SKAGIT RIVER, WASHINGTON - SUMMARY

( ) Draft (X) Final Environmental Statement

Responsible Office: U.S. Army Engineer District, Seattle, Washington

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: An improved levee system is proposed within the Skagit-Samish River Basin from the mouth of the Skagit River to the vicinity of Sedro Woolley, Washington. The plan involves levee improvements on the Skagit River downstream of Mount Vernon to provide a 50-year level of flood protection to the Skagit Delta farmland and new and improved levees upstream on the right bank to provide a 100-year level of protection for the urban areas of Sedro Woolley-Sterling, Burlington, Avon, and west Mount Vernon, and on the left bank to provide 100-year protection for Clear Lake and Standard Project Flood Protection for Mount Vernon. The Samish Valley overflow area will receive 50-year protection from Skagit River flooding and will be assured that no worse than existing conditions occurs at the 100-year flood level. In total, 39,600 acres will receive rural (50-year) protection and 14,200 acres will receive urban (100-year or more) protection. The length of the proposed project is approximately 50.4 miles, 5.6 miles of which turn away from the Skagit River and extend through farmland to form a levee around Burlington and along the Sedro Woolley-Sterling area on the right bank, and along the community of Clear Lake on the left bank. The proposal includes landscaping, habitat restoration, and fish and wildlife mitigation as project features and provides for the opportunity to incorporate future recreation development. Coupled with the structural aspects of the project are nonstructural features, such as floodproofing, relocation, and flowage easements, to be used in unleveed areas to provide general flood damage reduction and to minimize damage due to project-related induced flooding. The continuation of the existing flood plain management program by Skagit County is another important nonstructural aspect of the proposed project.

a. Environmental Impacts. Primary impacts associated with the project include flood damage reduction; permanent impacts to fish and wildlife as a result of habitat losses from vegetation clearing and placement of riprap in the stream course; temporary disruption to fish and wildlife during project construction; short-term impacts to air quality, water quality, noise, and traffic; relocations of residences and businesses; long-term visual impacts; and potential effects on cultural resources identified in the project alinement. Secondary impacts result from induced flood damages in areas not protected by the project and from the increased pressure to develop in flood plain areas protected by the proposed project.

b. Adverse Environmental Impacts. Adverse impacts will result from the permanent reduction in fish and wildlife habitat due to levee construction. Approximately 36 acres of deciduous forest and 5 acres of wetlands will be permanently lost. Twelve acres of deciduous scrub will be cleared. Approximately 2 acres will be revegetated with shrubs; some additional scrub habitat will establish naturally within 10 years. All

levee slopes above the ordinary high waterline and levee tops and berms will be grass seeded. A permanent loss of shore zone associated with the placement of riprap will occur along 3.3 miles of the project reach. A portion of deciduous forest and rearing habitat losses will be reestablished by mitigation features. Seventy-two residences and 22 buildings will be relocated due to project implementation (structural and nonstructural features); approximately 200 people will be displaced; and about 44 acres of prime farmland will be committed to the levee right-of-way. Induced damage estimated at an average annual amount of $11,000 may be incurred in south Sedro Woolley to a log storage area, the Burlington Northern railway, and State Highway 20. Secondary impacts will result to study area fish and wildlife and to prime farmland from an increased pressure to develop portions of the flood plain provided 100-year or more protection and, to a lesser extent, in areas provided 50-year protection. Permanent visual impact will occur from levee improvements. Temporary impacts, such as increased turbidity, noise, traffic congestion, and exhaust emissions will result in localized areas during the 4-year construction period.

3. Alternatives: Continue existing conditions; Authorized Levee and Channel Improvement Project; Levee and Channel Improvements and Urban Levees (Rural and Urban Levees A, B, C, D, E); Levee and Channel Improvements, Urban Levees and Upstream Storage; Levee and Channel Improvements, Urban Levees, and Avon Bypass; and Levee and Channel Improvements, Avon Bypass, and Upstream Storage; other measures (including Nonstructural and Channel Dredging).

4. Comments Received from Public Review of the Draft EIS and Addendum:

Advisory Council on Historic Preservation
Department of Transportation
    United States Coast Guard
Federal Energy Regulatory Commission
United States Department of Agriculture
    Forest Service, Region 6
    Soil Conservation Service
United States Department of Commerce
    National Oceanic and Atmospheric Administration
        National Ocean Survey
        National Marine Fisheries Service
United States Department of Housing and Urban Development
    Federal Emergency Management Agency
        Federal Insurance and Hazards Mitigation Division
United States Department of the Interior
    Office of the Secretary, Pacific Northwest Region
    Bureau of Land Management
United States Environmental Protection Agency
Washington State Department of Ecology
Washington State Parks and Recreation Commission
Washington State Department of Transportation
Washington State Department of Fisheries
Washington State Department of Game
Skagit Conservation District
Skagit System Cooperative

Nookachamps Valley Flood Defense Organization
Mr. Thomas Collins

5. Draft Statement Listed in Federal Register on: 11 May 1979.

Addendum to Draft EIS Distributed to Public on: 11 June 1979.

Final Statement Listed in Federal Register on:

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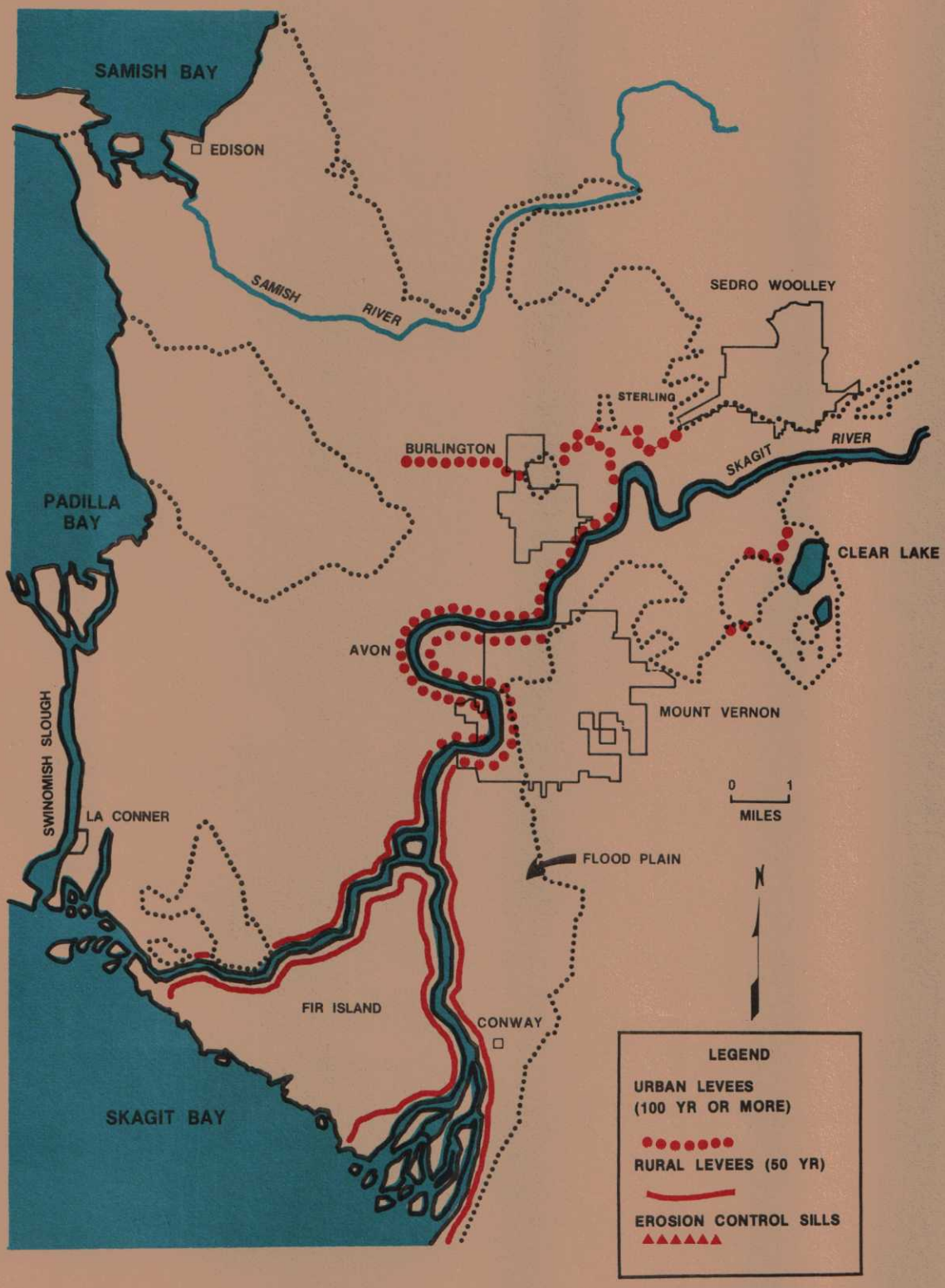
PREFACE

The Skagit River, Washington, Project, authorized in 1966 by Public Law 89-878, provided for levee and channel improvements from the mouth of the Skagit River to about 20 miles upstream. The result of those improvements would be the provision of approximately 10-year flood protection to the Skagit River Delta. The recommended plan, as discussed in this environmental impact statement, is the result of postauthorization reformulation studies and departs from the authorized project by increasing rural flood protection to 50 years; increasing urban protection to 100 years or more; extending protection upstream to about river mile 24, including provision for incorporating future recreation development; and providing nonstructural measures. Legislation regarding this project is currently under consideration by Congress.

Reformulation of the authorized project resulted from detailed review of the authorized plan, reexamination of the flood problem, consideration of alternatives, and extensive public and agency coordination. Technical data were developed through field investigations, topographic mapping, hydrologic and hydraulic studies, evaluation of flood damages, appraisals of property values within and adjacent to the flood plain, foundation and materials exploration, inventory of environmental base conditions, assessment of impacts, fish and wildlife studies, recreation studies, and detailed design investigations.

Skagit County has provided a letter indicating their willingness and capability to sponsor the project and provide the required items of local cooperation.

The total estimated cost of the recommended project is $55 million. The recommended project has annual benefits estimated at $6,565,000 and annual costs estimated at $4,397,000, resulting in a benefit-to-cost ratio of 1.5 at 6-7/8 percent interest rate.



SKAGIT RIVER, WASHINGTON

1. PROJECT DESCRIPTION

1.01 GENERAL. An improved levee system is proposed within the Skagit Samish River Basin from the mouth of the Skagit River to the vicinity of Sedro Woolley in western Washington. The general location is shown in figure 1-1.

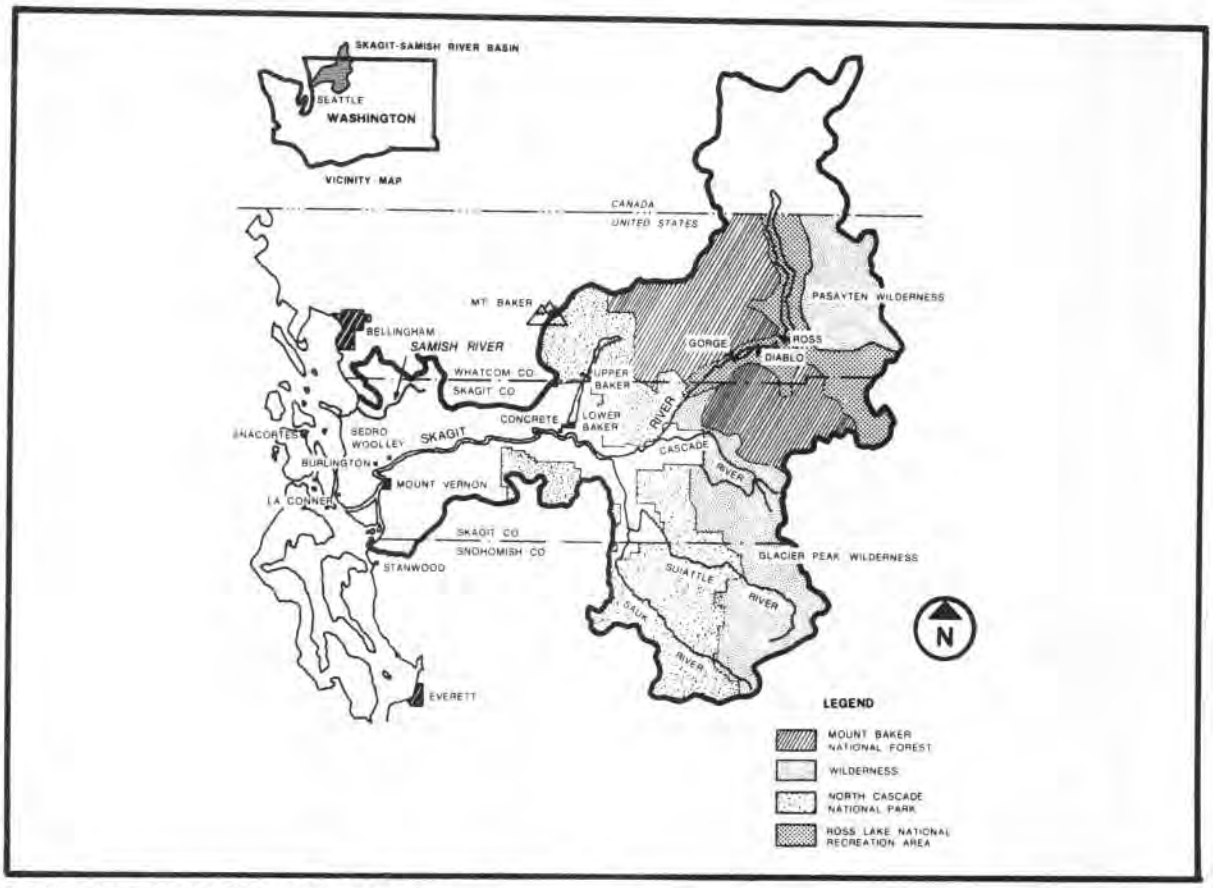


FIGURE 1-1. SKAGIT-SAMISH RIVER BASIN

The proposed project is designed to provide 100-year protection to the urban areas of Sedro Woolley-Sterling, Burlington, Avon, Clear Lake, and west Mount Vernon; Standard Project Flood protection to Mount Vernon; and 50-year protection to the farmland of the Skagit Delta and portions of the Samish Valley. Skagit County, the local sponsor, will maintain and operate the project.

1.02 PROJECT AUTHORIZATION. The Skagit River, Washington, Project was authorized by Section 203 of Public Law 89-878 dated 7 November 1966. This authorization provided for raising and strengthening about 34 miles of the existing levee system below Mount Vernon and widening three constricted reaches (about 3.4 miles) of the river's North and South Fork distributaries. These improvements would have provided the entire levee system a minimum capacity of 120,000 cubic feet per second (c.f.s.) to

protect against floods with an expected occurrence of about once in 8 years.

The proposed levee improvement plan departs from the authorized project in that the level of protection for authorized levees downstream of Mount Vernon is increased from about 10 years (with Baker Project) to 50 years; the upstream limit of levee protection is extended to Sedro Woolley to provide 100-year or more protection to the urban areas of Sedro Woolley-Sterling, Burlington, Avon, Clear Lake, west Mount Vernon, and Mount Vernon; nonstructural flood control measures are provided; and the provision for incorporating future recreation development is included. Legislation regarding this project is currently under consideration by Congress.

1.03 PROJECT COSTS AND BENEFITS. 1/ The following table provides a summary of project benefits and costs.

TABLE 1-1

Benefit-Cost Comparison
(October 1978 Prices)

Annual Benefits	Under Existing Conditions (October 1978)	Including Projected Future Growth (1983-2083)
Inundation Reduction Benefits	$5,455,000	$6,018,000
NED 1/ Nonstructural Benefits	73,000	73,000
NED Employment Benefits	394,000	394,000
Elimination of Flood-proofing Costs	-	80,000
Total Annual Benefits	$5,922,000	$6,565,000
Annual Costs		
Interest and Amortization 2/	$4,307,000	$4,307,000
Operation and Maintenance	90,000	90,000
Total Annual Costs	$4,397,000	$4,397,000
Benefit-to-Cost Ratio	1.3	1.5

1/National Economic Development (NED)
2/Based on 6-7/8 percent interest and 100-year period of economic analysis.

1.04 PROJECT PLAN. The proposed levee alinement is shown on plates 1 through 16. The location of nonstructural measures is shown on plates 17 and 18. Typical sections are displayed on plates 19 to 27. The plan involves improving the rural levees on the Skagit River downstream of

1/Summary economic data has been extracted from the Skagit River, Washington, General Design Memorandum. Additional economic information is available upon request from the Seattle District, Corps of Engineers.

Mount Vernon to provide a 50-year level of protection to the Skagit Delta farmland and provision for a 100-year level of protection for the urban areas of Sedro Woolley-Sterling, Burlington, Avon, and west Mount Vernon on the right bank and for the community of Clear Lake on the left bank; and Standard Project Flood (SPF) protection for Mount Vernon on the left bank. A combination of berms and erosion control sills is proposed at Sterling Hill to limit 100-year overflows to the Samish Valley to the same extent as under existing conditions and to provide a 50-year level of protection to the Samish overflow area from Skagit River flooding. Approximately 39,600 acres of land will be provided rural protection (50-year) and 14,200 acres of land will be provided urban protection (100-year or more). A total of about 50.4 miles of levee improvement and floodwall is proposed for construction (see plate 1).

URBAN LEVEES (100-YEAR OR MORE PROTECTION)

On the right bank of the Skagit River, a levee segment will extend from Sedro Woolley to Sterling (see plate 2). A buried sill between the proposed levee along District Line Road and Sterling Hill will prevent excessive erosion when floodwaters overflow to the Samish Valley (see plate 3). The District Line Road levee will protect the hospital and other structures east of the road. A closure structure will be placed where the levee crosses the Burlington Northern Railroad. Nonstructural measures will be provided south of the erosion sill in the area that will be exposed to increasd floodflow velocities and water surfaces due to the project.

Three levee segments in the Burlington area on the right bank will prevent overflow from entering Burlington from the east, north, and west (see plates 3, 4, and 5). Another buried sill will be placed at Sterling Hill. Along Gages Slough, the new levee will follow the existing levee until the Burlington Northern Railroad where the levee will block Gages Slough, cross the Burlington Northern Railroad, and State Highway 20. Drainage from Gages Slough will be redirected to the Skagit River via a new culvert under the existing levee and a new channel paralleling this levee. A structural railroad closure will be constructed where the levee crosses the Burlington Northern Railroad. Levees around Burlington are designed with overflow areas which will allow backflooding in flood events greater than 100 years and will prevent catastrophic failure upstream at Burlington.

The levee through the Avon reach on the right bank will generally follow the existing levee (see plates 6 and 7). The levee will continue around the bend to west Mount Vernon (see plate 8). Six acres of land riverward of Front Street will remain unleveed. Nonstructural flood control measures are proposed for this area.

Two levee segments will provide 100-year protection to the Clear Lake and Nookachamps Creek area (see plate 16). One segment is about 4,500 feet long and will extend southerly along the west side of Clear Lake. The second segment is about 240 feet long and will cross the East Fork Nookachamps Creek, forming a barrier to prevent flooding of Clear lake from the East Fork. This segment will include a concrete box culvert

structure consisting of two barrels 9 feet by 9 feet and one barrel 6 feet by 6 feet. The large barrels will have a flapgate and a positive closure sluice gate on the downstream end. The smaller barrel will have barn-door gates and a positive closure sluice gate (see plate 27). The design of this structure will be further coordinated with fisheries agencies during preparation of the feature design memorandum for the urban levees. Other areas of the Nookachamps will be protected by nonstructural measures.

The left bank urban levee will protect Mount Vernon from a Standard Project Flood (SPF). The levee will start at the Burlington Northern Bridge and generally coincide with the existing levee (see plate 6). The levee will continue past the Anacortes water treatment plant where special seepage control treatment will be given to several intake pipes which pass through the levee. Due to restricted space between the river and commercial development in Mount Vernon, floodwall construction will be required and will include a tilt-up section at Roadside Park and another at the Mount Vernon parking area (see plates 7 and 8). Downstream from this area, nonstructural measures will be utilized to protect the cannery warehouse and the Moose Hall where structural protection could not be justified.

For the lands that will remain unleveed by the proposed project, nonstructural measures will be used to provide general flood damage reduction and to minimize project-related induced flooding (see plates 17 and 18). Generally, residences will be floodproofed so that the first floor is 1 foot above the 100-year flood level, or they will be removed from the flood plain. All other buildings will be considered on a structure-by-structure basis for floodproofing to offset any significant detrimental effect caused by the project. Livestock mounds will be raised to 1 foot above the 50-year flood level, with space provided for the livestock, feed storage, and emergency milking. Also, flowage easements will be obtained for all land which, without the project, would not be flooded by the 100-year event but will be flooded because of the project. Nonstructural measures will be used at west Mount Vernon, east Mount Vernon, Nookachamps Creek, and Sterling-south Sedro Woolley. Studies indicate that 94 residences and 162 other buildings will be floodproofed; 34 residences and 27 trailers or modular homes will be removed from the flood plain; the Sedro Woolley sewage treatment plant will be floodproofed; and flowage easements on 140 acres will be necessary. A detailed study of each structure and property ownership will be necessary during further studies of the upstream portion of the project.

RURAL LEVEES (50-YEAR PROTECTION)

Rural levees on the right bank will begin at the terminus of the urban levees below west Mount Vernon and will generally follow the existing levee alinement along the main stem to the divergence of the North and South Forks and then along the right bank of the North Fork (see plates 8 through 11). Increased heights of right bank rural levees over existing levees will range between 3 and 5 feet. About 6,300 lineal feet of riverward levee slope will be protected with riprap.

Rural levees on the left bank will begin at the terminus of urban levees below Mount Vernon and will follow the existing levee alinement along the main stem to the divergence of the North and South Forks and then will continue along the South Fork to Tom Moore Slough, where they will follow along the left bank (see plates 8 through 15). Increased heights of left bank rural levees over existing levees will range between 4 and 8 feet. About 1,500 lineal feet of riverward levee slopes will require riprap protection. There are several special features that will be required for the left bank levee, particularly in the area of Fisher Slough and Carpenter Creek. About 400 feet of Fisher Slough will have to be realined to allow construction of the improved levee. Construction of a drainage structure across Fisher Slough will be necessary just west of the Burlington Northern Railroad bridge near the mouth to replace the existing wooden drainage gates on the highway bridge just east of the railroad. This structure will consist of a manually operated slide gate and two vertically hinged tide gates. Special design criteria for fisheries have been incorporated to provide for adequate fish passage through this structure. A closure structure for a railroad spur will also be required near this location.

The rural levees on Fir Island begin at the divergence of the North and South Forks at the upstream end of the island and extend down the left and right banks of the North and South Forks, respectively (see plates 9 through 13). Levee improvements along the South Fork will begin at the divergence and parallel the right bank of the South Fork to Freshwater Slough, then continue along Freshwater Slough to Wiley Slough, and end at an intersection with the existing sea dike. Levee improvements on Fir Island along the North Fork will generally parallel existing levees to an intersection with the sea dike. Increased levee heights on Fir Island will average between 4 and 6 feet with increases to 9 feet in limited areas. Levee design at Phil's Boathouse and Resort facility on the left bank of the North Fork will create minimum impact on existing facilities to allow operation in the future to continue as it has in the past. Approximately 18,700 lineal feet of riverward levee slope will be protected with riprap.

OTHER DESIGN FEATURES

Throughout the project, openings will occur where railroads, roadways, or other access ways are required in either the earthen embankments or floodwalls. Special temporary closure structures will be provided for three locations where a railroad and the levee cross (see plates 2, 3, and 14). During high flows, roadway crossings will be sandbagged if necessary. Access openings through floodwalls will be bulkheaded or have tilt-up walls for closure.

The proposed levee is designed with predetermined overflow areas to avoid catastrophic levee failures and to allow the system to operate through the full range of flows up to the Standard Project Flood. Under design conditions, as water rises, unleveed lands in the Nookachamps area and the right bank areas of Sedro Woolley, Sterling, and Mount

Vernon will begin to flood. When flows exceed the 50-year event, the Samish Valley will begin to receive an overflow from the Skagit River with flows going on both sides of Sterling Hill. Also, overflow will occur in three areas (left bank of South Fork, Fir Island, and right bank of North Fork) at the divergence of the North and South Forks. As flows increase past the 100-year event, overtopping will begin at Avon Bend near the downstream end of Gages Slough and will progress upstream (but not reach the I-5 bridge). Concurrent with the overtopping at the Avon-Gages Slough area, overtopping will also occur along the District Line Road and backflood into west Sedro Woolley. As backflooding into Burlington occurs from the downstream and riverflows rise toward the SPF level, two areas just upstream of the Burlington Northern Railroad bridge will be overtopped. This sequence will prevent possible levee failure upstream of Burlington which, if it occurred without back-flooding, would create a catastrophic effect through Burlington. Also, overtopping with resulting breach and discharge from the system keeps water surfaces below the several bridges over the Skagit River. A combination of raising the levee 0.4 foot and release of water from the channel's right bank is the means by which SPF protection is provided to Mount Vernon along the left bank.

1.04.1 GENERAL LEVEE DESIGN. Basic levee design features are shown in figure 1-2.

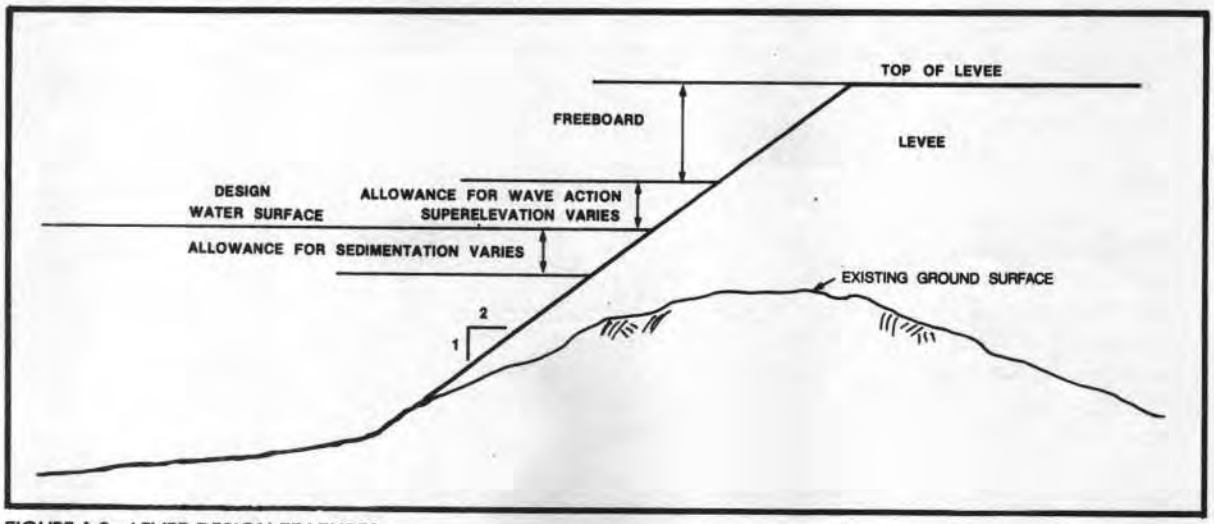


FIGURE 1-2. LEVEE DESIGN FEATURES

For the Skagit levees, design water surface is the 50-year flood event for the rural levees and the 100-year or more flood event for the urban levees. The standard levee top will be 12 feet wide; side slopes are typically 1 vertical on 2 horizontal. Varying increments up to approximately 2 feet are included in the design water surface to allow for sedimentation during the 100-year economic life of the project. Another increment up to 2 feet of allowance is added to the design water surface for wave action and superelevation at required locations. Two and 3 feet of freeboard are added as a design safety feature in the rural and urban areas, respectively.

The levee embankment will be constructed of silty, sandy gravel or silty, gravelly sand placed on ground which has been cleared, grubbed, and stripped as required. Maximum use will be made of embankment materials from existing levees along the project reach. Figure 1-3 shows the basic design of an earthen embankment.

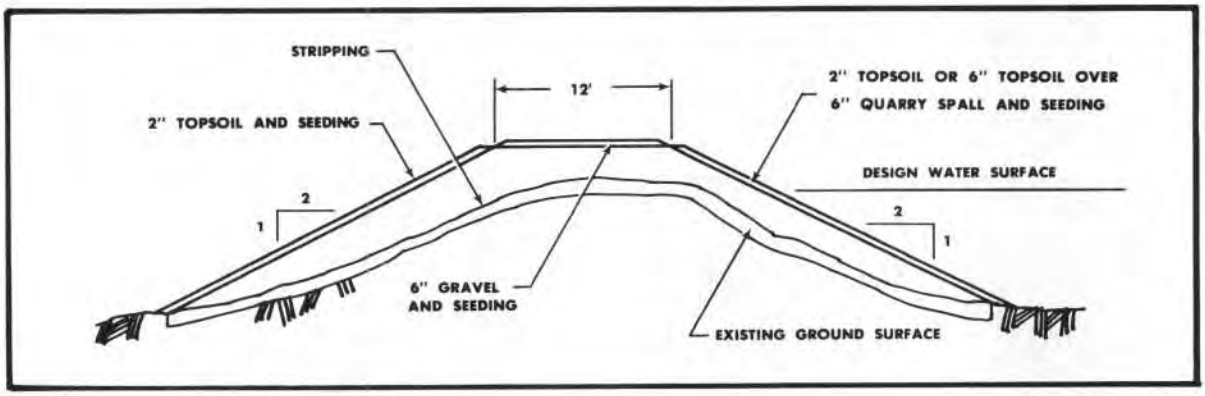


FIGURE 1-3. EARTHEN EMBANKMENT

Photo 1-1. View of existing levees on right bank Freshwater Slough, South Fork. Figure 1-3 is typical of levee improvements to be made.

For erosion control, quarry spalls and seeding will be added to the riverward side of approximately 7 miles of the project. A 12-foot gravel berm on the landward levee side is necessary in many reaches of the project to control water seepage under the levee and prevent loss of levee integrity.1/ This gravel berm will also serve as an access road for floodfighting and levee maintenance purposes. The basic design of this type of levee is shown in figure 1-4.

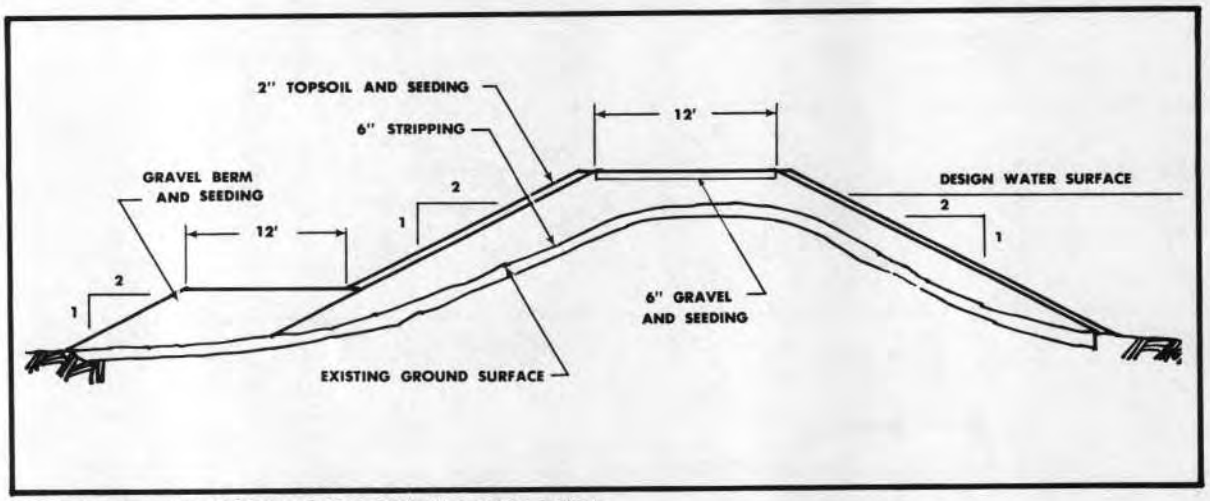


FIGURE 1-4. EARTHEN EMBANKMENT WITH GRAVEL BERM

Photo 1-2. View of existing levees on left bank of Tom Moore Slough, South Fork. Figure 1-4 is typical of the levee improvements to be made.

1/In addition to gravel berms, other measures, such as sheet-pile cutoffs and semi-impervious filled, cutoff trenches, will be utilized to control seepage in certain specific locations.

To provide a high level of erosion control where levees will be subject to high-water velocities, wind waves, and debris attack, rock riprap will be placed along approximately 8.5 miles of the total 50.4-mile project length. In cases where a sufficiently wide bench is available between the levee and the river, a buried toe levee design will be utilized as shown in figure 1-5.

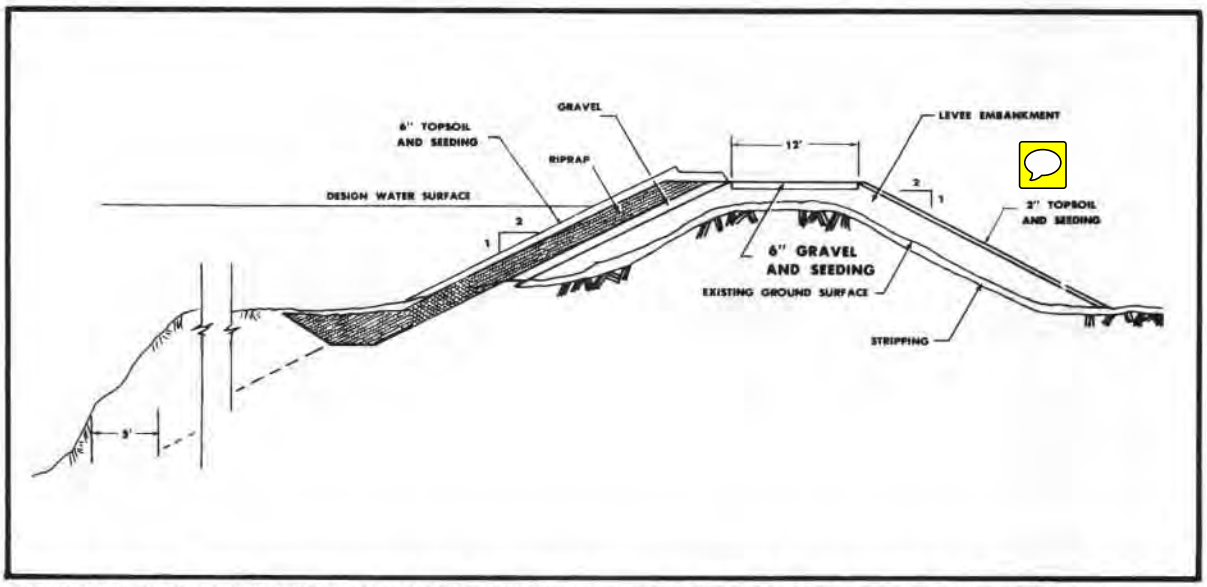


FIGURE 1-5. EARTHEN EMBANKMENT WITH RIPRAP ON RIVERWARD SIDE AND BURIED TOE IN RIVERBANK

In cases where encroachment into the river is unavoidable, a weighted toe levee design will be utilized as shown in figure 1-6.

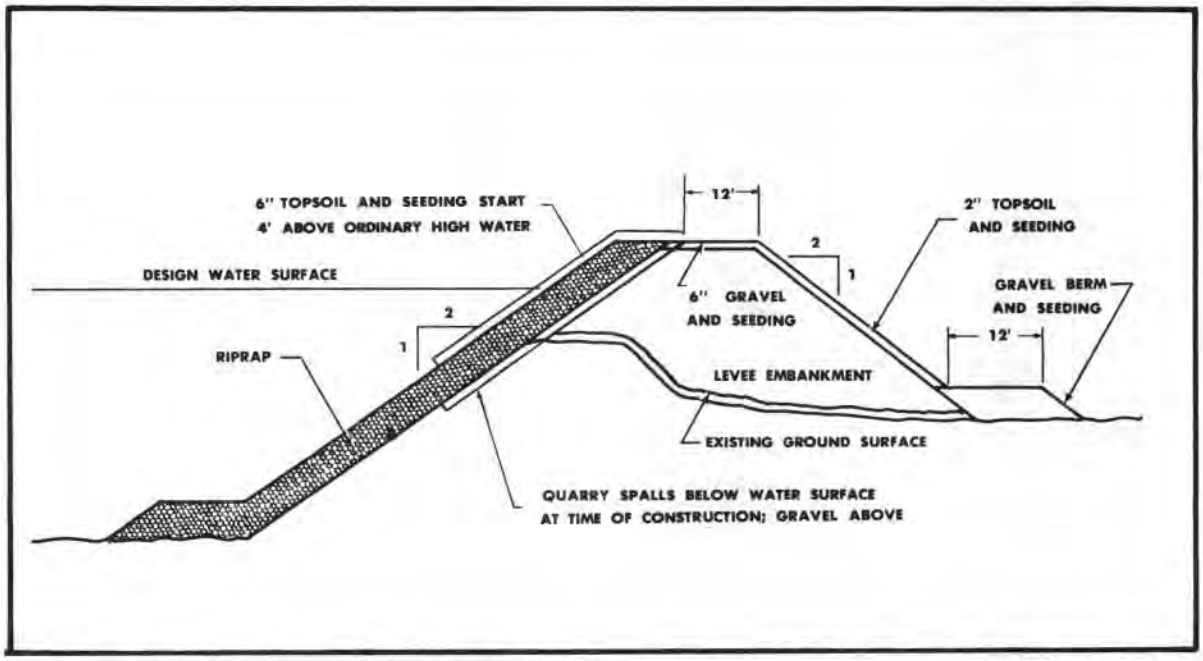
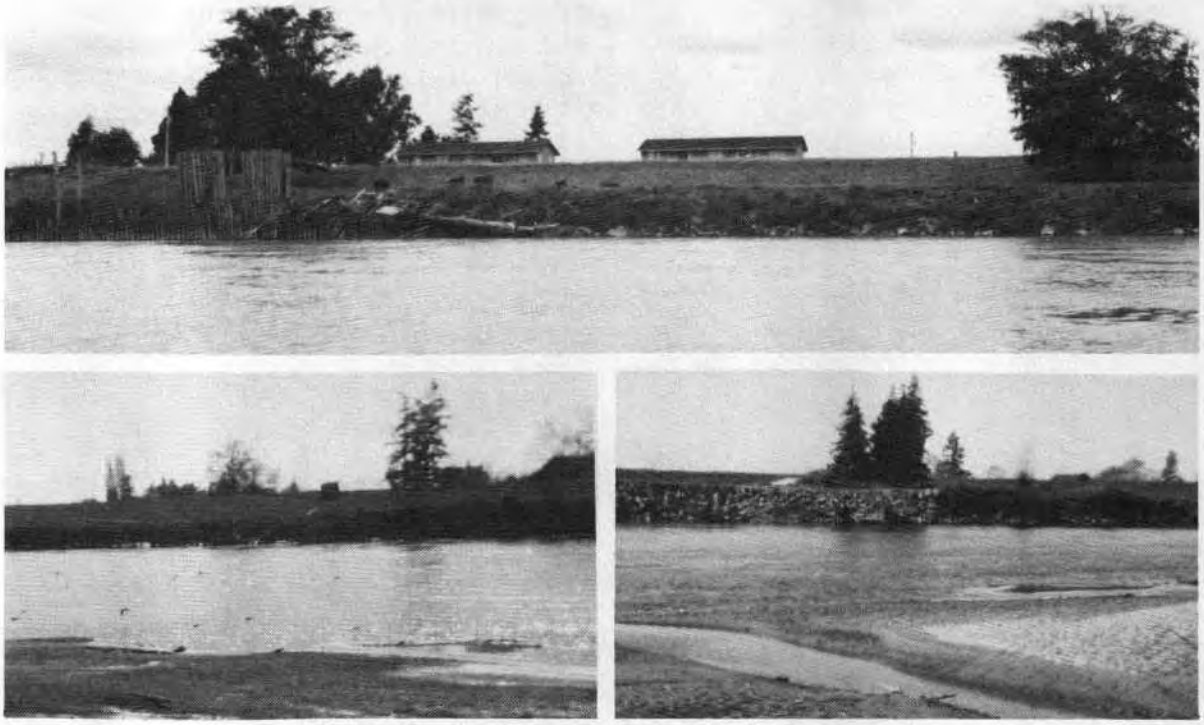


FIGURE 1-6. EARTHEN EMBANKMENT WITH RIPRAP ON RIVERWARD SIDE AND WEIGHTED TOE ON RIVER BOTTOM



Photos 1-3. Views of right bank of Avon Bend on the main stem Skagit River. Figures 1-5 and 1-6 are typical of the levee improvements to be made.

On the left bank of the river through Mount Vernon, where right-of-way through the urban area is limited, a floodwall will be constructed instead of a levee. This will occur along approximately 1.4 miles of the total project. For bank protection in this reach, rock riprap with a weighted levee toe will be placed in the river. The basic levee design is shown in figure 1-7.

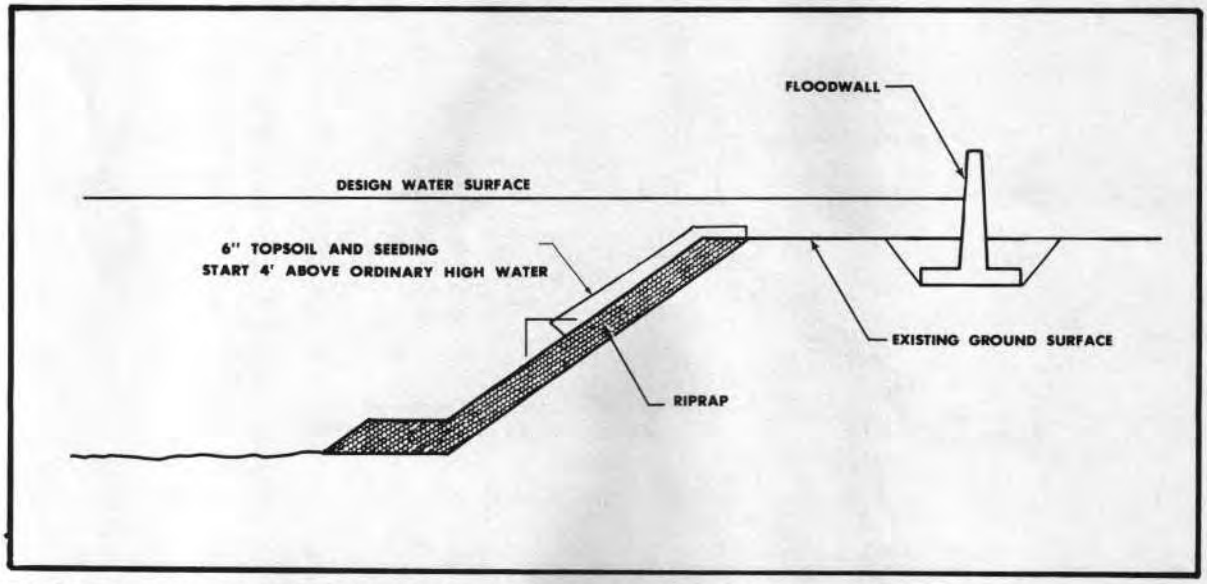


FIGURE 1-7. FLOODWALL WITH RIPRAP ON RIVERBANK AND WEIGHTED TOE ON RIVER BOTTOM

Photo 1-4. View of left bank, Skagit River, through Mount Vernon, looking at the overhanging revetment parking lot. In this particular reach, an aggregate concrete blanket will be utilized under the parking lot rather than rock riprap. A weighted riprap toe will be provided, and a floodwall will be constructed through the parking lot, as illustrated in figure 1-7.

A summary of levee types and lengths throughout the project reach is provided in table 1-2.

TABLE 1-2

Summary of Levee Types and Lengths 1/

Description of Levee Type	Length of Project Levees 2/ Urban	Rural	Total Lineal Feet	Miles	% of Total Project
Earthen Embankment (along river)	27,710	122,610	150,320	28.4	56
Earthen Embankment (off river) 3/	29,570	---	29,570	5.6	11
Earthen Embankment with Spalls	17,260	14,420	31,680	6.0	12
Buried Toe Design	19,770	7,690	27,460	5.2	10
Weighted Toe Design	10,880	6,420	17,300	3.3	7
Floodwall	7,270	70	7,340	1.4	3
Erosion Control Sill	2,500	---	2,500	.5	1
TOTAL	114,960	151,210	266,170	50.4	100

1/Of the approximate 50 miles, 47.1 will be set back from the river's edge; 3.3 miles will encroach into the river.

2/Urban levees provide 100-year or more protection and are displayed on plates 1 through 8 and 16. Rural levees provide 50-year protection and are displayed on plates 8 through 15.

3/Off-river levees around Burlington; along Sterling-west Sedro Woolley; and at Clear Lake.

Specifics of the levee design and project alinement are displayed on plates 1 through 27 of this environmental statement.

1.04.2 LANDSCAPING Landscaping features, including plantings and

signing, will be provided where levees parallel major highways, where public roadways cross the levee, and at public access points. Planting will include native and ornamental shade trees, shrubs, and ground cover. Plant groupings will be confined to mulched beds to minimize turf mowing requirements along the levee slopes. Overbuilding will be incorporated at planting areas adjacent to levee slopes to accommodate a minimum 3-foot root-free zone. Special landscaping features will be included within the revetment parking area in the Mount Vernon central business district and within Roadside Park in north Mount Vernon. These features include rock gardens in the parking area and plantings at Roadside Park. Tilt-up floodwalls will be provided in both locations as a project feature to maintain existing views and park activities. Landscaping locations are shown in figure 4-3 and on plates 2 through 16. A typical section of the tilt-up floodwall is shown on plate 22.

1.04.3 RECREATION. The proposed project does not include development of recreation facilities nor does it specifically identify future development. However, Skagit County continues to increase in population, and, as the demand for river-oriented recreation areas expands, recreation programs may utilize sites within the project area. The local sponsor recognizes the need for additional river-oriented recreation development but has higher priority recreation needs to satisfy with limited funds. For that reason, the local sponsor wishes to hold in abeyance plans for developing river-oriented recreation facilities until some time in the near future after some of the higher priority recreation needs are satisfied.

1.04.4 HABITAT RESTORATION. Special habitat restoration features have been incorporated into the project plan to minimize adverse environmental impacts associated with loss of habitat due to project construction. To accelerate the reestablishment of vegetation following project construction, all levee tops and berms will be seeded with native grass species. Stripped material stockpiled during levee construction will be placed on all riprap and quarry spall slopes above ordinary high water[1/] and grass seeded. Buried levee toes will be backfilled with excavated material and grass seeded. Typical sections of these restoration features are shown on plates 9 through 12 and 20 through 27.

In certain reaches of the project where immediate restoration of shrub habitat has been identified as critical to the project area fish and wildlife, revegetation with shrubs, in addition to grass seeding, is proposed. These areas are listed in table 1-3 and depicted on plates 7, 10, 11, and 12.

1/Represents normal line of vegetation.

TABLE 1-3

Areas Recommended for Shrub Habitat Restoration

Location	Length (feet)
North Fork, Left Bank, Stations 227-241	1,400
North Fork, Left Bank, Stations 125-140	1,500
North Fork, Right Bank, Stations 818-829	1,050
South Fork, Right Bank, Stations 142-147	500
Main Stem, Right Bank, Stations 570-600	3,000
TOTAL	7,450

The riprap blanket will be thickened and the rock sizes increased in reaches for shrub plantings in order to assure that the vegetation, when established, will not vibrate riprap and weaken levee protection. The program of revegetation will consist of placing topsoil over the riprap and into the voids and grass seeding, followed by the planting of a 4-foot zone of shrub species above ordinary high water. Species considered acceptable in terms of levee integrity and wildlife values will be determined through coordination among the Seattle District, Corps of Engineers; the U.S. Fish and Wildlife Service; and the Washington State Department of Game. Some suggested species are provided in table 1-4.

TABLE 1-4

Shrub Species Recommended for Habitat Restoration

Common Name	Scientific Name
Honeysuckle	Lonicera spp.
Salal	Gaultheria shallon
Red Elderberry	Sambucus callicarpa
Red Osier Dogwood	Cornus stolonifera
Native Willows	Salix spp.
Snowberry	Symphoricarpus albus
Wild Rose	Rosa spp
Spirea	Spiraea spp.

Planting will be in randomly arranged planting groups distributed over approximately 1.7 acres along 7,450 feet (1.4 miles) of river edge. Planting density will be approximately 2,500 plants per acre. Coordination will be ongoing with resource agencies during the further development and the implementation of the restoration program.

Restoration planting is also planned for the 400-foot reach of Fisher Slough that will be realined. Planting will occur on approximately 0.2 acre of the right bank and will consist of native species existing there at the time of realinement. A typical section is shown on plate 14.

1/Compilation of lists provided by Seattle District, Corps of Engineers, and the U.S. Fish and Wildlife Service, 1979.

On each side of the levee right-of-way (except where the levee encroaches into the river), an easement of 10 feet minimum width will be required to provide additional access where needed for construction of the levees, including areas for stockpiling stripped material for use as topsoil. As part of the construction contract, the contractor will be required to restore easements to preproject conditions to the extent possible.

In addition to habitat restoration where losses are unavoidable, river-edge vegetation will be preserved by adjustments in levee alinements as discussed in paragraph 4.06.2.1.

1.04.5 FISH AND WILDLIFE MITIGATION. Mitigation is proposed to reduce impacts resulting from the project-related losses of shore zone and of overstory vegetation. The proposed location of the mitigation program is the Skagit Wildlife Recreation Area (WRA), which is currently owned and operated by the Washington State Department of Game. No land acquisition will be required for mitigation measures.

Mitigation for the loss of shallow rearing habitat for juvenile anadromous fish will be provided by reopening a slough on No Name Island on the Skagit WRA between Steamboat and Freshwater Sloughs. This involves the placement of two culverts, one at each end of the 2,500-foot slough to permit freshwater in from the Skagit River. This feature will result in immediate mitigation for a portion of the losses associated with project construction and riprap placement in the shore zone. Management will be accomplished by the Washington State Department of Game in coordination with the Washington Department of Fisheries.

Offsite planting is recommended to mitigate for the loss of approximately 10 acres of overstory vegetation which will be permanently lost along the river due to levee right-of-way and maintenance requirements. The plan consists of planting zones of deciduous forest on currently disturbed sites within the Skagit WRA. One site involves improving the existing levee on Freshwater Slough to approximately 10-year protection, sufficient to maintain the planting of a zone of overstory vegetation along the inside of the levee. A second zone of vegetation will be planted on Milltown Island along the river's edge. Other sites may be identified in continued coordination with the resource agencies. Total acreage planted will be 10 acres. An agreement will be established between the local sponsor and the Washington State Department of Game regarding commitment of this acreage to fish and wildlife purposes for the life of the project.

Recommended planting density for the 10 acres is 500 plants per acre.[1/] Species planted will be coordinated with the U.S. Fish and Wildlife Service and Washington State Department of Game to insure maximum wildlife value. Suggested species include crabapple (Malus

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1/U.S. Fish and Wildlife Report, Skagit River Project, April 1979.

diversifolia), hawthorn (Crataegus douglasii), hazel (Corylus cornuta californica), and western red cedar (Thuja plicata). Planting will involve a mixture of these species and faster growing, shorter lived native species such as alder (Alnus spp.), willow (Salix spp.), and cottonwood (Populus spp.).1/Although these species are of lesser value to wildlife, they are faster growing and will provide some habitat replacement in 5-10 years, while the slower growing, higher valued species will require 10-20 years to become established. Planting should be accomplished prior to or at the initiation of the construction period to provide some habitat for those species displaced by project construction.

The location and construction details of the proposed mitigation plan are shown on plates 13 and 14. Further development and implementation of the mitigation program will be accomplished through coordination with the resource agencies.

1.04.6 LANDS AND RELOCATIONS. Approximately 474 acres of land will be required for the project right-of-way.2/ Necessary relocations are summarized in table 1-5.

TABLE 1-5

Relocations Required by the Proposed Action

Location	Roads (miles)	Buildings	Residences
Structural Measures			
Rural Levees	4.7	14	7 1/
Urban Levees	6.3	8	4
Nonstructural Measures	---	---	61
TOTALS	11.0	22	72

1/Includes 2 cabins and 2 abandoned homes.

1.05 BORROW SOURCES. Potential borrow sources for semi-impervious fill, gravel fill, and riprap are existing sites and quarries owned privately or owned by Skagit County. These sources are all within an 8-mile radius of Mount Vernon. Their general locations are shown in figure 1-8.

All necessary borrow materials will be trucked to the project site from the borrow sources. The proposed semi-impervious materials are near optimum moisture content in the pit, so it will be important during construction not to have stockpiles of materials exposed to rainfall or they will become too wet for placement. Sampling and testing of all borrow materials will be conducted during preparation of construction plans and specifications.

1/U.S. Fish and Wildlife Report, Skagit River Project, April 1979.

2/474 acres includes 356 acres of vegetation stripping and clearing and 118 acres of public road right-of-way. An additional 138 acres will be obtained as temporary construction easement; although, not all of this easement will necessarily be utilized by the construction contractor.

Topsoil will be obtained from stripped and stockpiled surface material from the project right-of-way.

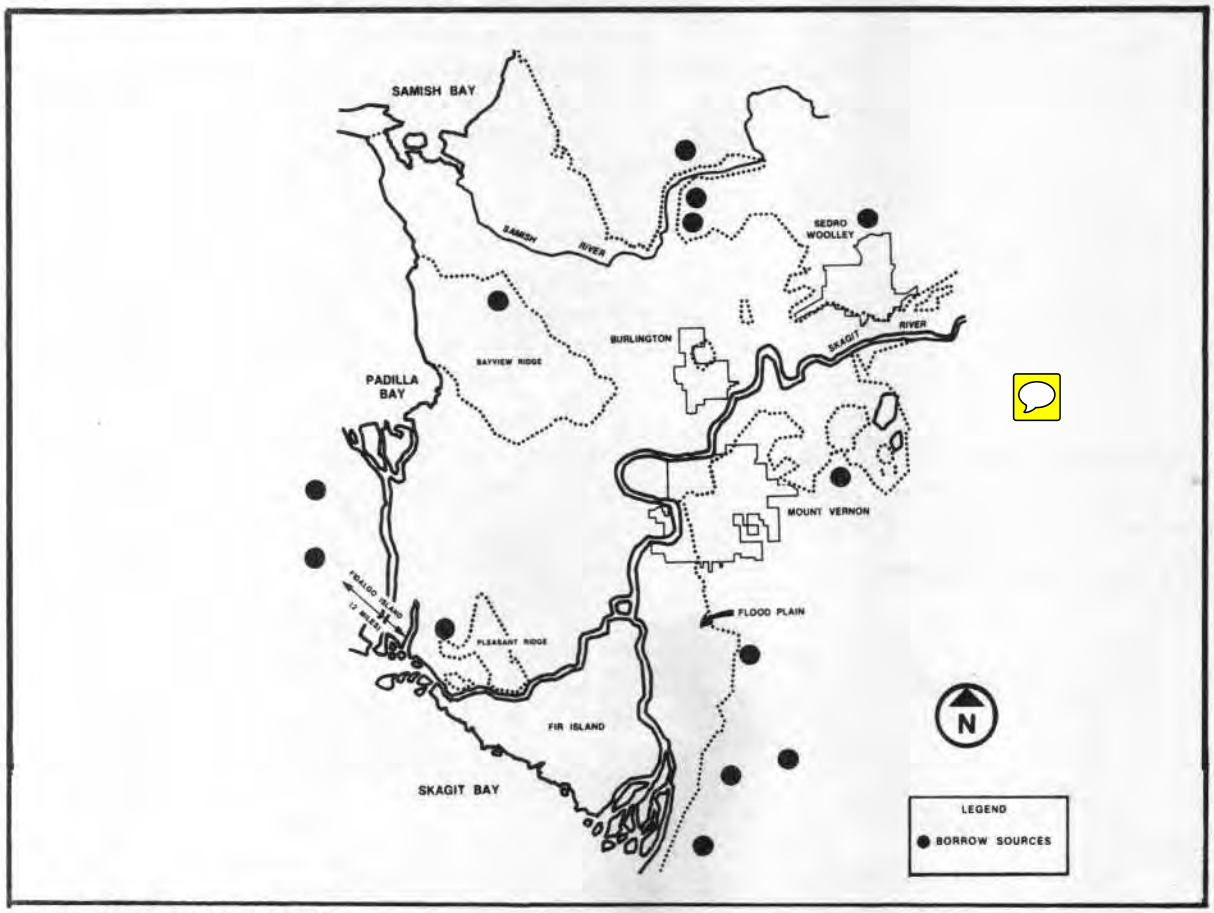

FIGURE 1-8. BORROW SOURCES

1.06 STOCKPILING AND STAGING AREAS. Easements for stockpiling and staging areas will be obtained by the construction contractor as necessary during project construction. The contractor will be required to restore these areas to preproject conditions following their use.

1.07 CONSTRUCTION SCHEDULE. The schedule for the Skagit River project calls for a 4-year construction period, with construction of the rural levees downstream of Mount Vernon beginning in the summer of 1980 and construction of the urban levees beginning in 1981. Both of these construction starts are subject to congressional funding. Nonstructural flood reduction measures will be accomplished prior to completion of the urban levee segments that would cause higher water surfaces in the unleveed areas during large flood events. Construction within the river will be limited to the July-to-February period to avoid disruption of the peak migration period for juvenile anadromous species. Embankment construction will be accomplished primarily during dry weather (May through September) to insure proper moisture control for compaction of semipervious fill materials. Construction activities within the Skagit Wildlife Recreation Area will be coordinated to avoid major disruption

to the various uses of that area by the Washington State Department of Game. Any necessary planting associated with the project will be accomplished early in the growing season to allow maximum time for establishment prior to the winter flood season (November through February).

1.08 OPERATION AND MAINTENANCE. Operations prior to and during floods consist of erecting the floodwall, operating closure structures as required, patrolling the levees, and providing the emergency stoplog and sandbag closures. Maintenance includes mechanical mowing of the embankment top and side slopes; periodic inspection of the levees; repair as necessary, including correcting damage from animals; maintenance of drainage and closure structures; maintenance of levees to designed elevation; and the maintenance of landscaping features as required. Project operation and maintenance (O&M) will be accomplished by the local sponsor in accordance with an O&M manual to be prepared by the Corps of Engineers. Among the items prescribed in this manual will be the operation of temporary closures and the tilt-up floodwall, including when to erect it, which will be tied to upstream gage readings. Stoplogs for closing access openings in the standard floodwall segments through Mount Vernon will be stored in city shops. Braces and gaskets used to keep tilt-up floodwall panels in place when raised will be stored under the lowered floodwall. Placement of the floodwall and stoplogs will require approximately 4 to 6 hours and will involve the use of cranes. Estimates of impending peak floodflows and anticipated times of occurrence are prepared by the National Weather Service River Forecast Center in Portland, Oregon, and are disseminated as part of a flood-warning system to the county and city officials and news media. At least 24 hours advance warning of peak winter flows is possible.

Habitat restoration features of the O&M manual will be coordinated with resource agencies. Generally, the preservation of restoration plant species will be required except where excessive growth occurs (i.e., over 6 feet in height and 1-1/2 inches in stem diameter). Denuding levee slopes by the use of chemical herbicides will be an unacceptable maintenance practice. Further, the local sponsor will be required to obtain any necessary permits/certifications prior to any maintenance work in the stream course.

As part of the items of local cooperation for the proposed project, Skagit County will be required to maintain and operate the project after construction; to at least annually inform flood plain occupants regarding the limitations of the protection afforded by the project; and to publicize flood plain management information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the flood plain and in adopting regulations that may be necessary to insure compatibility between future development and protection provided by the project.

2. ENVIRONMENTAL SETTING WITHOUT THE PROJECT

2.01 INTRODUCTION. The study area for the Skagit River Levee Project consists of the standard project flood plain[1/] for the Skagit River as shown in figure 2-1. The total size of this area is approximately 74,000 acres, and it lies almost entirely within Skagit County, with relatively few acres in Snohomish County at the project terminus on the South Fork. The project area, also shown on figure 2-1, consists of the Skagit River from its mouths to Sedro Woolley. The total length of levees in this reach is approximately 45 miles, including the North Fork, South Fork, and the main stem to Sedro Woolley. The proposed project involves approximately 50.4 miles of levees, 5.6 miles of which diverge from the Skagit River to provide protection to Sedro Woolley - Sterling and Burlington on the right bank and to Clear Lake on the left bank.

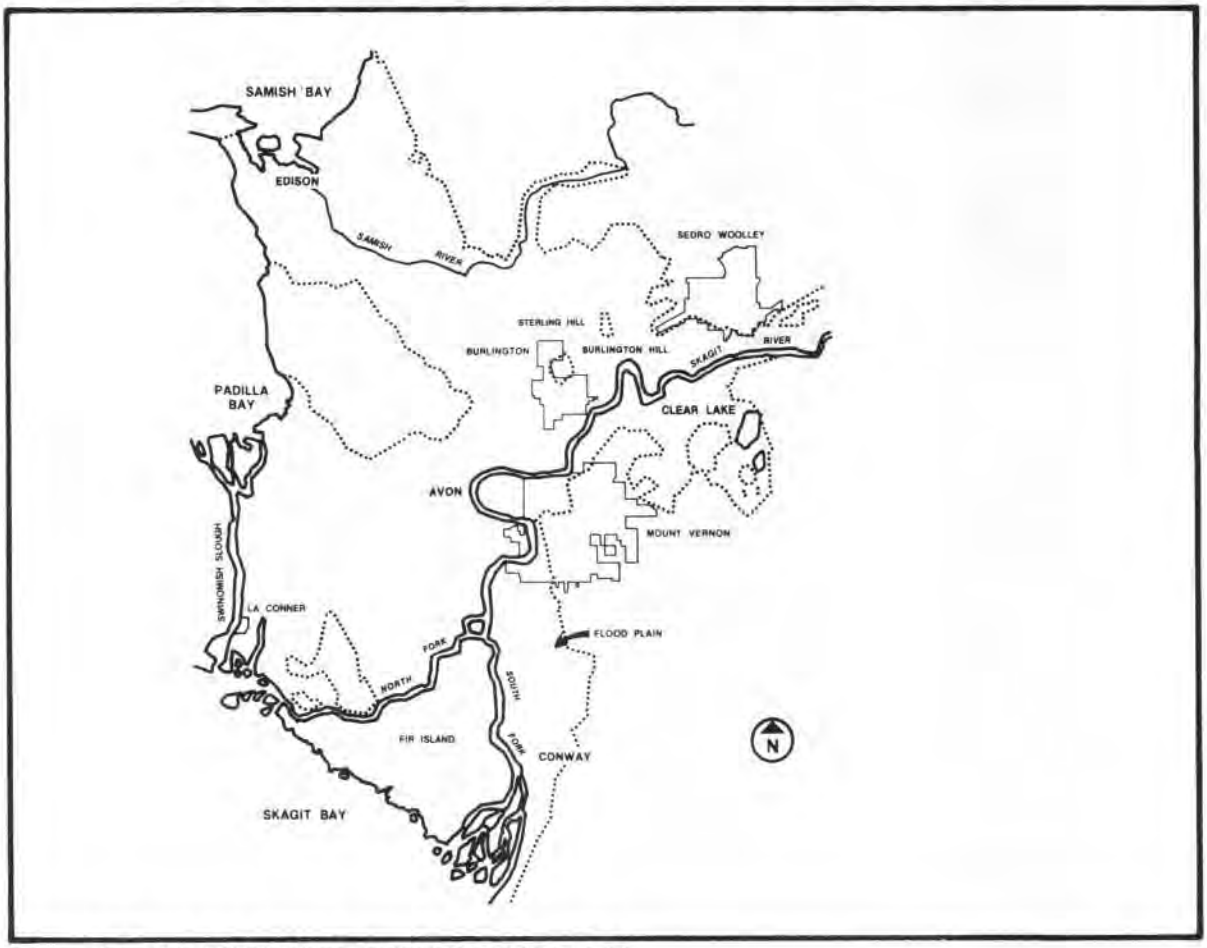

FIGURE 2-1. THE SKAGIT RIVER STUDY AND PROJECT AREA

1/Standard Project Flood (SPF): The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations.

Photo 2-1. View of the Skagit River Delta looking north. The city of Mount Vernon is in the foreground.

The following discussion of the environmental setting is divided into a general description of the study area, with major emphasis on the Skagit River system, followed by a more specific discussion of the significant features of the project area. The purpose of the chapter is to provide a basis for use in assessing the primary and secondary socioeconomic and natural environmental impacts that will result from implementation of the proposed project.

THE STUDY AREA

2.02 PHYSICAL FEATURES OF THE STUDY AREA.

2.02.1 TOPOGRAPHY. The Skagit River Basin is located in the northwest corner of the State of Washington and encompasses a total drainage area of 3,140 square miles. The Skagit River originates in a network of narrow, precipitous mountain canyons in Canada and flows west and south into the United States where it continues 135 miles to Puget Sound. The crest of the Cascades forms the eastern boundary of the basin with altitudes ranging to over 8,000 feet. From the Cascades, the river flows through gorges of glacier peaks to lower mountains, where its banks are

heavily wooded with conifers, then meanders around island stands of cottonwoods and alders and expands into the farm delta of the Skagit Valley. The valley varies in width from less than 1 mile in upper reaches to about 2 miles at Sedro Woolley and then to the broad delta outwash plain which is more than 15 miles wide. In the lower 9-1/2 miles of the river, it divides into two principal distributaries of nearly equal length. During the usual range of river discharge, about 60 percent of the flow is carried by the North Fork and 40 percent by the South Fork.

The entire floor of the Skagit River Valley and the deltas of the Samish and Skagit Rivers comprise the flood plain. The major portion of the flood plain within the study area is developed farmsteads; the remainder is mostly uncleared bottom land and wetlands.

2.02.2 GEOLOGY. The study area was glaciated during the Pleistocene[1/] by a lobe of continental ice moving south from Canada. It rounded nearby bedrock knobs and ridges and left behind a varying sequence of glacial deposits. Since the deglaciation, the Skagit River has built a broad delta alluvial plain covering older hills of bedrock and glacial drift in a thick deposit of alluvial silt, fine sand. and clay. Though the Skagit River now exists in the southern portion of the delta alluvial plain, prehistoric exits into Samish and Padilla Bays are evident from present topography. The plain is generally 10 to 20 feet above the mean sea level. Ground water levels are close to the surface. Beds of gravel are centered around the Mount Vernon-Burlington area, close to one of the older hills, which protrude through the plain. Because of man's attempt to control the river, the deposition by the river of silt, sand, and debris onto the delta alluvial flood plain at high-flow stages has been greatly reduced, with resultant increased deposition on the channel bottom and more rapid extension of the active delta into Skagit Bay.

2.02.3 CLIMATE. The study area has a mild, wet, maritime climate caused by air masses originating over the Pacific Ocean which influence both the temperature and precipitation regimes. During the winter, the Skagit Basin, lying directly in the storm path of cyclonic disturbances from the Pacific, is subject to a definite rainy season, with numerous storms often in quick succession. During the short summers, the weather is warm and relatively dry as the winter low pressure system is displaced by a semipermanent high pressure system. The mean length of the growing season is 193 days.

Precipitation over the basin varies greatly from a mean annual amount of 40 inches or less in the vicinity of the mouth of the Skagit River and that portion of the basin in Canada which lies in a topographical rain shadow, to an average of 180 inches or more on the higher elevations of the Cascade Range. Mean annual snowfall varies from 5.6 inches at Anacortes to 525 inches at Mount Baker lodge. Mean annual temperatures for

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1/Pleistocene Epoch is approximately 2.5 million years ago.

weather stations in or near the basin vary from 40.1°F at Mount Baker lodge (4,150 feet) to 51.5°F at the town of Concrete.

2.02.4 FLOOD CHARACTERISTICS. Because of its geographic location, the Skagit River Basin is subject to winter rain floods and an annual high water due to snowmelt runoff. The annual high water during the spring or early summer is caused by melting of the accumulated snowpack as a result of a seasonal rise in temperatures. The spring snowmelt is characterized by its relatively slow rise and long duration. While high water from snowmelt occurs annually, it has never reached a damaging stage. During the annual spring or early summer high water, power reservoirs are filling, and the spring peak discharges are frequently reduced.

Rain-type floods occur usually in November or December, but may occur as early as October or as late as February. Frequently, in the winter, a light snowpack is formed over most of the entire basin. A heavy rainfall accompanied by warm winds completes the sequence which produces major floods. The heavy rainfall and accompanying snowmelt result in a high rate of runoff, as the ground is already nearly saturated from earlier precipitation. All major floods of record on the Skagit River have occurred during the period November through February and have been caused by high rates of precipitation with accompanying snowmelt.

2.03 SOCIOECONOMIC FEATURES OF THE STUDY AREA. The socioeconomic profile focuses on the economic activity of Skagit County.

2.03.1 LAND USE. About three-fourths of the 1,110,000 acres in Skagit County is timberland, mostly classified as commercial. Of the remaining land area, approximately 111,000 acres are farmland, 9,000 acres are in urban use, and 111,000 acres are alpine areas. The bottom lands of the study area, composed of rich river silt deposited over many centuries, provide some of the best farmland in the nation. Farmland in the flood plain is classified by the U.S. Department of Agriculture as prime (above average productivity and above average farm income).

2.03.2 HYDROPOWER. Seattle City Light has constructed three power dams on the Skagit River. Ross Dam, at river mile 105, has a total capacity of 360,000 kilowatts(kW); Diablo Dam, below the present Ross damsite, provides a total rating of 120,000 kW and Gorge Dam, approximately 4 miles below Diablo Dam, has a rating of 134,400 kW. Two powerplants on the Baker River are owned by Puget Sound Power and Light Company and have a total rating of 158,400 kW. The locations of these dams are indicated on figure 1-1.

2.03.3 WATER SUPPLY. Essentially all water used for consumptive, agricultural, sewage disposal, and industrial purposes within the flood plain originates in watersheds located in Mount Baker National Forest.

The Skagit River and its tributaries are the major source of water. Abundant ground water is located at or near the ground surface; however, because of proximity of the water supply to the surface, it is particularly vulnerable to contamination during flooding.

2.03.4 FLOOD HISTORY. The Skagit River Valley has had a long history of flooding since the area was first settled in the mid-1800's. Floodflows have been recorded intermittently since 1908. In the leveed areas below Sedro Woolley, the maximum safe channel capacity varies from 100,000 cubic feet per second (c.f.s.) to 146,000 c.f.s.[1/] Since 1908, 100,000 c.f.s. has been exceeded 15 times during the winter flood season (October-March); the most recent flood causing major damage occurred in February 1951 with a peak discharge of 139,000 c.f.s. at Concrete; 150,000 c.f.s. at Sedro Woolley; and 144,000 c.f.s. at Mount Vernon. During this flood, many dikes failed because they lacked sufficient height and width to withstand saturation. The December 1975 flood had a peak discharge of 122,000 c.f.s. at Concrete and 130,000 c.f.s. at Mount Vernon. Since 1920, floodflows have been reduced through incidental control at the power reservoirs. However, the location of these reservoirs is such that they cannot effect a great amount of flood control because of the contribution to flooding from large uncontrolled tributary areas, of which the Sauk River Basin is the largest.

2.03.5 EXISTING FLOOD PROTECTION. Existing flood protection in the Skagit River Basin includes a combination of upstream storage and downstream local flood protective works. The Federal Energy Regulatory Commission (FERC) license for Ross Dam requires a winter flood storage reservation of 120,000 acre-feet for the benefit of the downstream valley. The FERC license for Upper Baker Dam requires 74,000 acre-feet of flood control storage during the winter flood season and 16,000 acre-feet during the remainder of the year to compensate for valley storage lost because of the dam. Farmland and towns in the delta flood plain west of Sedro Woolley are partially protected by levees that prevent river and tidal saltwater flooding. About 43 miles of main line river levees prevent flooding from spring and minor winter events. Levees along saltwater bays and channels prevent inundation by tidal flows. There are 16 diking districts inclosing a total of 45,041 acres of land within levees. Individual owners have inclosed an additional 1,000 acres of land. The present levee system, in conjunction with the upstream storage, protects from flows ranging from 100,000 c.f.s. to 146,000 c.f.s.

2.03.6 POPULATION.[2/] Skagit County population in April 1978 was 57,600, ranking the county 13th of 39 in Washington State. The rate of population growth since 1950 has been less than that of the state, probably due to the wider variety of employment opportunities in nearby met-

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1/Mean annual flows in the Skagit River range from 10,000 to 20,000 c.f.s. at Mount Vernon.

2/Information obtained from U.S. Department of Commerce, Census of Population, 1970; and Washington State Office of Financial Management, Population Studies Division, Population Trends, 1978.

ropolitan areas. Population projections based on April 1978 figures indicated an average annual increase of approximately 1 percent by 1990. Population of the county in 1978 was about evenly divided between urban and rural areas, whereas about 36 percent of the population was classified as urban and 64 percent as rural in 1950.

2.03.7 LABOR FORCE AND EMPLOYMENT. Total September 1978 labor force in Skagit County was 28,800, with 7.2 percent unemployed. In comparison, the statewide unemployment rate was 5.4 percent. High unemployment in the county is due mainly to the large percentage of the labor force employed in the highly seasonal agricultural and forest products sectors. Skagit County has been classified as a labor surplus area by the Employment and Training Administration, U.S. Department of Labor, and has been designated a redevelopment area by the Economic Development Administration, U.S. Department of Commerce.

Employment trends over the 16-year period from 1960 to 1976 were characterized by a relative shift from the extractive and processing industries to the trade and service industries. In 1976, trade and services provided 27 percent of all employment in the county, compared with only 19 percent in 1960.

2.03.8 INCOME. Total personal income, an indication of magnitude of economic activity in an area, was $362.1 million in Skagit County in 1976. This represented a real (constant dollars) average annual increase of 3.9 percent over 1950, compared with a 3.6 percent average annual increase for the state.

2.03.9 AGRICULTURE. Agriculture is important to the Skagit County economy, providing year-round employment to about 3,000 persons and part-time employment to an undetermined number of migrant workers during harvest. Although the number of farms and the percentage of land in farms have been declining since 1940, the market value of agricultural products sold has been increasing, both in current and constant dollars. The market value of products sold increased from $26.2 million to $29.1 million (1969 dollars) between 1969 and 1974.

2.03.10 FORESTS. In 1975, about 180 million board feet of timber was harvested in Skagit County. Most of the logs are moved by truck to pulp and lumber mills in Everett and Bellingham. Forest resources are relatively unimportant in the Skagit River flood plain.

2.03.11 MINERAL RESOURCES. There is a wide variety of mineral resources in Skagit County, but only a few have been developed commercially. The Bureau of Mines' mineral industry location system files indicate that past mineral production has come from 22 operations in the study area. Mineral commodities produced have been asbestos, basalt, clay, gemstones, and sand and gravel. In 1974, the value of mineral production amounted to $2.6 million. There are currently 17 active mineral industry operations in this drainage area. The majority of these

are sand and gravel operations.

2.03.12 MANUFACTURING. Manufacturing activity in Skagit County is primarily associated with processing of natural resources. Principal manufacturing activities are lumber and wood products processing, food processing, and petroleum refining.

2.03.13 TRADE AND SERVICES. Mount Vernon, partially located in the flood plain, is the center of trade and services for Skagit County. In 1972, Mount Vernon accounted for 44 percent of all retail sales and one-half of selected services in the county.

2.03.14 TRANSPORTATION SERVICES. Skagit County is serviced by all major forms of transportation. Two railroads, Burlington Northern and Milwaukee Road, provide access to the area. The county is readily accessible by vehicle from Interstate 5 (I-5), which extends north-south, and State Highway 20, which runs eastward from Discovery Bay through Port Townsend and Oak Harbor, then along the Skagit River Valley and across the Cascade Mountains into eastern Washington. Deep-draft shipping terminal facilities serve petroleum refineries at Anacortes, and ferry service from Anacortes links the mainland with the San Juan Islands and Sidney, British Columbia, near Victoria, British Columbia. There is no scheduled major commercial airline service in the area, but Bay View Airport and other local airfields are operated for charter and regional service.

2.03.15 CULTURAL HISTORY. The Skagit Delta and adjacent uplands have been used and occupied by human populations for a considerable span of time. Although the exact duration is not known precisely, evidence that supports an estimate of 12,000 years has been discovered elsewhere in the Puget Sound region and on the Olympic Peninsula. The oldest cultural resources so far found in the Skagit Delta area date to less than 5,000 years ago.

Before the 1850's, the Skagit Delta constituted a part of the territory associated with several culturally similar Indian groups. The northern delta was occupied by the Swinomish and Samish. The North Fork and adjacent areas were inhabited by the Lower Skagits. The South Fork was Kikiallu territory. The Upper Skagits were resident in the area north and east of Mount Vernon. The Swinomish and Samish territories are outside the project area.

Euro-American settlement and dislocation of the resident Indian populations did not begin until the late 1850's. The Point Elliot Treaty of 1855 required most of the local Indians to resettle outside the delta on either the Swinomish or Tulalip Reservations.

The first Euro-American homestead along the Skagit River was settled in 1859. In 1863, the first trading post in the delta was opened at the

point of divergence between the North and South Forks of the river. Six years later, the post became the site of Skagit City, the earliest river town. As the area's population grew, many additional towns were founded. Today, only Mount Vernon, Burlington, and Sedro Woolley remain as important centers of population and commerce.

The early settlers quickly recognized the need for dikes to protect their holdings against the Skagit River's frequent floods. Initially, levees were the responsibility of individual landholders, but the magnitude of the task soon prompted collective action and diking districts were formed in the late 1890's. As the levee system developed, the crests of these structures served as paths and later roads. Private ferries provided cross-river transport. The Great Northern Railroad, now the Burlington Northern, was extended to Conway in 1889.

Agriculture was initially, and continues to be, the principal economic activity in the delta. Logging operations began around 1865, but on the lowlands the resource was expended before 1920.

2.03.16 RECREATION. Partly within the Skagit River Basin are the North Cascades National Park and the Mount Baker National Forest, which provide camping, hiking, and picnicking facilities for a large number of visitors each year. The Washington State Parks and Recreation Commission maintains two parks within the basin providing camping, fishing, and hiking. The Washington State Game Department maintains 25 fishing access sites throughout Skagit County, the majority of which are in the study area. In addition, the Game Department operates the Skagit Wildlife Recreation Area on the Skagit River Delta. Major uses are waterfowl hunting, fishing, and various appreciative activities. This area is the fourth largest recreation attraction in the basin and has been experiencing an average annual visitation increase of approximately 8 percent.

The Skagit County Park Board operates and maintains one site within the project area at Conway on the left bank South Fork and three sites upstream of the study area. Two of these are currently developed for recreation.

The various cities within the study area provide some park and recreational facilities. The city of Burlington's only park, Malben City Park, is a 13-acre parcel offering day-use activities. The city of Mount Vernon operates 480 acres of wilderness recreation at Little Mountain, southeast of the city; a day-use park of 37 acres at Hillcrest Park just east of the downtown area; 17 acres of developed land at Edgewater Park on the right bank of the Skagit River, which offers fishing access, playfields, picnicking, and hiking; and Roadside Park, a 1-acre day-use area located about 1 mile upstream of the downtown area on the left bank.

Sections of the Skagit River upstream of the study area were recently included under the Wild and Scenic Rivers System. Inclusion by Congress of the river in the wild and scenic system restricts the type of development which can occur along each designated reach.

2.03.17 COMMUNITY COHESION. The study area sustains a healthy interdependence between urban and rural business interests, centering on agricultural production and supply. Leisure time interests reflect the urban/rural dichotomy and include traditionally rural activities such as county fairs, grange halls, herd and crop organizations, and hunting and gun clubs. The urban areas in the county support entertainment typical of that found in other small urban areas.

2.03.18 FUTURE DEVELOPMENT. The overall pace of future growth in Skagit County should remain below that of the State of Washington. Per capita incomes are also expected to continue below the state average due to the seasonality of the county's dominant industries, which include agriculture, food processing, and lumber and wood products. Agriculture and processing of agricultural products should remain the controlling economic activities, although their relative importance may decline with expansion of the growing trade and service sectors. Output in lumber and wood products manufacturing may expand, but technological change is expected to offset the need for expansion of employment. Tourism and recreation are expected to rank among the most important growth industries in Skagit County.

2.04 ENVIRONMENTAL FEATURES OF THE STUDY AREA. 1/ The study area contains environmental features of great diversity and uniqueness. Preserving this diversity is of critical importance to the continuance of the many fish and wildlife species within the flood plain. For ease of presentation, the features are briefly discussed below as individual entities; however, it should be understood that maintenance of the integrity of each component is necessary to the continued functioning of the ecosystem 2/ as a whole. An understanding of this concept is

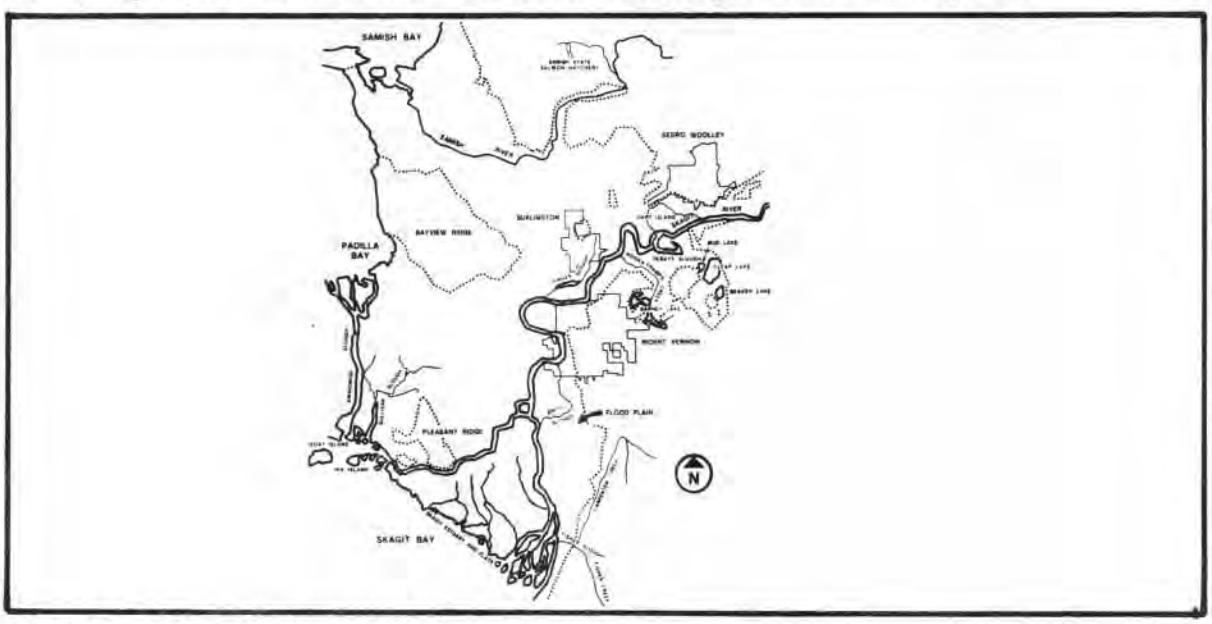

FIGURE 2-2. ENVIRONMENTAL FEATURES OF THE STUDY AREA

1/Much of the information in this section obtained from Washington Environmental Atlas, Seattle District, Corps of Engineers, 1975.

2/Ecosystem is a community of interrelated organisms and their environments considered together as a unit.

important in the impact assessment and evaluation tasks of environmental planning for the proposed project. The concept may be illustrated by a consideration of the many interrelationships making up the Skagit River ecosystem. For example, bald eagles wintering in the upper river reaches depend on migrating salmon for food. Juvenile salmon depend upon the wetlands and productive mudflats of the river estuary for feeding and shaded river banks for rearing and protection from predators. Benthic invertebrates in the mudflats require detritus from the nearby wetlands of the river. Waterfowl nest in cutoff sloughs, but feed in tidal wetlands along Skagit Flats at the mouth of the river. Visiting harbor seals and snowgeese depend on food sources available in the estuary and along the flats. For locations of the various environmental features discussed, refer to figures 2-2 and 2-3.

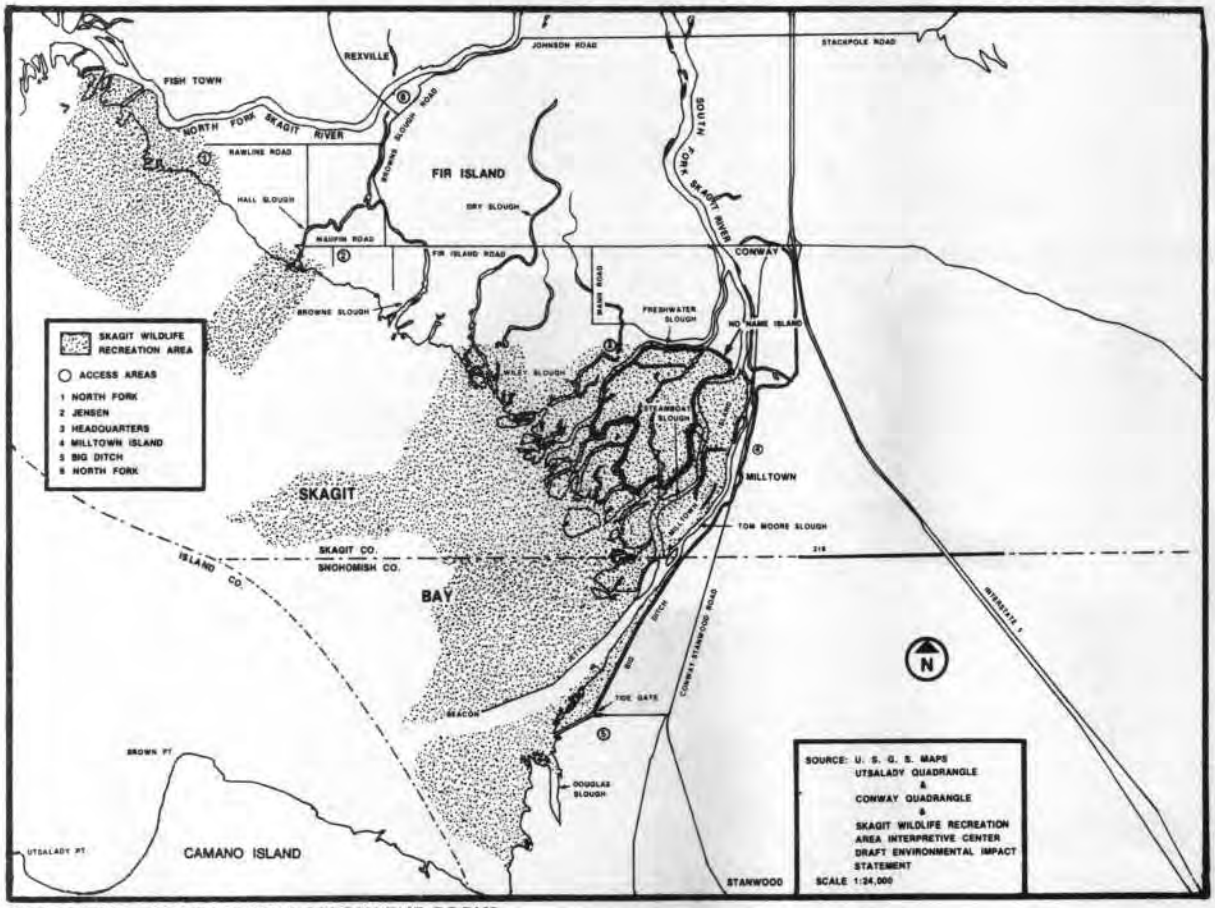

FIGURE 2-3. SKAGIT RIVER BELOW THE FORKS

2.04.1 SLOUGHS. There are numerous sloughs which exist in the study area. Some, like Freshwater Slough on the South Fork of the Skagit River, are open channels that connect to the main Skagit River; others, like the many that bisect Fir Island, no longer carry running water except in times of flood.

Habitats along cutoff sloughs consist of open water ponds, dry beds, and wooded channels connected by culverts beneath roads and driveways. These systems are often extremely diverse and provide food and shelter

for numerous bird and mammal species. In the summer, waterfowl prefer to nest adjacent to the quiet water of closed sloughs, rather than the moving river waters.[1/] The slough channels are also important for draining adjacent uplands during floods. Examples of this type of slough in the study area are Britt Slough, south of west Mount Vernon, and Gages Slough, located 2 miles north of Mount Vernon, between Highway 99 and I-5.

Photo 2-2. View of the numerous sloughs bisecting Fir Island in the Skagit Delta.

Photo 2-3. View of wooded channel along Britt Slough.

1/R. Jeffrey, Washington State Department of Game, personal communication, 1978.

Open river channels are important routes for adult salmon migrating upriver as well as critical resting and rearing areas for seaward migrating juvenile salmon. Examples include Tom Moore Slough, Freshwater Slough, and Fisher Slough on the South Fork of the Skagit River and Swinomish Slough connecting Skagit Bay to Padilla Bay.

Photo 2-4. Looking toward Skagit Bay where the main stem South Fork of the Skagit River divides into Tom Moore Slough and Freshwater Slough.

A channel of the Skagit River before 1921, Debays Slough, near Sedro Woolley, is a combination of open water, wetlands, and surrounding deciduous forest. It is an important resting and feeding area for the trumpeter swan (Olor buccinator) and other waterfowl.

Photo 2-5. View of Debays Slough in the Nookachamps Creek drainage area looking northwesterly toward Burlington and Skagit Bay.

2.04.2 ISLANDS. Many islands have been formed in the study area by alluvial buildups and changes in the course of the Skagit River over its history. Hart Island, located on the Skagit River near Sedro Woolley, is a large (1,126 acres) heavily wooded oxbow island formed in 1911 (figure 2-2). Although not a diverse habitat, this large uninterrupted unit of forested wetlands is an important habitat to upland game mammals, furbearers, raptors, and other bird species.

Photo 2-6. View of Hart Island looking toward Burlington Hill.

About 15 large and numerous small islands separated by 10 major sloughs (figure 2-3) are located in the 3,000-acre delta at the mouth of the South Fork Skagit River between Tom Moore and Freshwater Sloughs. Most of this area is owned by the Washington State Department of Game (WDG)

Photo 2-7. View of the South Fork Delta, looking at Freshwater Slough.

as part of the Skagit Wildlife Recreation Area. These islands provide habitat for many migratory waterfowl, wading birds, song birds, and raptors. The main island is diked and farmed by the WDG to encourage waterfowl usage. Cereal crops are planted and then the fields are flooded through the winter, providing food and resting area for migrating waterfowl.

Islands in Skagit Bay, such as Goat and Ika (figure 2-2), are essential to the preservation of scenic, recreation, and wildlife habitats of the area. Some of these islands are game refuges and others are parks. Raptors nest on Ika Island, which is also the location of a heron rookery. These islands are landlocked by alluvial buildups and diking. They border Skagit Bay primarily between the north bank of the Skagit River and the south end of Swinomish Channel.

Photo 2-8. View of Ika Island in Skagit Bay at the mouth of the North Fork of the Skagit River.

Fir Island refers to the area of the Skagit Delta between the North Fork and the South Fork (figure 2-3). Land use in this area is predominantly agricultural.

2.04.3 LAKES AND CREEKS. Refer to figure 2-2 for the locations of the lakes and creeks within the study area. Lakes include Barney Lake, a shallow wet-season lake 3 miles east of Mount Vernon, Beaver Lake, and

the nearby Clear Lake in the Nookachamps Creek drainage area. All three are important winter feeding areas for trumpeter swans. Mud Lake is a small, wooded lake west of Clear Lake.

Nookachamps Creek, located between Burlington and Sedro Woolley, is the first major salmon producing tributary of the Skagit River located upstream of Skagit Bay. Both coho (Oncorhynchus kisutch) and chum (O. keta) spawn and rear in this creek.

Photo 2-9. View of the Nookachamps Creek.

Coho salmon spawn and rear within the Carpenter Creek and Fisher Creek drainages, originating on the slopes of Conway Hill. These drainages are the only tributaries within the lower Skagit River below Conway that are utilized by salmon.

2.04.4 BAYS, ESTUARIES, AND ADJACENT UPLAND. The Puget Sound estuarine environment in the study area is made up of Samish Bay, Padilla Bay, Skagit Bay, and their associated estuaries. These systems together may be viewed as an ecological entity. All three bays are located in the Pacific Flyway for migrating waterfowl The estuaries of these bays provide critical habitat to juvenile salmon during their transition from freshwater to saltwater. The shorelines along this area of Puget Sound are designated as shorelines of statewide significance under the Washington State Shoreline Management Act.

Samish Bay, at the northwestern corner of the study area, and Padilla Bay, forming the western boundary, are large shallow bays which support extensive eelgrass beds and shellfish populations. Both are heavily

used by migrating populations of waterfowl. The southern ends of each of these bays provide wintering habitat for American peregrine falcons (Falco peregrinus anatum), which prey on the large populations of waterfowl and shorebirds. This species is listed on the Federal List of Endangered and Threatened Wildlife and Plants.

The entire Skagit River flood plain delta area, including Skagit Bay, estuary, and associated uplands (figure 2-3) has long been one of the state's most outstanding waterfowl areas for ducks during part of the year, and for wintering populations of between 20,000 to 40,000 snow geese (Chen hyperborea), Canadian geese (Branta canadensis), black brant (B. bernicla), mallard (Anas platyrhynchos), widgeon (Mareca spp.), teal (Anas spp.), and pintail (A. acuta). The delta is most important as a wildlife wintering area where waterfowl find food, rest, and protection from predators. Little breeding is done in this area; most takes place farther north. Table 2-1 is a summary of waterfowl survey data from 1973-1977 furnished by the Washington State Department of Game for Skagit Bay. Note the fluctuation in abundance over time for most species, attesting to the fact that the bay is a stopover point for these species during their winter migration.

TABLE 2-1

Waterfowl Abundance in Skagit Bay

Time of Count	Mallard (Anas platyrhynchos)	Pintail (Anas acuta)	Gr. W. Teal (Anas carolinensis)	Widgeon (Mareca sp.)	Snow Goose (Chen hyperborea)	Canvasback (Aythya valisineria)
1973						
October	29,850	29,675	9,325	13,650	5,112	18
November	23,000	11,400	3,900	2,850	11,300	30
December	17,400	2,900	1,200	100	11,800	—
1974						
October	34,380	26,620	6,320	22,140	5,100	5.5
November	31,800	16,567	3,933	10,067	5,400	50
December	17,300	1,800	700	1,800	3,800	125
1975						
October	30,033	29,767	12,433	12,667	5,250	—
November	40,400	33,300	16,100	12,800	4,000	—
December	50,350	7,950	13,000	4,850	4,650	—
1976						
October	28,800	24,450	8,350	8,400	200	—
November	45,000	20,800	9,300	6,600	5,325	150
December	20,300	10,000	1,700	2,000	3,200	250
1977						
September	23,900	33,500	300	8,200	50	—
October	66,400	50,800	18,900	18,900	4,450	—
December	8,800	2,500	2,700	400	8,200	—

Source: Summarized from data provided by Washington State Department of Game, 1978.

The Skagit Estuary is among the most important marine estuaries on Puget Sound. Its large size and diverse environment make it a major Pacific Coast wildlife area. About one-half of the 125,000 black brant on the Pacific Flyway feed in eel grass beds found in the Skagit Estuary. More than 70 whistling swans (Olor columbianus) utilize the area between Hall and Browns Sloughs (figure 2-3). Between September and April, the estuary is an excellent raptor area for such birds of prey as the golden eagle (Aquila chrysaetos), the bald eagle (Haliaeetus leucocephalus alascanus), now listed on the Federal list of Endangered and Threatened Wildlife and Plants, and Peale's peregrine falcon (F. p. pealei). The

estuary and its associated sloughs also provide critical habitat to anadromous juvenile fish as a rearing and transition area between freshwater and saltwater.

Photo 2-10. Views of Skagit Bay and Estuary from the Big Ditch public access area at the mouth of the South Fork of the Skagit River. This is a popular birdwatching area.

Skagit Flats, a component of the Skagit Estuary, is a broad expanse of wetland habitats extending from the mouth of the North Fork to the mouth of the South Fork. The Flats are an extremely important resting and rearing area along the Pacific Flyway, in particular, for large populations of snow geese.

Within the area made up of Skagit Bay, Estuary, Flatlands, and Delta is the 11,000-acre Skagit Wildlife Recreation Area (WRA) (figure 2-3), owned and managed by the Washington State Department of Game with the primary management objective of maintaining populations of waterfowl at harvestable levels.[1/] It is located along Skagit Bay at the mouth of the Skagit River in Skagit and Snohomish Counties and is composed of

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1/Information regarding Skagit WRA obtained from the Skagit WRA Interpretive Center, Draft Environmental Impact Statement (DEIS), 1977, Washington State Department of Game (WDG), or through personal communication with the WDG, 1978.

intertidal marshes, adjacent shorelines, and upland farmlands. Much of the area is diked and farmed in cereal grain crops, such as corn and barley, proven beneficial to drawing and keeping waterfowl in the area. A majority of the crops are left unharvested for use by wintering waterfowl.

Photo 2-11. View of the Skagit Wildlife Recreation Area between Freshwater and Tom Moore Sloughs, showing fields left unharvested and flooded for wintering waterfowl.

Nearly 200 species of wildlife have been identified in the WRA. Located on the Pacific Flyway, it is one of the most important waterfowl areas in western Washington. Uses of the Skagit WRA include fishing, hunting, trapping, and appreciative uses such as birdwatching, canoeing, hiking, and photography.

Photo 2-12. Skagit Wildlife Recreation Area, Jensen access. View toward Skagit Bay of Skagit Flats from Fir Island seawall.

2.04.5 RIVERS. Two rivers, the Samish and Skagit Rivers, are within the study area (figure 2-2). Both are critically important as salmon production systems. The shorelines of these rivers are designated as shorelines of statewide significance under the Washington State Shoreline Management Act.

The Samish River system, the largest independent drainage of the Skagit Basin, consists of 29 miles of main stem river. Three species of salmon

(chinook (Oncorhynchus tshawytscha), coho, and chum)and two anadromous game species (steelhead (Salmo gairdeni) and sea-run cutthroat trout (S. clarki)) spawn and rear in the Samish River system. A Washington Department of Fisheries hatchery is located on Friday Creek, tributary to the Samish River. It has both hatching and rearing capacities for salmon and also handles principally fall chinook and coho salmon, with most fish released directly into the Samish River. The Samish River and the Samish hatchery support an important commercial fishery, primarily for fall chinook.

The 162-mile-long Skagit River and its numerous tributaries form a major river basin in the Puget Sound region. The river is an important spawning and rearing river and transportation route for salmon, a waterfowl wintering ground, and a human recreation area. The upper Skagit River, outside the study area, is now a part of the Wild and Scenic Rivers System.

Virtually all of the Skagit River supports fish. The river has the largest runs of anadromous fish on Puget Sound and has a major winter steelhead run. It is second only to the Columbia River as a source of salmon in the State of Washington. All five species of Pacific salmon (chinook, coho, chum, pink (O. gorbuscha) and sockeye (O. nerka)) utilize the Skagit River. Salmon originating in the Skagit are caught by commercial and sport fisheries from California to Alaska.

The Washington State Department of Fisheries maintains and operates the Skagit salmon hatchery on the Cascade River, tributary to the Skagit River. The mean annual adult returns for coho to the hatchery from 1967 to 1976 is calculated to be 18,606 and 767 for chinook.[1/] The mean for pink, an odd year spawner, is 1,624 for 1971, 1973, and 1975.[1/] A summary of the value of the Skagit salmon hatchery and natural runs is provided in tables 2-2 and 2-3.

TABLE 2-2

Value of Skagit River Salmon Hatchery Production

Species	Escapement	Sport Harvest	Sport Value	Commercial Harvest	Commercial Value	Total Harvest	Total Value
Chinook	767 1/	1,120	$31,360	1,181	$22,439	2,301	$53,799
Coho	18,606 1/	21,174	592,872	53,250	415,350	74,424	1,008,222
Pink	1,624 2/	48	672	3,200	8,672	3,248	9,344
					Total		$1,071,365

1/Mean annual escapement, 1967 to 1976.
2/Mean annual escapement, 1971, 1973, and 1975.

Source: Letter from Washington Department of Fisheries, 24 July 1978.

1/Information provided by the Washington State Department of Fisheries, 1978.
2/Ibid.

TABLE 2-3

Value of Skagit River Natural Salmon Runs

Species	Escapement	Sport Harvest	Sport Value	Commercial Harvest	Commercial Value	Total Harvest	Total Value
Chinook	14,830 1/	20,992	$587,776	22,148	$420,812	43,140	$1,008,588
Coho	14,667 2/	16,691	467,348	41,978	327,428	58,669	794,776
Pink	310,000 3/	9,176	128,464	610,824	1,665,333	620,000	1,783,797
Chum	37,422 4/	-	-	37,422	390,686	37,422	390,686
Sockeye	2,839 5/	-	-	2,839	16,750	2,839	16,750
						Total 6/	$3,994,597

1/Mean annual escapement, 1965 to 1976.
2/Mean annual escapement, 1965 to 1976.
3/Mean annual escapement, 1959 to 1975, odd years only.
4/Mean annual escapement, 1968 to 1976.
5/Mean annual escapement, 1959 to 1976.
6/Mean annual total value for odd years only.

Source: Letter from Washington State Department of Fisheries, 24 July 1978.

Gillnet vessels make up the bulk of the fishery, with purse seiners also utilizing the area. The Swinomish Tribe fishes primarily with gillnets in Skagit Bay and the lower river. The Upper Skagit Tribe fishes with gillnets as far upstream as Faber's Landing near Concrete on the Skagit River. An average annual number of 37,600 angler trips between 1966 and 1971 was recorded for the saltwater salmon sport fishery in the area.[1/] Freshwater angling for salmon in the study area is permitted in the Skagit and Samish Rivers.

In addition to spring and fall runs of chinook, coho, pink, chum, and sockeye salmon, the Skagit River provides feeding and breeding habitat to summer and winter steelhead, sea-run cutthroat, and Dolly Varden (Salvelinus malmo). Over the past 16 seasons, the annual Skagit Basin catch for steelhead, the most economically valuable game fish in the study area, has averaged 14,000.[2/] This harvest stems from both artificial and natural production. On Barnaby and Harrison Sloughs, between Rockport and Marblemount upstream of the study area, the Washington State Department of Game has rearing ponds for summer and winter steelhead. The rearing ponds utilize the Skagit River as the main water source.

There are also many resident fish species within the Skagit system. These include, but are not limited to, rainbow trout (Salmo gairdeni), brook trout (Salvelinus fontinalis), brown trout (Salmo trutta), mountain whitefish (Prosopium williamsoni), largemouth bass (Micropterus salmoides), yellow perch (Perca fluviatilis), brown bullhead (Ictalurus nebulosus), and suckers (Catostomus spp.).

1/A Catalog of Washington Streams and Salmon Utilization, Volume I, Puget Sound, Washington State Department of Fisheries, 1975.

2/Information provided by Washington State Department of Game, 1978.

2.04.6 FUTURE WITHOUT PROJECT CONDITION. Within the Skagit River Basin, the major limiting factors which are continuing to contribute to a reduction of the environment's fish producing potential, other than harvest or exploitation, include seasonal flooding, low summer flow, extreme river fluctuations, natural barriers in streams and rivers, and excessive silt deposition in the Skagit Estuary.[1/] Within the Samish River system these factors include seasonal flooding, low flows, physical barriers, high water temperatures, runoff from agricultural operations, limited spawning and rearing, and watershed developments.

The Washington State Department of Fisheries has several salmon enhancement programs planned for the Skagit River Basin which, if implemented, should increase the production of salmon from the Skagit River.[2/] These programs include expansion of the existing Skagit hatchery for increased production of spring chinook smolts and for chum salmon production. A second Skagit River hatchery is proposed for Sulfur Creek in the Baker River System, a tributary to the upper Skagit River. Other enhancement programs include installation of egg incubation boxes, initiated in 1977, and habitat improvement of natural spawning and rearing areas through gravel replacement or cleaning, gabion installation, and flow augmentation. Although the potential for increasing natural salmon from the Samish River is very limited, compared to the Skagit River, increases could be achieved through stream and streambed improvement projects.[3/]

The Washington State Department of Game (WDG) has the present goal of increasing winter-run and summer steelhead production at the Barnaby-Harrison Slough Facility.[4/] This program, along with a recently developed rearing facility on the Sauk River to enhance wild stock returns, should more than double the total adult steelhead return to the Skagit Basin.

The WDG is becoming more interested in the management and enhancement of nonhunted wildlife. As part of their Wildlife Interpretive Program, an interpretive center has been proposed at the Skagit Wildlife Recreation Area (WRA).[5/] The WDG also has plans for future acquisition of lands to add to the Skagit WRA.[6/]

THE PROJECT AREA

2.05 PHYSICAL FEATURES OF THE PROJECT AREA.

1/A Catalog of Washington Streams and Salmon Utilization, Volume 1, Puget Sound, Washington State Department of Fisheries, 1975.

2/Information supplied by the Washington State Department of Fisheries, 1978.

3/A Catalog of Washington Streams and Salmon Utilization, Volume 1, Puget Sound, Washington State Department of Fisheries, 1975.

4/Information provided by Washington State Department of Game, 1978.

5/Skagit Wildlife Recreation Area, Proposed Interpretive Center, DEIS, Washington Department of Game, 1977.

6/Information provided by Washington State Department of Game, 1978.

2.05.1 SOILS. Foundation soils throughout the project area are mainly composed of alluvial and estuarine-marine sedimentary deposits consisting of fine sands, silts, and clays, with wood debris and shells. A few deposits of medium-to-coarse sands and fine gravels are also present generally in the upstream portion of the project. The existing levee materials along the project reach are very similar to the foundation soil in most cases and are predominantly fine sands and silty sands of loose-to-medium relative density.

2.05.2 RIVER SEDIMENTS. River bottom materials consist mostly of sands and silts with seashells, wood debris, and logs, except near the mouth of the North Fork where gravels and bedrock are presumably due to the proximity of a nearby partly buried hill, Pleasant Ridge.

2.05.3 CHANNEL AGGRADATION. Prior to construction of any levee system along the lower Skagit River, the flood waters overflowed the riverbanks and spread river-borne sediments over the delta alluvial plain via many small distributaries. The effect of diking on this system has been the containment of not only flood waters, but also sediments within the leveed channel. A portion of these sediments is flushed down the confined channel and into Skagit Bay. Over a period of years, the result has been an extension of the delta seaward at a more rapid rate and a corresponding increase in the length of the stream. In response, the gradient of the stream channel has increased and under existing levee conditions, the result has been aggradation in the stream channel varying in depth from 4 feet at the mouth of each fork to 2 feet at Mount Vernon and the remainder of the study reach. This is considered representative of 100 years of bed material accumulation. As the channel bottom increases, groundwater levels adjacent to the levees are permanently raised. Nearby lands require drainage and local pumping in order to be farmed even during non-flood periods.

2.05.4 AIR QUALITY. The Northwest Air Pollution Authority has measured total suspended particulates in the Mount Vernon/Burlington area for several years. To date, U.S. Environmental Protection Agency (EPA) standards have not been exceeded, and generally, ambient air quality in the project area is considered good.[1/]

2.05.5 WATER QUALITY. The quality of Skagit River is exceptional in upper reaches above Sedro Woolley, but becomes degraded in the project reach as it is influenced by industrial, municipal, and agricultural wastes. Lower segments of the Skagit are characterized by relatively high levels of fecal coliform bacteria and turbidity. High coliform counts are the result of septic tank seepage, dumping of municipal wastes, and runoff from cattle pastures. Water quality is also degraded by agricultural influences such as silage and crop spraying. Increased turbidity has resulted from logging practices and developments in the

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1/Washington Environmental Quality Profile, U.S. Environmental Protection Agency, 1978. EPA 910/9-78-049A.

watersheds that increase surface runoff. During periods of warm temperatures and rain, high turbidity in the Skagit River can be attributed further to a natural condition of "glacial flour."[1/] Heavy turbidity in Skagit Bay is contributed largely to excessive siltation from the surface water runoff of the Skagit and Samish Rivers.

The project reach of the Skagit River is classified as Class A by the State of Washington Department of Ecology, providing for the protection of the following (noninclusive) characteristic uses: fisheries, including salmon migration, rearing and spawning; wildlife; recreation, including water contact recreation; and water supply, including domestic, industrial and agricultural supply.

Ground water within the Skagit Delta is of poor quality and requires treatment to remove iron and organic compounds. Aquifers are not large and do not extend to outer regions of the delta. Recharge of aquifers is thought to be principally from precipitation, with small amounts contributed locally by the Skagit River.

2.05.6 INTERIOR DRAINAGE. The economic well-being of the agricultural community of the project area is very dependent on drainage improvements. Without the present drainage improvements, the largest dairy in Skagit County (located in the project area) could not adequately operate. Thousands of feet of subsurface drainage tubing and open ditches for outlets have been constructed to cope with both surface and subsurface drainage problems in the project area. Some common problems associated with local flooding include ponds formed in natural depressions, inoperable septic tanks, minor flooding in basements, and other inconveniences caused by a high ground-water table. In winter months, the Skagit River has a high water table, which results in water ponding behind dikes. After heavy rains or floods, storm water has to be pumped into sloughs or flows out tidegates which protect most drainage ditches and sloughs.

In the Fir Island agricultural area, runoff is collected into a network of drainage ditches and canals and is carried to a point along the sea dikes where gravity drains or pumps discharge into Puget Sound. Interior flooding is experienced when gravity drains are closed during periods of high tides.

Runoff from Carpenter Creek is separated from the lowlands runoff by a 5-mile ditch and levee system. Tidegates at the mouth separate the creek from Skagit River floodwaters. Interior flooding occurs along the river levees when storms arrive after the Skagit River has risen, and gravity drains in the urban areas and Carpenter Creek are closed.

About 50 percent of Mount Vernon is serviced by a storm sewer system which is overtaxed during major storms, resulting in most of the runoff flowing overland down paved roads. Almost all of the runoff from Burlington drains into Gages Slough.

During high water, a significant amount of water may seep through the levee system. Seepage water eventually flows into existing drainage ditches in the project area.

1/Suspended sediment originating from glacial action on bedrock.

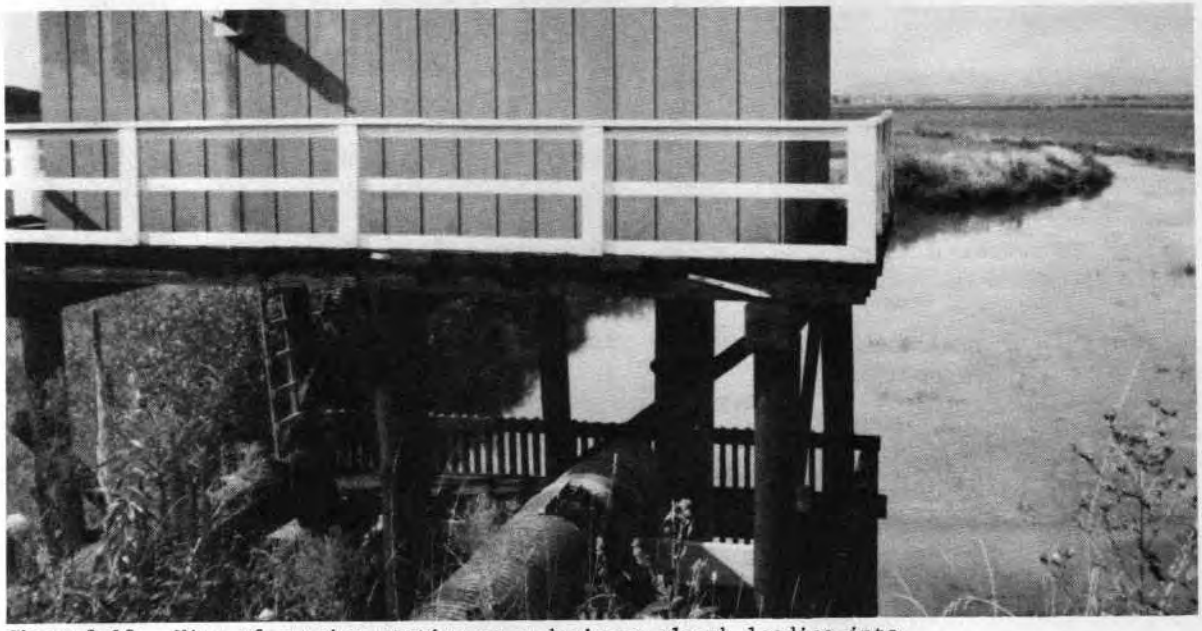

Photo 2-13. View of pumping station on a drainage slough leading into the North Fork of the Skagit River.

2.05.7 EXISTING CONDITION OF LEVEES. Existing levees along the project reach are shown on figure 2-4. At some locations the levees are in very good condition, but generally can be described as unsatisfactory. Considerable brush and trees are growing out of the levee embankment. Rip-

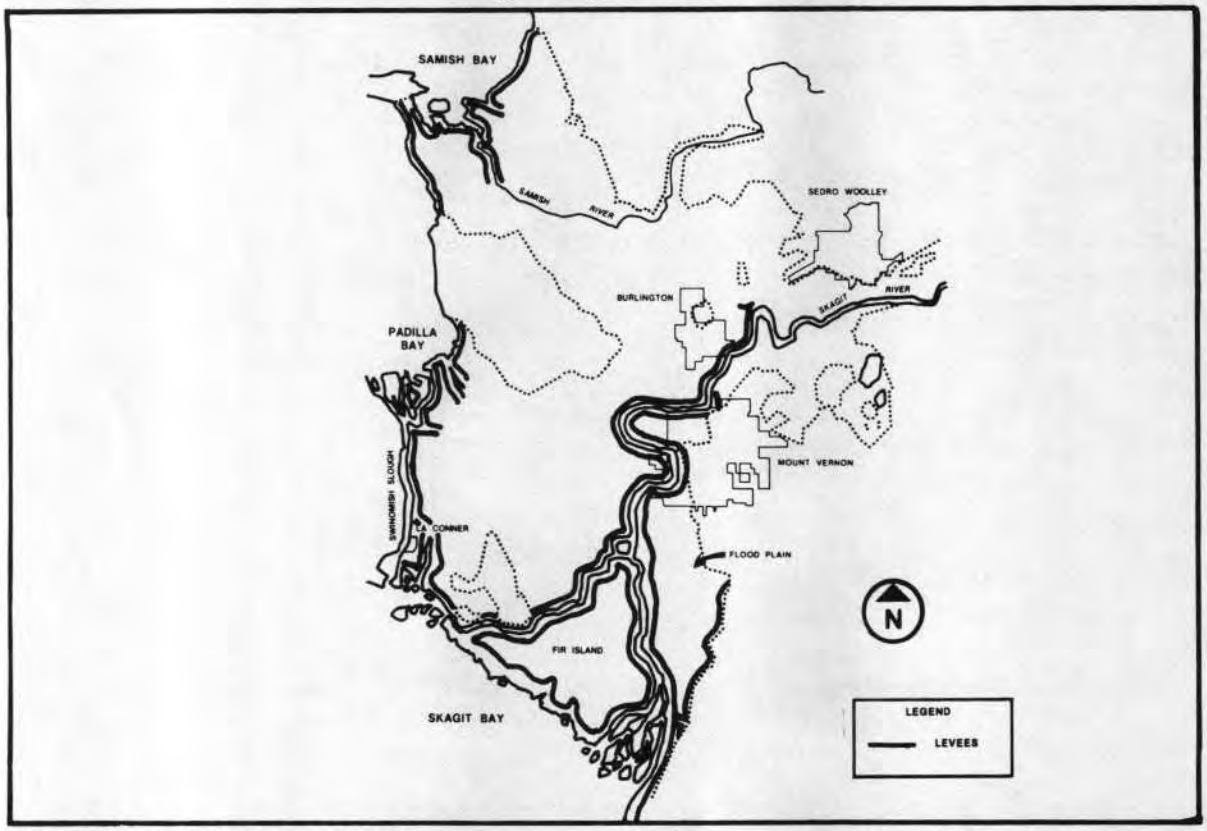

FIGURE 2-4. EXISTING LEVEE SYSTEM

rap has typically been placed on river banks and not on levees, and slopes of the levees are steeper than desirable for stability. Serious levee embankment material displacement has occurred at many locations caused by the trampling action of cattle grazing along the top and sides of existing levees. Only extensive floodfighting enabled the levee system to contain the 1975 flood (approximately 12-year frequency flood).

2.06 SOCIOECONOMIC FEATURES OF THE PROJECT AREA

2.06.1 GENERAL. The project reach of the Skagit River passes through the major towns of Mount Vernon, Burlington, and Sedro Woolley, and the smaller unincorporated communities of Avon, Clear Lake, and Conway (figure 2-1). All of these towns and communities are subject to flooding from the Skagit River.

2.06.2 CULTURAL RESOURCES OF THE PROJECT AREA. Reconnaissance, survey, and excavation of prehistoric cultural resources have been carried out sporadically in the Skagit Delta for 25 years, although the vast potential of the delta's cultural resources, both prehistoric and historic, has largely remained unexplored.

Currently two properties within the Skagit Delta are on the National Register of Historic Places: the town of La Conner and the Skagit City School. In addition, the Fishtown Archeological District, a constellation of three prehistoric sites at the mouth of the North Fork, has been nominated to the register.

The Washington State Register of Historic Places includes the Old Skagit County Courthouse in Mount Vernon and the Methodist Church in Fir. The Washington State Inventory of Historic Places includes the townsites of Fir, Sterling, and Skagit City.

During the summer and fall 1978, the Corps of Engineers, Seattle District, contracted with Seattle Central Community College to conduct a cultural resources reconnaissance[1/] of the project area of the proposed Skagit River Levee Project. The reconnaissance identified 54 cultural resource sites: 20 prehistoric sites, and 34 historic sites. The prehistoric sites are largely habitation/shell middens; the historic sites include elements of towns, farms, refuse areas, a cemetery, granary, and logging establishments.

2.06.3 RECREATION. Recreation facilities within the project area include the Skagit Wildlife Recreation Area, public access sites along the river, and the parks in Mount Vernon and Burlington. Opportunities provided include fishing, hunting, and various appreciative uses. Recreation development is low intensity, consistent with the rural environ-

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1/Skagit River Cultural Resources Reconnaissance, Seattle Central Community College, 1979. Report on file at Seattle District, Corps of Engineers.

ment of the Skagit River.

2.06.4 ESTHETICS. The Skagit Delta is flanked by wooded valley slopes on the northwest and southeast. The Olympic Mountain Range on the west and Mount Baker to the northeast are distant but prominent landscape features.

The downstream project reach of the Skagit River flows through a patchwork of open fields and forest land in a predominantly agricultural setting. The river branches into the North and South Forks which in turn branch into smaller sloughs terminating at the mouth in a network of streams across a broad tidal plain. Undeveloped saltmarshes merge with active farmlands of the lower delta creating a vast rural landscape of significant natural beauty.

Mount Vernon is a center of urban development in the upstream project reach. Urban and rural-residential development radiates from this center into the surrounding agricultural landscape. Development of the river shoreline is concentrated near Mount Vernon and Burlington. The landscape varies in this area from views of riprapped shoreline and Interstate Highway 5 with intermittent patches of forest and shrub vegetation along sandbars to views of open grassy levee slopes in agricultural areas.

Near Burlington away from the main stem Skagit River, a flat landscape of agricultural fields and the rural-residential area along Gages Slough across State Highway 20 is interrupted by the forested ridges of Sterling Hill and Burlington Hill. Views toward Sedro Woolley with the Cascade Mountains as a background provide a spectacular diversity to the predominantly rural setting.

2.07 ENVIRONMENTAL FEATURES OF THE PROJECT AREA.

2.07.1 VEGETATION. The project reach of the Skagit River is influenced by the Puget Sound maritime climate, daily tidal fluctuations, and occasional river flooding. Vegetation forms a deciduous forest landscape divided into islands by river channels and numerous sloughs. Past and current agricultural development forms a patchwork of active farmland and old fields in various stages of succession from open field and scrub to forest land. Vegetation patterns of the project area are described in terms of eight habitat categories.

2.07.1.1 DECIDUOUS FOREST. Forest is the most extensive vegetation type in the project area. Predominant species consist of red alder (Alnus rubra), cottonwood (Populus), and willow (Salix), with scattered evergreen individuals (Sitka spruce (Picea sitchensis) and western red cedar (Thuja plicata)). This habitat type provides nesting and feeding habitat for many species of birds and small mammals. Large forested areas are often inhabited by deer. Mature trees provide nesting and

roosting sites for raptors. When along the river edge, this habitat provides excellent cover and serves as a food source for migrating juvenile salmon.

Photo 2-14. View of deciduous forest along both banks of the North Fork of the Skagit River looking upstream of the North Fork bridge.

2.07.1.2 DECIDUOUS SCRUB. 1/ Scrub communities scattered along the river edge form a buffer between agricultural land and the natural river habitat. Low shrubs, including three species of willow and dense stands of canary grass (Phalaris) in the understory are typical. Nesting and feeding habitat is provided for numerous species of songbirds and small mammals. Important cover is provided by this habitat for juvenile salmon relying on the shore zone for resting and rearing areas.

Photo 2-15. View of deciduous scrub along the left bank of the North Fork of the Skagit River.

2.07.1.3 FRESHWATER MARSH. Cattails (Typha), rushes (Juncus), canary grass, horsetails (Equisetum), and several aquatic plant species form shoreline communities along ponds, sloughs, and slow-moving river channels. This habitat type serves as productive waterfowl nesting area. Along the sloughs, semi-aquatic mammals such as muskrat, beaver, and river otter are found.

1/A scrub community consists of small trees and shrubs.

Photo 2-16. View of freshwater marsh on Milltown Island, South Fork of the Skagit River. Pond in foreground is edged with cattails and rushes. A field of predominantly canary grass extends to deciduous forest in the background.

2.07.1.4 TIDAL SCRUB. Dense stands of shrub vegetation characterized by spirea (Spiraea), honeysuckle (Lonicera), crabapple (Malus), and willow are found along the high intertidal areas. This association is often found between existing levees and naturally occurring river-edge berms and usually represents a successional stage between cattail wetlands and forested wetlands. This habitat provides important cover for a variety of wildlife species and for juvenile salmon.

Photo 2-17. View of tidal scrub along river edge berm on the right bank near the mouth of Tom Moore Slough, South Fork of the Skagit River.

2.07.1.5 GRASSES AND FORBS. An open field vegetation type characterized by grasses (Gramineae), broadleaf weeds, and scattered herbaceous and woody shrubs is typical of existing levee areas within the project reach. Various degrees of mechanical and chemical vegetation management and cattle grazing account for the predominantly open grassy character. Some cover for fish and wildlife is provided. Songbirds and rodents are the most common species found in this habitat type.

Photo 2-18. View of grasses and forbs habitat type on existing levee on the left bank South Fork, looking toward its confluence with the main stem of the Skagit River.

2.07.1.6 AGRICULTURAL LAND. Areas adjacent to the Skagit River include both grazing and croplands. Dairy pasture is the most common use. The cropland left unharvested in the Skagit Wildlife Recreation Area provides wintering habitat for many species of waterfowl.

Photo 2-19. View of dairy pastureland near Burlington along Gages Slough. Sterling Hill is on the left.

2.07.1.7 HIGH SALT MARSH. Upper tidal areas are vegetated by diverse communities of grasses (Agrostis), sedges (Carex), asters (Aster subspicatus), and Pacific silverweed (Potentilla) on the North Fork and by a dense single species stand of cattail on the South Fork. This habitat provides significant wintering area for migrating waterfowl as well as important transition areas for juvenile anadromous fish migrating from freshwater to the saltwater of Skagit Bay. The abundance of small mammals in this habitat is responsible for the birds of prey, such as hawks, owls, bald eagles, and osprey, that visit or nest in the Skagit Delta area.

Photo 2-20. View of high salt marsh on the North Fork of the Skagit River looking toward Skagit Bay from the North Fork public access.

Photo 2-21. View of high salt marsh on the South Fork of the Skagit River looking at a dense stand of cattails.

2.07.1.8 LOWER SALT MARSH. This area is flooded by daily tides, and a network of tidal streams drain and separate dense hummocks of vegetation and sparsely vegetated flats. Lower areas are characteristically vegetated by bulrush (Scirpus) and sedges; upper areas by bulrush, bentgrass (Agrostis), and seaside arrowgrass (Triglochin). This habitat provides resting and feeding areas for waterfowl and rearing areas for juvenile salmon during their transition to saltwater. Vegetative detritus from this habitat is a significant food source for invertebrates in Skagit Bay, which in turn provide food for shorebirds and fish.

Photo 2-22. View of lower salt marsh in Skagit Bay.

2.07.2 QUANTITATIVE SURVEY OF VEGETATION. An inventory[1/] directed at wetland habitats was accomplished under contract by the Seattle District, Corps of Engineers, for the general area of the proposed project (figure 2-5).

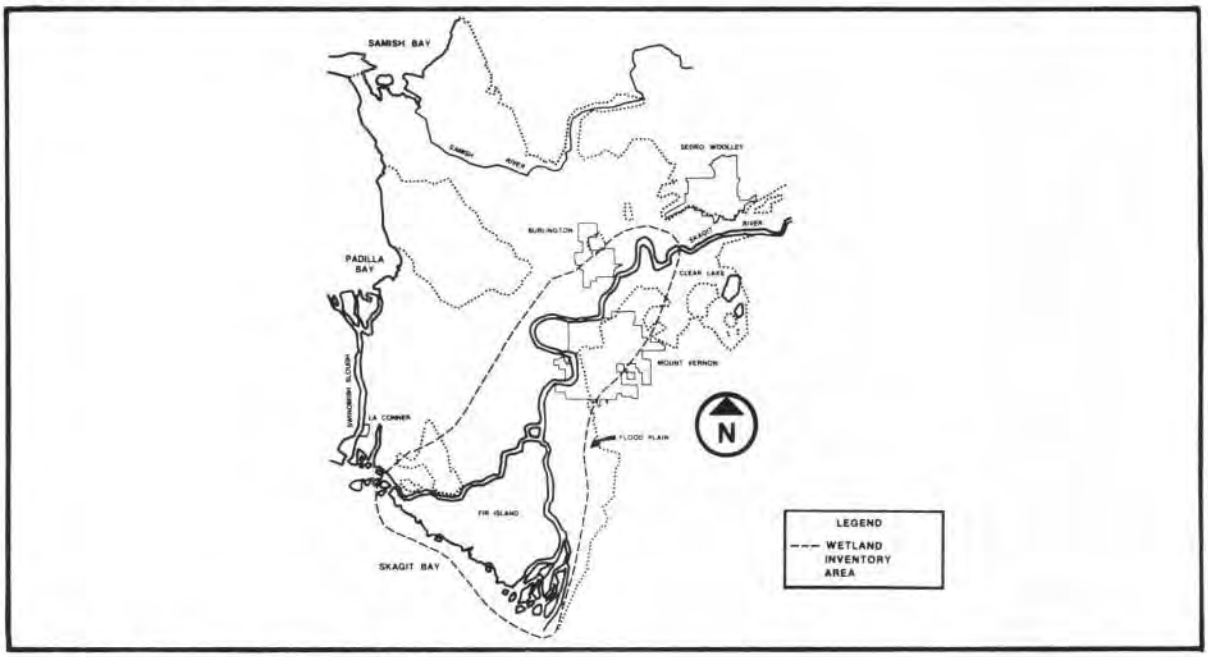

FIGURE 2-5. WETLAND INVENTORY AREA

1/Inventory of Wetlands, Lower Skagit River, Shapiro and Associates, Inc., 1978. Report on file at Seattle District, Corps of Engineers.

The categories of vegetation described in 2.07.1, Vegetation, are condensed and summarized from this inventory and from field observations by Seattle District personnel and by the U.S. Fish and Wildlife Service 1/. An acreage comparison of vegetation types for the greater wetland inventory area and the proposed construction right-of-way is shown in table 2-4.

TABLE 2-4

Vegetation Survey
Skagit River Project Area

Vegetation Type	Wetland Inventory[1] Area (acres)	Proposed Construction Area (acres)
Deciduous Forest	1,539	36
Deciduous Scrub	511	18
Freshwater Marsh	246	1.3
Tidal Scrub	121	2.5
Grass/Forbs	not evaluated	253
Agricultural	665	44
High Salt Marsh	1,852	1.2
Lower Salt Marsh	1,593	—
TOTAL	6,527	356

1/Wetlands are defined in this environmental statement to include the tidal scrub, freshwater marsh, high salt marsh, and low salt marsh vegetation categories.

Table 2-5 shows the percent frequency and acreage of each vegetation type present in the construction right-of-way. For purposes of analysis, the project reach is divided into the North Fork, the South Fork, and the main stem Skagit River (including the area of the proposed Clear Lake levees).

TABLE 2-5

Vegetation of the Proposed Construction Right-of-Way

Vegetation Type	North Fork acres	North Fork percent[1]	South Fork acres	South Fork percent	Main Stem[2] acres	Main Stem[2] percent	Totals acres	Totals percent
Deciduous Forest	8.5	2.4	22.0	6.2	5.5	1.5	36.0	10.1
Deciduous Scrub	0.5	0.1	13.4	3.8	4.1	1.1	18.0	5.0
Fresh Marsh	0	—	1.3	0.4	0	—	1.3	0.4
Tidal Scrub	0	—	2.5	0.7	0	—	2.5	0.7
Grass/Forbs	70.0	19.7	56.0	15.7	127.0	35.6	253.0	71.0
Agricultural	10.9	3.1	9.0	2.5	24.1	6.8	44.0	12.4
Salt Marsh	0	—	1.2	0.3	0	—	1.2	0.4
TOTAL	89.9	25.3	105.4	29.6	160.7	45.0	356.0	100.0

1/Percent represents the percent of the 356 acres within the proposed construction area.

2/Includes levees at Clear Lake.

1/ Skagit Levee Qualitative Vegetation and Bird Survey, U.S. Fish and Wildlife Service, 1978.

The predominant vegetation type along the existing levees on both the North Fork and the main stem is grass and forbs; other vegetation types are poorly represented in terms of area and percentage. In contrast, the South Fork shows some representation by all vegetation types. The South Fork construction right-of-way transects a more diverse group of vegetation types than the North Fork or main stem alinements. A vegetative survey of the project reach, the existing levee alinement, and the proposed project alinement are displayed on plates 2 through 16 at the back of this environmental impact statement.

2.07.3 FISHERIES. The project stream sections and the Skagit Estuary are critically important to all five species of Pacific salmon as well as steelhead and searun cutthroat. This reach of the Skagit River serves as a transportation route for adult spawners and provides the rearing environment for juvenile anadromous species during their outmigration to the sea. No spawning occurs in the project reach of the Skagit River; spawning does occur in the Carpenter and Fisher Creek drainages and in Nookachamps Creek. Salmon use of the Skagit waterways within the project area is summarized in the following table.

TABLE 2-6

Salmon Usage (Distribution) in Skagit Waterways of the Project Reach

Stream Name[1/]	Length (Miles)	Salmon Use
Sullivan Slough	1.35	unknown
Wiley Slough	3.0	unknown
Skagit River	162.3	chinook, coho, pink, chum, sockeye
Tom Moore Slough	2.75	chinook, coho, pink, chum, sockeye
Carpenter Creek	9.0	coho, (chum)
Freshwater Slough	3.0	chinook, coho, pink, chum, sockeye
North Fork Skagit River	7.3	chinook, coho, pink, chum, sockeye
Browns Slough	2.8	unknown
Dry Slough	5.9	unknown
Britt Slough	2.6	unknown
Gages Slough	7.0	unknown
Nookachamps Creek	14.31	coho, chum

Source: Summarized from A Catalog of Streams and Salmon Utilization, Volume I, Puget Sound, Washington State Department of Fisheries, 1975.

1/Locations found on figures 2-2 and 2-3

Table 2-7 indicates the timing of salmon usage of the project reach of the Skagit River. Though peak abundance is in the spring months, juvenile coho and chinook reside in the shore zone of the project reach during the entire year. This zone provides the primary rearing and migration zone for juveniles.[1/]

TABLE 2 7
TIMING OF SALMON FRESHWATER LIFE PHASES
IN THE PROJECT REACH OF THE SKAGIT RIVER

Species	Freshwater Life Phase	Months J F M A M J J A S O N D
Spring Chinook (Oncorhynchus tshawytscha)	Upstream Migration Juvenile Rearing Juvenile Outmigration	
Summer-Fall Chinook (Oncorhynchus tshawytscha)	Upstream Migration Juvenile Rearing Juvenile Outmigration	
Coho (Oncorhynchus kisutch)	Upstream Migration Juvenile Rearing Juvenile Outmigration	
Pink (Oncorhynchus gorbuscha)	Upstream Migration Juvenile Rearing Juvenile Outmigration	
Chum (Oncorhynchus keta)	Upstream Migration Juvenile Rearing Juvenile Outmigration	
Sockeye (Oncorhynchus nerka)	Upstream Migration Juvenile Rearing Juvenile Outmigration	

Source: Modified from A Catalog of Streams and Salmon Utilization, Volume I, Puget Sound, Washington State Department of Fisheries, 1975.

1/Information provided by Washington State Department of Fisheries, 1978.

Most of the salmon migrate through the North Fork channel which receives 60 percent of the main stem flow. The North Fork is the major reach of the river utilized by the set-net fishing stations reserved by the Swinomish Indian tribes in the 1855 Treaty of Point Elliott with the United States.1/ Besides providing large numbers of all Pacific salmon species to the tribal fisheries for subsistence, ceremonial and commercial purposes, the project reach sustains an excellent sport fishery for chinook, coho, and pink salmon.

Steelhead are the most intensively sought game fish in the project reach of the Skagit River; although migrant steelhead, Dolly Varden, and searun cutthroat depend heavily on this area as it provides riparian vegetation, natural streambank, and channel diversity.2/ The cover and food organism production provided by the river-edge vegetation is directly related to the ability of the environment to support fish populations. Some steelhead and cutthroat are present in the East Fork Nookachamps Creek as well as in the Carpenter Creek and Fisher Creek drainages.

The maintenance of riparian cover is critical to provision of rearing and feeding areas for juvenile anadromous and resident fish species. Juvenile anadromous fish rely on shore cover for food organisms (insects), cover, and protection from predators during their migration downstream. Loss of this cover may result in early outmigration into the open saltwater of the Bay and reduced survival probability. Extensive riprapping and diking has precluded streambank cover in most of the main stem Skagit project reach. In the lower North Fork and South Fork channels, deciduous trees, scattered brush, stumps, logs, and debris provide good cover.3/

Photo 2-23. View of right bank North Fork near its mouth. Deciduous trees, shrubs, stumps, and debris provide good cover for juvenile anadromous fish species.

1/Information provided by the Skagit System Cooperative, 1978.

2/Information provided by the Washington State Department of Game, 1978.

3/A Catalog of Streams and Salmon Utilization, Volume I, Puget Sound, Washington State Department of Fisheries, Stream Catalog, Volume I, 1975.

The many small sloughs and sand islands of the project reach form ideal habitat for the rearing of juveniles. The small ditches and channels that drain the Skagit Estuary are important as habitat for juvenile chum and chinook salmon. Sampling in the sloughs of the South and North Forks of the Skagit River have indicated abundant juvenile chum and chinook from late March through May. 1/ The greatest concentrations of fry have been found in the muddy shallow upper ends of tidal channels, immediately adjacent to existing levees in some cases. Feeding habits have indicated a peak immediately following the two high tides occurring each day when fish move out of the channels and into the marsh to feed. The majority of the diet has been found to consist of dipteran pupae and adults. This data indicates the importance of the sloughs as transition zones for juveniles as they migrate from freshwater to saltwater. A short period of rapid growth in the estuary could have a marked effect on subsequent marine survival which is strongly correlated with the size of the juvenile fish at the time of entrance into saltwater.

Resident fish species are found throughout the project reach of the Skagit River and its tributaries and associated sloughs. Sports fisheries include whitefish (Prosopium williamsoni), largemouth bass (Micropterus salmoides), and other spiny-rayed fishes.

The principal limiting factor to fisheries within the project reach is the amount of available rearing area, which is directly related to shore cover. 2/ Sand mining on lower river bars, if not done according to permit provisions, can create potholes which trap juvenile salmon on receding river waters. High water conditions and tidal influences in lower reaches trap juvenile fish within drainage ditches and sloughs and along sand bars where they perish as the river recedes.

2.07.4 WILDLIFE. Within the project reach, the Skagit River Delta area below the forks to the mouth is considered critical wildlife habitat, particularly outstanding as a waterfowl wintering area due to mild climate and good habitat. Dikes along its numerous sloughs have created upland areas for agriculture. On the Skagit Wildlife Recreation Area between Tom Moore and Freshwater Sloughs, crops are produced which are beneficial to waterfowl and other wildlife, as are the expanses of freshwater and saltwater marshes and intertidal flats. Few winter residents breed in the project area (in spring most leave for breeding areas further north).

Wintering waterfowl include ducks, geese, and swans, common along the project area sloughs in Skagit Bay and upland on farms during the peak months of October and November. Dabbling ducks, such as mallard, pintail, and green-winged teal (A. crecca carolinensis), are the most numerous. 3/

1/Information provided by Jim Congleton, Washington Cooperative Fish Research Unit, U.S. Fish and Wildlife Service, 1978.

2/Information provided by Washington State Department of Fisheries, June 1979.

3/Skagit Wildlife Recreation Area Interpretive Center, DEIS, Washington State Department of Game, 1977.

Snow geese are present in the fall and winter months in the Skagit Delta. In past years, up to 30,000 have wintered in Skagit Flats; however, recently there has been a reduction in numbers, apparently thought due to undesirable nesting or feeding conditions in Siberia.[1/]

Trumpeter swans and whistling swans visit the Skagit Estuary, feeding mainly in shallows on vegetation. The trumpeter swan, once an endangered species, has increased in numbers in Skagit County from a 1963 population of 20 to a 1977-1978 population of 240. The major wintering habitat in the project reach for this species is the entire Nookachamps Creek drainage area, including its lakes, streams, sloughs, and pasturelands. In recent years, the amount of swan usage specifically in the Clear Lake-Beaver Lake area has been more prevalent in Clear Lake. Generally, this occurs during periods of prolonged cold when area lakes and streams freeze over.

Freshwater riparian habitat is important for waterfowl. The numerous sloughs adjacent to Skagit Bay are highly productive for mallards and wood ducks (Aix sponsa). Table 2-8 summarizes waterfowl production data for the project reach of the Skagit River.

TABLE 2-8

Waterfowl Production in
the Project Reach of the Skagit River

Habitat Type	Average Annual Production (ducks/mile)[1/]	No. of Species[2/]
Diked-in sloughs, Big Ditch to Milltown	45	9
Lateral Drainage, Gages Slough, Britt Slough	10	5
River	2	2
Tidal channels below limits of tree growth on Tom Moore Slough	2.5	1

1/Based on counts of both adults and broods.

2/Most numerous species are mallards and wood ducks.

Source: Summarized from data provided by Washington State Department of Game, Environmental Management Division, 1978.

1/Personal communication with members of Audubon Society, March 1978.

Photo 2-24. Woody riparian vegetation along left bank South Fork on Tom Moore Slough near Milltown provides productive habitat for waterfowl.

There are wading birds and songbirds in the areas of Milltown Island on the South Fork of the Skagit River. This island in particular has been identified as breeding habitat for the green heron (Butorides virescens) and bushtits (Psaltriparus minimus).

Shorebirds are numerous and diverse in the project area. Species include spotted sandpiper (Actitis macularia), gulls (Larus spp.), and yellowlegs (Totanus spp.).

Several species of birds of prey are found in the project area. These include bald eagle, the golden eagle, and osprey (Pandion haliaetus).

Large upland mammals, such as blacktailed deer (Adocoileus hemionus), in the project reach can be found on Hart Island and are occasional visitors to the estuary, although this type of habitat is not favored by such species. The abundance of small mammals in the Skagit Delta accounts for the presence of raptors in the area. Semiaquatic mammals such as muskrat (Ondatra zibethicus), mink (Mustela vison), and beaver (Castor canadensis) inhabit the sloughs.

2.07.5 THREATENED AND ENDANGERED SPECIES. The northern race of the bald eagle (Haliaeetus leucocephalus alascanus), now listed on the Federal List of Endangered and Threatened Wildlife and Plants, is known to occur in the project area. No nesting sites are known within the proposed project alinement; however, bald eagles nesting in nearby areas[1/], such as Ika Island, and wintering upstream of the study area are seen roosting in trees along the project reach and snags within the estuary, where the large number of small mammals attract birds of

1/Nesting information provided by Washington State Department of Game, 1978.

prey.1/ The greatest number of bald eagles on the Skagit River are found wintering in the Rockport/Marblemount area where they feed on spawned salmon carcasses.

Both Samish and Padilla Bays provide habitat for a relatively large number of wintering American peregrine falcons (Falco peregrinus americanus)2/ also listed on the endangered and threatened species list. It is speculated that these birds nest either in the coast range north of Washington or along the coast of British Columbia. One nest has been identified in Washington, but it is not within the project area. Identification of the Peale's and American subspecies is difficult; however, it is thought that the predominant wintering subspecies utilizing Skagit Bay is the Peale's peregrine falcon, which is not listed on the endangered species list.

No other endangered or threatened animal species are known to occur in the project area. No known plant species in the project area are included on the Federal List of Endangered and Threatened Wildlife and Plants.

1/Field observations, spring 1978, and personal communication with the Washington State Department of Game (WDG), January, 1979. On one morning in January, WDG personnel counted 20 eagles in the lower Skagit Delta. Most were seen roosting or feeding in the Skagit Estuary.

2/ Information obtained from Dr. Steven Herman, Evergreen State College, 1978.

3. RELATIONSHIP OF THE PROPOSED PROJECT TO LAND USE PLANS

3.01 EXISTING LAND USE. The current land use in the study area flood plain is primarily agricultural, with some residential and commercial development located in and around the cities of Mount Vernon, Burlington, Sedro Woolley, La Conner, and Stanwood. The areas upland of the study area are primarily forested and undeveloped.

Figure 3-1 shows the current land use within and adjacent to the study area. This map is a composite of information from 1978 aerials, U.S. Geological Survey topographic maps, 1974 Washington State Department of Natural Resources orthophoto maps, and 1973 land use maps. The land use categories on the map are similar to those of the revised Skagit County Comprehensive Plan. Further discussion of these categories follows in paragraph 3.02.

Several local, county, state and Federal plans and programs have directly or indirectly influenced land use within the study area. The local and county plans recognize development restrictions associated with the flood plain, and their plans have generally encouraged development in upland and incorporated areas. State and Federal programs encourage protection of wetland areas and controlled development within flood plain boundaries.

The proposed project will provide 100-year or more flood protection to 14,200 acres of the existing Skagit Delta flood plain area and 50-year flood protection to an additional 39,600 acres. This will accelerate development pressure, particularly in 9,500 acres of farmland incidentally being provided 100-year protection in order to protect existing urban areas. The intent of the proposed project is not to encourage development of farmland, but to reduce flood damages to existing development within the flood plain; no project benefits have been claimed for any higher or more intensive use of the land within the study area.

3.02 LAND USE PLANS AND REGULATIONS. Land use and development of the Skagit River flood plain is directly or indirectly regulated by city, county, state, and Federal laws and regulations. The land use laws and plans which apply to this area are discussed in paragraphs 3.02.1 through 3.02.8.

Figure 3-2 is a composite map of the proposed future land uses as indicated by the comprehensive plans of the local jurisdictions. Many of the local land use plans recognize flood plain restrictions and the importance of flood protection; however, none of the comprehensive plans have assumed flood protection in their land use designations. The land use categories shown on this map are similar to the designations of the revised Skagit County Comprehensive Plan. The minimum lot sizes indicated are the smallest size into which the land can be divided, with or without intention of constructing a residence. A brief summary of land use categories follows:

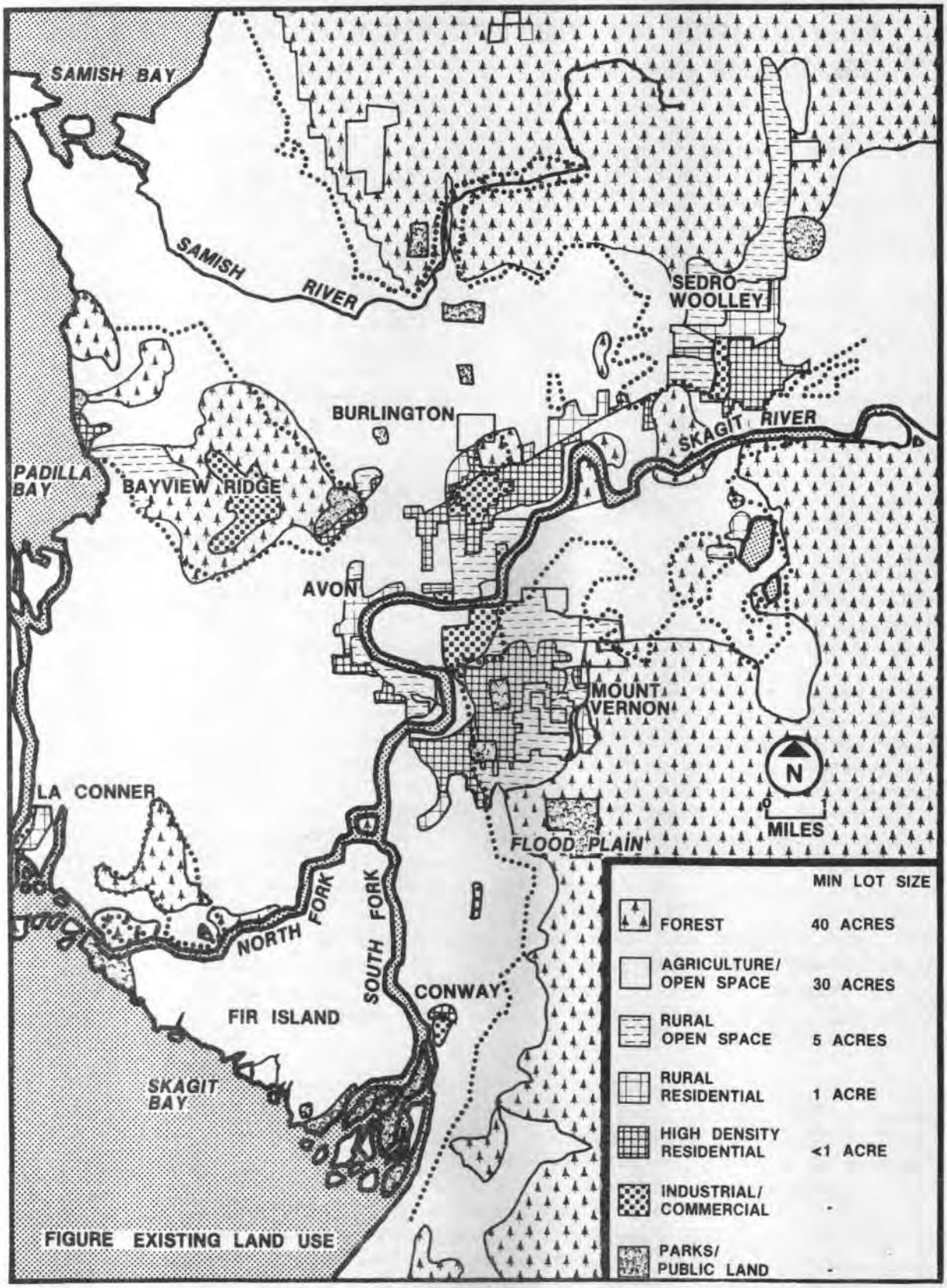

FIGURE 3-1 EXISTING LAND USE

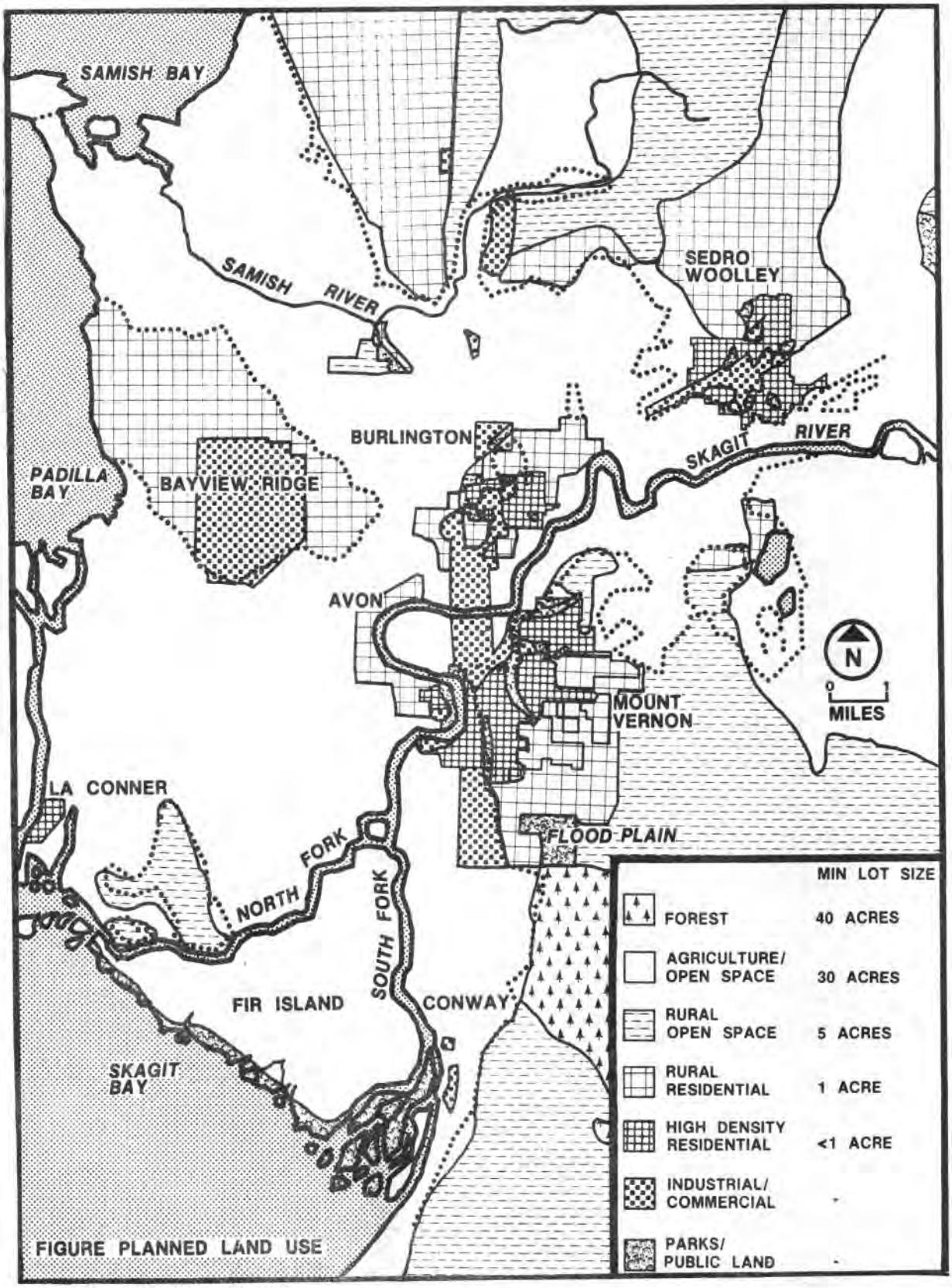

FIGURE 3-2 PLANNED LAND USE

Category	Purpose of Category	Lot Size
Forest	Protection of forestry land for sustained forest product production	40 acres
Agriculture/ Open Space	Permit uses related to agricultural production; prohibit urban encroachment on agricultural land	30 acres
Rural Open Space	Permit low density development in areas of limited agricultural or timber value	5 acres
Rural Residential	Provide single-family dwellings, primarily on fringe of high density development	1 acre
High Density Residential	Provide single-family and multiple-family dwellings in dense residential environment	1 acre
Industrial/ Commercial	Provide areas which are capable of developing as commercial and industrial uses which would not create nuisances or hazards	--
Parks/Public Lands	Provide areas or facilities to be used to the public's benefit	--

3.02.1 CITY PLANS. Mount Vernon, Burlington, Sedro Woolley, La Conner, and Stanwood are within the study area. Development within each of these cities is regulated by comprehensive plans and zoning ordinances. Conway and Avon are unincorporated towns within this area, and development within these areas is regulated by Skagit County.

The Comprehensive Plan and plan map for Mount Vernon were adopted in 1976. The objectives of the plan include accommodating controlled growth; encouraging quality development; preserving the existing environmental quality, rural setting, and lifestyles of the residents; and encouraging continued development of the city as a regional center. It discourages annexation of agricultural lands and westward expansion of the city into the flood plain area. The Comprehensive Plan map shows a city of primarily single-family houses, with industry concentrated along I-5 and a network of parks, agriculture, and public open space running throughout the city and along most of the Skagit River. One policy of the Comprehensive Plan restricts land uses between the dikes and the river to open space, agriculture or park lands. The city currently has two riverside parks, Edgewater and Roadside, and is trying to acquire additional land for northward expansion of Roadside Park. Neither of the existing parks is protected by a levee.

The proposed levees will provide 100-year flood protection for approximately 150 acres of land within the western portion of Mount Vernon and Standard Project Flood Protection to about 1,100 acres on the left bank of the river in Mount Vernon. This would include all of the existing flood plain area in the city except land between the existing river levees. Most of the land in this flood plain area is designated as commercial, manufacturing, or multiple-family residential use on the zoning and Comprehensive Plan maps. Roadside Park will have levee protection with the proposed action, although the new park area and the Edgewater Park will not have protection. The proposed action will not conflict with Mount Vernon's plans or zoning.

The General Plan for the city of Burlington was prepared in 1975. This plan recognizes the importance of agriculture in the economy of the Skagit Valley and that much of the agricultural land on the edge of the city has been infiltrated by residential development. The plan also recognizes that development in Burlington has been limited by flood plain restrictions since nearly all of the city is within the 100-year flood plain. The future land use recommendations in the General Plan are made with these two factors in mind. The location criteria for designating the future land uses in the plan are based primarily on the flood plain restrictions. For example, the plan suggests that most of the future residential development take place in the northeast and east portions of the city because those areas are at a somewhat higher elevation than the rest of the city and would require less fill to develop. Most of the residential development in recent years has occurred in these two areas, and the school district has purchased property in this area in anticipation of this trend continuing.

An additional General Plan recommendation is that SR 20 be located on a levee to the south of Burlington, although the plan recognizes that the feasibility of this route is based on Federal funding for development of the levee and roadbed.

The Corps of Engineers' proposed levee improvement project will provide 100-year flood protection to Burlington. The increased protection will allow building to occur in Burlington without requiring fill. This may encourage further development in the western and southern areas of Burlington where growth was previously slowed by fill restrictions.

The Comprehensive Plan for Sedro Woolley was adopted in 1977. This plan contains population forecasts, as well as goal and policy statements relating to the future physical, social, and economic development of Sedro Woolley. Although the plan is recent, it will be amended early in 1979 to reflect the proposed southerly route of SR 20. The City of Sedro Woolley also prefers the southerly route alternative with construction of SR 20 combined with flood protection efforts. The zoning code was prepared in 1971 and is currently being updated. The proposed changes in this code are primarily distinctions in industrial zones.

Only a very small portion of Sedro Woolley is in the flood plain. The proposed levee improvements will include floodproofing of the Sedro Woolley sewage treatment plant and the provision of 100-year protection

to the Sedro Woolley-Sterling area. The proposed project is not expected to impact Sedro Woolley land use or plans.

The city of La Conner is located along the Swinomish Slough at the western edge of the Skagit flood plain. The zoning and land use plans for the city attempt to preserve the existing quality of life which is available to residents. These plans do not assume flood protection improvements or mention flood restrictions in any way. However, the city has been concerned about flooding and supports the proposed project. Stanwood is located in a two-river flood plain. The flood plains of the Skagit and the Stillaguamish Rivers overlap north of Stanwood. Approximately 50 percent of the city is within the flood plain, and as much as 2-1/2 feet of fill are required in some places for building in accordance with zoning restrictions imposed due to the Federal flood insurance program. Stanwood's zoning code (1965) and Comprehensive Plan (1976) will not be affected by the proposed project. The city also has a shoreline master program. No conflicts with this plan are expected.

3.02.2 COUNTY PLANS. The 100-year flood plain is within the Northwest, North Central, and Southwest planning districts of the Skagit County Comprehensive Plan. The policies and maps for the Northwest and North Central Districts were adopted between 1973 and 1975; the policy statements and plan map for the Southwest planning area are currently in draft form. The general intent of these plans is to keep residential and commercial development within, or adjacent to, major highways and existing urban areas. The plans are similar to the 1973 zoning map with a somewhat lower density residential development permitted in the areas which are distant from the incorporated areas.

The portion of the study area which will receive approximately 50-year flood protection by the proposed project is designated primarily as Agriculture (uses which relate to agricultural production) and Rural Open Space (low density residential development on 5-acre minimum lots). In addition, two small Commercial/Industrial areas will be within the 50-year flood protection area along the Burlington Northern Railroad right-of-way. More than half of the area which will receive 100-year flood protection by the proposed project is designated as Agriculture; the remainder is designated as Rural Residential (single-family units on 1-acre minimum lots) and Commercial/Industrial. The 100-year or more urban flood protection provided by the proposed project could cause pressure to change the present zoning to permit development of areas currently designated agricultural. It is expected that Skagit County will maintain present zoning with or without the project.

A policy statement in the Northwest District Comprehensive Plan advocates a southerly route for SR 20 which would provide flood protection for Burlington by using the highway as a levee, as well as cause the least disruption of agricultural and urban land. The proposed levee project provides flood protection to Burlington, but does not follow the proposed southerly route for SR 20 along the right bank of the Skagit

River. The alinement for the levee project along the proposed SR 20 route was considered, but was found to create severe impacts of increased flooding of more than 5 feet during a 100-year flood in the Nookachamps/Clear Lake area.

3.02.3 SHORELINE MANAGEMENT PLAN. The Washington Coastal Zone Management Program, established pursuant to the National Coastal Zone Management Act, is implemented by the Shoreline Management Act. In accordance with requirements of the state act, local shoreline master programs are prepared. Skagit and Snohomish Counties and Stanwood have master programs for the study area. The Skagit County Shoreline Management Master Program was prepared in 1976 and designates four types of shorelines within the study area: Urban, Rural Residential, Rural, and Conservancy. The proposed levee work will primarily be within the Rural designation with some work in the Urban and Rural Residential designations in the area of Mount Vernon. Shoreline stabilization and flood protection measures are permitted in these designations subject to the general regulations contained within the program.

Snohomish County's Master Program was completed in 1974. The environmental designations for the flood plain area are Rural and Conservancy. Flood control measures are permitted uses within these zones subject to the general regulations of the plan.

Stanwood's Master Program was completed in 1975. The proposed levee improvements will not involve construction within the city of Stanwood. The city does not see any conflict between the proposed project and their plan.

3.02.4 REGIONAL PLANNING AGENCIES. The Port of Skagit believes that the proposed project will have positive impacts on their projects and plans. The Port owns several parcels of land in the Skagit River area: a 69-acre industrial area between Burlington and Mount Vernon, a pole yard at Conway, and a marina in La Conner on Swinomish Slough. The pole yard and industrial park are in the flood plain. The pole yard will receive 50-year flood protection, and the industrial area will receive 100-year flood protection from the proposed project. The Skagit Regional Planning Council is composed of 12 member agencies: Port of Anacortes, Skagit Public Utility District #1, Mount Vernon, Sedro Woolley, Burlington, La Conner, Anacortes, Lyman, Concrete, Skagit County, the Swinomish Tribal Community, and the Skagit Soil Conservation District. The Council has done a series of studies on demographics, overall economic development, transportation development, and land use planning alternatives for Skagit County. The Overall Economic Development Program (1978) identifies the Lower Levee Flood Control project as the number one priority project for the region; the proposed levee improvement project will meet this goal. The Council's Transportation Development Program (1978) recognizes that the southern route of the SR 20 bypass is the favored route, with or without its combination with the levee improvement project. In addition, the Council will be preparing a regional park and recreation plan in the future.

3.02.5 STATE PROGRAMS, PLANS AND PROJECTS. Substantial work or development within 200 feet of the natural shoreline requires a Shoreline Management Permit. Such permits are issued by local government agencies and reviewed by the Washington State Department of Ecology. Skagit and Snohomish Counties are the agencies which will issue the permit for the proposed project.

The Washington State Department of Natural Resources (DNR) is the state's major owner and manager of marine and upland property. In 1975, a River Management Policy Plan was prepared to guide management of wetland areas to be consistent with the comprehensive plans; environmental and land use programs; existing local and state regulations; public and private interests; and the multiple-use values of rivers. The DNR is currently preparing a River Management Plan for the Skagit River. In regard to the proposed project, the DNR has requested that the fill for the levee improvement be brought in from outside sources to leave the streambeds undisturbed. The proposed levee improvement project will not utilize streambeds as borrow sources. In addition, the DNR manages the school property island between the North and South Forks of the Skagit River. This island currently has public access at the northeast corner by a road along an existing levee. The DNR prefers that this public access continue to be available following any levee improvement.

The Washington State Department of Fisheries is responsible for preservation, perpetuation and management of the state's food and shellfish resources. The State has a number of salmon enhancement programs planned for the Skagit River Basin, but none within the study area. These programs include a habitat improvement project, an egg incubation box program, a hatchery, and an increased salmon production program at the Skagit Hatchery, located upstream of the study area.

The Washington State Department of Game manages game, fish, and wildlife in the study area. The Department of Game has plans for enhancement and restoration of game fish resources of Skagit Basin including a steelhead production increase in Barnaby and Harrison Sloughs between Rockport and Marblemount upstream of the study area; a rearing facility on the Sauk River; and studies to identify solutions to the fish damage resulting from the hydroelectric dam.

The Washington State Parks and Recreation Commission acquires, developes, operates, and maintains parks and recreation areas for general public use and enjoyment. The Parks and Recreation Commission does not have any plans or programs in the project area.

The Interagency Committee for Outdoor Recreation is a State agency which provides grant funds for obtaining parks, but leaves the planning, development, and management of these parks to other local and State agencies. This agency is not currently involved in funding any parks in the project area.

The Washington State Department of Transportation has conducted a preliminary study of alternative routes for SR 20 between Burlington and Sedro Woolley. Included in these alternative routes was a southerly

route for SR 20 which could be combined with a levee. The Corps of Engineers and the Transportation Department have been in coordination regarding the proposed levee improvement project and the SR 20 project.

The Washington State Department of Ecology (DOE) reviews all projects which require local shoreline management permits and, therefore, would review the permits granted for this project by Skagit County and Snohomish County. The DOE also issues permits for all work done in designated flood plains under RCW 8616. The Skagit Valley is a designated flood plain, and the project will, therefore, require a State flood control zone permit. In addition, the DOE issues water rights permits, but the project will not require such a permit or conflict with existing water rights in the area.

3.02.6 FEDERAL REGULATIONS AND POLICIES. There are many Federal regulations which are applicable to the proposed action. Section 103 of Public Law 89-90 established principles and standards for planning the use of the nation's water and related land resources. The proposed project has been formulated in compliance with these principles and standards. Refer to chapter 6 for additional discussion.

Executive Order 11988 applies specifically to flood plain management. Its objective is to "avoid short term adverse impacts associated with occupancy and modifications of flood plains, and to avoid direct and indirect support of floodplain development whenever there is a practicable alternative" (Corps of Engineers Regulation 33 CFR 239.6). The proposed action will alter the 100-year flood plain boundaries in the project area by providing increased flood protection. Lower flood insurance rates may be expected for those businesses and residents in the existing flood plain, and flood proofing will no longer be required in areas provided 100-year or more protection. Development pressure in areas provided a high level of flood protection, and to a lesser extent in areas provided 50-year protection, can be expected to increase. Floodproofing will still be required in areas with 50-year protection, which will tend to discourage intensive development and to preserve agricultural land use. Providing 100-year flood protection to the urban areas unavoidably results in a high level of protection to approximately 9,500 acres of prime farmland (see figure 4-1). Unless current zoning is enforced, the loss to this area from increased development would be significant. An EO 11988 analysis following the eight-step decision-making process was performed during planning of the proposed project. Alternatives were evaluated, impacts assessed, and the determination made that to achieve the planning objective of reduced flood damages, there is no practicable alternative to locating in the flood plain. Given that there is no practicable alternative, EO 11988 directs agencies to adjust to the flood plain. The proposed project adjusts to the flood plain to:

a. reduce the hazard and risk of flood loss;

b. minimize the impacts of floods on human safety, health, and welfare; and

c. mitigate adverse impacts, and restore and preserve natural and beneficial flood plain values to the extent possible within the planning constraints.

The project is, therefore, basically compatible with EO 11988. The public has been kept informed of the study progress and the trade-offs involved in achieving flood damage reduction for the study area and has been given the opportunity to provide meaningful input into project formulation (see chapter 9). The public notice requirements of Section 2(a)(2) Executive Order 11988 will be accomplished through normal reporting procedures as required by Corps of Engineers regulations. Likewise, the A-95 Clearinghouse requirements of Section 2(a)(3) of EO 11988 will be accomplished.

Protection and preservation of wetlands is mandated by Executive Order 11990. This applies specifically to governmental actions. The order instructs all Federal agencies to develop priorities and guidelines to protect these areas. The Corps of Engineers has established such policies. A wetland inventory for the project area has been completed and provides a data base for policy implementation. The nature of the proposed action will require some construction activities within certain areas designated as wetlands. Measures have been incorporated into the project to minimize unavoidable destruction of these sensitive areas or alterations of their functions.

In compliance with Section 404 of the Clean Water Act of 1977, an evaluation of the impacts of instream filling has been accomplished during project planning. To achieve desired flood control, some disruption and alteration of wetland areas as well as filling in waters of the United States is necessary; although, impacts to wetlands have been avoided where possible. A Section 404(b) evaluation report which addresses evaluation factors as defined by the U.S. Environmental Protection Agency Guidelines is attached as appendix 1.

3.02.7 FEDERAL PROGRAMS, PROJECTS, AND PLANS. Federal agencies which have programs, plans or projects in the study area are discussed below.

The National Park Service and U.S. Forest Service are jointly studying the feasibility and desirability of designating a "Pacific Northwest National Scenic Trail" extending approximately 1,000 miles from the Continental Divide in Glacier National Park, Montana, to the Pacific Ocean beach of Olympic National Park, Washington. One of several routes is along the Skagit River through the study area. Any major changes in the esthetic quality of the river or its banks could eliminate this area from further consideration. The proposed levee project would not affect the Services' plans and would be compatible with the proposed scenic trail since esthetic considerations are included in the project's design.

The Skagit River, from the pipeline crossing at Sedro Woolley upstream to and including the mouth of Bacon Creek, has been designated as a recreational river by the U.S. Department of Agriculture under the Wild and Scenic Rivers Act Amendments (Public Law 95-625 Title VII, Subtitle A, Section 703, Subsection 3(a)). Under this designation ". . . no department or agency of the United States shall recommend authorization of any

water resources project that would have a direct and adverse effect on the values for which such river was established, as determined by the Secretary charged with its administration, or request appropriations to begin construction of any such project . . . without advising the Secretary of the Interior or the Secretary of Agriculture . . ." (Public Law 90-542, 82 Stat. 913, Section 7). The proposed Corps project in the Skagit River will terminate at Sedro Woolley. The project area is, therefore, not included in the "recreational river" designation. No adverse effects are expected further upstream. Coordination has been maintained with the U.S. Forest Service (Department of Agriculture) regarding the proposed project and its environmental impacts, and a final determination of the project impacts on the designated reach will be forthcoming from the Service now that review of the draft EIS has been completed. When received, the determination will be appended to this final statement.

The U.S. Department of Housing and Urban Development administers the National Flood Insurance Program. In general, the program provides Federal Flood Insurance to those flood-prone communities which adopt regulations restricting construction in flood hazard areas. All communities in the project area, as well as the unincorporated areas of Skagit and Snohomish Counties, are participants in this program. The Federal Insurance Administration is currently conducting detailed studies of the flood hazards in these areas. The products of these studies will ultimately be used as a major criterion for land use regulations as well as establishing the basis for the area's insurance rates.

Under the Wilderness Inventory Study, the U.S. Department of the Interior, Bureau of Land Management, is currently reviewing islands at the mouth of the Skagit River to determine if they have wilderness characteristics. The proposed levee project does not impact these islands.

3.02.8 OTHER ACTIVITIES. Seattle City Light is presently studying the feasibility of constructing a dam on the Skagit River near Copper Creek, about 45 miles east of Sedro Woolley. The purpose of the 120,000 acre-feet reservoir created by the dam will be to produce power and reregulate discharges from upstream dams. The Corps of Engineers project would not affect, nor be affected by, the Copper Creek Dam project. The distance between the two projects would be expected to mitigate any changes in downstream flow characteristics during the construction phases. The proposed Copper Creek project would offer only minor incidental flood control benefits.

Puget Sound Power and Light Company is planning a nuclear power station at Sedro Woolley. No conflicts between the levee project and the nuclear power plant are anticipated.

If the Corps of Engineers' levee project is constructed at the same time as either Copper Creek or the nuclear power plant, much of the construction labor force in northwest Washington would be required.

4. PROBABLE IMPACTS OF THE PROPOSED ACTION ON THE ENVIRONMENT

4.01 INTRODUCTION. Probable impacts of the proposed action were determined from analyses of data collected from literature search; field inventories and surveys of the project reach; economic and hydraulic and hydrological studies; and coordination with Federal, state, and local agencies and the public. Throughout plan formulation, information gained from impact assessment activities was considered with the overall objective of avoiding adverse environmental[1/] impacts where feasible. The evaluation of impacts is discussed in this chapter in terms of the study area as a whole and the project reach of the Skagit River specifically. The narrative indicates where features were incorporated into the project to avoid adverse environmental effects and what features are proposed to minimize those adverse effects which cannot be avoided.

Two major categories of impacts are considered, primary and secondary. Primary impacts are those directly associated with project construction; secondary are those which result indirectly from project implementation. Impacts within these categories may be either adverse or beneficial; short-term or long-term. An example of a long-term, primary, beneficial impact of the proposed project is flood damage reduction; an adverse, short-term, primary impact is disruption to wildlife during project construction. An example of a beneficial, short-term, secondary impact of the proposed action is stimulation of the local economy due to increased employment during project construction; an adverse, long-term, secondary impact is project-related induced flood damage to certain areas outside the proposed levee improvements.

THE STUDY AREA

4.02 IMPACTS ON SOCIOECONOMIC FEATURES OF THE STUDY AREA.

4.02.1 LEVEL OF FLOOD PROTECTION.[2/] Implementation of the proposed project will provide protection for the 50-year flood frequency to the Skagit Delta from Mount Vernon downstream to the mouths of the North and South Forks, and to the Samish overflow area from flooding of the Skagit River. Protection for the 100-year flood frequency will be provided to the urban areas of Sedro Woolley-Sterling, Burlington, Avon, west Mount Vernon, and Clear Lake, and for the Standard Project Flood frequency to Mount Vernon. Project design will assure that no worse than existing conditions are experienced by the Samish overflow area for the 100-year flood frequency. In addition, nonstructural measures, such as flood-proofing, relocations, and flowage easements, will provide general flood protection and minimize induced flood damages to 6,300 acres remaining unleveed by the project (refer to figure 4-1). In total, 14,200 acres will receive urban protection, and 39,600 acres will

1/Environment includes social, cultural, and natural environments.

2/Information from the Skagit River, Washington, General Design Memorandum, Seattle District, Corps of Engineers, July 1979.

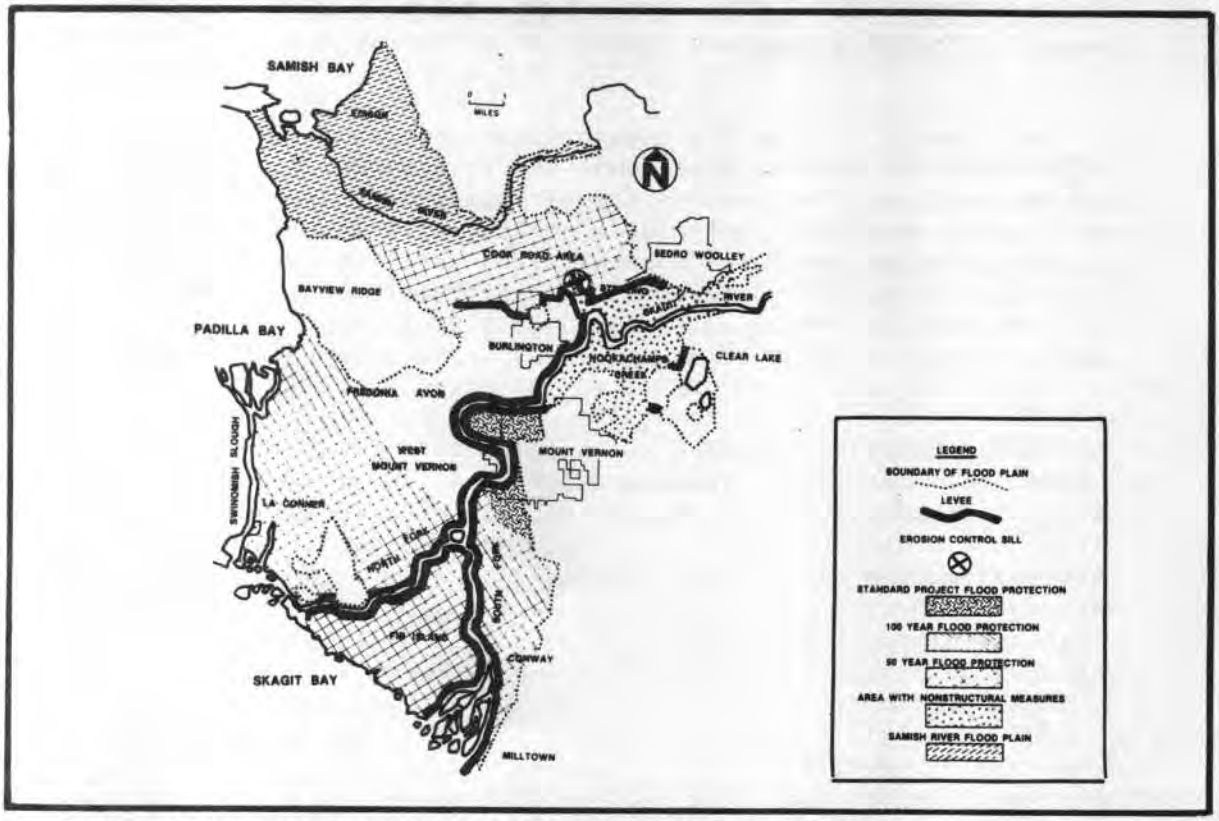

FIGURE 4-1. FLOOD PROTECTION PROVIDED BY THE PROPOSED LEVEE IMPROVEMENTS

protection. Due to allowance in the project design for sedimentation over the 100-year economic life of the project, the level of protection at project year 1 will be something greater than 50 years for the rural areas and 100 years for the urban areas; however, this increased protection is temporary and will decrease in time to the level of protection for which the project is designed.

The level of protection provided by the project will be accomplished through structural measures including levees, closure structures on Fisher Slough and the East Fork Nookachamps Creek, floodwalls through Mount Vernon, buried erosion sills at Sterling, and nonstructural measures including relocations, floodproofing, and flowage easements. The erosion sill will be in two segments totaling 2,500 feet (refer to plate 3). Construction of the sills will involve the excavation of a 90- to 100-foot-wide trench to a depth of about 5 feet, placement of sheet pile in the ground, backfilling, and grass seeding. An earthen berm over the sill (approximately 1 foot above ground level) will provide 50-year protection to the Samish overflow area. When a greater than 50-year event occurs, overtopping will begin, causing erosion, which will continue until the control sill elevation is reached, thereby regulating the amount of water being discharged to the Samish Valley and insuring that the same volume of water flows down the Samish overflow area in the 100-year event as under existing conditions. Between 50- and 100-year events, flood volumes to this area will be something less than under existing conditions.

After selection of the proposed project, design refinement of the levee system to preclude catastrophic flooding required that the levees be designed to permit backflooding or gradual flooding once the design flood level is exceeded. This was accomplished by varying the levee freeboard and providing designed overflow areas in the levee at the Skagit River forks for the rural levees and at the mouth of Gages Slough and upstream at the Burlington Northern Railroad bridge for the urban levees. As a part of these studies, it was determined that Standard Project Flood protection could be provided to the portion of Mount Vernon on the east side of the river if the levee top was raised 0.4 foot. This addition to the selected plan was considered appropriate because substantially higher protection could be provided with relatively little cost increase. The sequence of flooding in the study area under "with project" conditions is presented in paragraph 1.04 and displayed in figure 4-1b.

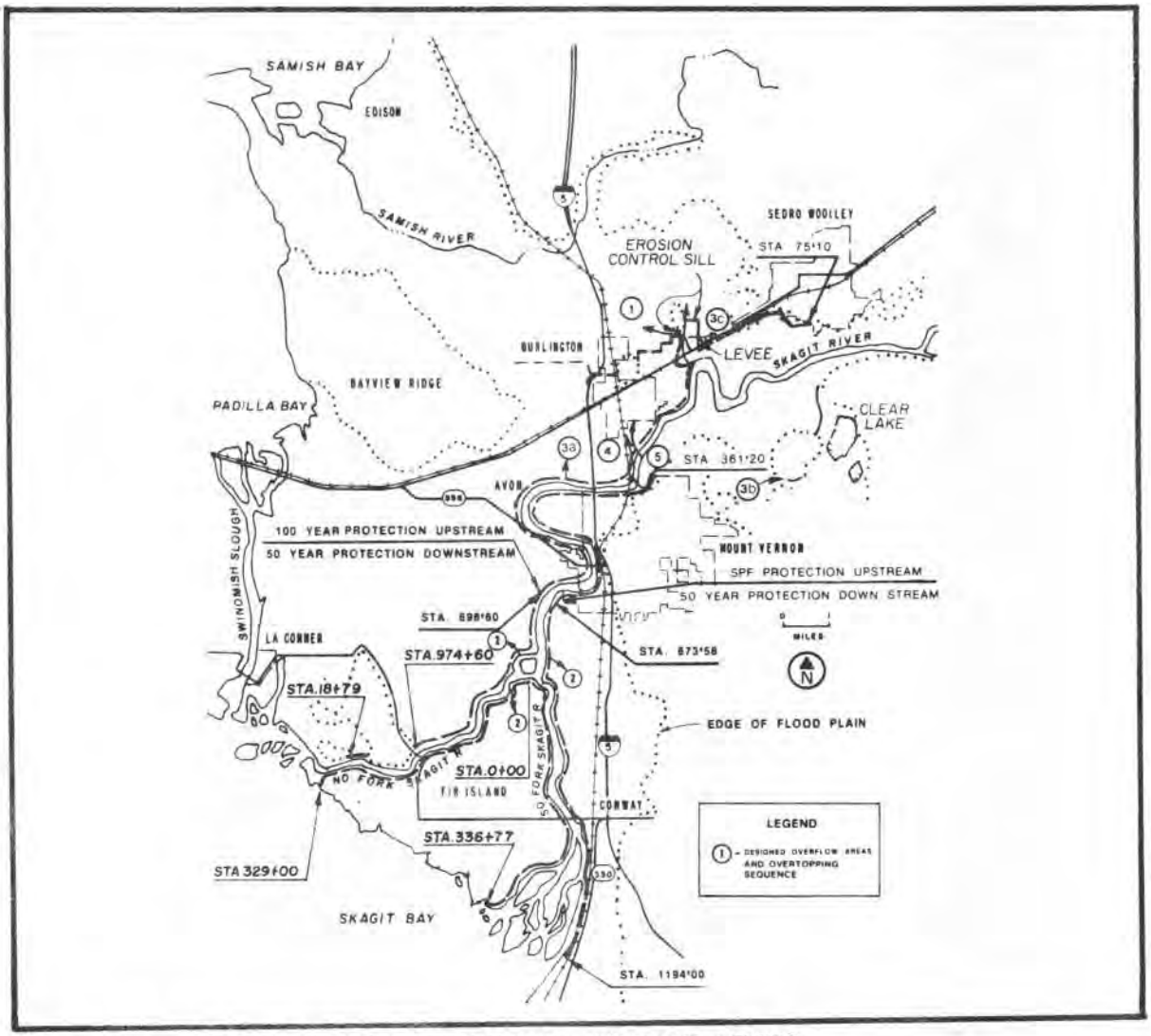

FIGURE 4-1b. DESIGNED OVERFLOW AREAS WITH PROPOSED LEVEES.

The different levels of protection provided by the project are appropriate for rural, urban, and suburban areas. For the rural levees, a 50-year level of protection was selected during the study because it was the level that achieved the maximum net benefits on rural lands. Also, 50-year protection is completely acceptable for rural agricultural lands without concentrated urban centers. Skagit County desired that no more than 50-year protection be provided so that pressure for more intensive development of farmland would be avoided.

For the urban levees, a 100-year level of protection was initially established to compare alternative plans. Standard Project Flood protection is considered appropriate for urban areas where it is justified by the benefits received. However, levels of protection for the entire Mount Vernon-Burlington urban area in excess of 100 years would sequentially involve the raising or replacement of the Burlington Northern Railroad bridge at Mount Vernon at $30 million, the Mount Vernon highway bridge at more than $4 million, and the "old 99" highway bridge at more than $4 million. Because of these bridges, the provision for any higher levels of protection for the entire urban area would involve significant increases in project costs with little gain in benefits. Alternatives including bridge removal could not be economically justified. Therefore, protection greater than 100 years was not considered feasible except along the left bank in the Mount Vernon area.

4.02.2 FLOOD DAMAGE REDUCTION. Existing average annual flood damages for the study area are $1,582,000 for the right bank urban areas, $3,030,000 for the left bank urban areas, $2,051,000 for the rural areas, and $386,000 for other areas including the Samish overflow, Clear Lake, unleveed west Mount Vernon, Nookachamps area, Sterling area, and Sedro Woolley. Total average annual damages amount to $7,049,000. If the proposed project were in operation in October 1978, an estimated $5,455,000 in average annual damages would be prevented by the structural components, and $5,510,000 in average annual damages would be prevented by all proposals in the total project area including those areas where nonstructural measures are proposed. The annual damages not prevented would be an estimated $1,539,000.

4.02.3 INDUCED FLOOD DAMAGES. In the areas that will remain unleveed by the proposed project, flood depths from a 50-year to about a 500-year event will be increased. Nonstructural measures, as described in paragraph 1.04, have been incorporated into the project to minimize induced damages. As a result, no structures in the unleveed areas will incur increased flood damages as a result of the project; livestock mounds will be raised to be 1 foot above the 50-year flood level; and flowage easements will be obtained for all land which, without the project, would not be flooded, but will be flooded because of the project. Each landowner within the unleveed areas will be contacted during further detailed study to discuss the nonstructural measures that will be used for his/her property.

Average annual remaining project-related induced damages total $11,000 which may be incurred by a log storage area, about 4,000 lineal feet of railway line, and Highway 20 in south Sedro Woolley where the 50- and

100-year water surface profiles will be raised by approximately 1 foot as a result of the proposed project. The upstream limit of project-induced flooding is near the pipeline crossing at Sedro Woolley; therefore, no impacts will occur on private forest land above the proposed levee system.

4.02.4 FLOODPROOFING COSTS. Existing State of Washington flood plain zoning laws[1/] and HUD regulations[2/] require that all new residential development in flood-prone areas be floodproofed to the 100-year level of protection. In the urban areas that will receive 100-year protection by the project, floodproofing requirements will be eliminated for the residential and commercial development now expected to take place without additional flood protection. In those portions of the study area receiving less than 100-year protection, floodproofing will still be required.

4.02.5 LAND USE. The flood plain presently is used for residential development, commercial development, and agricultural production. The project will provide 100-year protection to 14,200 acres within the Skagit Delta. Approximately 9,500 acres, or 67 percent, is currently in agricultural use (Clear Lake area and area west of Burlington) and will be incidentally provided 100-year protection in order to provide a high level of protection to existing urban areas (refer to figure 4-1). In the areas where 100-year protection is provided, floodproofing will no longer be required. This will result in an increase in pressure to develop in the protected flood plain, although the intent of the project is to protect existing development and development that would occur in the future without the project, and no benefits have been claimed for any higher or more intensive use of the flood plain. Development pressure, although less intensive, will also increase in rural areas provided 50-year protection because flood insurance rates and floodproofing costs will be reduced. The requirement for floodproofing will tend to discourage intensive development and to preserve the beneficial use of the flood plain for agriculture and pastureland.

The potential for changes in land use is one of the tradeoffs involved in providing flood damage reduction. The extent that land use is altered in the study area as an indirect result of the project will depend upon the enforcement of existing local land-use regulations. Flood plain management is an integral part of the proposed project. Unwise development of the protected flood plain would have a significant impact on Skagit County economy and flood plain resources and would commit the study area to continued flood control problems in the future (see paragraph 3.02.7 for a discussion of the relationship of the project to Executive Order 11988).

4.02.6 ENERGY. Energy usage in Skagit County may experience a short-term increase during the 4-year project construction period if employees

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1/Washington State Flood Control Zone Act of 1935, State of Washington's Shoreline Management Program.

2/U.S. Department of Housing and Urban Development's National Flood Insurance Program.

are brought in from out of the study area. As an indirect result of the project, energy usage in the county may experience an increasing trend due to increased development pressure in the protected flood plain.

A beneficial secondary impact of the project may be realized by a reduction of the chronic consumption of energy required without the project for flood fighting, evacuation of residents, emergency levee repair, replacement or repair of residential and commercial structures and contents, and replacement of mobile equipment such as automobiles and trucks. In addition, the chronic consumption of energy required for repairing flood-damaged roads, bridges, and public utilities will be reduced due to the project.

4.02.7 WATER SUPPLY. . The contamination of ground-water supplies during flooding will be reduced as a result of the increased flood protection provided by the project.

4.02.8 PUBLIC FACILITIES. 1/ No long-term, adverse impacts upon existing public facilities and services are foreseen due to the project. Temporary detours will be necessary during project-related alteration of some county roads. Raising the levees will increase protection from flooding of the Mount Vernon Sewage Treatment Facility, the Burlington Sewage Treatment Facility, the Anacortes Water Treatment Plant, and other county and municipal facilities, including the Skagit County Public Utility District. The Sedro Woolley Sewage Treatment Plant will be floodproofed as part of the nonstructural features of the proposed project.

4.02.9 COMMUNITY SERVICES. 1/ Proposed levee alinements will increase flood protection afforded several community services including the Mount Vernon and Burlington Police Departments and Libraries, the Burlington Fire Department, community mental health organizations, and other Skagit County and municipal offices. The United General Hospital between Burlington and Sedro Woolley will be provided 100-year protection due to the proposed levee added along District Line Road. Some community facilities have emergency action plans that will allow them to maintain service at alternate locations during flooding. Increased flood protection will relieve them of the necessity to move their equipment during a flood and allow them to concentrate on their role in the flood fight.

4.02.10 EMPLOYMENT. 1/ No permanent loss of employment is foreseen as a result of the project. Project construction itself will provide jobs for the unemployed; wages paid to local residents on the project are estimated at $5,168,000. Labor requirements for construction will average 167 workers per month over a 50-month period.

1/This item is specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

4.02.11 TAX REVENUES. 1/ A total of 72 homes will be relocated as a result of this project. Tax loss to the county is not expected to be significant, since the homes will probably be relocated to another part of the county. Tax loss may occur at the community level if relocation involves moving a home from one tax district to another. Tax revenues may be expected to increase with any improvement in property values resulting from increased flood protection.

4.02.12 PROPERTY VALUES. 1/ Property values could increase in accordance with the degree of flood protection provided in each area. Downtown, west, and south Mount Vernon are subject to the threat of severe flooding, while the possibility of flooding is more moderate in north Mount Vernon and Burlington. Flooding of farmlands has been severe in the past. Completion of the project will allow federally insured lending institutions to make loans for new construction and improvements in the former flood plain that will be provided with 100-year protection.

4.02.13 REGIONAL GROWTH. 1/ Regional growth is not expected to be affected by the proposed project.

4.02.14 COMMUNITY GROWTH. 1/ Where the improved levee lies adjacent to waterways, it will have no adverse effect on community growth. The relocation of 11 homes due to construction of the project structural features is not expected to significantly impact growth in any individual community or the county. The relocation of approximately 61 homes as a result of nonstructural measures will disrupt community growth in the unleveed areas and may increase growth in other areas depending upon where the homes are relocated.

Secondary impacts of increased community growth may result from increased pressure to develop in the protected flood plain.

4.02.15 BUSINESS AND INDUSTRIAL ACTIVITY. 1/ No significant impacts to business and industrial activity are expected to result from the proposed project; however, the extent of any impact is dependent upon the degree that existing zoning is enforced in the protected flood plain. During project construction, there will be some temporary disruption to business activity in Mount Vernon where the floodwall and levees will be constructed through town.

4.02.16 LOCAL GOVERNMENT FINANCE. As the local sponsor for the proposed project, Skagit County must assume all non-Federal project costs. These costs will be paid out of current county operating revenue or from general obligation bonds and intergovernmental agreements between the county, the cities, and the diking and drainage districts.

1/This item is specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

4.02.17 COMMUNITY COHESION. [1/] The proposed levee alinements are situated so as not to cause long-term interference with community activities or business routines. There will be short-term impacts resulting from disruption during project construction. Beneficial impacts to public health and safety will be realized after project completion because of increased flood protection.

Community response to the proposed project differs between urban and rural residents within the study area. Many urban business persons appear to discount the possibility of severe flooding and dismiss the project as an example of Governmental interference with their daily lives and an unnecessary increase in their taxes. Many of these people have never really experienced flooding, although they have been threatened on several occasions. Many rural residents, on the other hand, have actually suffered losses due to flooding. Although many rural residents were initially opposed to additional levee construction (many expressed a preference for dredging the Skagit River), the majority seem to recognize the benefits of levee improvement and appear generally supportive of the project.

Those people living in the communities where the proposed project will cause induced flooding are divided, with some opposed and some not opposed to the project; however, all feel they should not have to sustain damages in order to provide flood protection for others. With features now incorporated into the project to minimize induced flood damages, much of the opposition has been resolved, although there is still concern being expressed for assurance that no one will suffer economic losses as a result of the project. Discussions at project meetings in Skagit County have revolved around what areas are being protected and to what level, what induced damages will be incurred, and what measures will be used to minimize induced flood damages. Particular concern has been voiced by Nookachamps Valley and Samish Valley residents. The result of these concerns and the varying levels of protection being provided by the proposed project could be a disruption to the cohesiveness of the study area as a whole. Further, the cohesiveness of localized communities could be disrupted by relocations required by the project, especially by the nonstructural project features.

With increased flood protection comes an increased security regarding living in the flood plain. The study area communities should recognize that levee protection is not a permanent solution to flooding. Although the project has been designed to prevent catastrophic effects from a greater than 100-year flood event, damages will still be incurred by flood events greater than 100-year in the urban and greater than 50-year in the rural areas. People living in the vicinity of the designed overflow areas incur the greatest risk of flood damage once project design is exceeded. As certain areas of the levee system are designed to overflow in order to prevent catastrophic levee failures, operation of the project will not permit floodfighting at these locations.

1/This item is specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

4.02.18 PRIME AND UNIQUE FARMLANDS. The Soil Conservation Service has indicated that all farmlands within the study area are classified as prime[1/] and has as a general policy their preservation. An indirect beneficial impact of the proposed project to these prime farmlands results from reduction of flooding. Refer to correspondence from the Soil Conservation Service in appendix 2.

The proposed project has the potential to result in significant secondary impacts from increased development of prime farmland. Approximately 9,500 acres of farmland will be incidentally provided 100-year protection; 39,600 acres will be provided 50-year protection. In areas with 100-year protection, floodproofing will no longer be required. This will increase pressure to develop in the protected farmland. Areas with 50-year protection will still require floodproofing which will discourage intensive development, although some development pressure can be expected due to reduction of floodproofing and flood insurance costs. The result of increased development would be the loss of one of the most important resources of Skagit County, which relies on agriculture as its mainstay.

The proposed project, of the five levee alinements studied in detail, provides the third highest area with urban protection and represents a compromise between flood damage reduction and secondary impacts of increased development. For the potential of these impacts to be reduced, it is imperative that flood plain management and local zoning regulations be enforced within Skagit County.

4.02.19 MINERAL RESOURCES. [2/] Any materials needed for levee construction, other than those obtained from making maximum use of existing levee embankment material, will be acquired from borrow sources within the study area (refer to paragraph 1.05). Materials will be hauled in by truck on temporary routes established in coordination with Skagit County prior to construction start. Precautions will be taken to avoid damages to existing roads; where damage is unavoidable, repairs will be made. The local sources of construction material are considered adequate and will not be significantly depleted by the demands of the project.

The Bureau of Mines, U.S. Department of Interior, has indicated that no adverse impact to study area mineral resources is anticipated as a result of the proposed project and has identified a beneficial impact to the sand and gravel operations. Refer to appendix 2 for pertinent correspondence.

4.03 IMPACTS ON ENVIRONMENTAL FEATURES OF THE STUDY AREA.

4.03.1 GENERAL. The environmental features of the study area that will be directly impacted by the project are those located along the project reach of the Skagit River. Accordingly, they are discussed in the next section of this chapter beginning at paragraph 4.06. Table 4-1 summarizes these features and the action proposed for each.

1/Personal communication with Soil Conservation Service, Mount Vernon, Washington, 1978.

2/This is an item specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

TABLE 4-1

Environmental Features Directly Impacted
by The Proposed Project

Feature[1/]	Action(s) Proposed
Sloughs	
Fisher Slough	Realinement of 400 feet at the mouth; removal of existing tide gate; construction of a new closure structure west of the Burlington Northern Railroad Bridge.
Tom Moore Slough	Levee improvements on left bank.
Wiley Slough	Levee improvements on left bank.
Freshwater Slough	Levee improvements on right bank.
Gages Slough	Construction of 1,750 feet of new channel near Burlington and provision of seven ponding areas within the levees.
Islands	
Fir Island	Levee improvements on both banks of the North and South Forks. Increases in height average 4-6 feet, with increases of up to 8-9 feet in some limited areas.
No Name Island	Part of mitigation plan proposed in Skagit Wildlife Recreation Area (WRA). Placement of culverts to reopen a slough to the Skagit River and thus provide fish rearing habitat.
Milltown Island	Part of mitigation plan proposed in Skagit WRA. Tree planting along river edge to mitigate for portion of deciduous forest lost to project.
Lakes and Creeks	
Mud Lake	Levee improvements bordering Mud Lake Road in west Clear Lake.
East Fork Nookachamps Creek	Levee (240 feet) with concrete box culverts across creek.
Bays, Estuaries, and Adjacent Uplands	
Skagit River Delta	Levee improvements through the agricultural uplands and the Skagit Estuary (including the Skagit WRA) to Skagit Bay. Tree planting of a riparian zone along Freshwater Slough in Skagit WRA as part of proposed mitigation plan.
Rivers	
Skagit River	Levee improvements from the mouth of the Skagit River to Sedro Woolley. Placement of riprap in approximately 3.3 miles of river reach.

1/Refer to figures 2-2 and 2-3 for locations of these features.

4.03.2 HABITATS. The major impacts of concern to the biological characteristics of the study area as a whole are secondarily associated with the proposed action. These impacts derive from the increased level of protection that will be provided the study area and the resulting increase in pressure to develop in the protected flood plain. Progressive loss of habitat from human encroachment on the flood plain will add to the existing stress already placed on area fish and wildlife.

In those areas of the flood plain receiving only 50-year protection, it is expected that intensive development will continue to be discouraged by floodproofing requirements and current zoning. Therefore, if flood plain management and zoning regulations are enforced, increased protection provided the rural areas should not significantly contribute to adversely affecting the area fish and wildlife over the existing and future without-project conditions.

4.03.3 FUTURE PLANS FOR ENHANCEMENT OF STUDY AREA FISH AND WILDLIFE. The proposed project will not adversely impact the fisheries enhancement programs planned by the Washington State Department of Fisheries and Washington State Department of Game for the Skagit River Basin and the future management plans of the Department of Game for the Skagit Wildlife Recreation Area. Refer to paragraph 2.04.6 for a discussion of these plans.

THE PROJECT AREA

4.04 IMPACTS ON PHYSICAL FEATURES OF THE PROJECT AREA.

4.04.1 CHANNEL AGGRADATION. Due to aggradation in the Skagit Delta area, the channel bottom of the Skagit River is continually becoming more elevated with a resultant elevation of ground-water levels adjacent to the levees. Under existing conditions, nearby lands require drainage and local pumping in order to be farmed even during nonflood periods. Over the project life, the channel bottom will rise, as will adjacent ground-water levels, limiting the effectiveness of levees as a long-term solution (several hundred years) to flood control. Continued levee raising will eventually permit the channel bottom to become higher than the flood plain, in which case the integrity of the levee will become more difficult to maintain. When the perched channel condition occurs and levee failure is experienced, the resulting flood damage is likely to be greater than if the event occurred under existing conditions. Velocities of water near the breach will be greater and the depth of ponding is likely to increase behind the levees due to the increased height of levees downstream. The perched channel will also raise the ground water level adjacent to the levees, necessitating local pumping of nearby lands for farming. Dredging, as an alternative to mitigate aggradation and to effect flood control, has been suggested during the planning of the proposed project. Due to the channel bottom configuration of the Skagit River, significant quantities of material would have to be dredged to cause the desired decrease in water surface profile in combination with levees of lesser height than those of the proposed project. This poses cost as well as disposal and environmental problems. Channel dredging, therefore, was not considered a viable alternative for detailed study.

For the 100-year project life, allowance for sediment deposition in the design profile on the North Fork is estimated at 1.2 feet at the confluence to 1.1 feet at the mouth; on the South Fork, 1.1 feet near the confluence to 0.5 feet at the mouth; and on the main stem, 0.6 feet at Sedro Woolley to 1.4 feet at the confluence. The proposed project does not attempt to provide a permanent solution to flood control in the Skagit River Basin but to reduce flood damages, a recognized need in the basin. The longer term (several hundred years) problems of continued levee raising and continued extensive development in the flood plain are recognized as significant. Wise flood plain management by local governments is the key to the reduction in the extent that future flood control measures will be required.

The proposed project will not affect the amount of bedload and sediment in the Skagit River, nor will it significantly affect sediment deposition. A minor impact may result from reduction in overbank flooding and the secondary impact of reduced deposition of the riverborne sediments on the flood plain. However, channel aggradation will not appreciably change over the existing rate.

The project is not expected to impact river velocities except during the large and rare flood events that the levee provides flood protection against. The project is designed not to alter hydrologic conditions, but to react to the existing conditions of discharge, aggradation, debris, and wind waves.

4.04.2 SKAGIT WILDLIFE RECREATION AREA (WRA). The proposed project will not adversely impact the levee system maintained on the South Fork by the Washington State Department of Game for the primary purpose of producing cereal grain crops for wintering waterfowl. These levees are maintained at about a 10-year flood frequency and, due to an agreement with Skagit County, that level of protection cannot be increased. The proposed levee improvements on Fir Island will cause an increase in the depth of flooding in the Skagit WRA in flood events greater than a 10- to 15-year frequency due to the loss of overbank flooding that would have occurred on the Fir Island levees without the project. Frequency of flooding, however, will not be affected; nor is there expected to be a significant change in sediment deposition patterns in that area.

Coordination has been conducted with the Game Department to discuss the relationship of the proposed project to the Skagit WRA levees.[1/] The project-induced increased depth during flooding on the Skagit WRA farmland is not considered to result in increased flood damages.

4.04.3 INTERIOR DRAINAGE. The proposed project will not significantly alter existing patterns of ponding or amounts of interior runoff in the rural areas and for most of the urban levee segments. In rural areas, sites currently used for ponding will continue to be used with the proposed levee improvements. The extent of ponding will not be altered, and existing gravity drains and pumping systems will continue in operation.

1/Meeting between Seattle District, U.S. Army Corps of Engineers, and representative of Game Department, Engineering Division, October 1978.

In urban areas, ponding is generally less acceptable because of houses, buildings, or other high-value developments. The proposed project will not significantly change existing urban drainage conditions. Where the proposed new levee alinements around Burlington interrupt natural surface runoff, seven new ponding areas are required; the new levee segments prevent backflooding from the rural areas. In general, all new ponding areas have sufficient storage capacity to limit drainage requirements to gravity drains with flap gates; these will be provided as part of the proposed project.

The proposed project will not cut off any significant existing drainage systems. Where project levees do cross drainage systems, culverts will be placed in order that existing flows will not be impeded.

4.04.4 AIR QUALITY, NOISE AND TRAFFIC. [1/] Increased noise, exhaust emission levels, and traffic congestion are unavoidable during construction of the project. Construction activities, including heavy equipment operation, stripping, stockpiling of soil materials, and clearing and disposing of vegetation, will cause temporary air pollution due to exhaust emissions and dust. Dust will be minimized by sprinkling haul roads and construction areas as necessary. A short-term impact on noise and traffic during floods will result from operation of the cranes to erect the tilt-up floodwall through Mount Vernon. Construction of the flood wall through Mount Vernon will result in the loss of five to 10 parking spaces in the revetment parking lot; however, placement of the wall has been designed to minimize loss of space and maneuverability.

A secondary impact of the project on noise, traffic, and air quality could be incurred by the trend toward acceleration of development in the protected flood plain.

4.04.5 WATER QUALITY. [1/] Both primary and secondary effects on water quality will result from implementation of the proposed action. Primary effects will result principally from construction and chiefly be increases in turbidity. Additionally, control of flooding will result in a reduction of ground-water degradation from floodwaters and a reduction of ground and surface water contamination from flooding of storm and sanitary sewers. Secondary effects will be subtle and difficult to detect. Such effects will result from the loss of wetland functions which contribute to maintaining water quality over a long time period.

A water quality and ecological evaluation of proposed discharge of dredged or fill material into navigable waters and adjacent wetlands is required by Section 404 of the Clean Water Act of 1977. Levee construction involving fill into navigable waters and adjacent wetlands falls within the Section 404 program. A Section 404 Evaluation of the proposed project is presented in appendix 1, using evaluation factors from the Environmental Protection Agency guidelines (40 CFR 230 dated 5 September 1975) pursuant to Section 404(b) of the Clean Water Act of 1977. Pertinent factors are also discussed in this section and others within this environmental statement.

1/ This is an item specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

Suspended material and dissolved solids in the water will increase during instream construction. Areas in which construction in the water will occur are the relocated portion of Fisher Slough (approximately 400 lineal feet of slough), near the mouth of Fisher Slough for the construction of a tide gate, in Gages Slough for construction of levees, and an approximate 17,295 feet of riverbank along Avon Bend, through Mount Vernon, and in specific locations along the North and South Forks for the construction or rock riprap bank protection.

The realinement at Fisher Slough, the construction of a closure structure near the mouth of the slough, and construction of the closure structure across the East Fork Nookachamps Creek will result in suspension of native soil material in the water. The presence of contaminants in amounts believed to be toxic to aquatic organisms has not been identified or suspect in the material. The impact on water quality will be that of direct physical effects from increased turbidity during construction.

The construction of approximately 3.3 miles of levee along the Skagit River consists of placement of rock riprap in the water for the levee weighted toe. Increased turbidity in the construction area is the only water quality degradation suspected.

Turbidity increases associated with the above referenced construction activity may result in exceedence of the Washington State Water Quality Standards. Turbidity levels sufficiently high to exceed the standard will be localized and short-term, occurring during actual instream construction. The construction contractor will be required to utilize construction methods which will minimize turbidity.

A determination of mixing zone was not made, as such was not believed necessary due to the minimal expected impact to river water quality and the aquatic community.

Approximately 1,750 feet of new channel for Gages Slough will be built near Burlington. Construction will be accomplished while the slough is dry. Drainage in Gages Slough is inhibited under existing conditions by numerous fills and an inadequate culvert system. This has resulted in drainage problems leading to nuisance algal blooms and insect and odor problems during the summer months. The proposed diversion will not alter this situation, nor will it affect the present Gages Slough outlet on the right bank of the Skagit River. The diversion will result in the loss of about 15 percent of the drainage which flows down Gages Slough and through the outlet during periods of high runoff. During normal runoff conditions, the diversion is not expected to have any noticeable effect on Gages Slough drainage downstream.

Approximately 5.0 acres of wetland[1/] (of a total of 3,812 acres of wetlands in the wetland inventory area) will be lost with construction of levees and gravel berms. Wetlands function as active biochemical systems that assimilate nutrients and pollutants. Fill of wetland sites

1/Includes 1.2 acres of high salt marsh, 2.5 acres of tidal scrub, and 1.3 acres of freshwater marsh. Refer to paragraph 2.07.2 for additional details.

will eliminate this function with a subtle impact to river and estuarine water quality. Levee construction material will be principally that from existing levees at the site. Necessary borrow material will be from sites within Skagit County. No borrow material will be obtained from the river-bottom sediment. The presence of contaminants in amounts that could be toxic to the aquatic/wetland community has not been identified or suspected in the construction material.

An estimated 18 acres of scrub vegetation exists within the project right-of-way. Approximately 6.0 acres of critical river-edge brush will be preserved by levee realinements discussed in paragraph 4.06.2.1. Another 1.7 acres will be reestablished on riprap slopes (refer to paragraph 1.04.4 and paragraph 4.06.2.1). About 0.2 acre will be revegetated on the right bank of Fisher Slough. Of the 36 acres of deciduous forest cleared by the project, the loss of approximately 10 acres of critical river-edge trees will be mitigated by planting on disturbed areas within the project reach. Overhanging vegetation along the river and sloughs provides shaded holding and rearing habitat for fish. Loss of shaded riverbank would be a loss of important fish habitat and could cause an increase in river temperature. Presently, high water temperature is not a problem in the Skagit River, although it is for many rivers and streams in western Washington as a result of urbanization and loss of streambank cover.

Under existing conditions, flooding along the Skagit River results in a degradation of ground water. Additionally, flooding results in the overloading of storm and sanitary sewers with resultant contamination of surface and ground waters. The control of flooding will accordingly improve the quality of ground water and reduce the contamination of ground and surface waters from domestic and industrial wastes.

Restoration features of the project include the seeding of levee tops and berms, the placement of topsoil and grass seeding of all remaining disturbed areas, and the planting of shrub vegetation in specific project reaches. Should a high-water event occur before the complete establishment of the ground cover, the topsoil and seed could erode and/or leach into the water. The impact to water quality would be that of direct physical effects (turbidity). No harmful effects to the resident aquatic community is suspected.

Project operation during floods consists of patrolling the levees, closing the tide gate, raising the tilt-up floodwall, and providing the emergency stoplog and sandbag closures. None of these actions will appreciably alter water quality of the flooding river. Maintenance that could affect water quality is the repair of levees. The impact to water quality will be that of increased turbidity.

4.05 IMPACTS TO THE SOCIOECONOMIC FEATURES OF THE PROJECT AREA.

4.05.1 CULTURAL RESOURCES. 1/ The Corps of Engineers is responsible for the identification, preservation, and mitigation of losses of cultural and paleontological resources associated with its civil works projects. The principal authority for these actions is the Reservoir Salvage Act of 1960 (Public Law 86-523) as amended in 1974 by Public Law 93-291 (16 U.S.C. 469). As discussed in paragraph 2.06.2, a cultural resources reconnaissance of the project area identified 20 prehistoric and 34 historic sites which could potentially be affected by the proposed project. Additional sites may be identified in further reconnaissance work to be accomplished in summer 1979 of areas covered by project modifications made since the reconnaissance done in 1978. All resources identified must be treated as significant,2/ and thus eligible for nomination to the National Register of Historic Places, until they can be sufficiently investigated.

To develop sufficient qualitative and quantitative data to evaluate site significance according to the National Register criteria, a cultural resources survey has been initiated by the Seattle District. The survey will also confirm suspected site locations and determine which sites will be affected by the project and the nature of that effect.

When the number of significant sites and the specific kinds and extents of project effects have been determined for each site, a mitigation program will be designed. Avoidance of significant sites is the preferred mode of mitigation. Preservation by excavation or other means will be undertaken only if avoidance is not a feasible alternative. All sites for which mitigation is proposed must be determined eligible for the National Register of Historic Places. The plan designed for mitigating project effects on cultural resources must receive the concurrence of the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the Corps of Engineers in a joint Memorandum of Agreement. These determinations must be obtained prior to the start of mitigative action.

There will be no project effect on the two properties in the Skagit Delta that are currently on the National Register of Historic Places. The town of La Conner is not within the project reach of the Skagit River, and the Skagit City School is not within the proposed levee right-of-way. No levee work is proposed in the Fishtown Archeological District which has been nominated to the Register. The project will not affect those sites on the Washington State Register of Historic Places or the sites on the Washington State Inventory of Historic Places (refer to paragraph 2.06.2).

1/This is an item specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

2/The level of significance is based upon the potential a site or group of sites has for contributing useful information regarding human paleoecology, culture history, or culture process.

4.05.2 OTHER MANMADE RESOURCES. 1/ Eleven homes (including two cabins and two abandoned homes) and 22 buildings will be relocated due to levee construction. Approximately 61 homes will be relocated due to nonstructural project measures. Several unused buildings and an empty industrial warehouse will be destroyed. Several roads throughout the project area will be altered, and resurfacing will be necessary. Approximately 13 public and 57 private levee crossings will be required. A number of utilities will be altered.

4.05.3 DISPLACEMENT OF PERSONS. 1/ A total of 72 homes will be relocated, displacing about 200 persons. It is probable that these people will remain in the county and possibly in the same community.

Within localized areas, relocations will cause the breakup of communities and disruptions to persons displaced; however, no significant impact will occur to the population or settlement patterns of the area as a whole. Relocation assistance will be available as needed.

4.05.4 DISPLACEMENT OF BUSINESSES. 1/ There will be some disruption to Lundeen's Resort on the South Fork because of project construction. Project design will minimize impacts to Phil's Boathouse and Resort on the North Fork. Project construction will also necessitate the destruction of the timber building at the old Carnation plant in downtown Mount Vernon. No other displacement of businesses is expected to result from project implementation.

4.05.5 DISPLACEMENT OF FARMS. 1/ Some adverse impacts on farming activity may occur where new levee alinements cut across agricultural lands. No farms will be displaced. Three non-farm residences on Fir Island will have to be relocated because of project construction. but this should have no effect on agricultural activity on adjacent farmland. Nonstructural measures will cause some disruption to farms in unleveed areas, but no displacements are expected.

4.05.6 RECREATION. There are currently 13 river access sites located along the project reach of the Skagit River (refer to figure 4-2). Any one of these sites that is disturbed by construction of the proposed project will be restored to preproject conditions. During construction, there will be some short-term inconvenience to fishermen and boaters who normally utilize the access sites. The project does not include any recreation development features; however, it does make provision for incorporating future recreational development.

Construction activities will cause a short-term disturbance to the recreational uses of the Skagit Wildlife Recreation Area (WRA) along Wiley, Freshwater, and Tom Moore Sloughs. To minimize disruption, construction in that area will be coordinated with the Washington State Department of Game to avoid peak use periods and maintain access. The Washington Department of Game has specifically indicated a concern for project impacts on access to the existing boat launch ramp on Freshwater Slough. Following construction, this site will be restored to a level

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1/This is an item specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

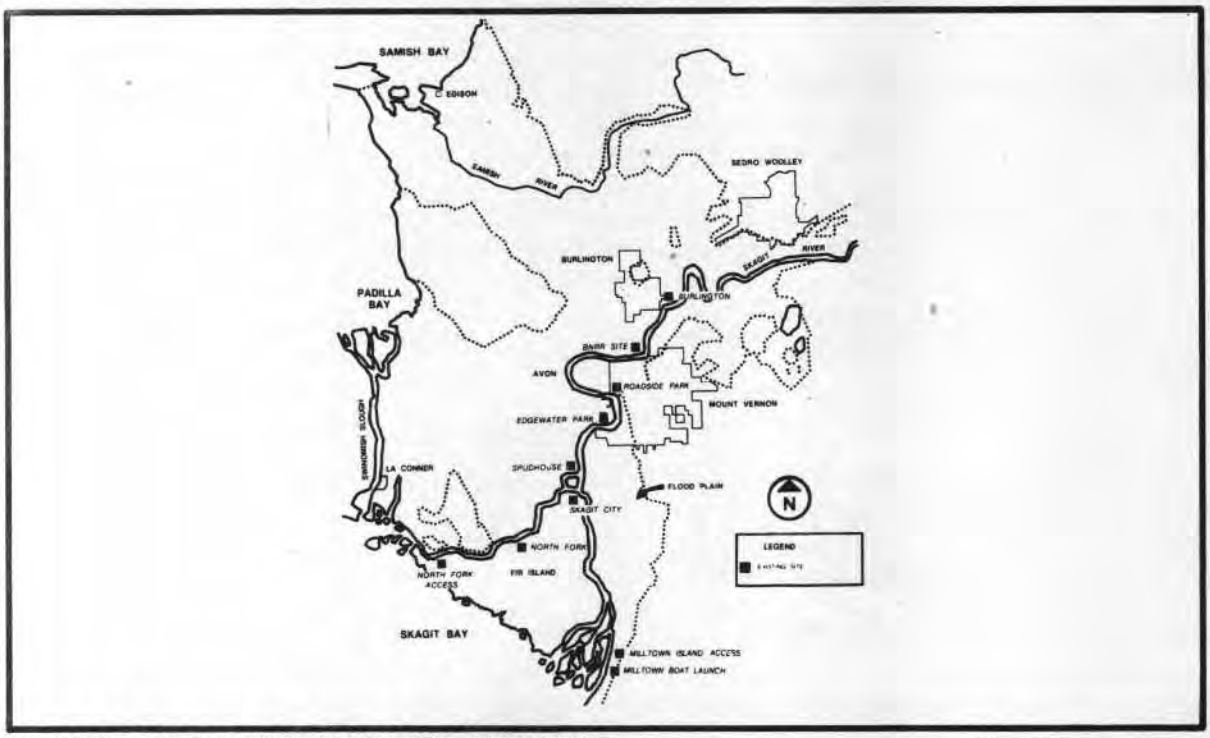

FIGURE 4-2 EXISTING RIVER ACCESS RECREATION SITES

necessary to provide adequate access along the improved Wiley Slough dike. Details regarding this access and the avoidance of unacceptable congestion through the Skagit WRA headquarters area will be resolved during the preparation of plans and specifications prior to construction.

The proposed project is not expected to significantly impact waterfowl populations and thus hunter success in the project area (see discussion in paragraph 4.06.4). Due to construction activities in the water and loss of water area and riverbank vegetation from placement of riprap along approximately 3.3 miles of the project reach, fish will be impacted temporarily by increased turbidity and will suffer some permanent loss of shore zone. Measures that attempt to reduce impacts of construction as well as long-term impacts associated with loss of streamside habitat have been incorporated into the project (refer to paragraphs 1.04.4, 1.04.5, 1:07, 4.06.3, and 4.06.4). The secondary effect that any permanent impact on fish will have on fishing success is difficult to quantify due to the multitude of parameters which may affect future fisheries of the project reach with or without the project.

4.05.7 ESTHETICS. 1/ Significant short-term impacts to the river landscape will be realized during project construction as a result of vegetation clearing, stripping, and grubbing operations; stockpiling; staging; construction right-of-way; and temporary haul roads. In the 5 to 10 years following construction, vegetation in areas not part of the permanent levee right-of-way will gradually reestablish, aided by any restoration accomplished by the construction contractor. The levees themselves will be grass seeded, which will serve to blend them into the surrounding landscape.

1/This is an item specifically listed in Section 122 of Public Law 91-611 as an item that must be identified and impacts assessed.

Long-term, permanent, visual impacts will result along the river from higher and wider levees, from the new levees around Burlington, from the berm over the sills at Sterling, and from the new levees along the railroad between Burlington and Sedro Woolley. The impact of this change in land form will be reduced by the landscaping proposed at 30 sites (see figure 4-3) along the proposed project alinement. Esthetic impacts to individual structures (buildings/homes) will also result in areas where nonstructural measures such as floodproofing will be implemented.

To minimize the visual impact from the proposed floodwall through Mount Vernon, a tilt-up floodwall and landscaping features are proposed through the revetment parking area and Roadside Park. These features will preserve existing views of the river setting.

Visual impacts will result from the use of riprap on levee embankments along 3.3 miles of riverbank and 5 miles of setback from the river's edge. In most areas on the riverbank, riprap and other bank-erosion control protection already exists; however, the existing view will be modified following project construction to a more pronounced rock landscape due to a thicker riprap blanket not only on the riverbank but on the levee slope as well. Visual impacts will be reduced by grass seeding over all buried toes and riprap slopes above the ordinary high waterline.

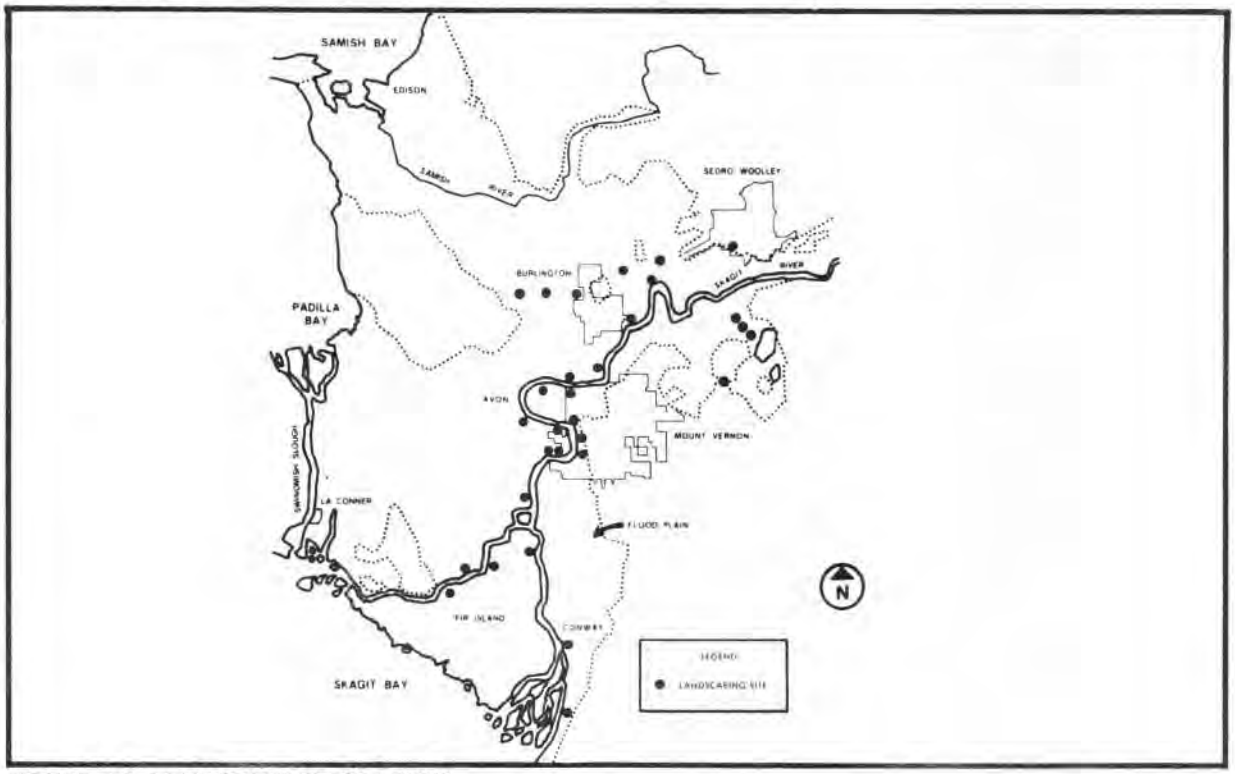

FIGURE 4-3. LANDSCAPING LOCATIONS

4.05.8 ENERGY The energy expenditure required for implementation of the proposed project will result from construction of the levees; landscaping, restoration, and mitigation plantings; maintenance; and opera-

tion. Construction activities include hauling of materials from borrow sources, placement of levee material and shaping, placement of riprap, relocation of roads and residences, clearing and removal of vegetation, stockpiling of stripped material, and seeding and planting. Maintenance of the project includes levee inspection, mechanical mowing of grass levee slopes, selective cutting of shrub vegetation planted in specific levee reaches, and repairs when necessary. With the exception of mowing, most of this effort will be manpower; therefore, it is thought that maintenance of the levee will require minimal energy consumption. Operation requires patrolling the levees, closing the tide and drainage gates, raising the tilt-up floodwall, and providing the emergency stoplog and sandbag closures. Except for the crane utilized to erect the floodwall, manpower will also accomplish most levee operation.

Indirectly, through construction practices utilizing the most cost-effective methods, conservation measures such as high loading efficiency and maximum usage of onsite materials will be incorporated. Materials will come from local borrow sources, all within an 8-mile radius of Mount Vernon. This will minimize haul distance and, therefore, fuel consumption. Other conservation measures that could be utilized by the construction contractor are maximum usage of the local labor force and encouragement of carpooling.

Due to design criteria and levee integrity considerations, alternative materials for levee construction were not assessed during plan formulation. Materials utilized are committed during the life of the project. Fuel resources are committed permanently.

During the process of project planning, alternatives were considered and evaluated on a net dollar benefit basis. The selected project was analyzed for maximum net dollar benefits. Maximization of net dollar benefits produces the most benefits for the least cost. This technique inherently considers cost and use of energy in the selection of a project. When the project is scheduled for construction, competitive bid process also takes into consideration the cost and use of energy.

4.05.9 PRIME FARMLAND. Approximately 44 acres of prime farmland will be committed in permanent easement to the levee right-of-way. Some use of this land will be maintained as pastureland for grazing cattle, although this practice is discouraged as overgrazing and cattle traffic may contribute to a reduction in levee integrity. Improvement of the levee on Wiley Slough will result in the loss of approximately 2.0 acres of the more than 50 acres of cultivated land currently farmed by the Washington State Department of Game to produce cereal grain crops for wintering waterfowl.

As mentioned in paragraph 1.07, construction of earthen embankments will be primarily accomplished during dry weather to insure proper moisture control for compaction of semi-impervious fill materials. This will minimize cropland damage from compaction during levee construction. Work on farmland will be limited to the permanent levee right-of-way and an approximate 10-foot temporary construction easement on either side of the levee. The construction contractor will be required to restore temporary easements to preproject conditions following construction.

The provision of higher levels of flood protection to the farmland of the Skagit Delta will result in a significant potential for increased development and loss of prime farmland. Unwise development of the farmland would result in the loss of an important resource of the Skagit River flood plain, as discussed in paragraph 4.02.18. The potential for increased development in the protected flood plain is a significant tradeoff involved in providing protection to existing development within the study area. For the potential of this impact to be reduced, flood plain management measures and local zoning regulation must be enforced within Skagit County. Items of local cooperation for the proposed project require that the local sponsor publicize information regarding flood plain management to assist local zoning agencies in preventing unwise development of the flood plain and to ensure compatability of any new development with the protection provided by the project.

4.06 IMPACTS ON ENVIRONMENTAL FEATURES OF THE PROJECT REACH.

4.06.1 VEGETATION. Vegetation will be removed from 356 acres along 50.4 miles of the proposed levee alinement. A quantitative survey of this acreage is discussed in paragraph 2.07.2. Of a total project land requirement of 612 acres, approximately 474 acres are required for permanent levee right-of-way including 118 acres of public road right-of-way; 138 acres consist of temporary construction easement. Along these easements, pruning and selective tree removal may be required to allow construction access. Typical situations of clearing for the proposed project are shown in figures 4-4 to 4-7.

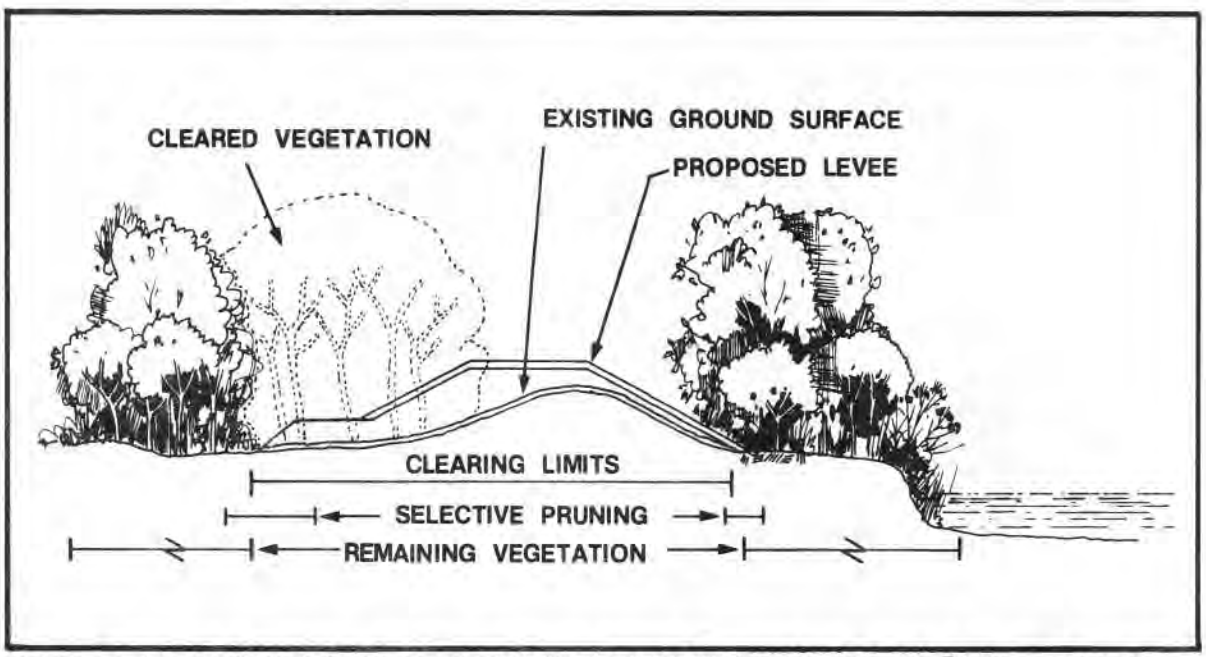

FIGURE 4-4. VEGETATION CLEARING REPRESENTATIVE OF STATIONS 1053 TO 1105, LEFT BANK, TOM MOORE SLOUGH, SOUTH FORK. LEVEES ARE BEING ADJUSTED LANDWARD TO AVOID REMOVAL OF STREAMSIDE VEGETATION.

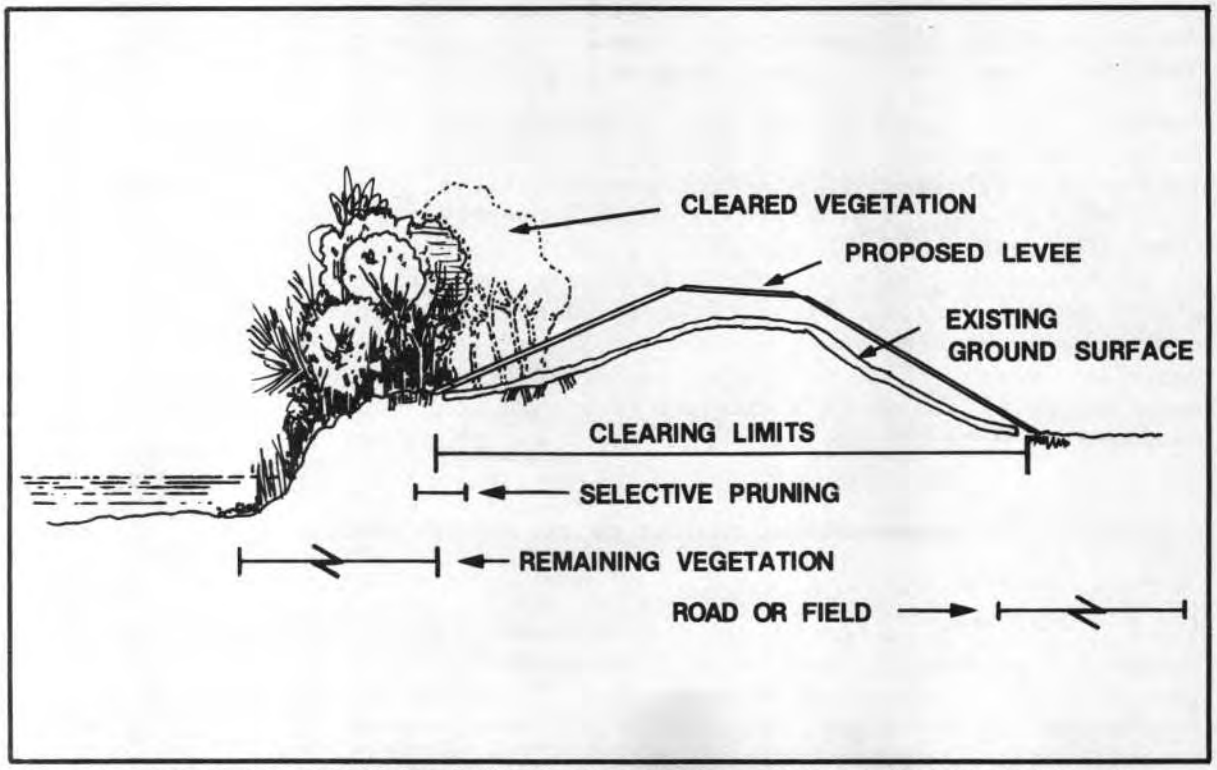

FIGURE 4-5. VEGETATION CLEARING REPRESENTATIVE OF STATIONS 950 TO 960, RIGHT BANK, NORTH FORK ALONG NORTH SKAGIT ROAD.

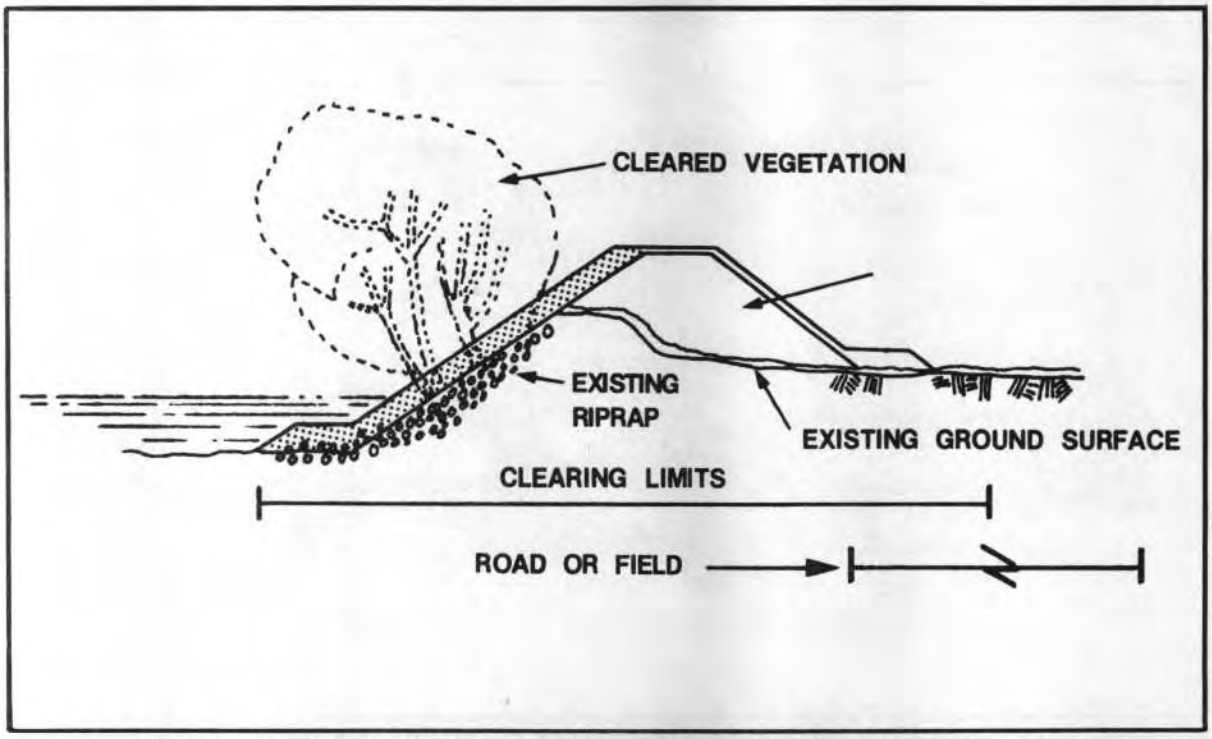

FIGURE 4-6. VEGETATION CLEARING REPRESENTATIVE OF STATIONS 142 to 147, RIGHT BANK, SOUTH FORK. RIPRAP SLOPE WILL BE REVEGETATED WITH SELECTED SHRUB SPECIES IN THIS REACH TO RESTORE CRITICAL STREAMSIDE COVER.

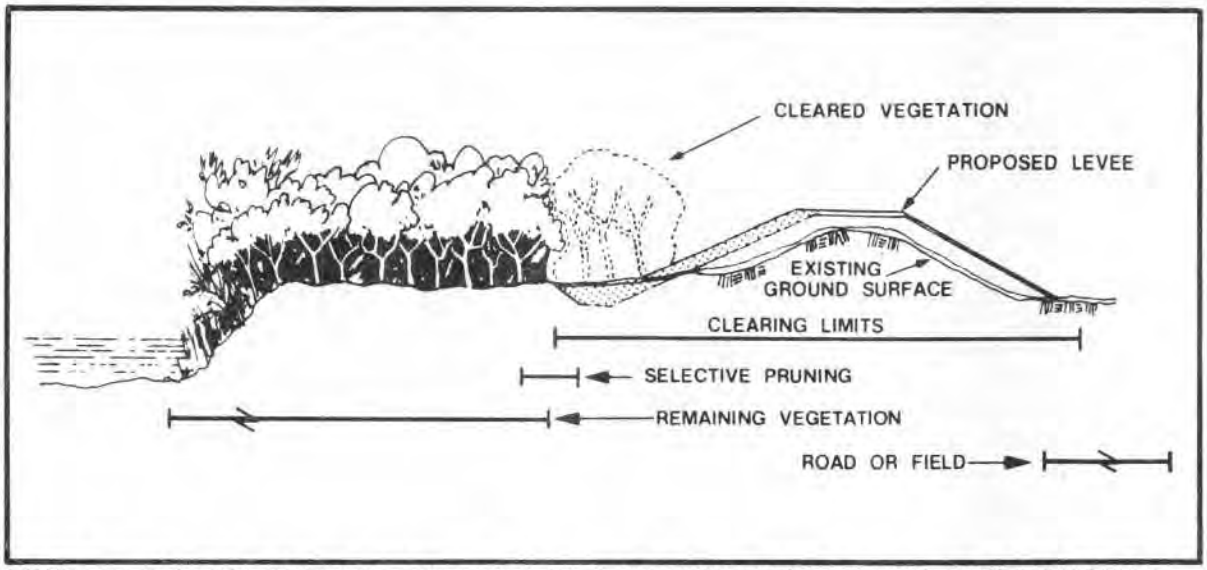

FIGURE 4-7. VEGETATION CLEARING REPRESENTATIVE OF STATIONS 530 TO 540, RIGHT BANK, MAIN STEM AT AVON BEND. RIPRAP SLOPE AND BURIED TOE WILL BE GRASS SEEDED.

Plans for the restoration of vegetation losses due to the project are discussed in chapter 1 and in paragraphs 4.06.2, 4.06.3, and 4.06.4. In general, restoration includes replacement of surface soil and grass seeding on buried toes and riprap slopes above ordinary high waterline; seeding of embankment slopes, tops, and gravel berms; and selected shrub plantings. The predicted progress of revegetation is shown in table 4-2.

TABLE 4-2

Progress of Revegetation[1/]

Skagit River Levee Improvements

Vegetation Type[2/]	Acreage				
			Years after Construction		
	Precon-struction	Acres Revege-tated	1	5	10[3/]
Deciduous Forest [4/]	36	10	0.4	2.8	6.5
Deciduous Scrub [5/]	18	1.9	0.2	0.9	1.5
Agricultural	44	44	44	44	44
Grass and Forbs [6/]	253	230	240	265	265
TOTALS	351	285.9	284.6	312.7	317

1/Based on estimates by Corps of Engineers 1978. Figures are intended to show trends in revegetation rather than specific acreages. The range of accuracy is approximately ±25 percent.

2/Vegetation types shown do not include freshwater marsh, tidal scrub, and high salt marsh. Preconstruction acreages for these are shown in table 4-3.

3/Projections beyond year 10 are expected to remain near the 10-year values. Maturation and regeneration of shrubby species may change the character of scrub areas with time.

4/Deciduous forest planting is recommended on Washington Department of Game land as mitigation for project-related forest clearing.

5/Six acres of this total will be preserved by proposed levee realinements.

6/Grass seeding of buried toes and riprap slopes will provide suitable substrata for the eventual reestablishment of native shrub species.

For the purposes of comparison, table 4-3 shows the progress of revegetation for the North Fork, South Fork, and main stem of the Skagit River.

TABLE 4-3
Progress of Revegetation by Project Reach

Acreage - North Fork

Vegetation Type	Precon-struction	Acres Revege-tated	Years after Construction 1	5	10
Deciduous Forest	7.5	0	0	0	0
Deciduous Scrub	1.5 1/	0.9	0.05	0.5	0.8
Grass and Forbs	70.0	56.0	56.0	65.0	65.0
Agricultural	10.9	10.9	10.9	10.9	10.9
TOTALS	89.9	67.8	66.95	76.4	76.7

Acreage - South Fork

Vegetation Type	Precon-struction	Acres Revege-tated	Years after Construction 1	5	10
Deciduous Forest	23.0	10.0	0.4	2.8	6.5 2/
Deciduous Scrub	12.4 1/	0.3	0	0.06	0.1
Tidal Scrub	2.5	0	0	0	0
Freshwater Marsh	1.3	0	0	0	0
Grass and Forbs	56.0	73.0	73.0	80.0	80.0
Agricultural	9.0	9.0	9.0	9.0	9.0
High Salt Marsh	1.2	0	0	0	0
TOTALS	105.4	92.3	82.4	91.86	95.6

Acreage - Main Stem (including Clear Lake)

Vegetation Type	Precon-struction	Acres Revege-tated	Years after Construction 1	5	10
Deciduous Forest	5.5	0	0	0	0
Deciduous Scrub	4.1	0.7	0.04	0.3	0.6
Grass and Forbs	127.0	101.0	101.0	110.0	110.0
Agricultural	24.1	24.1	24.1	24.1	24.1
TOTALS	160.7	126.5	125.1	134.4	134.7

1/Approximately 1 acre of deciduous scrub will be preserved by levee realinements on the North Fork. Approximately 5 acres will be preserved by levee realinements on the South Fork.

2/Deciduous forest species will be planted on approximately 10 acres of Washington Department of Game land between Freshwater Slough and Tom Moore Slough. Acreage represents vegetative cover with an initial planting density of 500 trees per acre. Tree planting is not recommended on proposed levee right-of-way.

4.06.2 HABITATS. For a more thorough understanding of project impacts on the habitats of the project area, reference should be made throughout this discussion to the habitat survey displayed on plates 2 through 15.

The habitats impacted by the proposed project are those listed and discussed in paragraph 2.07.1. Depending on the reach of the river, any one or more of these habitat types contribute to the river-edge habitat that is critical to the fish and wildlife resources of the project reach.

Deciduous forest makes up the canopy vegetation which is important habitat for songbirds and game birds and provides both shade and an insect food source for fish and wildlife. This is the most extensive habitat type of the project area.

The deciduous and tidal scrub habitats and grasses and forbs make up the understory which provides habitat for songbirds, game birds, small mammals, reptiles, and insects. Grasses and forbs are the predominant habitat of the existing levees.

Shrubs that overhang the river edge and wetland vegetation are important sources of food to resident and migrant fish. Throughout spring, summer, and fall, insects drop from the overhanging vegetation into the river. In the project area, vegetation along the sloughs and the Skagit River provide rearing habitat for juvenile anadromous fish, particularly along the North Fork and the South Fork in the Skagit Estuary where the transition between freshwater and saltwater takes place. Wetlands of the project area are also important habitat to a variety of waterfowl species.

Within the proposed levee right-of-way, there will be permanent losses of wetland, shrub, and forest habitats. Grass habitat will be restored within one construction season. Wetlands in the right-of-way will be permanently lost. Shrub revegetation on riprap slopes will require 5 to 10 years to establish. Some natural shrub reestablishment can be expected to initiate on backfilled, buried toes and grass-seeded riprap slopes within 3 to 5 years following construction. The extent of this reestablishment will depend largely on the level of maintenance sustained by the local sponsor.

Ten acres of deciduous forest lost to the project right-of-way will be mitigated by planting on land within the project area. This habitat replacement will require approximately 10 to 20 years to establish. The rearing habitat provided for juvenile anadromous fish by reopening the slough on No Name Island will be available during the first year of construction.

Temporary construction easements will be restored by the construction contractor and should approach preproject conditions within 5 years following construction.

4.06.2.1 LEVEE REALINEMENTS. To minimize the impacts to fish and wildlife as a result of the removal of critical streamside vegetation, efforts in project planning were first made to avoid adverse impacts associated with loss of habitat by realining levees landward where feasible. Engineering, economic, and environmental criteria were involved in the analysis. The result was a change in alinement in four critical reaches of the proposed project.

a. South Fork, Freshwater Slough, Right Bank, Stations 285 to 340. The levee alinement was changed from the right bank of Freshwater Slough to the left bank of Wiley Slough. This avoids the removal of approxi-

mately 3 acres of river-edge vegetation and the filling of approximately 3 acres of freshwater wetlands.

b. South Fork, Tom Moore Slough, Left Bank, Stations 1053 to 1105. Levee alinement was adjusted landward to avoid removal of approximately 1.8 acres of river-edge vegetation.

A trade-off was involved in this decision, because moving the levee alinement landward will result in the filling of approximately 1 acre of freshwater wetlands in ponded areas adjacent to the existing levees and the removal of additional canopy and understory. This area is productive for waterfowl. When weighing the amount and value of this habitat type in the project area as opposed to the amount and value of the riparian edge habitat, the decision to preserve the riverward side was made. New wetland areas between the new levee and railroad should establish in time. To provide additional habitat diversity on the landward side after construction, it has been suggested that large trees

Photo 4-1. View of Tom Moore Slough, stations 1053 to 1105, left bank, existing levees. Proposed levee improvements will be adjusted landward to avoid removal of streamside vegetation.

felled during construction be left at the project site. These trees will provide nesting and roosting sites for a variety of bird species.

c. North Fork, Left Bank, Stations 100 to 120. Levee alinement was adjusted landward to avoid removal of approximately 1 acre of river-edge vegetation. This area is especially critical to juvenile anadromous fish, as the opposite bank offers very little vegetative cover in this reach of the river.

Photo 4-2. View of North Fork looking east at left bank, stations 100 - 120. Levee on the left bank will be adjusted landward to avoid removal of river-edge vegetation.

d. North Fork, Left Bank, Stations 300 to 305+43. Levee alinement was adjusted landward to avoid removal of approximately .2 acres of river-edge vegetation.

4.06.2.2 PLACEMENT OF RIPRAP. Where riprap is required along the project reach, encroachment into the river is avoided where possible. Avoidance of encroachment occurs along 5.2 miles of the 8.5 miles of proposed riprap placement. Buried toes will be placed into the bench between the levee and the river. These toes will be backfilled and, along with the riprap slope, will be grass seeded. Replacement of native soil and grass seeding will contribute to the restoration of shrub habitat type by providing an adequate substrata for native species to become reestablished. Refer to plate 9 for a typical section showing this habitat restoration feature.

In 3.3 miles of the project reach, riprap encroachment into the river cannot be avoided. These areas were field examined, and it was noted that most areas currently have some level of riprap protection and do support vegetative cover. To restore some of the cover that will be lost due to project construction, the riprap slopes will be grass seeded to 4 feet above the ordinary high waterline (OHW). Areas currently supporting substantial vegetative cover will be revegetated with shrubs in a 4 foot zone above OHW as discussed in paragraph 1.04.4. Refer to plate 7 for a typical levee section showing this habitat restoration feature.

Riprap placement will cause some permanent loss of water area. In project design, this loss has been kept at a minimum by keeping the levee toe out of the river wherever possible. Temporary impacts associated with riprap placement are discussed in paragraphs 4.04.5 and 4.06.3.

4.06.2.3 OTHER LEVEE SEGMENTS. It is not expected that construction of the remaining levee reaches of the project will have a significant impact on fish and wildlife due to loss of habitat. These levees are set back from the river's edge anywhere from 20 feet to several hundred feet. The levees around Burlington will be earthen embankments through farmland. Impacts of west Burlington levees on farmland are minimized by the alinement of the levee along Joshua Wilson Road. The levee through Clear Lake parallels Mud Lake Road, the railroad, and Highway 9, and will result in the loss of grass habitat, some farmland, and deciduous scrub. The levee segment across East Fork Nookachamps Creek and work in Gages and Fisher Sloughs are discussed in paragraphs 4.06.2.5 and 4.06.3. All project levee segments will be grass seeded on the slopes, tops, and gravel berms. Refer to plates 20 through 27 for typical sections.

Some encroachment of the lower 2,000-foot reach of the project on the South Fork into the vast salt-marsh wetlands of the Skagit Estuary can be expected. The estimated loss is 1.2 acres or .06 percent of the total high salt-marsh habitat identified in the Skagit Estuary by the wetland inventory (refer to paragraph 2.07.2).

4.06.2.4 HABITAT MITIGATION. As a result of environmental planning and extensive coordination with resource management agencies, features as discussed above have been incorporated into the project plan to avoid or minimize adverse impacts to fish and wildlife. A certain portion of the critical habitat losses cannot be reduced by onsite project features, however. These are the losses primarily associated with the removal of overstory vegetation 1/ and the permanent reduction in shallow rearing area for juvenile anadromous fish. To compensate for a portion of these losses, a mitigation plan has been incorporated into the project. This plan is discussed in paragraphs 1.04.5, 4.06.3, and 4.06.4 and is generally described below.

The deciduous forest lost to the project right-of-way will not be restored due to the clearing and maintenance which would prevent reestablishment of levee embankment slopes. To mitigate this loss, an estimate was made of what portion of deciduous forest lost was within a 100-foot riparian zone of the river and thus a part of the critical river-edge habitat. Following this analysis, an examination was made of what river-edge sites would be available to plant overstory as a means of replacing that loss. The result was development of the mitigation plan for replacement of 10 acres of overstory by planting on sites identified in the Skagit Wildlife Recreation Area.

There will be some permanent loss of shallow rearing area for juvenile fish due to placement of riprap. To mitigate for a portion of this loss, rearing habitat will be provided by reopening a 2,500-foot slough on No Name Island (South Fork) to the freshwater of the Skagit River. Project mitigation features are displayed on plates 13 and 14.

1/The maintenance of levee integrity does not permit the planting of trees on levee slopes. Further, planting trees between the toe of the levee and the river edge could jeopardize hydraulic design.

4.06.2.5 CONSTRUCTION IN FISHER AND GAGES SLOUGHS AND IN NOOKACHAMPS CREEK. The construction of 1,750 feet of new channel for Gages Slough and the construction of levees in Gages Slough will not significantly impact the habitat of the project area fish and wildlife. The slough does provide some habitat for waterfowl, water-oriented furbearers, and spiny-rayed fish such as perch, bullhead, and bass.

Timing of realinement work near the mouth of Fisher Slough and construction of a new closure structure will be coordinated with the Washington State Department of Fisheries to avoid peak migration periods for fish. Realinement of about 400 feet is necessary to improve the levee on the left bank. Revegetation of the right bank following construction is planned to provide some restoration of streamside cover. The existing tide gate under Highway 520 will be removed and replaced with a structure consisting of vertically hinged flap gates and a manually operated slide gate which will remain open except during periods of flooding. This new structure will be constructed through the proposed levee west of the Burlington Northern Railroad and is expected to provide better fish passage than the existing tide gate.

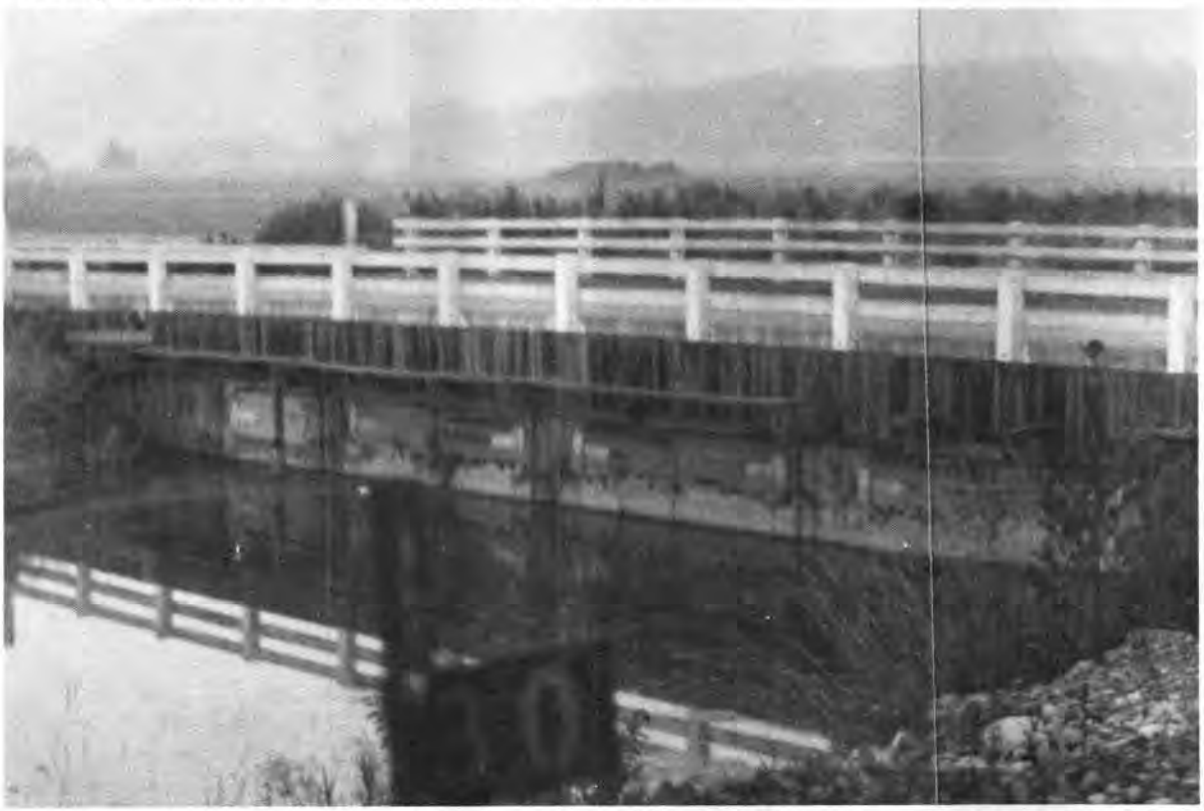

Photo 4-3. View of existing tide gate at Fisher Slough looking east. This structure will be removed and a slide-gate structure constructed closer to the mouth of Fisher Slough.

Construction activities in the East Fork Nookachamps Creek will be coordinated with fisheries agencies regarding both timing of construction of the closure structure and design of the structure to ensure adequate fish passage. Water quality impacts associated with the work in Fisher and Gages Sloughs and in East Fork Nookachamps Creek are discussed in paragraph 4.04.5

Photo 4-4. View west toward mouth of Fisher Slough where it flows into the Skagit River. Four hundred feet of the slough will be realined to permit construction of the levee on the left bank. Right bank vegetation will be restored.

4.06.2.6 FLOODWALL AND EROSION SILLS. No adverse impact will result to project area fish and wildlife from construction of the erosion control sill at Burlington or the floodwall through Mount Vernon.

4.06.3 FISH RESOURCES. The principal fisheries concern raised throughout project planning has been the impact to migrating and rearing juvenile anadromous fish from project-related losses of vegetative cover and shore zone habitat.[1/] Migrating adult spawners are not expected to be impacted by the proposed project or its construction. Spawning by anadromous fish does not occur in the project reach of the Skagit River. Resident fish in the project area will be impacted by loss of cover due to proposed levee construction but not to a significant degree.

The shore zone is critically important to juvenile fish (both anadromous and resident species) as rearing, feeding, and resting area. Loss of this rearing area results in a loss of the river's carrying capacity and a concomitant impact to fish abundance. The shore zone along the North Fork and South Fork in the Skagit Estuary and associated sloughs is particularly important as a transition zone from freshwater to saltwater for the juvenile anadromous fish migrating downstream to Skagit Bay. The importance of the estuary and sloughs to juvenile salmonids has been previously discussed in chapter 2.

1/Reference fish and wildlife coordination letters in appendix 2.

Impacts of the project on the shore zone are related to the loss of vegetative and physical cover due to levee construction and the loss of cover and shallow-water rearing area from the placement of riprap in the stream course. Riprap and quarry spall placement along the shoreline is proposed for approximately 3.3 miles of levee and in Fisher Slough and East Fork Nookachamps for construction of closure structures. This involves the placement of approximately 125,000 cubic yards of riprap and 17,000 cubic yards of quarry spalls into the shore zone.[1/] Most of the placement will entail the reworking or replacing of existing riprap. In many of these areas, riparian vegetation, consisting primarily of deciduous forest and scrub habitat types, is growing within the quarried rock.

Photo 4-5. View of right bank, main stem of the South Fork during August low flow. Note that vegetation has reestablished within existing riprap down to the level of ordinary high water.

Through coordination with resource management agencies, features have been incorporated into the project to minimize probable long-term impacts to fisheries. These features include levee realinements to avoid vegetative cover removal and the habitat restoration features for riprap slopes as discussed in paragraph 4.06.2. In addition, a mitigation program is proposed which provides for the replacement of a portion of the lost overstory cover and rearing area associated with the project. With the inclusion of the restoration features and the mitigation plan, it is not expected that the project will have significant long-

1/Estimates based on normal water surface profile.

term impacts on the fishery resource and requisite habitats of the Skagit Delta, Estuary, and associated sloughs, although there will be some permanent loss of shore area and riparian vegetation. Additionally, it is important to note that construction in the lower reaches of the North Fork and on Tom Moore and Freshwater Sloughs will be on one bank, leaving the other bank undisturbed.

The duration of impacts will vary depending upon the type of habitat restoration feature or mitigation recommended. The reopening of the slough on No Name Island in the Skagit Wildlife Recreation Area will provide immediate replacement of some of the rearing habitat losses from placement of riprap in the shore zone. It is estimated that rearing area in this slough will be provided for 2,000 coho salmon smolts and 75 cutthroat.[1/] It will also provide some estuarial rearing habitat for chinook, pink, and chum salmon. The revegetation planting of overstory will require approximately 10-20 years to reestablish.

Newly constructed rock bank protection will require at least one season to settle into the shoreline and become substrate for aquatic insects. Larger rock will provide some shelter and resting habitat for juvenile fish. The largest size riprap placed on most slopes will be 18 inches. On reaches requiring a steeper slope and on those reaches on which shrub revegetation is planned, a larger gradation rock will be utilized.

As grass seeding becomes established on riprap slopes and herbaceous vegetation reestablishes naturally, more food resources will become available along the shoreline. The time period between the initial construction impact and the gradual redevelopment of a vegetated (by grasses and forbs) shoreline will be about 3 to 5 years. Grass seeding of all levee slopes will accelerate the reestablishment of some habitat. The revegetation proposed in those critical reaches discussed in paragraph 1.04.4 will require approximately 5 to 10 years to establish.

Short-term increases in turbidity caused by instream construction and by surface erosion during levee construction will not significantly impact fish resources. Construction will be timed to avoid interference with the peak period of downstream migration of juvenile fish. Additionally, the construction contractor will be required to implement measures to control water quality degradation. Fish passage in the main stem Skagit River will not be blocked by construction activities.

The new outlet structure at Fisher Slough will consist of an 8.25-foot-wide concrete slot with two vertically hinged tide gates and a manually operated vertical slide gate (refer to plate 19). Special fisheries criteria were developed in coordination with fisheries agencies and have been incorporated into the design of the proposed closure structure to permit adequate fish passage. These criteria include a minimum water depth of 0.6 feet through the structure; a maximum average velocity not to exceed 8 feet per second, except during major flood events; and

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1/Personal communication with representatives of Washington State Department of Fisheries and Washington State Department of Game, 1979.

vertically hinged tide gates with no gravitational component for opening and closing. Tide gates will remain open until the Skagit River provides hydraulic force for closure. The manually operated slide gate will normally remain open and not cause submergence of the outlet except during major flooding events when positive closure may be required.

Construction at the mouth of Fisher Slough will be scheduled so that the proposed 400-foot realinement will not interfere with either adult or juvenile migration. Following realinement, the stream bottom is expected to return to existing conditions. Shoreline restoration after realinement, as discussed in paragraph 4.06.2 and displayed on plate 14, will replace lost vegetation and attempt to establish previously existing conditions.

Construction of 240 feet of levee across East Fork Nookachamps Creek between miles 1.0 and 2.0 by Highway 9 will result in the loss of approximately 0.3 acre of deciduous forest in the riparian zone which provides cover for fish and wildlife. The East Fork Nookachamps Creek between mile 0.0 and 0.3 provides rearing habitat and transportation for coho and chum salmon and some steelhead and cutthroat trout. Spawning occurs above river mile 3.0. The closure structure at Highway 9 will be designed to provide adequate fish passage (refer to plate 27). Final design will be coordinated with fisheries agencies. Construction will be scheduled to minimize disruption to migrating salmonids. Major water quality impacts will be those associated with short-term increases in turbidity during construction in the stream course.

Secondary impacts to fisheries in the project reach may result due to increased stress on the river ecosystem from accelerated development of the protected flood plain. These impacts would primarily be associated with loss of, and/or degradation of, habitat from continued human encroachment on the flood plain. The potential for these impacts is significant if unwise development is allowed to occur in the areas provided protection by the project. Flood plain management is realized as an important aspect of the proposed project.

4.06.4 WILDLIFE RESOURCES. Project-related impacts to wildlife will result from temporary disruption during construction and long-term changes in habitat. During construction, the removal of vegetation and extensive earth stripping and earthwork will drive away most resident wildlife species in the immediate construction area. These include songbirds, rodents, and small predatory mammals such as river otters and raccoons. The loss of cover due to project-related clearing will reduce the total habitat and to some unknown extent reduce the population of resident species which depend upon these habitat features.

The long-term, primary impacts to wildlife associated with the project include a reduction in the total scrub and forest habitat along the project alinement. Other than grasses and forbs (253 acres), scrub (18 acres) and forest (36 acres) habitat represent the major vegetation categories impacted by the proposed project. In relationship to the

local abundance of these habitat types, this clearing will create a reduction of some 3.0 percent (54/2000).[1/] The levee realinements discussed in paragraph 4.06.2.1 will result in the preservation of approximately 6 acres of river-edge scrub habitat. Project plans include the revegetation of 1.9 surface acres [1/] along the river edge to offset a portion of the remaining loss of scrub habitat that provides critical streamside cover to fish and wildlife. Within 5 to 10 years after restoration, these planted areas will provide cover and food for wildlife. Placement of stripped material on riprap slopes and buried toes will accelerate the natural reestablishment of shrub species. Grass seeding of levee slopes, tops, and berms will become established within one season following construction and will provide some wildlife cover.

Due to requirements for maintenance of levee integrity, the replacement of cleared deciduous forest along the proposed levee alinement is not possible. To mitigate for a portion of the total 36 acres lost to the project, 10 acres of offsite land will be planted with overstory species as discussed in paragraphs 1.04.5 and 4.06.2.4. A mixture of fast-growing and slow-growing tree species of varying heights will be planted. The result will be some habitat replacement in the shorter term (5 to 10 years), while the slower-growing tree species of higher wildlife value become established (10 to 20 years).

The area recommended for tree planting is the Skagit Wildlife Recreation Area owned and managed by the Washington State Department of Game. The planting sites proposed include the area between Freshwater and Wiley Sloughs and a river-edge area on Milltown Island. On Freshwater Slough, a 7-acre riparian zone along the inside of the existing levee will be planted following levee repairs that will be necessary to prevent frequent inundation of flows from the Skagit River. Levee improvements will involve topping the levee with gravel in a few places and will create minimal disturbance to the habitat. The remainder of this area will continue to be farmed by the Department of Game to provide cereal grain crops for wintering waterfowl.

On Milltown Island, plantings will occur along the river edge on the existing dikes. This island is no longer being farmed, and there are no current plans by the Department of Game for improving or maintaining existing dikes. Through continuing coordination with the Department of Game, other sites as well as the Milltown site may be recommended for the remaining 3 acres of planting.

Wildlife species most directly affected by the loss of canopy associated with the project will be songbirds which utilize canopy for cover from predators and as insect food sources. Loss of canopy will also result

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1/54 acres represent the total deciduous scrub and deciduous forest estimated as project clearing. The 2,000 acres represent the total of these categories as evaluated for the Skagit River wetlands inventory (Inventory of Wetlands, Lower Skagit River, Shapiro and Associates,

2/Includes 1.7 acres revegetation on riprap slopes and .2 acres on right bank of Fisher Slough.

in loss of some roosting and perching sites along the river for birds of prey. It has been suggested that large trees felled during project construction along Tom Moore Slough on the South Fork be left to provide additional habitat diversity for songbirds and roosting sites for birds of prey. Disturbance to these species in this reach will be minimized by the fact that construction activities will occur on one bank only.

There will be some reduction in duck breeding habitat by levee construction, particularly along Tom Moore Slough. The proposed project is not expected to significantly impact wintering waterfowl within the Skagit Estuary. Some impact will be incurred by construction-related noise, but this impact will be minor if construction is not accomplished in the period of peak wintering waterfowl abundance (October through January).

No primary adverse impacts will occur to the wintering populations of trumpeter swan in the Nookachamps Creek area as a direct result of levees built at Clear Lake. Some beneficial secondary impact may result in the Barney Lake area from increased water levels during floods, and thus increased ponding habitat for swans due to lost valley storage upstream of the East Fork Nookachamps closure structure and from discouragement of development due to increased reliance on this area to provide storage for flooding from the Skagit River.

There will be additional impacts to wildlife habitat associated with the selective clearing of 138 acres of temporary construction easement along the project right-of-way. Although a 10-foot minimum construction easement is provided on each side of the proposed levee, except where the levee encroaches into the river, both sides will not necessarily be utilized by the contractor. Where easements are utilized, the duration of habitat impacts will be approximately 3 to 5 years until vegetation restored in the easement by the construction contractor becomes reestablished.

Adverse secondary impacts may result to study area wildlife due to the provision of flood protection and the potential for increased pressure to develop in the protected flood plain. Particularly sensitive to this development pressure are the trumpeter swan and the threatened bald eagle. The trumpeter swan was once listed on the Federal list of Endangered and Threatened Species, but was removed as a result of recovery. The species is locally considered a sensitive species due to its past history and still limited population.

4.06.5 THREATENED AND ENDANGERED SPECIES. The project will not impact the American peregrine falcon known to winter in the southern ends of Samish Bay and Padilla Bay within the study area. Consultation with the U.S. Fish and Wildlife Service (FWS) regarding project impacts on the bald eagle has been completed. Correspondence documenting this consultation is contained in appendix 2. The biological opinion of the Fish and Wildlife Service is that the project, as currently proposed, is not likely to jeopardize the continued existence of the bald eagle. Addi-

tional coordination with the FWS regarding the bald eagle was accomplished in July 1979 for the project modifications made since receipt of the biological opinion. The correspondence included in appendix 2 discusses Seattle District's opinion that the project modifications will not jeopardize the continued existence of the bald eagle. No known nests occur within the area of the proposed levee alinement. Because project construction will not be occurring over the entire project reach at one time, bald eagles will only temporarily be displaced from any one section of the river over the 4-year construction period. In the Skagit Estuary on the South Fork where bald eagles appear in the greatest numbers within the project reach, construction activities will occur on only one bank, leaving the canopy habitat on the other bank undisturbed and available for displaced eagles to roost and perch. Adverse fisheries impacts associated with the proposed project have been reduced by the incorporation of habitat restoration features and a fish mitigation program into the project plan. As a result, it is not expected that salmon spawning populations in the upper reaches of the Skagit River will be significantly affected by the project. Consequently, the wintering eagle populations which concentrate near Rockport to feed on spawned-out salmon will not be impacted.

No other threatened and endangered species are known to occur in the project area.

5. ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

5.01 GENERAL. During project planning, efforts have been made to avoid significant adverse environmental impacts. Where it was not practicable to avoid adverse effects, features have been incorporated into the project to minimize the effects. These features have been described in chapter 1 and discussed in chapter 4. Coordination that has been involved in the environmental planning for the project is summarized in chapter 9.

Unavoidable adverse impacts resulting from the proposed project are associated with the following impact categories:

- o Air quality.
- o Water quality.
- o Induced flood damages.
- o Land use.
- o Manmade resources.
- o Displacement of persons.
- o Noise and traffic.
- o Recreation.
- o Esthetics.
- o Prime farmland.
- o Fish and wildlife habitat.

5.02 SUMMARY. A summary of the unavoidable adverse impacts resulting from the proposed levee improvements is presented in table 5-1. For more complete discussions of each of the impacts displayed, refer to the appropriate paragraphs in the text.

TABLE 5-1

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Physical Features				
Air Quality	Direct impact to air pollution due to exhaust emissions & dust related to construction activities.	Sprinkling haul roads & construction areas as necessary to minimize dust.	Short-term during project construction. Localized in project area.	Paragraph 4.04.4.
	Secondary impact if development of flood plain is intensified as a result of increased protection.	Encouragement of the strict enforcement of current zoning regulations.	Long-term in the study area.	Paragraph 4.04.4.
Water Quality	Primary impacts due to increases in turbidity from placement of 125,000 cubic yards of riprap & 17,000 cubic yards of quarry spalls in the stream course & from construction activities at Fisher Slough and in the East Fork Nookachamps Creek.	Construction contractor will be required to use construction methods which minimize turbidity. Construction will be scheduled to minimize impacts to migrating anadromous fish.	Short-term during project construction. Localized in project area. Some impacts of turbidity may result during periodic levee maintenance throughout the project life.	Paragraph 4.04.5, appendix 1.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Water Quality (con.)	Activities in Fisher Slough include construction of levee & closure structure, removal of the existing tide gate, & realinement of 400 ft. of the slough. Activities in the East Fork Nookachamps Creek include construction of levee and closure structure.			
	Primary impacts of increased turbidity should a high-water event occur before completion of ground cover restoration features on riprap slopes.	Potential tradeoff involved in implementation of habitat restoration features.	Short-term, localized at restoration sites.	Paragraph 4.04.5, appendix 1.
	Secondary, subtle effects of filling approx. 5.0 acres of freshwater and saltwater wetlands & the clearing of	In keeping with Executive Order 11990, filling & clearing wetlands has been avoided where practicable.	Permanent loss during life of project. Localized to specific sites within project area.	Paragraph 4.04.5, appendix 1.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Water Quality (con.)	2.5 acres of tidal scrub wetland.	The filling of 1 acre of freshwater marsh landward of the levee on Tom Moore Slough is unavoidable if streamside vegetation is to be preserved.		
	Secondary impacts of increased water temperatures resulting from loss of streamside cover.	Levee alinements have been adjusted landward where feasible and removal of 6.0 acres of streamside vegetation has been avoided that would have been lost if existing levee alinement was followed. Habitat restoration is proposed to minimize loss of cover on certain riprap slopes.	Loss of deciduous forest and some scrub habitat within the levee right-of-way is permanent. Shrub habitat revegetation will require approx. 5-10 years to reestablish. Some natural reestablishment of native shrubs will take place within 10 years.	Paragraph 4.04.5.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Water Quality (con.)			Impact is confined to those areas where project will encroach on the river (approx. 3.3 miles).	
Socioeconomic Features				
Induced Flood Damages	Minor impact may occur to a log storage area, the railroad, and the highway in South Sedro Woolley. Total average annual induced flood damages are estimated at $11,000.	Induced flood damages have been reduced by structural and nonstructural features incorporated into the proposed project.	Permanent for the life of the project. Localized to south Sedro Woolley.	Paragraph 1.04. Paragraph 4.02.3.
Land Use	Secondary impact resulting from potential increase in pressure to develop in the protected floodplain, particularly in those agricultural areas (9,500 acres)	Enforcement & compliance with Executive Order 11988 on Flood Plain Management & encouragement of enforcement of local zoning. Although some increase in pressure to develop in areas	Permanent impact to the study area.	Paragraph 4.02.5.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Land Use (con.)	unavoidably provided 100-year protection by the project.	(39,600 acres) provided 50-year protection can be expected, intensive development will be discouraged by flood-proofing requirements, having a tendency to preserve the Skagit Delta in agricultural land use.		
Manmade Resources	Adverse impacts to cultural resources will be determined in the cultural resources survey. The reconnaissance report identified 20 prehistoric & 34 historic sites in the study reach. Additional required reconnaissance may identify further sites.	Mitigative action as necessary.	Extent and duration to be determined by cultural resources survey.	Paragraph 4.05.1.
	72 homes (11 due to structural features; 61 due to nonstructural) and	For relocations required by structural measures, design features	Permanent, localized.	Paragraph 4.05.2.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Manmade Resources (con.)	22 buildings will be relocated due to levee construction.	(i.e., floodwall, retaining wall, rockery, etc.) were incorporated to avoid displacement where feasible. Relocations required by nonstructural measures will be examined further in detail on a case-by-case basis. Other measures, such as floodproofing, will be utilized where possible.		
Displacement of Persons	Approximately 200 persons may be displaced by the project, with resulting disruption to families and communities.	Relocation assistance will be provided as necessary. Further detailed studies for nonstructural measures may reduce number of displacements necessary.	Permanent, localized.	Paragraph 4.05.3.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Noise & Traffic	Primary impact during project construction & during crane operations to erect tilt-up floodwall.	Haul routes will be coordinated with Skagit County to avoid major traffic disruptions.	Short-term during project construction and flood operations. Localized in project area.	Paragraph 4.04.4.
	Primary impact from the loss of 5-10 parking spaces in Mount Vernon due to construction of folding floodwall.	Floodwall was designed to minimize loss of parking spaces and maneuverability.	Permanent for life of project.	
	Secondary impacts could result from any accelerated development stimulated by flood protection provided by the proposed project.	Encouragement of zoning enforcement to restrict development of the flood plain.	Long-term impacts to the study area.	Paragraph 4.04.4.
Recreation	Primary impact of disturbance to uses of public access sites along the project reach & to areas within the	Public access sites disturbed by project construction will be restored. Disturbance to the	Short-term during project construction. Localized in specific areas of the project area.	Paragraph 4.05.6.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Recreation (con.)	Skagit Wildlife Recreation Area (WRA) during project construction.	recreational uses of these areas will be minimized by coordinating the construction activities and the timing of those activities with the the respective property owners.		
	Primary impacts due to potential relocations necessary at Lundeen's Resort and Phil's Boathouse and due to the loss of lawn area in Roadside Park due to construction of a tilt-up floodwall.	Minimization of relocations and impacts to existing park areas were considered during project planning. Design of project at Phil's Boathouse will permit continued operation of the resort under "with project" conditions as under "without project" conditions.	Permanent impact for the life of the project.	
Esthetics	Primary impacts from construction	Landscaping plantings are proposed	Short-term, significant impact	Paragraph 1.04.2, paragraph 4.05.7.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Esthetics (con.)	operations, vegetative clearing, & haul roads; &, following construction activities, from change in landform resulting from levee construction. Impacts to structures floodproofed as part of nonstructural measures.	for 30 locations along the project alinement. A tilt-up floodwall will be constructed through Mt. Vernon. Grass seeding is proposed on all levee surfaces above the ordinary high waterline.	during project construction. Permanent visual impact in the project area from higher & wider levees, new levees & sill in Burlington-Sedro Woolley-Sterling area, placement of riprap, and from certain nonstructural measures.	
Prime Farmland	Approximately 44 acres of prime farmland will be committed in permanent easement to the levee right-of-way.	Some use of land as pasture will be maintained; however, cattle grazing on levees is discouraged since overgrazing may lead to lowering of levee height and a reduction in levee protection.	Permanent for project life. Localized to area along project alinement.	Paragraph 4.05.9.
	Significant secondary impacts may result from increased potential	Strict enforcement of zoning regulations. Local sponsor is required to	Long-term, significant impact to study area.	Paragraph 4.02.18.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Prime Farmland (con.)	for development in the protected flood plain.	publicize information to land-use agencies in order to provide guidance in preventing unwise development of the flood plain.		
Environmental Features				
h & Wildlife labitat	Primary impacts to habitat resulting from the clearing and stripping of 356 acres of vegetation along 50.4 miles of proposed levee. Major unavoidable loss related to clearing is 12 acres of deciduous scrub & 36 acres of deciduous forest. Approximately five acres of wetlands will be committed to the project right-of-way. Additional vegetative losses will be incurred by	Streamside vegetation removal has been avoided where feasible. Habitat restoration features have been incorporated to minimize impacts in critical reaches along the river where vegetation removal is unavoidable. Planting 10 acres of trees will be accomplished to mitigate for a portion of the deciduous forest losses.	Long-term loss of scrub (small trees and shrubs) habitat along the project reach. 1.9 acres revegetation will require 5-10 years to become reestablished. In other areas, natural reestablishment of scrub species will occur within 10 years. There will be some permanent scrub habitat losses. Permanent loss of deciduous forest	Paragraph 1.04.4, paragraph 1.04.5, paragraph 4.06.1, paragraph 4.06.2, paragraph 4.06.3, paragraph 4.06.4.

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Fish & Wildlife Habitat (con.)	selective clearing required in the 138 acres of temporary construction easement.		cleared in the levee right-of-way. Mitigation plantings will require 10-20 years to reestablish.	
	Primary impacts to shore-zone habitat resulting from the placement of riprap in the stream course along approximately 3.3 miles of the project reach and from placement of closure structures at Fisher Slough and East Fork Nookachamps.	Reopening of a slough in the Skagit WRA is planned to establish 2,500 feet of shallow rearing habitat for juvenile anadromous fish.	Permanent reduction of shallow rearing habitat for fisheries along the project reach. Rearing habitat provided by proposed mitigation will be immediately available, following placement of culverts.	Paragraph 1.04.5, paragraph 4.06.2, paragraph 4.06.3.
		Construction activities within the stream course will be timed to avoid the peak juvenile salmonid migration period		

TABLE 5-1 (con.)

Category	Unavoidable Adverse Impact	Policies & Features That Will Minimize Impact	Expected Duration & Extent of Impact	Discussion Reference in EIS
Fish & Wildlife Habitat (con.)	Secondary impacts of increased stress to habitat resulting from potential increases in development of the protected areas of the flood plain.	Encouraged zoning enforcement and compliance with Executive Order 11988 on Flood Plain Management.	Permanent impact to the study area.	Paragraph 4.03.2.

6. ALTERNATIVES TO THE PROPOSED ACTION

6.01 PLANNING OBJECTIVES. The planning objectives considered during plan formulation have incorporated national, state, regional, and local water and related land resource management needs specific to the study area. Those objectives identified include:

- Insure benefits of any recommended plan exceed costs.
- Reduce both rural and urban flood damages in the Skagit River Delta.
- Preserve the shore zone along the Skagit River, including shallow water areas and river-edge and wetland vegetation, critical to fish and wildlife.
- Protect the threatened bald eagle and its habitat.
- Preserve existing and potential outdoor recreation opportunities along the Skagit River consistent with local and regional recreation needs and plans.
- Preserve or salvage significant (as determined by National Register of Historic Places criteria) historic and prehistoric cultural resources sites affected by potential project construction.

Study alternatives were evaluated against these objectives and the plan selected which best satisfied them.

6.02 PLAN FORMULATION. Section 103 of Public Law 89-90 established principles and standards for planning the use of the nation's water and related land resources.1/ These principles and standards require that Federal and federally-assisted water and related land planning be directed to achieve National Economic Development (NED) and Environmental Quality (EQ) as equal national objectives. NED is to be achieved by increasing the value of the nation's output of goods and services and improving national economic efficiency; EQ is to be achieved by managing, conserving, preserving, creating, restoring, or improving the quality of certain natural and cultural resources and ecological systems. This is accomplished by developing one plan which maximizes net economic benefits (NED plan) and another plan which emphasizes environmental quality (EQ plan). Plans which address combinations of NED and EQ are formulated as well.

6.03 PRELIMINARY ALTERNATIVES CONSIDERED. Six preliminary alternatives were developed which combined potential flood damage reduction measures to address both NED and EQ objectives. The alternatives considered

1/Water Resources Council-Water and Related Land Resources, Establishment of Principles and Standards for Planning, Federal Register, Volume 38-Number 197, September 10, 1973.

were: (1) continue existing conditions; (2) levee and channel improvements as authorized in 1966; (3) levee and channel improvements with higher levees protecting urban areas; (4) levee and channel improvements, higher urban levees, and upstream flood control storage; (5) levee and channel improvements, higher urban levees, and Avon Bypass; and (6) levee and channel improvements, Avon Bypass, and upstream flood control storage. Table 6-1 provides a comparison of these preliminary alternatives.

6.03.1 ALTERNATIVE 1 - CONTINUE EXISTING CONDITIONS (WITHOUT PROJECT CONDITIONS) No new action would be taken for flood damage reduction through either structural or nonstructural means. Development on the flood plain would be restricted through existing zoning. Floodproofing of future structures would be required for continuation of the flood insurance program in Skagit County. This would indemnify property owners against losses, but would not prevent flooding. Undeveloped land in the flood plain could be preserved for parks and open space. The existing levee system and upstream flood control storage would be maintained. The existing flood-warning system would provide forecasts of floods and give emergency information to flood plain residents. However, this alternative would not meet the planning objectives since the existing average annual flood damages of $7,049,000 would increase in the future. Little support was expressed for this alternative by any agency or group.

6.03.2 ALTERNATIVE 2 - LEVEE AND CHANNEL IMPROVEMENTS. This alternative is the plan that was recommended by the U.S. Army Corps of Engineers and authorized by Congress in 1966. It would involve raising and strengthening the existing levee system from the mouths of the North and South Forks upstream to the Burlington Northern Railroad bridge and improving the hydraulic capacity of the North Fork and Freshwater Slough so that the safe channel capacity downstream from the railroad bridge would be 120,000 cubic feet per second. Development of the flood plain would continue to be restricted. Flood plain management would continue to be required for the entire Skagit River flood plain, including zoning, floodproofing of future structures, the flood warning system, and the flood insurance program. This alternative was considered lacking in that it did not address the entire flood control problem on the Skagit River Delta. It would provide only 8-year protection to the town of Mount Vernon, would not maximize benefits for rural flood protection, and included environmentally damaging channel excavation and maintenance. Further, alternative 2 is not economically justified. Skagit County, the local sponsor, did not support this alternative.

6.03.3 ALTERNATIVE 3 - LEVEE AND CHANNEL IMPROVEMENTS AND URBAN LEVEES. Alternative 3 includes rural levees generally as described in alternative 2, but would also include higher levees with 100-year or more protection for the urban areas of Burlington and Mount Vernon. Flood plain management would continue to be required for those areas lying outside the high levees, including zoning, floodproofing of future structures, and the flood insurance program. Five combinations of urban and rural protection were examined in detailed studies. These are discussed beginning in paragraph 6.05.

6.03.4 ALTERNATIVE 4 - LEVEE AND CHANNEL IMPROVEMENTS, URBAN LEVEES, AND UPSTREAM STORAGE. Alternative 4 includes rural levees generally as described in alternative 2, but which would provide about 40-year protection; higher levees with 100-year protection for the urban areas of Burlington and Mount Vernon (2 feet lower than alternative 3 urban levees); and upstream storage of 134,000 acre-feet on the Sauk River. Flood plain management would continue to be required for those areas lying outside the high levees. This would include zoning, floodproofing of future structures, and the flood insurance program. This alternative was eliminated from further consideration because of significant environmental impacts, incompatibility with the scenic designation of the Sauk River as part of the National Wild and Scenic River system, and high costs when compared with other alternatives.

6.03.5 ALTERNATIVE 5 - LEVEE AND CHANNEL IMPROVEMENTS, URBAN LEVEES, AND AVON BYPASS. Alternative 5 includes rural levees generally as described in alternative 2, but which would provide about 60-year protection; higher levees with 100-year protection for the urban areas of Burlington and Mount Vernon (3.5 feet to 5.5 feet lower than alternative 3 high levees); and the authorized Avon Bypass Project. The existing levee system would be extended to Sedro Woolley, and the bypass channel to Padilla Bay from Mount Vernon would have a capacity of 60,000 c.f.s. Flood plain management would continue to be required for those areas lying outside the high levees. This alternative was eliminated from further consideration due to: potential adverse environmental impacts to Padilla Bay and local concern over the large amount of productive farmland required and the high percentage of local costs.

6.03.6 ALTERNATIVE 6 - LEVEE AND CHANNEL IMPROVEMENTS, AVON BYPASS, AND UPSTREAM STORAGE. Alternative 6 includes levee improvements as described by alternative 2 plus the authorized Avon Bypass and upstream storage of 134,000 acre-feet on the Sauk River. The existing levee system would be extended to Sedro Woolley, and the bypass channel would have a capacity of 60,000 c.f.s. Since about 100-year flood protection would be provided to most of the flood plain downstream of Sedro Woolley, flood plain restrictions in protected areas would no longer be required. This alternative was eliminated from further consideration due to: significant adverse environmental impacts, incompatibility with the scenic designation of the Sauk River as part of the National Wild and Scenic River System, and potential adverse environmental impacts to Padilla Bay.

6.04 OTHER MEASURES CONSIDERED DURING PRELIMINARY STUDIES.

6.04.1 NONSTRUCTURAL. Flood plain regulation has already been implemented by Skagit County as a requirement of the Federal Flood Insurance Program and is considered an element of Alternative 1 - Continue Existing Conditions, which is the without condition. However, since flood plain regulation does not prevent damage to existing structures and property, other nonstructural measures were considered. Relocation of the structures of the entire Skagit River Delta flood plain was determined to be not economically feasible or politically or socially acceptable. Existing residential, commercial, industrial, and public development

within the flood plain is valued at about $800,000,000. No other nonstructural measures, such as floodproofing or raising buildings, was feasible as a complete solution to the delta flooding problem. Thus, no feasible nonstructural alternative could be developed.

6.04.2 CHANNEL DREDGING AND OTHERS. During the study many individuals suggested that flood reduction could be accomplished by channel dredging. Investigations of dredging were conducted to sufficient level of detail to determine that the desired levels of flood protection could not be provided by dredging alone and that a combination of dredging and levee construction to provide desired levels is significantly more costly than levee construction alone. Also, dredging the Skagit River downstream of Sedro Woolley would cause major environmental impacts. Consequently, channel dredging was not considered a viable alternative for detailed study. The possibility of setback levees was also suggested as a flood control alternative to making improvements to existing levees along the river; however, due to the existing development in the urban areas along the river, the significant relocations that would be required, and the lack of economic, social, and political feasibility, this alternative was precluded from consideration.

6.05 DETAILED ALTERNATIVES CONSIDERED. Of the preliminary alternatives, alternative 3 received public and local government support as the first priority for flood damage reduction in the Skagit River Delta. Within this alternative, five combinations of urban and rural levee protection were developed and designated 3A, 3B, 3C, 3D, and 3E (see figure 6-1). Alternative 1, Continue Existing Conditions, is the without condition and was carried throughout plan formulation, as was alternative 2, the 1966 authorized project, to serve as the basis for evaluating the impacts of the various alternatives being considered. Table 6-2 provides a comparison of the detailed alternatives. Alternative 1, Continue Existing Conditions - Without Condition, and Alternative 2, Authorized Project, were described in paragraphs 6.03.1 and 6.03.2, respectively, and are not repeated here.

6.05.1 ALTERNATIVE 3A - RURAL AND URBAN LEVEES. Alternative 3A involves improving and extending the existing levee system to provide 50-year level of protection for the Avon-Fredonia area and the rural land downstream of Mount Vernon and 100-year level of protection for the urban areas of Burlington and west Mount Vernon on the right bank and Mount Vernon on the left bank. A gated overflow weir would be provided on the Avon bend to prevent a catastrophic failure when a greater than 50-year flood overtops the levee. In a similar manner, freeboard on the remainder of the levee system would be designed such that a catastrophic failure of the levee would be prevented. The natural overflow of Skagit River floods into the Samish Valley would increase and begin at lower flood levels than under existing conditions.

6.05.2 ALTERNATIVE 3B - RURAL AND URBAN LEVEES. Alternative 3B is similar to alternative 3A except that the Avon-Fredonia area would also be provided 100-year protection (rather than 50-year), and a gated weir on the Avon bend would not be required. The natural overflow of Skagit River floods into the Samish Valley during greater than 10-year floods would be increased.

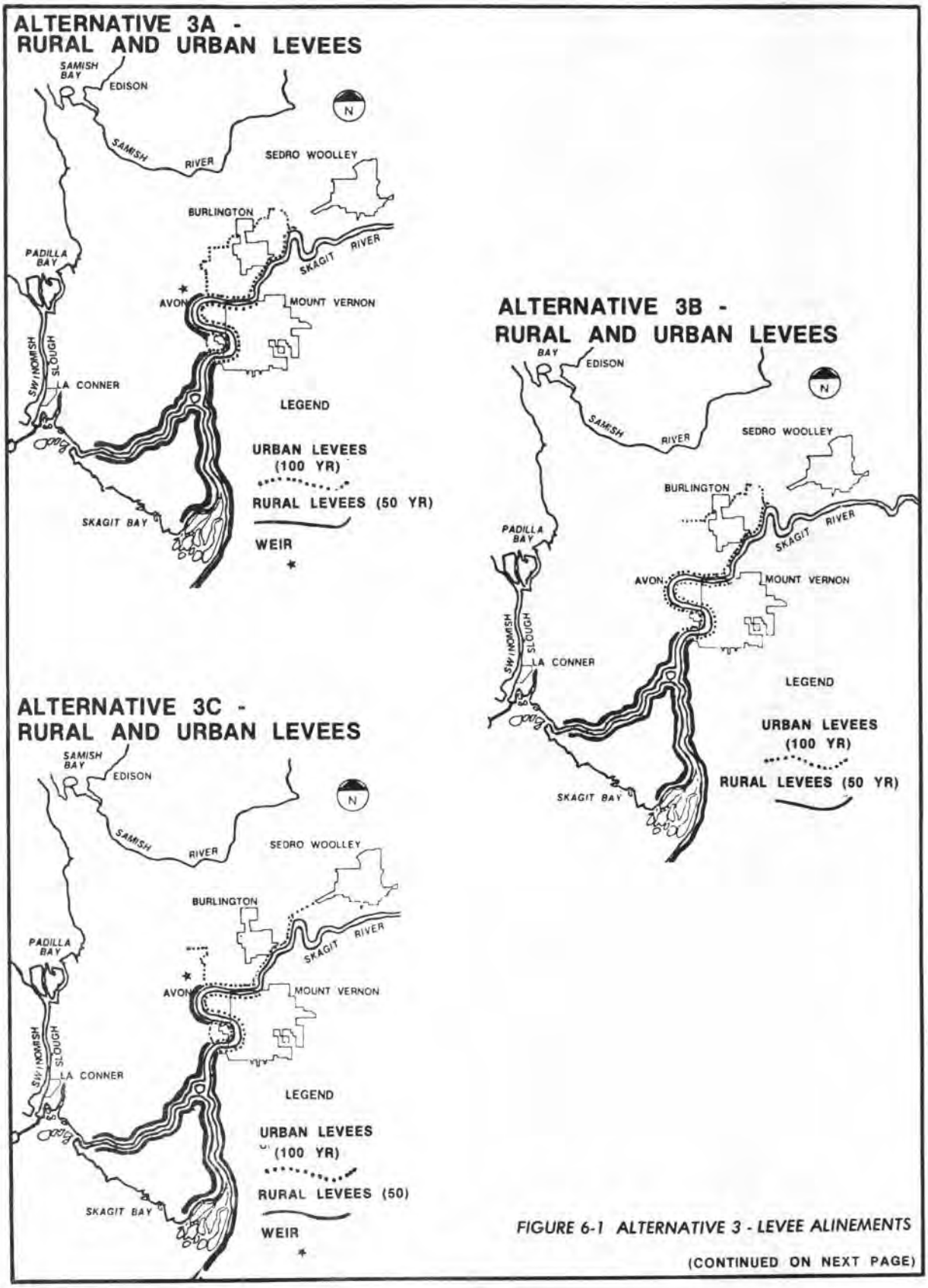
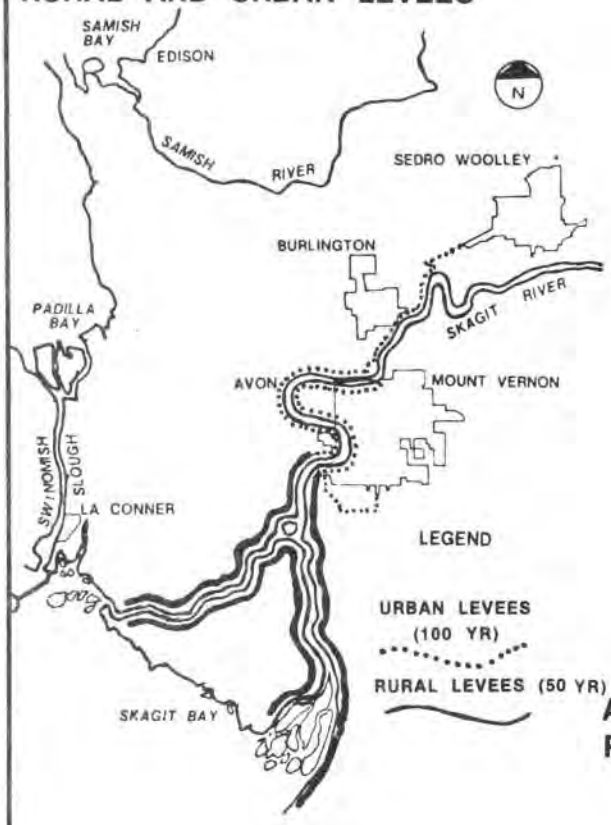


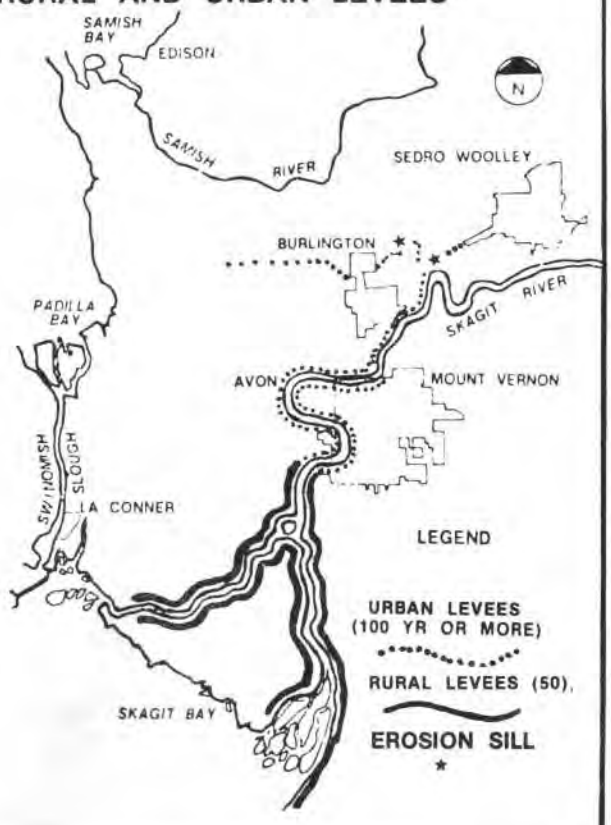
FIGURE 6-1 ALTERNATIVE 3 - LEVEE ALINEMENTS

(CONTINUED ON NEXT PAGE)

ALTERNATIVE 3D - RURAL AND URBAN LEVEES



ALTERNATIVE 3E - RURAL AND URBAN LEVEES



6.05.3 ALTERNATIVE 3C - RURAL AND URBAN LEVEES. Alternative 3C is similar to alternative 3A except that 100-year flood protection would also be provided to the Cook Road area northwest of the Burlington Northern Railroad between Burlington and Sedro Woolley. The natural overflow of Skagit River floods into the Samish Valley would be prevented during a 100-year flood. The Burlington Northern Railroad bridge at Mount Vernon would have to be raised or replaced. This alternative is not economically justified.

6.05.4 ALTERNATIVE 3D - RURAL AND URBAN LEVEES. Alternative 3D is similar to alternative 3C except that the Avon-Fredonia area would also be provided 100-year protection (rather than 50-year), and a gated weir would not be required on the Avon bend. The natural overflow of Skagit River floods into the Samish Valley would be prevented during a 100-year flood. The Burlington Northern Railroad bridge at Mount Vernon would have to be raised or replaced. This alternative is not economically justified under existing conditions.

6.05.5 ALTERNATIVE 3E - RURAL AND URBAN LEVEES. Alternative 3E is similar to alternative 3D except that 50-year protection would be assured for the Cook Road area north and west of Sterling Hill by means of berms and erosion control sills. The sills would also be designed to restrict the volume and discharge during a 100-year event to not greater than would be experienced under existing conditions. Additional levees would be built providing 100-year protection for Clear Lake and the Sedro Woolley-Sterling area. Also, improvements in the flood plain riverward of the improved levee system would receive flood damage reduction by nonstructural measures such as raising, floodproofing, relocation, easements, mounds for livestock, and levees. No bridges would have to be raised.

6.06 SELECTION OF PLANS. The NED plan is the alternative that provides the highest net economic benefits. Since alternative 3B does this, it was selected as the NED plan. At a minimum, an alternative plan must make net positive contributions to the EQ account to be designated the EQ plan. When this cannot be done, the plan which is least damaging to the environment (LDE) must be identified. The direct impacts to fish and wildlife were not considered significantly different among alternatives 3A - 3E. The evaluation of the LDE plan was made on the basis of secondary impacts. Alternative 3A was selected as the LDE plan since it provides the least flood protection and thus the least secondary impact to fish and wildlife and prime farmland due to accelerated trends in flood plain development.

Alternative 3E, described in chapter 1, has been selected as the proposed project because it is the most effective plan when contributions to the planning objectives, impacts, and specific evaluation criteria are considered. It strikes a balance between the provision of 100-year or more flood protection to the developed areas and the limitation of induced flooding damages to unprotected areas. The plan provides for Standard Project Flood protection to the highly developed areas of Mount Vernon, and 100-year protection to west Mount Vernon, Avon, Burlington, Sedro Woolley-Sterling, and Clear Lake, while providing 50-year protection for the farmland of the Skagit Delta and the Samish Valley-Cook Road area, and limiting 100-year Skagit River flooding in the Samish

Valley to that which would occur under existing conditions. Induced flooding damages are limited to relatively low values in the remaining unprotected area of south Sedro Woolley. With respect to adverse environmental impacts, all the alternatives would be similar in their environmental impacts, with the primary differences between the plans related to the amount of area provided 100-year flood protection. Alternative 3E lies midway in the array of alternatives in the amount of 100-year flood protection provided and would be similarly ranked with respect to its adverse environmental impacts. The plan is the most publicly acceptable.

During plan formulation, the level of flood protection which would be appropriate was also evaluated. Generally, urban areas should be provided the highest level of flood protection which can be supported by the benefits obtained. Levels of protection for the Mount Vernon-Burlington areas in excess of 100 years would sequentially involve the raising or replacement of the Burlington Northern bridge at Mount Vernon ($30 million), the Mount Vernon highway bridge ($4 million) and the "Old 99" highway bridge ($4 million). Because of the bridges, the provision for any higher levels of protection for the urban areas would involve significant increases in project costs with no commensurate gain in benefits. Therefore, protection greater than 100-year was not considered feasible except in the Mount Vernon area. Design of the levees along Burlington to preclude catastrophic flooding requires assurance of backflooding for floods exceeding 100-year levels. The result of this design, plus raising the levee another 0.4 foot, is the provision of Standard Project Flood protection to Mount Vernon.

6.07 ALTERNATIVE MITIGATION PLANS. Mitigation is recommended as part of the proposed project because fish and wildlife habitat will be adversely impacted by project construction. Alternative mitigation approaches include: (1) propagation of selected fish and wildlife for release into natural populations, (2) land acquisition and management for increased wildlife yields, and (3) offsite mitigation plantings and provision of rearing habitat for juvenile fish on land owned and managed by the Washington State Department of Game.

6.07.1 ARTIFICIAL PROPAGATION. Propagation techniques are limited to a few species of economic and recreational importance which, in the project reach, would include anadromous fish and waterfowl. However, this alternative yields no benefits to nongame species and no mitigation for the habitat resource. Habitat replacement is thought to be the key to successful mitigation. If, instead, mitigation is accomplished by adding numbers of animals to existing habitat that is already at its carrying capacity, survival will be short-term until the resources are overexploited. The population will eventually decline to the equilibrium of that habitat and mitigation will be unsuccessful. If, however, habitat (hence resources) is provided, populations will increase naturally to a new equilibrium level defined by the resources provided. Because artificial propagation fails to mitigate adequately for fish and wildlife losses in the project area by not providing for lost habitat, it was not given further consideration.

6.07.2 LAND ACQUISITION AND MANAGEMENT. This alternative would provide an additional parcel of land as part of the public wildlife recreation area on the Skagit River. Lands could be conveniently and economically managed for increased wildlife production by the Washington State Department of Game. Based on vegetation losses of about 10 acres of deciduous forest, land acquisition and management of a comparable 10 acres would provide a basis of mitigation. Benefits to both game and nongame species would be realized; however, the plan provides no mitigation for the lost rearing area for fisheries. Further, land comparable to the habitat being lost was not available for acquisition in the immediate project area. Thus, this alternative was not considered acceptable.

6.07.3 OFFSITE MITIGATION PLANTINGS AND PROVISION OF FISH REARING HABITAT. The recommended mitigation plan incorporated into the proposed project is offsite mitigation planting and provision for fish rearing habitat. For a discussion of the plan, refer to chapters 1 and 4. This alternative mitigates for fish and wildlife habitat lost by providing for 10 acres of tree plantings and the establishment of fish rearing habitat in the immediate project area. By utilizing land already owned by the Washington State Department of Game, no land acquisition will be required. The plan was developed in coordination with the U.S. Fish and Wildlife Service, the Skagit System Cooperative, Washington State Department of Fisheries, Washington State Department of Game, and the National Marine Fisheries Service. Coordination will be ongoing with resource agencies through implementation of the mitigation program and, in particular, with the Washington State Department of Game to formulate an agreement for management of the mitigation features. The estimated cost of the recommended mitigation plan is $220,000, to be cost shared with the local sponsor at the same ratio as the remainder of the project.

7. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed Skagit River project will provide 100-year or more flood protection to the urban areas of Sedro Woolley - Sterling, Burlington, Avon, west Mount Vernon, Clear Lake, and Mount Vernon, and 50-year protection to the agricultural lands of the Skagit Delta and to a portion of the Samish Valley from Skagit River flooding. The flood plain is currently used primarily for agriculture, with some residential and commercial development located in and around the cities of Mount Vernon, Burlington, and Sedro Woolley.

The most significant primary impacts of the proposed project are a result of vegetation clearing along the Skagit River and the loss of critical shore zone habitat due to the placement of riprap in the stream course. Levee alinement to preserve streamside vegetation and a habitat restoration plan have been incorporated as project features to reduce adverse impacts on riverine habitat with the intent of maintaining its long-term productivity for fish and wildlife. An additional 10 acres of offsite lands will be planted with tree species to mitigate for project-related losses of canopy which cannot be restored in the levee right-of-way due to levee maintenance requirements.

Revegetation plantings alone do not provide an optimum short-term solution to habitat losses due to the 5- to 10-year lag time before vegetation becomes established. The degree of long-term loss over the project life will depend largely upon the degree of revegetation success.

Some mitigation of shore zone losses will be provided by reopening a 2,500-foot slough in the Skagit Wildlife Recreation Area to the freshwater flows of the Skagit River. This will result in the immediate availability of 2,500 feet of shallow rearing habitat for use by juvenile fish.

The most significant secondary impacts of the proposed project are those associated with the potential for accelerated development in the protected flood plain, particularly in the 9,500 acres of undeveloped land incidentally provided 100-year protection in order to protect the existing urban areas. The extent of this impact largely depends upon the degree that local land-use regulations are enforced within Skagit County. As part of the items of local cooperation, the county is required to publicize flood plain management information for use by zoning and regulatory agencies in preventing unwise future development in the flood plain.

When the primary and secondary adverse impacts associated with the project are weighed against the beneficial social and economic impacts of flood damage reduction related to man's short-term uses of the flood plain, the decision has been made to protect the lives and property of flood plain occupants at the expense of some permanent losses in fish and wildlife habitat and the potential secondary losses of flood plain resources.

8. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Labor, materials, energy, and capital used in preconstruction planning and project construction will be committed if the proposed action is implemented. The land area occupied by the levee system will be committed for the life of the project, if not indefinitely. This includes the commitment of approximately 44 acres of prime farmland.

As a consequence of continuing economic activity and the possibility of flood events exceeding the project design, flood protection without strict enforcement of land-use zoning commits the area to continued flood protection and the continued loss of natural flood plain resources.

The project related changes in habitat quality and quantity, the fish and wildlife which depend on the habitat resource, and the existing landscape quality of the project area will be committed by the proposed action. Riprap placement in the stream course and the removal of river-edge vegetation will premanently reduce the quality of shallow water habitat areas. The quantities of vegetation and the habitats impacted by the proposed action are discussed in paragraphs 4.06.1 and 4.06.2. Because of levee design and maintenance requirements, the loss of deciduous forest within the permanent levee right-of-way will be irreversible. Fish and wildlife displaced by the proposed work will be committed if the project is implemented.

9. COORDINATION [1/]

9.01 PUBLIC PARTICIPATION. Coordination with Federal, state, and local agencies for the Skagit River Project has been ongoing since the mid-1960's. Public meetings were held in 1961 and 1964 during the feasibility study. Plans for levee and channel improvements received general support and were endorsed by Skagit County officials, representatives of diking districts, the city of Mount Vernon, and others.

Advanced engineering and design studies for the Skagit River Project, authorized in 1966, were initiated in 1977. An initial broad range of alternatives was presented at a public meeting in Mount Vernon in March 1978. The objectives of this meeting were to review alternatives which had previously been developed for flood control in the Skagit Delta, to consider present criteria and conditions, and to obtain public response to these alternatives. Prior to the meeting, alternatives were summarized in a public information brochure, which provided a format for public review and comment on the alternatives. The alternative of rural levee improvements and urban levee protection for Mount Vernon and Burlington received the greatest support at the meeting. As a result, detailed studies were made of several levee alternatives which provide varying degrees of flood protection to the urban and rural areas of the study area.

Following detailed studies, a preferred alternative was selected based primarily on engineering, environmental, and economic criteria. This alternative and the other alternatives considered were summarized in a studygram distributed to the public and presented at a public workshop in December 1978.

At the December workshop and in two follow-up meetings in January, considerable public concern was expressed regarding unleveed areas that would be affected by induced flooding caused by the proposed project. In response to these concerns, the Skagit County Commissioners requested Seattle District to conduct additional studies to assure that every possibility was explored to assist individuals living in the unleveed areas. As a result of the studies, the levees at Clear Lake and other flood reduction measures were added to alternative 3E. Continued concern for induced damages was expressed at a public meeting held in June 1979; although, alternative 3E did receive general support.

A group of individuals living in areas that would remain unleveed under with-project conditions has organized into the Nookachamps Valley Flood Defense Organization (NVFD) to attempt to have upstream storage constructed in lieu of the proposed project. The NVFD is also seeking to assure that there will be no economic losses to residents in the unleveed areas because of the project. Seattle District has been working with this group to resolve their concerns. Responses to comments on the draft EIS from the NVFD are provided in paragraph 9.10. There is no other organized opposition to the proposed project.

1/Correspondence documenting the coordination discussed in this chapter is contained in appendix 2 of this environmental impact statement.

9.02 PRIME AND UNIQUE FARMLANDS. Contact has been made with the U.S. Department of Agriculture regarding the project impact on prime and unique farmlands. Considerable concern for secondary impacts on prime farmlands due to increased development in the protected flood plain was expressed during public review of the draft EIS. Refer to chapters 3 and 4 and responses to comments in paragraph 9.10 for discussions of these impacts.

9.03 MINERAL RESOURCES. The results of coordination with the Bureau of Mines regarding the proposed project are discussed in chapter 4.

9.04 CULTURAL RESOURCES COORDINATION. In compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, coordination regarding cultural resources within the project area has been maintained with the appropriate Washington State and Federal agencies. Coordination will be ongoing throughout the cultural resources survey and any required mitigation. All sites for which mitigation is proposed must be determined eligible for the National Register of Historic Places. Before a mitigation plan can be put into effect, a memorandum of agreement must be established between the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the Corps of Engineers.

9.05 LAND-USE PLANS. The proposed project has been coordinated with local, regional, state, and Federal land-use plans and regulations. A discussion of the results of coordination has been presented in chapter 3. In addition to contact by formal coordination letters, various agencies[1/] were interviewed regarding the relationship of the project to land-use plans.

9.06 WILD AND SCENIC RIVERS COORDINATION. Coordination has been ongoing with the U.S. Forest Service regarding project impact to the portion of the Skagit River recently classified under the Wild and Scenic Rivers Act. The opinion of the Corps of Engineers is that the project will not adversely affect the values for which that portion was designated. As stated in the 26 December 1978 letter from the U.S. Forest Service, the Section 7(a) determination would be made following review of the draft EIS (refer to pages 2-24 of appendix 2). The review of the draft EIS has been completed (refer to Comment/Response Section and letter from U.S. Forest Service in appendix 3). When the 7(a) determination is received from the Secretary of Agriculture, it will be added to appendix 2 of the final EIS. Contact with Forest Service personnel in July 1979 has indicated that they expect the Section 7(a) determination to be positive.

1/ Agencies interviewed include: Port of Skagit, Skagit County, Puget Power, city of Stanwood, city of Burlington, city of La Conner, city of Mount Vernon, city of Sedro Woolley, U.S. Environmental Protection Agency, U.S. Forest Service, Skagit Regional Planning Council, Washington State Department of Ecology, Washington State Parks and Recreation Commission, Washington State Department of Natural Resources, and Interagency Committee for Outdoor Recreation.

9.07 THREATENED AND ENDANGERED SPECIES COORDINATION. Coordination has been maintained with fish and wildlife agencies regarding threatened and endangered species in the project area. Section 7 consultation under the Endangered Species Act was initiated for the northern race of the bald eagle in June 1978 and was completed in January 1979 with receipt of the biological opinion of the U.S. Fish and Wildlife Service. The opinion is that the project, as currently proposed, is not likely to jeopardize the continued existence of the bald eagle. Additional coordination regarding project modifications made since receipt of the biological opinion was accomplished with the U.S. Fish and Wildlife Service in July 1979 (refer to letter in appendix 2).

9.08 FISH AND WILDLIFE COORDINATION. Coordination with resource management agencies throughout project planning has included formal coordination letters, field investigations, workshops, and informal contact. This coordination contributed to plan formulation, preparation of the Fish and Wildlife Coordination Act Report (by the U.S. Fish and Wildlife Service), this environmental impact statement, and the General Design Memorandum (project report).

An interagency workshop and follow-up field trip were held in August 1978 to identify environmental concerns relative to the project. Agency concerns centered around reduction of shore zone due to placement of riprap, channel improvements, and loss of streamside vegetation. These concerns were considered during project planning. Detailed studies have indicated that no significant channel improvements are necessary to achieve project objectives and that substantially less riprap will be required than that indicated at the August workshop. In addition, the feasibility of adjustments to certain levee alinements to avoid removal of riparian habitat has been studied. Where possible, alinement adjustments have been incorporated into the project plan. In critical reaches of the river where it is not possible to avoid removal of riparian vegetation, habitat restoration features are proposed.

Continued coordination with the agencies has been maintained and alternative fish and wildlife mitigation plans have been discussed. Following receipt of the draft Fish and Wildlife Report in January 1979, a workshop was held with the various resource agencies to formulate a mitigation plan to reduce project-related adverse impacts to fish and wildlife. This plan is presented in chapter 1 and discussed in chapter 4.

The final Fish and Wildlife Coordination Act Report, dated 6 April 1979, is appended to the project General Design Memorandum. The mitigation and restoration features of the project, as proposed, are consistent with the recommendations of the Fish and Wildlife Report.

9.09 OTHER COORDINATION. Other Federal and state agencies have been contacted for information regarding the study area and have been provided with a description of the selected plan through coordination letters. Correspondence documenting this coordination is presented in appendix 2.

9.10 COORDINATION OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT. The draft environmental impact statement (EIS) for the Skagit River Project was listed in the Federal Register on 11 May 1979. An addendum was circulated on 11 June 1979 to inform the public of modifications made to

the project plan since distribution of the draft EIS. These modifications relate primarily to the reduction of project-related induced flood damages.

On 19 June 1979, a final public meeting was held in Mount Vernon, Washington. At this meeting, the selection of alternative 3E as the recommended plan was discussed. Although continuing concern was raised for induced flood damages and some support for other alternatives was expressed, general support was received for alternative 3E as the plan which best meets the planning objectives and is engineeringly, economically, and environmentally feasible. This plan has been presented in the final EIS and recommended in the General Design Memorandum.

The commenting period for the draft EIS and public meeting ended on 30 June 1979. Responses to comments received on the draft EIS are presented below. The letters of comment are contained in appendix 3. The record of the public meeting is available at Seattle District, Corps of Engineers.

9.10.1 FEDERAL AGENCIES.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

Comment 1: We regret that we will be unable to review and comment on this document in a timely manner pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969. Nevertheless, the Corps of Engineers is reminded that, if the proposed undertaking will affect properties included in or eligible for inclusion in the National Register of Historic Places, it is required by Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320) to afford the council an opportunity to comment on the undertaking prior to the approval of the expenditure of any Federal funds or prior to the issuance of any license. The council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800.4) detail the steps an agency is to follow in requesting council comment.

Response 1: As discussed in paragraph 2.06.2 and in paragraph 4.05.1 of the final EIS, a cultural resources reconnaissance of the project area identified 54 cultural resources sites. Additional reconnaissance work for those project modifications discussed in the 11 June addendum to the Skagit draft EIS will be completed in the summer of 1979. A cultural resources survey has been initiated to develop data necessary to evaluate site significance according to the National Register criteria and to confirm suspected site locations and determine which sites will be affected by the project and the nature of that effect. All sites for which mitigation is proposed must be determined eligible for the National Register of Historic Places. Any mitigation plan will be coordinated by the Corps of Engineers with the State Historic Preservation Officer and the Advisory Council on Historic Preservation and concurrence received in a joint Memorandum of Agreement prior to the start of the mitigative action.

There will be no project effect on the two properties in the Skagit Delta that are currently on the National Register of Historic Places.

Comment 2: Generally, the council considers environmental evaluations to be adequate when they contain evidence of compliance with Section 106 of the National Historic Preservation Act, as amended. The environmental documentation must demonstrate that either of the following conditions exists:

a. No properties included in or that may be eligible for inclusion in the National Register are located within the area of environmental impact, and the undertaking will not affect any such property. In making this determination, the council requires:

--evidence that the agency has consulted the latest edition of the National Register (Federal Register, February 6, 1979, and its monthly supplements);

--evidence of an effort to insure the identification of properties eligible for inclusion in the National Register, including evidence of contact with the State Historic Preservation Officer, whose comments should be included in the final environmental statement.

b. Properties included in or that may be eligible for inclusion in the National Register are located within the area of environmental impact, and the undertaking will or will not affect any such property. In cases where there will be an effect, the final environmental statement should contain evidence of compliance with Section 106 of the National Historic Preservation Act through the council's regulations, "Protection of Historic and Cultural Properties."

Response 2: The cultural resources reconnaissance included a literature search of available historic and archeological data for the Skagit Delta. This included a review of the National Register (Federal Register and its monthly supplements). The review revealed two properties on the National Register of Historic Places: the Skagit City School and the town of LaConner. There will be no project effect on these properties. The Deputy State Historic Preservation Officer (SHPO) was contacted early in the study and was requested to comment on the draft EIS. No formal response letter was received; however, contact was made with the Deputy SHPO in July 1979 and concerns regarding the project discussed. The Deputy SHPO agreed that the proposed project would not impact those properties currently on the National Register, but expressed concern for sites located in the project alinement that may be eligible for inclusion on the National Register. A cultural resources survey is underway to develop data necessary to determine site significance (see response 1). In the event that the ongoing survey work for those sites identified in the project area determines that any sites may be eligible for the National Register, coordination as discussed in the above Comment/Response will be conducted with the Advisory Council on Historic Preservation in compliance with Section 106 of the National Historic Preservation Act and prior to the initiation of any mitigative action.

DEPARTMENT OF TRANSPORTATION, UNITED STATES COAST GUARD

Comment: This project proposal does not appear to impact any Coast Guard programs or activities; likewise, no regulatory action by this agency will be required. In view of the foregoing, we have no comments on the document or on your proposed project.

Response: Your review is appreciated.

FEDERAL ENERGY REGULATORY COMMISSION

Comment: Due to the impending relicensing of the Ross, Diablo, and Gorge developments (FERC Project No. 553), we are currently very interested in the utilization of all water resources in the Skagit Basin. As you know, our review of other agencies' environmental impact statements concentrates basically on those areas of the electric power and natural gas industries for which the Federal Energy Regulatory Commission has jurisdiction by law, or where the staff has special expertise in evaluating environmental impacts involved with the proposed action. It appears that there would not be any significant impacts in these areas of concern nor serious conflicts with this agency's responsiblities should the proposed levee improvement be constructed.

Response: Your review is appreciated.

UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE, REGION 6

Comment 1: Neither the draft Statement nor the addendum evaluates the long-term effects of the project-induced flood damages on forest vegetation above the proposed levee system or how the proposed nonstructural measures will be applied on private forest lands. A long-term change in riparian species could be induced by changes in the floodflow regime. Some information on these effects would be desirable.

Response 1: The upstream limit of project-induced flooding is about river mile 24, near the pipeline crossing at Sedro Woolley. Therefore, project-induced flood damages will not occur on forest vegetation above the proposed levee system nor will the proposed nonstructural measures be applied on private forest lands. This is clarified in paragraph 4.02.3 of the final EIS. Refer also to figure 4-1 for the geographical extent of the proposed nonstructural measures.

The project is designed not to alter hydrologic conditions, but to react to the existing conditions of discharge, aggradation, debris, and wind waves. As mentioned in paragraph 4.04.1, the project will not impact river velocities except during the large and rare flood event that the levee provides flood protection against. Long-term changes in riparian species are therefore not expected to occur as a result of the project.

Comment 2: The following corrections are suggested in the final EIS:

Page 64, Section 3.02.7, par. 1, first sentence should read: "The National Park Service and U.S. Forest Service are jointly studying the

feasibility and desirability of designating a Pacific Northwest National Scenic Trail...."

Page 64, last paragraph, second sentence should read: "Under this designation...no department or agency of the United States shall recommend authorization of any water resources project that would have a direct and adverse effect on the values for which such river was established, as determined by the Secretary charged with its administration, or request appropriations to begin construction of any such project... without advising the Secretary of the Interior or the Secretary of Agriculture..." (Public Law 90-542, 82 Stat. 913, Section 7).

Page 65, line two: Change the word "opinion" to "determination."

Page 127, 9.06: Rewrite this section to read: "Coordination has been ongoing with the U.S. Forest Service regarding project impact to the portion of the Skagit River recently classified under the Wild and Scenic Rivers Act. The opinion of the Corps of Engineers is that the project will not adversely affect the values for which that portion was designated. A determination by the Secretary of Agriculture will be furnished following their review of the environmental impact statement."

Response 2: Suggested corrections have been made in the final EIS, paragraphs 3.02.7 and 9.06. Note in paragraph 9.06 that since review of the EIS by the Forest Service has been completed, the last sentence of the suggested rewrite has been changed to read: "As stated in the 26 December 1979 letter from the U.S. Forest Service, the Section 7(a) determination would be made following review of the draft EIS (refer to pages 2-24 of appendix 2). The review of the draft EIS has been completed (refer to Comment/Response Section and letter from U.S. Forest Service in appendix 3). When the 7(a) determination is received, it will be added to appendix 2 of the final EIS. Contact with Forest Service personnel in July 1979 has indicated that they expect the Section 7(a) determination to be positive."

Comment 3: The project does not invade the designated portion of the Skagit Wild and Scenic River. We are, however, proceeding with an analyses pursuant to Section 7(a) of the Wild and Scenic Rivers Act to develop a Secretary of Agriculture opinion as to whether the project would unreasonably diminish the values for which the river was designated. This determination will be forthcoming in a short time.

Response 3: The proposed project includes onsite restoration and offsite mitigation features to reduce project-related impacts to fish and wildlife from loss of riparian habitat and placement of riprap in the stream course. These features are discussed in chapter 1, paragraphs 1.04.4 and 1.04.5, of the final EIS. Coordination with the resource agencies to develop these features has been ongoing throughout project planning. Landscaping, discussed in paragraph 1.04.2, has also been incorporated into the project to reduce project-related impacts on esthetics. Significant channel modifications have been removed from the project authorized in 1966 and levee realinements, discussed in paragraph 4.06.2.1, made to reduce the loss of riparian habitat. These actions, although they will not eliminate adverse impacts to Skagit River resources, serve to reduce primary impacts to an acceptable

level. Participation of Skagit County in the National Flood Insurance Program and the enforcement of existing land-use plans by the local sponsor will contribute to wise management of the protected flood plain and maintenance of its natural and beneficial values. It is expected that these programs will reduce potential long-term secondary impacts to the Skagit River fish and wildlife from increased development in the protected flood plain. With these facts in mind, in addition to those discussed in comment 1 regarding effects upstream of the project, it is the opinion of the Seattle District that the proposed levee project will not unreasonably diminish the recreational and fish and wildlife values for which the upper Skagit River was designated under the Wild and Scenic Rivers Act.

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

Comment 1: Project Description - 1.08, Operation and Maintenance, Page 15. The responsibility of the local sponsor should also include regulation of animal use and utilization of all-terrain vehicles on dikes. In the past, dike degradation and damage has been caused by such use.

Response 1: In general, use of the levees following project construction will be similar to that prior to project construction. Where fences and gates now exist, they will exist following levee improvements, discouraging animal use and all-terrain vehicles. Most of the proposed levee system involves private land; permission to use that land will be obtained through easement agreements made with the individual landowners. Although animal use of the levees will be discouraged by the local sponsor, many private landowners wish to maintain some limited use of the levees for cattle grazing. All-terrain vehicles on the levees are not permitted; however, enforcement, particularly on a project of this size, would be a difficult, if not impossible, task. Any damage to the levee system, including damage incurred by animal use or all-terrain vehicles, will be the responsibility of the local sponsor to repair in a manner prescribed in the operation and maintenance manual.

Comment 2: Environmental Setting Without the Project - 2.05.6, Interior Drainage, Page 38. The economic well-being of the agricultural community is very dependent on drainage improvements. Without the present drainage improvements, the largest dairy in Skagit County (located in the project area) could not adequately operate. Thousands of feet of subsurface drainage tubing and open ditches for outlets have been constructed to cope with both surface and subsurface drainage problems in the project area.

Response 2: Paragraph 2.05.6 of the final EIS has been expanded to include the discussion of the importance of drainage improvements to the economic well being of the agricultural community of the Skagit Delta.

Comment 3: Environmental Setting Without the Project - 2.05.7, Existing Condition of Levees, Pages 39 and 40. There is no mention of existing soil material within the dikes. Considerable seepage now occurs through several reaches of dike during high river flows. Are there sections of existing dike too porous to build on without an impervious core trench being added?

Response 3: The existing levee materials along the project reach are predominantly fine sands and silty sands of loose-to-medium relative density. This is mentioned in paragraph 2.05.1 of the final EIS.

As discussed in paragraph 1.04.1, a 12-foot gravel berm on the landward levee side is necessary in many reaches of the project to control water seepage under the levee and to prevent the loss of levee integrity. Figure 1-4 shows the basic design of this type of levee. Typical sections and locations are shown on plates 20 through 27. In areas of extreme seepage problems, cutoff trenches consisting of a semi-impervious material will be provided on the riverward side. These trenches will lengthen flowage distance and thus lessen the impacts of seepage on levee integrity. Areas where cutoff trenches will be provided include stations 325+00 to 342+50 on the right bank of the Skagit River along Whitmarsh Road and stations 614+60 to 617+00 on the right bank. Similar trenches have already been constructed by Diking Districts 3, 12, and 17 since the 1975 flood. These trenches are incorporated into the proposed project design. In addition, two holes formed by previous levee seepage will be filled to prevent future flowage problems. The locations of these holes are shown on plates 6 and 7. Seepage control will also be provided for the proposed floodwalls, under and around railroad closures, at the Fisher Slough gate structure, and at the Anacortes Water Treatment Plant.

Comment 4: Probable Impacts of the Proposed Action on the Environment - 4.02.1, Level of Flood Protection, Pages 66 and 67. We are somewhat confused over the specific design and intended use of the proposed weir structure. The document contains no cross section or other drawings and specifications for the weir. The magnitude of a weir that will spill 60,000 cubic feet per second during a 100-year flood event should be more adequately addressed in the document. Cross sections and profiles that show the proposed weir and its relationship to different river flows and surrounding ground elevations should be included.

At the April 24, 1979 meeting in Allen, Washington, the Corps of Engineers informed local citizens that the weir will start spilling water between a 15- and 20-year flood event. This is considerably less than the stated 50-year flood protection mentioned on page 66.

Response 4: Under existing conditions, the Samish overflow area north of Burlington (that area of the Samish Valley flooded only from the Skagit River) experiences less than a 50-year level of protection. The proposed weir was designed to provide a 50-year level of protection and to insure that in a 100-year event, flooding of the Samish overflow area would be no greater than under existing conditions. The location of the weir was shown on plate 2 and a typical section provided on plate 16 (stations 181+40 to 198+40) of the draft EIS. Since distribution of the draft EIS, additional engineering and economic studies revealed that a more effective method of providing 50-year protection to the Samish overflow area and of insuring no worse than existing conditions in the 100-year event would be a combination of an earthen mound and buried erosion control sill, as described in the 11 June addendum to the draft EIS. The sill will consist of 12-foot-deep sheet piling extending the entire length (2,500 feet). A strip of riprap 60 feet wide and 3 feet deep will be placed downstream from the sill. The excavated soil will

then be replaced over the sheet piling and riprap and mounded to an elevation approximately 1 foot above the previous ground level. This will insure a 50-year level of protection to the Samish overflow area. When a greater than 50-year event occurs, overtopping will begin, causing erosion, which will continue until the control sill elevation is reached, thereby regulating the amount of water being discharged to the Samish Valley and insuring that the same volume of water flows down the Samish overflow area in the 100-year event as under existing conditions. Between the 50- and 100-year events, flood volumes to this area will be something less than under existing conditions. The location of the sill is shown on plate 3 of the final EIS. Discussion of the weir has been deleted in the final EIS; references to the sill may be found in chapters 1 and 4. A typical section of the sill is shown on plate 20.

The west bank of Gages Slough and District Line Road will be leveed under the proposed project, forming a corridor to the sill and providing 100-year protection for Burlington and the area east of District Line Road. Flood water will enter the corridor during events with a recurrence interval of about 20 years. The area, including structures between the sill and the Burlington Northern Railroad embankment, will be subjected to higher velocities and higher levels of inundation than under existing conditions; relocation or floodproofing of the structures is planned.

Comment 5: Community Services - 4.02.9, Page 70. The present location of United General Hospital between Burlington and Sedro Woolley will be impacted by the proposed project. The hospital elevation is around 42.5 feet while the top of the weir will be at 40 feet. The protection of the hospital is extremely important to the welfare of Sedro Woolley, Burlington, and eastern Skagit County. The impact of the project on the hospital operations should be addressed, in addition to possible mitigating measures.

Response 5: Modifications made to the proposed project since distribution of the draft EIS include the addition of a levee along District Line Road to provide 100-year flood protection for the hospital and other improvements northeast of the road. This levee was discussed in the 11 June addendum to the draft EIS. The location of the District Line Road levee is shown on plate 3; a typical section is shown on plate 20 of the final EIS. A discussion of the levee has been added to paragraphs 1.04 and 4.02.9 of the final EIS.

Comment 6: The Project Area - 4.04.3, Interior Drainage, Page 76. Several existing drainage systems will be bisected by the proposed levees north and west of Burlington. Adequate recognition and treatment of each system should be addressed in the document. Many of these systems were installed with Federal assistance, both financially and technically, and represent a sizable investment to the farmer.

Response 6: The proposed project will not cut off any of the existing drainage systems north and west of Burlington. Where project levees do cross drainage systems, culverts will be placed in order that the existing flows will not be impeded. The extent of drainage systems which will be crossed has been lessened by the change in alinement of proposed levees west of Burlington from a route through agricultural fields to a

route which parallels Joshua Wilson Road. This realinement was discussed in the 11 June addendum and is shown on plate 4 of the final EIS. Refer also to paragraph 4.04.3, which has been expanded in the final EIS. Additional field survey of the existing drainage systems will be accomplished by the Corps of Engineers during detailed design and preparation of plans and specifications for construction.

Comment 7: The Project Area - 4.04.5, Water Quality, Page 78. A portion of the proposed project includes 1,750 feet of channel work on Gages Slough. Where will this take place? Will the present tide outlets be included in the channel work? Will the channel work affect Snelson's Lake? Due to the past problems with Gages Slough, we believe more information is needed on this phase of the project.

Response 7: The proposed channel work on Gages Slough will take place south of the Burlington Northern Railroad at the upstream end of the project between Burlington and Sedro Woolley (refer to plate 2 of the final EIS). The present outlet at about station 450 on the right bank of the Skagit River will not be affected by the channel work. The proposed diversion will result in a loss of about 15 percent of the drainage which flows down Gages Slough and through the outlet during periods of high runoff. During normal runoff conditions, the diversion is not expected to have any noticeable effect on Gages Slough drainage downstream because the source of runoff is localized and largely due to storm water runoff from the city of Burlington. The diversion is not expected to impact Snelson's (Gages) Lake under normal runoff conditions and will have only a minor effect during periods of high runoff when flows through Gages Slough will be reduced relative to existing conditions. Some beneficial effect may result in high runoff periods due to a reduction of the demand on the Gages Slough outlet to provide drainage.

Drainage in Gages Slough is inhibited under existing conditions by numerous fills and an inadequate culvert system. This has resulted in drainage problems in the past, as Gages Slough provides the only storm drainage outlet for the city of Burlington. One result of poor drainage is standing water and associated nuisance algal blooms, and insect and odor problems during the summer months. The proposed diversion will not alter this current situation.

Paragraph 4.04.5 of the final EIS has been expanded to include a discussion of impacts associated with the diversion of Gages Slough.

Comment 8: The Project Area - 4.05.9, Prime Farmland, Page 84. As was stated in the 7 July 1978 correspondence with this agency, nearly all of the soils within the project area meet S.C.S. criteria for prime agricultural land. The major limitation of the soils is adequate drainage. Allowances should be made to schedule work when the farmland is dry to avoid cropland damage from compaction. Farmers should have the opportunity to install subsurface drainage systems in proposed ponding areas and before dikes are constructed north and west of Burlington. These mitigations will help insure no more than 40 acres of prime agricultural land will be lost by the proposed project.

Response 8: One of the general design criteria for the construction of the proposed project is that embankment construction be primarily accomplished during dry weather to insure proper moisture control for compaction of semi-impervious fill materials. Months of least precipitation are May through September. Paragraph 1.07 of the final EIS has been expanded to reflect this scheduling requirement. Work on farmland will be limited to the permanent levee right-of-way and an approximate 10-foot temporary construction easement on either side of the levee. The construction contractor will be required to restore the temporary easements to preproject conditions.

In general, all new ponding areas are expected to have sufficient storage capacity to limit drainage requirements to gravity drains with flap gates; these will be provided as part of the proposed project. The culverts will allow interior runoff to pass when the Skagit River is below flood stage and will drain the area after each runoff event. The installation of subsurface drainage systems will not be necessary. For the location of new ponding areas, refer to plates 2 through 16 of the final EIS. The drainage requirements north and west of Burlington have been reduced due to the realinement of the proposed levee to north of Joshua Wilson Road.

UNITED STATES DEPARTMENT OF COMMERCE

Comment: The inclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration. Thank you for giving us an opportunity to provide these comments which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final EIS.

Response: Upon filing of the final statement with the U.S. Environmental Protection Agency, eight copies will be forwarded to you, as requested.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL OCEAN SURVEY (NOS)

Comment: Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project include the cost of any relocation required for NOS monuments.

Response: No required relocation of geodetic monuments has been identified for the project to date. The local NOS office will be contacted during further detailed survey work accomplished in preparation of plans and specifications to insure that all monuments that may be in the project area have been located. Should any require relocation, NOS will be notified at least 90 days in advance of the date that relocation will be necessary. Such relocations will be provided as part of the Federal cost of the project.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL MARINE FISHERIES SERVICE

Comment: The National Marine Fisheries Service (NMFS) was consulted during the planning stages of the proposed project or during development of the draft EIS. Resources for which NMFS bears a responsibility and alternatives to reduce adverse impacts on these resources have been addressed to our satisfaction in the draft EIS. Therefore, we have no comments.

Response: Thank you for your input into the environmental planning for the proposed project.

UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Comment: The Federal Insurance and Hazards Mitigation Division (FIHM) of the Federal Emergency Management Agency (FEMA) has just completed their review of the draft statement. They have informed me that they will be discussing their comments directly with your staff. For your information, a copy of their comments is attached.

Response: Members of the Seattle District have been in contact with the FEMA office regarding their comments. Responses to the comments are provided in the following paragraphs.

FEDERAL EMERGENCY MANAGEMENT AGENCY, FEDERAL INSURANCE AND HAZARDS MITIGATION DIVISION

Comment: The eight step decision-making process, as defined in Executive Order 11988 on Floodplain Management, is outlined below:

EIGHT STEP DECISION-MAKING PROCESS

1. Determine if action is in or affects a flood plain.
2. Involve public in decision-making process.
3. Determine if there is a practicable alternative.
4. Identify adverse impacts.
5. Mitigate adverse impacts.
6. Re-evaluate alternatives.
7. Announce and explain decision to the public.
8. Implement action with appropriate mitigation.

The FIHM comments on the draft EIS are organized for reference to the eight step decision-making process.

Response: Your concerns and analysis of the proposed project under requirements of EO 11988 are provided in the comments below, organized by the eight step decision-making process. Each comment is followed by our response, which addresses your concerns and provides a summary of our EO 11988 analysis performed during project planning.

Comment (Step 1): Determine if the Action is in or Affects a Flood Plain. The project is of such a nature that it must be located in the flood plain in order to serve its intended purpose. It is, then, site dependent and no alternative site outside the flood plain is appropriate.

Response (Step 1): The Skagit River project is located in the base (100-year) flood plain. The primary objective of the proposed project is flood damage reduction to existing development within the flood plain. This is Skagit River Basin's highest water resource need. In order to accomplish this objective, the project must be located in the flood plain. No other feasible alternative exists at this time.

Comment (Step 2): Make Public the Intent to Locate an Action in the Base Flood Plain. Public involvement in the decision-making process is well documented in the draft EIS.

Response (Step 2): The Seattle District has issued news releases, public brochures, and project information letters to the public and agencies since initiation of the reformulation study. Two public meetings, one public workshop, two resource agency workshops and numerous informal meetings have been held to keep the public informed of study progress as well as to invite public input into project planning. In response to involvement by resource agencies and the public, project features have been incorporated to reduce adverse impacts to fish and wildlife and to minimize project-related induced flood damages. Refer to paragraph 9.01 through 9.09 of the final EIS for a summary of coordination accomplished throughout the study.

Comment (Step 3): Identify and Evaluate the Practicable Alternatives to Locating in the Base Flood Plain. Determination of a practicable alternative is the primary concern of the pre-authorization study, although we understand this project has been authorized by Congress for a number of years. The draft EIS deals with practicable alternatives, including the "no action" option.

Response (Step 3): Due to the change in conditions since the feasibility studies in the early 1960's, the postauthorization studies initiated in 1977 were focused on reexamining the earlier recommendations in view of the entire flooding condition caused by the Skagit River and involving the deltas of the Samish and Skagit Rivers and the Skagit River Valley. To accomplish this, various alternatives, including no action, were considered. Studies were performed to be consistent with new planning criteria required since 1966, including the preparation of an environmental impact statement. Flood control alternatives were identified and evaluated against the planning objectives (see paragraph 6.01 of the final EIS). The preliminary alternatives identified are displayed in table 6-1; detailed alternatives are displayed in table 6-2, which summarizes how the various alternatives contribute to the planning objectives and provides insight into project selection including the tradeoffs that would be involved in implementing each alternative. Levee alternatives were examined in detail. Studies indicated that to meet flood damage reduction needs of today required the development of a plan which expanded the protection provided by the 1966 authorized project. The no action alternative does not meet the planning objective of flood damage reduction. Under "no action," the average annual flood damages

of $7,049,000 would not be reduced. Little support was expressed for this alternative by any agency or group. Flood plain evacuation is not practical, given the extent of existing development in the flood plain. Of the levee alternatives studies, alternative 3E was selected as the plan which best meets the planning objective of flood damage reduction while at the same time reduces impacts to fish and wildlife and minimizes induced damages.

The decision was made in this step that there is no "practicable" solution for avoiding the base flood plain and at the same time meeting the planning objective of reducing flood damages. (Practicable is defined by the Water Resources Council as "capable of being done within existing constraints and depends upon the situation and consideration of pertinent factors, such as environment, cost, or technology").

Comment (Step 4): Identification and (Step 5): Mitigation of Adverse Impacts. These steps are interrelated and will be treated together.

Response (Steps 4 and 5): Step 4 focuses on adverse impacts of the proposed action on lives and property and on natural beneficial flood plain values. The impacts of the proposed action are addressed in chapter 4 of the final EIS. Both positive and negative impacts and shortand long-term impacts are addressed. To the extent possible, sources of impacts are identified. Impacts on natural and beneficial uses of the flood plain (i.e., water quality, wetlands, habitat, fish, wildlife, agriculture, etc.) and cultural resources are discussed. The social and physical impacts associated with the project have been expanded upon in the final EIS.

Step 5 focuses on the minimization, restoration, and preservation of the flood plain values if a proposed action will result in harm to or within the flood plain. Efforts to minimize direct impacts to natural and beneficial values of the flood plain are described in chapter 1, paragraphs 1.04.4 and 1.04.5, and in chapter 4, paragraph 4.06, of the final EIS. Features to minimize project-related induced flood damages are discussed in chapter 1, paragraph 1.04. Although the project may indirectly result in increased development in areas provided 50-year protection, intensive development will be discouraged, which will tend to preserve agricultural use of the flood plain. With the exception of the Clear Lake area, the project maintains the Nookachamps Valley as a natural flood storage area. Also, to the extent possible, wetlands in the project area have been preserved. Two areas will be restored to natural flood plain use as a result of the project. These areas are the corridor area north of Highway 20 and south of the erosion control sills and 6 acres on the river in west Mount Vernon, where houses will be relocated and the area left undeveloped. Also, an area on the right bank North Fork, south of the bridge, where levees currently exist but are in poor repair and wetlands are reestablishing, will be left undisturbed by the project. An alinement which involves raising a road rather than improving the existing levees was selected in this reach.

Comment (Steps 4 and 5): Adverse Impact A. NFIP's One-Foot Rise Criteria Exceeded. The selected alternative encroaches on the flood plain and in several areas will cause stage increases of the 100-year flood well in excess of one (1) foot, which is the greatest cumulative stage

increase for all development permitted under the National Flood Insurance Program (NFIP) and, most significantly, under Executive Order (EO) 11988. Section 3(a) of the EO requires that Federal projects comply with standards and criteria of the National Flood Insurance Program as a minimum, unless it can be shown that the standards are demonstrably inappropriate and the facility will not endanger existing development or encourage future development which will result in harm to or within the flood plain. This is somewhat broad language and could not be applied to storage reservoirs, channel realignments or the like. The Federal Insurance Administration has held that it does apply to construction of levees, unless the project includes mitigation measures that will protect existing development from the adverse effects of the project. After studying your addendum to the draft EIS, we conclude that the planned mitigation measures will protect existing development to the greatest practicable extent from an additional degree of flood loss potential. Accordingly, we believe the project is not in direct violation of EO 11988.

Response (Steps 4 and 5): Adverse Impact A: Paragraph 1.04 of the final EIS includes those features added to the project to reduce or eliminate induced damages. Paragraph 4.02.3 discusses remaining induced damages. Figure 4-1 displays and paragraph 4.02.1 discusses the level of protection provided by the project. For additional information regarding induced damages, refer to responses to comments from the Nookachamps Valley Flood Defense Organization.

Comment (Steps 4 and 5): Adverse Impact B(1). Perched Channel Aggrevates Future Flood Problems. Section 2.02.2 of the draft EIS states that man's attempts to control the river with levees has reduced deposition on the alluvial flood plain with a resultant increased deposition on the channel bottom. Section 2.05.3 of the draft EIS states that past aggradation in the stream channel has been 2 to 4 feet during the last 50 years. Section 4.04.1 states the aggradation will continue at the present rate with the project. At that rate, aggradation would amount to 4 to 8 feet in the 100-year project life. Section 4.04 also states that for the 100-year project life, the project design contains the following allowance for sediment deposition (aggradation):

River Branch	Location	Design Allowance for Aggradation
1. North Fork	Confluence	1.2 feet
	Mouth	1.1 feet
2. South Fork	Confluence	1.1 feet
	Mouth	0.5 foot
3. Main Stem	Confluence	1.4 feet
	Sedro Woolley	0.6 foot

The design allowances for aggradation appear inconsistent with the 4 to 8 feet to be expected if the rate of deposition remains constant. The basis on which the adequacy of the design allowance was calculated should be stated for purposes of clarification.

Response (Steps 4 and 5): Adverse Impact B(1): Paragraph 2.05.3 of the draft EIS was in error and was corrected to read that past aggradation in the stream channel, varying in depth from 4 feet at the mouth of each fork to 2 feet at Mount Vernon and continuing at this depth throughout the upstream remainder of the study reach, is considered representative of 100 years of bed material accumulation. This aggradation is based on sediment yield determinations and represents an average annual sediment yield of 33 cubic yards per square mile of contributing drainage area.

The annual sediment yield of 33 cubic yards/square mile, used for the 100-year aggradation formulation, was derived from three independent analyses: average annual sediment yield determinations utilizing the Skagit River cross section comparisons, Snohomish River bedload retention curve (a similar and adjacent basin for which quantitative data was available), and a generalized sediment yield for Skagit Basin. The levee design heights, as described in paragraph 4.04.1 and referenced in the above comment, reflect aggradation as determined by this rate. Basic computer model cross sections were modified to reflect the aggraded channel and used to compute design water surface profiles. The design allowances for aggradation represent the degree that the water surface profile is raised over the 100-year life of the project. Due to channel cross section configuration, a 2- to 4-foot deposition of material on the channel bottom does not necessarily result in a like increase in water surface profile. If the channel cross section were rectangular, the case would be as you described it; i.e., a certain increase in the channel bottom would, by displacement, result in a similar increase in water surface profile.

Comment (Steps 4 and 5): Adverse Impact B(2): The draft EIS also indicates in Section 9.04.2 that continued levee raising will create a perched channel, with bottom higher than the flood plain, making it more difficult to maintain the integrity of the levee. This perched channel would cause several adverse impacts not specifically identified as such in the draft EIS. We believe they should be so identified and specific mitigation measures developed.

When the perched condition occurs and levee failure is experienced, the resulting flood damage is likely to be greater than if the event occurred under existing conditions. Velocities of water near the breach will be greater and the depth of ponding is likely to increase behind the levees due to the increased height of levees downstream. These are site specific adverse effects and value judgment must be made as to whether the overall project effect would become adverse on that account.

Secondly, the perched channel will raise the ground-water level adjacent to the levees necessitating local pumping of nearby lands for farming. This procedure is already practiced to some extent in the area; however, the problem will become worse with continued deposition in the channel and will limit the effectiveness of levees as a long-term solution.

Aside from the aggradation problem, levees reduce the natural and beneficial values of the flood plain by preventing normal deposition of soil and nutrients on the land. No mitigation of this adverse impact is considered possible because the beneficial value is a side effect of the flooding that the project is designed to control.

Mitigation measures are, however, possible for the adverse impacts associated with the channel aggradation. They would involve control of the aggradation to prevent further formation of a perched channel.

Federal Register, Volume 43, No. 29, Friday, February 10, 1978, published "Flood Plain Management Guidelines for Implementing EO 11988." Step 5, beginning on page 6047 of that publication discussed the requirement to "minimize, restore, and preserve." We call your attention to this guidance because we believe it may be applicable to the adverse impacts of channel aggradation. Step 5B most strongly suggests that there is a requirement under the EO to restore flood plain values that have been degraded by past actions.

Response (Steps 4 and 5): Adverse Impact B(2): Paragraph 4.04.2 of the final EIS has been expanded to incorporate the information you have provided regarding impacts of a "perched channel" condition. We agree that these are very real long-term concerns with levee projects and, as stated in the referenced paragraph, realize that levees are not a permanent long-term solution for flood control. Levees, instead, are intended to provide for immediate protection to existing development within the flood plain in order to reduce flood losses and minimize the impacts of floods to human health, safety, and welfare. Your concerns add further emphasis to the fact that occupants of the flood plain should not obtain false security from levee protection and that unwise development should be prevented. To keep occupants of the flood plain aware of flood risk, the operation and maintenance manual for the proposed project will require that the local sponsor annually inform occupants of the limited protection afforded them by the project. This, along with strict enforcement of local land-use regulations and participation in the National Flood Insurance Program, should contribute to preserving the beneficial values of the flood plain.

The intent of the proposed project is to react to existing hydrologic conditions, not to alter them. The levees are designed to allow for natural accretion, not to affect its rate or to prevent it. Dredging as an alternative which would periodically remove accumulated sediment for flood control purposes is not feasible for reasons discussed in paragraph 6.04.2 and in response to comment 8 from the Department of Fisheries. Methods of stopping aggradation, such as dams and settling basins, would require separate study and the costs of "such project mitigation" would far outweigh the levee project benefits. Aggradation is a natural process toward formation of the flood plain; preventing aggradation would, in itself, be contrary to preservation of the flood plain. It is sediment deposition which contributed over several hundred years to the formation of the rich farmland and vast wetlands of the Skagit Delta. Preventing aggradation would have significant ramifications on the ecology of the Skagit River system, in which without deposition the continuing process of building wetlands would be interrupted resulting in serious implications on fish and wildlife. Given the costs, both economic and environmental, it is our opinion that mitigation for aggradation is not justified nor is it appropriately required under EO 11988. We feel that such an action would, instead, be contrary to EO 11988, as well as EO 11990 on the preservation of wetlands. Refer also to the response to comment 11 from the Department of Fisheries regarding what will happen at the end of the project life.

Comment (Steps 4 and 5): Adverse Impact C. Project Directly Encourages Development: The proposed levees will directly encourage development of the flood plain. This is true of agricultural levees as well as urban levees. However, local zoning and building restrictions will tend to mitigate increases in damages from floods up to a return frequency of 100 years.

Response (Steps 4 and 5): Adverse Impact C: We do not agree that the project directly encourages flood plain development. The project purpose is not to intensify development of the flood plain but to protect existing development and development that would occur in the flood plain without the project; no benefits have been claimed for any intensified use of the flood plain as a result of the project. The project will, however, indirectly accelerate development pressure in the protected flood plain. This is largely the result of the incidental provision of 100-year protection to 9,500 acres of farmland in order to provide a high level of protection to urban areas. Additionally, the provision of 50-year protection to the Skagit Delta may indirectly encourage increased development; although, intensive development would be discouraged by the requirement for floodproofing. This should tend to preserve the beneficial use of the delta for agriculture. The extent of secondary impact due to accelerated development in the flood plain greatly depends on the enforcement of local land-use regulations, an important flood plain management aspect of the provision of flood protection to Skagit Valley. We agree that land-use zoning and building restrictions will tend to ameliorate the secondary impacts of increased development pressures. Refer also to response to comments 2 and 3 from Mr. Thomas Collins and response to comment 3 from the Department of Ecology.

Comment (Steps 4 and 5): Adverse Impact D. Structures Require Human Intervention: Section 1.08 of the draft EIS indicates that operations prior to and during floods consist of erecting the floodwall and operating closure structures. The floodway will be erected by use of cranes according to Section 4.04.4. The floodwall and closure structures clearly require human intervention and therefore normally would not qualify under NFIP criteria as a viable means of providing 100-year flood protection. Structures built behind the floodwall would be subject to floodproofing requirements and insurance rates based on flood levels that would occur if human intervention did not take place.

Response (Steps 4 and 5): Adverse Impact D: Contact was made with the Federal Emergency Management Division regarding the adequacy of the tilt-up floodwall in meeting NFIP criteria. This type of floodwall was designed, at the request of the local sponsor, to preserve esthetics both through the Roadside Park and the city of Mount Vernon, while at the same time to satisfy the flood control objective. Roadside Park was recently improved by local interests at a cost of $106,000 and contains a comfort station, picnic shelters, parking areas, children's play area, and a grassy overlook on the Skagit River. A primary design consideration was the preservation to the extent possible of the existing character and functional uses of the park. Design formulation involved retaining existing views of the river from the park, minimization of the loss of park space, compatibility with the park environment, and protection of the park from flooding. The tilt-up floodwall design met all of these criteria and was, therefore, selected. Through the revetment

parking lot in Mount Vernon, the preservation of existing views is also considered of prime importance to the water-oriented identity of the town. Use of the tilt-up floodwall through one portion of the parking lot will preserve river views, maintain open-space characteristics, and make possible the future enhancement of the river edge by the city of Mount Vernon. Riverfront enhancement will likely become a logical course for Mount Vernon to follow as increased economic competition from suburban shopping centers forces the downtown businesses to explore new and unique ways to attract additional consumers. In light of the opportunities along the river edge and the negative effects that a standard floodwall could have, the tilt-up floodwall was selected for use through a portion of the parking lot.

The design of the tilt-up floodwall was generated by the 1977 Corps of Engineers' Distinguished Design Awards Brochure that contained such a floodwall, recently constructed in Monroe, Louisiana, by the Vicksburg District. The effective wall height is 7 feet for the Skagit project. The tilt-up portion (10-foot lengths), hinged to the base, is designed to lie flat and serve as a sidewalk when not in use and to be tilted up and secured in place when needed as a floodwall. Gaskets are used to seal the joints between panels when raised. The braces and gaskets are stored under the lowered tilt-up floodwall. In the parking area, there will also be two standard floodwall sections with 17 vehicle access openings. These openings will be closed during flood events by means of 6-foot-long stoplogs with one or two I beams placed in sockets for the wider openings. Stoplogs will be stored in Mount Vernon city shops. The time and effort required to erect the floodwall and place the stoplogs was given serious consideration during project planning. The operation and maintenance of these features will be fully described in the project operation and maintenance manual. The timing of erection of the floodwall and placement of the stoplogs will be tied to upstream gage readings as part of the flood warning system, which, due to the nature of flooding on the Skagit River, is able to provide ample lead time (at least 24 hours) to prepare for the flood event. Placement of the floodwall and stoplogs can occur concurrently and will require approximately 4 to 6 hours. Cranes will be utilized to erect the wall.

In view of the fact that the tilt-up floodwall and its operation is a designed system to provide flood protection to the city of Mount Vernon and erection procedures will be well documented in an operation and maintenance manual prepared for Skagit County, our opinion is that the floodwall design does meet the NFIP criteria as a viable means of providing 100-year (or more) flood protection. Paragraph 1.08 of the final EIS has been expanded to more adequately address temporary closures associated with the proposed levee project.

Comment (Step 6): Reevaluate Alternatives Following the Identification of Impacts and Methods to Minimize, Restore, and Preserve.

a. There is no alternative to project location on the flood plain.

b. However, there may be alternatives to the proposed construction and operation methods which would allow the project to accomplish the "Minimize Restore and Preserve" criteria of the Water Resources Council's guidelines on EO 11988. An alternative to the floodwall design would appear desirable in view of the Flood Insurance ramifications.

Response (Step 6):

a. A summary of the relative adverse impacts of all alternatives studied in detail is displayed in table 6-2 of the final EIS. In reevaluating all alternatives in view of impacts, alternative 3E was selected as the one that best met the planning objectives and was engineeringly, socially, economically, and environmentally feasible. No action did not meet the planning objective of flood damage reduction. Alternative 2 does not provide the desired level of protection, is economically unjustified, and contains environmentally unacceptable channel improvements. Alternative 3A protects the least undeveloped land, but does not provide an acceptable level of urban protection, nor does it minimize induced damages. Alternative 3B provides a high level of urban protection, but also causes a high level of induced damages, particularly to the Samish Valley. Alternative 3C and 3D result in the highest level of protection to urban areas, provide the highest incidental 100-year protection to undeveloped land, the highest induced damages, and require raising the Burlington Northern Railroad bridge. After considering relative tradeoffs among the alternatives, 3E, with the least induced damages, the third highest reduction in urban flood damages, and the third highest incidental protection of undeveloped land, was selected as the recommended plan. Alternative 3E minimizes adverse impacts to the extent possible, while meeting the objective of flood damage reduction.

b. The tilt-up floodwall design, as discussed in the response to comment (Step 4 and 5) Adverse Impact D, is considered consistent with NFIP criteria both in design and operation for provision of flood control and for preservation of a beneficial use (esthetic enjoyment) of the flood plain. This appears consistent with EO 11988 and an alternative design is not believed to be necessary.

Comment (Step 7): Announce and Explain Decision to the Public: The standard Corps of Engineers procedure for accomplishing this is well respected.

Response (Step 7): The Statement of Findings to the final EIS addresses the recommendation to support an action located in the flood plain. A public notice and formal statement of findings, in compliance with the requirements of EO 11988, will be issued following public review of the final EIS and prior to the implementation of any action.

The findings, as reflected in following through the decision-making process, are that for the proposed action, there is no practicable alternative to locating in the flood plain. As required by EO 11988, since the project cannot be located outside the flood plain, it has been adjusted to:

a. reduce the hazard and the risk of flood loss;

b. minimize the impact of floods on human safety, health, and welfare; and

c. restore and preserve the natural and beneficial flood plain values to the extent practicable.

The recommended project is, therefore, basically compatible with EO 11988. Paragraph 3.02.6 of the final EIS has been expanded to more adequately address the requirements of EO 11988.

Comment (Step 8): Implement Action with Appropriate Mitigation, is inappropriate for comment at this time.

Response (Step 8): The proposed project, as discussed in the final EIS, is being recommended in the project General Design Memorandum for approval. Funding for construction is under consideration by Congress.

UNITED STATES DEPARTMENT OF THE INTERIOR

Comment: Since the project area does support anadromous fish runs, we recommend that detailed plans include measures to minimize turbidity and downstream migration of resuspended sediments and to avoid periods of critical anadromous fish use. Otherwise, the draft EIS adequately covers the interests of the Department of the Interior.

Response: Environmental protection provisions are written into all project contracts. As part of these provisions, the construction contractor will be required to submit an environmental protection plan prior to construction which will include construction methods to minimize turbidity within the main stem Skagit River and its tributaries during project construction. Paragraph 4.04.5 of the final EIS has been expanded to reflect this requirement. Also refer to table 5-1 and to paragraph 6.c.(7) of the Section 404 Evaluation Report.

To avoid periods of critical anadromous fish use, construction within the river will be limited to the period of 1 July to 28 February as recommended in the U.S. Fish and Wildlife Report, dated 6 April 1979. Refer to the final EIS, paragraph 1.07.

UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

Comment: We have reviewed the draft EIS for the Skagit River, Washington, and have one addition pertaining to page 64-3.02.7 - Federal Programs, Projects, and Plans. The Spokane District of the Bureau of Land Management administers a large number of unsurveyed islands at the mouth of the Skagit River. These islands are presently being reviewed to determine if they have wilderness characteristics and should be so noted in this section.

Response: Thank you for the information regarding the islands at the mouth of the Skagit River. A statement that they are being reviewed by BLM for possible wilderness status has been added to paragraph 3.02.7.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Comment: From the standpoint of the Environmental Protection Agency's areas of concern and expertise, we are rating this statement LO-1 (LO - Lack of Objections; 1 - Adequate Information). This rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, as amended.

Response: Your review and comment are appreciated.

9.10.2 STATE AGENCIES.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Comment 1: On page 19 of the statement you indicate that floodproofing requirements can be eliminated in areas with 100-year flood protection. These floodproofing requirements should be continued to provide protection from possible floods in excess of 100-year levels, or from possible piping or rupture of the dikes.

Response 1: Floodproofing requirements are defined and administered under the U.S. Department of Housing and Urban Development's (HUD) National Flood Insurance Program, which enables participants to buy flood insurance at a reasonable cost. In return, communities carry out local flood plain management measures to protect lives and new construction from future flooding. The program is geared to protect against the intermediate level of flooding, defined as the base or 100-year flood. Therefore, over a 30-year period, the life of most mortgages, there is about one chance in four (26 percent) that this level of flooding will occur in a given area. Under the regular program, a community must require that all new construction and substantial improvements to existing structures in HUD identified flood prone areas be elevated or floodproofed to the level of the base (100-year) flood. Therefore, if an area has 100-year or more protection, floodproofing is no longer required; although, flood insurance would still be available. The purpose of the Flood Insurance Program is not to rid the flood plain of flood risks, but to reduce annual flood losses and potential damage from future flooding through careful planning and wise management of the flood plain. In the same way, the proposed levee project does not seek to eliminate flood damages, but to reduce average annual losses and hazards to human health and safety. Coupled with continued flood plain management, the project will contribute to a reduction in future flood losses in the study area. In the areas provided less than 100-year protection by the project, floodproofing will still be required.

As discussed in paragraph 4.02.1 of the final EIS, the proposed levees are designed with overflow areas to avoid the catastrophic effects of flood events greater than 100 years on the city of Burlington and the communities of Clear Lake and Sterling. The result of designed overflow areas in the levee system is the provision of Standard Project Flood protection to the city of Mount Vernon. Provision of greater than 100-year protection to Burlington was not possible because greater protection would raise the Skagit River water surface profile to a level that would require raising the Burlington Northern Railroad, the Highway 99, and Mount Vernon bridges, at considerable added expense that would reduce the economic feasibility of the project to below unity. Due to the nature of the Skagit River flood plain, benefits derived from reducing damages incurred from floods beyond the 100-year level in Burlington and other communities (except Mount Vernon) are not significantly greater. These benefits could not justify the cost of raising the bridges.

Features have been incorporated into levee design to minimize the possibility of levee failure either from rupture, piping, or overtopping. These features are mentioned in paragraph 1.04.1 of the final EIS and include berms and cutoff trenches for seepage control and 2-3 feet of freeboard added to the levee height as a safety feature. In addition, as part of the operation and maintenance of the project, the local sponsor will be required to periodically inspect the levees and make all necessary repairs. Refer also to the response to comment 3 from the Soil Conservation Service.

Comment 2: The final EIS should discuss the possibility of a setback dike alternative. By placing the new dikes back from the existing dikes, there would be room for the river to meander and work within the dikes. The land within the dikes could be federally owned and leased for agricultural, recreational, or wildlife uses; otherwise, more diking will eventually be required east of Sedro Woolley and a Sauk River dam may be needed.

Response 2: In the case of the Skagit River Basin, the alternative of setback levees is not a feasible alternative for provision of flood protection in the study area. Primary reasons for its lack of feasibility are economics and lack of acceptability to flood plain residents and the local sponsor, Skagit County. Setback levees would require the purchase of vast acreages of private land for use as a floodway riverward of the levees and significant relocations of residents, businesses, structures, roads, and utilities, particularly in the urban areas. Prime farmland would be lost as cities are relocated landward of the levees and as the river meanders on the riverward side. The effects of significant impacts to prime farmland would have serious ramifications on Skagit County economy. If land riverward of the new levees was not purchased and residents and businesses relocated, induced damages from the project would be extremely significant. Such an alternative would not be economically justified, nor would it be practical for provision of flood protection to existing development in the study area. The end result of pursuing the alternative of setback dikes in lieu of other levee alternatives would be the continuance of the no action alternative and no reduction in average annual flood damages of $7,049,000. Also, due to the fact that the study area is a narrow flood plain, a setback alternative may be essentially the same as flood plain evacuation, which is not a practical or reasonable alternative in the Skagit River Basin. Mention of the setback levee alternative has been added to paragraph 6.04 of the final EIS.

The proposed project (alternative 3E) makes maximum use of existing levee improvements and is economically, environmentally, and engineeringly feasible, as well as socially acceptable. Combined with existing flood plain management, this alternative will result in significant reductions to future flood damage losses.

Our preliminary studies of a single purpose flood control dam project on the Sauk River indicated that such an alternative is not economically justified. This, in addition to classification of the Sauk under the Wild and Scenic Rivers Act, precluded the alternative from further consideration at this time. Levees on the left bank between Burlington and

Sedro Woolley were not considered economically or environmentally feasible; the Nookachamps drainage serves as a natural flood storage area. An alternative which provided continuous levees on the right bank to Sedro Woolley was considered in detail and was not found to be feasible because in order to provide the same levels of protection, the Burlington Northern Railroad, Highway 99, and Mount Vernon bridges would have to be raised at significant additional cost to the project (refer to alternative 3C, figure 6-1 of the final EIS). Refer also to response to comments 15 and 16 from the Nookachamps Valley Flood Defense Organization.

Comment 3: The new 50-year flood protection in rural areas might increase the potential for development which in turn could result in extensive damage from future flooding.

Response 3: Skagit County currently participates in the National Flood Insurance Program. As discussed in comment 1, under this program, any new development in the flood plain will have to be floodproofed to the 100-year (base flood) level. Although the intent of the project is not to encourage development, it is true that provision of 50-year protection to the entire rural area may accelerate development due to a reduction in flood insurance rates, which are based on degree of flood hazard. Participation in the National Flood Insurance Program, enforcement of zoning regulations by the local sponsor, and the protection provided from the proposed project will result in a substantial reduction in future flood damages in the study area. For additional discussion of secondary impacts related to the project, refer to the response to comments 2 and 3 from Mr. Thomas Collins and responses to comments from the U.S. Department of Housing and Urban Development.

Comment 4: Some consideration should be given to the possibility of compensating those outside the dike where there is an increased potential for flood damage.

Response 4: As discussed in the 11 June addendum to the draft EIS, features have been added to the project to reduce induced flood damages. The discussion of these features has been incorporated into paragraph 1.04 of the final EIS. These features include both structural measures (levees) and nonstructural measures (relocations, floodproofing, flowage easements). With these measures, average annual induced damages associated with the proposed project have been reduced to $11,000. These damages may be incurred south of Sedro Woolley to a log storage area, about 4,000 lineal feet of railway line, and to Highway 20 due to the raising of the 50-year and 100-year water surface profiles 1 foot. Refer also to paragraph 4.02.3 of the final EIS and responses to comments from the Nookachamps Valley Flood Defense Organization.

Comment 5: In addition to review by the Department of Ecology, copies of the EIS were forwarded to other state agencies for their review. The State Parks and Recreation Commission and the Department of Transportation were the only agencies to respond and their letters are enclosed for your information. The Department of Transportation has expressed a desire to work with your office on the feasibility of incorporating SR 20 into the levee system. The Department of Transportation should be contacted directly for input.

Response 5: Responses to comments from the Parks and Recreation Commission and the Department of Transportation are provided below.

WASHINGTON STATE PARKS AND RECREATION COMMISSION

Comment: The staff of the Washington State Parks and Recreation Commission has reviewed the Skagit River draft EIS and finds that it will have no effect on properties under the management or control of the Washington State Parks and Recreation Commission. The staff has also reviewed the addendum to the EIS and does not wish to make any comments.

Response: Your review is appreciated.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Comment: The selected route for SR 20 has not been determined yet. Once the route is selected, the Department will appreciate the opportunity to coordinate with the Corps on the feasibility of incorporating the route into the levee system.

Response: Preliminary alternatives as proposed by the Department of Transportation (DOT) were considered during the initial planning stage of the proposed levee system. Representatives of the Seattle District met with the DOT regarding the levee system and the ongoing SR 20 study. The preferred southerly route, discussed in the DOT study of preliminary alternatives, was not feasible either environmentally or hydrologically for combination with the proposed levee system. Methods of making the southerly route compatible with the proposed levee alinement were also discussed. Since the recommended route has not yet been determined by DOT, Seattle District was unable to further consider the combination of the highway and the levees in our detailed studies. The proposed flood control project, as discussed in the final EIS, is the plan that is being recommended for approval and funding. You will be kept informed of our study progress. The DOT should continue coordination with the Corps when the SR 20 route is selected to ensure the compatibility of our two projects.

WASHINGTON STATE DEPARTMENT OF FISHERIES

Comment 1: The Skagit River is the single largest producer of salmon in the Puget Sound region and the Department is vitally interested in maintaining the present level of salmon production. Basic to this is maintenance of existing spawning and rearing habitats. With these facts in mind, we have reviewed the EIS and our comments are as follows:

Skagit River, Washington - Summary, Pages 1, 2a, disruption to fish and wildlife, such as loss of habitat, will be more than temporary.

Response 1: The intent of paragraph 2a was not to indicate that there will be no permanent impacts to fish and wildlife as a result of the project. In the final EIS, the first sentence of paragraph 2a in the summary has been revised to clarify that some habitat losses from the

project will be permanent with subsequent permanent impacts to fish and wildlife. These habitat losses are associated with vegetation clearing and the placement of riprap in the stream course. The fact that there will be permanent losses was indicated in paragraph 2b of the summary and discussed in paragraphs 4.06.1 - 4.06.4 and table 5-1 of the draft EIS, as well as in this final EIS. In addition to permanent impacts, there will be temporary disruption to fish and wildlife due to construction activities and impacts for several years following construction while vegetation reestablishes. The extent of impact is dependent upon revegetation success (both natural and through restoration and mitigation plantings). There are also secondary impacts associated with possible accelerated development of the flood plain. Refer to paragraph 4.03.2 of the final EIS.

Comment 2: Project Description, Page 3, paragraph 2 and Page 9, photo 1-4. Aggregate concrete blanket rather than riprap is proposed for the left bank at Mt. Vernon. There must be compensation for loss of rearing habitat (USFWS report to the Corps, Page 14, paragraph 2).

Response 2: As was developed at the mitigation workshop in January 1979, fish habitat improvement on Center Slough of the Skagit Wildlife Recreation Area was incorporated into the project to provide some compensation for lost rearing habitat due to the project. Of particular concern to the resource agencies was the revetment parking lot where an aggregate concrete blanket will be placed and rearing habitat will be lost. Refer to paragraph 1.04.5 of the final EIS for a discussion of project mitigation.

Comment 3: Page 4, paragraph 1. Incorporation of fish passage design criteria at Fisher Slough is appreciated.

Response 3: During preparation of plans and specifications for project construction, Seattle District will continue to coordinate with the Department of Fisheries regarding both the closure structure at Fisher Slough and the structure on the East Fork Nookachamps Creek to ensure adequate fish passage is provided. Refer to plates 19 and 27 for typical sections of these structures.

Comment 4: Page 7, paragraph 1. 8.3 of the total 50-mile project length will be riprapped. Riprap was to be designed to provide fish habitat. This was not mentioned in the text and should be included.

Response 4: Due to project modifications discussed in the addendum to the draft EIS, the total miles of riprap for the project length (50.4 miles) is 10.5 miles; of that, 8.5 will be along the Skagit River. For approximately 3.3 miles of the 8.5 miles along the river, riprap will be placed within the stream course to form a weighted levee toe design. The remaining 5.2 miles of riprapped levee segments will be set back from the river's edge and will form a buried toe levee design. Of the 3.3 miles which will encroach on the river, 1.7 miles will consist of a thickened riprap section with shrub plantings in a 4 foot zone above ordinary high water (OHW) to provide fish and wildlife cover. The thickened riprap section may provide some additional voids; although, not to any significant extent. In the remaining 1.6 miles of riprapped

section in the stream course, grass will be planted down the levee slope to a level 4 feet above the OHW line in order to allow voids in the 4-foot zone to remain available for fish cover during high water. We recognize that whatever voids will be available in the riprap section will fill in over time through natural sediment deposition.

During coordination with resource agencies, including the Department of Fisheries, other features were discussed (such as placement of larger rock periodically along the shoreline) for provision of rearing habitat lost due to the placement of riprap; however, none were found to be feasible or practical at this time either for hydraulic reasons or because of the lack of available information. The implementation of features incorporated into the project to reduce the impacts of riprap placement will minimize the effects of the project on Skagit River fishery resources. Refer to chapter 1 of the final EIS for a discussion of the project plan and specifically to plates 7, 9, 10, 11, 12, 13 and 14 for typical sections of the mitigation and restoration features.

Comment 5: Page 15, paragraph 1. The maintenance programs must be approved by all involved agencies. If parts of the program are not acceptable, there should be provisions for alteration through mutual agreement. Operation and maintenance work within the river will require a hydraulics permit issued jointly by the Washington Departments of Fisheries and Game.

Response 5: Coordination will be ongoing with resource agencies throughout construction of the recommended project as well as development of the maintenance program. One stipulation of the operation and maintenance manual will be that the local sponsor coordinate with appropriate agencies and obtain all necessary permits/certifications prior to any work within the river. This has been added to paragraph 1.08 of the final EIS.

Comment 6: Environmental Setting Without the Project, Page 34, paragraph 1. The Samish River and Samish Hatchery support an important commercial fishery primarily for fall chinook.

Response 6: Correction has been made and this information added to paragraph 2.04.5 of the final EIS.

Comment 7: Page 35, paragraph 1. The Swinomish Tribe fishes primarily with gill nets in Skagit Bay and the lower river. In addition, the Upper Skagit Tribe fishes with gill nets as far as Faber's Landing, above Concrete.

Response 7: This information has been added to paragraph 2.04.5 of the final EIS.

Comment 8: Page 37, paragraph 3. If aggradation continues, either the dikes will have to be raised or the channel dredged. Further raising of the dikes does not appear feasible and dredging would be very disruptive to the ecosystem. This problem should be addressed in the EIS.

Response 8: Paragraph 4.04.1 of the final EIS recognizes that levees do not provide a permanent, long-term solution to flood control. The project is designed to provide an immediate solution toward reduction of flood damages to existing development in the flood plain and provides for sediment deposition over the 100-year economic life of the project. Although it is not known what problems and needs will exist in the Skagit River Basin in the future, it is known that further raising of the levees beyond the proposed project height is feasible and that levee protection for the study area could be provided beyond the 100-year economic life of the project.

Dredging and channel improvements have been studied by the Seattle District in conjunction with levee improvements to provide flood control. Investigations have determined that the desired levels of flood protection cannot be provided by dredging alone, and in combination with levees, dredging is significantly more costly than levees alone. Due to the channel bottom configuration of the Skagit River, significant quantities of material would have to be dredged to effect the desired decrease in the water surface profile. This would pose cost as well as disposal problems. Dredging would also, as mentioned, cause signficant disruption to the Skagit River ecosystem. Channel dredging is, therefore, not considered a viable alternative for detailed study.

Paragraph 4.04.1 of the final EIS has been expanded to address the problems of dredging. Refer also to paragraph 6.04.2 and to the response to comment (Steps 4 and 5) from the U. S. Department of Housing and Urban Development regarding aggradation.

Comment 9: Page 51, paragraph 2.

a. The principal limiting factor to fisheries is the amount of available rearing area, which is directly related to cover. While sewage outfall, agricultural practices and siltation can affect fish production, they are not major factors within the project area.

b. Improper sand mining practices can leave potholes. However, if done according to permit provisions, there will be no problems.

c. Fluctuating flows resulting from upriver hydroelectric dams are the primary cause of stranding. Stranded juvenile fish are also consumed by predators.

Response 9: Paragraph 2.07.3 has been revised to reflect the information provided in a. and b. Regarding c., however, Seattle District hydrologic modeling studies of the effect of the upriver hydroelectric dams on flows through the project reach have indicated that these dams have little effect on the flows in the lower Skagit River. Most of the contributing flow is uncontrolled natural discharge from the Sauk River. The juvenile fish in the project area are more likely to be affected by tidal fluctuations.

Comment 10: Relationship of the Proposed Project to Land Use Plans, Page 65, paragraph 3. The Corps of Engineers' project will be affected by surges from both the Seattle City Light and Puget Sound Power and Light projects.

Response 10: The routing of water through the proposed Skagit Nuclear Power Plant (Puget Sound Power and Light) for cooling purposes will have no effect on the proposed levee project. The proposed Copper Creek Dam (Seattle City Light) may have some minor beneficial effects due to water storage and a subsequent reduction in Skagit River floodflows. Further, the proposed project is designed to withstand floodflows from the 100-year or more flood event in the urban areas and from the 50-year event in the rural areas. The levees also have 2-3 feet of freeboard as a design safety feature. Any minor fluctuations in flow caused by upriver projects should have no effect on the levees. Refer to the response to comment 9, which discusses the downstream effects of existing upstream projects (Ross and Upper Baker projects).

Comment 11: Probable Impacts of the Proposed Actions on the Environment, Page 66, paragraph 3. As a result of sedimentation and channel aggradation, what will happen after the 100-year economic life of the project? Page 75, paragraph 3. "Continued levee raising will eventually permit the channel bottom to become higher than the flood plain, in which case the integrity of the levee will become more difficult to maintain." This statement further emphasizes the need to assess what will happen after the life of the project.

Response 11: As discussed in the response to your comment 8, the project is designed to provide for 100 years of sediment deposition. This means that at year 100, the project will be providing its designed level of protection. Year 100 is the end of the period of economic analysis; i.e., no benefits for the project are claimed after 100 years. The physical life of the project must at least equal its economic life, and usually, physical life exceeds economic life. Through proper operation and maintenance, the proposed project will remain effective long after the end of its economic life; although, it is recognized that the designed level of protection cannot be assured after 100 years. The identification of water resources management needs and probable solutions for the Skagit River Basin is a continuing endeavor by local entities. Projecting basin needs 100 years from now would be premature at this time.

The project does not attempt to provide a permanent solution to flood control in the Skagit River Basin nor is it the intent of the project to encourage future development of the flood plain. Instead, the project is a short-term (100 years plus) solution to an immediate water resource need (flood control). The longer term (several hundred years) problems of continued levee raising and continued extensive development in the flood plain are recognized as significant. Wise flood plain management by the local governments within the flood plain is the key to the reduction in the extent that future flood control measures will be required.

Paragraph 4.04.1 of the final EIS has been expanded to more fully address the problem of "perched channels." Refer also to the response to comment (Steps 4 and 5) Adverse Impact B from the U. S. Department of Housing and Urban Development.

Comment 12: Page 77, Water Quality. Construction procedures must be designed to minimize siltation. Procedures should be reviewed to ensure all precautionary measures are being taken.

Response 12: Construction procedures will be designed to minimize siltation. Refer to response to comments from the U.S. Department of Interior and to paragraph 4.04.5 and the Section 404 Evaluation Report in the final EIS.

Comment 13: Page 87, Habitats. Revegetation and maintenance programs must be more than "paper" programs. They must mitigate for losses of shore cover. Plantings must be made at a time when success is assured and proper care given. The mere planting is not acceptable in view of the losses associated with establishing natural cover. The revegetation plan, along with the operation and maintenance plan must be established and approved through all involved groups.

Response 13: All involved groups will be given the opportunity to provide input into both the revegetation and maintenance programs. Plantings will be scheduled and monitored to assure optimal success. Coordination of the revegetation and mitigation programs is discussed in paragraphs 1.04.4 and 1.04.5 of the final EIS. The maintenance program will also be coordinated with the appropriate agencies (see paragraph 1.08).

Comment 14: Page 93, paragraph 2. Project impact will affect rearing as well as migrating juvenile anadromous fish. Loss of cover will have an equal impact on resident fishes.

Response 14: Paragraph 4.06.3 of the final EIS has been revised to clarify that impact will occur to rearing and migrating juvenile anadromous fish. The fact that loss of cover will impact resident, as well as anadromous fish, has been added.

Comment 15: Page 94, paragraph 2. The loss of cover along one bank of the lower North Fork and on Tom Moore and Freshwater Sloughs still represents a loss and is not a compensation.

Response 15: The referenced paragraph does not intend to tell the reader that a loss of cover is a compensation. Instead, the paragraph attempts to present the fact that restoration and mitigation features will provide for replacement of a portion of habitat losses and that there will remain a permanent reduction in shore area due to the project. To clarify these points, in paragraph 4.06.3 of the final EIS, the words "shore zone and riparian vegetation" were added to the end of the first sentence on page 95. Also, impacts associated with construction of a closure structure on the East Fork Nookachamps Creek were added to paragraph 4.06.3 and the last paragraph was expanded regarding secondary impacts to fish resources in the project area.

Comment 16: We feel the Corps has tried to minimize the impact of this project, while still accomplishing the objective of flood control. The losses of shore cover while not completely eliminated have been greatly reduced.

Response 16: Thank you for your input into the environmental planning of the proposed project.

Comment 1: Draft EIS. Paragraph 4.06.2.5 - Construction in Gages and Fisher Sloughs. Construction of 1,700 feet of new channel will affect habitat for fish and wildlife. The statement that no fish are known to inhabit the slough is not true. They are spiny ray - principally perch, bass, and bullhead. In terms of wildlife, aside from the waterfowl mentioned, there would be the water-oriented furbearing species such as muskrat and mink - no beaver are known to be present.

Response 1: Paragraph 4.06.2.5 of the final EIS has been corrected to reflect the fact that fish do inhabit the slough and that water-oriented furbearing species are present. Channel work will impact fish and wildlife habitat but not to any significant degree. Refer also to the response to comment 7 from the Soil Conservation Service for additional information regarding the proposed work in Gages Slough.

Comment 2: Addendum to Draft EIS, Page 8 - Impacts to Fish and Wildlife. The presence of some steelhead and cutthroat trout should be included on the East Fork of the Nookachamps.

Response 2: A statement that some steelhead and cutthroat trout are present in the East Fork of the Nookachamps has been added to paragraph 2.07.3 of the final EIS.

Comment 3: Adverse Secondary Impacts. It is stated on page 8 that the trumpeter swan winters at Beaver Lake. In recent years, the amount of swan usage in the Clear Lake - Beaver Lake area has been more prevalent in Clear Lake. Generally, however, this only occurs during periods of prolonged cold, when area lakes and streams freeze over. During these periods, swans have been noted more often at Clear Lake.

Response 3: This information has been added to paragraph 2.07.4 of the final EIS.

Comment 4: Draft EIS. It is additionally stated on page 30 that Barney Lake, Beaver Lake, and Clear Lake are important winter-feeding areas for the trumpeter swan. It should also be mentioned that the swan use DeBay's Slough and portions of the lower Nookachamps as well as many of the local pasturelands as feeding areas. The important point to make is that it is not just Barney Lake, or just the three lakes that are important to the wintering swans. The whole Nookachamps complex; lakes, streams, sloughs, and pasturelands are integral parts of wintering habitat.

Response 4: The importance of the whole Nookachamps complex as integral parts of wintering habitat for trumpeter swan has been added to the final EIS, paragraph 2.07.4, which describes the wildlife of the project area.

9.10.3 LOCAL AGENCIES.

Comment 1: Community Cohesion, Page 72. We do not feel there is a difference in attitude between urban and rural residents that disrupt the cohesiveness of the proposed project.

We do feel, however, there exists today a lack of support for alternative 3E in the Cook Road - Samish Basin area due to several reasons. Among those reasons are: lack of understanding of the total project; assurance that added water won't complicate flooding in the Samish Basin; lack of offered compensation to farmers near the throat of the erosion control sills; and the lack of site specific information available to the residences that will be directly affected.

Response 1: The discussion in this section regarding the difference in attitudes between urban and rural residents reflects the results of interviews by the Seattle District sociologist with residents within rural and urban areas of the flood plain. These interviews indicated that the cohesiveness of the communities may be disrupted due to differences in attitudes regarding levee protection.

Representatives of the Seattle District have met with residents of the Cook Road - Samish Basin area to explain the project and the impacts it would have on this area. As explained in the response to comment 4 from the Soil Conservation Service, the provision of an earthen mound and buried erosion control sill will insure a 50-year level of protection to the Samish overflow area from flooding of the Skagit River and that no worse than under existing conditions will occur in the 100-year event. Between the 50- and 100-year events, flood volumes will be something less than existing. Residents in the area north of SR 20 (i.e., in "the throat" of the erosion control sill) will be compensated fully by nonstructural measures, such as relocation and floodproofing. The specifics of these measures will be worked out with each resident of that area during the preparation of the feature design memorandum and plans and specifications for project construction. Paragraph 4.02.17 has been revised to reflect current attitudes regarding the proposed project after features to reduce induced flood damages were added. Refer also to the responses to comments from the Nookachamps Valley Flood Defense Organization.

Comment 2: The Project Area, Interior Drainage, Page 76. Drainage of our agricultural land is very important in Skagit County. Several individual drainage systems will be bisected by the proposed project. Adequate recognition and treatment of each system should be addressed in the document. Many of these systems were installed with Federal assistance, both financially and technically and represent a sizeable investment to the farmers.

Response 2: Please refer to the response to comment 6 from the Soil Conservation Service. The response addresses the interior drainage aspects of the proposed project.

Comment 3: The Project Area, Prime Farmland, Page 84. The recognition and future treatment of prime agricultural lands is of grave importance to the economic well-being of Skagit County. We cannot afford to lose any more farmland than is absolutely necessary.

Urban pressures that will be exerted on farmland protected from 100-year floods deeply concern us.

Response 3: Paragraphs 3.02.6, 4.02.18, and 4.05.9 of the final EIS have been expanded to more fully address both direct and indirect impacts of the proposed project on prime farmland. Refer also to the response to comments 2 and 3 from Mr. Thomas Collins and responses to comments from the U.S. Department of Housing and Urban Development. The extent of secondary impacts from accelerated development pressure in the agricultural areas incidentally provided 100-year protection by the proposed project is largely dependent upon the enforcement of existing land use regulations by the local sponsor.

Comment 4: In closing, the Skagit Conservation District Board of Supervisors have always felt that better flood control was badly needed for Skagit County. From the Avon Bypass to the Sauk River Dam, and now the Lower Levee Channel Improvement Project, this Board has sought to achieve the best alternative available to protect Skagit County from devastating floods. We now feel we could support an alternative that will give Skagit County better flood protection, but people and property must not be left with a worse flood situation than prior to the project. If alternative 3E can be made to do this, we will support the project.

Response 4: As discussed in the 11 June addendum to the draft EIS, structural and nonstructural features have been added to the project to minimize induced flood damages. Discussion of these features has been incorporated into paragraph 1.04 of the final EIS. The remaining average annual induced flood damages related to the project are $11,000. For additional information, refer to paragraph 4.02.3 of the final EIS and to responses to comments received from the Nookachamps Valley Flood Defense Organization.

Alternative 3E with these features now incorporated is being recommended in the project General Design Memorandum for approval. Funding for construction is being considered by Congress.

SKAGIT SYSTEM COOPERATIVE

Comment 1: The Corps has maintained communication with the Skagit System Cooperative through the planning stages of the project and my earlier comments are included in the draft EIS appendixes 2-44 and 2-56. The primary interest of the SSC is the Skagit fishery. Many of the project's potentially adverse impacts to the fishery were eliminated by changes made in the planning phases. The remaining potentially adverse impacts have been reduced through the Corps' cooperation with the SSC.

Response 1: Thank you for your input into the environmental planning of the proposed project.

Comment 2: It is agreed that those impacts will be partially mitigated through revegetation efforts and culvert installations in Center Slough in the Wildlife Recreation Area. The probable net loss over the life of the project is an unquantified reduction in juvenile fish-rearing habitat. The SSC is still interested in additional fish habitat improvement features if opportunities exist within the project area.

Response 2: The recommended plan includes restoration and mitigation as discussed in paragraphs 1.04.4 and 1.04.5 of the final EIS. This mitigation has been developed through coordination with the resource agencies, including the SSC, and is considered an adequate plan for reducing project-related adverse impacts in the interest of protecting the fish and wildlife resources of the project area. It is not expected that any additional fish habitat improvement features will be added to the project. Some flexibility remains in the selection of sites for planting of the 10 acres of deciduous forest (refer to paragraph 1.04.5) and coordination will continue to insure that sites are selected which best contribute to the objective of replacing a portion of that fish and wildlife habitat lost due to the construction of the proposed project.

Comment 3: The SSC wishes to be notified of any changes from the project plan as detailed in the draft EIS and June 11 addendum. Overall, the proposed plan is a project of considerable magnitude, with apparent fishery-related impacts reduced to a low level.

Response 3: Coordination with the SSC will continue through preparation of the feature design memorandum and plans and specifications and throughout construction. Any changes to the project plan as discussed in the final EIS will be made available to you for your review and information.

9.10.4 GROUPS AND INDIVIDUALS.

NOOKACHAMPS VALLEY FLOOD DEFENSE ORGANIZATION

Comment 1: In order that the final EIS will adequately reflect the concerns of the Nookachamps area residents regarding impacts of project-related induced flooding, we would request that the Corps of Engineers fully consider all of the questions below prior to submitting the General Design Memorandum and prior to the introduction of any legislation in Congress.

Will Corps of Engineers staff meet with each and every landowner in the Nookachamps area to determine what specific damage would occur as a result of induced flooding?

Response 1: One or more members of the Corps of Engineers staff will meet one or more times with each and every landowner in the Nookachamps area, and in other unleveed areas, to determine what effects higher water surfaces would have and what flood damage reduction measures might be warranted.

Comment 2: After having met with Nookachamps residents to determine consequential damages, will the Corps outline in detail what structural and nonstructural steps it will take to prevent economic loss as a result of induced flooding? Will these structural and nonstructural steps included in the General Design Memorandum be included in the legislative authorization bill?

Response 2: Should approval and funding be received for the project as recommended, following examination by Corps of Engineers personnel of

buildings in the Nookachamps area, each property owner will be informed, in detail, of the nonstructural measures which can be undertaken to reduce flood damages to his/her improvements. Whether the structural and nonstructual flood damage reduction measures that are being included in the General Design Memorandum will be authorized by legislation being considered by Congress, is unknown. However, Senators Magnuson and Jackson and Congressman Swift have participated in having draft legislation submitted that would provide for nonstructural flood reduction measures in the Skagit River project. Congress could fail to authorize or authorize less than we recommend, but our plans are based on Congress authorizing the project as proposed and discussed in the final EIS.

Comment 3: To the extent that structural measures to prevent induced flooding are not feasible, will the Corps compensate each and every landowner fully for each and every economic loss that will arise out of induced flooding?

Response 3: The proposed project provides for floodproofing or relocating all residences in the project area to 1 foot above or outside the limits of the (with project) 100-year flood level. All land that would not be covered with water in a 100-year event (without project), but would be covered with water in a (with project) 100-year event, will be considered for compensation commensurate with damages. One type of compensation would be a flowage easement that could be obtained for these lands. All improvements (other than residences) that would have induced damages due to construction of the project, will be considered on a case-by-case basis to determine what measures are warranted to eliminate or minimize effects of (without project) flooding or higher water due to construction of the proposed project. As a general rule, incidental damages that may occur to land that would be inundated without the project and may have higher water levels with the project, would be considered as consequential damages and not necessarily be compensated for. Refer to paragraph 1.04 of the final EIS, which has been expanded to incorporate discussions of features to reduce induced flood damages.

Comment 4: Has the Corps taken the 1974 Public Works Act into consideration in formulating its plan to prevent induced flooding and, in the alternative, in formulating its plan to compensate affected landowners?

Response 4: We have considered all alternative flood damage reduction measures for the project area and considered effects of increased water surface elevation due to construction of the project. The response to comment 3 describes the planned action in the unleveed areas.

Comment 5: After meeting with residents who will be affected by induced flooding, does the Corps still take the position that the average annual induced damages as a result of proceeding with alternative 3E will be only $25,000? At the 19 June 1979 meeting, Corps staff stated that nonstructural measures will be paid for with 20 percent local monies and 80 percent Federal monies. Regardless of the source of the monies, does the Corps guarantee that all losses suffered by affected owners will be paid for in their entirety prior to beginning?

Response 5: Modifications to alternative 3E have reduced the average annual induced damages from $25,000 to $11,000. This reduction is due primarily to the nonstructural measures that have been added. The total

cost of the contemplated nonstructural measures is estimated at $5 million. The Federal share of these costs would be 80 percent, and non-Federal share would be 20 percent. The nonstructural flood reduction measures would be accomplished in conjunction with other project features, but would be finished prior to completion of those structural features that would cause higher water surfaces in the unleveed areas for larger events. Refer to paragraphs 1.07 and 4.02.3 of the final EIS.

Comment 6: Does the Corps have exact figures on what will be the increased water levels in the Nookachamps area at a 10-year event, a 25-year event, a 50-year event, and a 100-year event? What are those increased water levels in the Nookachamps area as a whole? What are those levels with regard to each individual landowner in the Nookachamps area?

Response 6: We have figures available for the increased water levels associated with the project in the Nookachamps area for the 1975 level flood (approximately a 10-year event), 50-year, 100-year, and 500-year floods. Generally, the 100-year water surface in the Nookachamps - Clear Lake area would be raised by 1.5 to 2.0 feet over existing conditions. A number of landowners have been provided with estimates of increased water levels as a result of the project for their property, and we will provide this information to any other landowner requesting this data. Additional data will be available in the next 2 or 3 years as more detailed studies proceed; however, the estimated water surfaces are expected to remain essentially unchanged.

Comment 7: Does alternative 3E contemplate congressional funding to compensate for damage that will occur to farm improvement, such as livestock, barns, roads, homes, milking operations, and electricity?

Response 7: In addition to the measures described in the above responses, construction of the animal mounds and modifications to barns, mechanical or electrical systems are contemplated.

Comment 8: Does alternative 3E contemplate the payment of flowage easements to any of the residents of the Nookachamps area? If so, on what basis will these flowage easements be computed, and when will they be paid?

Response 8: Response to comment 3 above describes the possibility of flowage easement as one type of compensation that may be obtained under alternative 3E (the proposed project). The payment of these easements would be commensurate with damages incurred. The nonstructural measures would be accomplished about 3 years after construction funds are received.

Comment 9: Has the Corps of Engineers considered what effect the construction of a highway between Sedro Woolley and Mount Vernon on the dike would have in terms of increased waterflows to the Nookachamps area? If so, what are the increased waterflows which would be caused by the construction of this highway, and who would pay for the increased damages?

Response 9: Construction of a highway on continuous fill along the river between Burlington and Sedro Woolley could increase water surface levels in the Nookachamps area by 4 to 5 feet in a 100-year flood. We have no authority in determining who would pay for increased damages resulting from the state highway project.

Comment 10: In past floods in other areas similar to the Nookachamps area, farmers have lost their whole livestock operations within minutes as a result of the drowning of the livestock. What attention has the Corps given to this possibility in the Nookachamps area? What steps, if any, does the Corps anticipate taking to prevent this possibility from happening? Has the Corps considered the possibility of insuring the farmers against catastrophic damage that might occur as a result of flooding in the Nookachamps area?

Response 10: Flooding of the unleveed areas (including the Nookachamps) will occur gradually, as before, with no difference due to construction of the proposed project, except that water surface levels will be higher for the floods having a frequency of once in about 15 years or more. Estimates of impending peak floodflows and anticipated times of occurrence are prepared by the National Weather Service River Forecast Center in Portland, Oregon, and disseminated to the county and city officials and news media. One to 2 days of warning in advance of peak winter flows is possible. Skagit County is continuing to improve the flood-warning system. The Corps does not provide insurance for any purpose. The National Flood Insurance Program is administered by the U.S. Department of Housing and Urban Development. Refer to the response to comment 1 from the Department of Ecology.

Comment 11: Prior to submission of legislation, will the Corps do a complete economic analysis of the farming operations in the Nookachamps area so that they will have an adequate base upon which to compensate farmers for damages that cannot be prevented by structural measures?

Response 11: Nonstructural flood reduction measures that may be applicable for individual property owners will take into consideration effects of floodflows upon improvements in the unleveed areas in the project area. To the extent that these improvements are involved in the farming operation, the farming operations will be considered.

Comment 12: What procedures, if any, must individual landowners in the Nookachamps area follow in order to notify the Corps of specific damages they will suffer as a result of the induced flooding that will occur?

Response 12: Refer to the response to comment 1. During the 2 to 3 years following funding for construction, individuals will be contacted, and they will have an opportunity to advise the Corps representative of the possible induced flooding problems. Also, public meetings will be held and information will be mailed to individual landowners.

Comment 13: After the 20 December 1978 workshop, the Skagit County Commissioners requested the Corps to study in more detail the flooding problems of the Nookachamps. In response to the Commissioners' request, what further studies did the Corps undertake and what did those studies reveal?

Response 13: The Corps conducted studies on hydraulics, hydrology, cost estimates, and foundations and materials investigations. The results of the field and office studies are the project modifications as contained in the 11 June addendum to the draft EIS and in the final EIS. There is no separate report on these studies, but the raw data from which modifications were formulated is available at the Seattle District.

Comment 14: Corps Manager, Vernon Cook, has stated, "No matter which alternative the County Commissioners decided to pursue, the Nookachamps will get more water." Would the Nookachamps get more water under the Sauk containment alternative?

Response 14: Mr. Cook's statement was in relation to detailed alternatives 3A through 3E and did not relate to the preliminary alternative which included upstream storage on the Sauk River. Construction of a storage project on the Sauk River would reduce flood levels in all areas downstream of the confluence of the Sauk with the Skagit River.

Comment 15: If it were not for the existence of the Wild and Scenic Rivers Act, would the Corps have recommended the Sauk Containment Alternative? Please explain.

Response 15: A very preliminary investigation of single-purpose flood control storage on the Sauk River indicated a lack of economic feasibility. A multipurpose project has not been investigated in many years. A detailed investigation of a single-purpose or multipurpose project on the Sauk River would require a request by Congress and take approximately 4 years to complete a preauthorization report. A request by Congress for such studies is unlikely, based on the recent congressional action designating the Sauk River under the Wild and Scenic Rivers Act.

Comment 16: What factors have led the Corps to conclude that flood prevention in the Nookachamps area is not cost effective? Please outline in detail all factors considered.

Response 16: In addition to significant environmental concerns, structural measures to prevent flooding in the Nookachamps area are not feasible because the economic feasibility of the entire project would fall below unity. The provision of structural flood prevention measures for the Nookachamps Creek area would require levees paralleling the left bank of the Skagit River in the Nookachamps area. This alone would cost $11 to $12 million. A pumping plant to remove the ponding of Nookachamps Creek might also be required, adding additional cost. Levees protecting the Nookachamps area would raise the water surfaces downstream during flooding. To accommodate these additional flows and maintain proposed levels of protection for downstream and upstream areas would require raising three bridges at a cost of about $30 million, and raising downstream levees at a cost of $5 to $10 million.

Comment 17: According to Colonel Poteat's statements at the 19 June 1979 meeting, alternative 3E has been modified to include structural and nonstructural measures to alleviate the induced flooding and, where possible, provide for flood damage reduction measures for improvements on the land in the Nookachamps Valley. Please outline in detail the total cost the Corps anticipates in providing these structural and nonstructural measures.

Response 17: The levees to protect Clear Lake and the East Fork of Nookachamps Creek are estimated to cost about $1,300,000. The estimated cost of nonstructural flood reduction measures in the unleveed areas (discussed above) is $5 million.

Comment 18: Finally, please outline in detail how these costs will be allocated.

Response 18: All costs related to the Skagit River, Washington, project would be cost-shared with Skagit County on an 80-percent Federal and 20-percent non-Federal participation.

MR. THOMAS COLLINS

Comment 1: The draft has many good points and it covers several impacts in sufficient depth so that those impacts are adequately presented. Unfortunately, the draft is not adequate in three fundamental areas:

1. Level of flood protection
2. Prime farmland
3. Flood plain management (E.O. 11988)

Providing a 100-year flood level of protection for urban areas of Mt. Vernon and Burlington is a basic assumption for several of the alternatives. The estimate of how much water is in a 100-year flood is basic to project design and to cost/benefit comparisons. The entire project and public safety hinge on the estimates and predictions about flooding, but the draft says little on this subject. What method was used to calculate the 100-year flow, and what is the margin of error in the estimate? The draft should present some data or source of reference so that the interested reader can assess independently whether the data base and methods of calculations are sound, and whether the proposed action does in fact provide 100-year flood protection in urban areas.

Response 1: The General Design Memorandum for the Skagit River, Washington, project contains the details regarding the analyses made to determine floodflows and the levels of protection to be provided by the proposed project. A copy of this report is available for review at the Seattle District, Corps of Engineers, or may be purchased for the cost of printing. A reference to this report and an update of the level of protection to be provided by the project can be found in paragraph 4.02.1 and figure 4-1 of the final EIS. A summary of the hydrologic and hydraulic analyses utilized to determine discharge-frequency relationships and methods for providing various degrees of flood protection is provided in the following paragraphs.

A hydrologic analysis of the Skagit River Basin was performed to develop the required discharge-frequency relationship at Sedro Woolley and Mount Vernon, and thus to define the floodflows that can be expected at various recurrence intervals (i.e., 10-, 50-, 100-, and 500-year floods). The majority of the data used in the development of the various discharge-frequency curves was collected by stream gages maintained and operated by the U.S. Geological Survey. The lack of sufficient data concerning the effects of the Ross and Upper Baker reservoirs upstream

of Sedro Woolley required an analysis of almost the entire basin and development of a hydrologic routing model of the main stem Skagit River in order to develop the various discharge-frequency relationships for the Skagit River near Concrete and near Sedro Woolley. Through the use of this model, the effect of regulation at the upstream reservoirs could be determined. Discharge data from six observed floods were used to calibrate the model. Appropriate adjustments were made to the model so the computed hydrographs (plot of discharge versus time at a given location), on the average, approached the actual observed hydrograph at Concrete. Data from the hydrographs was utilized to develop a cumulative frequency curve for maximum annual discharge (plot of discharge versus exceedence frequency in percent). The lower portion of the discharge-frequency curve was projected downstream to Sedro Woolley based on a flow relationship between Concrete and Sedro Woolley. The complete discharge-frequency curve was then projected downstream to Mount Vernon based on a hydraulic model. The resulting regulated 10-, 50-, 100-, and 500-year flows for Sedro Woolley are 132,000, 200,000, 229,000, and 309,000 c.f.s., respectively. The corresponding flows for Mount Vernon are 124,000, 163,000, 185,000, and 235,000 c.f.s., respectively. The Standard Project floodflow for Mount Vernon is 265,000 c.f.s.

The hydraulic analyses of the Skagit River Delta region were made to define flooding potential for existing conditions and to define methods for providing various degrees of flood protection. Analysis of various flood protection methods included levees and floodwalls on various alinements; channelization of various reaches of river; and combinations of these two flood protection methods. Included in the analysis of flood protection methods were the effects of future sedimentation, wind wave effects, swellhead due to existing bridge construction, water surface superelevation on the outside of bends, and freeboard requirements to allow for the factors that cannot be rationally accounted for in the computations of the design water surface profile (indicated by the notation DWS on typical sections provided on plates 20 through 27). To determine water surface elevations for the various frequency floods and for the Standard Project Flood (SPF), an unsteady flow computor model was utilized. Calibration of the model was based on observed water surface data for the 1975 flood. The computed profile was found to be within 0.5 foot of all observed points and within 0.1 foot of most points. Data resulting from the model was used to formulate and define the proposed project.

Comment 2: On the issue of prime farmland, the Corps of Engineers can be commended for at least showing more insight and concern than the Soil Conservation Service. The draft EIS acknowledges the proposed project may accelerate urban development on prime farmland currently zoned as urban. Although the draft does not adequately assess the full scope and force of the adverse impact on prime farmland, it does recognize that the secondary effect of inducing urbanization is a potentially significant issue. In contrast, the Soil Conservation Service (letter of 7 July 1978 on page 2-14 of draft EIS) put blinders on and chose to say nothing about the secondary effects on prime farmland.

In any case, the draft EIS does not adequately assess the impact on prime farmland. The proposed project will provide urban protection (100-year) to 11,800 acres of land. It appears (figure 4-1 in draft

EIS) that at least half of this acreage is in actual agricultural use right now. In other words, the proposed project will provide urban protection to a land base twice as large as is in current urban use. Although the current zoning allows urban use in only part of 11,800 acres, zoning can be changed. And it is this very project which will provide the impetus and the pressure for rezoning on a massive scale.

In addition, rural protection (50-year) will be provided to 40,000 acres of land which is dominantly agricultural in use. With this improved flood protection, pressure for nonagricultural development can be expected to increase. The 50-year protection of the proposed project will mean lower floodproofing costs.

The draft EIS needs substantial revision in order to adequately assess the potential loss of several thousand acres of prime farmland for the 51,800 acres which would receive 50- or 100-year protection.

Response 2: Paragraphs 4.02.5, 4.02.18, and 4.05.9 of the final EIS have been expanded and updated to more fully address both the direct and indirect effects that the project will have on prime farmland.

All of the farmland within Skagit County is classified as prime by the Soil Conservation Service. The proposed project, modified since distribution of the draft EIS to reduce project-related induced flood damages, will now provide urban (100-year or more) protection to 14,200 acres. About 9,500 (67 percent) of this acreage is currently used for agriculture or pastureland. Refer to figures 3-1 and 4-1 of the final EIS, which show current land use and protection provided by the project, respectively. As mentioned in paragraph 4.02.5 of the final EIS, it is not the intent of the project to intensify development of rural areas but to protect existing development, now incurring average annual flood damages of $7,049,000. To provide a high level of protection to urban areas and to minimize induced flood damages, provision of a high level of protection to certain rural areas is unavoidable. Of the levee alinements examined in detail (refer to table 6-2), alternative 3A provides a high level of protection to the least acreages of farmland and is considered the least environmental damaging plan. This alternative, however, provides the least urban protection and incurs induced flood damage to unleveed areas. As a result, alternative 3A is socially unacceptable as well as unacceptable to the local sponsor. Alternative 3E, on the other hand, reduces induced damages to a minimum and provides a high level of protection to the urban areas while providing, of all the alternative 3 alinements, the third highest acreages of farmland with 100-year protection. Alternative 3E provides neither the highest urban protection nor the highest acreages of farmland with urban protection, and was selected as the plan which best met the planning objectives and best compromised the tradeoffs involved in its implementation.

By eliminating floodproofing requirements in the areas provided 100-year or more protection, the project indirectly results in accelerating the pressure for development in the protected flood plain and, thus, the potential for significant secondary impacts on fish and wildlife resources, on prime farmland, and on the Skagit County economy which relies on agriculture as its mainstay. For the potential of these

impacts to be reduced, it is imperative that flood plain management measures and local zoning regulations be enforced by the local sponsor. The public, including the local sponsor, recognizes the problems involved in zoning enforcement. The intent of the county to uphold zoning is implicit in their comprehensive land use plan (see figure 3-2) which indicates controlled development of the flood plain with overall preservation of prime farmland.

Similarly, secondary impacts of accelerated development pressure can be expected in the 39,600 acres of the Skagit Delta receiving 50-year protection from the project. Floodproofing will still be required in these areas, although flood insurance rates will be reduced. The floodproofing requirement should discourage intensive development and encourage preservation of the beneficial use of the flood plain for agriculture and pastureland. In addition to project-related secondary impacts to prime farmland, direct impacts will occur from the commitment of approximately 44 acres of farmland in permanent easement for the levee right-of-way. Disruption to farmland in temporary construction easements will be restored by the contractor following construction. A beneficial impact of the project to prime farmland in the Skagit Delta is from the reduction of flooding and damaging effects of periodic wetness on prime soils. Refer also to response to comment 3 from the Department of Ecology and to responses to comments from the U.S. Department of Housing and Urban Development.

Comment 3: The proposed project is a clear violation of Executive Order 11988 on Flood Plain Management which requires Federal agencies ". . . to avoid direct and indirect support of flood plain development wherever there is a practical alternative. . . ."

The project significantly increases the flood protection on 51,800 acres of flood plain (50-year protection to 40,000 acres and 100-year protection to 11,800 acres). Increased flood protection will lead to increased development incompatible with flood plain management.

Despite past, present, and some future flood plain development (even if the project is not built), the Federal Government does not have to contribute to irrational, costly development, nor does it have to protect those who chose to live dangerously. The alternative of using zoning and floodproofing (that is, the present condition), is practical, and in the long term will have less impact on safety and flood damage than the proposed project.

The statement in the draft EIS (section 3.02.6) that ". . . the extent of existing flood plain development will not be significantly altered as a result of the proposed project. . . ." is unjustified and goes against common sense and past experience, both local and national. Certainly, the elimination of floodproofing costs on 11,800 acres and the reduction of floodproofing costs on an additional 40,000 acres provides economic incentive for extensive flood plain development. Pressure to change zoning and land use can be expected to increase flood plain development. The impact of the project will be to provide unequal levels of protection to different parts of the Skagit River flood plain and delta. Some areas will remain with less than 10-year flood protection, as they now have; some areas will get 50-year flood protection; and some

will get 100-year flood protection. It is a recipe for poor flood plain management for the Federal Government, on one hand, to give part of the flood plain 100-year flood protection and thereby give a significant boost to flood plain development while, on the other hand, leaving the rest of the flood plain with a patchwork of lesser protection. The escalating and vicious cycle inevitable follows: Increased development throughout the flood plain; increasing flood damage; calls for more structural measures to increase flood protection; new structures built which increase flood protection to some degree; then more development, and so on.

The issue is more than whether a proposed alternative encourages or discourages unwise flood plain development. All the structural alternatives move toward increasing flood plain development and, consequently, to the long-term worst consequences. In contrast, by continuing the present conditions, the Federal Government will not be encouraging piecemeal development and costly flood plain management.

Response 3: We do not agree that the proposed project violates Executive Order 11988. The analysis leading to this conclusion is detailed in responses provided to comments regarding compatibility with Executive Order 11988 from the U.S. Department of Housing and Urban Development. In the responses, each step of Executive Order 11988's eight-step, decisionmaking process is presented and an analysis summarized.

Executive Order 11988 requires that agencies:

a. Avoid the base flood plain, unless it is the only practicable solution. Our studies conclude that there is no practicable alternative to locating in the Skagit River flood plain.

b. Adjust to the base flood plain, if it cannot be avoided, in order to (1) reduce the hazard and risk of flood loss; (2) minimize the impact of floods on human safety, health, and welfare; (3) restore and preserve the natural and beneficial flood plain values. The proposed project in combination with flood plain management measures (a) reduces the hazard and risks of flood loss; (b) minimizes flood impacts, both direct and induced, on human safety, health, and welfare; and (c) incorporates features to reduce impacts and preserve the natural and beneficial values of the flood plain, results in some restoration of specific areas of the flood plain, and, by not providing high levels of protection to all land within the Skagit River Basin, does contribute to the preservation of areas of the flood plain as agricultural and pastureland. There are adverse impacts associated with the project that do indirectly support flood plain development. These impacts are both incidental and unavoidable if flood protection is to be provided. Other adverse impacts regarding flood plain values associated with the project have been reduced to the extent practicable. Seattle District has, therefore, concluded that the requirements under Executive Order 11988 have been met and that the project is basically compatible with the order.

The project will indirectly accelerate the pressure to develop in the flood plain, particularly in areas provided 100-year or more protection. The extent of that impact is largely dependent upon the enforcement of local land use regulations by the local sponsor, Skagit County.

Current comprehensive plans for the county reflect the intent to preserve agricultural and open-space areas (see figures 3-1 and 3-2). In the areas provided rural protection (50-year) by the project, flood-proofing of new structures will still be required; however, insurance rates will be lowered, indirectly encouraging some development but tending to discourage intensive development and to preserve the agricultural use. Paragraph 3.02.6 of the final EIS has been revised and expanded regarding Executive Order 11988. Discussion of project impacts to land use and prime farmland has been expanded in paragraphs 4.02.5, 4.02.18, and 4.05.9.

Improved flood protection, as it was in 1966, is still the Skagit River Basin's highest priority water resource need. Under October 1978 prices and conditions, average annual flood damages in the flood plain downstream of Sedro Woolley are estimated at $4,612,000 for urban areas, $2,051,000 for rural areas, and $386,000 for the remaining study area. These figures are based on existing development in the flood plain. Under no action, these damages would continue, as would the hazard and risk of floods on human safety, health, and welfare. Flood plain management requirements under the National Flood Insurance Program applies to new structures or substantial modifications to existing structures, but provides no protection to existing structures (see response to comment 1 from the Department of Ecology). If the no-action alternative were pursued, the Federal Government would continue to provide disaster relief to flood victims at considerable expense. Flood plain evacuation is an alternative, albeit not a practical one for the Skagit Valley due to the degree of existing development. In order to protect existing and future development in the flood plain, a combination of levees and flood plain management is prudent. As a result of both, flood damage reduction will be effected and taxpayers will be called upon fewer times to provide costly relief for flood losses.

The levels of protection provided by the proposed project (see figure 4-1 and paragraph 4.02.1 of the final EIS) are based on economic analysis of flood damages incurred to existing development in the flood plain. Benefits are based on protection of that development and a projection of future development that would occur without the project. No benefits are claimed for any higher or more intensive use of the flood plain. Under existing conditions, levels of protection in the Skagit Valley are patchwork, ranging from 2-year to 50-year protection, largely dependent upon the degree of existing levee maintenance by individual diking districts. The proposed project attempts to equalize protection by generally providing 50-year protection to rural areas where justified and 100-year protection to urban areas. (Note: Usually, protection provided farmland is no greater than 25 years; however, due to the amount of development that has taken place in the rural areas of the Skagit Delta without the project, 50-year protection is desirable to significantly reduce average annual flood damages.) As a result of early public input, requests of the local sponsor, and detailed studies, planning constraints surfaced that led to exceptions to the general objective of providing 50-year protection to rural areas and 100-year protection to urban areas. Some of these constraints included: the desire to provide 100-year protection to the Avon area, as well as to the urban areas of Burlington and Mount Vernon; provision of the same level of protection to the Samish Valley as the Skagit rural area and

guarantee of no worse than existing conditions for the Samish Valley from Skagit River flooding; minimization of induced damages; and elimination of the risks of a catastrophic event to the city of Burlington in a flood greater than 100 years. Protection of Avon and Burlington resulted in the incidental provision of 100-year protection to 8,100 acres of farmland. In order to meet the constraints regarding the Samish and Skagit Valley, an erosion sill with a berm in the Sterling Hill area was designed to provide 50-year protection to the Samish Delta from flooding of the Skagit River and also to ensure that no worse than existing conditions resulted at the 100-year flood level. To minimize project-related induced damages, levees were designed to protect the community of Clear Lake, incidentally providing 100-year protection to 1,400 acres of pastureland. In addition, a levee was added along District Line Road to provide 100-year protection to the hospital and structures east of the road, and nonstructural measures (such as relocations and floodproofing) were designed to minimize induced damage to the Cook Road and Nookachamps areas where provision of flood protection could not be economically justified. Project design to prevent occurrence of a catastrophic event to Burlington resulted in the provision of Standard Project Flood protection to Mount Vernon. In summary, economic analyses, hydraulic studies, and planning constraints form the rationale for the levels of protection provided by the project. The intent of project formulation was not to design a "recipe for poor flood plain management", but to design a project which best meets the objective of flood control and is, at the same time, feasible economically, environmentally, socially, and engineeringly within the planning constraints given. The result of this planning approach was the formulation and selection of alternative 3E as the proposed project.

The concerns that you have raised, and others described and evaluated in the EIS, represent the tradeoffs involved in providing flood protection to the Skagit Valley. Through analysis of input provided throughout the planning process and through our detailed studies, our decision is that provision of flood protection to the study area outweighs the tradeoffs, and that the degree of tradeoffs involved has been reduced to the extent practicable. The results of the analyses leading to this decision are presented in the final EIS and project General Design Memorandum. Congress has the options of denial, modification, or approval of the proposed project for funding and construction.

Comment 4: Because of the serious deficiencies in regard to the interpretation of Executive Order 11988 and to assessing the impact on land use, particularly prime farmland, the draft EIS is not adequate. These issues and impacts need to be developed more fully and evaluated more objectively.

Response 4: Project analyses in regard to Executive Order 11988 and impacts on prime farmland have been elaborated upon in detail in the comment/response section of the final EIS. Expanded discussion of these issues has been provided in chapters 3 and 4 of the final EIS.

APPENDIX 1
SECTION 404 REPORT

APPENDIX 1

404 EVALUATION FOR CONSTRUCTION OF THE SKAGIT RIVER LEVEE PROJECT

1. The proposed project is the construction of levees in the Skagit River flood plain downstream of Sedro Woolley, Washington. The purpose of this appendix is to display the results of an evaluation of the effects of placement of fill material (levee construction material) into waters of the United States (specifically Skagit River and adjacent wetlands) using guidelines promulgated pursuant to Section 404(b) of the Clean Water Act.

2. The factors, considerations, and analyses contained in the Section 404(b) Guidelines (40 CFR 230), dated 5 September 1975, are presented and evaluated in the following table (table 1-A) and the table's referenced paragraphs of the EIS for the Skagit River Levee Project.

TABLE 1-A

SECTION 404 EVALUATION FACTORS

Factors	Remarks/References
1. Project Description.	The proposed project is the construction of levees in the Skagit River flood plain. Such will involve the placement of levee construction material in the waters of the Skagit River and adjacent wetlands. For a description of the proposed project, refer to chapter 1 of the EIS.
a. Description of the Proposed Discharge if Dredged or Fill Materials.	The fill activities for the proposed project relate to instream construction of levees, not to the disposal of dredged material.
(1) General characteristics of material.	The fill material for this project which will be placed into waters of the United States consists of riprap ranging in weight from 25 pounds to 500 pounds, quarry spalls, material from existing levees at the site, and borrow material. Site material and borrow material consist of silty, sandy gravel and silty, gravelly sand. The presence of contaminants in amounts believed to be toxic to the aquatic/wetland community has not been identified or suspect in the material.
(2) Quantity of material proposed for discharge.	Approximately 125,000 c.y. of the rock riprap and 17,000 c.y. of quarry spalls will be placed in waters of the United States. Additionally, approximately 15,000 c.y. of levee construction material will be placed into waters of the United States.

TABLE 1-A (con.)

Factors	Remarks/References
(3) Source of material.	Levee construction material will be principally that from existing onsite levees. Material for riprap and needed borrow material for levees and gravel berms will be obtained from borrow areas within an 8-mile radius of Mount Vernon in Skagit County. Refer to paragraph 1.05 of the EIS for general location of borrow sites.
b. Description of the Proposed Disposal Site(s) for Dredged or Fill Material.	
(1) Location.	The proposed sites for in-stream/wetland construction are discussed in paragraphs 1.04 and throughout paragraph 4.06 of the EIS and displayed on plates 2 through 16 of the EIS.
(2) Type of disposal site(s).	Sites for placement of riprap and levee construction material include the Skagit River, the East Fork Nookachamps Creek, Gages Slough, Fisher Slough, and adjacent wetlands. Refer to paragraph 1.04 of the EIS and plates 2 through 16 of the EIS for site locations.
(3) Method of discharge.	Construction material will be placed using standard construction equipment such as trucks and bulldozers.
(4) When disposal will occur.	Refer to paragraph 1.07 of the EIS for tentative construction schedule.
(5) Projected life of disposal site(s).	The economic life of the project is 100 years. Physical life will be longer.
(6) Bathymetry (if open-water disposal).	Not applicable.

TABLE 1-A (con.)

Factors	Remarks/References
2. Physical Effects (40 CFR 230.4-1(a)).	
a. Potential Destruction of Wetlands - Effects on (40 CFR 230.4-1(a)(1)(i-vi)):	Refer to paragraphs 4.04.5, 4.06.1, 4.06.2, 4.06.2.1, and 4.06.2.3 of the EIS for discussions of impact on wetlands.
(1) Food chain production.	Negligible impact; refer to paragraph 4.06.3 of the EIS.
(2) General habitat.	Negligible impact; refer to paragraphs 4.06.1, 4.06.2 and 4.06.3 of the EIS.
(3) Nesting, spawning, and resting sites for aquatic or land species.	Negligible impact; refer to paragraphs 4.06.2 through 4.06.5 of the EIS.
(4) Those set aside for aquatic environment study, sanctuaries, or refuges.	Minor impact; refer to paragraphs 4.04.2 and 4.05.6 of the EIS.
(5) Natural drainage characteristics.	Negligible impact.
(6) Sedimentation patterns.	Minor impact; refer to paragraph 4.04.1 of the EIS.
(7) Salinity distribution.	No impact.
(8) Flushing characteristics.	No impact; refer to paragraph 4.04.2 of the EIS.
(9) Current patterns.	No impact.
(10) Wave action, erosion, or storm damage protection.	No impact.
(11) Storage areas for storm and floodwaters.	Minor impact; refer to paragraph 4.04.3 of the EIS.
(12) Prime natural recharge areas.	No impact.
b. Impact on Water Column (40 CFR 230.4-1(a)(2)).	Refer to paragraph 4.04.5 of the EIS for a discussion of impact to water quality.

TABLE 1-A (con.)

Factors	Remarks/References
(1) Reduction in light transmission.	Localized turbidity will be generated by project construction. The turbidity will cause a temporary reduction in light transmission immediately adjacent to the project. Refer to paragraph 4.04.5 of the EIS.
(2) Esthetic values.	Landscape restoration upon completion of the project is a feature of the project. The completed project will not significantly alter the visual appearance of the vicinity. Refer to paragraph 4.05.7 of the EIS for a discussion of project impact on esthetics.
(3) Direct destructive effects on nektonic and planktonic populations.	Project effects on phytoplankton and zooplankton will be subtle, and no overall change in productivity is expected.
c. Covering of Benthic Communities (40 CFR 230.4-1(a)(3)).	
(1) Actual covering of benthic communities.	Project activities will result in the covering and destruction of benthic plants and animals existing in the construction sites; the impact is insignificant.
(2) Changes in community structure or function.	3.3-miles of the Skagit riverbank will be altered by construction of the levees. Riprap will offer a different substrate for colonization by aquatic organisms which will cause a change in community structure. This change will be insignificant in regard to the biological composition of the river system. Approximately 5.0 acres of wetland of a total of approximately 3,812 acres inventoried in the study area will be lost.

TABLE 1-A (con.)

Factors	Remarks/References
d. Other Effects (40 CFR 230.4-1(a)).	
(1) Changes in bottom geometry and substrate composition.	Permanent change in the riverbottom in approximately 3.3 miles of the project reach as a result of placement of rock riprap.
(2) Water circulation.	No significant effect.
(3) Salinity gradients.	No effect.
(4) Exchange of constituents between sediments and overlying water with alterations of biological communities.	No measurable effect.
3. Chemical-Biological Interactive Effects (40 CFR 230.4-1(b)).	
a. Does the material meet the exclusion criteria? (If so, state the rationale.)*	Material meets the exclusion criteria in that: a. 142,000 c.y. of the material proposed to be placed into waters of the United States is rock riprap and quarry spalls with particle size larger than silt. b. The material proposed for levee construction on wetland areas and in Fisher and Gages Sloughs and in East Fork Nookachamps Creek is substantially the same as the substrate at or near the site of construction. Closure structures in Fisher Slough and East Fork Nookachamps Creek will be precast concrete. c. The presence of contaminants in amounts believed to be toxic to aquatic/wetland communities has not been identified or suspect in the material and the source of fill material is sufficiently removed from sources of pollution to provide reasonable assurance that the material has not been contaminated.

*Note that if the material meets the exclusion criteria, no further testing under 40 CFR 230.4-1(b)(2) and (3) is required.

TABLE 1-A (con.)

Factors	Remarks/References
b. Water column effects of chemical constituents (elutriate test optional but recommended) (40 CFR 230.4-1(b)(2)). Are contaminants released? If so, at what levels?	The impact on water quality will essentially be that of direct physical effects from increased turbidity during construction. Refer to paragraphs 4.04.5 and 4.06.3 for effects on water quality from the proposed action.
c. Effects of chemical constituents on benthos (40 CFR 230.4-1(b)(3)).	See item 3.b. above. Turbidity will impact the benthos in the local site.
4. Description of Site Comparison (40 CFR 230.4-1(c)).	
a. Total sediment analysis (40 CFR 230.4-1(c)(1)).	Not applicable.
b. Biological community structure analysis (40 CFR 230.4-1(c)(2)).	Not applicable.
5. Review Applicable Water Quality Standards.	
a. Compare Constituent Concentration.	Turbidity is the only water quality standard projected to be exceeded; such will occur from placement of rock riprap, quarry spalls, and earthen levee material into the river and accordingly will be localized and short-term.
b. Consider Mixing Zone.	Mixing zone determinations for turbidity have not been made.
c. Based on a and b above, will disposal operation be in conformance with applicable standards?	Without considering mixing zone, the State of Washington turbidity standard will be exceeded; however, the exceedance will be short-term and localized at the site of instream construction.
6. Selection of Disposal Sites (40 CFR 230.5) for Dredged or Fill Material.	The fill activities for the proposed project relate to instream and in-wetland construction of levees, not to the disposal of dredged material. Accordingly, a discussion of disposal site selection is not pertinent.

TABLE 1-A (con.)

Factors	Remarks/References
a. Need for the Proposed Activity.	The proposed activity is necessary for flood control.
b. Alternatives Considered.	Levees design and alinement selected are those which minimize adverse environmental impacts; refer to paragraph 4.06.2.1 of the EIS.
c. Objectives to be Considered in Discharge Determination (40 CFR 230.5(a)).	
(1) Impacts on chemical, physical, and biological integrity of aquatic ecosystem (40 CFR 230.5(a)(1)).	Only minor impacts to the aquatic ecosystem are expected.
(2) Impact on food chain.	Impacts to the food chain will be insignificant.
(3) Impact on diversity of plant and animal species.	No impact is expected.
(4) Impact on movement into and out of feeding, spawning, breeding, and nursery areas.	No impact is expected.
(5) Impact on wetland areas having significant functions of water quality maintenance.	Approximately 5.0 acres of wetland (of a total of 3,812 acres of wetlands inventoried in the study area) will be lost with levee construction. Such will result in a negligible impact to river and estuarine water quality. Refer to paragraph 4.04.5 of the EIS.
(6) Impact on areas that serve to retain natural high waters or floodwaters.	Refer to paragraph 4.02.5 of the EIS for project impacts on land use and 4.04.3 for impacts on interior drainage.
(7) Methods to minimize turbidity.	Placement of riprap below water level will result in only minor localized increases in turbidity; the contractor will be required to use construction methods to minimize turbidity.

TABLE 1-A (con.)

Factors	Remarks/References
(8) Methods to minimize degradation of esthetic, recreational, and economic values.	Landscaping, restoration, and recreation features of the project are presented in chapter 1 of the EIS.
(9) Threatened or endangered species.	The proposed project will not jeopardize the continued existence of any threatened or endangered species or modify or destroy critical habitat of those species. Refer to paragraph 4.06.5 of the EIS.
(10) Investigate other measures that avoid degradation of esthetic, recreation, and economic values of navigable waters.	Landscape, restoration, and recreation are discussed in chapter 1 of the EIS.
d. Impact on Water Uses at Proposed Disposal Site (40 CFR 230.5(b)(1-10)).	
(1) Municipal water supply intakes.	No impact anticipated.
(2) Shellfish.	The proposed fill activity will not take place in an area of concentrated shellfish production.
(3) Fisheries.	For a discussion of fisheries impacts related to the proposed project and fill action, refer to paragraph 4.06.3 of the EIS.
(4) Wildlife.	No discernable impact from the proposed fill.
(5) Recreational activities.	Temporary disruption to fishing use of riverbank in localized areas during project construction. Some permanent loss of shore zone will occur. Refer to paragraph 4.05.6 of the EIS.
(6) Threatened and endangered species.	See 6.c(9) above.
(7) Benthic life.	No significant impact.

TABLE 1-A (con.)

Factors	Remarks/References
(8) Wetlands.	See 2.a above.
(9) Submerged vegetation.	The proposed fill activity will not take place in an area containing submerged vegetation of significant biological productivity. Instream construction of levee (levee weighted toe) will occur in approximately 3.3 miles of river; approximately 5.0 acres of wetlands will be lost with construction of the levee.
(10) Size of disposal site.	See b(1) above.
(11) Coastal Zone Management Programs (40 CFR 230.3(e)).	The project is consistent with the Skagit County Shoreline Master Program; refer to paragraph 3.02.3 of the EIS.
e. Considerations to Minimize Harmful Effects (40 CFR 230.5(c)(1-7).	Refer to paragraphs 1.04.4, 1.04.5, and 4.06.2.1 of the EIS.
(1) Water quality criteria.	Water quality has been considered in project planning; refer to paragraph 4.04.5 of the EIS.
(2) Investigate alternatives to open-water disposal.	Not applicable.
(3) Investigate physical characteristics of alternative disposal sites.	Not applicable.
(4) Ocean dumping.	Not applicable.
(5) Where possible, investigate covering contaminated dredged material with cleaner material.	Not applicable.
(6) Investigate methods to minimize effect of runoff from confined areas on the aquatic environment.	Not applicable.
(7) Coordinate potential monitoring activities at disposal site with EPA.	Construction activity will be coordinated with EPA.

TABLE 1-A (con.)

Factors	Remarks/References
7. Statement as to Contamination of Fill Material if From a Land Source (40 CFR 230.5(d)).	The presence of contaminants in amounts that could be toxic to the aquatic/wetland community has not been identified nor suspected in the construction material.
8. Determine Mixing Zone.	A determination of mixing zone was not believed necessary due to the minimal impact to water quality expected with construction of the project; see items 5.a and 5.b above.
9. Conclusions and Determinations.	The proposed work has been evaluated in accordance with the objectives of the EPA's guidelines on the discharge of dredged or fill material into waters of the United States. All considerations and objectives were examined with respect to the proposed action. We have concluded that the project conforms with these objectives by minimizing or avoiding impacts on these environmental considerations and not significantly affecting fish and wildlife, water quality, or the ecology of the area. Refer to the project EIS for discussion of total project impacts and to EIS paragraphs referenced above for impacts associated with placement of levee construction material into waters of the United States.

APPENDIX 2
LETTERS OF COORDINATION

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NPSEN-PL-ER

15 JUN 1978

Mr. Galen S. Bridge
State Conservationist
Soil Conservation Service
United States Courthouse, Room 360
Spokane, Washington 99201

Dear Mr. Bridge:

We are currently conducting advanced engineering and design studies of the Skagit River Levee and Channel Improvement Project. As part of these studies, we are reevaluating the authorized project to determine whether any modifications are desired and feasible. A description of the authorized project (inclosure 1) and a map (inclosure 2) are attached. We have also provided for supplemental information the public brochure (inclosure 3) prepared for the initial public meeting held on 22 March 1978 in Mount Vernon, Washington.

The project, as authorized in 1966, would involve levee raising and strengthening and channel modifications from the Burlington Northern Railroad Bridge in Mount Vernon to the mouth of the Skagit River. In addition, legislation has been introduced in Congress that, if passed, would extend our authority and would permit the U.S. Army Corps of Engineers to improve the levee system upstream to the vicinity of Sedro Woolley as part of the Skagit Levee and Channel Improvement Project. These levees were previously authorized as part of the Avon Bypass project in 1936.

We would appreciate any information or opinion the U.S. Department of Agriculture has concerning the impact of a levee and channel improvement project on prime and unique farmlands. For purpose of impact assessment, the reach of the Skagit River from the mouth to Sedro Woolley should be considered as the study area.

NPSEN-PL-ER
Mr. Galen S. Bridge

Any questions you have may be referred to Ms. Karen Mettling at FTS 399-3624. We would appreciate receipt of your comments by 30 July 1978 so they may be considered in project planning and discussed in the draft environmental impact statement.

Sincerely yours,

SIDNEY KNUTSON, P.E.
Asst. Chief, Engineering Division

3 Incl
As stated

SIMILAR CORRESPONDENCE SENT TO:

Mr. Frank Green
Washington State Historical Society
315 North Stadium Way
Tacoma, Washington 98403

Richard D. Daugherty, Director
Washington Archeological Research Center
Washington State University
Pullman, Washington 99163

Robert C. Dunnell, Chairman
Anthropology Department
University of Washington
Seattle, Washington 98195

Jeanne Welch, Deputy State Historic
Preservation Officer
Office of Archeology and Historic Preservation
111 West 21st Avenue
Olympia, Washington 98504

Jerry V. Jermann, Director
Office of Public Archeology
Institute of Environmental Studies, FM-12
University of Washington
Seattle, Washington 98195

Mr. Garland Gordon
Interagency Archeological Services
Heritage Conservation and Recreation Service
Post Office Box 36062
San Francisco, California 94102

Louis S. Wall, Assistant Director
Office of Review and Compliance
Advisory Council on Historic Preservation
Post Office Box 25085
Denver, Colorado 80225

Mr. Marvin Wilbur
Swinomish Tribal Community
La Conner, Washington 98257

Mr. Terry Brenneman
Swinomish Tribal Community
La Conner, Washington 98257

Mr. Galen S. Bridge
State Conservationist
Soil Conservation Service
United States Courthouse, Room 360
Spokane, Washington 99201

Mr. Jack B. Robertson
Acting Regional Representative
Department of Energy
Region "X"
Federal Building, 19th Floor
915 Second Avenue
Seattle, Washington 98174

R. N. Appling, Jr., Chief
Western Field Operations Center
Bureau of Mines
East 315 Montgomery
Spokane, Washington 99207

Joseph R. Blum, Area Manager
U.S. Fish and Wildlife Service
Department of the Interior
Building "A"
2625 Parkmont Lane
Olympia, Washington 98502

Ralph W. Larson, Director
Washington State Department of Game
600 North Capitol Way
Olympia, Washington 98504

Gordon Sandison, Director
Washington State Department of Fisheries
115 General Administration Building
Olympia, Washington 98504

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
PO BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-ER

Dale Evans, Director
National Marine Fisheries Service
Environmental and Technical
Services Division
Post Office Box 4332
Portland, Oregon 97208

27 July 1978

Dear Mr. Evans:

This letter concerns our levee and channel improvement project on the Skagit River, Washington. The purpose of this letter is to inform you of our study progress and upcoming agency workshop, to provide information regarding the project, and to request information related to project effects on anadromous fish.

On 22 March 1978, a public meeting for the Skagit River Project was held in Mount Vernon, Washington. The purpose of the meeting was to discuss the background of previous flood control planning for the Skagit River Basin, the currently authorized project, and alternative flood damage reduction measures which are being considered. A copy of the public brochure is attached for your information (inclosure 1).

The project, as authorized in 1966, would involve levee raising and strengthening and channel modifications from the Burlington Northern Railroad Bridge in Mount Vernon to the mouth of the Skagit River. In addition, legislation has been introduced in Congress that, if passed, would extend our authority and permit the U.S. Army Corps of Engineers to improve the levee system upstream to the vicinity of Sedro Woolley as part of the Skagit Levee and Channel Improvement Project. These levees were previously authorized as part of the Avon Bypass Project in 1936. For purposes of assessing the impacts of the project and its alternatives on fish and wildlife, the reach of the Skagit River from its mouth to Sedro Woolley is considered the study reach. Of the alternatives discussed in the public brochure, alternatives 1, 2, and 3 are being considered in detail.

NPSEN-PL-ER
Dale Evans, Director

We are currently reevaluating the authorized project as part of our advanced engineering and design (postauthorization) studies. Due to the change in conditions since our 1965 feasibility (preauthorization) studies, we are reexamining our earlier recommendations in view of the entire flooding condition caused by the Skagit River involving the deltas of the Samish and Skagit Rivers and the Skagit River Valley. A description of the authorized project (inclosure 2) and a map (inclosure 3) are attached.

General design considerations for the project include making maximum usage of existing levee alinements and, where possible, avoiding encroachment into the river. Our previous studies indicated possible channel widening between river mile (R.M.) 2-3 and R.M. 5-6 on the North Fork. These recommendations are also being reevaluated.

Throughout our detailed study, we will be refining and modifying the various project alternatives as we develop a recommended plan. At this time, we request that you examine the inclosed information and make preliminary recommendations concerning project impacts (both beneficial and adverse) on anadromous fisheries and possible plan modifications for protection of that resource. A specific list of information needs is attached (inclosure 4). Please do not feel constrained by this list; we are interested in any recommendations which may reduce or avoid adverse impacts or provide beneficial impacts through project-related features.

On 29 August 1978, you are invited to attend a workshop with Federal and State resource agencies at the Seattle District office. The purpose of this workshop is to discuss your preliminary recommendations for the Skagit Project and to present additional project information which we expect to have at that time. Please furnish the name(s) of the person(s) from your agency who will be available to attend this workshop to Ms. Karen Mettling, telephone FTS 399-3624, at your earliest convenience. The final arrangements and agenda for the workshop will be forwarded directly to the representative(s) appointed to attend.

We would appreciate receipt of your preliminary recommendations by 21 August 1978 so we may review them prior to the 29 August workshop. Any questions you have regarding the Skagit Project may be referred to Ms. Karen Mettling, Environmental Coordinator, at the

NPSEN-PL-ER
Dale Evans, Director

above number, or Mr. Forest Brooks, Study Manager, at FTS 399-3621. Similar letters have been forwarded to those listed in inclosure 5.

Sincerely yours,

5 Incl
As stated

Copies furnished w/incl:
Mr. John Linvog
National Marine Fisheries Service
Environmental and Technical
Services Division
Post Office Box 4332
Portland, Oregon 97208

Mr. Bob Wunderlich (incl 4 only)
U.S. Fish and Wildlife Service
Department of the Interior
2625 Parkmont Lane, Building B
Olympia, Washington 98502

Mr. Russ Orrell
Washington Department of Fisheries
302 Sharon Avenue
Burlington, Washington 98233

Mr. Art Stendal
Washington Department of Game
1100 East College Way
Mount Vernon, Washington 98273

Mr. Gary Engman
Washington Department of Game
509 Fairview Avenue North
Seattle, Washington 98109

NPSEN-PL-ER 27 July 1978

NATIONAL MARINE FISHERIES SERVICE

1. Anadromous fish use and abundance in the reach of the Skagit River and its tributaries above or within the study reach. Specific locations of spawning within the project area. In letters to the Washington State Departments of Fisheries and Game, we have previously requested information on the use and abundance of salmon and trout species in the Skagit River and juvenile release and adult returns from fish hatcheries on the Skagit River and its tributaries.

2. Are there any Federal plans for enhancement of the fish resources in this portion of the Skagit River and its tributaries? What are your projections for fish production?

3. Generally, encroachment into the river will be avoided. In some areas (where levees are backed by roads), encroachment into the river may be unavoidable. If so, is a buried or weighted levee toe preferred for protection of the fish resources?

4. Would spawner migration or juvenile outmigration be significantly affected by channel modifications (widening) in the area of river mile (R.M.) 2-3 and R.M. 5-6 on the North Fork?

5. Would spawner migration or juvenile outmigration be significantly affected by the prevention of overbank floodflow due to improved levees?

6. Would spawner migration or juvenile outmigration be significantly affected by the clearing of bankside vegetation for levee construction?

7. What is your opinion regarding the effects of project-induced changes in stream form on anadromous fisheries?

8. What is your recommendation regarding the timing of construction activities and impacts to fisheries?

SIMILAR COMMUNICATION SENT TO:

Joseph R. Blum, Area Manager
U.S. Fish and Wildlife Service
Department of the Interior
2625 Parkmont Lane, Building A
Olympia, Washington 98502

Donald P. Dubois, Regional Administrator
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Gordon Sandison, Director
Washington Department of Fisheries
General Administration Building,
Room 115
Olympia, Washington 98504

Ralph W. Larson, Director
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

Christine Drivdahl, Manager
Wildlife Habitat Division
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

COPIES FURNISHED:

Mr. Russ Orrell (w/incl)
Washington Department of Fisheries
Burlington, Washington 98233

Mr. Bob Wunderlich (incl 2 only)
U.S. Fish and Wildlife Service
Olympia, Washington 98502

Mr. John Linvog
National Marine Fisheries Service
Portland, Oregon 97208

Mr. Gary Engman (w/incl)
Washington Department of Game
Seattle, Washington 98109

Mr. Art Stendal
Washington Department of Game
Mount Vernon, Washington 98273

Mr. Bob Wunderlich (incl 2 only)
U.S. Fish and Wildlife Service
Olympia, Washington 98502

Mr. John Linvog
National Marine Fisheries Service
Portland, Oregon 97208

Mr. John Garrett (w/incl)
Skagit Wildlife Recreation Area
Mount Vernon, Washington 98273

Mr. Gary Engman (w/o incl)
Washington Department of Game
Seattle, Washington 98109

SIMILAR COMMUNICATION SENT TO (con.):

Christine Drivdahl, Manager (con.)

Wilbur G. Hallauer, Director
Department of Ecology
State of Washington
Olympia, Washington 98504

Bert L. Cole, Commissioner
Washington Department of Natural Resources
Public Lands Building
Olympia, Washington 98504

COPIES FURNISHED (con.):

Mr. Art Stendal
Washington Department of Game
Mount Vernon, Washington 98273

Mr. Bob Wunderlich
U.S. Fish and Wildlife Service
Olympia, Washington 98502

NPSEN-PL-ER

Ralph W. Larson, Director
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

10 January 1979

Dear Mr. Larson:

The purpose of this letter is to present the status of the proposed Skagit River levee and Channel Improvement Project and to invite your participation in an interagency workshop to formulate a fish and wildlife mitigation plan for the project. The workshop will be held on 25 January 1979 at the Seattle District, U.S. Army Corps of Engineers, 4735 East Marginal Way South, Seattle, Washington, from 0930-1500 in the large engineering conference room. District personnel will remain available for further discussion during the remainder of that day if necessary.

Since our August interagency workshop and field trip to discuss environmental concerns regarding the project, Ms. Karen Kettling of my staff has been in contact with Mr. Jon Gilstrom and Mr. Jim Briscoe of your office; Mr. Gary Engman of the Seattle Regional Office; Mr. Art Stendal and Mr. Larry Brewer of the Mount Vernon District office; and Mr. John Garrett at the Skagit Wildlife Recreation Area. They have been provided details regarding the Skagit Project and have been most helpful in furnishing pertinent data about the study area for our use in preparation of the draft environmental impact statement and general design memorandum. Numerous information exchanges have also occurred regarding possible mitigation alternatives.

At our public workshop on 20 December 1978 in Mount Vernon, we presented the selected plan for the Skagit Project. This plan is described in inclosure 1. Basically, it consists of improvements to an existing levee system from the mouth of the Skagit River to the vicinity of Sedro Woolley. Landscaping and beautification features have been incorporated. Generally, the fish and wildlife mitigation concept we are currently pursuing is revegetation in the levee construction right-of-way to reduce project-related adverse impacts

NPSEN-PL-ER
Ralph W. Larsen, Director

caused by loss of habitat. This is the basis of the recommendations put forth in the draft Fish and Wildlife Report recently transmitted to your office by the U.S. Fish and Wildlife Service. A plan which attempts to implement the goal of habitat replacement will be presented at the 25 January workshop.

We look forward to meeting with you or your representative on 25 January 1979. Should you have any questions or comments regarding the selected plan or the mitigation workshop, please contact Ms. Karen Mettling, Environmental Coordinator, at (206) 764-3624.

Similar communication has been forwarded to those listed on inclosure 2.

Sincerely yours,

2 Incl
As stated

Copies furnished w/incl:
Mr. Art Stendal
Washington Department of Game
1100 East College Way
Mount Vernon, Washinton 98273

Mr. Larry Brewer
Skagit Waterfowl Laboratory
Washington Department of Game
1100 East College Way
Mount Vernon, Washington 98273

Mr. Gary Engman
Washington Department of Game
502 Fairview Avenue North
Seattle, Washington 98109

Mr. John Gilstrom
Research Team Leader
Environmental Management Division
Department of Game
600 North Capitol Way
Olympia, Washington 98504

Mr. John Garrett
Skagit Wildlife Recreation Area
Washington Department of Game
2214 Game Farm Road
Mount Vernon, Washirgton 98273

Mr. Jim Brincoe
Engineering Department
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

Similar communication sent to:

Joseph R. Blum, Area Manager
U.S. Fish and Wildlife Service
Department of the Interior
2625 Parkmont Lane, Building A
Olympia, Washington 98502

Dale Evans, Director
National Marine Fisheries Service
Environmental and Technical Services Division
Post Office Box 4332
Portland, Oregon 97208

Mr. Don Campbell
Forest Supervisor
Mt. Baker - Snoqualmie National Forest
1601 Second Avenue Building
Seattle, Washington 98101

Bert L. Cole, Commissioner
Washington Department of Natural Resources
Public Lands Building
Olympia, Washington 98504

Gordon Sandison, Director
Washington Department of Fisheries
General Administration Building, Room 115
Olympia, Washington 98504

Ralph W. Larson, Director
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

Mr. Steve Fransen
Skagit System Cooperative
Box 368
Reservation Road
LaConner, Washington 98257

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 360 U.S. Courthouse, Spokane, Washington 99201

July 7, 1978

Sidney Knutson, P.E.
Asst. Chief, Engineering Division
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

The Soil Conservation Service has reviewed the authorized levee raising and channel modifications project on the Skagit River from Sedro Woolley to its mouth in light of its impact on prime and unique farmlands.

Most of the soil bordering the Skagit River on both sides has been classified as prime by the SCS. We cannot determine at this time what the impact will be if the project is undertaken. If levees are expanded in width, they will of course occupy some of the prime lands. If borrow pits are used on these soils, that of course will have a detrimental effect on such soils.

We believe that a levee system that will prevent flooding and hence reduce the periodic wetness of these prime soils would be of benefit.

I would encourage you to contact our local office for detailed information on the location and amount of prime farmlands within the project area.

Frank R. Easter, D.C.
Soil Conservation Service
2121 E. College Way
Mt. Vernon, WA 98273

There are no unique lands in the proposed project area.

Sincerely,

Richard F. Foster, Acting

Galen S. Bridge
State Conservationist

cc: Frank Easter, SCS, Mt. Vernon

United States Department of the Interior
BUREAU OF MINES
EAST 315 MONTGOMERY AVENUE
SPOKANE, WASHINGTON 99207

Western Field Operation Center
July 6, 1978

Mr. Sidney Knutson
Assistant Chief
Engineering Division
Department of Army
Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Mr. Knutson:

The Skagit Levee and Channel Improvement Project, from the mouth of the Skagit River upstream to Sedro Woolley has been reviewed for mineral involvement.

According to the Bureau of Mines Mineral Industry Location System (MILS) files, past mineral production has come from 22 operations in the drainage area from the mouth of the Skagit River to Sedro Woolley. Mineral commodities produced have been asbestos, basalt, clay, gemstones, and sand and gravel. There are 17 active mineral industry operations in this drainage area. Past mineral producers, active operations, and the types of mineral industry output are shown on the enclosed map of the Skagit River basin. Past mineral industry operations shown on the map are listed in the table by number, name, and the type of mineral produced. This map is preliminary information and is not intended for publication.

We anticipate no adverse impacts on mineral resources from the proposed levee and channel improvement program. The levee improvement program will benefit the sand and gravel industry in the study area.

These comments are offered as technical assistance only and do not constitute a formal Department of the Interior or Bureau of Mines review. Should an environmental statement be prepared, we would appreciate the opportunity to review it.

Sincerely yours,

R. N. Appling, Jr., Chief
Western Field Operation Center

Enclosures: map
table

THE WASHINGTON STATE HISTORICAL SOCIETY

315 No. Stadium Way
Tacoma,
Washington
98403

June 17, 1978

Ms. Karen Mettling
Environmental Resources Section
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Ms. Mettling:

With regard to the Skagit River Levee and Channel Improvement Project mentioned in your letter of June 15, I know of only one historical site that could be close to being effected.

This would depend on whether the work of the project would impinge on Fir Island within the delta of the Skagit River. The Skagit City School, situated on Moore Road which crosses Fir Island at its northerly end, has been nominated for the National Register of Historic Places. It is the only surviving public structure associated with the now-extinct village of Skagit City, the first settlement on the lower Skagit River.

There may be archeological sites in the area as well, but archeologists will be able to fill you in on those.

Thank you for allowing us to comment on this project.

Sincerely,

Frank L. Green

Frank L. Green
Librarian

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Department of Anthropology, DH-05

14 July 1978

Dr. Steven F. Dice
Chief, Environmental Resources Section
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Dr. Dice:

I am in receipt of your request of 15 July concerning information pertinent to the cultural resources that may be affected by the planned Skagit River Levee and Channel Improvement Project. Our records are housed in the Office of Public Archaeology, Institute for Environmental Studies and their response should be taken to represent that of the Department of Anthropology as well. I might point out that while systematic surveys of the whole area to be affected have not been undertaken, there has been considerable archaeological work in the Skagit Delta in recent years. Dr. Gail Thompson of OPA just completed a dissertation on material and field work in the delta; Mr. David Munsell did work in the delta when connected with our highways program; John Mattson, now in Alaska, I believe, has worked in the delta largely north of the affected area; and finally Ms. Astrida Onat of Seattle Community College has worked off and on at Fishtown. Although some record of all of this work is held by OPA, it might be well to contact these people directly about archaeological resources within the project area.

I hope this information will be of value to you and I appreciate being informed of the Corps intentions in these matters.

Sincerely,

Robert C. Dunnell
Chairman

cc: J.V. Jermann, OPA

mac

NPSEN-PL-ER

Honorable Jack D. Miller
Mayor of Mount Vernon
Mount Vernon, Washington 98273

21 September 1978

Dear Mayor Miller:

This letter concerns our Levee and Channel Improvement Project on the Skagit River, Washington. The purpose of this letter is to inform you of our study progress, to provide information regarding the project, and to request information related to land-use plans within the project area.

On 22 March 1978, a public meeting for the Skagit River Project was held in Mount Vernon, Washington. The purpose of the meeting was to discuss the background of previous flood control planning for the Skagit River Basin, the currently authorized project, and alternative flood damage reduction measures which are being considered. A copy of the public brochure is attached for your information (inclosure 1).

The project, as authorized in 1966, would involve levee raising and strengthening and channel modifications from the Burlington Northern Railroad Bridge in Mount Vernon to the mouth of the Skagit River. In addition, legislation has been introduced in Congress that, if passed, would extend our authority and permit the U.S. Army Corps of Engineers to improve the levee system upstream to the vicinity of Sedro Woolley as part of the Skagit Levee and Channel Improvement Project. These levees were previously authorized as part of the Avon Bypass Project in 1936.

We are currently reevaluating the authorized project as part of our advanced engineering and design (postauthorization) studies. Due to the change in conditions since our 1965 feasibility (preauthorization) studies, we are reexamining our earlier recommendations in

NPSEN-PL-ER
Honorable Jack D. Miller

view of the entire flooding condition caused by the Skagit River involving the deltas of the Samish and Skagit Rivers and the Skagit River Valley. Of the alternatives discussed in the public brochure, alternatives 1, 2, and 3 are being considered in detail. Maps of the alternative levee alinements are attached as inclosure 2. A selected plan will be formulated from these alternatives.

At this time, we request that you examine inclosures 1 and 2 and inform us of any land-use plans Mount Vernon may have for the project area as well as any impacts our project may have on those plans. We would appreciate receipt of this information by 20 October 1978 so it may serve as input to project planning. Any questions you have regarding the Skagit River Project may be referred to Ms. Karen Mettling, Environmental Coordinator, telephone (206) 764-3624 or Mr. Forest Brooks, Study Manager, telephone (206) 764-3621. Similar letters have been forwarded to those listed in inclosure 3.

Sincerely yours,

3 Incl
As stated

SIMILAR CORRESPONDENCE SENT TO:

Honorable Ray Henery
Mayor of Burlington
Burlington, Washington 98233

Honorable Donald T. Walley
Mayor of Sedro Woolley
Sedro Woolley, Washington 98284

Robert C. Schofield, Director
Skagit County Planning Department
County Administration Building, Room 218
Mount Vernon, Washington 98273

Ian Munce, Director
Skagit Regional Planning Council
#4 Rio Vista Plaza
145 West Rio Vista
Burlington, Washington 98233

Honorable Jack D. Miller
Mayor of Mount Vernon
Mount Vernon, Washington 98273

NPSEN-PL-ER

22 NOV 1978

Mr. R. E. Worthington
Regional Forester
Pacific Northwest Region
U.S. Forest Service
319 Southwest Pine Street
Box 3623
Portland, Oregon 97208

Dear Mr. Worthington:

This letter concerns our proposed levee project on the Skagit River, Washington. The purpose of this letter is to provide information regarding the project and to request your concurrence that it will not adversely affect the values for which segments of the Skagit River have recently been designated under Section 703 of Public Law 95-625, amending Section 3(a) of the Wild and Scenic Rivers Act. A public brochure (inclosure 1), prepared for a March 1978 public meeting, is attached which discusses the background of previous flood control planning for the Skagit River Basin, the currently authorized project, and alternative flood damage reduction measures which are being considered.

The project, as recommended by the U.S. Army Corps of Engineers and authorized by Congress in 1966, would involve levee raising and strengthening and channel modifications from the Burlington Northern Railroad bridge in Mount Vernon to the mouth of the Skagit River. In addition, legislation has been introduced in Congress that, if passed, would provide additional authority for the U.S. Army Corps of Engineers to improve the levee system upstream to the vicinity of Sedro Woolley as part of the Skagit Levee and Channel Improvement project. This possible levee extension was previously authorized as part of the Avon Bypass project in 1936. For purposes of assessing the impacts of the project and its alternatives, the reach of the Skagit River from its mouth to Sedro Woolley is considered the study reach. This area is located downstream of the segments of the Skagit River designated under Public Law 95-625.

NPSEN-PL-ER
Mr. R. E. Worthington

We are currently reevaluating the authorized project as part of our advanced engineering and design (postauthorization) studies. Due to the change in conditions since our 1965 feasibility (preauthorization) studies, we are reexamining our earlier recommendations in view of the entire flooding condition caused by the Skagit River involving the deltas of the Samish and Skagit Rivers and the Skagit River Valley. Of the alternatives discussed in the public brochure, alternatives 1, 2, and 3 are being considered in detail. Within alternative 3, we have been developing flood control alternatives which consist of lower levees downstream from Mount Vernon, protecting agricultural areas of the Skagit Delta, and higher levees upstream, offering a greater level of protection to the urban areas of Mount Vernon and Burlington. No upstream storage is being considered at this time. Maps of the alternative levee alinements are attached as inclosure 2. A selected plan will be formulated from these alternatives.

Environmental considerations for the project include making maximum usage of existing levee alinements, most of which are set back from the river's edge. Any unavoidable instream work will be timed to avoid the peak migration period for juvenile salmon. Levee work will include grass seeding and restoration planting where recommended to reduce impacts to fish and wildlife due to project related loss of riparian habitat. Landscaping and beautification features are also being developed for the project. Further, the construction contractor will be required to restore the 10-foot construction easement made available along the levee right-of-way.

No new levee work is proposed on the south bank of the Skagit River above the railroad bridge between Mount Vernon and Sedro Woolley. No significant channel excavation or dredging is anticipated for the project.

In accordance with our responsibility under Section 7(a) of the Wild and Scenic Rivers Act, we have evaluated the impact of the Skagit Levee project on the values for which segments of the Skagit River were designated as either Recreational or Scenic. As a result of our assessment, we have determined that our levee project will not "invade" the designated portion of the Skagit River nor "unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area."

NPSEN-PL-ER
Mr. R. E. Worthington

To insure that we have adequately complied with the intent of the Wild and Scenic Rivers Act, we are requesting your review of the inclosed materials and subsequent opinion regarding the effect of the Skagit Levee project on the values for which the Skagit River was designated. We would appreciate your response by 20 December 1978 so it may be incorporated in the draft environmental impact statement and project report now under preparation.

If you have any questions or require additional information, please contact Ms. Karen Mettling, phone (206) 764-3624, FTS 399-3624, of my office.

Sincerely yours,

JOHN A. POTEAT
Colonel, Corps of Engineers
District Engineer

2 Incl
As stated

Copies furnished w/incl:
Mr. James B. Snow
U.S. Department of Agriculture
Office of the General Counsel
Natural Resources Division
Washington, D.C. 22050

Mr. Robert Simmons
U.S. Department of Agriculture
Office of the General Counsel
Federal Building, Room 1734
Southwest Third Avenue
Portland, Oregon 97204

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Region 6
P.O. Box 3623, Portland, Oregon 97208

2370

December 26, 1978

Colonel John A. Poteat
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Colonel Poteat:

We have reviewed your proposed levee project on the Skagit River.

At this time, we are unable to determine whether the proposed project will adversely affect the values within the classified portions of the Skagit River. We will need to review the environmental impacts (especially on the fisheries) together with any mitigating measures as they are presented in the environmental statement before we can make such a determination.

To aid in developing needed mitigation measures, I am asking the Forest Supervisor of the Mt. Baker-Snoqualmie National Forest to work with you during the preparation of your statement to avoid any last minute misunderstandings. I understand that staff people from his office have contacted your planners.

The attached letter from the Office of the General Council lists the procedural steps necessary to complete our review.

Sincerely,

for R. E. WORTHINGTON
Regional Forester

Enclosures

DEPARTMENT OF AGRICULTURE
OFFICE OF THE GENERAL COUNSEL
WASHINGTON, D.C. 20250

DEC 4 1978

SUBJECT: Skagit Wild and Scenic River
Corps of Engineers Flood Control Project

TO: Arno Reifenberg
Regional Attorney
Portland, Oregon

We have received copies of a November 22, 1978, letter from the Seattle District of the Corps of Engineers to Regional Forester Worthington requesting the Forest Service's review of a proposed Skagit Levee Project. This review is requested pursuant to Section 7(a) of the Wild and Scenic Rivers Act, 16 U.S.C. 1278(a). As a follow-up to a conversation between Jim Snow and Bob Simmons, here are our thoughts on this matter for your consideration.

The project lies outside the designated boundaries of the river. The role of this Department is, therefore, limited by one sentence of Section 7(a):

> Nothing contained in the foregoing sentence, however, shall preclude licensing of, or assistance to, developments below or above a wild, scenic, or recreational river area or on any stream tributary thereto which will not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on October 2, 1968 (emphasis added), 16 U.S.C. 1278(a).

Accordingly, the Forest Service has to make a determination of whether the project: (1) invades the area, or will (2) unreasonably diminish the natural values of the designated portion of the river. This determination is vested with the Secretary of Agriculture, as opposed to the Corps of Engineers.

Procedurally, we do not believe such determinations should be overly complicated, since the proposed project is outside the

federal zone of administration. We concur with Bob Simmons' suggestion that our 7(a) determination be made in the context of this Department's review of the Corps' project draft environmental statement. The principal issues will be whether the project invades the designated area, whether the project unreasonably impairs the scenic views available from the designated areas, and whether the project unreasonably diminishes the fish and wildlife, specifically anadromous fisheries.

We suggest that the Forest Service advise the Corps of Engineers that our Section 7(a) responsibilities will be carried out in the context of our Department's review of the project DES. The Region's recommendation will have to be forwarded to Washington for signing in the Chief's office.

If you have any questions or comments, please feel free to call.

Richard L. Fowler

RICHARD L. FOWLER, Director
Natural Resources Division

Letter from U.S. Department of Agriculture
regarding their final determination under
Section 7(a) of the Wild and Scenic Rivers Act
was not received by time of printing.
Refer to paragraph 9.06.

NPSEN-PL-ER

R. Kahler Martinson, Regional Director
U.S. Fish and Wildlife Service
500 NE Multnomah Street
Lloyd 500 Building, Suite 1692
Portland, Oregon 97232

15 June 1978

Dear Mr. Martinson:

We are currently conducting advanced engineering and design studies of the Skagit River Levee and Channel Improvement Project. As part of these studies, we are reevaluating the authorized project to determine whether any modifications are desired and feasible. A description of the authorized project (inclosure 1) and a map (inclosure 2) are attached. We have also provided for supplemental information the public brochure (inclosure 3) prepared for the initial public meeting held on 22 March 1978 in Mount Vernon, Washington.

The project, as authorized in 1966, would involve levee raising and strengthening and channel modifications from the Burlington Northern Railroad Bridge in Mount Vernon to the mouth of the Skagit River. In addition, legislation has been introduced in Congress that, if passed, would extend our authority and would permit the U.S. Army Corps of Engineers to improve the levee system upstream to the vicinity of Sedro Woolley as part of the Skagit Levee and Channel Improvement Project. These levees were previously authorized as part of the Avon Bypass project in 1936.

The northern race of the bald eagle (Haliaeetus leucocephalus alascanus), recently added to the Federal list of endangered and threatened species, has been identified in the area of our proposed Skagit River and Channel Improvement Project. Because we believe that our project may impact this

species and its habitat, we request the initiation of the formal consultation process, as required by Section 7 of the Endangered Species Act of 1973. For purposes of the impact assessment, the reach of the Skagit River from the mouth to Sedro Woolley should be considered as the study area. On the attached map of Skagit County (inclosure 4), the Washington Department of Game has indicated where bald eagle nests are known to exist in the project area.

Any questions you have may be referred to Ms. Karen Mettling at FTS 399-3624. We would appreciate an early reply to facilitate incorporation of your recommendations into project planning.

Sincerely yours,

4 Incl
As stated

Copy furnished
(w/incl 4 only):
Joseph Blum, Area Manager
U.S. Fish and Wildlife Service
Building "A"
2625 Parkmont Lane
Olympia, Washington 98502

Ralph W. Larson, Director
Department of Game
State of Washington
600 North Capitol Way
Olympia, Washington 98504

Gordon Sandison, Director
Department of Fisheries
State of Washington
115 General Administration Building
Olympia, Washington 98504

Mr. Jack Adkins
Washington State Department of Game
North 8702 Division
Spokane, Washington 98218

United States Department of the Interior

FISH AND WILDLIFE SERVICE
LLOYD 500 BUILDING, SUITE 1692
500 N.E. MULTNOMAH STREET
PORTLAND, OREGON 97232

June 21, 1978

In reply refer to:
AFA-SE

Mr. Sidney Knutson
Assistant Chief, Engineering Division
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

This acknowledges your request of June 15 for consultation relative to Section 7 of the Endangered Species Act and the Interagency Cooperation Regulations for the Skagit River Levee and Channel Improvement Project which could affect the Bald Eagle. Your request was received here on June 19. We are assigning field work for the threshold examination to our Area Manager at the following address:

Joseph R. Blum
2625 Parkmont Lane
Olympia, WA 98502
Phone: FTS 434-9578

His staff will likely want to review the project with your staff and may need additional information. We will notify you of our conclusions within 60 days as outlined in Section 404.02(e) or (f) of the Regulations.

Sincerely yours,

E. B. Chamberlain, Jr.
Assistant Regional Director
Federal Assistance

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way/Olympia, Washington 98504 206/753-5700

August 3, 1978

Sidney Knutson, Assistant Chief
Engineering Division
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Mr. Knutson:

We appreciate the opportunity to comment on your advanced design studies of the Skagit River Levee and Channel Improvement Project. I have reviewed your map and added several additional known nesting sites. It is important to note that this does not imply that these are the only nests that occur on this area. I would strongly recommend that field studies be conducted in the area in which you plan your work. Such a study should also incorporate locating feeding and winter roosting sites of Bald Eagles.

As you are aware, the Bald Eagle is now protected under the Federal Endangered Species Act. I have enclosed a copy of the USFWS management recommendations. These are directly applicable to Washington and may be useful. The section under roosting reflects the scanty knowledge about this important aspect of eagle biology and should be considered as a minimum recommendation.

Once again, thank you for the opportunity to comment. Please keep me informed of any progress in your plans.

Sincerely,

THE DEPARTMENT OF GAME

E. Reade Brown

E. Reade Brown, Chief
Game Management Division

ERB/dac

cc: Kahler Martinsen
Ralph Larson
John Andrews
Chris Drivdahl

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Area Office
2625 Parkmont Lane
Olympia, WA 98502

August 3, 1978

Colonel John A. Poteat
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

This responds to Mr. Sidney Knutson's letter of June 15, 1978 requesting our determination on threatened and endangered species which could be affected by your proposed Skagit River Levee and Channel Improvement Project.

We note that you have already initiated the formal consultation process under Section 7 of the Endangered Species Act for the bald eagle, which occurs within the project area. Accordingly, comments regarding project impacts to the bald eagle will be covered in that formal consultation process.

Aside from the bald eagle, the only threatened or endangered animal species occurring in the project vicinity would be the American peregrine falcon (Falco peregrinus anatum). Northern Puget Sound is reported to support the largest known wintering population of peregrines in North America, although they are predominately the Peale's subspecies (Falco peregrinus peali) which are not on the federal list of endangered or threatened species. You may wish to contact Dr. Steve Herman, a raptor authority at The Evergreen State College, Olympia, for more details on peregrines.

At present, no plant species occurring in Washington state are included on the federal list of endangered and threatened species.

This information represents the data presently known to this office concerning threatened and endangered species possibly affected by the proposed project. The information furnished is from our knowledge or files and without the benefit of a field inspection.

The data furnished does not meet the requirements of the formal consultation process referred to in Section 7 of the Endangered Species Act of 1973. If through your investigations you find endangered species or their critical habitats in the project area, in addition to the bald eagle, you may wish to initiate the formal consultation process by writing to the Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon. The formal consultation process is appropriate only if you find that endangered species or their habitats are involved.

Sincerely,

Joseph R. Blum
Area Manager

RCWunderlich:fee

United States Department of the Interior

FISH AND WILDLIFE SERVICE
LLOYD 500 BUILDING, SUITE 1692
500 N.E. MULTNOMAH STREET
PORTLAND, OREGON 97232

August 31, 1978

In reply refer to:
AFA-SE (1-3-78-F-59)

Colonel John A. Poteat
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

This responds to Mr. Sidney Knutson's letter of June 15, 1978, requesting consultation as provided in the Interagency Cooperation Regulations for Section 7 of the Endangered Species Act of 1973 relative to the Skagit River Levee and Channel Improvement project and its effect on the Bald Eagle.

We have conducted a threshold examination of this project and are of the opinion that the information provided us is insufficient to conclude whether the project is likely to jeopardize the continued existence of the Bald Eagle. Project informaton made available consists of the public brochure from your March 22, 1978 public meeting in Mt. Vernon, Washington, and your March 1975 authorization report for the Skagit project. These documents lack sufficient information to fully evaluate the problem. Our rationale for this opinion and additional information needs are described below.

Project data supplied us provides only a generalized description of the proposed leveee and channel work. From Mt. Vernon downstream, the 1965 authorization report indicates only general levee alignment and typical levee profiles. No additional specifics on the authorized project are available. From Mt. Vernon upstream to Sedro Woolley, we have no project data, although informal discussion with your staff indicates that the proposed levee work would likely follow the existing levee on the north bank, which would then be tied into the existing Burlington--Sedro Woolley railway roadbed. We further understand no new levee work is proposed on the south bank of the Skagit above the authorized project.

Available resource information indicates that eagle use of the lower Skagit River, with the exception of Skagit Bay tidelands, is relatively low. The upper Skagit drainage, however, serves as a wintering area for a significant number of Bald Eagles. This wintering population relies almost exclusively on spawned out Chum, Pink, and Chinook Salmon carcasses as a food source. These salmon, particularly Chums and Pinks, utilize the shallow shoreline areas of the Skagit River for migration and rearing. As the proposed project would cause modification of this shoreline zone, we believe the project could potentially affect salmon abundance and, ultimately, food availability for the wintering Bald Eagles of the upper river. Without site specific information on levee alignment and design, however, we are unable to reliably estimate the extent of such impacts or recommend design changes to avoid adverse impacts.

Accordingly, we require project information describing the specific alignment route of the improved levee system and levee profiles at all locations where shoreline modification would occur from Sedro Woolley downstream to the mouth of both forks. Upon receipt of the above information, a final opinion will be provided within 60 days.

Sincerely yours,

William H. Mayer

Acting Regional Director

William H. Mayer

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-ER

17 OCT 1978

R. Kahler Martinson, Regional Director
U.S. Fish and Wildlife Service
500 Northeast Multnomah Street
Lloyd 500 Building, Suite 1692
Portland, Oregon 97232

Dear Mr. Martinson:

Please reference your 31 August 1978 letter which responded to our 15 June 1978 request for consultation under Section 7 of the Endangered Species Act of 1973 for the northern race of the bald eagle which is known to occur in the area of the proposed Skagit River Levee and Channel Improvement Project. Your letter indicated that the information we have provided to date is insufficient to conclude whether the project will impact the continued existence of the bald eagle. Accordingly, we have prepared the additional information you requested and are forwarding it as inclosures 1 through 4.

Since June 1978, we have continued with our reevaluation of the Skagit River Levee and Channel Improvement Project authorized in 1966. Of the alternatives displayed in our March 1978 public brochure, we have been conducting detailed studies of alternative 1 (Continue Existing Conditions); alternative 2 (Authorized Project); and alternative 3(Authorized Project plus Urban Levees). Alternative levee alinements under consideration are displayed in inclosure 1.

As was explained in our 15 June letter, we are evaluating the authorized project (downstream, rural levees and higher, urban levees at Mount Vernon) as well as an extension of the levee system further upstream (urban levees) to the vicinity of Sedro Woolley. The proposed downstream levee improvements follow the existing levee alinements from the mouths of the Skagit River to Mount Vernon and will offer approximately 50-year protection to the Skagit delta farmland. The final design of the downstream levees has recently been initiated for a top of levee equal to the 120,000 cubic feet per second (c.f.s.) water surface profile plus 6 feet. This includes an allowance for approximately two feet of aggradation. The proposed downstream project levee alinement and location of riprap and quarry spalls

with sod is shown on the inclosed orthophotos (inclosure 2). Note that a higher levee is anticipated for the southern end of Tom Moore Slough on the South Fork to provide protection to Stanwood from flooding by the Skagit River.

Typical levee cross-section profiles for the downstream project at locations where encroachment into the river may occur are shown in inclosure 3. For some of these sections, the option to avoid encroachment may be available, depending on the width of the bench in the cross section. We are currently assessing the sections to determine which ones can be set back from the river's edge. We expect this data in the near future and will forward it to you as soon as the analysis is complete.

The upstream portion of the project extends from Mount Vernon, Washington, to the vicinity of Sedro Woolley. These levees will offer a higher level of protection (100-plus years) to the urban areas within the project area. Several alternative levee alinements are under consideration for the upstream project. These alinements and the locations of riprap and quarry spall with sod are shown in inclosure 2. Typical levee cross-section profiles are shown in inclosure 4.

No new levee work is proposed on the south bank of the Skagit River above the railroad bridge between Mount Vernon and Burlington. No channel improvements are anticipated in either the downstream or upstream segments of the project.

In the design of the levees, we are avoiding shoreline modification to the extent possible by minimizing encroachment of the levees into the river thus reducing adverse impacts on salmon, which serve as a food source for the wintering bald eagle on the upper Skagit River. Any necessary instream work will be timed to avoid the peak migration period for juvenile salmon; although, we are aware that juveniles continue to occupy the shore zone year around as a resting and rearing habitat.

Levee work will include grass seeding and restoration planting where recommended to reduce impacts to fish and wildlife due to project-related loss of riparian habitat. Any plantings done on the levees will consist of species compatible with the maintenance of levee integrity. Further, the construction contractor will be required to restore the 10-foot construction easement made available along the levee right-of-way.

Most of the project consists of levees set back from the river's edge. The loss of mature perching and roosting trees for the bald eagle within

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R. Kahler Martinson, Regional Director

the riparian zone is not expected to be significant. Along the densely vegetated South Fork, levee work will be accomplished on one bank of Tom Moore Slough and Freshwater Slough, leaving the other bank undisturbed.

We hope this information will be sufficient for you to determine project impacts to the bald eagle. If you have any other specific information needs, please contact Ms. Karen Mettling, Environmental Coordinator, at FTS 399-3624, or Mr. Forest Brooks, Study Manager, at FTS 399-3621. During the next 60-day period, we welcome any informal exchanges between your endangered species coordinator and members of my staff regarding recommendations for the bald eagle. Any preliminary input would be useful during project planning as we work toward formulation of the recommended plan.

Sincerely yours,

JOHN A. POTEAT
Colonel Corps of Engineers
District Engineer

4 Incl
As stated

Copy furnished w/o incl:
Joseph Blum, Area Manager
U.S. Fish and Wildlife Service
Building "A"
2625 Parkmont Lane
Olympia, Washington 98502

Mr. Bob Wunderlich
U.S. Fish and Wildlife Service
Department of the Interior
2625 Parkmont Lane, Building B
Olympia, Washington 98502

Ralph W. Larson, Director
Department of Game
State of Washington
600 North Capitol Way
Olympia, Washington 98504

Gordon Sandison, Director
Department of Fisheries
State of Washington
115 General Administration Building
Olympia, Washington 98504

United States Department of the Interior

FISH AND WILDLIFE SERVICE

LLOYD 500 BUILDING, SUITE 1692
500 N.E. MULTNOMAH STREET
PORTLAND, OREGON 97232

January 24, 1979

In reply refer to:
AFA-SE - 1-3-78-59

Colonel John A. Poteat, District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

This is in reply to your request dated June 15, 1978, for a Section 7 consultation as required by the Endangered Species Act of 1973, as amended in 1978, regarding the Skagit River Levee and Channel Improvement Project. The case number for this consultation is 1-3-78-59.

The proposed project includes construction of a levee system that follows the existing levee alignments from the mouth of the Skagit River to Mount Vernon, Washington. The project will provide a 50-year flood protection to the Skagit delta farmland. In addition, an upstream portion of the project will extend from Mount Vernon to the vicinity of Sedro Woolley. This section of the project will offer a 100-plus years protection to the urban sections within the project area. No channel improvements are anticipated in either the downstream or upstream segments of the project. Linear distance of the proposed levee project is 50.5 miles.

Accompanying the Corps of Engineers' October 17, 1978 request were copies of: (1) Alternative levee alignments under consideration; (2) ten orthophotos with superimposed descriptions of proposed levee and riprap areas; and (3) levee cross-section profiles for the downstream project.

The Service indicated that the information the Corps provided in the request for consultation was insufficient to conclude whether the project would impact the bald eagle (Haliaeetus leucoccophalus). On October 17, 1978, the Service received additional information which would allow a biological opinion to be rendered. This opinion addresses that information and assesses the likely impacts on bald eagles resulting from the proposed project.

Bald eagles utilize the lower Skagit River and estuary primarily in winter months--December through February. During this period, 10-20 birds may be found in this reach of the river. No known nests are found within one (1) mile of the proposed project. No large concentrations occur here; however, near Rockport, Washington, about 25 miles upstream from the project, groups of 30 or more eagles are commonly found during the winter months. They are attracted here by the spawned-out salmon. Very few, if any salmon spawn in the Skagit River below Rockport within the project boundaries. Consequently, there is little prey to attract large concentrations of wintering bald eagles.

The design of the proposed levees is such that minimal modification will be made to the existing perching sites used by eagles. Mature conifers found in the area along the banks of the river are not a limiting factor. Removal of some trees may provide better visual range to the eagles utilizing shoreline perches. Because the project will occur over a 3-year period and construction activities will be conducted on a section by section basis, bald eagles will be displaced from any one section on a temporary basis.

Based on the above discussion and existing data, the biological opinion of the Fish and Wildlife Service regarding impacts on bald eagles is that the proposed Skagit River Level and Channel Improvement Project is not likely to jeopardize the continued existence of this species.

Thank you for the opportunity to comment on this matter. This concludes Section 7 consultation on this project. Should any modification occur to the project other than discussed above, or should new information on listed species become available, the Corps of Engineers should consider reinitiating consultation. We would appreciate a notification of your intent in light of this opinion.

Sincerely yours,

Bill Meyer

[illegible] Regional Director

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-ER

JUL 9 1979

R. Kahler Martinson, Regional Director
U.S. Fish and Wildlife Service
500 N.E. Multnomah Street
Lloyd 500 Building, Suite 1692
Portland, Oregon 97232

Dear Mr. Martinson:

The purpose of this letter is to inform you of changes made to the proposed Skagit River, Washington, levee project since the biological opinion regarding the impact of the project on the endangered bald eagle was received from your office in a letter dated 24 January 1979. For ease of reference, a copy of the letter is attached as inclosure 1. A description of the project changes, presented as an addendum to the draft Environmental Impact Statement, is provided as inclosure 2. The changes are primarily both nonstructural and structural features added to reduce project-related induced flood damages.

It is our opinion that the project modifications are not likely to jeopardize the continued existence of the bald eagle and, therefore, we do not intend to reinitiate consultation under Section 7 of the Endangered Species Act, as amended. We do realize that flood protection will result in increased pressure to develop in the protected floodplain and recognize the potential effect of this secondary impact to all fish and wildlife in the Skagit Delta unless local zoning regulations are strictly enforced. The intent of the proposed levee project is to protect existing development, not to promote the undesirable development of agricultural land, and no project benefits have been claimed for any higher or more intensive use of any of the protected areas.

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R. Kahler Martinson, Regional Director

Should you have any questions or comments regarding this letter, or the inclosed addendum, please contact Ms. Karen Northup, Environmental Coordinator, phone (206) 764-3624.

Sincerely,

MAXEY B. CARPENTER JR.
Lt. Colonel, Corps of Engineers
Deputy District Engineer

2 Incl
As stated

Copy furnished (w/incls)
Joseph R. Blum, Area Manager
U.S. Fish and Wildlife Service
Department of the Interior
2625 Parkmont Lane, Building A
Olympia, Washington 98502

Gordon Sandison, Director
Washington Department of Fisheries
General Administration Bldg., Room 115
Olympia, Washington 98504

Ralph W. Larson, Director
Washington Department of Game
600 North Capitol Way
Olympia, Washington 98504

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
302 Sharon Avenue, Burlington, Washington 98233 206/755-0421

July 24, 1978

Ms. Karen Mettling
Dept. of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Ms. Mettling:

This letter is in response to a Corps of Engineers request for information regarding salmon resources in the Skagit River. We realize that this kind of information is necessary in developing an assessment of the effects of the proposed Corps Skagit River Levee and Channel Imporvement Project.

The Skagit River is the single largest producer of salmon in the Puget Sound region, and is second only to the Columbia River as a source of salmon in the State of Washington. All five species of pacific salmon-chinook, coho, sockeye, pink and chum salmon utilize the Skagit River. Salmon originating in the Skagit River are caught in the various coastal hook and line commercial and sport fisheries from California to Alaska. Skagit River salmon also contribute substantial numbers of fish to the Puget Sound sport and commercial net fisheries. And finally, the Skagit River itself, provides an excellent sport fishery for chinook, coho and pink salmon while yielding good numbers of all species to the three Indian tribal fisheries for subsistence, ceremonial and commercial purposes.

Because of the magnitude of Skagit salmon runs, these stocks contribute significantly to all of the various fisheries. Enclosed in tabular form are annual escapements for all five salmon species. Escapements are shown for both natural and artificial (hatchery) runs. Also shown in the tabular form are the economic value of Skagit salmon stocks, based on mean annual natural and artificial escapement. These values should be considered minimal as they are based on price paid at the commercial fishermen level and furthermore, current economic statistics are not available. The Skagit River salmon resource is of considerable worth to the economy of the State of Washington. As shown by the foregoing economic evaluation the combined value of both natural and artificial salmon runs during an average year is in excess of $5 million. In some years the value is substantially higher. Also enclosed is a production summary for the Skagit salmon hatchery for the years 1962 through 1976. The 1975 and 1976 summaries

show off-station and station releases. Station, or Skagit River, releases are shown as Clark Creek, while off-station releases are by stream planted. Skagit Hatchery and off-station releases in the Skagit basin are underlined in red. The 1976 summary reflects the recent trend towards production of pink and chum in addition to coho and chinook. Furthermore, the Department of Fisheries has been progressing towards inclusion of native summer and spring chinook in its Skagit Hatchery program.

The Department of Fisheries is vitally concerned about the well-being of Skagit salmon runs and any adverse impacts which may result from this project. If the enclosed information is not sufficient to meet your needs relative to an assessment of the Skagit River salmon resource, please contact me.

Russell Orrell, Fisheries Biologist

RFO: ei

SKAGIT SYSTEM COOPERATIVE

Swinomish • Upper Skagit • Sauk-Suiattle

July 28, 1978

Ms. Karen Mettling
Dept. of Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA. 98124

Dear Ms. Mettling:

As the fishery management unit for the Swinomish, Upper Skagit, and Sauk-Suiattle tribes, the Skagit System Cooperative has a serious interest in any proposed action that potentially affects Skagit fisheries or fish habitats. The Corps' proposed levee and channel improvements for the Skagit River represent such an action.

The affected area, from Burlington downstream, contains juvenile and/or adult salmonids the year-round. Juveniles would likely be more adversely affected than adults. The peak abundance of juvenile fish is from mid-winter through the spring months into June. The contemplated actions of channel straightening and obstacle removal reduces the available habitat for juvenile salmonids by eliminating resting and feeding zones.

Is channel dredging indicated in the proposed action? Dredging is documented as adversely affecting juvenile salmonids. If dredging is contemplated, is there any assurance that continued periodic maintenance dredging won't also be required?

Although adult salmonids may be less directly affected by the proposed action, channel straightening that eliminates eddies may well eliminate usual and accustomed set net fishing stations reserved by the Swinomish Tribe in the 1855 Treaty of Point Elliott with the United States. Further communication and coordination concerning this matter is requested.

These are my only comments at this time. As the Corps develops more detailed plans, I would appreciate a n opportunity for the Skagit System Cooperative to review them. Thank you.

Sincerely,

Steve Fransen

Steve Fransen, Biologist
Skagit System Cooperative

SF:db

cc: Lorraine Loomis,
Swinomish Fisheries Manager
Russ Orrell, Washington Department of Fisheries

Box 368 • Reservation Road • LaConner, Washington 98257 • Phone (206) 466-3423 or 466-3184

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
2625 Parkmont Lane, S.W., Bldg. B-3
Olympia, Washington 98502

August 7, 1978

Mr. Dwain F. Hogan
Chief, Planning Branch
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Mr. Hogan:

This responds to your letter of July 31, 1978 concerning Fish and Wildlife Service involvement in the Skagit River Levee and Channel Improvement project.

Mr. Bob Wunderlich of this office will participate in your August 29th interagency workshop.

We have reviewed our March 11, 1977 planning aid letter on the Skagit project as requested. Of the mitigative features mentioned in this letter, we are considering again our recommendation that cattle grazing be restricted from top and riverward levee slopes in the project. Apparently some riparian landowners encourage cattle grazing on levee slopes in the belief that grazing animals help to compact levee soils and also reduce shrubby vegetation, thereby allowing easier inspection and maintenance of a levee. Such grazing is generally inimical to wildlife values associated with good riparian cover, however. We would appreciate your views and a discussion of this practice as it relates to this project at the upcoming workshop.

A point of increasing concern to us at this time in the project timetable is the due date of our revised fish and wildlife report. The due date has already been postponed twice for lack of project details, and it appears we are in the same position again with a due date of September 30th. The 1965 authorization report and brochure from the March 1978 public meeting provide very few specific details for us to work with. Virtually no information is available concerning work upstream of the authorized project.

Without specific project information, we are unable to estimate project impacts to fish and wildlife and recommend mitigative measures useful to

your project planning. We would therefore like to again postpone the due date until we receive project details and have sufficient time to evaluate them and prepare our report.

Sincerely,

Ralph S. Boomer

Ralph S. Boomer
Acting Field Supervisor

RCWunderlich:fs

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
P.O. Box 4332, Portland, Oregon 97208

August 21, 1978

Colonel John A. Poteat
District Engineer, Seattle District
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

ATTN: Dwain Hogan, Chief, Planning Branch

Dear Colonel Poteat:

We reviewed information contained in your July 28, 1978 letter regarding the proposed Skagit River levee and channel improvement project alternatives and have some comments. The comments deal with potential project impacts upon anadromous fish utilizing the Skagit River and include preliminary recommendations to reduce adverse impacts.

Our general concerns with construction activities such as levee and channel improvements include the loss of water area for salmonids with the possible concurrent loss of area for spawning, rearing, resting, and avoiding predators. In addition, another concern would be the loss of riparian vegetation during levee construction which reduces cover, shade and sources of food.

While we recognize the need for flood control projects in this area, we also believe that certain precautions can be taken to minimize adverse impacts upon anadromous fish resources during project construction.

We strongly recommend that the selected project alternative permit the least encroachment into the river and that the loss of water area be held to an absolute minimum. If some encroachment is necessary during levee construction, we would recommend a levee with a buried toe which we believe usually has the least potential for encroachment. We also recommend that riparian vegetation be restored in areas where it has been necessarily removed during construction activities.

In addition, we are generally opposed to any form of channelization. However, if channel modifications occur, then the natural contour of the river should be followed. This would minimize the loss of aquatic habitat. If construction activities need to occur in the riverbed, then

the preferable time period for such activities would be after the peak juvenile salmonid downstream migration period, although adult and juvenile salmonids can be found any time of the year in the area.

We also note that an alternative levee and channel improvement proposal includes an upstream storage dam on the lower Sauk River. The Sauk River is an extremely important anadromous fish producing stream. A storage dam at this site with its inherent detrimental effects such as inundation of fishing areas and spawning beds, and upstream and downstream migrant passage problems, would most likely eliminate the Sauk River as a significant anadromous fish stream. The loss to the citizens of the State of Washington and also the nation would be irreplaceable.

Your July 28 letter also mentions an August 29 workshop to discuss the levee and channel modification alternatives. At that time, we can hopefully reach some consensus on a preferred alternative. Thank you for your continuing coordination efforts.

Sincerely,

John A. Hodges

for Dale R. Evans
Divivsion Chief

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
Seattle Regional Office—509 Fairview Avenue North, Seattle 98109. Telephone: 464-7764

August 25, 1978

Dwain F. Hogan, P. E.
Chief, Planning Branch
Seattle District
Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Hogan:

Thank you for your letter asking for our opinions and comments on your Skagit River levee and channel improvement project. In your July 27 letter you asked several specific questions. I understand Art Stendal and John Garrett of our staff have provided information concerning wildlife relationships and matters pertaining to our Skagit Wildlife Recreation Area. I will address my comments for game fish concerns.

We are not able to calculate game fish catches for your project area specifically nor are we in a position to provide escapement numbers. However, as you know, the Skagit River is one of the most important anadromous game fish rivers in the State of Washington. These runs are highly dependent on environmental conditions and qualities of Skagit River estuary. All pass through and may spend considerable time, during key life history phases, in the project area. We cannot overemphasize the importance of maintaining its ecological integrity. Channel modification or removal of riparian vegetation could severely impair important habitats and eliminate key food sources and cover habitat these fish depend on for survival.

Steelhead are the most intensively sought after and economically valuable game fish using the project area. In past years, more steelhead were harvested in Skagit River fisheries than from any other stream in Western Washington. Others, including sea-run cutthroat and Dolly Varden char, generate substantial additional value and public interest. Annual Skagit Basin steelhead catch, over past 16 seasons, has averaged 14,000. This harvest has ranged to over 22,000 during peak seasons under favorable survival conditions. Skagit Basin harvest stems from artificial and natural production. Both planted and naturally produced smolts are dependent on conditions in the project reach. We do not have total creel information for Dolly Varden and sea-run cutthroat but this harvest is significant and has considerable value.

Department of Game has substantial plans for enhancement and restoration of game fish resources of Skagit Basin. Present goals for our Barnaby-Harrison Slough facility include a 25 percent increase in winter-run steelhead and a sixfold increase in summer steelhead smolt production. We have recently developed a rearing facility on Sauk River to enhance late returning wild stock returns to that system. Collectively these plans, if successful, will more than double the total adult steelhead return to Skagit Basin. As you may be aware, existing hydroelectric developments in Skagit Basin are causing severe damages to

wild fish production. We are intensively seeking solutions to these problems. We cannot precisely forecast the level of increased production that could be realized through these measures but we expect it to be substantial. Success of all of these plans will depend on the maintenance and preservation of the biological integrity of the entire Skagit Basin and particularly your project reach. Migrant steelhead, Dolly Varden, and sea-run cutthroat depend heavily on this area. The intertidal estuarine zone of Skagit River is critical habitat for anadromous fish. Successful transition from fresh water to the marine environment is a key life history phase. Riparian vegetation, natural streambank and channel diversity provide important cover and food organism production that is directly related to the carrying capacity and ability of these environs to support these fish populations. Channel modification, streambank realignment, or riparian vegetation removal would have potentially severe negative impacts.

At this time, until I have had opportunity to review project plans in greater detail, I will not comment on project details such as buried or weighted levee toe or construction season. We are not aware of any steelhead spawning activity within your project reach.

Due to potentially severe biological impacts to the estuary-tidal zone, I recommend the North Fork channel modification feature be dropped. Levee configurations should be set back; riparian vegetation removal should be prevented.

Again, thank you for the opportunity to comment. I look forward to your meeting August 29.

Very truly yours,

R. Gary Engman

R. Gary Engman
Wildlife Project Leader

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Washington Coop. Fish. Res. Unit
College of Fisheries WH-10
University of Washington
Seattle, Washington 98195

September 12, 1978

U.S. District Corps of Engineers
Seattle District
P.O. Box C-3755
Seattle, WA 98124

Attn: Karen Mettling, Environmental Research Section

SUBJECT: A brief summary of studies on the distribution and feeding habits of juvenile salmon in the Skagit River salt marsh, 1976-1978.

Dear Sirs:

I am providing the following information for use in your assessment of the environmental impacts of the Skagit River levee and channel improvement project.

Students and faculty associated with the Washington Cooperative Fishery Research Unit began studying juvenile salmon in the Skagit salt marsh in the spring of 1976. Funding has been provided largely by Sea Grant. One of our primary objectives has been to determine the importance of the marsh habitat for juvenile salmon.

1. Distribution of juvenile salmon

In 1977 we sampled many different areas of the marsh, with the assistance of Washington Department of Fisheries personnel. The seines used were 20 feet in length and 6 feet deep, with 1/8-inch mesh. Standard hauls were made at low tide over a distance of 20 meters, sweeping approximately 100 m^2 of bottom. These small seines are only about 50% efficient: on the average, half of the salmon fry present in the area swept by the net escaped capture.

Both juvenile chum and juvenile chinook salmon were abundant in marsh sloughs and channels from late March through May. In April 1977 we caught 581 chinook and 3958 chum fry in 109 seine hauls between Tom Moore Slough and Wiley Slough (South Fork Skagit). In the same month we caught 375 chinook and 3530 chum fry in 30 seine hauls in the vicinity of Sullivan Slough, Dunlap Bay, and Deepwater Slough (North Fork Skagit). These hauls were not concentrated in areas where we expected to find salmon fry, but were distributed over various types of habitat. The greatest concentrations of fry were found in the muddy, shallow upper ends of tidal channels, immediately adjacent to dikes in some areas.

2. Feeding Habits

Young salmon find abundant food in the salt marsh. We have examined over 300 chum and chinook stomachs collected on the marsh, and have not yet found a completely empty one during either daytime or night time hours. Although the fish feed more or less continuously, the weight of the stomach contents reaches a peak immediately following the two high tides occurring each day. At high tide the fish move out of the channels and into the marsh to feed. Dipteran pupae and adults consistently make up a large part of the diet, with amphipods and mysids (for chinook) following in importance. The dipterans are apparently salt-tolerant forms originating in the marsh, and not freshwater forms from upstream.

3. Conclusions

The small ditches and channels that drain the salt marsh are important as habitat for juvenile chum and chinook salmon. The numbers of fry sampled in 1977 indicate that a large percentage of the outmigrating chum and chinook utilized the marsh at least briefly.

We have not attempted to estimate residence times or growth rates for fry in the marsh, although we intend to do so in 1979. Results from some studies in British Columbia indicate that juvenile chum and chinook may remain in brackish water near the mouth of their home stream for a period of several days to several weeks. Juvenile salmon on maximum rations may increase in weight at a rate of 6% to 7% per day, and so could double in weight in 10 to 12 days. A short period of rapid growth in the salt marsh could have a marked effect on subsequent marine survival, because marine survival is strongly correlated with size at the time of entrance into salt water.

I hope this information will be of some use to you. Please contact me if there is need for clarification or additional information.

Yours very truly,

James L Congleton

James L. Congleton
Assistant Professor

JLC/tw
cc: R. Orrell, WDF.

STATE OF WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way/Olympia, Washington 98504 206/753-5700

January 26, 1979

Ms. Karen Northup
Environmental Resources Section
Seattle District, Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Karen:

Recently you asked us to clarify our position on mitigation alternatives suggested for the Skagit River Levee Project. You asked us to identify management plans for the Skagit WRA. This would allow us to coordinate mitigation proposals with future WRA management. I discussed your questions with most of the Game Department people who have been involved. I think we reached concensus. This letter represents the Game Department's position on the questions you asked.

A. Improvement of Game Department Levees

1. Levees along Wiley and Freshwater Sloughs. We agree, placing the main levee along Wiley Slough is the appropriate location. There are several reasons why. One reason is that this would require removal of a bare minimum of riparian vegetation. However, we have three concerns.

   a) Increasing levee height by five feet with 3:1 side slopes might extend side slopes well into the farmed area. A substantial acreage of cultivated field might be lost.

   b) We have a boat launch ramp on Freshwater Slough just above the upper end of Wiley. Traffic to the ramp passes through the WRA headquaters area then along the Wiley Slough dike. Increasing the levee height might make car access on the dike and ramp difficult if approaches are too step. Vehicle turn around may become more difficult.

   c) Levee construction traffic through the headquaters area will likely cause unacceptable congestion for the public and construction crews alike.

Items a) and b) can probably be resolved by building a short section of road around the headquarters on the north and east and extending to the boat ramp. We trust these concerns will

be resolved during advanced planning.

We would like to improve the dike along Freshwater Slough. We recommend adding material to the top of the dike increasing average height by one foot. Most of the increase would be concentrated in four low areas. This would take about 3,500 cubic yards of material at a cost of about $18,000. Our main concern here is to prevent saltwater intrusion on the farmed area. A major benefit of this limited improvement alternative is that it would preserve the extensive riparian vegetation along Freshwater Slough.

The Game Department would make these repairs itself when we have the money. We must maintain the dike to preserve the integrity of the present program. Making the improvement preserves the exisiting benefits and would allow planting trees and shrubs inside this dike to replace forest/shrub vegetation types lost from levee construction elsewhere in the project.

Failure of this dike would destroy the existing program. We farm over 50 acres here, growing cereal grains and pasture. Benefits of the program are obvious. Every year this segment supports about 10,000 user days of appreciative wildlife use, 2,500 user days of pheasant hunting and 8,300 user days of duck hunting. About 2,500 people launch boats at the ramp each year. Cereal grains and pasture provide critical winter waterfowl food. Snowgeese, mallards, pintails, greenwing teal, and widgeon all feed here. During peak use periods, 30,000 to 40,000 waterfowl feed here each day.

B. Improvement of Milltown Island Levees

We do not recommend either suggested approach. Both alternatives, repairing existing levees or building new dikes around old farmed areas would be expensive. Both would require construction of an expensive bridge (estimated $50,000 to $100,000) as well as expensive construction costs. They would commit the Game Department to an expensive farming operation which would require regular pumping. We don't think either option is cost effective. In addition, repairing breaks in existing levees would require removing more deciduous forest and shrub vegetation. That would be self defeating since one purpose for repairing the dikes is to preserve deciduous forests.

We could make some improvements on Milltown Island. We could make some semi-permenent ponds in the old farmed areas creating open water for waterfowl. Plants with particular benefit as wildlife food and shelter would be planted. The present bridge could be reconstructed to assure access for foot traffic lost through riprap placement elsewhere. We could place small bridges over brakes in the dike to extend human access

replacing access lost to riprap placement elsewhere in the project. We will supply a more specific plan if these ideas are acceptable

C. Land Acquisition and Mitigation Plantings

Most of the land on our list of possible acquisitions, is available for the right price. Salt marsh would probably cost $1,000 per acre. Farm land might cost $3,000 per acre or more. Ownership is shown on the list. We don't believe any areas on our possible acquisition list are presently growing deciduous forest.
The best way to mitigate for lost deciduous forest is to plant new trees and shrubs. Several people suggested planting behind the improved dike along Freshwater Slough. This is a good idea. The Game Department owns other areas within the W.R.A. and in the lower Skagit valley where the Corps could make plantings to replace lost habitat types. We should concentrate on areas that are presently disturbed and/or contain little or no vegetation.

A similar strategy should be followed to replace lost salt marsh. The Corps could purchase disturbed or partially developed areas which were formerly salt marsh. We could encourage these areas to revert back to salt marsh. This would create new salt marsh to replace salt marsh lost by project construction.

We need more detailed work to determine specific areas for wildlife improvement.

D. The area on North Fork Skagit River south of Rexville.

This area appears to be reverting to wetland although we have not made a detailed examination. At one time we considered buying this area but eventually dropped the idea. We probably would not justify purchase now because that area is isolated from our current ownership. The best use of the area is probably to remain as wetland. We do not know who owns it. It should be easy to determine ownership through the county tax assessors office or local title company office.

I hope this information answers your questions. If you need any other information I will try to provide it.

Sincerely,

THE DEPARTMENT OF GAME

Jon Gilstrom, Research Team Leader
Habitat Management Division

JG:jd

SKAGIT SYSTEM COOPERATIVE

Swinomish • Upper Skagit • Sauk-Suiattle

MEMORANDUM

TO: Karen Mettling, Environmental Coordinator

FROM: Steve Fransen

DATE: January 31, 1979

SUBJECT: LEVEE IMPACTS ON THE FISHERY RESOURCE

The interest of the Skagit System Cooperative is to maintain natural production of salmonids in the Skagit basin at least at the present levels. In fact, some populations are gradually increasing.

The planning coordination of the Corps with this organization has been very good, and I believe it has served to substantially reduce adverse impacts to the fishery resource. Continued coordination, and monitoring through the construction phase, should alleviate many of the problems that may arise during implementation of the project.

I have some comments on specific impacts and proposed mitigation. These comments are mainly the result of the January 25 interagency workshop.

1. The agreed upon levee realignment on Tom Moore Slough (St. 1052-1120) will better serve the fishery resource by reducing streamside habitat alteration.

2. Relocating the mouth of Fisher Slough imposes a temporary impact during construction; no permanent adverse conditions are expected. Although design specs aren't finalized, a slide gate flood control structure is preferable to a flap gate for purposes of fish passage. Deleting the remainder of Fisher Slough from the project area eliminates any additional impacts in this area.

3. The four miles of instream riprap is properly considered an adverse impact in terms of eliminating fish habitat or reducing its quality. Proposed mitigation for 7450' in five "critical" reaches (1) includes an 18" thick blanket of riprap with about four vertical feet above mean high water to be revegetated with selected shrubs. Based on the discussion at the workshop, I have doubts that this will provide adequate fish habitat to replace the expected losses. However, it may be the best onsite mitagative alternative that is consistent with the project purpose.

   The remaining instream riprap, approximating 2½ miles total, will receive sod and grass cover on the top and upper sideslope. In all probability this would not benefit fish habitat.

Box 277 • LaConner, Washington 98257 • Telephone (206) 466-3163

Memorandum to:
Karen Mettling, Environmental Coordinator

If habitat losses cannot be further reduced in the instream riprap reaches, then habitat improvement or restoration in other lower Skagit locations should be considered. First among these is the addition of culverts to the upstream end of the Deep Slough extension, (called Center Slough by John Garrett of Washington State Department of Game). Opening this channel so that it receives and flushes freshwater will provide habitat for nearly 2,000 coho smolts annually. Chinook, pink, and chum salmon that utilize estuarine and lower river rearing areas will also benefit from this type of habitat restoration.

I would recommend at this point that a survey be initiated to locate additional fish habitat restoration and improvement opportunities, and that they be incorporated as a part of the final mitigation plan.

4. "Edge" habitat, the line dividing forested and unforested areas is critical to wildlife, particularly along streams. Removal of overstory vegetation for levee improvements eliminates some critical habitat. Proposed mitigation is offsite planting on the Skagit Wildlife Recreation Area. Where possible, this planting should be done along streambanks presently void of overstory. Mitigation plantings of overstory on areas not adjacent to the stream will offer little benefit to the fishery resource. I believe the final environmental report should address the role of overstory vegetation in the aquatic environment. Trees provide shade to the stream and temporary habitat for terrestrial and adult aquatic insects that are important food sources to fish.

5. The proposed concrete wall along the Mount Vernon waterfront (St. 618-647) will probably completely eliminate fish utilization of this area.

(1) Riprap to be revegetated:

North Fork, LB, St. 421-227
North Fork, LB, St. 140-125
North Fork, RB, St. 829-818
South Fork, RB, St. 142-147
Main Stem, RB, St. 600-570

SF:db

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Area Office
2625 Parkmont Lane
Olympia, Washington 98502

April 6, 1979

Colonel John A. Poteat, Jr.
District Engineer
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

This constitutes the final revised report of the U.S. Fish and Wildlife Service on the effects of the Skagit River Levee and Channel Improvement Project on fish and wildlife resources. It has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 501, as amended; 16 U.S.C. 661 et seq.).

These comments are based on engineering data and related information provided by the Corps of Engineers through March 1, 1979. This report supplements and updates our Service report dated May 20, 1964, which addressed the proposed Sauk River Dam, the Avon Bypass, and a more limited levee improvement proposal for flood control in the lower Skagit River Valley. The levee improvement proposal is now in the advanced engineering and design stage, and this report is intended for inclusion in your General Design Memorandum for the project.

Copies of the draft report were reviewed by Washington Department of Game, Washington Department of Fisheries, National Marine Fisheries Service, and Skagit System Tribal Cooperative. Letters of comment and concurrence from these agencies are attached to this report. We believe this report incorporates all recommendations received. Additionally, this final report reflects the changes in project design which have occurred since the date of the draft report, as well as mitigation features discussed in the January 25, 1979, Fish and Wildlife Mitigation Workshop at the Seattle District Office. The present project design is the result of considerable coordination and planning between our respective staffs and State resource agencies. We believe the present plan significantly reduces impacts to fish and wildlife resources of the lower Skagit River Valley.

RECOMMENDATIONS

We recommend:

1. That, as now proposed, vegetation which is destroyed by levee construction be restored to preproject conditions by means of a revegetation program consisting of the following:

   a. On-site plantings of native shrubs on 1.7 acres of riprapped slopes, and 0.2 acres of Fisher Slough shoreline. Specifically, we recommend use of containerized, rooted cuttings of 12-18 inches height at a planting density of 2,500 plants per acre.

   b. Off-site plantings of 10 acres of native trees in suitable riparian sites on the Skagit WRA agreeable to Washington Department of Game and the Fish and Wildlife Service. More specifically, we recommend use of an assortment of six-to-seven foot native trees at a density of 500 plants/acre.

2. That a monitoring program be established to determine the success of revegetation efforts, particularly those proposed for riprapped shoreline areas, for a period of five years after project completion.

3. That, as now proposed, the Deep Slough (Center Slough) extension in the South Fork of the Skagit River in the Skagit WRA be opened to allow free water circulation and anadromous fish use.

4. That, as now proposed, the outer Freshwater Slough levee receive limited, nondisruptive, improvement to allow greater flood protection for adjacent Skagit WRA lands, and yet preserve contiguous wetlands and riparian vegetation.

5. That, to the maximum extent possible, levee construction activity not occur in construction easements that contain mature riparian vegetation or wetlands in order to avoid unnecessary disturbance and loss of critically important riparian vegetation and shoreline habitat.

6. That a performance bond be required of the contractors to insure observance of construction specifications that provide for protection of riparian vegetation and associated wetlands and restoration of construction easements to preproject conditions if damage to riparian vegetation or wetlands must occur.

7. That all instream work occur only during the period July 1 to February 28 to avoid the principal period of juvenile salmonid outmigration.

8. That all precautionary measures be taken to avoid siltation of mainstem river and tributaries during project construction.

9. That all construction activities by closely coordinated with Washington Departments of Fisheries and Game to avoid unnecessary adverse impacts to fish and wildlife and their habitat, and public use and enjoyment of same.

10. That all levees remain open for year-round public use except for sections reserved for safety or protection of public property. The potential for improvement of existing public access facilities affected by the project should also be considered in further project planning.

11. That vegetation control on all levee side slopes be restricted to mechanical mowing of vegetation only six feet or greater in height.

12. That final design of fish passage features for the Fisher Slough tidegate be acceptable to State and Federal resource agencies.

13. That, in the event of any significant changes in project design or mitigation opportunities, the operation, maintenance, mitigation, and loss-prevention measures associated with our recommendations be subject to re-evaluation between the Corps of Engineers and State and Federal resource agencies.

Sincerely,

George L Capp

for Joseph R. Blum
Area Manager

APPENDIX 3

LETTERS OF COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX 3

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Advisory Council On Historic Preservation

1522 K Street NW.
Washington D.C.
20005

Reply to: P. O. Box 25085
Denver, Colorado 80225

June 8, 1979

Mr. Sidney Knutson, P.E.
Assistant Chief, Engineering Division
Corps of Engineers, Seattle District
Department of the Army
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

This is to acknowledge receipt of the draft environmental statement for Skagit River, Washington, on May 1, 1979. We regret that we will be unable to review and comment on this document in a timely manner pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969.

Nevertheless, the Corps of Engineers is reminded that, if the proposed undertaking will affect properties included in or eligible for inclusion in the National Register of Historic Places, it is required by Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320) to afford the Council an opportunity to comment on the undertaking prior to the approval of the expenditure of any Federal funds or prior to the issuance of any license. The Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800.4) detail the steps an agency is to follow in requesting Council comment.

Generally, the Council considers environmental evaluations to be adequate when they contain evidence of compliance with Section 106 of the National Historic Preservation Act, as amended. The environmental documentation must demonstrate that either of the following conditions exists:

1. No properties included in or that may be eligible for inclusion in the National Register are located within the area of environmental impact, and the undertaking will not affect any such property. In making this determination, the Council requires:

--evidence that the agency has consulted the latest edition of the National Register (Federal Register, February 6, 1979, and its monthly supplements);

--evidence of an effort to ensure the identification of properties eligible for inclusion in the National Register, including evidence of contact with the State Historic Preservation Officer, whose comments should be included in the final environmental statement.

2. Properties included in or that may be eligible for inclusion in the National Register are located within the area of environmental impact, and the undertaking will or will not affect any such property. In cases where there will be an effect, the final environmental statement should contain evidence of compliance with Section 106 of the National Historic Preservation Act through the Council's regulations, "Protection of Historic and Cultural Properties".

Should you have any questions, please call Jane King at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall
Chief, Western Office
of Review and Compliance

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
COMMANDER (dpl)
THIRTEENTH COAST GUARD DISTRICT
915 SECOND AVE
SEATTLE, WASH. 98174
PHONE 206 442-7523

16452
DPL79-561

Colonel John A. Poteat, USA
District Engineer
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, WA 98124

Dear Colonel Poteat:

We have reviewed your draft environmental impact statement of 30 April 1979, addressing your proposed flood damage reduction project on the Skagit River, Washington. This project proposal does not appear to impact any Coast Guard programs or activities; likewise, no regulatory action by this agency will be required.

In view of the foregoing we have no comments on the document or your proposed project. Thank you for the opportunity to review this document.

Sincerely,

RICHARD F. MALM
Captain, U.S. Coast Guard
Chief of Staff
13th Coast Guard District

FEDERAL ENERGY REGULATORY COMMISSION
REGIONAL OFFICE
555 BATTERY STREET, ROOM 415
SAN FRANCISCO, CA 94111

June 19, 1979

Mr. Sidney Knutson
Asst. Chief, Engineering
Division
Seattle District,
Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

Due to the impending relicensing of the Ross, Diablo, and Gorge developments (FERC Project No. 553) we are currently very interested in the utilization of all water resources in the Skagit basin and appreciated this opportunity to review both your Draft Environmental Impact Statement (EIS) concerning the Skagit River and the June 11, 1979, addendum to the EIS.

As you know, our review of other agencies' environmental impact statements concentrates basically on those areas of the electric power and natural gas industries for which the Federal Energy Regulatory Commission has jurisdiction by law, or where the staff has special expertise in evaluating environmental impacts involved with the proposed action. It appears that there would not be any significant impacts in these areas of concern nor serious conflicts with this agency's responsibilities should the proposed levee improvement be constructed.

Sincerely,

Eugene Neblett
Regional Engineer

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Region 6
P. O. Box 3623, Portland, Oregon 97208

1950

July 10, 1979

Mr. Sidney Knutson
Assistant Chief, Engineering Division
Department of the Army, Seattle District
Corps of Engineers
P. O. Box C3755
Seattle, Washington 98124

Dear Mr. Knutson:

We have reviewed the Draft Environmental Impact Statement and the Addendum on the Skagit River proposed improved levee system.

Neither the Draft Statement nor the Addendum evaluates the long-term effects of the project-induced flood damages on forest vegetation above the proposed levee system or how the proposed nonstructural measures will be applied on private forest lands. A long-term change in riparian species could be induced by changes in the flood flow regime. Some information on these effects would be desirable.

The following corrections are suggested in the Final EIS:

Page 64, Section 3.02.7, par. 1, first sentence should read: "The National Park Service and U.S. Forest Service are jointly studying the feasibility and desirability of designating a Pacific Northwest National Scenic Trail..."

Page 64, last paragraph, second sentence should read: "Under this designation...no department or agency of the United States shall recommend authorization of any water resources project that would have a direct and adverse effect on the values for which such river was established, as determined by the Secretary charged with its administration, or request appropriations to begin construction of any such project...without advising the Secretary of the Interior or the Secretary of Agriculture..." (Public Law 90-542, 82 Stat. 913, Section 7)."

Page 65, line two: Change the word "opinion" to "determination."

Page 127, 9.06: Rewrite this section to read: Coordination has been ongoing with the U.S. Forest Service regarding project impact to the portion of the Skagit River recently classified under the Wild and Scenic Rivers Act. The opinion of the Corps of Engineers is that the project will not adversely affect the values for which that portion was designated. A determination by the Secretary of Agriculture will be furnished following their review of the environmental impact statement.

We appreciate the opportunity to review and comment on this Draft Statement and the Addendum to it. We regret that these comments are a few days late but are hopeful that they will be received in time to be considered in the preparation of the Final Environmental Impact Statement.

The project does not invade the designated portion of the Skagit Wild and Scenic River. We are, however, proceeding with an analysis pursuant to Sec 7(a) of the Wild and Scenic Rivers Act to develop a Secretary of Agriculture opinion as to whether the project would unreasonably diminish the values for which the river was designated. This determination will be forthcoming in a short time.

Sincerely,

for D. Thornton

R. E. WORTHINGTON
Regional Forester

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 360 U.S. Courthouse, Spokane, Washington 99201

May 23, 1979

Mr. Sidney Knutson, P.E.
Asst. Chief Engineering Division
Department of Army
Seattle District Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Sir:

In regards to the Draft Environmental Impact Statement for the proposed Lower Levee Channel Improvement Project, we offer the following comments:

1. Project Description - 1.08 Operation and Maintenance, Page-15

   The responsibility of the local sponsor should also include regulation of animal use and utilization of all terrain vehicles on dikes. In the past, dike degradation and damage has been caused by such use.

2. Environmental Setting Without the Project - 2.05.6 Interior Drainage, Page-38

   The economic well being of the agricultural community is very dependent on drainage improvements. Without the present drainage improvements, the largest dairy in Skagit County (located in the project area) could not adequately operate. Thousands of feet of subsurface drainage tubing and open ditches for outlets have been constructed to cope with both surface and subsurface drainage problems in the project area.

3. Environmental Setting Without the Project - 2.05.7 Existing Condition of Levees, Page-39 and 40

   There is no mention of existing soil material within the dikes.

   Considerable seepage now occurs through several reaches of dike during high river flows. Are there sections of existing dike too porous to build on without an impervious core trench being added?

4. Probable Impacts of the Proposed Action on the Environment - 4.02.1 Level of Flood Protection, Page-66 and 67

We are somewhat confused over the specific design and intended use of the proposed weir structure. The document contains no cross-section or other drawings and specifications for the weir. The magnitude of a weir that will spill 60,000 cubic feet per second during a 100-year flood event should be more adequately addressed in the document. Cross-sections and profiles that show the proposed weir and its relationship to different river flows and surrounding ground elevations should be included.

At the April 24, 1979 meeting in Allen, Washington, the Corps of Engineers informed local citizens the weir will start spilling water between a 15 and 20-year flood event. This is considerably less than the stated 50-year flood protection mentioned on page-66.

5. Community Services - 4.02.9, Page-70

The present location of United General Hospital between Burlington and Sedro Woolley will be impacted by the proposed project. The hospital elevation is around 42.5 feet while the top of the weir will be at 40 feet.

The protection of the hospital is extremely important to the welfare of Sedro Woolley, Burlington, and Eastern Skagit County. The impact of the project on the hospital operations should be addressed, in addition to possible mitigating measures.

6. The Project Area - 4.04.3, Interior Drainage, Page-76

Several existing drainage systems will be bisected by the proposed levees north and west of Burlington. Adequate recognition and treatment of each system should be addressed in the document. Many of these systems were installed with Federal assistance, both financially and technically and represent a sizable investment to the farmer.

7. The Project Area - 4.04.5, Water Quality, Page-78

A portion of the proposed project includes 1,750 feet of channel work on Gauges Slough. Where will this take place? Will the present tide outlets be included in the channel work? Will the channel work affect Snelson's Lake? Due to the past problems with Gauges Slough, we believe more information is needed on this phase of the project.

8. The Project Area - 4.05.9, Prime Farmland, Page-84

As was stated in the July 7, 1978 correspondence with this agency, nearly all of the soils within the project area meet S.C.S criteria for prime agricultural land. The major limitation of the soils is adequate drainage. Allowances should be made to schedule work when the farmland is dry to avoid cropland damage from compaction. Farmers should have the opportunity to install subsurface drainage systems in proposed ponding areas before dikes are constructed north and west of Burlington. These mitigations will help insure no more than 40 acres of prime agricultural land will be lost by the proposed project.

Thank you for the opportunity to comment on the project. If you have further questions, please do not hesitate to contact me.

Sincerely,

Galen S. Bridge
State Conservationist

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-4335

June 7, 1979

Mr. Sidney Knutson
Seattle District, Corps of Engineers
Department of the Army
Post Office Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

This is in reference to your draft environmental impact statement entitled, "Skagit River, Washington." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final environmental impact statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures Memo from: Mr. Gordon Lill
National Ocean Survey
OA/Cx1

Mr. Dale R. Evans
National Marine Fisheries Service
FNW5

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
P. O. Box 4332, Portland, Oregon 97208

May 25, 1979 FNW5:JRL

TO : PP/EC - Richard Lehman

FROM : FNW5 - Dale R. Evans

SUBJECT: Draft Environmental Impact Statement -- Skagit River, Washington, (CE, Seattle District) DEIS #7904.44

The National Marine Fisheries Service was consulted during the planning stages of the proposed project or during development of the DEIS. Resources for which NMFS bears a responsibility and alternatives to reduce adverse impacts on these resources have been addressed to our satisfaction in the DEIS. Therefore, we have no comments.

CLEARANCE: SIGNATURE AND DATE:

F7:Kenneth R. Roberts Yates M. Barber, Jr. for KRR 6/5/79

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

OA/C52x6:JLR

JUN 4 1979

TO: PP - Richard L. Lehman

FROM: OA/Cx1 - Gordon Lill

SUBJECT: DEIS #7904.44 - Skagit River, Washington

The subject statement has been reviewed within the areas of NOS responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

The following comment is offered for your consideration.

Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
REGIONAL OFFICE
ARCADE PLAZA BUILDING, 1321 SECOND AVENUE
SEATTLE, WASHINGTON 98101

July 11, 1979

REGION X

IN REPLY REFER TO:

Office of Community Planning
& Development

10C

Mr. Sidney Knutson, P.E.
Assistant Chief, Engineering Division
Department of the Army
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

Re: Skagit River Levee Draft E.I.S.

The Federal Insurance and Hazards Mitigation Division of the Federal Emergency Management Agency (FEMA), has just completed their review of the draft statement. They have informed me that they will be discussing their comments directly with your staff.

For your information a copy of their comments is attached. I realize we are past your deadline, however, if the comments can be considered in you final statement it will be appreciated.

Thank you for the opportunity to review your draft.

Sincerely,

Robert C. Scalia, Director
Regional Office of CPD

Attachment

cc: Chuck Steele/FEMA
Richard Moore/HUD-SAO

Memorandum

U.S. DEPARTMENT OF
HOUSING AND URBAN DEVELOPMENT

TO : Ry Tanino, Room 3104 M/S 317
Environmental Officer

DATE: July 10, 1979

IN REPLY REFER TO:

FROM : Wes Edens, FIHM, SRO
Director of Engineering

SUBJECT: Skagit River Levee Draft EIS

On June 4, 1979, we hosted an interagency seminar to provide participants with a more complete understanding of Executive Order 11988. Bill Spurlock from the Seattle District of the U. S. Army Corps of Engineers participated in the seminar and obtained the necessary background to fully understand the implications of the Executive Order.

The seminar was conducted by Washington, D. C. personnel who have been actively involved in review of other agency regulations implementing the Executive Order. They organized the seminar on the basis of an eight step analysis process for decision making and/or review of other agency decisions. That process is summarized below:

EIGHT STEP DECISION MAKING PROCESS

1. Determine if action is in or affects a flood plain.
2. Involve public in decision-making process.
3. Determine if there is a practicable alternative.
4. Identify adverse impacts.
5. Mitigate adverse impacts.
6. Re-evaluate alternatives.
7. Announce and explain decision to the public.
8. Implement action with appropriate mitigation.

The following comments on the draft environmental impact statement are organized for reference to the eight step decision-making process:

1. The project is of such a nature that it must be located in the flood plain in order to serve its intended purpose. It is, then, site dependent and no alternative site outside the flood plain is appropriate.

2. Public involvement in the decision-making process is well documented in the draft Environmental Impact Statement.

3. Determination of a practicable alternative is the primary concern of the pre-authorization study, although we understand this project has been authorized by Congress for a number of years. The draft Environmental Impact Statement deals with practicable alternatives, including the "no action" option.

4. & 5. Step 4, Identification, and 5, Mitigation of adverse impacts, are interrelated and will be treated together.

Adverse Impact A, NFIP's One-Foot Rise Criteria Exceeded. The selected alternative encroaches on the flood plain and in several areas will cause stage increases of the 100-year flood well in xcess of one (1) foot, which is the greatest cumulative stage increase for all development permitted under the National Flood Insurance Program (NFIP) and, most significantly, under Executive Order 11988. Section 3(a) of the Executive Order requires that federal projects comply with standards and criteria of the National Flood Insurance Program as a minimum, unless it can be shown that the standards are demonstrably inappropriate and the facility will not endanger existing development or encourage future development which will result in harm to or within the flood plain. This is somewhat broad language and could not be applied to storage reservoirs, channel realignments or the like. The Federal Insurance Administration has held that it does apply to construction of levees, unless the project includes mitigation measures that will protect existing development from the adverse effects of the project. After studying your addendum to the draft Environmental Impact Statement, we conclude that the planned mitigation measures will protect xisting development to the greatest practicable extent from an additional degree of flood loss potential. Accordinagly, we believe the project is not in direct violation of Executive Order 11988.

Adverse Impact B, Perched Channel Aggrevates Future Flood Problems. Section 2.02.2 of the draft EIS, states that man's attempts to control the river with levees has reduced deposition on the alluvial flood plain with a resultant increased deposition on the channel bottom. Section 2.05.3 of the draft EIS states that past aggredation in the stream channel has been 2 to 4 feet during the last 50 years. Secton 4.04.1 states the aggrêdation will continue at the present rate with the project. At that rate aggrêdation would amount to 4 to 8 feet in the 100-year project life.

Section 4.04 also states that for the 100-year project life, the project design contains the following allowance for sediment deposition (aggredation):

River Branch	Location	Design Allowance for Aggredation
1. North Fork	Confluence	1.2 feet
	Mouth	1.1
2. South Fork	Confluence	1.1
	Mouth	0.5
3. Main Stem	Confluence	1.4
	Sedro Wooley	0.6

The design allowances for aggredation appear inconsistent with the 4 to 8 feet to be expected if the rate of deposition remains constant. The basis on which the adequacy of the design allowance was calculated should be stated for purposes of clarification.

The draft Environmental Impact Statement also indicates in Section 4.04.2 that continued levee raising will create a perched channel, with bottom higher than the flood plain, making it more difficult to maintain the integrity of the levee. This perched channel would cause several adverse impacts not specifically identified as such in the draft EIS. We believe they should be so identified and specific mitigation measures developed.

When the perched condition occurs and levee failure is experienced, the resulting flood damage is likely to be greater than if the event occurred under existing conditions. Velocities of water near the breach will be greater and the depth of ponding is likely to increase behind the levees due to the increased height of levees downstream. These are site specific adverse effects and value judgment must be made as to whether the overall project effect would become adverse on that account.

Secondly, the perched channel will raise the groundwater level adjacent to the levees necessitating local pumping of near by lands for farming. This procedure is already practiced to some extent in the area, however, the problem will become worse with continuing deposition in the channel and will limit the effectiveness of levees as a long term solution.

Aside from the aggredation problem, levees reduce the natural and beneficial values of the flood plain by preventing normal deposition of soil and nutrients on the land. No mitigation of this adverse impact is considered possible because the beneficial value is a side effect of the flooding that the project is designed to control.

Mitigation measures are however, possible for the adverse impacts associated with the channel aggradation. They would involve control of the aggradation to prevent further formation of a perched channel.

Federal Register, Volumn 43, No. 29-Friday, February 10, 1978, published "Flood Plain Management Guidelines for Implementing EO 11988". Step 5, beginning on page 6047 of that publication discussed the requirement to "minimize, restore, and preserve". We call your attention to this guidance because we believe it may be applicable to the adverse impacts of channel aggredation. Step 5B most strongly suggests that there is a requirement under the Executive Order to restore flood plain values that have been degraded by past actions.

Adverse Impact C, Project Directly Encourages Development. The proposed levees will directly encourage development of the flood plain. This is true of agricultural levees as well as urban levees. However, local zoning and building restrictions will tend to mitigate increases in damages from floods up to a return frequency of 100-years.

Adverse Impact D, Structures Require Human Intervention---. Section 1.08 of the draft EIS indicates that operations prior to and during floods consist of erecting the floodwall and operating closure structures. The floodway will be erected by use of cranes according to Section 4.04.4. The floodwall and closure structures clearly require human intervention and therefore normally would not qualify under NFIP criteria as a viable means of providing 100-year flood protection. Structures built behind the floodwall would be subject to flood proofing requirements and insuranace rates based on flood levels that would occur if the human intervention did not take place.

Step 6 in the decision making process would be to Re-evaluate Alternatives. There is no alternative to project location on the flood plain. However, there may be alternatives to the proposed construction and operation methods which would allow the project to accomplish the "Minimize Restore and Preserve" criteria of the Water Resources Council's guidelines on EO 11988. An alternative to the floodwall design would appear desirable in view of the Flood Insurance ramifications.

Step 7, Announce and Explain Decision to the Public. The standard Crops of Engineers procedure for accomplishing this are well respected.

Step 8, Implementation Action with Appropriate Mitigation, is inappropriate for comment at this time.

United States Department of the Interior

OFFICE OF THE SECRETARY

PACIFIC NORTHWEST REGION

500 N.E. Multnomah Street, Suite 1692, Portland, Oregon 97232

June 13, 1979

ER-79/427

District Engineer
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Sir:

We have reviewed the draft environmental statement for Skagit River, Flood Damage Reduction, Skagit County, Washington, and offer the following comments.

Since the project area does support anadromous fish runs, we recommend that detailed plans include measures to minimize turbidity and downstream migration of resuspended sediments and to avoid periods of critical anadromous fish use. Otherwise, the draft EIS adequately covers the interests of the Department of the Interior

Thank you for the opportunity to review and comment on this document.

Sincerely yours,

Charles S. Polityka

Charles S. Polityka
Regional Environmental Officer

United States Department of the Interior

IN REPLY REFER TO
8500 (22)

BUREAU OF LAND MANAGEMENT
Spokane District Office
Room 551, U. S. Court House
Spokane, Washington 99201

June 26, 1979

Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Sir:

We have reviewed the draft environmental impact statement for the Skagit River, Washington, and have one addition pertaining to Page 64-3.02.7 - Federal Programs, Projects, and Plans. The Spokane District of the Bureau of Land Management administers a large number of unsurveyed islands at the mouth of the Skagit River. These islands are presently being reviewed to determine if they have wilderness characteristics and should be so noted in this section.

Sincerely yours,

Roger W. Burwell
District Manager

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 443

JUN 27 1979

Colonel John A. Poteat
District Engineer
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Colonel Poteat:

We have completed our review of the Draft Environmental Impact Statement on the Skagit River levee improvements.

We are aware that the Corps of Engineers has intensively coordinated this project with the Federal and state resource agencies over the past year. The result of this effort is clear in the project design and proposed mitigation plans.

From the standpoint of the Environmental Protection Agency's areas of concern and expertise, we are rating this statement LO-1 (LO - Lack of Objections; 1 - Adequate Information). This rating will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, as amended.

We appreciate the opportunity to review this draft environmental impact statement.

Sincerely,

Alexandra B. Smith

Alexandra B. Smith, Chief
Environmental Evaluation Branch

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753-2800
Mail Stop PV-11

July 6, 1979

Mr. Sidney Knutson
U. S. Army Corps of Engineers
Seattle District
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

Thank you for the opportunity to comment on the draft environmental impact statement for the Skagit River flood damage reduction project. We have reviewed the EIS and offer the following comments for your consideration.

On page 19 of the statement you indicate that floodproofing requirements can be eliminated in areas with 100-year flood protection. These floodproofing requirements should be continued to provide protection from possible floods in excess of 100-year levels, or from possible piping or rupture of the dikes.

The final EIS should discuss the possibility of a set-back dike alternative. By placing the new dikes back from the existing dikes, there would be room for the river to meander and work within the dikes. The land within the dikes could be federally owned and leased for agricultural, recreational, or wildlife uses, otherwise more diking will eventually be required east of Sedro Woolley and a Sauk River dam may be needed.

The new 50-year flood protection in rural areas might increase the potential for development which in turn could result in extensive damage from future flooding.

Some consideration should be given to the possibility of compensating those outside the dike where there is an increased potential for flood damage.

In addition to review by the Department of Ecology, copies of the EIS were forwarded to other state agencies for their review. The State Parks and Recreation Commission and the Department of Transportation were the only agencies to respond and their letters are enclosed for your information. The Department of Transportation has expressed a desire to work with your

office on the feasibility of incorporating SR 20 into the levee system. The Department of Transportation should be contacted directly for input.

Thank you again for the opportunity to comment on the draft EIS. If you have questions, please contact the Environmental Review Section at 753-6892.

Sincerely,

Fred D. Hahn

Fred D. Hahn, Assistant Director
Office of External Affairs

FDH:as

Enclosures

cc: Earl Finn, Department of Fisheries
Gene Dziedzic, Department of Game
Jerry Probst, Department of Natural Resources
Dave Heiser, Parks and Recreation Commission
Bert Baron, Planning and Community Affairs Agency
Mike Mills, Office of Financial Management
Dave Kile, Department of Agriculture
Jeanne Welch, Archaeology and Historic Preservation Office
Malcom McPhee, Commerce and Economic Development Dept.
Forrest Wilcox, Department of Emergency Services
Russell Albert, Department of Transportation
Jake Fey, State Energy Office
Gloria Tarver, Dept. of Social and Health Services
Lorinda Anderson, Interagency Committee for Outdoor Recreation
Walt Bergstrom, Department of Ecology, S.W. Region
Steve West, Department of Ecology, N.W. Region
Barbara Ritchie, Department of Ecology, Environmental Review

STATE OF WASHINGTON
Dixy Lee Ray
Governor

WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane, Olympia, Washington 98504
206 753-5755

May 9, 1979

35-2650-1820
Draft EIS - Skagit
River, Washington
(E-1631)

Mr. Pete Haskin
Environmental Review Section
Department of Ecology
Olympia, Washington 98504

Dear Mr. Haskin:

The staff of the Washington State Parks and Recreation Commission has reviewed the above-noted document and finds that it will have no effect on properties under the management or control of the Washington State Parks and Recreation Commission.

Thank you for the opportunity to review and comment.

Sincerely,

David W. Heiser, E.P., Chief
Environmental Coordination

DWH/NAM:jc

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane, Olympia, Washington 98504 206/753-5755

June 28, 1979

35-2650-1820
Addendum to DEIS -
Skagit River, Washington
(E-1667)

Ms. Karen Northup
Environmental Coordinator
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Ms. Northup:

The staff of the Washington State Parks and Recreation Commission has reviewed the above-noted document and does not wish to make any comment.

Thank you for the opportunity to review and comment.

Sincerely,

David W. Heiser, E.P., Chief
Environmental Coordination

DWH/NAM:jc

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF TRANSPORTATION KF-01
Highway Administration Building, Olympia, Washington 98504 206/753-6005

May 23, 1979

Mr. Pete Haskin
Environmental Review Section
Department of Ecology, PV-11
Olympia, WA 98504

U. S. Army Corps of Engineers
Skagit River: Flood Damage Reduction
Draft Environmental Impact Statement

Dear Mr. Haskin:

We have reviewed the subject document and are pleased to note the recognition of the Department's planning for SR 20.

The selected route for SR 20 has not been determined yet. Once the route is selected, the Department will appreciate the opportunity to coordinate with the Corps on the feasibility of incorporating the route into the levee system.

If you have any questions, please call me at 753-3811.

Sincerely,

ROBERT S. NIELSEN
Assistant Secretary
Public Transportation and Planning

By: WM. P. ALBOHN
Environmental Planner

RSN:kar
WPA/WBH

cc: J. D. Zirkle
R. Albert
Environmental Section

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES
302 Sharon Avenue, Burlington, Washington 98233 206/755-0421

June 27, 1979

Mr. R.P. Sellevold, P.E.
Chief, Engineering Division
Department of the Army
Seattle District Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Sellevold:

The Washington Department of Fisheries appreciates the opportunity to review and comment on the U.S. Army Corps of Engineers' draft EIS on the Skagit River Levee and Channel Improvement Project. The Skagit River is the single largest producer of salmon in the Puget Sound region and the Department is vitally interested in maintaining the present level of salmon production. Basic to this is maintenance of existing spawning and rearing habitats. With these facts in mind, we have reviewed the EIS and our comments are as follows:

Skagit River, Washington - Summary

Page 1, 2a.

Description to fish and wildlife, such as loss of habitat, will be more than temporary.

Project Description

Page 3, paragraph 2 and Page 9, photo 1-4

Aggregate concrete blanket rather than riprap is proposed for the left bank at Mt. Vernon. There must be compensation for loss of rearing habitat (USFWS report to the Corps, Page 14, paragraph 2).

Page 4, paragraph 1

Incorporation of fish passage design criteria at Fisher Slough is appreciated.

Page 7, paragraph 1

8.3 of the total 50 mile project length will be riprapped. Riprap was to be designed to provide fish habitat. This was not mentioned in the text and should be included.

Page 15, paragraph 1

The maintenance programs must be approved by all involved agencies. If parts of the program are not acceptable, there should be provisions for alteration through mututal agreement. Operation and maintenance work within the river will require a hydraulics permit issued jointly by the Washington Departments of Fisheries and Game.

Environmental Setting Without the Project

Page 34, paragraph 1

The Samish River and Samish Hatchery support an important commercial fishery primarily for fall chinook.

Page 35, paragraph 1

The Swinomish Tribe fishes primarily with gill nets in Skagit Bay and the lower river. In addition, the Upper Skagit Tribe fishes with gill nets as far as Faber's Landing, above Concrete.

Page 37, paragraph 3

If aggradation continues, either the dikes will have to be raised or the channel dredged. Further raising the dikes does not appear feasible and dredging would be very disruptive to the ecosystem. This problem should be addressed in the EIS.

Page 51, paragraph 2

The principal limiting factor to fisheries is the amount of available rearing area, which is directly related to cover. While sewage outfall, agricultural practices and siltation can affect fish production, they are not major factors within the project area.

Improper sand mining practices can leave potholes. However, if done according to permit provisions there will be no problems.

Fluctuating flows resulting from upriver hydro-electric dams are the primary cause of stranding. Stranded juvenile fish are also consumed by predators.

Relationship of the Proposed Project to Land Use Plans

Page 65, paragraph 3

The Corps of Engineers' project will be affected by surges from

both the Seattle City Light and Puget Sound Power and Light projects.

Probable Impacts of the Proposed Actions
on the Environment

Page 66, paragraph 3

As a result of sedimentation and channel aggradation, what will happen after the 100 year economic life of the project?

Page 75, paragraph 3

"Continued levee raising will eventually permit the channel bottom to become higher than the flood plain, in which case the integrity of the levee will become more difficult to maintain." This statement further emphasizes the need to assess what will happen after the life of the project.

Page 77, Water Quality

Construction procedures must be designed to minimize siltation. Procedures should be reviewed to ensure all precautionary measures are being taken.

Page 87, Habitats

Revegetation and maintenance programs must be more than "paper" programs. They must mitigate for losses of shore cover. Plantings must be made at a time when success is assured and proper care given. The mere planting is not acceptable in view of the losses associated with establishing natural cover. The revegetation plan, along with the Operation and Maintenance plan must be established and approved through all involved groups.

Page 93, paragraph 2

Project impact will affect rearing as well as migrating juvenile anadramous fish. Loss of cover will have an equal impact on resident fishes.

Page 94, paragraph 2

The loss of cover along one bank of the lower North Fork and on Tom Moore and Freshwater Sloughs still represents a loss and is not a compensation.

We feel the Corps has tried to minimize the impact of this project, while still accomplishing the objective of flood control. The losses of shore cover while not completely eliminated have been greatly reduced.

Sincerely,

William Spaeth

Gordon Sandison
Director

ei

STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 Olympia, WA 98504 206/753-5700

June 28, 1979

Department of The Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

DRAFT ENVIRONMENTAL IMPACT STATEMENT:

Skagit River, Washington

Gentlemen:

Your document has been reviewed by our staff as requested; comments follow:

Areas of Conflict - 4:06.25 - Construction in Gages and Fisher Sloughs

Construction of 1700 feet of new channel will affect habitat for fish and wildlife. The statement that no fish are known to inhabit the slough is not true. There are spiny ray - principally perch, bass, and bullhead.

In terms of wildlife, aside from the waterfowl mentioned, there would be the water-oriented furbearing species such as muskrat and mink - no beaver are known to be present.

Addendum to DEIS, May 1979 - Page 8 - Impacts to Fish and Wildlife

The presence of some steelhead and cutthroat trout should be included on the East Fork of the Nookachamps.

Adverse Secondary Impacts

It is stated on page 8 that the trumpeter swan winters at Beaver Lake. In recent years, the amount of swan usage in the Clear Lake - Beaver Lake area has been more prevalent in Clear Lake. Generally, however, this only occurs during periods of prolonged cold, when area lakes and streams freeze over. During these periods, swans have been noted more often at Clear Lake.

It is additionally stated on page 30, DEIS, that Barney Lake, Beaver Lake and Clear Lake are important winter feeding areas for the trumpeter swan. It should also be mentioned that the swan use DeBay's Slough and portions of the lower Nookachamps as well as many of the local pasture lands as feeding areas. The important point to make is that it is not just Barney Lake, or just the three lakes that are important to the wintering swans. The whole Nookachamps complex; lakes, streams, sloughs, and pasture lands are integral parts of wintering habitat.

We hope our comments have been useful. Thank you for the opportunity for review.

Very truly yours,

THE DEPARTMENT OF GAME

Jerry Smith, Applied Ecologist
Environmental Affairs
Habitat Management Division

JS:mjf

cc: Regional Agency
Regional Manager

Skagit Conservation District

2121 E. COLLEGE WAY MOUNT VERNON, WASHINGTON 98273

June 27, 1979

Mr. Sidney Knutson, P.E.
Asst. Chief Engineering Division
Department of Army
Seattle District Corps of Engineers
P.O. Box C 3755
Seattle, Washington 98124

Dear Sir,

In regards to the Draft Environmental Impact Statement for the proposed Lower Levee Channel Improvement Project, we offer the following comments:

1. Community Cohesion, Page - 72

   We do not feel there is a difference in attitude between urban and rural residents that disrupt the cohesiveness of the proposed project.

   We do feel however, there exists today a lack of support for Alternative 3 E in the Cook road - Samish Basin area due to several reasons. Among those reasons are; lack of understanding of the total project; assurance that added water won't complicate flooding in the Samish Basin; lack of offered compensation to farmers near the throat of the erosion control sills; and the lack of site specific information available to the residences that will be directly affected.

2. The Project Area, Interior Drainage, Page - 76

   Drainage of our agricultural land is very important in Skagit County. Several individual drainage systems will be bisected by the proposed project. Adequate recognition and treatment of each system should be addressed in the document. Many of these systems were installed with Federal assistance, both financially and technically and represent a sizeable investment to the farmers.

3. The Project Area, Priarie Farmland, Page - 84

   The recognition and future treatment of prime agricultural lands is of grave importance to the economic well being of Skagit County. We cannot afford to loose anymore farmland than is absolutely necessary.

   Urban pressures that will be exerted on farmland protected from 100 year floods deeply concerns us.

In closing, the Skagit Conservation District Board of Supervisors have always felt that better flood control was badly needed for Skagit County. From the Avon By-Pass to the Sauk River Dam, and now the Lower Levee Channel Improvement Project,

Continued on page 2

2121 E. COLLEGE WAY MOUNT VERNON, WASHINGTON 98273

this Board has sought to achieve the best alternative available to protect Skagit County from devastating floods.

We now feel we could support an alternative that will give Skagit County better flood protection but people and property must not be left with a worse flood situation than prior to the project. If Alternative 3 E can be made to do this we will support the project.

Thank you for the opportunity to comment on the project.

Sincerely,

Robert Hulbert, Chairman
Skagit Conservation District Board of Supervisors

Lyle Wesen
Cliff Magin
Jess Knutzen
David Youngquist

SKAGIT SYSTEM COOPERATIVE

Swinomish • Upper Skagit • Sauk-Suiattle

26 June 1979

Ms. Karen Northup, Environmental Coordinator
Department of the Army
Seattle District, Corps of Engineers
PO Box C 3755
Seattle, Washington 98124

Dear Ms. Northup:

I have received the draft Environmental Impact Statement and June 11 Addendum for the Skagit River levee project. The Corps has maintained communication with the Skagit System Cooperative through the planning stages of the project and my earlier comments are included in the DEIS Appendix 2-44 and 2-56.

The primary interest of the SSC is the Skagit fishery. Many of the project's potentially adverse impacts to the fishery were eliminated by changes made in the planning phases. The remaining potentially adverse impacts have been reduced through the Corps' cooperation with the SSC.

It is agreed that those impacts will be partially mitigated through revegetation efforts and culvert installations in Center Slough in the Wildlife Recreation Area. The probable net loss over the life of the project is an unquantified reduction in juvenile fish rearing habitat.

The SSC is still interested in additional fish habitat improvement features if opportunities exist within the project area.

The SSC wishes to be notified of any changes from the project plan as detailed in the DEIS and June 11 Addendum. Overall, the proposed plan is a project of considerable magnitude, with apparent fishery-related impacts reduced to a low level.

Sincerely,

Steve Fransen

Steve Fransen
Biologist

Box 368 • Reservation Road • LaConner, Washington 98257 • Phone (206) 466-3423 or 466-3184

MICHAEL D. WALKER, ATTORNEY AT LAW

610 BELLINGHAM TOWERS • BELLINGHAM, WASHINGTON 98225 • (206) 671-2200

June 28, 1979

Forrest Brooks, Study Manager
U. S. Army Corps of Engineers, Seattle District
P. O. Box C-3755
Seattle, WA 98124

Dear Mr. Brooks:

The purpose of this letter is to provide the Corps of Engineers with written comments in response to its proposed plan for levy and channel improvements in the Skagit River system. This letter is written on behalf of numerous residents in the Nookachamps area, all of whom will be significantly affected by the Corps' present proposal as embodied in Alternative 3E and described in the public brochure prepared for the June 19, 1979 meeting on Draft #2 of the Environmental Impact Statement.

Both in the public brochure prepared for the meeting and at the meeting itself, the Corps publicly stated that Alternative 3-E will have a significant environmental impact on the Nookachamps area in that it will cause induced flood damage to the area. The residents of the Nookachamps area are rightfully concerned about the damages that they will suffer personally and in their businesses as a result of the induced flooding.

The June 19, 1979 meeting was well attended by many of the residents of the area. Near the end of the meeting, the Nookachamps residents were encouraged by Colonel Poteats' statements that his staff will be specifically directed to meet with each and every landowner in areas where induced flood damage would occur. The residents were further encouraged by his statements that no work of any kind would be begun on the project without first identifying specifically each and every damage that would occur and therefore preventing the damage through structural and/or non-structural measures.

In order that the final environmental impact statement will adequately reflect the concerns of these residents, we would request that the Corps fully consider all of the questions below prior to submitting the general design memorandum and prior to the introduction of any legislation in Congress:

1. Will Corps of Engineers staff meet with each and every landowner in the Nookachamps area to determine what specific damage would occur as a result of induced flooding?

2. After having met with Nookachamps residents to determine consequential damages, will the Corps outline in detail what structural and non-structural steps it will take to prevent economic loss as a result of induced flooding? Will these structural and non-structural steps included in the general design memorandum be included in the legislative authorization bill?

3. To the extent that structural measures to prevent induced flooding are not feasible, will the Corps compensate each and every landowner fully for each and every economic loss that will arise out of induced flooding?

4. Has the Corps taken the 1974 Public Works Act into consideration in formulating its plan to prevent induced flooding and, in the alternative, in formulating its plan to compensate affected landowners.

5. After meeting with residents who will be affected by induced flooding, does the Corps still take the position that the average annual induced damages as a result of proceeding with Alternative 3E will be only $25,000? At the June 19, 1979 meeting, Corps staff stated that non-structural measures will be paid for with 20% local monies and 80% federal monies. Regardless of the source of the monies, does the Corps guarantee that all losses suffered by affected owners will be paid for in their entirety prior to beginning the project?

6. Does the Corps have exact figures on what will be the increased water levels in the Nookachamps area at a 10-year event, a 25-year event, a 50-year event, and a 100-year event? What are those increased water levels in the Nookachamps area as a whole? What are those levels with regard to each individual landowner in the Nookachamps area?

7. Does alternative 3E contemplate Congressional funding to compensate for damage that will occur to farm improvement such as livestock, barns, roads, homes, milking operations, and electricity?

8. Does Alternative 3E contemplate the payment of flowage easements to any of the residents of the Nookachamps area? If so, on what basis will these flowage easements be computed and when will they be paid?

9. Has the Corps of Engineers considered what affect the construction of a highway between Sedro Woolley and Mount Vernon on the dike would have in terms of increased water flows to

the Nookachamps area? If so, what are the increased water flows which would be caused by the construction of this highway and who would pay for the increased damages?

10. In past floods in other areas similar to the Nookachamps area, farmers have lost their whole livestock operations within minutes as a result of the drowning of the livestock. What attention has the Corps given to this possibility in the Nookachamps area? What steps, if any, does the Corps anticipate taking to prevent this possibility from happening? Has the Corps considered the possibility of insuring the farmers against catastrophic damage that might occur as a result of flooding in the Nookachamps area?

11. Prior to submission of legislation, will the Corps do a complete economic analysis of the farming operations in the Nookachamps area so that they will have an adequate base upon which to compensate farmers for damages that cannot be prevented by structural measures.

12. What procedures, if any, must individual landowners in the Nookachamps area follow in order to notify the Corps of specific damages they will suffer as a result of the induced flooding that will occur?

13. After the December 20, 1978 Workshop, the Skagit County Commissioners requested the Corps to study in more detail the flooding problems of the Nookachamps. In response to the Commissioners' request, what further studies did the Corps undertake and what did those studies reveal?

14. Corps Manager Vernon Cook has stated, "No matter which alternative the County Commissioners decided to pursue, the Nookachamps will get more water." Would the Nookachamps get more water under the Sauk containment alternative?

15. If it were not for the existence of the Wild and Scenic Rivers Act, would the Corps have recommended the Sauk Containment Alternative? Please explain.

16. What factors have led the Corps to conclude that flood prevention in the Nookachamps area is not cost effective? Please outline in detail all factors considered.

17. According to Colonel Poteats' statements at the June 19, 1979 meeting, Alternative 3E has been modified to include structural and non-structural measures to alleviate the induced flooding and, where possible, provide for flood damage reduction measures for improvements on the land in the Nookachamps Valley. Please outline in detail the total cost the Corps anticipates in providing these structural and non-structural measures.

Finally, please outline in detail how these costs will be allocated.

Having in good faith attempted to apprise the Corps about their concerns about the damage they will apparently suffer if the Corps proceeds with Alternative 3E, the residents in the Nookachamps area now submit this letter in the hopes that the Corps will do everything in its power to prevent flood damage where at all possible and to fully compensate each and every landowner for the risks they will take to benefit all of the residents of Skagit County.

Sincerely,

Michael D. Walker

MICHAEL D. WALKER
Attorney for NOOKACHAMPS VALLEY FLOOD DEFENSE ORGANIZATION

cc: Larry Kunsler
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Mount Vernon, WA 98273

Larry Gadbois
2046 Mudlake Rd.
Mount Vernon, WA 98273

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Ken Johnson
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Mount Vernon, WA 98273

Skagit Valley Herald
Sedro Woolley Courier-Times
Congressman Al Swift
Senator Henry Jackson
Senator Warren Magnuson
Bud Norris, Chairman
Skagit County Commissioners

May 30, 1979

Sidney Knutson
Assistant Chief, Engineering Division
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

Dear Mr. Knutson:

The Draft EIS on the Skagit River project is a pleasure to read. The text is well-organized and easy to follow. The photos, plates, and figures are a big help in understanding the various alternatives. Like the public meetings the Corps of Engineers has held on this project, the Draft EIS shows a real effort to communicate.

The Draft has many good points and it covers several impacts in sufficient depth so that those impacts are adequately presented. Unfortunately, the Draft is not adequate in three fundamental areas:

1. Level of flood protection
2. Prime farmland
3. Flood plain management (E.O. 11988)

1. Providing a 100-year flood level of protection for urban areas of Mt. Vernon and Burlington is a basic assumption for several of the alternatives. The estimate of how much water is in a 100-year flood is basic to project design and to cost/benefit comparisons. The entire project and public safety hinge on the estimates and predictions about flooding, but the Draft says little on this subject. What method was used to calculate the 100-year flow, and what is the margin of error in the estimate? The Draft should present some data or source of reference so that the interested reader can assess independently whether the data base and methods of calculations are sound, and whether the proposed action does in fact provide 100-year flood protection in urban areas.

2. On the issue of prime farmland, the Corps of Engineers can be commended for at least showing more insight and concern than the Soil Conservation Service. The Draft EIS

acknowledges the proposed project may accelerate urban development on prime farmland currently zoned as urban. Although the Draft does not adequately assess the full scope and force of the adverse impact on prime farmland, it does recognize that the secondary effect of inducing urbanization is a potentially significant issue. In contrast, the Soil Conservation Service (letter of 7/7/78 on page 2-14 of Draft EIS) put blinders on and chose to say nothing about the secondary effects on prime farmland.

In any case, the Draft EIS does not adequately assess the impact on prime farmland. The proposed project will provide urban protection (100-year) to 11,800 acres of land. It appears (Fig. 4-1 in Draft EIS) that at least half of this acreage is in actual agricultural use right now. In other words, the proposed project will provide urban protection to a land base twice as large as is in current urban use. Although the current zoning allows urban use in only part of 11,800 acres, zoning can be changed. And it is this very project which will provide the impetus and the pressure for rezoning on a massive acale.

In addition, rural protection (50-year) will be provided to 40,000 acres of land which is dominantly agricultural in use. With this improved flood protection, pressure for non-agricultural development can be expected to increase. The 50-year protection of the proposed project will mean lower floodproofing costs.

The Draft EIS needs substantial revision in order to adequately assess the potential loss of several thousand acres of prime farmland for the 51,800 acres which would receive 50- or 100-year protection.

3. The proposed project is a clear violation of Executive Order 11988 on Floodplain Management which requires Federal agencies "to avoid direct and indirect support of floodplain development wherever there is a practical alternative...."

The project significantly increases the flood protection on 51,800 acres of floodplain (50-year protection to 40,000 acres, and 100-year protection to 11,800 acres). Increased flood protection will lead to increased development incompatible with floodplain management.

Despite past, present and some future floodplain development (even if the project is not built), the Federal government does not have to contribute to irrational, costly development nor does it have to protect those who chose to live dangerously. The alternative of using zoning and floodproofing, that is, the present condition, is practical, and in the long term will have less impact on safety and flood damage than the proposed project.

The statement in the Draft EIS (sec. 3.02.06) that "the extent of existing floodplain development will not be significantly altered as a result of the proposed project" is unjustified and goes against common sense and past experience, both local and national. Certainly the elimination of floodproofing costs on 11,800 acres and the reduction of floodproofing costs on an additional 40,000 acres provides economic incentive for extensive floodplain development. Pressure to change zoning and land use can be expected to increase floodplain development. The impact of the project will be to provide unequal levels of protection to different parts of the Skagit River floodplain and delta. Some areas will remain with less than 10-year flood protection, as they now have; some areas will get 50-year flood protection; and some will get 100-year flood protection. It is a recipe for poor floodplain management for the Federal government, on one hand, to give part of the flood plain 100-year flood protection and thereby give a significant boost to floodplain development, while on the other hand leaving the rest of the floodplain with a patchwork of lesser protection. The escalating and vicious cycle inevitably follows: increased development throughout the floodplain; increasing flood-damage; calls for more structural measures to increase flood protection; new structures built which increase flood protection to some degree; then more development, and so on.

The issue is whether a proposed alternative encourages or discourages unwise floodplain development. All the structural alternatives move toward increasing floodplain development, and consequently to the long-term worst consequences. In contrast, by continuing the present conditions the Federal government will not be encouraging piecemeal development and costly floodplain management.

Because of the serious deficiencies in regard to the interpretation of E.O. 11988 and to assessing the impact on land use, particularly prime farmland, the Draft EIS is not adequate. These issues and impacts need to be developed more fully and evaluated more objectively.

Regardless of the outcome of the impact assessment process, the Draft EIS will serve as a valuable reference for planning and resource information on the Skagit River.

Thomas Collins

Thomas Collins
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Sedro Woolley, Washington 98284