STUDYGRAM

DECEMBER 1978

SKAGIT RIVER LEVEE
CHANNEL IMPROVEMENTS

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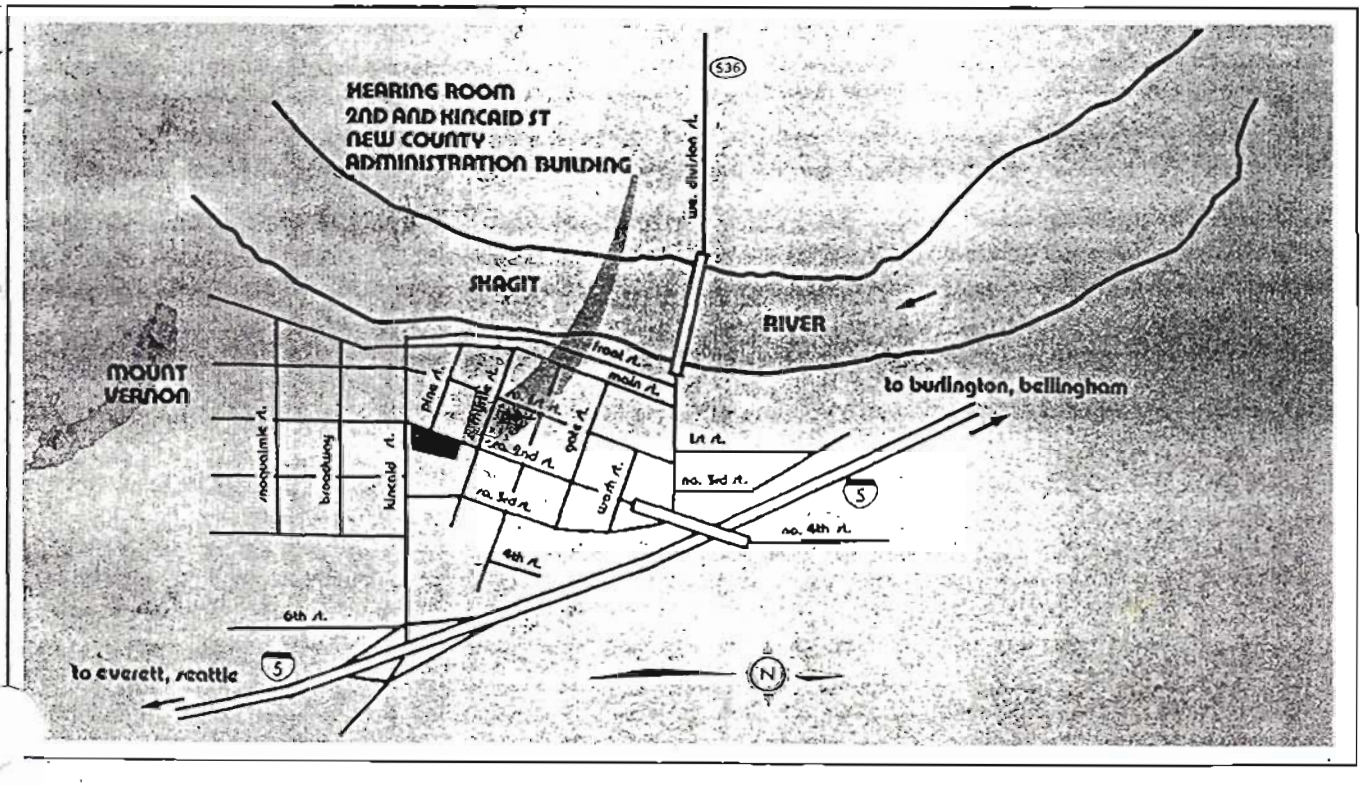
PUBLIC WORKSHOP

WHERE:
HEARING ROOM
NEW COUNTY ADMINISTRATION BUILDING
2ND AND KINCAID ST
MOUNT VERNON, WA.

WHEN:
WEDNESDAY
20 DECEMBER 1978
7:30 P.M.



WHY THIS WORKSHOP ?

The Seattle District, Corps of Engineers, is holding a public workshop in Mount Vernon at 7:30 p.m. on Wednesday, 20 December 1978 , in the Hearing Room on the ground level of the New County Administration Building. At this workshop, we will inform the public about the status and progress of our studies on the Skagit River Levee and Channel Improvement Project and provide a means for public input.

WHAT IS THE BACKGROUND OF THE PRESENT CORPS STUDY ?

Following extensive flooding in 1959, Congress in 1960 asked the Corps of Engineers to study the Skagit River Basin. In 1966, the Corps of Engineers recommended and Congress authorized improvements to the existing levee system downstream of the railroad bridge at Mount Vernon. After further studies in the 1970's, the Corps of Engineers recommended and Congress authorized in 1977 flood control storage in Upper Baker Dam. This storage was available last winter and the final agreement with Puget Sound Power and Light is currently being negotiated.

The purpose of our present study is to review the project which was recommended and authorized in 1966 and determine whether that project should be modified because of changed criteria or conditions. We are currently scheduled to complete a project report (General Design Memorandum) and environmental impact statement in the spring of 1978.

WHAT HAS HAPPENED SINCE THE PUBLIC MEETING ?

Since the March 1978 public meeting, the Corps of Engineers has been developing detailed technical data to use in selecting a plan. We have also evaluated the public input received both at and following the public meeting. Most of the comments indicated support for developing further information about Alternative 3 - Levee and Channel Improvements and Urban Levees. In subsequent months, we have been developing additional hydrologic, hydraulic, environmental, economic, geologic, and design information. To better analyze alternative 3, we divided it into five separate alternatives to include different combinations of urban levees. Information on each of these is summarized in this studygram.

WHAT WILL HAPPEN AT THE WORKSHOP?

At the workshop, we will update the public on the status of our studies. This will give YOU, THE PUBLIC, an opportunity to express your concerns. We will discuss new information developed by our study since the public meeting and provide you and other interested parties a means to comment on our study and suggest possible modifications. You may use the sheet in the back of this studygram for this. Cut or turn it out, fold, staple, and mail it back to us. We pay the postage. YOUR COMMENTS ARE IMPORTANT! Please share them with us. Comments can also be turned in at the public workshop or you may write or telephone (see cover) the Skagit Basin Study Manager, Mr. Forest Brooks, with comments or questions.

WHAT WERE THE PRELIMINARY ALTERNATIVES ?

In the preliminary phase of the study, we considered elements of the Skagit County comprehensive flood control plan to determine whether any of these should be combined with the plan which was authorized in 1966. The preliminary array of alternatives included measures such as levee and channel improvement, high urban levees, upstream storage, and floodflow diversion, as well as the option of doing nothing. These alternatives were displayed in the public brochure which was distributed prior to the March 1978 public meeting. They are briefly summarized on pages 4 and 5 of this studygram. The consensus at the public meeting was that current study efforts should be concentrated on alternatives 1, 2, and 3. Recently, Congress enacted and the President signed legislation adding portions of the Skagit, Sauk, Cascade, and Suiattle Rivers to the National Wild and Scenic River System. This action restricts upstream storage on the Sauk as presented in alternatives 4 and 6. Consequently, our efforts since the public meeting have centered on evaluating a levee system from Sedro Woolley to the mouths that would involve lower rural levees protecting agricultural lands and higher urban levees protecting the towns of Mount Vernon, Burlington, and Sedro Woolley.

ALTERNATIVE 1

DO NOTHING

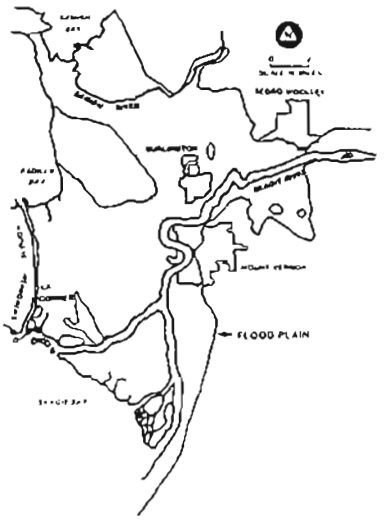
DESCRIPTION: No new action would be taken for flood damage reduction through either structural or non-structural means. Development on the flood plain would be restricted through existing zoning. Flood proofing of future structures would be required as part of a flood insurance program that would indemnify property owners against losses. Undeveloped lands in the flood plain could be preserved for parks and open space.

Implementation costs.

Federal	Flood plain information studies Flood insurance studies
Washington State	- Zoning, land purchase,
Skagit County	and park development
Cities	
Individuals	- Floodproofing

Annual management costs.

Federal	insurance premiums subsidy, emergency operations
Local	administration and maintenance of parks and zoning, emergency operations
Individuals	floodproofing maintenance, insurance premiums



ALTERNATIVE 2

LOW LEVEES

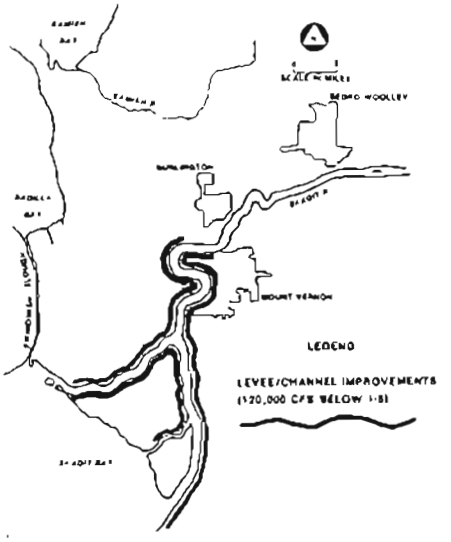
DESCRIPTION: Involves raising and strengthening the existing levee system from the mouths of the Forks upstream to the railroad crossing and improving the hydraulic capacity of the North Fork and Freshwater Slough so that the safe channel capacity downstream from the railroad bridge is 120,000 c.f.s. Development on the flood plain would continue to be restricted through existing zoning. The existing flood warning system would provide flood forecasts and emergency information.

Implementation costs.

Federal	$15,100,000 (1966 report updated to
Local	$ 560,000 1977 prices)

Annual management cost.

Federal	None
Local	$15,000 (in addition to present costs)



ALTERNATIVE 3

RURAL AND URBAN LEVEES

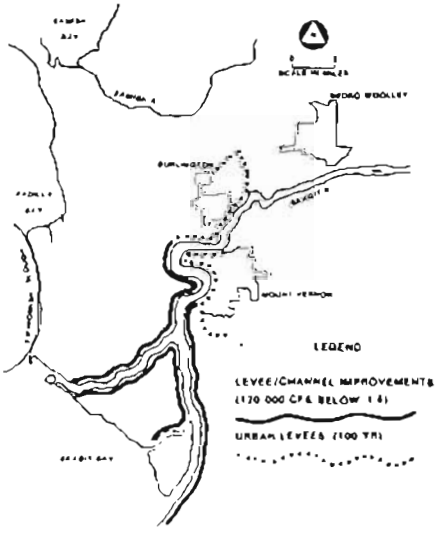
DESCRIPTION: Includes alternative 2 and in addition would provide a high degree (100-year) of flood protection to the urban area of Burlington and Mount Vernon by a high levee system. Flood plain management would continue to be required for those areas lying outside the high levees. This would include zoning, flood proofing of future structures, the flood warning system, etc. Undeveloped lands could be used for parks and open space.

Implementation costs.

Federal	$27,000,000 - 53,000,000 (preliminary
Local	$ 3,000,000 - 7,000,000 estimates not based on detailed studies)

Annual management costs.

Federal	None
Local	$50,000 - 70,000



ALTERNATIVE 4

DAM , RURAL AND URBAN LEVEES

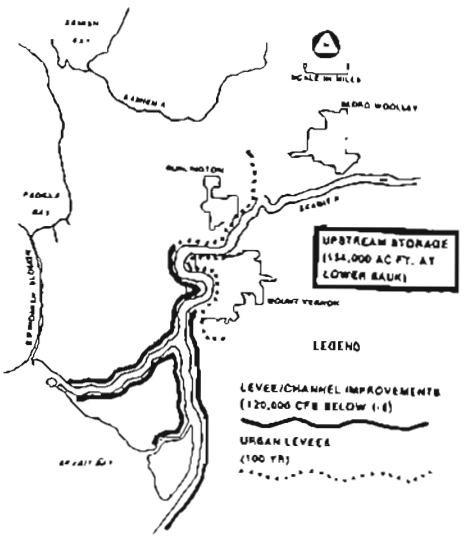
DESCRIPTION: Includes alternative 2 and, in addition, upstream storage of 134,000 acre feet would be provided by a dam on the Sauk River and a high levee system would provide a high degree of flood protection (100-year) to the urban areas of Burlington and Mount Vernon. Flood plain management would continue to be required for those areas lying outside the high levees. This would include zoning, flood proofing of future structures, the flood warning system, etc. Undeveloped lands could be used for parks and open space. Upstream storage on the Sauk River would conflict with "Scenic" designation.

Implementation costs.

Federal	$175,000,000 - 225,000,000	(preliminary
Local	$ 3,000,000 - 6,000,000	estimate-not based on detailed studies)

Annual management costs.

Federal	$500,000
Local	$ 50,000 - 70,000



ALTERNATIVE 5

BYPASS, RURAL AND URBAN LEVEES

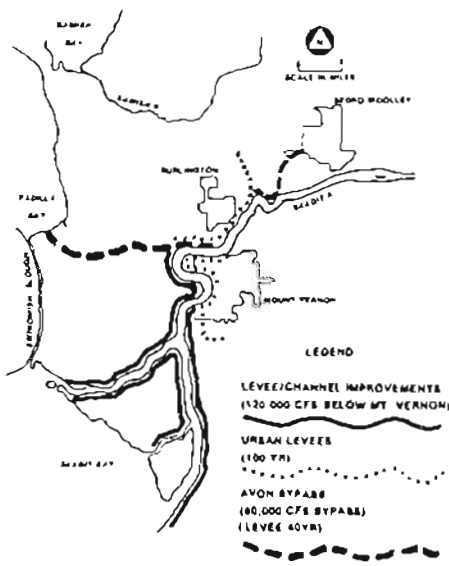
DESCRIPTION: Includes alternative 2 and, in addition, the Avon Bypass and a high levee system to provide a high degree of flood protection (100-year) to the urban areas of Burlington and Mount Vernon. The existing levee system would be extended to Sedro Woolley. Flood plain management would continue to be required for those areas lying outside the high levees. This would include zoning, flood proofing of future structures, the flood warning system, etc. Undeveloped lands could be used for parks and open space.

Implementation costs.

Federal	$70,000,000 - 90,000,000	(preliminary
Local	$15,000,000 - 20,000,000	estimate-not based on detailed studies)

Annual management costs.

Federal	None
Local	$150,000 - 200,000



ALTERNATIVE 6

DAM, BYPASS, RURAL AND URBAN LEVEES

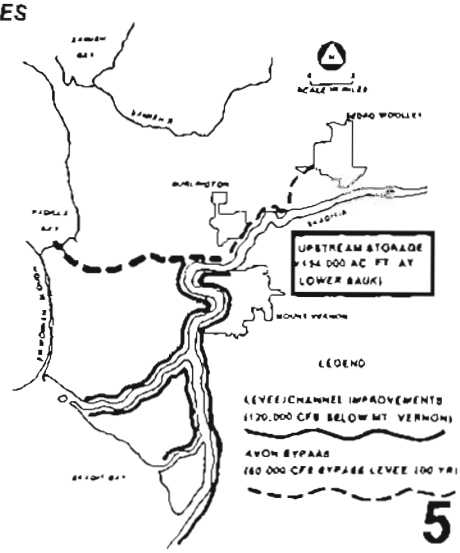
DESCRIPTION: Includes alternative 2 and, in addition, the Avon Bypass and upstream storage of 134,000 acre feet on the Sauk River. The existing levee system would be extended to Sedro Woolley. Since about 100-year flood protection would be provided to the entire flood plain downstream of Sedro Woolley most of the restrictions would no longer be required. Undeveloped lands could be used for parks and open space. Upstream storage on the Sauk River would conflict with "Scenic" designation.

Implementation costs.

Federal	$200,000,000 - 250,000,000	(preliminary
Local	$ 14,000,000 - 18,000,000	estimate-not based on detailed studies)

Annual management costs.

Federal	$500,000
Local	$120,000 - 160,000



WHAT ARE THE DETAILED ALTERNATIVES?

In the detailed phase of the study, we have continued to consider alternatives 1, 2, and 3. Alternatives 1 and 2 are the same as shown in the March 1978 public brochure and as summarized on page 4. To better analyze the possible combinations of urban and rural levee protection, alternative 3 has been divided into five separate alternatives: 3A, 3B, 3C, 3D, and 3E.

- Alternative 3A involves urban levees protecting central/south Mount Vernon, west Mount Vernon, River Bend/Riverside, and Burlington/Gages Slough with other areas downstream of Burlington provided rural levee protection
- Alternative 3B would be the same as 3A with additional urban protection for Avon.
- Alternative 3C would be the same as 3A with additional urban protection for the area northwest of SR20 between Burlington and Sedro Woolley.
- Alternative 3D would be the same as 3A with the additional urban protection provided by both 3B and 3C.
- Alternative 3E would be the same as 3B with the addition of a control weir between Burlington and Sedro Woolley to limit the overflow to the Samish River Valley to the same peak and volume experienced under existing conditions. This would provide rural levee protection to the Samish overflow area.

The following section of this studygram describes the detailed alternatives that provide urban protection around the cities and rural protection for the agricultural land. Each alternative is presented on a separate page, including information on its cost and effects.

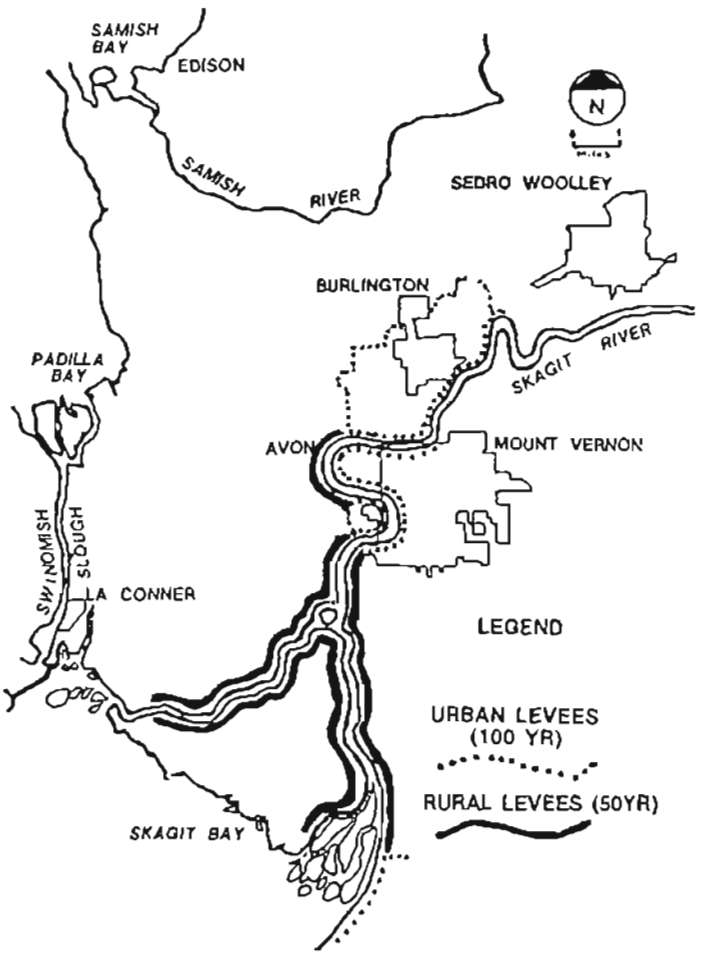
WHAT DO THE LOCAL COSTS CONSIST OF?

In general, for local flood damage reduction measures such as levees, the local government agency that sponsors the project (in this case Skagit County) is required to (1) provide all land required for the project, (2) pay for all alterations or relocations of buildings, utilities, roads, etc., (3) pay half the costs of specific recreation features, (4) hold the United States free from damages due to the work and, (5) operate and maintain the project after completion. Generally, the major component of the local costs is the value of the land required for the project. On the Skagit Project the land value represents about 40% of the local costs. However, much of the land is currently in public ownership by the Diking Districts, Skagit County and the State of Washington and the County will not have to actually spend any funds to acquire easements on these public lands although their value is shown as part of the local costs. The remainder of the local costs is divided between the relocation of roads along the levee alinement representing about 35% of the local costs and other relocations representing the remaining 25% of the costs. The cost estimates shown are based on detailed studies but still must be adjusted to account for project details (i.e., addition of costs for specific recreation items etc.).

ALTERNATIVE 3A - RURAL AND URBAN LEVEES

Description: This alternative would involve improving the existing levee system to raise the level of protection for rural land to 50-year and for urban land, including Burlington and west Mount Vernon on the right bank and Mount Vernon on the left bank. The levee design would include allowances for wave action, superelevation, and future sedimentation. Rural levees would have a freeboard (factor of safety) of 2 feet and urban levees 3 feet. Drainage outlets would be modified as required. Flood plain management would still be required for areas outside the urban levees, including zoning, flood warning system, etc.

Implementation Costs		Annual Management Costs	
Federal	$35,200,000	Federal	- none
Local	$10,400,000	Local	$62,000



Effects:

Flood Damage Reduction: 34,900 acres of land would be provided rural protection (50-year), and 6,600 acres of land would be provided urban protection (100-year). The project would raise 100-year water surface elevations in the Samish overflow area by about one foot east of I-5 and ½ foot west of I-5. The effect would be negligible in the Nookachamp-Clear Lake area.

People: Residents of the Skagit delta would experience a reduction in annual flood damages and hazards to life and property, with those in Burlington and Mount Vernon receiving a significant reduction.

Land: 6,600 acres of flood plain land provided a high degree of protection could be more intensively developed.

Recreation: Increased recreational opportunities are possible with access and minimal improvements as part of the project and future park development by local interests along or adjacent to the levee.

Transportation: Road, highway, and rail traffic would continue to be disrupted during floods except in Burlington and Mount Vernon.

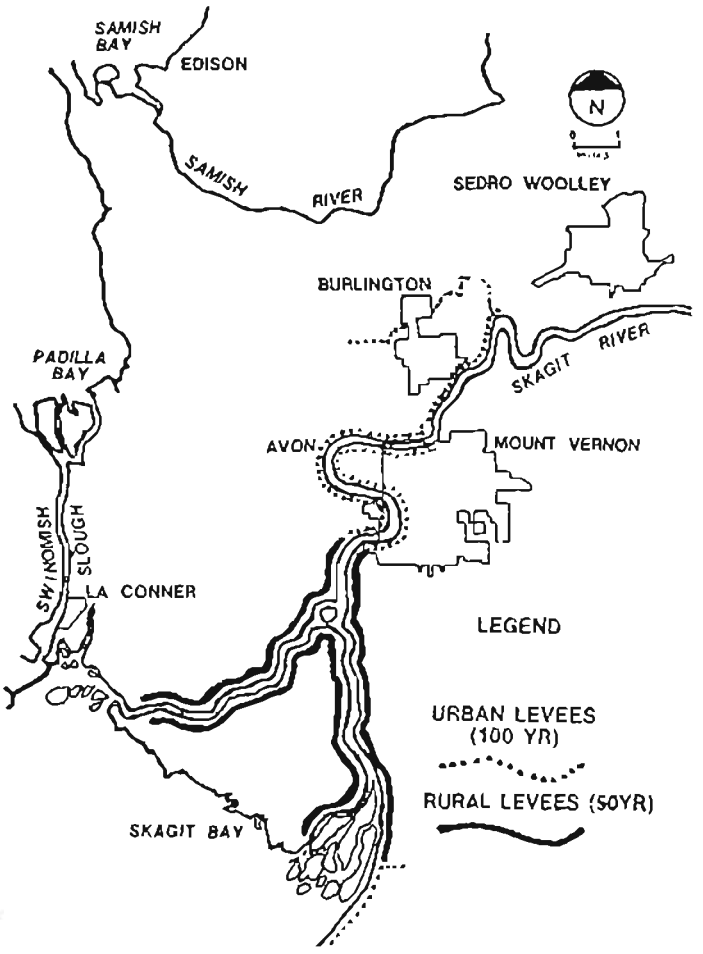
Water Quality: Construction activities such as removal of riverbank vegetation and channel modifications would cause temporary increases in turbidity and could affect other parameters. Development could increase in flood-protected area. Impact to water quality during flooding would be reduced.

Fish and Wildlife: Habitat would be reduced due to streambank vegetation clearing, including loss of cover, shade, and food resources and encroachment on near-shore instream habitat. Secondary impacts may occur as a result of increased development in protected areas. Temporary effects would be associated with construction activities. Mitigation measures may be required.

Cultural Resources: Historic or archeologic sites might be adversely affected unless salvaged prior to construction.

ALTERNATIVE 3B - RURAL AND URBAN LEVEES

Description: This alternative would involve improving the existing levee system to raise the level of protection for rural land to 50-year and for urban land, including Burlington, Avon, and west Mount Vernon on the right bank and Mount Vernon on the left bank. The levee design would include allowances for wave action, super-elevation, and future sedimentation. Rural levees would have a freeboard (factor of safety) of 2 feet and urban levees 3 feet. Drainage outlets would be modified as required. Flood plain management would still be required for areas outside the urban levees, including zoning, flood warning system, etc.



Implementation Costs		Annual Management Costs	
Federal	$34,800,000	Federal	- none
Local	$ 9,900,000	Local	$60,000

Effects:

Flood Damage Reduction: 29,700 acres of land would be provided rural protection (50-year), and 11,800 acres of land would be provided urban protection (100-year). The project would raise 100-year water surface elevations in the Samish overflow area by about 3 feet east of I-5 and 2 feet west of I-5 and in the Nookachamps-Clear Lake area by about 1/2 foot.

People: Residents of the Skagit delta would experience a reduction in annual flood damages and hazards to life and property, with those in Burlington and Mount Vernon receiving a significant reduction.

Land: 11,800 acres of flood plain land provided a high degree of protection could be more intensively developed.

Recreation: Increased recreational opportunities are possible with access and minimal improvements as part of the project and future park development by local interests along or adjacent to the levee.

Transportation: Road, highway, and rail traffic would continue to be disrupted during floods in the rural areas.

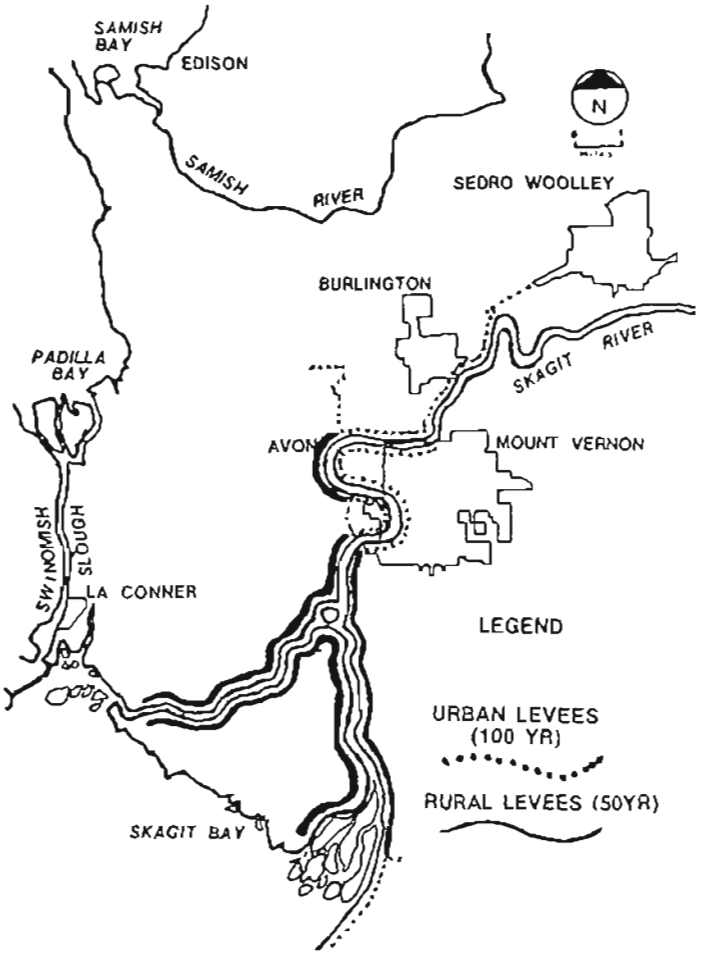
Water Quality: Construction activities such as removal of riverbank vegetation and channel modifications would cause temporary increases in turbidity and could affect other parameters. Development could increase in flood-protected area. Impact to water quality during flooding would be reduced.

Fish and Wildlife: Habitat would be reduced due to streambank vegetation clearing, including loss of cover, shade, and food resources and encroachment on near-shore instream habitat. Secondary impacts may occur as a result of increased development in protected areas. Temporary effects would be associated with construction activities. Mitigation measures may be required.

Cultural Resources: Historic or archeologic sites might be adversely affected unless salvaged prior to construction.

ALTERNATIVE 3C - RURAL AND URBAN LEVEES

Description: This alternative would involve improving the existing levee system to raise the level of protection for rural land to 50-year and for urban land, including west Sedro Woolley, Burlington, and west Mount Vernon on the right bank and Mount Vernon on the left bank. The levee design would include allowances for wave action, superelevation, and future sedimentation. Rural levees would have a freeboard (factor of safety) of 2 feet and urban levees 3 feet. Drainage outlets would be modified as required. Flood plain management would still be required for areas outside the urban levees, including zoning, flood warning system, etc.



Implementation Costs		Annual Management Costs	
Federal	$36,800,000	Federal	- none
Local	$11,000,000	Local	$60,000

Effects:

Flood Damage Reduction: 34,900 acres of land would be provided rural protection (50-year), and 16,800 acres of land would be provided urban protection (100-year). The project would prevent 100-year Skagit floods from overflowing to the Samish. However, flooding would still occur due to Samish River flows on 14,500 acres. The Nookachamps-Clear Lake area would experience an increase in the 100-year water surface elevation of about 1.5 feet.

People: Residents of the Skagit delta would experience a reduction in annual flood damages and hazards to life and property, with those in Burlington and Mount Vernon receiving a significant reduction.

Land: 16,800 acres of flood plain land provided a high degree of protection could be more intensively developed.

Recreation: Increased recreational opportunities are possible with access and minimal improvements as part of the project and future park development by local interests along or adjacent to the levee.

Transportation: Road, highway, and rail traffic would continue to be disrupted during floods between Mount Vernon and Padilla Bay and in the downstream rural areas.

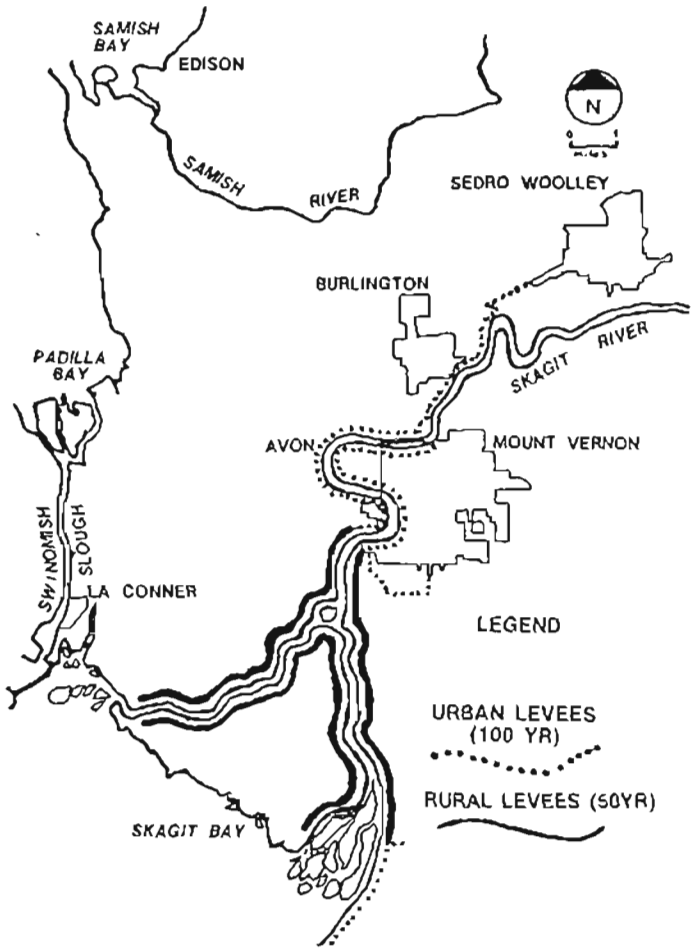
Water Quality: Construction activities such as removal of riverbank vegetation and channel modifications would cause temporary increases in turbidity and could affect other parameters. Development could increase in flood-protected area. Impact to water quality during flooding would be reduced.

Fish and Wildlife: Habitat would be reduced due to streambank vegetation clearing, including loss of cover, shade, and food resources and encroachment on near-shore instream habitat. Secondary impacts may occur as a result of increased development in protected areas. Temporary effects would be associated with construction activities. Mitigation measures may be required.

Cultural Resources: Historic or archeologic sites might be adversely affected unless salvaged prior to construction.

ALTERNATIVE 3D - RURAL AND URBAN LEVEES

Description: This alternative would involve improving the existing levee system to raise the level of protection for rural land to 50-year and for urban land, including west Sedro Woolley, Burlington, Avon, and west Mount Vernon on the right bank and Mount Vernon on the left bank. The levee design would include allowances for wave action, superelevation, and future sedimentation. Rural levees would have a freeboard (factor of safety) of 2 feet and urban levees 3 feet. Drainage outlets would be modified as required. Flood plain management would still be required for areas outside the urban levees, including zoning, flood warning system, etc.



Implementation Costs		Annual Management Costs	
Federal	$42,700,000	Federal	- none
Local	$41,800,000	Local	$60,000

Effects:

Flood Damage Reduction: 29,700 acres of land would be provided rural protection (50-year), and 22,000 acres of land would be provided urban protection (100-year). The project would prevent 100-year Skagit floods from overflow to the Samish. However, flooding would still occur due to Samish River flows on 14,500 acres. The Nookachamps-Clear Lake area would experience an increase in the 100-year water surface elevation of about 4.5 feet.

People: Residents of the Skagit delta would experience a reduction in annual flood damages and hazards to life and property, with those in Burlington and Mount Vernon receiving a significant reduction.

Land: 22,000 acres of flood plain land provided a high degree of protection could be more intensively developed.

Recreation: Increased recreational opportunities are possible with access and minimal improvements as part of the project and future park development by local interests along or adjacent to the levee.

Transportation: Road, highway, and rail traffic would no longer be disrupted during 100-year floods in the Sedro Woolley-Burlington-Mount Vernon urban area.

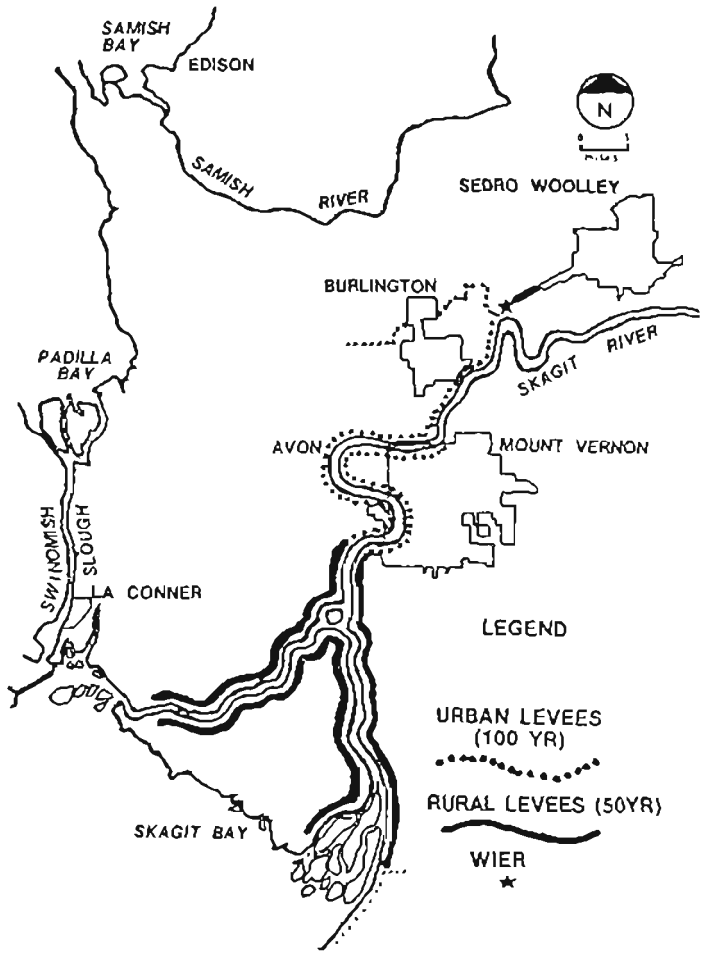
Water Quality: Construction activities such as removal of riverbank vegetation and channel modifications would cause temporary increases in turbidity and could affect other parameters. Development could increase in flood-protected area. Impact to water quality during flooding would be reduced.

Fish and Wildlife: Habitat would be reduced due to streambank vegetation clearing, including loss of cover, shade, and food resources and encroachment on near-shore instream habitat. Secondary impacts may occur as a result of increased development in protected areas. Temporary effects would be associated with construction activities. Mitigation measures may be required.

Cultural Resources: Historic or archeologic sites might be adversely affected unless salvaged prior to construction.

ALTERNATIVE 3E - RURAL AND URBAN LEVEES

Description: This alternative would involve improving the existing levee system to raise the level of protection for rural land to 50-year and for urban land, including Burlington, Avon, and west Mount Vernon on the right bank and Mount Vernon on the left bank. The levee design would include allowances for wave action, super-elevation, and future sedimentation. Rural levees would have a freeboard (factor of safety) of 2 feet and urban levees 3 feet. A weir would be built between Burlington and Sedro Woolley to limit 100-year Samish overflows to the same as under existing conditions. Drainage outlets would be modified as required. Flood plain management would still be required for areas outside the urban levees, including zoning, flood warning system, etc.



Implementation Costs		Annual Management Costs	
Federal	$44,100,000	Federal	- none
Local	$11,200,000	Local	$63,000

Effects:

Flood Damage Reduction: 40,000 acres of land would be provided rural protection (50-year), and 11,800 acres of land would be provided urban protection (100-year). The project would raise 100-year water surface elevations in the Nookachamps-Clear Lake area by about one foot.

People: Residents of the Skagit delta would experience a reduction in annual flood damages and hazards to life and property, with those in Burlington and Mount Vernon receiving a significant reduction.

Land: 11,800 acres of flood plain land provided a high degree of protection could be more intensively developed.

Recreation: Increased recreational opportunities are possible with access and minimal improvements as part of the project and future park development by local interests along or adjacent to the levee.

Transportation: Road, highway, and rail traffic would no longer be disrupted during floods in the rural areas.

Water Quality: Construction activities such as removal of riverbank vegetation and channel modifications would cause temporary increases in turbidity and could affect other parameters. Development could increase in flood-protected area. Impact to water quality during flooding would be reduced.

Fish and Wildlife: Habitat would be reduced due to streambank vegetation clearing, including loss of cover, shade, and food resources and encroachment on near-shore instream habitat. Secondary impacts may occur as a result of increased development in protected areas. Temporary effects would be associated with construction activities. Mitigation measures may be required.

Cultural Resources: Historic or archeologic sites might be adversely affected unless salvaged prior to construction.

WHAT ARE THE ENVIRONMENTAL CONCERNS RELATED TO THESE ALTERNATIVES ?

The major environmental concerns that have been raised through ongoing coordination with Federal, State and local resource agencies include the following:

- Project-related losses of existing riparian vegetation, which provides food, cover, and other benefits to Skagit River fish and wildlife.

- The impact of the Skagit River fishery resource due to the modification of the shore zone, the primary migration and rearing area for juvenile salmon, by channel improvements and placement of riprap.

- The effects of levee improvements on the Skagit Estuary,which is an important rearing location for anadromous fish during their transition from fresh water to salt water and a productive habitat for waterfowl. The Skagit Wildlife Recreation Area, located within the Skagit Estuary, has as its primary management objective the maintenance of waterfowl populations at harvestable levels.

- Other concerns include: the encroachment of the project on prime farmlands; the impact to the fishery resource of Fisher Slough and Carpenter Creek; the preservation of project area wetlands; the identification and preservation of significant cultural resources; and the impact of the project on the northern race of the bald eagle, which is on the Federal list of Endangered and Threatened Species.

Environmental considerations used in project design to reduce project-related adverse impacts associated with these concerns include the following. The project will make maximum use of existing levee alinements, most of which are set back from the river's edge. No significant channel excavation or dredging is anticipated for the project. Any unavoidable instream work will be timed to avoid the peak migration periods for juvenile salmon. The project design at Fisher Slough will allow for adequate fish passage from Tom Moore Slough to Carpenter Creek. Levee work will include grass seeding and restoration plantings where recommended to reduce impacts to fish and wildlife due to project-related losses of riparian habitat. In addition, landscaping and beautification features are being developed.

A wetlands inventory of the project area has been accomplished. Information from that inventory is being utilized to evaluate the project impact on study area wetlands. A cultural resources (archeological and historical) reconnaissance study of the project area has also been completed. Depending on results of more detailed study, the salvage of selected cultural resources sites may be necessary and/or the levee alinement modified.

FLOOD PLAIN MANAGEMENT

On 24 May 1977, President Carter issued a comprehensive environmental message accompanied by "Executive Order 11988 - Flood Plain Management" which was a significant policy initiative tying together the need to protect lives and property with the need to restore and preserve natural and beneficial flood plain values. The objective of the order is "to avoid to the extent possible the long-term and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of flood plain development whenever there is a practicable alternative." The order requires Federal agencies to:

- avoid the base (100-year) flood plain unless it is the only practicable alternative;
- reduce the hazard and risk of flood loss;
- minimize the impact of floods on human safety, health, and welfare; and
- restore and preserve the natural and beneficial flood plain values.

All of the measures under consideration lie within the base flood plain. As part of our analysis in accordance with the Executive Order, we are considering whether any practicable alternatives exist to protect lives and property which would not require construction in the flood plain.

WHAT WILL HAPPEN NEXT?

We are currently preparing the General Design Memorandum which includes an environmental impact statement. Most of our detailed studies are in their final stages or have been completed. After the public workshop, we will evaluate the public input, modify the alternatives as appropriate, and complete our remaining studies. Next spring we will hold a public meeting to discuss the tentatively selected alternative and to receive comments on our draft report and environmental impact statement. Our final report is currently scheduled for submission to our higher authority in the late spring of 1979.

WHAT CAN I DO ?

Part of the reason for preparing this studygram is to provide you a means to comment on this Corps of Engineers' study and to suggest changes or modifications to the authorized flood control project. Your comments can be written on the following page, which can be cut out and mailed to us. If you need more space, attach additional sheets of paper, making sure as you staple them together that our address appears on the outside. We are not soliciting votes for or against any of the alternatives, but we are inviting you to present comments or information that could have a bearing on the outcome of our study. Your input is essential so that our evaluation will be complete. If you wish to discuss the study at any time, you may write or telephone the study manager at the address and number noted on the cover of this studygram. Also, to help us update our mailing list, please fill in the information at the top of the comment sheet. Thank you.

GLOSSARY

Acre Feet (ac.ft.) - A unit for measuring the volume of water or sediment. It is equal to the amount of water needed to cover one acre of land with water one foot deep. One acre foot equals 43,560 cubic feet or 325,851 gallons.

Cubic Feet Per Second (c.f.s.) - A unit of measure for the rate of discharge of water. One cubic foot per second is the rate of flow of a stream with a cross section of one square foot which is flowing at one foot per second. It is equal to 448.8 gallons per minute.

Drainage Basin - That portion of the surface of the earth which is drainaged by a river and its tributaries, or which is occupied by a permanent body of water (lake, pond, reservoir, etc.) and all of its tributaries.

Flood - Any relatively high streamflow or overflow that comes from a river or other body of water.

Flood Plain - The area adjoining a watercourse (river, stream, lake, etc.) which has been or may be covered by floodwaters. Flood plains are often defined for a flood of a particular megnitude, e.g., "100-year flood.:

100-year Flood - A flood which is expected to recur on an acreage of once every 100 years. or a flood which has a 1 percent chance of occurring in any given year. It is based on statistical analysis of rainfall and runoff characteristics in the watershed. At Sedro Woolley, the 100-year flood on the Skagit River is estimated to be equal to a streamflow of 215,000 c.f.s.

Floodway - Ordinarily means those portions of the flood plain adjoining the watercourse which are reasonably required to carry and discharge floodwaters.

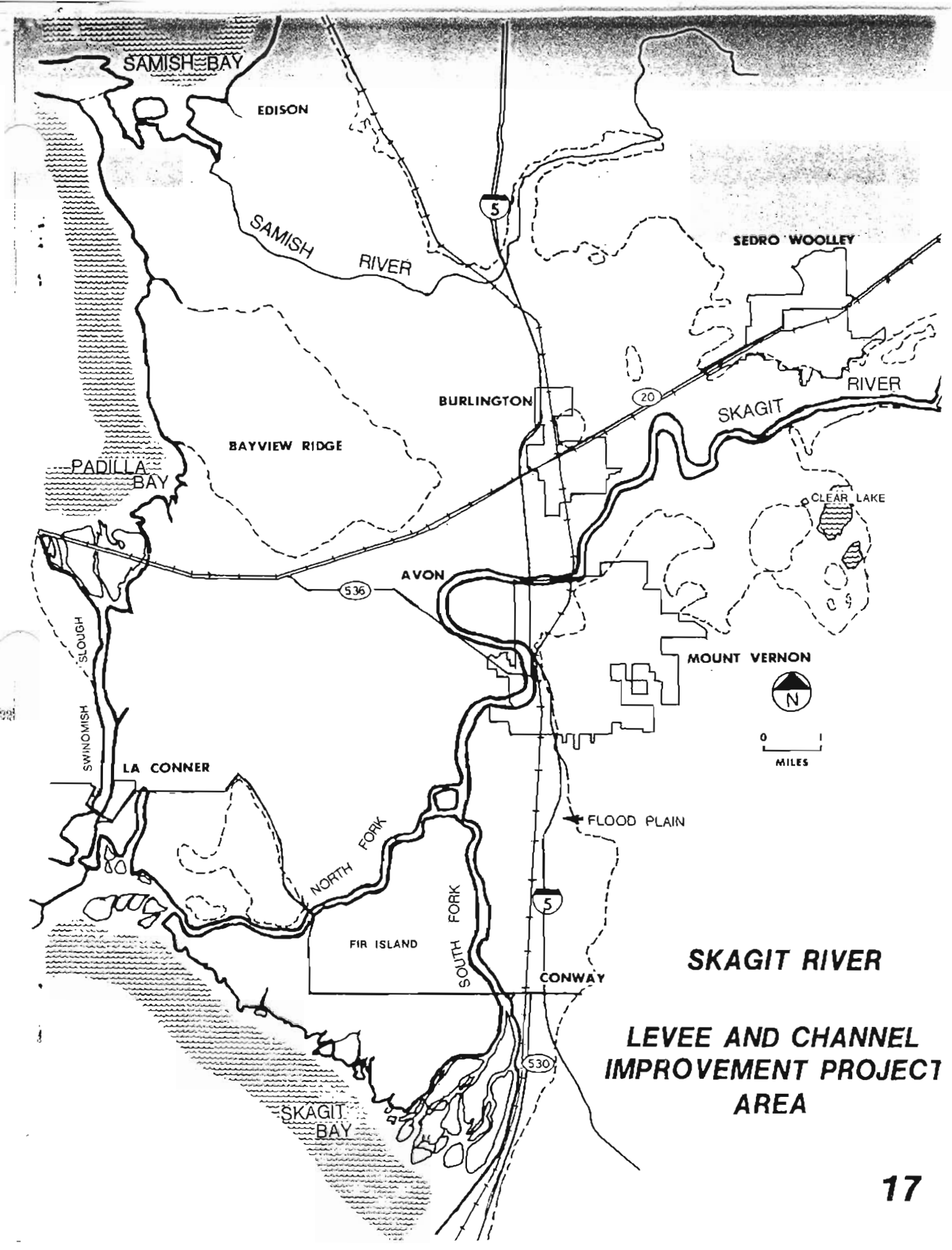
Freeboard - The height of the top of the levee above the water surface of the design river flow is called freeboard. It is a factor of safety in levee design.

Runoff - That part of precipitation that appears in surface streams. This is the streamflow before it is affected by artificial diversion, reservoirs, or other man-made changes in or on stream channels.

Storage - Water naturally or artificially stored in surface or underground reservoirs.

Usable Storage Capacity - The volume of the reservoir which can be used to store flood waters, generate hydroelectirc power, provide irrigation or water supply. Usually the volume of the reservoir above the intake to the powerhouse.

Valley Storage - Natural storage of floodwater in adjacent areas when a river overflows its banks.



SKAGIT RIVER

LEVEE AND CHANNEL IMPROVEMENT PROJECT AREA