



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

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Reference: RBS

May 20, 1964

Your file: NPSGW
NPSGW-R
NPSSEN-BP
NPSSEN-PP-R

District Engineer
Seattle District, Corps of Engineers
1519 South Alaskan Way
Seattle, Washington 98134

Dear Sir:

This is the interim report of the Bureau of Sport Fisheries and Wildlife on effects on fish and wildlife of proposed Corps of Engineers projects in Skagit River basin, Skagit and Whatcom Counties, Washington. With the exception of statements pertaining to various physical features, the portion of the basin lying in British Columbia, Canada, is not discussed. This report supersedes our preliminary comments on water development projects within this basin which were transmitted to you in previous correspondence. Our comprehensive report on Skagit River basin fish and wildlife is scheduled for release in 1969. The comprehensive report will present a detailed summation of the effects of these contemplated projects on the abundance, distribution, and utilization of these resources and recommend a plan for their conservation and development.

This report has been prepared under the authority and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and is based on information supplied to us by your staff prior to September 1963. All use and value estimates contained herein are preliminary and will be subject to revision in our detailed report.

The Washington Departments of Fisheries and Game have reviewed and concur with this report as indicated by the attached copies of letters from Director George C. Starlund, dated May 4, 1964, and Director John A. Biggs, dated February 24, 1964. These agencies furnished basic estimates of potential fisherman and hunter use employed in evaluating the projects. They also proposed development and management measures recommended herein

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for conservation and improvement of fish and wildlife resources. The suggestions referred to in Mr. Starlund's letter have also been incorporated in our report. The Bureau of Commercial Fisheries has reviewed the fishery sections of this report and endorsed the fishery recommendations.

Your staff has furnished definite plans for the Avon Bypass project, to be located between Skagit River near Burlington, and Padilla Bay, an arm of Puget Sound, and for channel and levee improvement on North Fork Skagit River and Skagit River downstream from the bypass inlet site. Plans for channel dredging in a 40-mile reach of Skagit River from the bypass inlet site upstream to Concrete, a dam on lower Sauk River, and diversion of water from Sauk River to Stillaguamish River are under study and will be reported on at a later date. Effects of the Avon Bypass development and the associated channel and levee improvement work on fish and wildlife resources are analyzed in detail in this report. A tentative plan for fish and wildlife improvement in the Avon Bypass project area also is outlined. Discussion of the other proposals described above will of necessity be confined to statements of a preliminary nature.

DESCRIPTION OF THE BASIN

Physical Features

Skagit River basin lies on the west slope of the Cascade Range, and contains approximately 3,140 square miles, much of which is rough timbered land. A portion of the upper basin, approximately 400 square miles, lies in British Columbia, Canada. About two-thirds of the basin is in Mount Baker National Forest. Basin elevations vary from sea level to over 10,000 ¹/₂, and there are active glaciers and several peaks with perennial snow cover including Mount Baker, Mount Shuksan, and Glacier Peak. Much of the basin is so topographically rough and heavily vegetated that it is inaccessible except for trails or roads up the principal tributaries and to the major lakes, mountains, and glaciers. Over one-fifth of the North Cascade Primitive Area and approximately one-half of the Glacier Peak Wilderness Area lie within the basin.

Skagit River is the largest stream entering Puget Sound. It originates in Canada and flows 135 miles south and west to Skagit Bay. About seven miles upstream from the bay, the river divides into the North and South Forks which in turn branch into several subsidiary channels. The major tributaries of Skagit River are Sauk, Cascade and Baker Rivers. Sauk River is a large glacier-fed stream that enters Skagit River a few miles upstream from Concrete. Cascade River, also glacier-fed, heads at the

¹/₂ All elevations are in feet and refer to mean sea level datum.

summit of the Cascade Range and joins Skagit River at Marblemount. Upper Skagit River is impounded near river mile 97 by City of Seattle's High Gorge Dam. The City's Diablo and Ross Dams are located upstream, and Ross Lake Reservoir extends into Canada. All of these projects are for hydroelectric power production. Baker River is blocked near its mouth by Baker Dam and upstream by Upper Baker Dam. Both are Puget Sound Power and Light Company installations. Padilla Bay is a large, shallow arm of Puget Sound. The east and south portions of the bay are very shallow except in slough channels. Extensive mud flats are exposed in these portions of the bay at low tide.

Skagit River has a broad, fertile flood plain varying in width from one mile at Concrete to 13 miles on Puget Sound. Area soils are mostly alluvial fine sandy, silt, and silty clay loams. Above the flood plain, soils are mostly of glacial derivation.

The climate of Skagit River basin and vicinity is mild, varying with elevation and distance from Puget Sound. Anacortes, to the northwest, has an average growing season of about 227 days, recorded maximum and minimum temperatures are 95° F. and 6° F., and average annual precipitation is about 26 inches. At Concrete the average growing season is 194 days, maximum and minimum temperatures are 106° F. and -1° F., and annual precipitation averages 61 inches.

Skagit Game Range, a 12,192-acre area located on the Skagit Delta, is the largest and most important public hunting ground in the Puget Sound area. It ranks first in annual waterfowl harvest among the management units administered by the Washington Department of Game. The Department also maintains Barnaby Slough for steelhead rearing. This 27-acre impoundment located near Rockport produces over 100,000 steelhead migrants each year for release into the Skagit River. It also owns or administers a number of fisherman-access areas on Skagit River and scattered tideland acreages of the Sound. The Washington Department of Fisheries maintains Skagit Hatchery, a salmon production facility located on Skagit River near Marblemount. It has a capacity of 6.5 million fry. The Department also maintains Newhalem Pond, a 30-acre rearing area planted annually with approximately 150,000 coho salmon.

Commercial Features

About 80 percent of Skagit River basin's human population of 50,000 are concentrated in the lower Skagit Valley. Principal towns are Mount Vernon, population 7,921 ^{1/}; Burlington, population 2,968; and Sedro Woolley, population 3,795. Mount Vernon is the county seat of Skagit County. Seattle, a Puget Sound metropolis with a population exceeding one-half

^{1/} 1960 Federal Census.

million, lies about 50 miles to the south. United States Highway 99 crosses Avon Bypass project site in the Mount Vernon-Burlington area. North-south State Highway 1A crosses Skagit River near Sedro Woolley, and State Highways 1F, 17A, and 17 follow the Skagit Valley for about 100 miles. The North Cascades Highway, now under construction, will connect these roads with the eastern Washington highway system. Secondary roads parallel Baker River upstream to Baker Lake, Cascade and Sauk Rivers throughout most of their lengths, and Suiattle River for about 25 miles upstream from its confluence with Sauk River. The Great Northern Railroad serves the Skagit Valley upstream to Concrete and connects Mount Vernon, Burlington, and Anacortes, a Fidalgo Island city to the northwest. The Northern Pacific Railway crosses the basin in the vicinity of Sedro Woolley. Skagit River is navigable to Marblemount, about 78 stream miles from Puget Sound, but river traffic upstream from Mount Vernon is composed principally of tug-towed log rafts.

Principal industries in the area are agriculture, lumbering, hydroelectric power production, mining, commercial fishing, and catering to outdoor recreationists and sportsmen. The U. S. Forest Service has developed numerous camp grounds, shelters, trails, and other recreational facilities in the basin, and private interests have constructed similar public facilities near the major power developments. The portion of Skagit River downstream from High Gorge Dam, including Sauk River and tributaries, has been selected for study by a joint U. S. Department of the Interior-U. S. Department of Agriculture team as one of twelve regions in the United States having outstanding recreational potential. The Skagit River flood plains are intensively farmed and are noted for production of vegetables, vegetable seeds, and other specialty crops. Dairying is an important industry. Basin uplands contribute forest products. There are a number of mineral deposits in the basin, but the only significant production is from a quarry near Concrete where limestone deposits support a local cement industry.

PLAN OF DEVELOPMENT

Avon Bypass

The flood control provisions of the project plan for Avon Bypass were authorized by the Flood Control Act of 1936, and are being recommended for reactivation. Flood control plans for the Skagit River downstream from Mount Vernon, and addition of fisheries and recreation as project purposes of Avon Bypass project, are being considered for authorization.

Avon Bypass project will be essentially a large canal designed to divert flood waters from Skagit River to Padilla Bay. The canal will be approximately 8 miles long and equipped with intake and downstream control structures and one intermediate control structure.

The intake structure will have six 48-foot by 19-5-foot tainter gates, a debris deflector, and a controlled 3-foot by 3-foot sluice. The sluice will permit introduction of fresh water to the channel as necessary to maintain proper temperature and flow for fish life.

The intermediate weir will, under the flood control plan, be a water inflated, rubber fabric dam on a concrete sill. It will be placed approximately midway in the channel to control drawdown of the groundwater table during nonflood periods.

The downstream control structure will be near the outlet about 7 miles below the intake. It will be an uncontrolled concrete weir with a sill elevation of 11.0. It will be provided with a 5-foot by 6-foot sluice equipped with a tide gate and control gate. The sluice will control introduction of brackish water to the channel at certain tidal flows.

Between the outlet and inlet works, the channel will have a bottom width of 340 feet, and a width between levee crests of about 600 feet. Downstream from the downstream control structure, the channel will have a bottom width of 460 feet and a crest-to-crest width of about 700 feet. The channel will have 1 on 2 gravel-blanketed side slopes from the bottom to 2 feet above low water level, and 1 on 3 slopes for the remainder. It will have a design velocity of 5 feet per second and will be capable of passing flood flow ranging to 60,000 second-feet.

The sluices will be equipped with fish barriers to insure against contamination by rough fish and to exclude anadromous fish, except during periods of migration. Crest elevation proposed for the downstream control structure is 11.3, and of the downstream sluice, -2.3. For the intake structure, these elevations are 21.0 and 9.0 respectively. The elevation of the channel bottom immediately below the intake will be approximately 4.8, and at the outlet structure, -2.3. Low-water pool level of the lower pool will be 5.0, and of the upper pool, 13.0. At these elevations the depth of the lower pool will be 7.3 feet to approximately 2.0 feet, and of the upper pool, approximately 13.0 to 9.0 feet.

Channel and levee improvement on lower Skagit River and North Fork Skagit River, downstream from the bypass inlet, will be necessary to provide freeboard for flows of approximately 120,000 second-feet. Addition of this capacity to that of Avon Bypass will control floods of 180,000 second-foot magnitude. Construction will consist of raising and strengthening existing levees and widening the streambed at three locations for uniform channel capacity.

Other Projects Under Study

The navigation improvement project between the bypass inlet and Concrete would provide for yearlong barge and log raft transportation on that reach of Skagit River. It would consist of excavating a channel 6 feet deep and 100 feet wide to accommodate a flow of 9,000 second-feet. Channel side slopes would be 1 on 6. The channel would be in the deepest part of the stream, and channel shortening is not planned.

Spoil would be deposited within the banks of the high water channel. The original project would entail removal of an estimated 1,520,000 cubic yards of material from the channel, and maintenance dredging would involve removal of 380,000 cubic yards annually.

Several damsites on Sauk River have been investigated. The most feasible is the Lower Sauk River site near Rockport. The project would be constructed for flood control and hydroelectric power production. Diversion of Sauk River flows to Stillaguamish River, through the divide near Darrington, is one of the features of this plan.

Detailed reports analyzing the impacts on fish and wildlife resources of projects under study will be issued as plans are formulated. These reports will recommend the most feasible means to conserve and develop these resources prior to the time that any such projects are authorized.

FISH

Without Proposed Skagit River Basin Projects

Skagit River produces large numbers of pink, coho, chinook, chum, and sockeye salmon that support a significant sport and commercial fishery extending over a wide area. About 46,000 angler-days annually are expended in Skagit River to catch about 17,000 salmon. The average annual commercial salmon harvest in the Skagit Bay-Deception Pass area during the past 29-year period is 23,000 chinook, 32,000 coho, 59,000 chum, and 1,000 sockeye. The 15-year average annual catch of pink salmon is 165,000. However, peak annual catches over the past years have produced as many as 52,000 chinook, 3,500,000 pink, 73,000 coho, 366,000 chum, and 4,000 sockeye salmon from the Skagit River and closely adjoining areas. Contribution of Skagit River salmon to commercial catch and sport fisherman harvest in other areas is very significant.

Skagit River is nationally famous for winter run steelhead trout and usually furnishes more of these fish to the creel than any other stream in the state. The river and many of its tributaries provide excellent angling for searun and resident cutthroat trout. There is also good fishing for whitefish and rainbow, brook, brown, and Dolly Varden trout.

High Gorge Dam on Skagit River is a block to anadromous fish. Diablo and Ross Lake Reservoirs provide excellent fishing for rainbow and Dolly Varden trout, as well as brook and cutthroat trout. High Gorge Reservoir provides little fishing.

Baker River was one of Washington's finest anadromous fish spawning streams before its runs were barred by completion of Baker Dam in 1925. The Washington Department of Fisheries, in cooperation with Puget Sound Power and Light Company, has successfully passed adult coho and sockeye salmon upstream and juveniles downstream around this barrier and Upper Baker Dam, completed in 1959. Other anadromous fish runs have not been maintained or have been reduced in numbers. Lake Shannon and Baker Lake Reservoirs, behind Baker and Upper Baker Dams, respectively, furnish good fishing for resident cutthroat, rainbow, Dolly Varden, brown, and brook trout, and young sockeye salmon.

Sauk River supports moderate to heavy runs of steelhead trout and coho, chum, spring chinook, and pink salmon. It is an excellent spawning stream and is readily accessible to fishermen. Sulattle and Whitechuck Rivers, main tributaries to Sauk River, are also important spawning streams and are noted producers of large steelhead trout and spring chinook salmon.

Cascade River has moderate to heavy runs of the same species of fish as Skagit River. It is considered a good late-season fishing stream for cutthroat, rainbow, and Dolly Varden trout.

Runs of anadromous fish are known to pass through Padilla Bay. These fish move through Swinomish Channel, which joins Padilla Bay with North Fork Skagit River.

There is a commercial crab fishery in the deeper portions of Padilla Bay. The bay once supported commercial oyster farms, but production has virtually ceased. There are fairly extensive but little utilized beds of jackknife clams and bay clams in some areas.

With Proposed Skagit River Basin Projects

Avon Bypass

Avon Bypass operated solely for flood control would have little hunter and fisherman use value and would probably result in major losses of anadromous fish. The Washington Departments of Fisheries and Game and our Bureau have worked closely with your staff and local sponsors to determine a plan for development, operation, and management of the area to assure optimum fish and wildlife values and to avoid possible losses. Certain problems remain, but changes in project design or management are not expected to be so major as to radically affect its value for fish.

There is a strong possibility that anadromous fish would be attracted by the minimum and flood flows released from the bypass, and be entrapped in the outlet channel and the bypass proper. This could result in significant losses of fish. Entrapment and possible losses of downstream migrants could be expected in the bypass following flood flow periods. During flood flow periods, which would have a 1- to 3-day duration period with a frequency of once in seven years, it would be possible for both juvenile and adult anadromous fish to enter the channel via the intake and downstream control structures. Drainage and flushing of the channel may serve to remove downstream migrant fish remaining after flood flows have receded. During normal flow periods, fish could be excluded from the channel by using gravel filters or some other type of screen at the low-level intake and outlet sluices, except during periods when anadromous fish are migrating.

 Influx of fresh water into Padilla Bay during flood flow periods may kill shellfish. This possible loss has not been evaluated but, because of the small shellfish populations present, would not be expected to be monetarily significant.

Some fishing will occur in Avon Bypass outlet channel. Fish from Padilla Bay may occupy this area, and anadromous fish species could be attracted by flows through the channel. It is estimated that the outlet section will provide 1,400 fisherman-days annually, valued at \$1,400.

Tentative plans are to manage Avon Bypass as a trout fishing lake. This would require water of sufficient depth in the bypass to raise trout, exclusion of other fish from the channel, and low-level sluices designed so that the bypass can be drained and refilled with both fresh and brackish water for cooling and enrichment. Public access to the area would be required for fishing. Sanitary facilities, parking areas, and boat launching ramps should also be provided.

Trout fishing in bypass waters is expected to draw people from adjacent metropolitan areas. No other trout angling site in the Puget Sound region will be more accessible. A local organization would administer the area, but management of the fishery resource will be a responsibility of the Washington Departments of Fisheries and Game. Department of Game will manage the game fish fishery while the Department of Fisheries will have authority to drawdown the bypass in order to obtain egress for any anadromous fish that may be trapped in the bypass. Avon Bypass, constructed with controls and safeguards as recommended in this report, will yield annual fishing benefits in Skagit River basin amounting to an estimated 159,000 angler-days valued at \$238,000.

Boat launching ramps and parking facilities near both ends of the bypass channel have been proposed by your agency. The west end ramp will permit access to Padilla Bay. It will receive some use by fishermen, and encourage harvest of shellfish. Estimated annual use of this facility is 500 fisherman-days valued at \$1,000. The ramp and parking lot proposed

for the east end of the channel is expected to receive considerable use because of restricted access to Skagit River. Only a small portion of this utilization will represent actual increases in river use by fishermen. With facilities, estimated fisherman use of Skagit River is expected to increase 700 fisherman-days annually valued at \$3,500.

Channel and levee improvements proposed in North Fork Skagit and Skagit Rivers downstream from Avon Bypass inlet would have little effect on the fish or fisheries of the river if standard precautions are taken to avoid unnecessary turbidity and siltation in the stream, and to minimize interference with anadromous fish movement.

Other Projects Under Study

We have not received definite proposals resulting from your feasibility study of barge channel construction from the bypass inlet upstream to Concrete. However, preliminary information indicates that such a project would be extremely damaging to fish populations and fishing in Skagit River. It would be particularly disastrous to pink and chum salmon, since the 40-mile reach of the project encompasses a significant portion of the chum and pink spawning and rearing area of the Skagit River, along with about one-third of the chinook salmon habitat. This project would also be very detrimental to sockeye salmon and searun cutthroat and steelhead trout. The damage to fish resources would not only occur in the project vicinity but also in upstream areas. Fisherman-use of the river downstream from Concrete would be greatly reduced.

The dam on Lower Sauk River would prove very damaging to anadromous fish, even though passage for adults is provided. Spawning beds would be inundated, and migrant losses would occur through residualism and delay in the reservoir. Reservoir losses to downstream migrants might be alleviated by collecting these fish at the heads of the impoundment and transporting them to the stream below the dam. However, there are no presently known methods of successfully collecting downstream migrants at the head end of a reservoir; therefore, a dam constructed at this time could destroy Sauk River fish runs.

The suggested diversion from Sauk River to Stillaguamish River would require much further study by fish conservation agencies before its effect on fish resources could be determined.

WILDLIFE

Without Proposed Skagit River Basin Projects

Virgin forests in Skagit River basin were composed almost entirely of large coniferous trees, principally Douglas fir, western hemlock, Sitka spruce, and western red cedar. Rocky Mountain juniper and lodgepole pine grew on more arid sites, and several deciduous species such as red alder, vine maple, and willow flourished in low, moist areas and on the flood plains. Most of the merchantable timber in the basin's western sector has been harvested. However, extensive stands of mature western and mountain hemlock, and balsam fir, remain in the basin's eastern and northern sectors. Many logged areas have revegetated with the harvested species. However, subclimax plants, including red alder, willow, and bigleaf maple, predominate in fire-damaged areas.

Skagit River basin contains black-tailed deer, mule deer, black and grizzly bear, and mountain goat. Black-tailed deer occur throughout the basin, particularly in cut-over areas and brushy stream valleys. There are a few mule deer in the northeastern corner of the basin. Deer hunting pressure is moderate. Black bear are most plentiful on National forest land. Few are harvested. Small numbers of mountain goats and grizzly bears inhabit the high mountain areas. Mountain goats are hunted on a permit basis, and a few of these animals are harvested each year.

Cottontails are numerous in lands adjacent to cultivated valley areas, but they are not heavily hunted. Blue, spruce, and ruffed grouse, which are widely distributed over the basin, are hunted quite extensively. Lower Skagit Valley contains low populations of wild ring-necked pheasants, but most of the harvest is from stocked birds.

Muskrats, mink, opossums, skunks, raccoons, beavers, martens, river otters, red foxes, and weasels inhabit Skagit River basin. However, fur harvest is of little significance to the local economy.

Skagit Game Range is favored hunting area for snow geese and many species of ducks. Skagit and Stillaguamish Deltas are major wintering grounds for snow geese, and Padilla Bay accommodates the largest concentrations of black brants north of Baja California, as well as significant numbers of other waterfowl. Waterfowl feeding flights from the bay commonly cross the proposed bypass area.

With Proposed Skagit River Basin Projects

Some marshland will be destroyed by construction of Avon Bypass, and a small amount of additional marsh may be formed in Padilla Bay by influx of fresh water from the bypass. Cultivated field and wasteland vegetation within the right-of-way will be lost with the project. The proposed navigation improvement projects would have little effect on wildlife habitat. A reservoir on Sauk River, however, would inundate fields, brushlands, and timberlands which support wildlife populations of importance.

The area that would be lost with construction of a dam and reservoir on Lower Sauk River is yearlong deer habitat of particular value as winter range. Other project proposals described in this report would have little effect on big-game resources.

The Washington Department of Game, in cooperation with the local sponsoring agency, plans to develop upland-game habitat along Avon Bypass right-of-way. The area will be managed for pheasant production and public hunting. With adequate stocking and development as proposed by the Department, the average annual increase in pheasant hunter use for the life of the project is forecast at 2,500 hunter-days valued at \$7,500. Proposed channelization and levee projects would have little effect on upland game. A reservoir on Lower Sauk River would flood ring-necked pheasant and grouse range.

Some aquatic and semi-aquatic fur-animal habitat in small sloughs and drains will be destroyed by Avon Bypass project. However, the loss of this environment will be compensated for by the habitat that will develop along the channel dikes. There will be no economic increase in fur-animal populations or harvest with the project. Channel construction and levee improvement would only temporarily affect fur-animal populations and habitat. Such habitat would be destroyed by inundation if a dam were to be constructed on lower Sauk River.

Good waterfowl pass shooting is expected to develop along Avon Bypass right-of-way between Padilla Bay and feeding areas to the east and southeast, and in the right-of-way southeast of Bay View Ridge. During the project life, we estimate that annual waterfowl hunter use of this area will average 6,200 hunter-days valued at \$28,000. The boat-launching ramp proposed by the Corps of Engineers for the west end of the bypass will increase waterfowl hunter use of the bay about 760 days, valued at \$3,400 annually. Channel and levee improvement projects would have slight effect on waterfowl populations and habitat. A reservoir on lower Sauk River would be expected to increase waterfowl values slightly.

DISCUSSION

The Avon Bypass project, as proposed for reactivation, does not include detailed plans for exclusion of fish from the channel area. However, rock crib filters at inlet and downstream control structures, or some other fish barriers, are proposed, and an allowance for fish barriers is included in cost estimates for the project.

During flood flow periods, it is not considered feasible to exclude fish from the channel. It is possible that immature fish remaining after flood flows have receded may be removed by draining and flushing the channel.

To eliminate losses to adult anadromous fish attracted to or entrapped in the bypass, fish-passage facilities would have to be provided at each water control structure. Washington Department of Fisheries personnel believe that relatively inexpensive Denil fish ladders would suffice because of the minor elevations involved. The project water-control structures should be so designed that these fish ladders can be easily and rapidly installed and removed. Ease of installation is essential in order that complete protection will be provided to anadromous fish species during migration. At other times of the year, the ladders could be removed to reduce the possibility of contaminating bypass waters with undesirable fishes. Close cooperation between Washington Departments of Fisheries and Game, your agency, and our Bureau will be necessary in final design stages.

Washington Department of Fisheries is interested in the possibility of salmon propagation either in the lower section of the bypass channel, or in ponds connected to the channel. They have indicated that further study will be necessary to determine whether or not such a project would be feasible.

Annual cost of stocking Avon Bypass channel with fish is estimated at \$9,000, and associated management costs are estimated at \$4,000 annually. These costs will be the responsibility of the Washington Department of Game.

Further detailed studies of the effect on fish and wildlife of Avon Bypass project will be necessary, as well as on other proposed Skagit River basin projects. Among these, studies to determine the feasibility of operating the west portion of the channel for salmon propagation will be necessary. Other project-associated problems affecting fish and wildlife resources may occur following bypass construction.

Substantial recreational use of the bypass channel is expected. Motor-boat operation in the comparatively narrow channel between the inlet and outlet structures would be hazardous. It would increase water turbidity and wave erosion, and conflict with swimming and fishing from shore. A zoning plan would be necessary to insure that this area would be available

for various fish and wildlife purposes without undue conflict with general recreational activities. The plan should be developed cooperatively by the agency expected to administer the area, the Corps of Engineers, the Washington Departments of Fisheries and Game, and our Bureau.

Washington Department of Game personnel have suggested purchase of approximately 180 acres of land above mean high water adjoining the bypass right-of-way and the proposed west end automobile parking site. This tract would constitute an excellent public waterfowl pass-shooting area. It is in the flight lane from Padilla Bay to inland feeding areas, and we anticipate that bay waterfowl will be attracted to bypass waters. It would also serve as a hunter and fisherman access point to Padilla Bay. Ultimate area development would consist of construction of shooting pits, office, sanitary facilities, a foot bridge, fence, and other essential structures to facilitate intensive management of the unit as a public shooting ground. Such comprehensive development would probably not be required for some time. Average hunter use of the proposed acquisition area for a 100-year project life is estimated at 7,000 hunter-days annually valued at \$31,000. Purchase price of the requested 180-acre land area is estimated at \$180,000. This cost should be a nonreimbursable project cost. Cost of improvements, which would be largely deferred until hunting demand warranted the expenditure, is estimated at \$50,000. Operation and maintenance costs, most of which would also be deferred, are estimated at \$4,000 annually. Development and operation and maintenance costs would be the responsibility of the Washington Department of Game.

No land is proposed for Federal acquisition on Avon Bypass project except the 180-acre tract referred to above. Right-of-way and other project area tracts will be acquired by local sponsors. Some public access restrictions will be required for public safety and conservation and development of fish and wildlife.

Avon Bypass right-of-way will be comparatively narrow; therefore, entry to adjacent land to retrieve birds killed from the right-of-way would be essential if indicated hunter-use values are to be realized. This would require access easements. Easements should include access during the hunting season to 1/4-mile-wide strips on each side of the right-of-way where hunting is permitted. Crossing stiles would then be necessary along right-of-way fences. Easement provisions and other shooting-ground rules would probably require enforcement personnel. Cost of easements is estimated at \$8,800 annually. Operation and maintenance costs are estimated at \$3,000 annually. Stile construction cost is estimated at \$2,000. Easement costs should be nonreimbursable project costs. Cost of stiles should be borne by the sponsoring agency, as stiles would be integral parts of the fence. Operation and maintenance costs would be the responsibility of the Washington Department of Game.

A few ring-necked pheasants will be produced along the bypass right-of-way, but most of the harvest will result from stocking by the Washington Department of Game. Stocking costs are estimated at \$3,500 annually. The success of any pheasant stocking program and natural production of

upland game will depend on the type and amount of cover that would be developed through planting or otherwise.

Since fish and wildlife conservation, improvement, and development are proposed as a purpose of the bypass project, right-of-way portions not reserved for other uses should be managed by the Washington Department of Game. This should include the west section of the channel until it may be utilized for salmon propagation by the Washington Department of Fisheries. The Department of Game agrees to assume some operation and maintenance costs for resource development, but budgetary limitations will dictate the extent of such expenditures.

Under the flood control plan the lower pool section will be about three miles long, and too shallow through most of its length to assure fish survival. An additional intermediate weir installed approximately one mile above the downstream control structure would make it possible to produce fish in this channel section. With this weir installed, water depth in the lower pool would range from about 7 feet to about 5 feet. In the second pool, depth would range from about 10 feet to about 8 feet, and in the upper pool from about 13 feet to about 9 feet. Additional studies will be necessary to determine more precisely the best location for weir installations for fish production. Cost of the additional weir should be a nonreimbursable project cost.

Right-of-way fencing is essential to control access to adjoining private lands and to protect upland-game habitat proposed for development by the Washington Department of Game on right-of-way lands. Fencing and the associated maintenance should be the responsibility of the local sponsoring agency except on areas purchased exclusively for fish and wildlife.

Skagit River is a vital spawning and rearing area for anadromous fish. So, extreme care must be used in timing and mode of project construction involving the streambed to minimize interference with upstream or downstream movements of fish. Consequently, channel work should be accomplished only from June 1 to August 15. Increasing the silt load in the stream would have undesirable effects on fish and fishing at any time.

RECOMMENDATIONS

It is recommended:

1. That the reports of the District Engineer, Corps of Engineers, include the conservation, improvement, and development of fish and wildlife resources among the purposes for which the projects are to be authorized or reauthorized.

2. That the report of the District Engineer, Corps of Engineers, on the Avon Bypass project, recommend that a zoning plan be developed in connection with overall planning to insure that the channel area between the intake and outlet structures will be available for various fish and wildlife purposes without conflicting uses for general recreation. It is further recommended that such plan include a stipulation prohibiting public use of motorboats in the area specified above. The zoning plan should be developed cooperatively by the agency expected to administer the area, the Washington Departments of Fisheries and Game, the Corps of Engineers, and the Bureau of Sport Fisheries and Wildlife.

3. That the report of the District Engineer, Corps of Engineers, on Avon Bypass project, recommend that all land in the east 1/2 of Sec. 6, T. 34 N., R. 3 E., W.M., not required for flood control purposes, be acquired for public access to tidal waters and for public hunting and fishing; and that cost of acquisition of this area, which contains approximately 180 acres above mean high water, be a nonreimbursable project cost. Estimated cost of acquisition is \$180,000.

4. That the report of the District Engineer, Corps of Engineers, on Avon Bypass project, recommend that easements granting the right of ingress and egress for the purpose of retrieving game birds shot on project land during the hunting season be acquired on 1/4-mile-wide strips on each side of the right-of-way where hunting is to be permitted. This area would include approximately 1,750 acres. Annual cost of easements, estimated at \$8,800, should be a nonreimbursable project cost. Operation and maintenance costs, estimated at \$3,000 annually, would be borne by Washington Department of Game.

5. That the report of the District Engineer, Corps of Engineers, on Avon Bypass project, recommend that one additional intermediate weir be installed in the bypass channel in order to facilitate water control for fishery management. Cost of this weir should be nonreimbursable.

6. That the report of the District Engineer, Corps of Engineers, on Avon Bypass project, recommend that a cooperative agreement be formulated among Washington Departments of Fisheries and Game, Bureau of Sport Fisheries and Wildlife, Corps of Engineers, and the administering agency, to delegate management and development of the fish and wildlife resources of the project area to Washington Department of Game, except management of the channel area between the outlet works and the section line between Secs. 10 and 11, T. 34 N., R. 3 E., W.M., which should be reserved for the propagation and management of anadromous fish by Washington Department of Fisheries, if that agency so desires. Management of bypass drawdown to allow egress of entrapped immature anadromous fish should also be a prerogative of Washington Department of Fisheries.

7. That the report of the District Engineer, Corps of Engineers, on Avon Bypass project, recommend that final design of water control facilities incorporate Denil fish ladders at each water control structure. Design criteria should be developed in cooperation with Washington Departments of Fisheries and Game and the Bureau of Sport Fisheries and Wildlife.

8. That the report of the District Engineer, Corps of Engineers, on Avon Bypass project, recommend that, with the exception of areas purchased exclusively for purposes other than flood control, the right-of-way be fenced by the local sponsoring agency, and that stiles permitting access to lands proposed for access easement be included in fences. Stiles should be rendered inoperative except during the hunting season for upland game birds and waterfowl. Cost of stiles, which should be a nonreimbursable project cost, is estimated at \$2,000.

9. That the report of the District Engineer, Corps of Engineers, on the channel work proposed for Skagit River and North Fork Skagit River downstream from the Avon Bypass inlet, recommend that such work be restricted to the period June 1 to August 15, and that silting of the stream be prevented to the greatest extent that is reasonably possible.

10. That the following language be incorporated in the recommendations of the report of the District Engineer, Corps of Engineers:

a. "That additional detailed studies of fish and wildlife resources be conducted, as necessary, after the projects are authorized or reauthorized in accordance with Section 2 of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); and that such reasonable modifications be made in the authorized project facilities and operation as may be agreed upon by the Director of the Bureau of Sport Fisheries and Wildlife and the Chief of Engineers for the conservation, improvement, and development of these resources.

b. "That all project lands and waters in the project areas be open to public use for hunting and fishing except for sections reserved for conservation and development of fish and wildlife, safety, efficient operation, or protection of public property.

c. "That leases of project land in the project areas reserve the right of public use of such land for hunting and fishing."

Please advise us of any subsequent revisions or refinements in your engineering plans so that we may have the opportunity to make such comments as may be necessary.

Sincerely yours,



Regional Director

Attachments

STATE OF
WASHINGTON
ALBERT D. ROSELLINI
GOVERNOR



DEPARTMENT OF
FISHERIES
GEORGE C. STARLUND
DIRECTOR

ROOM 115, GENERAL ADMINISTRATION BUILDING
OLYMPIA, WASHINGTON 98502

AIR MAIL

May 4, 1964

Bureau of Sport Fish & Wildlife
P. O. Box 3737
1002 N.E. Holladay
Portland 8, Oregon 97208

RE: Interim Report - Skagit Basin

Gentlemen:

The Department of Fisheries will concur in the "Interim Report on Fish and Wildlife Resources Affected by Proposed Corps of Engineer Projects in the Skagit River Basin".

This concurrence is on the basis that the suggestions made in our letter of March 26, 1964 are incorporated in the text of the report.

Very truly yours,

George C. Starlund
George C. Starlund
Director

GCS-RBA:lj

cc: Department of Game



*Game Commissioners / Charles T. Graham, Chairman, Colville
Arthur S. Coffin, Yakima; James H. Ralls, Wilson Creek;
Richard S. Seward, Seattle; Harold A. Pebbles, Olympia;
Albert T. Prichard, Kalama*

Director of Game / John A. Biggs

State of Washington

DEPARTMENT OF GAME

600 North Capitol Way / Olympia, Washington 98502

February 24, 1964

Regional Director
Bureau of Sport Fisheries and Wildlife
P. O. Box 3737
Portland, Oregon 97208

ATTN: Harry A. Goodwin, Chief, Division of Technical Services

Dear Sir:

We have reviewed the draft of the interim report on the Skagit River Basin. This draft of the interim report meets with our approval.

Very truly yours,

THE DEPARTMENT OF GAME

John A. Biggs
John A. Biggs, Director

RWL/mjb

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