



STATE OF
WASHINGTON

Dixy Lee Ray
Governor

DEPARTMENT OF FISHERIES

302 Sharon Avenue, Burlington, Washington 98233 206/755-0421

August 21, 1978

To: Karen Mettling
Department of the Army
Seattle District, Corps of Engineers
P. O. Box C-3755
Seattle, Washington 98124

From: Russ Orrell *RO*
Skagit Lab

Subject: Skagit River Levee and Channel Improvement Project

The following is submitted in response to the information requested in a letter dated July 27, 1978:

1. Escapement and harvest data have been provided.
2. The Department of Fisheries has a number of salmon enhancement programs planned for the Skagit River basin. These projects are as follows:

Skagit Hatchery

Starting with the 1976 brood year increased effort has been extended towards collection of native spring and summer chinook. Eggs taken during this program have been included in the Skagit Hatchery artificial production program for development of hatchery brood stock. Spring chinook egg takes for 1976 and 1977 were 30,000 and 170,000 respectively. Summer chinook egg takes for corresponding years were about 400,000 annually. If funded, two additional ponds will be constructed to accommodate production of 2,000,000 spring chinook smolts (200,000 pounds) and require an egg take of 3,000,000.

Chum salmon production from the Skagit Hatchery is scheduled for about 25 million, the eggs to be taken from native stocks. Attainment of this goal will be dependent upon success of brood stock collection and adult returns.

Skagit - Baker River Hatchery

This hatchery is proposed for Sulfur Creek, a tributary to Lake Shannon in the Baker River system. Included in Phase I of this proposal are two $\frac{1}{2}$ acre ponds and 8 - 10' x 100' raceways. Production from phase I will include 2.5 million coho smolts and 10 million chum. All chum will be released into the Nooksack River, while coho will be released in the Baker River below the barrier dam. Phase II of this program would include construction of a third one half acre pond.

P004549

State

Egg Incubation Box Program

This program was initiated in 1977 with the installation of a pink egg incubation box on Jones Creek. Total fry production was 250,000. The degree of expansion of this program will depend upon available sites, success of brood stock development, and funding.

Habitat Improvement

This program involves the improvement of natural spawning and rearing areas through gravel replacement or cleaning, gabion installation, and flow augmentation. The Hooper Slough project is presently being completed. Production will be dependent upon adult utilization, however, fry production has been shown to greatly increase following application of these techniques. Other potential projects include Corkindale Creek, Marblemount Slough, Illabot Slough and Red Cabin Creek.

3. Modification of shoreline habitat through conversion of shore zones to rock rip rap, or the development of additional sand bars resulting from modification are potentially detrimental to salmon resources. The shore zone is the primary migration and rearing area for juvenile salmon. Though abundance is highest during the spring months, juvenile coho and chinook reside in this zone the entire year. The importance of this zone to rearing salmonids has been well documented, however, the effect of conversion from a natural sandy, vegetated shore zone to one of rip rap should be investigated. Modification from a gradually sloping beach to a more steeply sloped beach could also increase predation, as smaller juvenile salmon seek protection in shallow water.

Presently there is a fry stranding problem in the lower Skagit which results from peaking hydroelectric dam discharge. During the spring juveniles become trapped along sand bars and perish as the river recedes. Stream bank modification resulting in alteration of geo-hydraulic patterns could create additional sand bars, providing additional stranding areas.

Buried or weighted levee toes represent another modification of existing natural shore zones and as a result are not preferred for protection of fish.

4. The effect of channel modification at RM 2-3 and RM 5-6 on juvenile outmigration cannot be completely evaluated until the engineering and design data are available. However, loss of cover (discussed under 6) would effect juvenile behavior. The extent of impact would be dependent upon the length of time needed to re-establish shore cover. If modification included excavation of streambed material, maintenance dredging may be required. Suction dredging can be detrimental to juvenile salmon.

Spawner migration would not be effected.

5. No.

6. Clearing of bank vegetation, or loss of vegetation due to heavy equipment operation, would not affect spawner migration, however, juvenile salmon migration habits and available rearing area would be affected. Loss of cover would include streambank trees and shrubs as well as vegetation and debris within the wetted perimeter of the river. Alteration of the physical habitat reduces fish production for some time. Salmonid carrying capacity is related to cover, any reduction in cover reducing carrying capacity. Reduction of bank cover could also result in accelerated movement of juveniles into downstream or estuarial areas.

Shore cover is important to juvenile salmon during periods of higher than normal streamflow, juveniles seeking protection in these lower velocity areas. Again, loss of cover could result in displacement.

7. Loss of shore cover resulting from levee improvement and alteration of the shore zone would effect juvenile salmon for those reasons stated above. Determining the degree of impact is not possible without more comprehensive design data, but in general the project impact on salmon resources will increase in relationship to the amount of streambank modification.

8. For dredging within the river for weighted toes, or channel modification, the months of peak juvenile abundance should be avoided (March, April, May and June). During the remaining months juveniles continue to occupy the shore zone and care must be taken to avoid their removal. Proper operation of the cutter head or drag line bucket normally minimizes problems.

9. Salmon do not spawn within the project area, spawning beginning about $\frac{1}{4}$ mile below the highway 9 bridge.



The above can be discussed in detail at the August 29 workshop.

RFO: ei

P004551