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SALMON HABITAT IMPROVEMENT RECONNAISSANCE
PRINCE WILLIAM SOUND, CORDOVA AND ANCHORAGE DISTRICTS
SEPTEMBER 1965

INTRODUCTION

From September 2 through September 8, I accompanied John Standerwick, Cordova District Ranger; Robert Roys, Alaska Department of Fish and Game Biologist; and boat skipper Harry Curran, also of the Alaska Department of Fish and Game, on the "MV Shad" on a fisheries habitat improvement reconnaissance in Prince William Sound.

The purpose of this trip was to discover new habitat improvement projects, and inspect completed projects. Emphasis was placed on those salmon streams which suffered extreme damage from the March 27 earthquake. Sketch maps and photos are included in the appendix of a limited number of this report. Maps were made by Alaska Department of Fish and Game previous to the March 27 earthquake to illustrate the Stream Catalog of Prince William Sound (not yet published). The intertidal zones of streams for which maps are included have changed considerably since the maps were made because of uplift or subsidence of the land. Streamflow in most of the streams examined was low at the time of our visit.

Fourteen streams are reported on; seven of these are representative of uplifted areas, four are representative of subsided areas, and three are completed habitat management projects.

Damage to the salmon resource in Prince William Sound because of the earthquake, although being evaluated by Alaska Department of Fish and Game and Bureau of Commercial Fisheries, cannot as yet be fully comprehended. In brief, large expanses of intertidal spawning areas were probably lost to future production because of land subsidence. On the other hand, uplifted areas will increase the extent of spawning area. This increase will not be felt however, until stream channels have stabilized; streams are still cutting downward and laterally. In addition, uplift of former lower intertidal zones has created a spawning environment in which there is an excessive amount of sediment which does not contribute to high survival of salmon eggs and alevins.

Streams in uplifted areas will, in time, stabilize. Since no one knows how much time stabilization will require, it might be possible to accelerate the rate of stabilization (and return of these spawning areas to productivity). Such acceleration presents a tremendous opportunity for habitat management in Prince William Sound.

In the Sound, according to Alaska Department of Fish and Game personnel in Cordova, there are about 25 elevated land type streams and about 12 of the subsided types.

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STREAMS EXAMINED AS POTENTIAL HABITAT MANAGEMENT PROJECTS

Pautzke Creek, No. 775, Zaikof Bay. This is a relatively small stream (discharge 5 cfs at time of visit), with a current escapement of about 10,000 salmon and a reported 30,000 salmon contributed to the fishery. Stream now goes underground at the 11 foot tide level. A pond below this level is cut off from salt water by a spit created by the tsunami. When this pond contains hundreds of salmon, water interchange is insufficient to allow the salmon enough dissolved oxygen for survival. Between 500 and 1000 unspawned carcasses of pink and chum salmon were observed in this pond. Recommend that high places in the channel be cut down with a cat or an end loader to eliminate the isolated pond and to insure unimpeded entry of salmon into upstream spawning areas.

Stream No. 767, Zaikof Bay. A small stream (discharge 1 cfs on 9/3) which disappeared into the gravel in several places. In the dry stream channel between the ponds at the upstream end, there were 200-300 spawned carcasses. Salmon had entered and spawned on higher water levels. Afterwards the water table had dropped at least 16 inches, leaving the deposited eggs above the water table. Any survival of these eggs is doubtful. Recommend cutting stream to consistent grade with heavy machinery.

Udall Creek, No. 770, Zaikof Bay. Stream forks at edge of timber, forks forming a common channel which runs for about 1000 lineal feet into the lower tide zone. Discharge and potential spawning area in the three forks and mainstream were as follows:

Stream Section	Potential Spawning Area (in sq. ft.)	Discharge (in cfs)
Right Fork	2000	3
Middle Fork	5000	5
Left Fork	3000	3
Mainstream	4500	11
Total	14,500	11 (all flow in mainstream)

The mainstream, as other streams in Zaikof Bay, disappeared into the gravel. There are two recommendations: first, to eliminate the problem of the stream going underground, we recommend a 1000 foot channel, cut to established pre-determined grade through the uplifted area, most of which is above high tide. An impervious underlay may be needed to prevent loss of water. Test holes must be dug to find out if gravel underlay is suitable for salmon spawning. There may be up to 6 feet of overburden to remove to achieve the proper grade for the stream channel. This can only be determined by a topographic survey.

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Second, an old stream channel connects the upper part of the middle fork to another small stream to the northwest (No. 769). Water now coming down the other stream apparently once came down No. 770. Since the other stream has comparatively mediocre spawning potential, we recommend that a dam be placed in this stream (see map) to route all, or a major portion of the water down No. 770. This would provide No. 770 with more water during periods of low streamflow.

Shad Creek, No. 749, Stockdale Harbor. A small, very productive stream (escapement 7,000 pinks, 3,000 offmouth) with many log jams. Recommend log jams be removed at the discretion of District Ranger. Removal of jams will increase spawning area.

Wild Creek, No. 745 Port Chalmers. A productive salmon stream (escapement 2,000 pinks, 500 chum) with a high enough streamflow to continue the cutting which has been taking place. There is a large quantity of gravel at the site and a wide floodplain. Recommend an engineering examination to determine suitability for an artificial spawning channel (could be about 1,000 feet long). Maximum discharge data would have to be obtained from crest gaging.

Wilby Creek, No. 744 Port Chalmers. Another productive salmon stream (escapement 5,000 pinks, 2,000 off mouth, plus 1,000 chum) successfully engaged in cutting to grade. Therefore, no recommendation for habitat improvement at this time.

Chalmers Creek, No. 741, Port Chalmers. This is a larger river than others examined on Montague Island (discharge 20 cfs). Twenty-two thousand chum salmon were spawning and at least 5,000 pinks were spawning or had spawned in the mainstream and two forks. Down-cutting and channel changes are occurring at high water levels. Apparently instability of channel is greatly contributed to by a stream entering the Chalmers River from the valley on the extreme left (facing upstream). At the time of our visit the streambed from the valley was dry because uplift had caused water to run underground.

Recommendations:

1. Streambed gravels contain a large amount of fine material; until stream channel stabilizes, however, it is doubtful if gravel cleaning would have lasting results.

2. Again, as with the other streams in the uplifted areas, cutting the channel to an established grade with heavy machinery should accelerate rate of stabilization.

3. Investigate the feasibility of directing the water issuing from the valley on the left permanently away from the Chalmers River. This approach alone could contribute to the stability of the mainstream. If,

after diversion of excess water, maximum streamflow of the Chalmers River does not exceed that required for construction of a flood plain channel, such a channel should be considered. The flood plain through which a channel could be built is much more than 1/2 mile wide.

Harrison Lagoon, Port Wells. An impassable fall is located in this stream just above high tide. Before the earthquake there was extensive spawning area in the intertidal zone, supporting as much as a 200,000 escapement of pink and chum salmon. Land subsidence of about 6 feet has almost put this stream out of production. Salt water now covers the area much of the time; in addition, the tsunami deposited a large quantity of sediment over the entire area.

No definite recommendations: the fall is quite high (70-100 feet) and would be prohibitively expensive to ladder. One thing that might be done, and this is probably impractical, is to haul in enough properly sized gravel to make a better spawning area from the bottom of the fall to the new 6 foot tide level. Since we visited the area at high tide, I do not know how much area this would create.

Meacham Creek, No. 430, Pigot Bay. Land has subsided about 6 feet, inundating the once productive intertidal spawning area. The tsunami brought in a large quantity of sediment. Consequently, the upstream spawning areas are all that remain; in these upstream spawning areas there are many deadfalls and the heavy growth of willow growing on the streambanks lies in the streambed when covered by snow. Gravels are heavily sedimented because of materials pushed in by the tsunami.

Recommend that: 1) log jams and deadfalls be removed from the stream channel, 2) willow along bank be cut back 10 to 15 feet for a lineal distance of a half mile if such cutting does not interfere with bank stability and, 3) use the gravel cleaner when it becomes available. Discharge was 8-10 cfs.

Swanson Creek, No. 432, Pigot Bay. A larger stream than Meacham Creek (discharge 20 cfs), there is not the same problem with deadfalls or willows, and the gravels appear to be much cleaner. Extensive spawning area in the intertidal zone was, however, lost because of land subsidence. The only recommendation is use of the gravel cleaner if results would be cf a long enough duration to make it worthwhile.

Hobo Creek, Hobo Bay, Port Wells. Hobo Creek was reported on in the second reconnaissance report for Prince William Sound, and has been considered for habitat management for three years. A land subsidence of one or two feet now enables salmon to go farther past the previous partial velocity blocks on extreme high tides.

Recommend that this stream be closely observed to obtain more information on problems salmon are having in negotiating the velocity barriers just above tidewater. If land subsidence has eliminated the partial velocity barriers, the run should build up. If the velocity barriers still present a serious obstacle to upstream migration, remedial work should be considered. The extensive upstream spawning areas in this stream make it one of the more important potential habitat management projects in Prince William Sound.

EXAMINATION OF COMPLETED PROJECTS

Three completed habitat management projects were examined. Observations follow:

Shrode Creek, No. 476, Long Bay. The complete history of design and construction of the habitat improvement in Shrode Creek is well documented elsewhere. On our visit, the water bypass structure and stepped fishway wereworking well. Seventy-five thousand pink salmon were estimated to be evenly distributed from the modified fall to Shrode Lake, a lineal distance of about 0.6 mile. The almost continuous spawning riffles are composed of several different types of gravel, ranging from pea-size to boulders. Although Alaska Department of Fish and Game has been unable to sample for pre-emergent fry in the spring, because of tremendous snowfall and late melt (some snow was still present in the valley at sea-level in September) they do intend to sample to determine egg deposition and mortality in the fall to compare with other streams. The one remaining problem at Shrode Creek is a too shallow pond at the foot of the stepped fishway.

Recommend that a permanent drop structure be constructed at the downstream end of the shallow pond to raise the water level and eliminate necessity for yearly placement of large rocks to accomplish the same thing.

Also recommend that the potential for gravel cleaning in Shrode Creek be thoroughly evaluated. The stream is backed by two lakes that act as sediment traps and also regulate streamflow. There is very little bank cutting or other occurrences that contribute to sediment. Therefore, Shrode Creek can be considered as probably the best potential gravel cleaning area in Prince William Sound.

Billy's Creek, No. 218, Port Wells. Two sections of aluminum steeppass were installed in this stream to facilitate passage of sockeye salmon over a partial barrier fall. The history of design and construction are documented elsewhere.

The ladder was in good condition at the time of our visit. Although no fish were observed, Alaska Department of Fish and Game reported that 4000-5000 sockeye salmon had entered the system through the steeppass earlier in the summer. No recommendations.

Control Creek, No. 52, Olsen Bay. Modification of an impassable fall close to tidewater had been accomplished by the Forest Service just prior to our visit. The Alaska Department of Fish and Game biologist felt that the steps blasted in the fall are too shallow and too short to allow fish passage. Control Creek was, at the time of our visit, carrying sediment and running 800-1000 cfs as a result of 5 inches of rain in 24 hours. Water velocity in mid-channel below the fall was 6-10 feet per second. Above and at the fall the stream was so high and discolored it was impossible to observe the fishway.

Recommend that the fishway be fully evaluated next summer. If it is not working properly additional blasting and/or installation of steeppasses should be undertaken.

SUMMARY OF RECOMMENDATIONS

A summary of the recommendations given in this report is as follows:

1. Initiate a pilot study in uplifted areas in Zaikof Bay as soon as possible to determine whether or not the rate of stream stabilization can be accelerated. This study will entail using heavy machinery plus dynamite to cut down through the overburden so the streams can attain the grade they maintained prior to the earthquake. This approach has been discussed with Forest Service and Alaska Department of Fish and Game engineers: they concur that the approach can be successful. The first step will be to conduct a topographic survey to determine the extent of overburden that must be removed and to set lines to maintain grade for lineal distances up to 1000 feet or more. Test holes must also be dug or blasted to whatever depth is necessary to find out if the gravel underlay is suitable for salmon spawning. The objective would be to stabilize the channels at a 3 to 5 tenths percent grade.

   Channel sides should be established beyond the angle of repose of the material so that bank sloughing will not occur on higher streamflows. It may be necessary to underlay the bottom of the channel with plastic, or other impervious material to prevent loss of water through seepage. The pilot study would be observed for at least a year to find out if this type of habitat improvement was successful. If successful, then other streams in the uplifted areas could be treated in a similar manner.

2. Cut down high places in the channel of Pautzke Creek to eliminate isolated pond and to insure unimpeded entry of salmon into upstream spawning areas.

3. In addition to recommendations in 1 above, place dam in Udall Creek system to concentrate streamflow in one stream.

4. Remove log jams in Shad Creek.

5. Investigate possibility of constructing a flood plain spawning channel in Wild Creek. Crest gaging needed first.

6. Investigate possibility of channelizing Chalmers River; also check on feasibility of diverting water from valley on left away from main-stream. If streamflows are not excessive, examine possibility of constructing flood plain spawning channel.

7. Remove log jams and debris from stream channel of Meacham Creek; cut willow along bank and use gravel cleaner when it becomes available.

8. Clean gravels in Swanson Creek.

9. Continue to evaluate Hobo Creek as a potential habitat management project.

10. Construct permanent drop structure at bottom of fishpass in Shrode Creek, and consider this stream for future gravel cleaning.

11. Thoroughly evaluate the Control Creek fishway during the spawning season of 1966. If this fishway is not effective, undertake additional blasting or installation of aluminum steeppasses.

12. The R10-2600-5 Fish Habitat Improvement Reconnaissance form will soon be distributed to the Forests. We suggest that information from the September 2-8 reconnaissance trip be entered on these forms and a file set up for them.

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