

Exxon Valdez Oil Spill
Restoration Project Final Report

Prince William Sound Cutthroat Trout, Dolly Varden Char Inventory

Restoration Project 97302
Final Report

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Study History: This one-year project was initiated under Restoration Project 97302. Funding for FY 98 was provided for writing this report, which is the first and final report.

Abstract: Research on anadromous Dolly Varden char (*Salvelinus malma*) and cutthroat trout (*Oncorhynchus clarki*) in Prince William Sound has been hampered by the lack of basic information on their distribution. Earlier studies stated that there are only a few streams in Prince William Sound with these species, but after consultation with local residents, it appeared these fish were more widespread than previously believed. Given these uncertainties, we consulted local residents, government agencies, Native groups, and other knowledgeable individuals to determine where these species could be found. Streams and lake systems were surveyed by field crews to determine the presence or absence of these species. We found 29 lakes and streams which had undocumented populations of these and other anadromous fish species. The number of undocumented populations by species were as follows: 23 Dolly Varden, 21 cutthroat trout, 14 coho salmon (*O. kisutch*), two sockeye salmon (*O. nerka*), and one chum salmon (*O. keta*). Six resident Dolly Varden and six resident cutthroat trout populations were also identified. The results of this study are being used to update the Alaska Department of Fish and Game Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes, (Anadromous Waters Catalog) and assist the research being conducted under EVOS project 96145.

Key Words: Exxon Valdez, Prince William Sound, Dolly Varden char, *Salvelinus malma*, cutthroat trout, *Oncorhynchus clarki*.

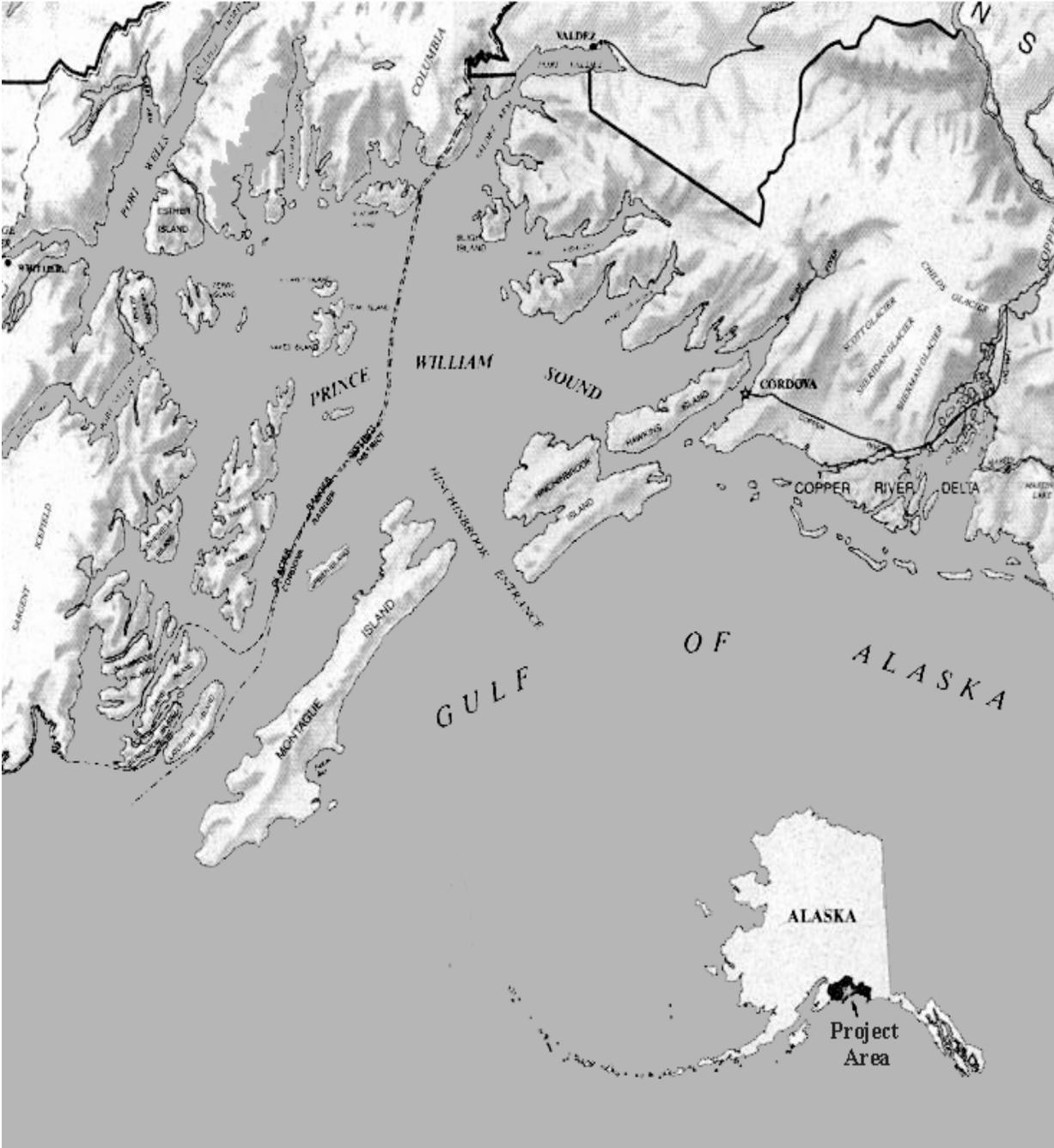
Project Data: Twenty-nine streams and lakes were submitted for addition to the Anadromous Waters Catalog. There were 23 nominations for Dolly Varden, 21 nominations for cutthroat trout, 14 nominations for coho salmon (*O. kisutch*), two nominations for sockeye salmon (*O. nerka*), and one nomination for chum salmon (*O. keta*). The custodian of this data is the Alaska Department of Fish and Game. The Anadromous Waters Catalog is updated on an annual basis. A copy of the Anadromous Waters Catalog is located at most Alaska Department of Fish and Game area offices.

There were also six resident Dolly Varden and six resident cutthroat trout sites identified but not nominated for inclusion in the Anadromous Waters Catalog. This information was submitted to the Alaska Department of Fish and Game for their reference.

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Table of Contents

	<u>Page #</u>
Location Map.....	1
Executive Summary.....	2
Introduction.....	3
Objectives.....	4
Methods.....	5
Results.....	6
Discussion.....	8
Conclusions.....	10
Literature Cited.....	11



Project Location: Prince William Sound Alaska

Executive Summary

In 1996 and 1997, we conducted an inventory of Dolly Varden (*Salvelinus malma*) and cutthroat trout (*Oncorhynchus clarki*) populations throughout Prince William Sound. The inventory was initially undertaken because of the difficulty researchers had locating populations of these species for a genetics study. We found that there had been very little documentation of the distribution of trout or in the area. Previous studies indicated that there were only a few streams with these species, but after consultation with local residents it appeared that these species were more widespread than previously believed.

Local residents, government agencies, historic documents, and Native groups, were consulted to determine where these species could be found. The Alaska Department of Fish and Game Anadromous Waters Catalog was also consulted. Stream channel type information, aerial photographs, and the documented presence of other salmonid species were also used to predict where these species might be found. This information was compiled and sites were chosen to be surveyed for field verification.

We found 29 streams and lakes for nomination to the Anadromous Waters Catalog. There were 23 nominations for Dolly Varden char, 21 nominations for cutthroat trout, 14 nominations for coho salmon (*O. kisutch*), two nominations for sockeye salmon (*O. nerka*), and one nomination for chum salmon (*O. keta*). There were also six resident Dolly Varden and six resident cutthroat trout sites identified but not nominated for inclusion in the Anadromous Waters Catalog. This information was submitted to the Alaska Department of Fish and Game for their reference.

This project has provided valuable information on sampling sites for EVOS project 96145, which is a study of the genetic relationships among Dolly Varden and cutthroat trout populations in the Sound. In the future, this information will provide baseline data for other researchers, resource managers, anglers, and any others with an interest in these species.

Introduction

In 1996, the researchers of *EVOS* project 96145 had difficulty locating populations of Dolly Varden (*Salvelinus malma*) and cutthroat trout (*Oncorhynchus clarki*) for a genetics study in Prince William Sound. The researchers were looking for populations of these species to determine the genetic relation between resident and anadromous forms within the same watershed and among watersheds. After reviewing the available literature and other sources, it became apparent that little was known about the distribution of these species.

The Alaska Department of Fish and Game Anadromous Waters Catalog (1994 revision) provided little help in locating populations, since the emphasis has been on the location of salmon streams. A report by Hepler et al. (1993) reported only 14 lacustrine systems with anadromous Dolly Varden and 10 with anadromous cutthroat trout in Prince William Sound. This assisted the researchers, but more sites were needed. Discussion with local residents about Dolly Varden and cutthroat trout revealed a larger number of populations of these species than previously believed.

Thus, the basic hypothesis is that there are a number of undocumented anadromous and resident populations of Dolly Varden and cutthroat trout in Prince William Sound. A more complete and accurate inventory of these species and the systems they inhabit is needed for any realistic understanding and management of these species in the future.

Baseline data on distributions of these species will provide an information base for future studies and help in the eventual determination of whether these species have recovered from the oil spill. If there are substantially more stream systems with these fish than previously believed, it may be necessary to reconsider the overall impact of the oil spill and what constitutes injury to these species. Additional knowledge of the locations of these species will be valuable for their protection if there is another oil spill or other man-made or natural disaster.

Objectives

1. Determine the presence or absence of anadromous cutthroat trout and Dolly Varden populations in stream systems in Prince William Sound by conducting interviews with local residents, consulting reports from other agencies, contacting Native groups, and consulting local sportfishing clubs.
2. If there is no information on a stream system, or there is some uncertainty about the information obtained from other sources, conduct limited surveys to confirm the presence or absence of these species.
3. Compile the information on population locations from this project and other studies for inclusion in the Alaska Department of Fish and Game Anadromous Waters Catalog.
4. Make results available for researchers of *EVOS* project 96145 for possible inclusion with their genetics studies.

Methods

We began our search for streams with populations of Dolly Varden and cutthroat trout in Prince William Sound by consulting the Anadromous Waters Catalog (1994 revision). This is the official record of all anadromous waters important for spawning, rearing or migration of anadromous fish in Alaska. As mentioned earlier, however, the main emphasis in the catalog has been on salmon species, which are more commercially important.

We also reviewed previous studies of Dolly Varden and cutthroat trout in Prince William Sound. Hepler et al. (1993) reported several streams with Dolly Varden and cutthroat trout populations which were not listed in the Anadromous Waters Catalog. Other site locations were found by looking through unpublished survey data by the USDA Forest Service, and reports by the Prince William Sound Aquaculture Corporation (Barto and Nelson 1982, Barto et. al. 1984, Pellissier et. al. 1984, Pellissier et. al. 1985). It was hoped that this method would provide many sites, but few were found. These reports mainly looked at the presence of salmon species, with little reference to Dolly Varden or cutthroat trout. Unrecorded sites were also identified by EVOS project 96145.

Other sites were located using aerial photographs, topographic maps, streams channel type classifications (as defined by Rosgen 1985), and the documented presence of other salmon species. In many cases this information led us to believe that there would be a high probability that or trout population would exist at a particular location.

The main effort of this project, however, was spent obtaining information on the distribution of these species from local residents, sportfishing clubs, Native organizations, agency biologists, and other knowledgeable individuals. Individuals and organizations were generally contacted by telephone. The investigator explained the purpose of the project, and if the individual was willing, an interview was conducted then or a later meeting was arranged. Discussions with these sources met with varying success, but the information gained through this method was substantial. All reported populations were verified by crews doing stream surveys. If no fish were found at these sites, the streams were not reported as anadromous waters.

The field surveys started at the point the stream entered saltwater and continued upstream until a barrier to anadromous fish passage was encountered. A barrier was defined as a vertical drop of six feet for Dolly Varden and cutthroat trout (USDA Forest Service Alaska Region, Fish Habitat and Stream Survey Procedures, unpublished). The surveys continued upstream above the barrier to the headwaters or until the gradient was too steep for fish to inhabit. Fish located above the barrier were considered a resident form. Lacustrine systems were also surveyed using the same methods. If no barriers were found on the system it was assumed that fish had access to the ocean and thus were classified as being anadromous.

Presence or absence of a species was confirmed using a variety of capture methods depending on the site and conditions at the site. These included baited minnow traps, larger funnel traps, electroshockers, seine nets, and hook and line.

Results

We found 23 Dolly Varden char, 21 cutthroat trout, 14 coho salmon, two sockeye salmon, and one chum salmon sites for nomination to the Anadromous Waters Catalog (Table 1). The nomination information submitted to and required by Alaska Department of Fish and Game included the cataloged water number if applicable, common name of water way, type of nomination, observation information, comments, and a detailed map of the location. This information was also provided to the researchers of *EVOS* project 96145. We found six resident Dolly Varden populations and six resident cutthroat trout populations (Table 2). The resident population locations have been submitted to researchers of *EVOS* project 96145, and to the Department of Fish and Game for their information, but not inclusion in the anadromous waters catalog.

Table 1. Locations of streams with previously undocumented anadromous populations of cutthroat trout, Dolly Varden char, coho salmon, sockeye salmon, and chum salmon.

Location							
Common Name	ADF&G Anadromous Waters Catalog #	Anadromous	Species			Stream	Lake
Gravina River Lake	221-30-10500-2015	Yes	Coho	Dolly Varden		X	
Gravina River -	221-30-10500-2015-0010	Yes	Coho	Dolly Varden			X
N/A	226-30-16870	Yes	Cutthroat	Dolly Varden		X	
N/A	226-30-16870-0010	Yes	Cutthroat	Dolly Varden			X
Otter Lake Creek	226-30-16880	Yes	Cutthroat	Dolly Varden		X	
Otter Lake	226-30-16880-0010	Yes	Cutthroat	Dolly Varden			X
Green Island Creek	227-20-17880	Yes	Cutthroat	Dolly Varden		X	
Green Island Lake	227-20-17880-0010	Yes	Cutthroat	Dolly Varden			X
Port Chalmers Creek	227-20-17464	Yes	Dolly Varden	Coho		X	
Port Chalmers Lake	227-20-17464-0010	Yes	Dolly Varden	Coho			X
Jack Pot Bay	226-20-16075	Yes	Dolly Varden			X	
Eshamy Lake Creek	225-30-15110	Yes	Cutthroat			X	
Eshamy Lake	225-30-15110	Yes	Cutthroat				X
Gun Boat Creek	225-30-15070	Yes	Cutthroat	Dolly Varden		X	
Gun Boat Lake 1	225-30-15070-0010	Yes	Cutthroat	Dolly Varden			X
Gun Boat Lake 2	225-30-15070-0020	Yes	Cutthroat	Dolly Varden			X
Gun Boat Lake 3	225-30-15070-0030	Yes	Cutthroat	Dolly Varden			X
Stump Lake Creek	227-30-17820	Yes	Cutthroat	Sockeye		X	
Stump Lake	227-30-17820-0010	Yes	Cutthroat	Sockeye			X
Quadra Creek	227-10-17110	Yes	Dolly Varden	Coho		X	
Hanning Creek	227-10-17100	Yes	Dolly Varden			X	
Milton Lake Creek	227-10-17100	Yes	Cutthroat	Dolly Varden		X	
Milton Lake	227-10-17100-0010	Yes	Cutthroat	Dolly Varden			X
Shelter Bay	228-50-18190	Yes	Cutthroat	Dolly Varden		X	
Hawkins Creek	228-30-18460	Yes	Cutthroat	Dolly Varden		X	
Hawkins Creek	228-30-18460-0010	Yes	Cutthroat	Dolly Varden			X
Hawkins Creek	228-30-18470	Yes	Cutthroat			X	
N/A	221-20-10380	Yes	Chum			X	
Hells Hole	221-30-10640	Yes	Cutthroat	Dolly Varden		X	

Table 2. Locations of streams with previously undocumented resident populations of cutthroat trout and Dolly Varden char.

Location						
Common Name	ADF&G Anadromous Waters Catalog #	Anadromous	Species		Stream	Lake
Chucks Lake Hole	221-30-N/A	No	Cutthroat	Dolly Varden		X
Chucks Lake	221-30-N/A	No	Cutthroat	Dolly Varden	X	
La Ray Lake	221-30-N/A	No	Cutthroat	Dolly Varden		X
Shelter Bay	228-50-18190-0010	No	Cutthroat	Dolly Varden		X
Hawkins Creek	228-30-18460 above barrier	No	Dolly Varden		X	
Hawkins Creek	228-30-18470 above barrier	No	Cutthroat			X
N/A	221-20-10380	No	Dolly Varden		X	
Hidden Lake		No	Cutthroat			X

Discussion

The emphasis of this study was to identify and inventory the presence or absence of Dolly Varden and cutthroat trout populations throughout Prince William Sound. Assessment of the effects on these species from the *Exxon Valdez* oil spill was not determined in this study. This inventory will provide baseline data for researchers who are assessing the effects of the oil spill, and will also provide information for agency resource managers and the public.

Many streams containing Dolly Varden and cutthroat trout had not been submitted to the Anadromous Waters Catalog from historic data. It is likely that these species were not included since they were not thought of as economically important species. Historically, government agencies and private corporations sponsored surveys looking for salmon species that were important for economic development. As a direct predator of salmon and competitor with salmon for food and habitat, many and trout were thought of as “pest” fish, and bounties had been paid for killing Dolly Varden (Scott and Crossman 1973). Thus, the low regard for these fish has been reflected in their infrequent listing in the catalog.

Talking with local sports fisherman about some of their favorite fishing locations and having them divulge this information was difficult. Although areas where cutthroat trout had been caught in Prince William Sound were mentioned, the exact location was

not always given. Thus, there may be other streams with cutthroat trout populations which were not divulged. Anglers did not appear to be as secretive with Dolly Varden and locations of populations were readily submitted.

One of the major concerns individuals had with submitting locations was concern for small populations of cutthroat trout. Since the Anadromous Waters Catalog is a public document, the information is readily available to sportfishing guides. If small populations of trout are targeted by guides, a significant impact could result to those populations, especially when salmon are not available or are uncooperative with clients. Clients will still want to catch a fish, even if it is not a salmon, and trout can be easily targeted. In sites with small populations this is a factor to consider since trout are very susceptible to hook and line fishing (Jones et al 1976, Gresswell et al. 1997).

A broad geographic distribution of Dolly Varden was found throughout Prince William Sound, with this species inhabiting both stream and lake systems. In stream systems without a lake in the watershed, Dolly Varden were more likely to be present than cutthroat trout. This was the case in Quadra Creek and Hanning Creek (Table 1) where no cutthroat trout were found.

We found slightly fewer cutthroat trout locations than Dolly Varden char, with 23 sites for Dolly Varden and 21 cutthroat trout sites. Again, this is probably because cutthroat trout prefer systems with lakes. Anadromous cutthroat trout often use freshwater lakes for overwintering, even though they may spawn in streams in different watersheds without lakes the following spring (Jones 1997). When they travel through saltwater on their spawning migrations, they prefer nearshore waters and are reluctant to cross large open stretches (Jones 1976, Trotter 1989). Thus, cutthroat trout are usually associated with a lacustrine system or one which has a lake system somewhere nearby along the coast. There was only one instance where we found cutthroat trout in a stream without a lake system located in the area (Hells Hole, Table 1). Although there is no lake associated with the watershed, there is a large estuary. This may provide the complex habitat needed for overwintering area.

The amount of money received for this project was modest, and the amount of time devoted to it far exceeded the allocation. To compile a more complete listing of anadromous Dolly Varden and cutthroat trout populations, it would be necessary to look at each watershed in greater depth. In some systems these species may not have been found due to small populations, seasonal migrations, flow conditions, or other factors. Additional sampling would ensure a more complete inventory, and other information such as population estimates would be valuable for sportfish management. However, the information collected now will contribute baseline data and will aid in current and

future studies. This information might also be used to protect streams with populations of Dolly Varden and cutthroat trout in the event of another oil spill or other disaster.

Additional inventory work should be conducted since each population is important to the overall genetic make up and survival for these species. This is especially true for cutthroat trout, since there can be a wide range of genetic variation between populations even within a single basin (Griswold 1996). Preliminary genetic work being compiled from *EVOS* Project 96145 may also indicate that each stream has genetically discrete populations of cutthroat trout (Gordon Reeves USDA Forest Service Pacific Northwest Research Laboratory personal communication). The genetics of Dolly Varden populations in Prince William Sound has not yet been fully analyzed, but until more is known, it will be important to protect all populations. This, of course, is one reason it is important to know the location of as many populations of Dolly Varden and cutthroat trout as possible.

Conclusions

Local knowledge will continue to be a significant source by which to locate populations of Dolly Varden and cutthroat trout. Overall the information gained from local residents was substantial and much of this project could not have happened without their contribution.

The best method to continue nominating sites to the Anadromous Waters Catalog is by conducting systematic on-the-ground surveys of streams and lakes. This is a very time consuming method but does provide the best chance of identifying new locations of Dolly Varden and cutthroat trout as well as other species.

Individual watersheds may have genetically unique populations of cutthroat trout. Dolly Varden genetics is more uncertain. Until more is known, it will be important to protect all populations. Knowing which streams have populations of these species will be essential for any comprehensive protection or management plan.

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