6/18 APWG

Study Title:	Technical Support Study for the Restoration of Dolly Varden and Cutthroat Trout Populations in Prince William Sound
Study Number:	7
Lead Agency:	Alaska Department of Fish and Game
Cost:	$147K
Inclusive Dates:	March 1, 1991 - February 28, 1992

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INTRODUCTION

Information collected by NRDA programs during oil years 1 and 2 has documented injury to Dolly Varden and cutthroat trout in Prince William Sound (PWS). Mortality rates of Dolly Varden and cutthroat trout from oiled sites were significantly lower than control sites and there was also a highly significant reduction in the growth of cutthroat trout from oiled sites. Dolly Varden and cutthroat trout are both important to the recreational fisheries in PWS and these fisheries offer a diverse and often unique range of angling opportunities.

Prior to the oil spill there were harvest and effort data available for the sport fishery on Dolly Varden and cutthroat trout through the Statewide Harvest Survey (SWHS) (Mills 1989). We also know through tag recoveries in 1990 that there is fishing mortality attributed to the bycatch of Dolly Varden and cutthroat trout in the commercial fishery for salmon although the full extent of the bycatch is not known. The additional mortality from oil perturbation has caused concern that some of the oil impacted stocks may be unable to sustain historical levels of fishing mortality. Reduction in growth due to oil perturbation may result in additional mortality and/or changes in size composition that impact historic fishing patterns on these stocks.

Due to these stock conservation concerns, the Alaska Department of Fish and Game (the Department) may have to enact restrictions on the sport fishery in the oil impacted areas which would greatly reduce the opportunities available to anglers. The most effective method to enhance the recovery of the oil impacted stocks is to redirect angling effort to populations outside of the oil impacted areas. This also provides alternative fishing opportunities for anglers who were displaced due to management actions taken to ameliorate impacts of the oil spill. At the present time there are few data available on the stock status of Dolly Varden and cutthroat trout populations outside of the oil impacted areas. It is imperative to collect the necessary data on these populations before we can redirect angling effort. It is also important not to exasperate the stock status of Dolly Varden and cutthroat in PWS by redirecting effort to populations of fish that cannot sustain increased sport harvest.

There is need to develop a consistent and rational approach in developing fisheries outside of the oil impacted areas. The sites of these fisheries will be selected according to a process that addresses a number of criteria. Each candidate water will be examined against a list of criteria to determine its suitability for promoting fishing opportunities.

At the conclusion of this project, a number of fishery locations will be identified outside of the oil impacted areas that will provide the sport fishing public with a range of desired angling opportunities. The range of angling opportunities will be categorized into three zones based on remoteness and accessibility.

This information will be disseminated to the angling public through brochures and other activities by the proposed Public Information restoration project. Additionally, data collected from this project could be used to identify further restoration opportunities for these stocks such as identifying possible sites for the placement of fish passes or critical habitat areas that could be protected through the purchase of private inholdings or mineral rights.

OBJECTIVES

The overall goal of this project is to develop a strategy to direct Dolly Varden and cutthroat trout sport fishing effort away from the oil impacted areas and into non-oiled locations in Prince William Sound. This goal will be met by accomplishing the following objectives and associated tasks.

Objective 1:

Identify stream systems in non-oiled locations in PWS that support viable populations of Dolly Varden and cutthroat trout.

Task:

A. Inventory known locations of Dolly Varden and cutthroat trout in the non-oiled locations in PWS and categorize into three sport fishing zones based on remoteness and access.

B. Visit a subset of sites identified and sample for Dolly Varden and cutthroat trout during the peak of the sport fishery (July through September) to determine fish catachability and attain a subjective estimate of stock size.

C. Prepare a matrix of fishery characteristics to evaluate each stream system for potential as an alternative sport fishery for Dolly Varden and cutthroat trout outside the oil-impacted area of PWS.

Objective 2:

Evaluate stock structure of overwintering populations of Dolly Varden and cutthroat trout at two sites in each of the three sport fishing zones. (Eyak and Culross lakes are examples of likely candidates in 1991).

Task:

D. Estimate abundance of Dolly Varden and cutthroat trout in two sites within each of the three sport fisheries zones. (tests will be done at a precision level of 0.1 ± 50%).

E. Estimate the length composition of Dolly Varden and cutthroat trout in two sites within each of the three sport fisheries zones. (± 10 mm of their true value 90% of the time).

Objective 3:

Based on results from objectives one and two, make recommendations for locations to promote redirection of sport fishing effort outside of the oiled areas of PWS.

METHODS

This study consists of a proposed multiyear plan to evaluate a variety of Dolly Varden and cutthroat trout systems in non-oiled locations in PWS to determine their potential for development as a sport fishery. In order to accomplish this a screening and evaluation process was developed (Figure 1). The first step in this process is the inventory of stream systems that support populations of target species. The characteristics of these systems will be evaluated relative to sport fisheries development using a matrix to compare and categorize systems. Next, stocks of Dolly Varden and cutthroat trout will be assessed in certain streams selected using the matrix. Finally a management strategy will be developed for redirecting sport fishing activity away from the oil impacted area.

IDENTIFICATION OF DOLLY VARDEN/CUTTHROAT TROUT SYSTEMS

An inventory of potential Dolly Varden and cutthroat trout systems will be developed using available information and field reconnaissance. Based on remoteness and access, each stream will be placed into one of three zones representing the type of sport fishing experience expected. Zone one would consist of systems accessible by road. Zone two would be those areas accessed by short boat trips limited to day trips. Zone three would be systems accessible only by extended overnight boat trips or by float plane.

Information from departmental and other agency studies, and other outside sources will be used to identify sites currently known to support Dolly Varden. Systems currently being used by sport fishermen will be identified using data from the Sport Fish Division's Statewide Harvest Surveys which provides harvest and effort data on specific sport fisheries in PWS. Other data sources include: lake surveys done in PWS by FRED division for PWS Aquaculture Corporation in the early 1980s, inventories of anadromous streams by Habitat Division, and stream rehabilitation work done by the US Forest Service, and US Fish and Wildlife Service. These data will be reviewed to compile information on historical locations of Dolly Varden and cutthroat trout in PWS. Interviews will also be conducted with others knowledgeable of the fisheries in PWS, such as fishing guides, fishermen, and hatchery

SCHEMATIC DIAGRAM OF MATRIX OF FISHERY CHARACTERISTICS

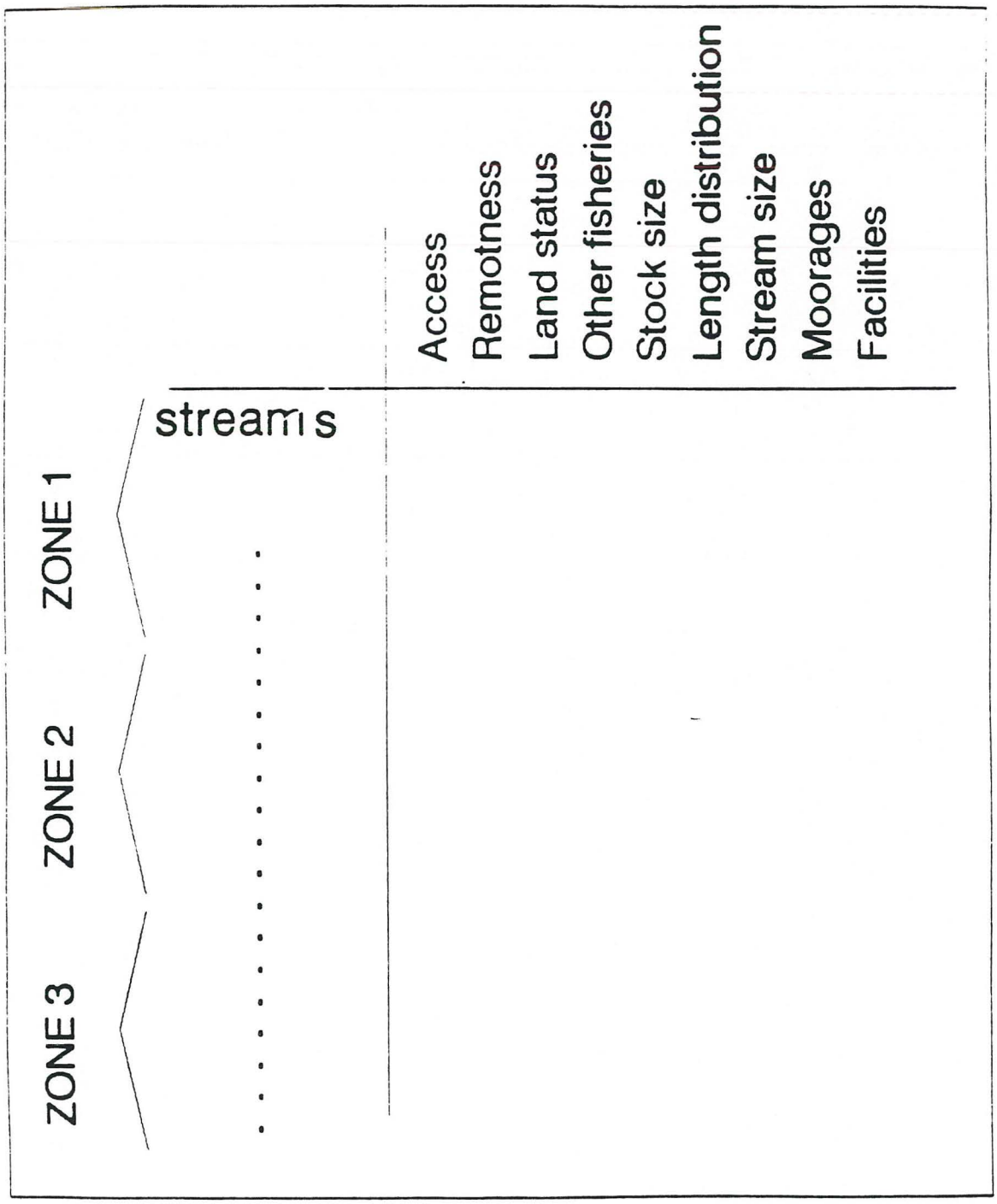

Figure 1. Schematic diagram of matrix used to evaluate fishery characteristics of streams in non-oiled areas of Prince William Sound.

personnel to collect anecdotal information about potential systems. Field reconnaissance will be made at selected sites to determine the presence of target species and conduct an initial evaluation of stocks.

The field reconnaissance will involve visiting stream systems once or twice during the periods of peak sport fishing (July through September). At each site hook-and-line and other sampling techniques will be conducted to determine the presence and catchability of stocks present. In addition, a subjective estimate of stock size and length distribution will be made by collecting fish using seines or electrofishing. All fish captured will be tagged with individually numbered tags. The purpose of the tagging is to allow for tracking of the movements of various populations to determine overwintering sites. The site will also be evaluated for the potential of conducting abundance estimates.

From the data collected in the inventory and reconnaissance a matrix of streams and associated characteristics will be developed to compare and categorize all streams identified as potential systems for Dolly Varden or cutthroat trout sport fisheries. Stream characteristics to be considered include access, remoteness, land status, proximity to other fisheries, stock size, length distribution of fish, unique characteristics of fishery, current and historic fishery, and physical nature of the stream.

STOCK ASSESSMENT

Estimates of abundance and mean length will be made at two suitable sites in each zone. Estimates of abundance will be made using mark recapture experiments. Weirs or fyke nets will be used as capture techniques depending on the nature of the stream system.

In systems selected for abundance estimates where the stream is suitable for constructing a weir, an aluminum picket weir will be installed. Weirs will be placed approximately 0.5 km from the saltwater terminus of the streams upstream of tidal influence. During the spring sampling, weirs will be used to count and sample the emigration of Dolly Varden and trout from study streams. The weirs will be operated by a two-person crew from mid-April to early July. Downstream live traps will be installed.

In systems selected for abundance estimates where a lake is present and the stream is not suitable for a weir, fyke nets will be used. Lightweight, 3'X 3'X 13' fyke nets will be fished around the perimeter of the lake and around the outlet stream. During the spring sampling, fyke nets will be used to count and sample the emigration of Dolly Varden and trout from study streams. The fyke nets will be operated by a three person crew from mid-April to early July.

Each fish captured using either capture technique will be identified, counted, and measured (tip-of-snout to fork-of-tail to

the nearest mm) and tagged using individually numbered Floy tags. Adipose fins will be clipped on all tagged fish as a secondary mark. Fish will also be examined for missing adipose fins, tags, or tag scars from other tagging studies. Scale smears will be collected from the preferred area from all cutthroat trout and placed individually on acetate slides in coin envelopes. Date, species, sex (if identifiable from external maturation characteristics), and length will be recorded for each fish.

During the proposed second year of study and each subsequent year, each fish containing a tag, a tag scar, or missing its adipose fin will be considered one recapture event. Recapture events will be recorded separately for fish containing tags and fish with missing tags. Recaptured fish with missing tags will be retagged. Fish with no visible tag scar and containing their adipose fin (not tagged in first year of study) will also be tagged. Tag numbers will be recorded for each recapture and each fish tagged.

All fish mortalities will be examined for presence of tags and adipose fins, identified, and measured as outlined above. Sex and maturity will be determined by internal examination, and sagittal otoliths will be collected. Date, species, sex, length, maturity, and tag number will be recorded. Fish containing tags, tag scars or missing adipose fins will be recorded as recaptures.

DATA ANALYSIS

Estimates of abundance will be computed for each study site through analysis of tag returns. The Jolly-Seber three-sample method (Seber 1982) will be used to estimate abundance at each study site. Buckland's program RECAP (1980) will be used to generate the estimates and variances. Abundance estimates will be used to approximate potential yields thus determining the level of sport fishing effort each system can support.

Length distribution data will be evaluated using Relative Stock Densities (RSD) as described by Gabelhouse (1984). Proportions of each species within specific length categories will be calculated for each system.

Recaptured data, in addition to being used for the abundance estimates, will be used to track the movements of fish. Tagging and recapture locations will be compared to determine movements among various systems and to determine overwintering areas.

SCHEDULES AND PLANNING

Year 1	Identification and inventory of Dolly varden and cutthroat trout systems.
Year 2-4	Proposed reconnaissance and stock assessment field work.

Year 5 Proposed development of management strategies.

BUDGET

Salaries	$ 80.0
Travel	2.0
Contracts	20.0
Supplies	30.0
Equipment	15.0
Total	$ 147.0

PERSONNEL QUALIFICATIONS

Andrew Hoffmann holds a bachelors degree in biology and a masters degree in environmental science/aquatic biology. He has worked with the Department of Fish and Game for ten years on a variety of projects. The work most relevant to this project is his involvement as the assistant to the principle investigator for the NRDA study involved with the injury of the oil spill to the Dolly Varden and cutthroat trout in Prince William Sound. This experience has allowed him to become familiar with the Dolly Varden and cutthroat trout in the sound as well as gaining first hand experience with the field work, data analysis and administration of the project upon which this proposal is based.

REFERENCES

Buckland, S. T. 1980. A modified analysis of the Jolly-Seber capture-recapture model. Biometrics 36:419-435

Gabelhouse, D. W. 1984. A length-categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Mills, M.J. 1989. Harvest and participation in Alaska sport fishing during 1989. Alaska Department of Fish and Game. Fishery Data Series No. 90-44.

Seber, G. A. F. 1982. The estimation of animal abundance and related parameters. 2nd ed. Charles Griffin and Company Limited. Charles Griffin House, Credon Street, High Wycombe Bucks, HP13 6LE, England 654 pp.