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The Role of Fish Hatcheries in the Sport Fisheries of the State of
Alaska

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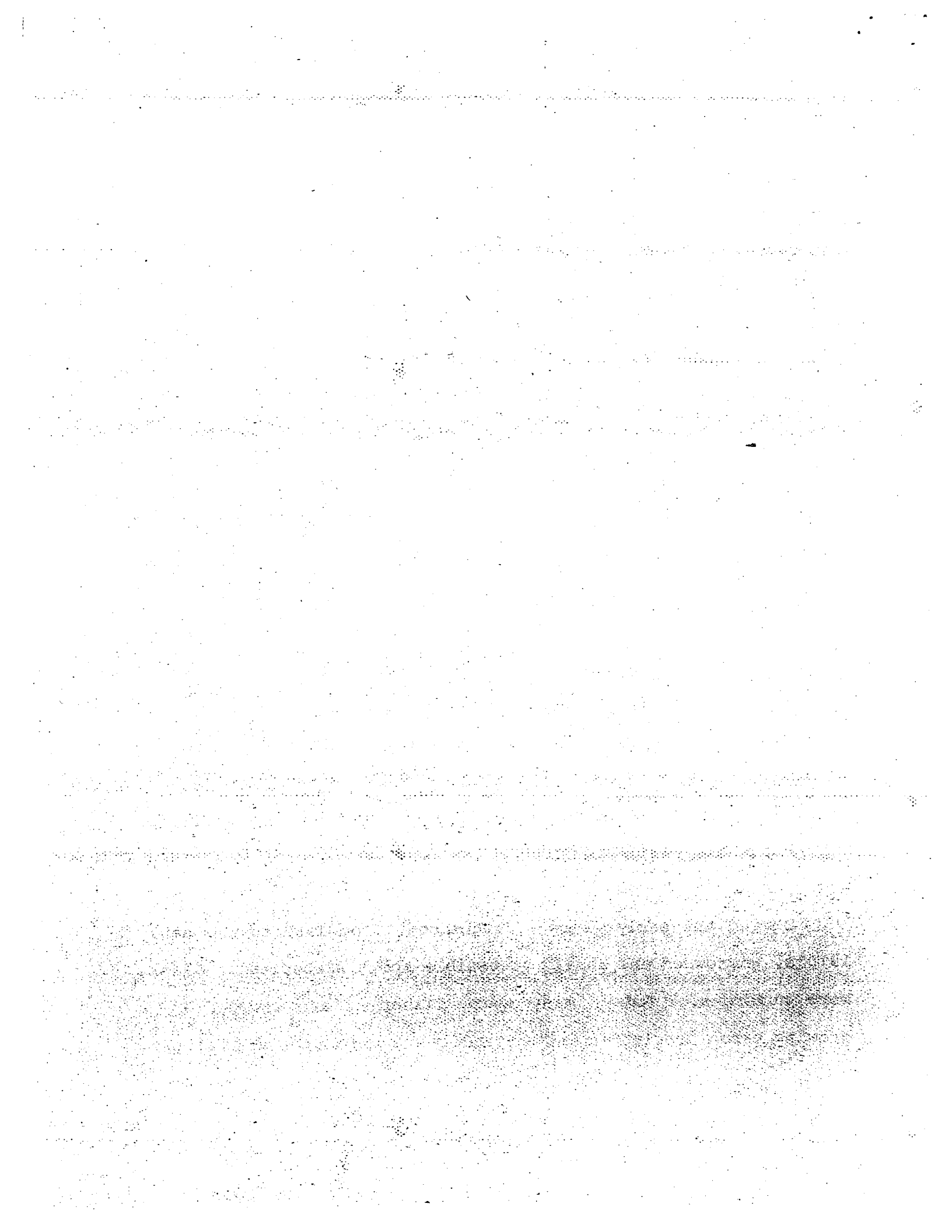
Alaska Department of Fish and Game

Palmer, Alaska

Introduction

Alaska contains millions of acres of pristine wilderness, innumerable lakes, and thousands of miles of streams. In addition, Alaska contains more miles of coastal shoreline than the rest of the contiguous 48 states combined. Sport fishing in Alaska is an important and growing activity for thousands of visitors and tourists alike. A total of 428,768 sport anglers fished in Alaska in 1992. Alaska residents made up 57% of the total and nonresidents comprised 43%. Nonresident anglers spent more for licenses than resident anglers for the first time. Sport anglers in 1992 caught an estimated 4.8 million fish of which 2.0 million were harvested (Mills 1993).

During the early years of statehood, from 1960 to the early 1970's, uncrowded and easily accessible sport fisheries in Alaska were numerous. Today, many sport fisheries are crowded by a growing urban population and a steadily rising number of visitors.



The ability of many aquatic ecosystems to meet the harvest demands of sport anglers has been exceeded in many of the more popular sport fisheries. As a result, numerous popular fisheries have been closed or restricted to maintain or preserve specific fish populations. Harvest restrictions may exacerbate the problem by forcing anglers to fish more remote fish stocks, there by increasing harvest pressure on less accessible populations of fish. A cycle is created by these effort shifts when increasing numbers of fisheries are restricted or closed.

In the last 15 years Alaska has developed an extensive enhancement program to benefit recreational anglers. Initially the sport fish enhancement program was a hodgepodge of individual projects designed to "make fish for people to catch". Some projects were beneficial and well designed, others were not. The only cost consideration was whether there was enough money to produce the fish. A detailed, long-term statewide plan for fish stocking activities has not existed until recently. Likewise, guidelines for evaluating project effectiveness were nebulous and inconsistent. The purpose of this paper is to outline the hatchery role in Alaska sport fisheries, and to discuss procedures which have been developed to govern hatchery operations in Alaska.

The Alaska Sport Fish Hatchery Program

The State of Alaska operates 4 hatcheries (Elmendorf and Fort Richardson Hatcheries in Anchorage, Clear Hatchery near Fairbanks, and Crystal Lake Hatchery in Petersburg) almost exclusively with Dingell-Johnson (D-J) funds, Wallop-Breaux (W-B) funds, and state fees collected from the sale of sport fishing licenses. These hatcheries produce most of the fish stocked to benefit recreational fisheries and their supporting industries.

In the past, several other state operated hatcheries raised fish for stocking programs to benefit sport anglers. Some of these hatcheries received D-J and W-B funds as compensation for the sport fish components of production. Recent changes to the State of Alaska hatchery program resulted in most of these hatcheries being transferred to the private sector or closed. Individual sport fish stocking projects that depend upon these hatcheries have either been discontinued, moved to one of the State hatcheries, or taken over by the new hatchery operator. Other federal and privately owned hatcheries raise small numbers of fish for sport fisheries enhancement projects. D-J funding is not involved in these projects. Some sport fisheries have developed on private hatchery commercial fisheries stocking projects. These incidental sport

fisheries are not considered part of the Alaska sport fish hatchery program. However, sport fish effort and harvest levels on some of the incidental sport fisheries are larger than some of our planned sport fisheries.

Almost 11 million fish were stocked in Alaska waters to benefit sport anglers in 1992 (Table 1). Six different species are currently raised and released: coho salmon (Oncorhynchus kisutch), chinook salmon (Oncorhynchus tshawytscha), rainbow and steelhead trout (Oncorhynchus mykiss), Arctic grayling (Thymallus arcticus), Arctic char (Salvelinus alpinus), and lake trout (Salvelinus namaycush). More than 3.7 million anadromous fish were released, while about 7.3 million fish were released into landlocked lakes. Fort Richardson Hatchery produced 42.5% of the total number of fish released. Rainbow trout were the most utilized species and with grayling accounted for 51.2% of the total fish released and 77.5% of the landlocked fish stocked. Chinook salmon comprised 65.4% of the anadromous fish stocked.

Types of Sport Fish Stocking Programs in Alaska

Stocking programs are selected to maximize benefits to sport anglers through rehabilitation, enhancement or development. Specific programs are intended to 1) supplement a depressed stock

(rehabilitation), 2) increase the number of fish caught beyond historic levels (enhancement), or 3) establish a new fishery (development) (Alaska Department of Fish and Game 1993).

Due to the healthy condition of most Alaska fish stocks, only a few sport fish rehabilitation programs are being carried out in Alaska. An example of rehabilitation is the Chena River Arctic grayling program. The Chena River and its tributaries once supported the largest recreational Arctic grayling fishery in North America (Clark 1991). Estimated annual harvests during the late 1970s through the early 1980s ranged from 20,000 to 40,000 fish. This level of exploitation combined with poor survival of juvenile fish during the mid-1980s dramatically reduced this population. Regulatory harvest restrictions failed to protect these fish or to provide sustainable harvests. Consequently, a no-harvest policy was imposed in 1991 and stocking using brood stock from the Chena River was initiated to accelerate rebuilding of the population. The stated objective of the program is to rebuild the Chena River Arctic grayling population to a level which, by 1995, will support a sustained annual harvest of 10,000 or more Arctic grayling.

Several enhancement programs are being conducted throughout the State. However, no new enhancement programs are planned. All existing enhancement programs are being intensively evaluated to

insure none of the enhanced populations are being negatively impacted by introduced fish. The Willow Creek chinook salmon program is representative of enhancement. Willow Creek is an easily accessible chinook salmon stream located near Anchorage. The chinook salmon sport fishery was closed during the 1970s due to poor returns. A "weekend only" fishery was initiated in 1979 and 285 fish were harvested. Smolt of Willow Creek brood stock were released beginning in 1983 to increase chinook salmon fishing opportunities by supplementing the stream's natural run with hatchery fish, while maintaining the present quality and quantity of natural chinook salmon production. In 1992, eleven additional days of sport fishing were added to the "weekend only" season. Over 18,000 angler-days of fishing effort were expended to harvest approximately 7,000 chinook salmon. Over half of the fish harvested were of hatchery origin and natural production was at a historically high level (Peltz and Sweet, 1993).

Most stocking programs to improve sport fisheries in Alaska create new fisheries where none previously existed. These "development programs" are preferred because there is no, or minimal interaction between hatchery and wild stocks of fish. Southcentral Alaska non-anadromous lake stocking is a typical example of a development program. This program was initiated in the 1950's to create new fisheries in lakes where game fish were

not present. Rainbow trout, Arctic grayling, Arctic char, lake trout, and landlocked chinook and coho salmon are annually stocked. In 1990 approximately 2.7 million fish were stocked in 173 southcentral Alaska lakes (Alaska Department of Fish and Game 1993). Approximately 128,000 angler-days of sport fishing effort were reported from stocked lakes in 1990 (Mills 1991) resulting in a catch of 299,000 stocked fish of which 109,600 were harvested.

Planning Sport Fish Hatchery Production

Planning should be the first stage in developing a recreational fisheries stocking program. Sport Fish Division has recently standardized a method for planning fish stocking programs. A fishery management plan is prepared during the initial stage of planning. Each fishery management plan lists the following: management objectives to be met by fish stocking, specific measures required to accomplish the objectives, and performance criteria that will be used to evaluate whether objectives are achieved. Management objectives have recently been defined in terms of benefits and are currently measured in angler-days (one angler fishing for any portion of a day) of fishing effort. Maintenance or increase in fishing effort due to stocking is a measure of performance and provides an indicator of program success. Specific stocking actions are the numbers of fish and locations for

stocking. Performance evaluation criteria require a listing of parameters to be measured (fishing effort, harvest, catch etc.) and how they will be measured (creel survey, Statewide Harvest Survey, harvest cards, etc.). A single fishery management plan may cover numerous stocking sites over a broad geographical area or a single stocking site.

The second stage in developing a recreational fisheries stocking program is to ensure that fish production in the hatcheries matches fish production demands in the fishery management plans. On a periodic (4-5 years) basis, all sport fisheries management plans which address fish stocking are incorporated into a Statewide Stocking Plan for Recreational Fisheries (SSP). The SSP contains specific information about each stocking location; region of the State, Division of Sport Fish Management Area, reference to a sport fishery management plan which covers the stocking location, release site, species to be released, whether the location is anadromous or landlocked, size of fish to be stocked, and number of fish to be stocked by year. If demand for hatchery fish exceeds hatchery capacity, projects are prioritized and fish are allocated to the most important projects. Time is allowed for public viewing of the draft plan. The plan becomes finalized when it is approved by the Commissioner of the Alaska Department of Fish and Game. The SSP is finally submitted

to the Regional Director of the United States Fish and Wildlife Service for approval, since the major funding source for the projects in the SSP is federal money administered through the United States Fish and Wildlife Service (D-J and W-B monies).

The recreational stocking program changes frequently to adjust to success or failure of prior fish plants, angler preferences, acquisition of public lands, human population growth, availability of funding, hatchery limitations, and recreational trends. Consequently, changes to the SSP are inevitable and to the extent possible anglers and the general public are alerted to any significant departures from the plan. Most changes appear in an update to the SSP which is made available to the public annually. Due to complexities of long-term rearing of fish in a hatchery, it is unusual to have exactly the planned number of fish for each location available for stocking. It is often necessary for professional staff of the Department to make minor changes in fish numbers, fish species or stock, or exact release location to accommodate variables in fish production.

Regulation of Sport Fish Hatchery Production

The final stage in developing a recreational fisheries stocking program is regulatory review. The State of Alaska

strictly regulates transportation, possession or release of live fish in the state. Regulations have existed since the Alaska hatchery program expanded in the 1970's. These regulations are part of the Alaska Administrative Code (Title 5, Chapter 41) and are thus State Law. Two specific regulations form the backbone of the fish stocking regulatory process.

The first regulation (5 AAC 41.070.) prohibits importation of any live fish into the state for purposes of stocking or rearing in the waters of the state. Ornamental fish not raised for human consumption or sport fishing purposes may be imported into the state, but may not be reared in or released into the waters of the state. This regulation prohibits introduction of nonindigenous species or stocks of fish into the state.

The second regulation (5 AAC 41.005.) makes it unlawful to transport, possess, export from the state, or release into the waters of the state, any live fish without a Fish Transport Permit or FTP. A FTP is issued for a fixed term and authorizes only that operation specified in the permit. Any change of species, brood stock, or location requires a new permit. Each applicant for a FTP submits the following information to the Department (5 AAC 41.010.):

- 1) species and stock involved;
- 2) incubation, rearing and/or release site(s);
- 3) number and life history stage involved;
- 4) history of previous transport, if any;
- 5) disease history of the stock, hatchery, or rearing facilities involved, any previous disease treatments or vaccinations, or, if the disease history is incomplete or unavailable a brood stock inspection and certification;
- 6) isolation measures planned to control disease;
- 7) description of proposed eggtake methods;
- 8) source of water for rearing and proposed effluent discharge location;
- 9) identification and status of native stocks involved;
- 10) method of transport or release and the expected date of transport or release;
- 11) purpose and expected benefits of the project; and
- 12) evaluation plans.

Each FTP application is reviewed by the Alaska Department of Fish and Game. A FTP is issued if it is determined that the proposed transport, possession or release of fish will not adversely affect the continued health and perpetuation of native, wild, or hatchery stocks of fish. Terms and conditions may be

attached to the FTP if it is determined that terms and conditions are necessary to protect the continued health and perpetuation of native, wild, or hatchery stocks of fish. A FTP can be denied if the proposed plans, methods, or specifications are not adequate, on the basis of fish disease, genetics, competition, predation, or other biological considerations, to assure the continued health and perpetuation of native, wild, or hatchery stocks of fish (5 AAC 41.030).

In addition to regulations, there are Department policies that apply to fish stocking programs in Alaska. The State of Alaska genetic policy for salmon (Alaska Department of Fish and Game 1985) addresses stock transports, protection of wild stocks, and maintenance of genetic variability. The genetic policy is reviewed as part of the FTP application process. The State of Alaska has also adopted a policy relating to fish health and disease control (Alaska Department of Fish and Game 1988). This policy is intended to prevent dissemination of infectious finfish and shellfish diseases within or outside the borders of Alaska without introducing impractical constraints for aquaculture and necessary stock-renewal programs. Again, the FTP process serves as a forum for reviewing fish health and disease control policies as well as regulations. The last policy of note which influences sport fish stocking programs in Alaska exists only in draft form. The

Division of Sport Fish wild stock protection policy is still being formalized, but the intent of the policy is clear. Sport Fish Division will not stock hatchery fish in locations where wild stocks of sport fish occur unless: a) the indigenous wild stock(s) is (are) incapable of supporting a recreational fishery or; b) the indigenous wild stock(s) is (are) important to sport anglers and is (are) found to be depressed or; c) adequate evaluation can be dedicated to the stocking project to maintain historical levels of natural production, run timing and spawning distribution. As previously mentioned, Sport Fish Division will not initiate any new enhancement stocking programs until evaluation from existing programs has thoroughly documented impacts on indigenous wild stocks of fish. The wild stock protection policy is generally reviewed for compliance as the fishery management plan is being composed.

Review of Sport Fish Hatchery Production

Mechanisms for review of a sport fish hatchery program have been built into the planning and regulation processes. The fishery management plan for each program usually lists a time period for reviewing achievement of program objectives. In addition, program costs during the time period are summarized. Measured objectives are combined with program costs to provide a measure of efficiency

(cost per angler hour of effort generated or fish harvested). Attainment of objectives and measurement of efficiency provide the primary basis for program review. If objectives are achieved and/or the program efficiency is adequate, the program is considered a success and the existing fishery management plan remains in effect with a new time period established for future review. If primary objectives are not achieved and/or the program efficiency is poor, the program is considered a failure and is terminated. If some of the objectives are achieved and/or the program efficiency is marginal, the program is closely scrutinized to determine; 1) if project objectives are realistic, 2) if program changes might increase the possibility of attaining stated objectives and/or improving program efficiency, or 3) if some aspect of program performance is adequate to justify continuing the stocking program. If any changes are made, the fishery management plan is modified accordingly and a new time period is established for further review.

Adherence to stipulations outlined in the issued FTP, and project compliance with Department regulations and policies are also periodically reviewed. The FTP is issued for a fixed term after which a new FTP is required for the program to continue. Renewal of a FTP is reviewed as thoroughly as a new FTP. As previously mentioned a FTP will be denied if the stocking program

doesn't conform to state regulations or department policies.

Most fish stocking programs have not yet received a thorough review. Fishery management plans for stocking programs were written within the last few years and the time period for review of most programs has not been reached. Total program costs which are used to help measure program efficiency have only recently been monitored. Numerous FTP's have expired and new FTP's have been reviewed for compliance with state regulations and policies. Within the next 5 years all sport fish stocking programs should receive thorough review. It should be evident after the first round of reviews whether or not the existing review process is adequate to produce good fish stocking programs while protecting wild populations of fish.

Summary

The State of Alaska has an extensive fish stocking program conducted for the benefit of anglers in Alaska. Most programs are easily accessible in highly populated areas where angling pressure on native stocks has exceeded natural production capability. Stocking programs serve two primary purposes. The first is to maintain or increase historic levels of angler participation and harvest. The second has been to protect other accessible wild

populations of fish that, in the absence of hatchery fish, would be subjected to unsustainable harvests. Fish produced from the stocking program have satisfied many angler's desire to catch fish. Consequently, wild populations of fish have been spared from the angler effort directed at stocking programs.

In order to insure that all sport fish stocking programs provide benefits while protecting existing fish populations, Sport Fish Division of the Alaska Department of Fish and Game has recently assembled the final pieces of a Fish Stocking Program Management Plan (Figure 2). The three main components of the plan are planning, regulation and review. Planning involves preparation of a fishery management plan for each fish stocking program and assembling all plans into a Statewide Stocking Plan. Regulation entails applying for a FTP. The FTP application is reviewed for compliance with all State of Alaska regulations and policies. Issuance of a FTP is the equivalent of granting a license for the program to begin. Review is a periodic visit back to the planning and regulation components. Achievement of the program objectives in the fishery management plans and measurement of program efficiency are the focal points of review. Likewise, compliance with State regulations and policies are reviewed. Completion of the review process will mean the fish stocking program will; continue as is, continue with modifications, or be discontinued.

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Table 1: Numbers of hatchery produced fish stocked in Alaska in 1992 to enhance sport fisheries.

Hatchery	Species	Number		
		Landlocked	Anadromous	Total
Clear	Arctic char	435,670		435,670
	Grayling	2,185,618		2,185,618
Big Lake	Coho salmon	215,000	215,000	430,000
Crooked Creek	Chinook salmon		273,000	273,000
	Coho salmon	246,000	74,000	320,000
	Steelhead		39,700	39,700
Elmendorf	Chinook salmon		1,289,000	1,289,000
	Coho salmon	349,000	283,000	632,000
Fort Richardson	Chinook salmon	200,000	359,000	559,000
	Coho salmon	187,000	515,000	702,000
	Rainbow trout	3,406,971		3,406,971
Deer Mountain	Coho salmon		162,000	162,000
	Rainbow trout	34,200		34,200
	Steelhead		1,030	1,030
Crystal Lake	Chinook salmon		520,000	520,000
Totals By Species	Arctic char	435,670		
	Grayling	2,185,618		
	Rainbow trout	3,441,171		
	Steelhead		40,730	
	Chinook salmon	200,000	2,441,000	
	Coho salmon	997,000	1,249,000	
Grand Totals		7,259,459	3,730,730	10,990,189

Figure 1: Diagram of the Alaska Department of Fish and Game, Sport Fish Division, fish stocking program management plan.

FISH STOCKING PROGRAM MANAGEMENT PLAN

