ARTIFICIALLY PROPAGATED FISH FOR NATIONAL FISHERY PROGRAMS

An Analysis of Source, Cost, Purpose, and Use

A Report to Congress

PREPARED BY
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
DIVISION OF PROGRAM OPERATIONS-FISHERIES
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ARTIFICIALLY PROPAGATED FISH FOR NATIONAL FISHERY PROGRAMS--

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Fishery Resources Program
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INTRODUCTION

This report responds to a provision in the Conference Report (Report 98-1159) that accompanied the Department of the Interior and Related Agencies Appropriations Act, FY 1985 (PL 98-473), which directed the U.S. Fish and Wildlife Service (FWS) to ...

> "prepare a report on additional fish rearing plans and include in that report a comparative analysis of the costs of Service production to private or commercial production. In addition, the report should provide a list of potential new hatchery sites including an evaluation of the Nisqually Tribe Hatchery, plans for the future production outputs from the Makah NFH (National Fish Hatchery), and an analysis of the effect of the Boldt case decisions, and the Salmon and Steelhead Enhancement Act on those hatcheries. In addition, the study should address other fishery issues including Atlantic salmon and striped bass recovery including the appropriate Federal role. That report should reflect public comment and be provided to the Committees in time for the fiscal year 1986 appropriations hearings."

All the issues the Congress directed the Service to examine are addressed. The main body of the report is divided into four parts:

- survey of Federal, State, tribal, and private fish propagation capability;
- comparison of Federal costs of producing fish with private sector prices for the same fish;
- review of the uses of fish required for Federal management needs; and
- evaluation and description of future Federal needs for artificially propagated fish, including needs for new fish hatchery construction, hatchery reorientation, or hatchery closures that can be inferred from the production forecasts.

Appendices and a synthesis of comments from the public are found at the end of this document.

Background

Federal statutory responsibilities for stewardship of the Nation's diverse and valuable fishery resources date from 1871 when Congress established the position of Commissioner of Fish and Fisheries in response to concern about the decline in domestic foodfish supplies. Subsequently, the kinds of fishery resource activities involving the Federal Government have expanded and changed greatly. In addition, State, Indian tribes, and local governments have developed independent fishery expertise and capability. Because of their substantial technical capabilities, State fishery agencies and Indian tribes have undertaken many tasks formerly performed by the Federal Government.

Partly in recognition of State and tribal responsibilities, the Administration and the Congress have, over the last 4 years, undertaken a major redirection of the National Fish Hatchery System. Federal funding has been terminated for a number of hatchery facilities that contributed primarily to activities no longer considered a Federal priority. Since FY 1983, FWS funding has been discontinued for a total of 19 Service hatcheries. Funding for 4 of these facilities, which contribute primarily to Indian tribal fishery programs, has been assumed by the Bureau of Indian Affairs (BIA), with FWS operating the facilities for that agency; funding and operation of the other 15 hatcheries have been assumed by the States (Appendix 1).

While Congress was deliberating on the future of individual Federal hatcheries, the Service launched its own internal review in light of managerial efficiency and renewed concern over the appropriate roles and responsibilities of Federal and State governments. The future direction and responsibilities of the Service's Fishery Resources Program have now been methodically and rigorously redefined in terms of natural resource goals, rather than in terms of organizational arrangements simply to accommodate Service activities. Major factors inducing a reassessment of Federal fishery resource responsibilities, role, and activity are the imperatives to achieve maximum results by focusing attention on high-priority Federal programs and to improve the efficiency of Federal programs. In addition to these factors, increasing emphasis has been placed on having project beneficiaries pay for the work performed by Federal agencies--commonly referred to as the "user-pay" concept.

After reviewing existing programs and areas of identified needs, the FWS delineated four national responsibilities meriting the attention of the Service's Fishery Resources Program:

- To facilitate restoration of depleted, nationally significant fishery resources.
- To seek and provide for mitigation of fishery resource impairment due to Federal water-related development.
- To assist with management of fishery resources on Federal (primarily Service) and Indian lands.
- To maintain a Federal leadership role in scientifically based management of national fishery resources.

On March 20, 1985, the Secretary of the Interior approved the Statement of Responsibilities and Role for the Fishery Resources Program.

The next section of this report describes the evolution, current characteristics, and capabilities of fish culture in the United States. It is followed by a section comparing the economics of fish culture in the Federal and private sectors. The third section explores why the Federal Government produces fish and what uses are made of them. Finally, future Federal fish propagation and distribution requirements are discussed in light of Federal fish production capabilities.

SURVEY OF PROPAGATION CAPABILITY

In the early years, artificial propagation or hatchery culture was considered the solution for all problems facing marine and freshwater fisheries. Hatcheries were advanced as the principal--often the only--management tool available for addressing fishery resource problems, most of which were due to habitat degradation, dam construction and operation, and overfishing. The growing impetus after World War II was to manage fisheries for recreational rather than commercial purposes. Because the productivity of many wild stocks was seriously impaired by overfishing and habitat loss, fish produced by Federal as well as State hatcheries soon became the principal means throughout the Nation by which to compensate for such impairment. Fish propagation has thereby contributed measurably to the maintenance of recreational fishing, which is now the focus of billions of dollars of discretionary expenditure annually. In 1980, for example, more than 36 million United States anglers spent an estimated $7.8 billion on freshwater fishing. But the significant cost of artificially propagating fish to meet the demand continues to mount, and more efficient and economical ways to accommodate it have to be developed.

The National Fish Hatchery System (NFHS)

Fish propagation by the NFHS continues to play an integral role in the discharge of FWS responsibilities. In FY 1985, about one-half of the Fishery Resources Program budget of $46.2 million was allocated to fish propagation. The Service now operates 80 fish propagation facilities (Appendix 6) that include fish hatcheries, fish technology centers, smolt release facilities, and a spawning channel, as well as 13 support facilities (fish health centers, a fish ladder, and a fish screening facility)--or a total of 93 Service installations dedicated to fish production. In 1984, about 138 million fish were distributed by Service hatcheries to many different resource programs throughout the United States. Most of the 61 species produced and stocked in FY 1984 were trout (including steelhead) and salmon. (Appendix 2).

The NFHS is a tool directed toward meeting Fishery Resources Program responsibilities. Other tools available to Federal fishery resource managers are fishery research, husbandry development, law enforcement, stock assessment, technical assistance, habitat-impact evaluation, and resource management planning.

To be fully effective, stocking must be part of an integrated and comprehensive approach to the management of fishery resources. Annual fish propagation requirements are determined cooperatively by State, tribal, and Federal biologists, who assess resource management needs on an area-by-area, system-by-system basis. Hatchery production is then coordinated to ensure that Service, State, and tribal facilities are used in a manner that will best serve common existing, emerging, and long-term purposes.

National Marine Fisheries Service (NMFS)

In 1970, Executive Order No. 4 placed the FWS's Bureau of Commercial Fisheries (later renamed the National Marine Fisheries Service) in the Department of Commerce.

The NMFS was assigned responsibilities for conservation activities related to marine mammals and marine fishes (both sport and commercial), and the FWS retained activities relating to inland fishery resource management, fish propagation, and habitat protection. Federal programs for coastal interjurisdictional fishery resources, especially anadromous and estuarine, are administered cooperatively by both agencies together with the States, tribes, and others.

Under the Mitchell Act of 1938 (P.L. 502), the NMFS funds 25 Pacific Northwest hatcheries and rearing ponds; 19 of these facilities are operated by the States and 6 by the FWS.

Tribal Hatcheries

In the last quarter century, Indian tribes have greatly improved their ability to manage the fishery resources for which they share responsibility. Collectively, the tribes control large areas of land throughout the United States, and the fishery resources on these lands are an important segment of the Nation's fishery resource base.

Seventeen Indian tribes (Appendix 3) operated 24 hatcheries in the Pacific Northwest in FY 1984. In 1983, approximately 18 percent of all steelnead trout and 12 percent of all salmon planted in Puget Sound and the coastal waters of Washington State were produced by tribal hatcheries. These plantings, largely coordinated with those of State and other Federal agencies, totaled 30 million fish--approximately twice the number planted by the FWS in the same area.

Tribes in the southwest and southeast United States produce fish to plant in lakes and streams on reservations, primarily in support of commercial enterprise. In the upper midwest (Wisconsin and Minnesota), tribes propagate fish for stocking reservation waters; these fish benefit non-Indian anglers as well as tribal members participating in traditional fisheries.

State Hatcheries

Some State hatcheries, like many tribal hatcheries, are operated in support of efforts to restore interjurisdictional resources. Examples of cooperative State and Federal restoration may be noted in the Great Lakes (lake trout), the New England area (Atlantic salmon), the Pacific Northwest (salmon and steelhead trout), and along the Atlantic and Gulf Coasts (striped bass).

Led by the Federal Government, attempts to reestablish the lake trout in the Great Lakes have been underway for the past 25 years. The States of Michigan, Minnesota, Wisconsin, New York, and (most recently) Illinois all support interagency efforts by producing and planting lake trout. State plantings of lake trout in the Great Lakes are expected to remain near 1 million fish annually, contrasted to Federal plantings of over 7 million annually. The Province of Ontario also annually plants about 2.5 million fish in Canadian waters of Lakes Superior, Huron, and Ontario.

State and Federal interagency coordination in Atlantic salmon restoration is a model of cooperation. Establishment of the North Atlantic Salmon Conservation Organization in 1983 and the Connecticut River Basin Atlantic Salmon Commission in 1984 increased the cooperation and sharing of information needed to effectively carry out the restoration of this important resource.

State, tribal, and Federal interagency coordination for Pacific salmon and steelhead restoration along the west coast is an enoromous undertaking involving millions of acres of habitat, as well as complex issues regarding water rights and user groups. The States operate dozens of hatcheries, with Washington, Oregon, and Idaho having major fish culture involvement. Artificial propagation of salmon and steelnead by the States collectively exceeds that by the Federal Government.

On the Atlantic and Gulf coasts, State hatcheries also contribute to the restoration of striped bass populations. This effort is coordinated by both the Atlantic and Gulf States Marine Fisheries Commissions through their leadership in the development of fishery management plans. In addition, the FWS and NMFS have assisted a number of States through financial grants and technical assistance. Ten States (Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Texas, and Virginia) stocked about 6.9 million fry and fingerlings in support of the striped bass restoration effort in FY 1984--roughly 1.8 million fish in Gulf Coast waters and 5.1 million in East coast waters.

Private Sector or Commercial Operations

Aquaculture in the United States varies greatly from species to species. The better established industries include those propagating rainbow trout and channel catfish. Salmon produced by sea-ranching and pen-rearing, however, are struggling to establish a position in the marketplace.

Congress has twice acted to promote the aquaculture industry through legislation: the Fish-Rice Rotation Farming Program Act of 1958 promoted federally funded research on fish farming, particularly in the southeast; and the National Aquaculture Act of 1980, as amended, encouraged a nationwide comprehensive approach to stimulate the industry. Although no funds have been explicitly appropriated under the National Aquaculture Act, other State and Federal aquaculture activities are supported by funds appropriated under other authorities. The National Aquaculture Development Plan, formulated as required by this Act, recognized the private sector as the primary agent for the continued development of commercial aquaculture.

Channel catfish and rainbow trout are the two fish species raised in greatest volume (by weight) at private hatcheries in the United States. Most of these fish are marketed for human consumption. A few are sold to fee-fishing operations, where anglers pay to fish in privately owned waters. Far fewer are sold to State and local governments for stocking in public fishing waters.

The U.S. Department of Agriculture (USDA) estimated that the private sector delivered 154 million pounds of channel catfish for processing in 1984, valued at $107 million to the producers. In FY 1984, the annual production of just one of Mississippi's large private growers exceeded the Service's entire output of 2.6 million channel catfish. Moreover, the State of Mississippi accounts for an estimated 75 percent of all channel catfish produced by private growers.

About 99 percent of all trout produced by private growers are rainbow trout. In 1980, the USDA documented private production of rainbow trout in all the conterminous States except Texas, Louisiana, and Mississippi. Most are generally processed and sold for food. Idaho growers account for about 80 percent of all rainbow trout grown in the United States; nearly all of their output is sold for food.

Commercial salmon production is almost exclusively a West Coast industry and is very strictly regulated by the States to protect the integrity of both naturally spawning salmon populations and government hatchery programs. Most salmon are grown through either pen-rearing or ocean ranching. Pen-rearing consists of growing fish in floating-net pens in coastal waters until they reach marketable size, when they are harvested. Salmon ranching involves releasing fish from a hatchery so they are free to forage in the open ocean--much as cattle are set free to graze on the open range. The salmon return to the release site as adults, and are harvested and sold.

Salmon ranching is an expensive and risky proposition requiring a substantial capital investment that may never be fully recouped. It takes as long as 12 to 16 years for the number of returning fish to become large enough to provide the eggs needed to operate a hatchery at full capacity. For these reasons, salmon ranching is dominated by corporations or wealthy investors able to afford the large initial investment and the uncertain and prolonged recovery period.

In Alaska, where salmon ranches are operated by non-profit corporations owned by fishermen's cooperatives or Alaskan natives, the financial risks are borne by the community of fishermen. The cooperative assesses its members to make up for any financial losses. In March 1985, one Alaskan fishermen's association from Prince William Sound voted a 0.5-percent tax on its fishing income to fund construction of a $15-million hatchery.

COMPARISON OF PRODUCTION COSTS

Introduction

In administering and operating the National Fish Hatchery System, there is a need to continually monitor the System and make adjustments that will improve efficiency and productivity.

Hatchery budgets have, in recent years, generally increased in line with the rise in prices of other raw agricultural goods. The average Federal hatchery budget increased at a 2.4-percent average annual rate between 1979 and 1985, compared with the 2.2-percent annual average increase in the producer price index for unprocessed agricultural products over the same period. This particular price index was chosen because, of all the available indices, it most closely describes the goods and services associated with a fish hatchery operation.

Productivity at national fish hatcheries has improved in the last 3 years. In 1982, the Service published a study very similar to the present one. Twelve of the Federal hatcheries whose costs were analyzed in that study were also examined in this report. Between FY 1981 and FY 1984, these 12 hatcheries averaged a 4.75-percent decrease in their unit cost of production (dollars per pound).

Methodology

In this section, variable costs [production, broodstock, maintenance, support services (administration and employee benefits), and training] of producing fish at a sample of 41 of the 80 Federal hatcheries in the NFHS are compared to both private-sector prices and State government and tribal hatchery costs for the same types of fish. In this context, "type" means a species of fish at a specified size. Specifically, the section addresses the question of whether it is more economical now or in the immediate future to use existing Federal hatcheries to produce needed fish or, instead, to purchase fish to serve Federal fish management purposes. A following section entitled Evaluation of Future Product Use analyzes several prospective hatchery and production expansion proposals from the perspective of long-term average costs.

Federal hatcheries were sampled based on the types of fish they raise, their geographic location, and the feasibility of isolating relevant costs. This last point deserves some explanation. Some of the 80 facilities have special missions of which fish production is only a part or a byproduct of their primary activity. For instance, seven facilities are broodstock hatcheries that serve as egg production and distribution centers. They hold large sexually mature fish that provide eggs for distribution to production hatcheries. These facilities were excluded from the sample because they are not production facilities. In calculating costs at the hatcheries that were sampled, however, the cost of producing the eggs obtained from a broodstock hatchery was captured by adding that cost to the cost of producing fish for stocking. Five more facilities, called fish technology centers, are primarily involved in activities to develop improved fish culture techniques. To do this, these facilities raise fish. Since the nature of their operations and pattern of their costs is atypical of normal fish hatchery operations, these facilities were also excluded from the analysis. Seven other facilities were excluded from the sample for a variety of reasons, such as specialization in the propagation of endangered species of fish, raising

primarily species of fish not addressed in the cost analyses, or having characteristics that exclude them from falling within the usual meaning of the term "hatchery." One example of the latter is the Tehama-Colusa spawning channel in California.

For these reasons, 19 of the 80 facilities were excluded from the sample described above. Most of the other 20 facilities not sampled were excluded because they raise so many different types of fish that it is practically impossible to reliably and reasonably isolate the costs allocable to one particular type. Appendix 7 lists the Federal hatcheries sampled and the types of fish whose costs were analyzed at each sampled station.

The costs of producing and buying nine species of fish at various sizes, and in different parts of the country, were analyzed for this report. For each comparison, data on Federal, State, tribal, and private operations were analyzed for the same types of fish, at comparable sizes, in the same part of the country. The types of fish analyzed represent about 90 percent (by weight) of all the fish distributed from Service hatcheries in FY 1984.

The cost of distributing fish to a particular stocking location is not included in the costs or prices shown because this level of detail is inappropriate for a general nationwide survey. Distribution costs rarely represent more than 5 percent of the total cost of fish produced and distributed, and, therefore, would have very little effect on the cost comparisons. All data in the comparisons are for the cost or price of fish raised to a size ready for distribution from the hatchery. The Service has data based on its own experience for the length of the average fish distribution trip, and the average cost per mile. However, because this information on distribution cost is aggregated, it is often not possible to assign such costs to a particular species and size of fish, let alone a specific distribution trip.

Private fish growers offer distribution of purchased fish at a mean price of $.80 per mile (1985). However, this price information does not reflect consideration of the species to be distributed, the number or weight of the fish, or the total roundtrip mileage of a distribution trip. It simply represents a starting point that would later be negotiated up or down based on a specific set of circumstances.

None of the FWS cost information includes depreciation of existing hatchery plants or equipment, or any interest or principal from actual or implicit government borrowing that might be attributable to the hatcheries producing the fish of interest. Depreciation of plant and equipment already in place is excluded for two reasons. First, it is a non-cash cost and therefore would not affect a prudent Federal manager's decision on whether in the near-term to buy fish or produce them in-house. Secondly, annual expenditures to maintain existing plants and equipment are regularly incurred and are included in these cost calculations. Therefore, there is little or no depreciation in a real sense.

Borrowing costs for past construction at existing facilities were excluded because these are non-recoverable fixed costs. This means that the Federal Treasury is locked into paying whatever borrowing cost (if any) there might have been, and a decision now to buy or not to buy fish will not change that fact.

It is assumed that no capital costs could be recaptured by selling any Federal hatcheries that become unneeded as a result of fish purchases. This assumption

derives from the fact that only one of the dozens of hatcheries for which the Service has withdrawn funding during the present century has been sold. Rather, hatcheries have been transferred to State governments for State fish production purposes, most recently with the Federal Government retaining title to the land and improvements.

Finally, no real or implicit borrowing costs are included for the variable Federal costs, because fish purchases would also have to be supported by borrowing in the same manner. Assessing these borrowing costs would not reverse the relative advantage that purchasing might have over in-house production, or vice versa. It would only increase the absolute difference between the two by a small amount. As a result, borrowing costs related to the variable costs of production or purchase would be unlikely to affect a decision on whether to buy fish and, therefore, they are not considered in the analysis.

Before the Service undertakes major and costly rehabilitation projects at existing hatcheries, it would be expected to consider whether it would be more cost-efficient to purchase fish than to incur one-time extraordinary costs. The decision would necessarily have to include an assessment of the future amortization and interest costs that would be generated by a major rehabilitation initiative.

The Fish and Wildlife Service used the expertise and capabilities of the North Carolina Cooperative Fishery Research Unit (NCCFRU) to obtain State cost information and data from private-sector price lists. The price information is based on purchases in lots of 1,000 fish each. However, this order quantity may not always have generated bulk-order price responses. Only prices were considered in assessing costs of purchasing fish. No adjustment was made for revenues from sales or property taxes, from which States and localities rather than the Federal Government would benefit. Although the Federal Government may benefit from additional income tax revenues, these tax receipts would likely be very small in relation to the purchase price of the fish. The resulting minor differences would not materially affect the analyses.

The NCCFRU obtained lists of known private fish producers from State government agencies and government and industry publications. Approximately 2,300 producers were asked to mail a copy of their price lists to the Unit. About 20 percent of the private growers responded, and about one-half of these provided quantitative information that could be readily included in the analysis. Follow-up telephone calls were made to private growers in the Pacific Northwest and to a lake trout producer in Minnesota.

The lack of private-sector quotes could be due to the fact that fish strains appropriate for stocking purposes are not the same as those used for food fish production, when one considers that most private producers raise fish for the food market. However, if there were a large market for fish suitable for stocking purposes, it might be expected that the private sector would respond by producing those species in demand, with the proper quality control and potentially at lower costs.

In addition, 39 State governments provided information on fish production costs at State hatcheries and on State experience in buying fish from the private sector for stocking purposes. In comparing government costs with private prices, one should bear in mind that private-sector price information was gleaned from existing price lists and, consequently, should not be treated

as actual bids in response to a detailed contract specifying fish quality, purchase quantity, time and location of delivery, etc. Along a similar vein, any actual contract to purchase fish would involve contract administration costs that would have to be borne by the government. A prudent manager would add an estimate of contract administration costs (approximately 8%) to the purchase price of the fish and compare the resulting figure against the cost of Federal fish production before deciding whether to accept a contract.

Comparative cost information (Federal costs are for FY 1984) is summarized in Table 1. State and tribal cost information applies to a recent year--generally 1983 or 1984. Appendix 4 (Tables 1-16) details Federal costs and provides information about the Federal hatcheries sampled and the State and tribal governments providing information for each type of fish considered. The tables also indicate the number of private price lists available for each analysis. Private-sector price information is from price lists in use in March 1985.

Federal costs are shown in the form of both a weighted average and a range. Weights were assigned on the basis of each sampled hatchery's percentage share of the total production of all sampled hatcheries for the fish of interest. The range shows the costs at the sampled Federal hatcheries, with the lowest and highest costs for a given type of fish. State and tribal costs are also shown in the form of an average and a range. As certain maintenance expenditures will fluctuate at a Federal hatchery from one year to the next, sampling the cost at several hatcheries for each analysis should average out these fluctuations at individual hatcheries, as one sampled hatchery may have had relatively low cyclical maintenance costs and another may have had relatively high costs for that year. In statistical terms, the Service has chosen to address this issue through cross-sectional rather than time-series analysis.

The average used for costs and prices is a simple arithmetic mean; the range shows the lowest and highest cost reported by those States reporting production of the fish indicated. When only one Federal hatchery was sampled, or only one State government responded, or only one price quotation was available, the same number appears as both "Average" and "Range."

The term "Area" in Table 1 represents the geographic area of the country for which Federal, State, and private information was collected on the specified fish. It corresponds to the States where most FWS fish of that type are stocked. The geographic area may not always denote precisely the same States each time it appears in the table, because the FWS often stocks fish of different types in different States within the same region. An itemized list of the States making up the area as defined in each analysis is included on the Tables in Appendix 4.

Federal/Service vs. State/Tribal Costs

Information on the cost of fish produced at State hatcheries was not available for 3 of the 19 comparisons in the analysis. States were asked to provide aggregated information on fish production costs. Hatchery-by-hatchery information was not requested, although it was sometimes provided. The only Indian tribal hatchery costs that could be obtained were from the Lummi Tribe's facilities in the State of Washington. The Lummis raise several species of Pacific salmon,

Table 1: Summary of Comparative Costs of Producing and Purchasing Fish[1]

Species or Form, and Area	Length (inches)	Average Costs or Prices Per Fish: Federal (1984) Average	Federal (1984) Range	State/Tribal[2] (1983-84) Average	State/Tribal[2] (1983-84) Range	Private (1985) Average	Private (1985) Lowest
Striped Bass							
South	1-2	$0.07	$.03-.09	$0.12	$0.02-0.35	$0.19	$0.08
South	5-6	.93	.52-1.15	--	--	.57	.25
Atlantic Salmon							
New England	6-7	.45	.32-.61	.70	.70	3.25	3.25
Fall Chinook Salmon							
West Coast	3-4	.03	.02-.08	.06	.03-.13	.07	.07
Spring Chinook Salmon							
Northwest	5-7	.21	.15-.35	.24	.20-.38	--	--
Coho Salmon							
Northwest	4-6	.11	.06-.26	.13	.03-.21	--	--
Steelhead Trout							
West Coast	7-8	.24	.18-.29	.41	.37-.45	.23	.20
Lake Trout							
Great Lakes	5-6	.18	.13-1.19	.63	.25-1.00	.30	.30
Channel Catfish							
East	3-5	.20	.14-.33	.08	.08	.21	.06
West	3-5	.15	.15	.19	.19	.20	.05
South	9	1.20	.86-4.48	.15	.15	.47	.07
Rainbow Trout							
No. Plains	3-4	.05	.05	--	--	.17	.12
Rocky Mtns.	5-6	.12	.11-.12	.29	.13-.37	.33	.08
South	7-8	.21	.21	.42	.42	.42	.23
West	7-8	.36	.26-.45	.41	.22-.53	.49	.24
Southeast	9	.30	.28-.36	--	--	.79	.48

1/ Average cost and price for each species and size are shown. Detailed breakdowns of the Federal sample, costs, and additional information relevant to prices are given in Appendix 4.

2/ The only available tribal data was from the Lummi Tribe of Washington.

as well as steelhead trout. Their operation is a large one as, in 1983, the Lummis contributed 35 percent (by weight) of all fish stocked by Indian tribes in the Pacific Northwest.

Most hatcheries distribute more than one species or size of fish. Also, each State government and tribal hatchery accounting system varies to some extent from the others and from the Federal accounting system. Moreover, some State cost estimates include distribution costs or capital costs, or even represent an average cost including all elements of a State fishery program's operations, not just hatchery costs. In general, it is likely that State cost estimates recognize more and different kinds of costs than do the Federal estimates. This may result in State costs appearing to be higher than would have been the case had these costs been calculated in the same manner as were Federal costs.

Accordingly, the following comparisons of State, tribal, and Federal costs provide only a rough indication of differences among State, tribal, and Federal governments relative to the cost of producing a given type of fish. They should not be considered completely definitive, for the reasons mentioned above.

-- For small striped bass (1- to 2-inch), the average Federal cost is estimated to be substantially below the average State cost. The average State cost exceeded the high end of the range for costs at the Federal hatcheries sampled. However, the Federal costs may reflect some "subsidy" due to assistance provided to the Service by States on broodstock procurement. The effect of such a subsidy is estimated to have little overall impact on the accuracy of Federal cost data.

   No State costs were available for larger (5- to 6-inch) striped bass.

-- For Atlantic salmon, the one source of State information indicated a cost in excess of the high end of the range of costs at Service hatcheries sampled. However, the State included capital costs in its calculations, which were not included in the Federal costs.

-- On the average, the costs of raising fall chinook salmon are higher for States than the Service, although the difference is small. The Lummi Tribe's cost are about equal to Federal costs.

-- Spring chinook salmon generally cost the States and Lummi Tribe about the same to produce as the Federal Government.

-- Coho salmon cost both the Federal and State governments about the same to produce.

-- Federal costs of raising steelhead trout are significantly lower than State costs.

-- Lake trout production costs are estimated to be higher at State than at Federal facilities. The high end of the Federal range exceeded the range of State costs because of a catastrophic loss of fish at a major Service lake trout hatchery in FY 1984. The problem causing that loss

(N_2 supersaturation) has been corrected and is unlikely to recur. The costs of producing trout at that facility under normal conditions are much lower, as is shown in Table 8 of Appendix 4. State costs could also be unusually high due to similar losses experienced at State facilities about the same time the Federal facility encountered problems.

-- Federal costs of raising small (3- to 5-inch) channel catfish in the eastern United States are estimated to significantly exceed State (Georgia) costs. State (Texas) costs of raising small channel catfish in the western United States exceed Federal costs. State (Mississippi) costs of raising large (9-inch) catfish in the South are estimated to be only a fraction of Federal costs.

-- Lack of State or tribal cost information for this analysis precluded comparison with Federal costs for (3- to 4-inch) rainbow trout in the Northern Plains region.

-- In the Rocky Mountains, State costs for (5- to 6-inch) rainbow trout are estimated to substantially exceed Federal costs.

-- Service costs of raising (7- to 8-inch) rainbow trout in the South were substantially lower than State (Missouri) costs.

-- In the West, State and Federal costs of (7- to 8-inch) rainbow trout averaged about the same.

-- No State or tribal cost data were available for comparison with Federal costs of raising large (9-inch) rainbow trout in the Southeast.

While State and tribal data were not available for all species and sizes of fish analyzed, Federal cost, except for that of most channel catfish produced, is estimated to be equal or lower than that incurred by States or tribes for producing fish of the same species and size.

Federal/Service vs. Private-Sector or Commercial Costs

As mentioned earlier, information from the private sector (Table 1) is shown both in terms of the lowest price noted from a number of private producers' price lists, and the average (mean) price submitted by responding private growers. All other things being equal, the lowest offered price is logically the one that a purchaser would choose to pay; but in case it may be questionable for some reason, the average is also shown for comparative purposes. This average should generally approximate a fair market price for the fish in question, although better terms could probably be negotiated. With larger quantity purchases, a price below the low figure shown might be obtained.

Specific findings were:

-- For small striped bass (1- to 2-inch), the average private-sector price was substantially higher than average Federal cost, and the low price was just above average Federal cost. For the larger striped bass (5- to 6-inch), the average private-sector price was below the average Federal cost, and the lowest private-sector price was substantially below Federal cost.

-- Private-sector price information on Atlantic salmon was from one New Hampshire grower who sold fish individually, which accounts for the extremely high price relative to Federal cost.

-- Steelhead trout prices in the West are comparable with Federal production costs, although only two price quotations were available.

-- The one fall chinook salmon price received was below the high end of the range of Federal cost, but substantially above the average Federal cost of producing these fish.

-- No private-sector price information was available for spring chinook salmon and coho salmon on the Pacific Coast.

-- The price quotation for lake trout (from a grower in Minnesota) exceeded average Federal cost, but was substantially below the cost of the Federal hatchery that suffered the loss mentioned in the preceding section. Indications are, however, that even when the Federal hatchery resumes normal operation, its costs would exceed those of the one quoted.

-- Prices for (3- to 4-inch) channel catfish in the eastern United States averaged about the same as Federal costs, but the lowest price was substantially lower. In the western United States, a similar situation prevailed. Large channel catfish (9-inch) in the southern United States were priced far below Federal production cost.

-- Small rainbow trout distributed in the Northern Great Plains (3- to 4-inch) and Rocky Mountains (5- to 6-inch) were priced much higher than Federal cost. The larger (7- to 8-inch) fish in the South were also priced above Federal cost, the lowest price being just above the average Federal cost.

-- In the West, the average price for larger (7- to 8-inch) rainbow trout exceeded the upper range of Federal cost, but the low price was substantially below average Federal cost. The largest (9-inch) rainbow trout are stocked by the Federal Government in the Southeast, where private prices substantially exceed the high end of the range of Federal cost.

Replacing existing production with a major fish-purchasing program would incur a number of monetary and non-monetary costs (severance pay, unanticipated retirement payments, staff and management dislocation and reorganization, retraining costs, contract administration costs, etc.), so a Federal manager should not undertake this option unless it will clearly produce economic savings. However, before initiating new Federal production programs and during evaluation of ongoing programs, a detailed comparison of the anticipated costs of Service production vs. purchasing should be completed, and the most cost-effective option chosen. Fish health, overall fish quality, timing of delivery, correct order quantities, proper strains, etc., may be more likely to pose problems in a production system outside the "customer's" control, and could constitute real costs. To minimize costs, stringent standards and criteria must be written into the contract by the purchaser and rigorously followed by private-sector contractors. A clear advantage, however, of purchasing fish would be that in the event of unusual losses at a contractor's hatchery, the Government would not have to pay for any fish not delivered.

There may be some biological difference between the domestic strains of fish raised by the private sector, and some of the "wild" strains that are produced for stocking (e.g., lake trout and striped bass) by the Service. Special diets and disease precautions may be necessary in culturing the wild fish, so, in a few cases, private price estimates may not reflect the need for the somewhat more costly special treatment wild fish may require.

The place of origin of privately produced fish would also be a consideration in initiating a purchase program. Fish from outside a geographic region or river basin in which they would be stocked may differ genetically from those that are indigenous. As a result, they may not survive as well as local fish, or they may survive too well and supplant the native fish. Either outcome would be unacceptable and discourage fish purchases. Also, transportation over long distances can severely stress fish, which may result in higher mortality than would be experienced with locally grown fish. This consideration would also militate against fish purchases from outside the area to be stocked.

Government-owned, contractor-operation of existing facilities is another option that should be considered. Although detailed studies of such operations have not been initiated with respect to fish production, this approach has been successful in providing other governmental services. It alleviates some of the potential problems of fish purchasing, such as appropriately locating hatcheries, and presents an opportunity for improving the efficiency of operations.

Overall, private-sector prices are estimated to offer substantial savings over Federal fish production for: (1) all sizes of channel catfish in all areas studied; (2) larger (7- to 8-inch) rainbow trout in the West; and, (3) larger (5- to 6-inch) striped bass along the Gulf and Atlantic coasts. Average Federal production costs were similar or lower for fall chinook salmon, steelhead trout, Atlantic salmon, lake trout, smaller (1- to 2-inch) striped bass, and for rainbow trout of most sizes in most areas surveyed. No private-sector prices were available for most species of Pacific salmon.

REVIEW OF PRODUCT USE

The National Fish Hatchery System is an important tool for the Service in fulfilling its fishery-related responsibilities and role. Major responsibilities entail activity required by Federal statutes, treaties, cooperative agreements, judicial action, or other mandates. The Service performs work related to anadromous fishes, fish of the Great Lakes, and fishery resources on National Wildlife Refuges, all of which have high priority. It also serves as a catalyst in identifying fishery resource problems, promoting corrective action, and assisting the efforts of other Federal agencies, States, and Indian tribes.

Anadromous resources receive high priority because of their interjurisdictional distribution and importance to both international and domestic fisheries. The recent United States-Canada Pacific Salmon Treaty and Convention for the Conservation of Salmon in the North Atlantic Ocean are examples of forums in which the Service contributes to the management of such fishery resources.

After nearly 15 years of effort by numerous agencies, the ratification of the United States-Canada Pacific Salmon Treaty in 1985 recognizes a commitment by both the United States and Canada to the coastwide conservation and coordinated management of salmon stocks. The North Atlantic Salmon Conservation Organization (NASCO), created in 1983 under the Convention for the Conservation of Salmon in the North Atlantic Ocean, provides an effective, permanent forum for regulating harvest of the salmon resource in ocean waters and promotes its restoration and and maintenance.

In support of international commissions, the Service participates with the Great Lakes Fishery Commission under its cooperative fishery programs involving eight States, a Canadian Province, the Canadian Department of Fisheries and Oceans, and various Indian tribes. The ultimate success of lake trout restoration efforts for the Great Lakes hinges on the full cooperation of all participants.

The Service assists the Bureau of Indian Affairs (BIA) in meeting trust responsibilities to Indian treaty tribes in several ways. In the Pacific Northwest, it operates a salmon hatchery and provides technical assistance to tribes and to two tribal fishery commissions associated with treaty fishing rights in the area. In recent years, the Pacific Northwest Treaty Tribes have developed sophisticated fishery management expertise, which has greatly lessened the need for technical assistance from the Service. The Service also works with the BIA in protecting and managing fishery resources on Indian reservations, and operates three hatcheries for the BIA in the Southwest.

Restoration of Depleted Resources

Restoration of depleted resources entails Service participation in rebuilding major, nationally significant, economically valuable, interjurisdictional fishery resources to self-sustaining levels. The National Fish Hatchery System is a key tool in accomplishing this objective. Several fishery resources of particular concern here are: Pacific salmon and steelhead trout; Great Lakes lake trout;

anadromous Atlantic salmon; anadromous striped bass of the Atlantic and Gulf of Mexico; American shad; Atlantic and shortnose sturgeon; and transboundary intercoastal and estuarine fishes (e.g., red drum, weakfish).

A successful restoration program addresses the causes of stock depletion, specifies corrective action, and cooperatively initiates measures that allow for the prudent resumption of recreational or commercial fisheries. The following examples illustrate cooperative restoration efforts.

Pacific Salmon and Steelhead Trout--Large and valuable stocks of Pacific salmon and steelhead trout spawn in the rivers of northern California and the States of the Pacific Northwest. However, virtually all of these stocks have declined from historic levels due to a combination of three factors: overfishing, construction of dams that block or impede upstream passage of adults and downstream movement of juveniles, and the general degradation of spawning and other habitat. The Federal Government is involved for two principal reasons: first, because of the complex interstate and international dimensions of managing these species, and second, Indian trust obligations of the Secretary of the Interior are linked to the restoration efforts for these fish.

The Service's restoration goal, as detailed in its Statement of Responsibilities and Role, is to facilitate reestablishment of self-sustaining populations to their full biological potential in currently available habitat, and in any part of their historical habitat that can once again be made available. Contributing to the attainment of its goal to facilitate restoration of Pacific salmon and steelhead, the FWS operates 16 hatcheries, 3 related facilities, (Abernathy Salmon Culture Technology Center, Tehama-Colusa Fish Facility, and Yakima Fish Screens), 3 fish health centers and 7 fishery assistance offices. The Service maintains a strong research capability, and contributes its expertise to assessing and planning harvest levels for the many salmon and steelhead runs. In all phases of its work, the Service strives to achieve effective coordination with the States, Indian tribes, regional organizations, and other Federal agencies that have direct interest in the management of salmon and steelhead resources.

Atlantic Salmon--Anadromous Atlantic salmon were once extremely bountiful in New England rivers. However, by the early 1800's the salmon resource had been severely reduced by the construction of dams, overfishing, water pollution, and basic ignorance of the biology of the species. Now, in the 1980's, Atlantic salmon are being reestablished in New England. They have been observed in the last 10 years in streams from which they had been absent for over a century. In 1984, Atlantic salmon returned to 15 river systems in New England. In Lakes Ontario and Champlain, the Service is cooperating with the States of New York and Vermont, the Province of Ontario, and the Canadian Department of Fisheries and Oceans in restoring landlocked Atlantic salmon in those waters.

The objective of the New England Atlantic salmon restoration program is to make full use of available salmon spawning habitat by the year 2000. The annual planting of 5 million fish is needed to achieve the restoration goal. This need has been determined through joint State and Federal restoration plans, planning processes, and formal agreements. Stocking at this level would continue

until the restoration objective is accomplished, i.e., by the year 2000. The Service is expected to contribute 76 percent of the 5 million fish--about 2.5 million fry and 1.2 million smolts. Service fishery assistance field biologists also advance the restoration program by conducting resource surveys, assessments, and related activities.

In October 1984, the Service released for public review a Draft Environmental Impact Statement for the Restoration of Atlantic Salmon to New England Rivers. The Final Environmental Impact Statement will be completed in the fall of 1985.

Lake Trout--After supporting a highly profitable commercial fishery for almost a century, the Great Lakes lake trout populations collapsed in the late 1940's and early 1950's. Overfishing, heavy predation by the invading sea lamprey, and deteriorating habitat all contributed to the collapse. The objective of the lake trout restoration efforts is to rehabilitate lake trout populations of the five Great Lakes so they sustain themselves at a relatively stable level by natural reproduction, and produce a usable annual surplus.

The Service supports lake trout restoration efforts in six ways: (1) assisting State, tribal, Canadian, and other Federal agencies in developing and implementing lake trout restoration plans for each lake; (2) producing fish at Federal hatcheries; (3) testing the utility of reintroducing different strains of lake trout; (4) conducting research to improve the survival and successful reproduction of lake trout in all lakes; (5) continuing control of the sea lamprey; and (6) maintaining a stringent law enforcement effort to reduce illegal harvest and sale of lake trout.

The Service produced over 7 million of the 8.5 million lake trout needed for the Great Lakes in 1985, and expects to produce 10 million lake trout for all the lakes by 1991. In support of this effort, continued law enforcement could reduce losses from illegal fishing, which is estimated at 3 million pounds annually. Suppression of illegal fishing could reduce the numbers of fish needed to meet restoration needs. The Service recognizes, however, that other factors, such as improved survival of lake trout in hatcheries and more effective and complete sea lamprey control, would also reduce the number of fish required to meet restoration needs.

Striped Bass--The striped bass was once an important game and food fish of the Atlantic coast. Historically, tributaries to the Chesapeake Bay have contributed about 80 percent of all striped bass found along the east coast. Since 1973, the sport and commercial catches of striped bass along the east coast have declined 90 percent. An Emergency Striped Bass Study, conducted under the Anadromous Fish Conservation Act (P.L. 89-304), concluded that overfishing is the major factor in the decline, possibly exacerbated by environmental contaminants. Similar problems have caused striped bass declines in the Gulf of Mexico. In October 1984, Congress passed the Atlantic Striped Bass Conservation Act (P.L. 98-613), which mandated reductions in striped bass catches from Maine to North Carolina. Should any State fail to comply with the reductions, the Secretary of Commerce is authorized to declare a moratorium on the catching of striped bass in that State's coastal waters.

The overall FWS goal for striped bass restoration is to assure that each of the three distinct populations of the Middle Atlantic, the South Atlantic, and the

Gulf of Mexico are self-sustaining by the year 2000, that in the interim their broodstocks are maintained. In 1984, the Service produced 2.8 million striped bass for this purpose. The Service, in coordination with the States, has estimated that up to 1.5 million striped bass (Phase II, 5- to 6-inch) fish are needed annually to evaluate, on an experimental basis, the potential of hatchery stocking to assist restoration efforts in Chesapeake Bay, and up to 3.5 million striped bass (Phase I, 1- to 2 inch) fish are required annually for restoration efforts in both the Gulf and the South Atlantic.

The Service operates 11 fish hatcheries, most in the southeastern United States, that produce striped bass for restoration purposes (Appendix 5). Eight Service hatcheries now raising striped bass will increase their production of the species, and measures are being considered at four others to increase their production capability.

Other species--The American shad is an anadromous fish inhabiting Atlantic coastal waters from Newfoundland southward to Florida. It is sought recreationally and and commercially, primarily for its roe. Commercial landings have declined over 90 percent during the last century, primarily because of barrier dams or seasonal pollution that blocks or limits access to spawning and nursery habitat.

Service restoration activities now addressing these problems focus on the Susquehanna, Delaware, Merrimack, and Connecticut Rivers. No Federal hatcheries are now producing American shad; however, the Service's Lamar (Pennsylvania) Fish Technology Center is developing shad culture techniques for State hatcheries.

The shortnose sturgeon was historically found along the east coast of North America, from the St. John's River in New Brunswick, to the St. John's River in Florida. It is now listed as an endangered species under the Endangered Species Act (P.L. 93-205). Commercial overfishing in the 1800's and loss of habitat have contributed to the decline of sturgeon in rivers of North Carolina, South Carolina, Georgia, and Florida. Specific Service restoration goals have yet to be developed for the shortnose sturgeon. The Service's Orangeburg (SC) NFH has experimentally cultured this species with very encouraging results. In the future, a number of other NFHs could be used to raise shortnose sturgeon to support restoration efforts outlined in the endangered species recovery plan.

Stocks of a number of fishes that move through estuarine and nearshore waters, such as weakfish and snook, have also suffered serious declines in recent years. The migratory nature of these species means that actions by a single State are insufficient to overcome the declines; joint action is required. Aggressive habitat protection and restoration of degraded habitat will be essential to the restoration of these species. Specific Service restoration plans have not been developed for estuarine and intercoastal species. In 1985, however, Uvalde (TX) and Bears Bluff (SC) NFHs will assist Texas and South Carolina, respectively, in their efforts to restore populations of snook and red drum.

Since the mid-1970's, the Service has played an ever-increasing role in protecting, maintaining, and propagating threatened and endangered species of fish. Nearly one-third of the 51 species of American fishes currently listed as threatened or endangered are being held at National Fish Hatcheries. These hatcheries function as refuges, or propagate the endangered or threatened

species for reintroduction into their former natural habitat. For example, at Dexter (NM) NFH, which presently holds 13 threatened or endangered fishes, propagation techniques have been developed for the razorback sucker and the Colorado River squawfish. Both species have been reintroduced into their former habitats. Similarly, the Orangeburg (SC) and the Lahontan (NV) NFHs have been successful in propagating and reintroducing the shortnose sturgeon and the Lahontan cutthroat trout, respectively.

Mitigation of Resource Impairment

Virtually all fishery resources of the United States are potentially affected by water resource and other Federal development initiatives. Mitigation, as paraphrased from the Council of Environmental Quality regulations (40 CFR 1508.2), is an action taken to lessen or reduce the impacts of Federal projects on fishery resources by repairing, rehabilitating, or restoring the affected resource. The Service mitigation policy has been one that replaces in-kind or substitutes fishery resources of equal value for those impacted. Mitigation is continued for as long as the habitat losses are sustained, i.e., for the life of the project, and for as long as effects of the project persist.

In the past, FWS mitigation efforts have often focused on providing hatchery-reared fish of the proper strain(s) needed to compensate for the loss of naturally produced stocks. Under the Service's redefined fishery resource responsibilities, mitigation activities also may include monitoring the implementation of mitigation measures and evaluating the results.

Currently, the Service has 44 national fish hatcheries and other installations meeting mitigation needs for various species (Appendix 6). An excellent example of NFHS participation in mitigation is the Lower Snake River Compensation Plan (LSRCP). Losses of fishery resources on the Lower Snake River are attributable to four dams. The Service and the States jointly developed a restoration plan for the species adversely affected by these dams. Capital and operational project costs are recovered by power receipts and reimbursed to the United States Treasury by the Bonneville Power Administration. Twenty-two facilities are designated to produce fish needed for the LSRCP. These consist of 9 State fish hatcheries, 2 national fish hatcheries, and 11 State fish trapping and release facilities.

Salmon and steelhead have declined dramatically in the Columbia River Basin since the turn of the century. It is estimated that anadromous fish runs in the Columbia River have dropped 70 percent from pre-McNary Dam levels (1957) due to the construction and operation of numerous Federal dams that impede the migration of fish. Other activities, such as overharvest, poor land use practices, and water diversion have also contributed to this decline. To alleviate this condition, Congress passed the Mitchell Act of 1938. The Act authorized the Secretary of the Interior (later, the Secretary of Commerce) to, among other things, establish and operate fish hatcheries to produce fish for the Columbia River Basin. Under the Mitchell Act, the NMFS funds the operation of 6 NFHs and 19 State hatcheries and rearing ponds to mitigate for these losses. In 1984, 14 NFHs contributed about 65 million anadromous salmonids toward the mitigation needs in the Pacific Northwest. In the Pacific Northwest, it

is likely that mitigation hatchery stocking will continue in perpetuity because the losses are long-term and irreversible, and it may be physically impossible to fully compensate for these losses.

Further inland, rainbow trout are often produced to mitigate losses by dams constructed by Federal agencies. Although many production needs are being met, shortfalls of 100,000 to 200,000 rainbow trout have occurred annually in the Colorado River Storage Project area, almost entirely because a major unit of a national fish hatchery was destroyed by a landslide in 1981. Also, striped bass are used routinely in inland waters to mitigate loss of warmwater fishery resources resulting from the construction of dams. Eight NFHs produced about 2.8 million striped bass for this purpose in FY 1984.

The Service also operates eight other mitigation hatcheries that raise coolwater and warmwater fishes for stocking project-impacted waters in various locations, primarily on the Great Plains and in the Mississippi River watershed. These facilities stock such species as channel catfish, walleye, northern pike, black bass, and sunfish.

Settlement of Resource Conflicts

A basic source of conflict is the issue of allocation of the harvest of a limited fishery resource of fluctuating size among user groups. Each group often has the capability and the desire to take most of the harvestable fish for itself. The challenge is to equitably allocate the harvest, while preventing overharvest that would both destroy the ability of the fishery resource to renew itself and prevent fishermen from continuing to benefit from use of the resource.

Most coastal anadromous and Great Lakes lake trout fishery resources of the United States have been depleted by overfishing, but pollution, habitat destruction, and the invasion of the sea lamprey in the Great Lakes must also share the blame. Regardless of the relative importance of the various causes, most fishermen awaiting the annual issuance of harvest regulations are frustrated that their annual take is or will be less than it used to be.

Fish culture can increase the potential number of harvestable fish, but the best strategy for perpetuating the species is habitat protection and the prevention of overharvest. Fish hatcheries are an integral and necessary tool in many areas, including the Pacific Northwest, and restoration of stocks of many fish species would be impossible without their contribution.

Restoration differs from enhancement, which involves artificially increasing fish populations with the sole and explicit purpose of increasing harvest. In the ocean, many different salmon populations mingle together in what is termed a mixed-stock fishery. Fishermen tend to oppose a harvest reduction on a mixed-stock fishery because a more restrictive harvest policy designed to protect wild populations and further restoration efforts will also deprive fishermen of a large part of the runs of hatchery fish produced for enhancement purposes. Fishermen are naturally very sensitive to any action that may affect--especially decrease--their catch. Even when there is sound scientific justification, it is sometimes politically difficult to make significant changes in the established

pattern of salmon being raised and stocked by Federal, State, and tribal hatcheries. However, in recent years, changes in hatchery operations have been effected through cooperative agreements among affected tribes, States, and Federal agencies.

Pacific Northwest--Production of salmon and steelhead trout by Federal, State, and tribal governments in the Pacific Northwest is extensive. Conflict occurs between the United States and Canada; between Indians with long-established treaty rights and all other fishermen; among the individual Indian tribes; among the State governments of Alaska, Idaho, Oregon, and Washington, each of which must represent several fishery constituencies; and among fishermen of differing orientation (e.g., sport and commercial, in-river and offshore).

The recently ratified Pacific Salmon Treaty allocates the Pacific salmon catch between the United States and Canada. The Treaty makes those United States restoration efforts that are included within the scope of the treaty much more achievable. Before the Treaty was signed, there was no guarantee that the benefits of restoration efforts would accrue to the Nation that undertook them. Treaty provisions help ensure that the Nation that takes action to increase the fishery resource will benefit in proportion to the extent of such efforts. The Treaty, therefore, improves the chances for success of restoration efforts, such as the $800 million in fishery projects that the Pacific Northwest Electric Power Planning Council has outlined under the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501), because those who will pay for the projects know they will receive the resulting fishery benefits.

Role of the Judiciary--Since the 1970's, the U.S. Federal courts have dealt with allocation of catch between treaty Indian tribes and all other fishermen. The two phases of the "Boldt Decision" (1423 U.S. 1086 (1976)) have allocated the catch in Puget Sound and along the northern coast of Washington. The "Belloni Decision" (529 F. 2d 570 (1976)) had a somewhat similar effect in the Columbia River Basin, except that there was no quantified allocation of the harvest.

Judicial intervention, while often disrupting existing fishery resource use patterns, attempts to establish equitable fishery harvest schemes. In the Boldt Decision, the Court allocated treaty Indians 50 percent of the harvestable surplus of Pacific salmon and steelhead within the case area. However, non-Indians, realizing the impact of this decision quickly reacted. A bitter controversy arose over the Indians' reaffirmed treaty right to fish, which was ultimately upheld by the U.S. Supreme Court. Few fishermen realize, however, that a number of Indian tribes manage effective fishery programs, including the operation of fish hatcheries.

Conflicts over fishery resources in the Great Lakes have increased in recent years to much the same degree as in the Pacific Northwest. A recent Federal court decision, the "Fox Decision" (471 F. Supp. 192 (1979)) in 1981, held that Indian tribes reserved the right to fish in Great Lakes waters within the State of Michigan, which the tribes had ceded by treaty to the United States in 1836. Michigan had sought to regulate Indian fishing activities and subject individual Indians to State fishing regulations. The Court held that the State has no more than conditional jurisdiction, and that only the Indian tribal government can regulate Indian fishing. In the aftermath of the Court's ruling, the tribes and the State reached an understanding with respect to cooperative management of the lake trout and other fish populations inhabiting the waters in question.

Salmon and Steelhead Conservation and Enhancement Act--Congress passed the Salmon and Steelhead Conservation and Enhancement Act in late 1980 to aid State, tribal, and Federal salmon and steelhead managers in the Pacific Northwest in developing a coordinated program to encourage stability and promote the economic well-being of the region's salmon and steelhead resources.

The Act authorizes a vessel buy-back program, administered by the Department of Commerce, to relieve the overcapitalized commercial fishing industry and thereby reduce the number of fishermen and other people whose livelihood depends on commercial fishing. It also established a Salmon and Steelhead Advisory Commission which was charged with developing a new management structure for anadromous salmon and steelhead resources and fisheries of the Washington and Columbia River Conservation Areas. The draft management plan calls for establishment of three subregional policy groups representing the States, Federal agencies, and Indian tribes to:

- develop and reconcile production and harvest plans;
- develop a subregional dispute resolution system;
- provide subregional policy-level coordination for production, harvest management, enforcement, habitat protection, research, and management information;
- develop formal subregional policy level liaison with land, water, and energy management entities;
- review existing institutional arrangements and procedures to consolidate duplicative functions and recommend management structures for the Columbia River Basin, Puget Sound, and coastal fisheries.

Finally, the Act authorizes enhancement grants for eligible participating parties. These grants would be used to increase the supply of salmon available for the remaining fishermen, and thereby lessen the extent of the conflict occurring between those with less abundant resources to share. The Act was thus designed to directly decrease fishing effort, increase fish populations, and more effectively manage the fishery resources.

The management structure proposal developed by the Salmon and Steelhead Advisory Commission, created under the SSCEA, consists of a single regional entity with three subregional policy groups for the Puget Sound, Coastal, and Columbia Basin subregions. The regional organization would not exercise regulatory authority, but would coordinate joint management policies. It would operate joint systems for information dissemination, research, and law enforcement. The Advisory Commission recommends that, at some point, Alaska and California also be brought into the management structure. Once the Secretary of Commerce approves the Commission's recommended management structure, it could become a vehicle for resolving disputes between Indians and other parties that otherwise would end up in litigation. The management structure has been successfully tested in that it served to consolidate the U.S. negotiating position before the Pacific Salmon Treaty was approved.

Although the Secretary of Commerce has not approved the management plan as required by the Act, the States and tribes represented in the Washington and Columbia River conservation areas are actively developing comprehensive enhancement plans.

To date there have been no grant funds appropriated for enhancement projects under the Act, nor have any of the comprehensive enhancement plans been completed. However, some fishery management plans have been completed.

At the international level, the Pacific Salmon Treaty rests partly on the understanding that the United States and Canada will continue fish culture activities with regard to the salmon resources specified in the agreement. This understanding also places constraints on United States fish culture prerogatives. Any significant change in fish culture regimes will change the mix and distribution of the catch, and thereby invalidate the assumptions the treaty negotiators used in setting catch quotas.

One way to reduce user conflict within the fishing community and promote the resolution of conflict, is to increase the harvestable surplus of fish by achieving higher survival of young downstream migrants (smolts). Doing so will require, among other things, a greater effort by Federal, State, and private dam operators toward cooperatively guaranteeing adequate streamflows for the young salmon and steelhead. Much has already been done at great cost but further improvements have to be made if increases in smolt survival are to be judged significant.

EVALUATION OF FUTURE PRODUCT USE

In planning for NFHs, the Service must anticipate both the long-term need for artificially propagated fish to meet Federal responsibilities, and the long-term potential of its facilities to meet this production need. Such forecasting is a notoriously uncertain and difficult task. In 1968, for instance, the Service forecast FY 1980 stocking needs for fry, fingerling, and catchable size fish of various types in a document entitled "National Survey of Needs for Hatchery Fish." Table 2 compares that forecast with the actual FWS fish distribution in FY 1984.

Table 2. FWS Fish Distribution: Forecast Need and Actual Stockings

	Millions of Fish		
	1968 Forecast Need	Actual Stocking	
Type of Fish	for FY 1980	In FY 1980	In FY 1984
Trout	23.2	39.1	24.3
Salmon and Steelhead	25.7	88.9	64.9
Warmwater Fish (e.g.; catfish, striped bass, northern pike)	27.5	176.4	79.4
Total	76.4	304.4	168.6

The 1968 report indicated that Federal hatcheries in 1965 contributed large numbers of fish for State programs. In the early 1980's, the Federal Government turned over to the States for operation and funding most Federal hatcheries that were supporting State programs. The large drop in Service fish distribution in FY 1984 reflects these changes. Nevertheless, FY 1984 figures, which can be generally assumed to represent exclusively Federal responsibilities, are more than double the 1968 forecast of FY 1980 needs.

The National Fish Hatchery System (NFHS) is currently the exclusive source of fish used by the Service to meet its needs. Where program plans indicate a need for more fish, such increases might be achieved by one or a combination of six measures: (1) allocating funds for maintenance and rehabilitation of production facilities to improve productivity and operating efficiency at existing hatcheries; (2) reducing seasonal fluctuations in production, where biologically and climatically feasible, to enable hatcheries to produce at full capacity during a greater portion of the year; (3) increasing operating funding to more fully use equipment and space at existing hatcheries (where insufficient funds can prevent the production use of all raceways, ponds, etc.); (4) undertaking limited construction to expand the carrying and production capacities of the facilities already making the utmost use of their physical plant; (5) constructing new Federal hatcheries; and (6) purchasing needed fish from non-Federal sources.

It is difficult to find suitable sites for new hatcheries. Quality and quantity of water supplies are crucial variables in siting a hatchery. Because the facilities sometimes occupy many acres, the availability of land may also be a factor. These and other constraints limit the number of locations where new hatchery construction is economically and technically feasible.

The private sector is an alternative to relying solely on NFHS capabilities. At times in the past, the Service has purchased small quantities of fish from private operators. This option must be examined carefully--especially when the most likely alternative is construction of expensive new Federal hatcheries. The number and technical capability of private fish producers has grown substantially in the last decade and it may now be feasible to buy some types of fish when it was not previously.

Projected Needs

Federal fish stocking needs are determined by the Service in consultation with State, tribal, and other Federal agencies in those fishery management situations where there is a clear Federal responsibility, as delineated recently by the Secretary of the Interior. These consulations are often formalized in interagency, intergovernmental, or international agreements, and then are addressed in Service planning and budgeting processes. A result of this process can be, and recently has been, hatchery closures or tranfers, not just new hatchery construction.

Pacific Salmon and Steelhead Trout--The Service operates 19 salmon and steelhead hatcheries and related facilities in the Pacific Northwest and northern California to meet Federal mitigation and restoration responsibilities. Past habitat loss or damage in most river systems that produce anadromous fish resources in the Pacific Northwest and northern California has been such that in only very few instances can the Service consider that full mitigation or restoration of those resources has been achieved. Accordingly, unmet needs remain that increased fish stocking could fulfill. However, the Service sees no requirement for construction of new Federal salmon or steelhead trout hatcheries in the near future. The mitigation and restoration stocking needs known at this time could most effectively be addressed by repairing, rehabilitating, and upgrading existing facilities, by encouraging production by States and other entities, and by examining the potential of user fees.

An effective, if indirect, way to increase hatchery production efficiency in the long term is to vigorously pursue research on diseases that cause the loss of or weaken fish grown at hatcheries. Although it rarely happens, disease epidemics sometimes cause major losses of fish in a hatchery. Some diseases have insidious effects which weaken the fish and decrease their chance of survival as they migrate downstream. Maximizing the survival of fish being raised at existing hatcheries, is a more economical course of action than constructing new hatcheries.

High mortality of young salmon and steelhead occurs as the fish migrate downstream past hydroelectric dams and irrigation diversions. Providing adequate downstream fish passage is another effective way to boost the survival of young salmon and steelhead, and indirectly increase the efficiency of hatcheries.

Although grants possible under the Salmon and Steelhead Conservation and Enhancement Act could stimulate hatchery development proposals, the Service recognizes

the need to emphasize more economical courses of action, such as the improvement of existing facilities to increase efficiencies, the restoration and protection of habitat, and the advancement of research on fish diseases. There is also a pressing need for more intensive evaluation of stocking. In general, only fragmentary information exists on the survival of hatchery fish and on their place and date of harvest. Better and more complete information would allow for more efficient fish production and stocking practices.

Makah National Fish Hatchery (Washington)-In the 1960's, the Makah and Elwah Tribes began promoting the construction of a hatchery near the northwest tip of the Olympic Peninsula to restore and maintain anadromous salmonid stocks in coastal and Strait of Juan de Fuca rivers. As a result of pollution, habitat degradation, and ocean over-fishing, native stocks of chinook, coho, and chum salmon and steelhead trout became severely depleted in rivers historically fished by both tribes. In December 1970, upon request of the Makah Tribe, the Service initiated a hatchery feasibility study. The study, finalized in March 1972, viewed favorably the construction of a hatchery to be located on the Tsoo Yess River on the Makah Indian Reservation.

In response to a request by the tribe and the Service, Congress authorized construction of the Makah National Fish Hatchery in 1972 (92 Stat. 369). In concert with the appropriation of construction funds in FY 1973, the tribe utilized tribal funds to purchase the land identified in the feasibility study for the hatchery. Problems in surveying during site preparation and the high inflationary rate encountered during the construction period (which resulted in multiple Service appropriation requests) were primary factors contributing to the escalation of construction costs for the facility from the original estimate of $4,835,000 to the $15,722,000 spent or obligated to date.

Without completion of the hatchery's original construction plan, neither maximum nor efficient utilization of the hatchery can occur. Items deleted from the original construction plan, due to insufficient funding, are currently being addressed by the Service in a 4-phase construction program totaling $3.55 million. Phase I includes: a feasibility study, which is currently in progress, to provide additional water for fish production during the summer; the installation of safety walkways on the raceways; and the covering of water discharge structures. The installation of 18-inch wide safety walkways is required to provide safe footing while working on the 8-inch wide raceway walls. The water discharge structures require safety coverings to prevent the potential drowning of staff or visitors.

Phase II includes: the purchase of vehicles and motorized equipment; a new domestic sewage facility; and completion of the spawning facilities. A distribution truck is necessary to facilitate the transportation of captured broodstock to the hatchery, the transfer of fry to the satellite rearing ponds, and the stocking of fry and smolts into local rivers. Additional equipment is also required for hatchery maintenance projects. Installation of an adult-fish crowder will facilitate the utilization of now-unusable spawning equipment and facilities.

Phase III includes paving hatchery roads and installing security fencing. Neither the access road to the hatchery nor the roads or work areas on the hatchery grounds are paved. Although the roads and work areas have been graveled, mud and dust are a continual problem, as well as the accumulation of gravel and

debris in the fish-rearing ponds. Paving will eliminate these problems. The installation of security fencing around the hatchery is necessary to protect adult broodstock as well as hatchery facilities and equipment.

Phase IV includes: erosion control; the installation of automatic fish feeders; and the installation of water disinfection facilities. Substantial rip-rap and reinforcement of the river bank is required upstream of the dam to prevent further bank erosion which may result in the river circumventing the dam. The installation of automatic fish feeders will provide for better food utilization by the fish and a reduction in future staff requirements. Completion of the water disinfection facilities is necessary to eliminate fish pathogens from water used for incubation and rearing inside the hatchery. This will directly increase the survivability of the young fish thus increasing the number of fish that could be stocked in local rivers or transferred to satellite rearing ponds.

Since the hatchery began operations in October 1981, an inadequate summer water supply has prevented it from reaching projected production goals for coho salmon and steelhead trout. In response to this shortage, production goals were altered to make the most effective use of available water. The primary change was a shift in emphasis from coho salmon and steelhead trout to fall chinook and chum salmon production. The latter two species can be released in the spring after hatching, while coho salmon and steelhead trout require over-summer rearing. This shift reduced the summer water requirement to that not exceeding water availability. If production facilities now available at the hatchery are to be utilized to the fullest extent during the summer months, an additional minimum water supply of 5 cubic feet per second (cfs) is required. A hydrological study is presently (1985) being conducted to develop a plan to provide additional water.

Future production plans, incorporating a minimal increase of 5 cfs in the water supply, propose increasing the hatchery's current production of yearling coho salmon from 300,000 to 600,000 smolts. The Table below compares the planned production with the current production goal.

	Original Fish Production Goal		Current Fish Production Goal	
	Number	Size	Number	Size
Fall chinook	4,000,000	90/lb	4,000,000	75/lb
			100,000	200/lb
Coho	750,000	20/lb	300,000	15/lb
			500,000	750/lb
Chum	4,250,000	400/lb	3,000,000	550/lb
Steelhead trout	400,000	7/lb	65,000	7/lb
TOTAL	9,400,000		7,965,000	

Due to the depleted local runs, native fall chinook and chum salmon broodstocks cannot provide sufficient eggs to meet current production goals. To maximize the available number of adults returning to the hatchery, the Makah Tribal Council has enacted regulations restricting the river fishery. In concert with the Service's efforts at the hatchery, the Tribal Fisheries Department, which receives funds from the Bureau of Indian Affairs, has constructed and currently operates trapping facilities on Wyaatch Creek and the Hoko River to provide additional broodstock. The Service has also recently installed an electric weir at the hatchery, as many returning adults have traversed the dam and escaped upriver rather than entering the hatchery.

In conjunction with the hatchery's production program, the Makah Tribe has constructed two satellite rearing ponds with tribal and BIA funding. One rearing pond, located on Wyaatch Creek, is used primarily for chum salmon production. The second pond, located off the reservation on the Hoko River, is used for fall chinook and steelhead trout production. The construction of additional rearing ponds is planned for Educket Creek (coho salmon) and the Sail River (fall chinook and chum salmon) as funds become available.

With the completion of the hatchery and satellite rearing ponds, restoration of salmon and steelhead trout stocks indigenous to these Olympic Peninsula river systems can be accomplished. The purchase of non-indigenous stocks reared outside of the local drainages is not a feasible alternative to completion of the hatchery, as past stocking of non-indigenous stocks has resulted in only partial success in some river systems. Stocks of salmon and steelhead trout are not only important to the marine and river fishermen of the Makah and Elwah Tribes, but also to other treaty tribes and non-Indian commercial and sport fishermen in both the United States and Canada. Due to the widespread economic benefits of these stocks, neither the user-pay concept nor cost sharing with the tribe are popular alternatives to Federal Government completion of the Makah NFH. However, both are potential alternatives for consideration.

Assuming 50-year amortization of the capital required to complete construction, a 12-percent Federal interest cost for that construction as well as for annual operation and maintenance, and an incremental $10,000 increase in annual operational costs, completion of the hatchery would cost $11.42 per pound for the additional salmon produced.

With the construction of the Makah Hatchery predating the Boldt Decision and the Salmon and Steelhead Conservation and Enhancement Act, there is no direct connection between the hatchery and either the Decision or the Act. Indirectly, the hatchery will help fulfill the fishery allocations for the marine and river tribal fishermen. Similarly, the hatchery production will be incorporated into salmon/steelhead management plans for Puget Sound and the Washington Coast.

Meeting Other Projected Needs--The Service does not, at present, need new hatcheries to meet its responsibilities for Atlantic salmon, lake trout, striped bass, or other species. However, the completion of new facilities, such as Iron River, LSRCP, etc., together with cyclical maintenance and selected rehabilitation projects on older facilities, is necessary if hatcheries are to meet their Federal production requirements. For striped bass, production capacity and activity at existing facilities would increase with the phasing-out of propagation for stocking private (farm) ponds.

Production and Enhancement Plans

Nisqually Indian Tribe Fish Hatchery (Washington)--The 5,000 acre Nisqually Indian Reservation is located at the southern end of Puget Sound; through it runs the Nisqually River. All salmon and steelhead returning to the Nisqually River must first escape both an intense ocean fishery and an intense fishery beginning at the northern end of Puget Sound and extending southward to the reservation. Being last in line for its own fish, coupled with habitat degradation and the operation of three dams on the Nisqually River, has meant meager harvests for the Nisqually Tribe, as well as for the Muckleshoot, Puyallup, and Squaxin Island Tribes, which are also located in the South Puget Sound area.

In response to this situation, and with funding support from the Bureau of Indian Affairs, the Nisqually Tribe has initiated a thorough and well-coordinated effort to restore and enhance salmon and steelhead runs in a 40-mile stretch of the Nisqually River. The tribe considers a new hatchery to be an essential part of this effort because it will provide the rapid boost in returning fish that is necessary if salmon runs are to be reestablished. The tribe's primary goal is to protect and preserve existing wild runs while providing additional adult returns of 10,000 fall chinook, 17,500 coho, and 17,500 normal timed (November spawners) chum to the Nisqually River.

The idea for a hatchery was advanced in 1972. The Nisqually Tribe obtained the endorsement of the State of Washington and the Northwest Indian Fisheries Commission (the coordinating body for all Indian fishing interests in Puget Sound) in February 1980. A Congressional appropriation of $700,000 in the Service's FY 1981 budget for initial planning and development of the facility resulted in a completed feasibility report in May 1982.

The land identified for the hatchery is currently part of the Fort Lewis Army Base. The Department of the Army is preparing to transfer any necessary land to the tribe, and to guarantee ready and safe access to the proposed hatchery site.

The feasibility study of the hatchery proposal included an economic analysis. This analysis conservatively estimated benefits from the proposed hatchery, but nevertheless showed that the project is economically justifiable. The Service estimates that the average annual cost of fish produced by the contemplated Nisqually Hatchery would be about $10.00 per pound. This is relatively inexpensive for new salmon hatchery construction. The figures assume 12 percent Federal interest costs for construction as well as annual operation and maintenance, $228,000 in annual operation and maintenance costs, and amortization of the $6.2 million construction costs over 50 years.

The alternative of providing the Nisqually Tribe with fish of different strains from other Federal hatcheries for stocking in the Nisqually River is not biologically sound. Experience has shown that fish, when introduced into new areas, do not survive as well as native fish. Moreover, such action would diminish the ability of the Service to meet obligations at other locations.

Spawning habitat improvements and instream flow guarantees are being considered by the tribe as factors that are as important as hatchery construction, and are part of a well-integrated restoration plan. Through Federal Energy Regulatory Commission (FERC) proceedings, local utilities and the cities of Centralia and

Tacoma have agreed to minimum water flows on the Nisqually River that will increase survival of salmon migrating up and down the river. The cities may also contribute funds toward the annual operation and maintenance of the hatchery, in fulfilling mitigation responsibilities identified by the FERC for the project. The Weyerhaeuser Company is assisting with restoration efforts in waters adjacent to its land in the upper watershed by helping the tribe build rearing ponds. The tribe has also garnered the support of local environmental and fishermen's groups for its efforts to restore and enhance the salmon and steelhead populations.

The Boldt Decision, as described earlier, allotted Indians 50 percent of the United States catch of Pacific salmon in Puget Sound and the northern coast of Washington. Subsequent agreements with other tribes accorded the Nisqually Tribe its fair share of the Indian portion of the catch. Nevertheless, unsatisfactory harvests continue to precipitate tribal interest in a hatchery and the associated restoration and enhancement efforts.

The Boldt Decision improved the tribe's bargaining position with respect to its hatchery proposal because it precipitated fishery management planning for the southern end of Puget Sound. This planning activity provided a vehicle for the tribe to pursue its hatchery proposal.

The Salmon and Steelhead Advisory Commission (SSAC), created via the authority and direction of P.L. 96-561, imposed a moratorium on new hatchery construction until the management structure and enhancement plans called for by the Salmon and Steelhead Conservation and Enhancement Act were in place. However, the appropriation for the feasibility study and design of the proposed Nisqually hatchery preceded the formation of the SSAC and the SSAC has never formally acted on this issue. Before the Nisqually Hatchery is constructed, we believe the Commission should review the hatchery and its planned production against the criteria in the Act and other enhancement plans currently under development.

Some of the fish produced by the Nisqually Hatchery will be caught by Canadians, and count toward Canada's quota under the Pacific Salmon Treaty. This catch would be offset by a corresponding increase in the aggregate allowable United States catch, although the Nisqually Tribe would not necessarily reap the entire benefit from this increase.

The tribe's hatchery proposal envisions ownership and operation of the facility by the tribe.

Kingsland Bay Hatchery (Vermont)--In the late 1970's, the State of Vermont began examining the feasibility of building a new State fish hatchery on Kingsland Bay in Lake Champlain, near the town of Ferrisburg. In 1985, additional studies indicated that a facility could be built at the proposed site for about $8.5 million. The hatchery would annually produce 260,000 pounds of rainbow trout and some lake trout and landlocked Atlantic salmon. The rainbow trout would be planted throughout the State of Vermont to support State fisheries. The Berlin (NH) NFH formerly supplied fish to Vermont to meet similar recreational fishing needs in Vermont's Green Mountain National Forest. The Berlin NFH was transferred to the State of New Hampshire in 1982 and it is now operated by New Hampshire in support of its State fishery program. The proposed Kingsland Bay Hatchery would provide fish to those areas previously served by Berlin, in addition to supplying lake trout and salmon for Lake Champlain.

The Service has, over the years, provided technical review and comment to Vermont concerning the proposed Kingsland Bay Hatchery. This review has concerned the feasibility of the hatchery, relative to water supply problems associated with the proposed site, and other engineering design issues. These issues suggest that the hatchery, as currently envisioned, could be relatively expensive to operate and may be subject to a greater than normal frequency of fish health problems.

Recently, Vermont requested the FWS to provide 65 percent, or $260,000, of the operation and maintenance costs for the proposed facility from the Federal Aid in Sport Fish Restoration Fund. Under current Service policy, the Fund could only contribute money for put-grow-and-take fish production and not for the put-and-take production contemplated for the proposed hatchery. There are two basic differences between put-and-take and put-grow-and-take fisheries. Put-and-take is a temporary fishery created when larger, costly fish are planted and harvested a short time thereafter. In put-grow-and-take fisheries, the fish are generally smaller, less costly when planted and remain in the system long enough to grow before they are harvested. It is the present policy of the Service not to fund put-and-take fish production.

When the Kingsland Bay Hatchery is analyzed applying the methodology used in in this report on Service hatcheries, the cost of producing fish at the hatchery is estimated at $6.11 per pound, or $1.75 per fish. This assumes interest costs of 12 percent on construction and annual operation and maintenance costs, amortization of the $8.5 million construction costs over 50 years, and $400,000 in annual operation and maintenance costs.

SUMMARY OF FINDINGS

The 80 Fish and Wildlife Service fish propagation facilities, under the responsibilities and role approved for the Service's Fishery Resources Program in March 1985, produce fish to meet four specific Federal responsibilities: (1) restoration; (2) mitigation; (3) assist in meeting Federal and Indian trust responsibilities; and (4) maintaining a Federal leadership role in managing national fishery resources.

The Service's National Fish Hatchery System is continuing to adjust its fish production to meet approved responsibilities. For example, some Federal hatcheries that formerly produced warmwater fishes for private farm ponds are undergoing a transition to the production of striped bass for high priority restoration efforts.

No new Federal hatcheries are contemplated for restoration of Atlantic salmon and lake trout. Nor are any new Federal hatcheries needed for salmon and steelhead trout production. Needs for increased production of a number of species exist; however, these needs can be met by effective and efficient maintenance and rehabilitation of existing hatchery facilities, control of fish diseases at hatcheries, and improving downstream migration of juvenile anadromous fish.

The Service maintains a close working relationship with other Federal, regional, State, and tribal agencies involved in, or responsible for, producing fish--particularly lake trout, Atlantic salmon, Pacific salmon and steelhead, striped bass, and other anadromous species. Through these activities, information on fish propagation is shared among those in the fish production community. Private fish producers also share in this knowledge, including knowledge resulting from the Service's fish culture research and technology development.

In this report, the costs of producing 9 types of fish, accounting for 90 percent (by weight) of the Service's total FY 1984 fish distribution, were analyzed at 41 National Fish Hatcheries and compared with the cost of buying similar fish from commercial hatcheries. The analysis dealt with fish from 1 to 9 inches long, distributed to all areas of the United States.

Overall, even though this study did not include distribution costs or costs for specific strains, private-sector prices are estimated to offer substantial savings over current Federal fish production only for all sizes of channel catfish in the East, West, and South, larger (5- to 6-inch) striped bass along the Atlantic and Gulf Coasts, and large (7- to 8-inch) rainbow trout in the West. Federal production costs are comparable with or lower than private-sector prices for fall chinook salmon, Atlantic salmon, lake trout, smaller (1- to 2-inch) striped bass, steelhead trout, and rainbow trout of most sizes and in most areas studied. No private-sector prices were available for most Pacific salmon.

Service fish-rearing plans will be based on an assessment of future resource needs in the context of redefined responsibilities, the Federal role in meeting fishery resource needs, and an examination of whether the required fish might be purchased at a price below the long-term cost to the Federal Government of additional hatchery construction, operation, and maintenance. Price alone, however, should not determine whether fish ought to be purchased from a private

source or produced in a Federal hatchery. Factors such as reliability in producing proper genetic strains, availability of needed sizes and quantities of disease-free fish, and timeliness of deliveries are also paramount in fulfilling Federal (Service) obligations. Opportunities for improving the economic efficiency and effectiveness of fishery management include: increasing the competition in fish production; evaluating the potential of Government-owned, contractor-operated facilities; implementing cost-sharing and user fees; and other appropriate practices.

SYNTHESIS OF PUBLIC COMMENTS

Introduction

On July 31,1985, notice appeared in the Federal Register, Volume 50, Number 147, informing interested parties that the U.S. Fish and Wildlife Service was prepared to distribute this report for public comment. The final date for receiving comments identified in the notice was August 30, 1985. However, all comments received through September 20, 1985, were considered.

In the Comment/Response Section which follows, comments have been grouped by section and each responded to. An abbreviated reference to the reviewer making the comment follows each comment. If more than one reviewer commented on the same item, more than one reference is shown. After most responses, the page number(s) corresponding to the comment and the response is (are) identified.

A key to the references corresponding to the complete list of reviewers follows the Comment/Response Section.

Comment/Response - By Report Section

I. INTRODUCTION (pages 1-2)

1. Comment: For consistency, the term "nationally significant fishery resources" should be used in the first and fourth national responsibility listed, or the difference should be discussed (USDA-ES).

   Response: There is a difference in the fishery resources discussed in the first and fourth national responsibilities of the Service's Fishery Resources Program. The first responsibility discusses nationally significant fishery resources which the Service has identified as those economically important fishery resources that are interjurisdictional or transboundary in nature, and whose management and allocation of use are the collective responsibility of two or more States, Indian tribes, and/or other Nations. This responsibility identifies specific species. The fourth national responsibility discusses the leadership role of the Service as an agency of the Federal Government and how the Service will continue its leadership by encouraging and influencing biologically sound decisions by the Department of the Interior, companion Federal agencies, the States, Indian tribes, and others interested in the protection and conservation of all the Nation's fishery resources.

   Further information and details on the responsibilities and role of the Fishery Resources Program are available in a document published by the Service entitled Statement of Responsibilities & Role. A summary of this document and information on its availability appeared in the Federal Register, May 17, 1985, Volume 50, Number 96, pages 20628-20630.

2. Comment: The Service claims to have a national responsibility to assist with fishery resource management on Indian lands, yet technical assistance and support to the tribes in the Pacific Northwest has been greatly reduced. (BIA)

   Response: In the past few years, the technical capabilities and expertise of the tribes have greatly increased. This has enabled the tribes to more fully and capably pursue their role as managers of important fishery resources. Because of this, the need for Service technical assistance has declined from what it was in previous years. However, the Service remains fully committed to assisting the tribes where necessary and appropriate as they pursue their obligations in managing fishery resources. This is not only stated in one of the national responsibilities identified by the Service; it has been formally agreed to in the "Agreement on Policy: Trusteeship of Tribal Fishery Resources", signed in May 1984, by the Director of the U.S. Fish and Wildlife Service, the Deputy Assistant Secretary - Indian Affairs (Operations), the Assistant Secretary for Fish and Wildlife and Parks, and the Assistant Secretary - Indian Affairs.

3. Comment: The report does not contain a comprehensive evaluation of treaty tribes' hatcheries (BIA).

   Response: This is correct. The Service was not directed to include a comprehensive evaluation of treaty tribes' hatcheries. The Service was directed by Congress to prepare a report on the Service's additional fish rearing plans and include a comparative analysis of the costs of Service production to private or commercial production. The report includes, by direction, an evaluation of the Nisqually Tribe Hatchery and plans for the future outputs of the Makah NFH.

II.A. SURVEY OF PROPAGATION CAPABILITY--NFHS, NMFS (pages 3-4)

1. Comment: This section should include the existing capabilities of all sectors along with the potential of each sector for expansion. Hatchery capability should be expressed in terms of actual total production by section and also in terms of total facilities for intensive and extensive rearing. (OH, COE/D.C.)

   Response: The Service was directed by Congress to prepare a report on its additional fish rearing plans and include in that report a comparative analysis of the costs of Service production to private or commercial production. Certainly a document as suggested by the reviewers would be informative; however, inclusion of that material would be beyond the scope of this report. Moreover, sufficient comparative cost information was obtained within the scope of this report.

2. Comment: The roles of the FWS, the NMFS and other Federal agencies involved in the management of fishery resources, should be presented as they relate to Congressional mandates and their respectve programs. (OH, COE/D.C.)

   Response: As stated in the previous response, the focus of this report is to inform Congress of any additional fish rearing planned by the Service and to provide a comparative analysis of costs. A brief discussion of NMFS' responsibilities is included in the report. However, to discuss the role of NMFS and other Federal agencies as they relate to Congressional mandates and their programs would not be appropriate in this document. (pages 3-4)

3. Comment: It should be acknowledged in the report that the Federal Power System, specifically in the Columbia River, was a major factor in the decline of the salmon runs, as was over-harvest. (WA)

   Response: Habitat degradation and changing water use practices, as well as over-harvest, have been acknowledged as major factors causing fishery resource problems. (page 3)

4. Comment: Two States questioned the assertion in the report that those who benefit both directly and indirectly by the artificial propagation of fish are reluctant or unwilling to pay the cost of it. (IL, TX)

   Response: There are many user groups of fishery resources and some are reluctant or unwilling to pay for the costs of propagation and management. However, we agree the original statement in the report was too broad and it has been removed. (page 3)

II.B. SURVEY OF PROPAGATION CAPABILITY--Tribal Hatcheries (page 4)

1. Comment: The percentages and numbers of fish quoted in the second paragraph of this section appear to be confused/incorrect. (WA, NMFS, COE/KS, NWIFC, BIA)

Response: The percentages and numbers were in error and have been corrected. (page 4)

2. Comment: Suggest something should be inserted regarding the operation of hatcheries by tribes in Wisconsin and Minnesota. (GLIFWC)

   Response: A sentence about the operation of hatcheries by tribes in the upper midwest (Wisconsin, Minnesota) was added. However, as this section deals with the Nation's tribes in general, no specific tribes were mentioned. (page 4)

3. Comment: The final sentence of the second paragraph of this section is inaccurate, in that the Tribes and Washington State, as co-managers of the resource, develop the regional management plans into which the FWS must integrate its plans. (NWIFC)

   Response: This paragraph has been revised.

II.C. SURVEY OF PROPAGATION CAPABILITY--State Hatcheries (pages 4-5)

1. Comment: The State of Oregon, as well as the State of Washington, have major fish culture involvement. (OR)

   Response: This oversight has been corrected. (page 5)

2. Comment: The report infers that Indian tribes are "user groups" rather than legitimate fishery managers and in the discussion of State and Federal interagency coordination for Pacific salmon and steelhead restoration along the west coast, mentions "tribal customs" as a complicating factor. (CF&H)

   Response: The Service fully recognizes the tribes' role as fishery managers, rather than as user-groups. The inference mentioned in the comment has been removed and the paragraph reworded. (page 5)

II.D. SURVEY OF PROPAGATION CAPABILITY--Private Sector or Commercial Operations (pages 5-6)

1. Comment: It may be beneficial to refer to H.R. 1544, the National Aquaculture Improvement Act of 1985 and the 1983 amendments to the National Aquaculture Act of 1980. (USDA/ES)

   Response: The oversight in not referring to the amendments of the National Aquaculture Act of 1980 has been corrected. However, as H.R. 1544 is still in the Senate's Committee on Commerce, Science, and Transportation and is not existing law, it was not referred to. (page 5)

2. Comment: There are more recent estimates of the total private-sector sales and values of channel catfish than the 1980 data used. (USDA/ES)

   Response: Estimates for 1984 were obtained from USDA and applied in place of the 1980 data originally used. (page 5)

3. Comment: The report should point out that though the National Aquaculture Act was passed - no funds were appropriated. (Peterson)

   Response: The point has been made. However, other Federal and State funding continues to assist aquaculture activities. (page 5)

4. Comment: The discussion in this section regarding the prospects for the aquaculture industry in the U.S could include more about the channel catfish industry's existing status and potential, and include other species where there is an existing industry and/or potential for growth. (USDA/ES)

   Response: Certainly more could be said about the channel catfish industry and other fish species where there is an existing industry and/or potential However, as the main thrust of this report was to provide Congress with the Service's fish rearing plans and a comparative cost analysis, the aquaculture industry was discussed only to the extent necessary to put such matters into proper context. (page 5)

5. Comment: In the discussion regarding salmon ranching, the rate given for straying of non-local strains of salmonids upon returning to freshwater is exaggerated, and the concern expressed over genetic contamination of wild stocks related to straying is overstated. (OR, Sal/Trout, NWIFC)

   Response: The statements referred to have been removed. However, straying and genetic contamination of wild stocks are real concerns of all salmonid hatchery operations. (page 6)

III.A. COMPARISON OF PRODUCTION COST--Introduction (page 7)

No Comments.

III.B. COMPARISON OF PRODUCTION COST--Methodology (pages 7-10)

1. Comment: State costs cannot meaningfully be compared with Federal costs because States vary in how they calculate costs, and some States included distribution, administrative, and capital costs in their cost estimates, or averaged in the cost of other facilities ignored in the estimates of Federal costs. (ME, IL)

   Response: The difficulty of comparing State and tribal costs to Federal costs was mentioned in the report. This discussion has been strengthened. (Page 10).

2. Comment: The numbers of each type of Federal special-mission facilities do not add up to the total shown. (COE/KS)

   Response: The number of broodstock hatcheries should have been listed as seven, not six. (page 7)

3. Comment: The analysis is inadequate due to the numerous exclusions and exceptions required in order to reduce the information to more simple denominators. (WA, ME)

   Response: To the contrary, the quality of the analysis was improved by excluding those Federal facilities that; (1) are not primarily fish production facilities; (2) raise fish not examined in these analyses; or (3) that produce such a variety of fish that cost for a specific type of fish could not be reasonably isolated. As a group, the Federal hatcheries that were included raise a large majority of the fish produced in the NFHS. (page 7)

4. Comment: State hatcheries whose costs were estimated are not identified. (NWIFC)

   Response: States were asked to submit their average costs, since requesting more detailed data was considered unreasonable and unnecessary. Moreover, Congress stated that the primary issue to be addressed was comparison of private sector prices to Federal costs. The responses from States might also have been fewer if more detailed information was requested. As it was, no State information was available for 19% of the analyses. The report has been clarified in this regard. (page 10)

5. Comment: Combining tribal with State facilities is inappropriate, and tribal costs are inadequately represented since only one tribe's costs are included. (NWIFC, CF&H)

Response: State and tribal information was put in the same category since these are both non-Federal types of governments that operate hatcheries. No tribes responded to requests to submit cost data. The Lummi Tribe data came from a May 1985 hatchery improvement proposal submitted to FWS outside of the context of this study. This cost information from the Lummi Tribe is complete and disaggregated so that the cost estimates attributed to the tribe are readily compared with Federal cost estimates.

6. Comment: A number of commentors doubted the usefulness of attempting to quantify and compare fish distribution costs when these would vary widely according to circumstances. The available information is highly generalized and of uncertain realiability. (Ark Aquatics)

   Response: To avoid confusing readers with numbers of questionable value, Table 1 of the draft has been deleted. The narrative discussion has been reworked to eliminate any suggestion that currently available distribution costs can be meaningfully compared at the regional level of analysis used in this study. (page 8)

7. Comment: Private hatcheries have different types of facilities or different types of costs than government facilities, so they cannot be meaningfully compared. (OH, ME, Trophy Fish, NMFS, Namaken)

   Response: The comment misses the point that the key issue is not how much it costs to produce fish at a private hatchery, but what the price is of a privately raised fish that meets certain specifications. Federal costs must be compared with private sector prices, not Federal costs with private costs. As long as the private fish meets the contract specifications of the FWS, it makes no difference how and when it was raised, and what type of costs the private growers did or did not incur. If the private grower has better technology, can take greater advantage of economies of scale, or pays employees less, that may explain why the price may be below Federal costs. However, it is not a reason to reject those private fish and continue to operate Federal hatcheries that may not operate at costs that are at or below private sector prices. (page 7)

8. Comment: Federal costs should include the cost of construction and borrowing. After all, the private hatchery must consider these costs in setting prices. (NC, Casta Line, Clear Springs)

   Response: Federal costs are for existing Federal hatcheries. The question at hand is whether it costs more to operate these hatcheries than to buy the fish. Any borrowing costs for the existing Federal hatcheries will be incurred whether or not the fish are bought. Borrowing costs are therefore fixed costs, and according to generally accepted financial accounting principles, they are irrelevant to the question at hand. The cost of constructing a Federal hatchery was experienced in the past. Those monies are spent, and whether or not fish are now purchased instead of produced at the existing facilities, will not change the fact that those funds are spent and cannot be recovered.

This means they are sunk costs, and according to generally accepted financial accounting principles, they are irrelevant to the question at hand. (pages 8-9)

9. Comment: Federal costs should include depreciation. (NC, Casta Line, Clear Springs, Cline Trout, Trophy Fish)

   Response: Depreciation is a non-cash cost that serves to indicate that plant and equipment are wearing out and will eventually need to be replaced. At the time of replacement, a real cash expense occurs. These types of real cash expenses are recognized as Federal costs in this analysis, as are the maintenance expenditures that, in a sense, prevent the deterioration that the accountant's depreciation entry is intended to represent. If a Federal manager is faced with the decision to buy fish now or produce fish at a Federal hatchery, the manager would be foolish to include as a cost depreciation of Federal buildings and equipment that might require no cost to repair until years (possibly many years) after the time of the decision he must make today.

   The time to include these eventual costs is when they are imminent and represent real costs. An every day situation may clarify this point. If someone is trying to decide whether to replace their personal automobile, they try to compare the estimated cash costs of maintaining or repairing it over the next year or so with the price of a new car. They do not attempt to calculate the car's depreciation expense over that period of time. They may even hold onto the car until it actually breaks down and they are faced with a choice between paying a repair bill and buying a new car. The annual depreciation expense is as meaningless to them as it is in the fish production versus purchase situation. (page 8)

10. Comment: Selling Federal hatcheries should be considered. (NC, COE/KS)

    Response: Many Federal hatcheries have been closed during this century, but only one was ever sold. It is clearly longstanding policy to transfer excess Federal hatchery facilities to State or other governmental entities at no charge. The present administration has followed this precedent, with approximately 20 hatcheries transferred since 1981, and none being sold. Considering sales of Federal hatcheries was not one of the purposes of this study. However, alternatives, such as government-owned, contractor-operated facilities, have been suggested elsewhere in this study. (page 8)

11. Comment: State agency assistance in procuring broodstock should be recognized as a Federal cost. (NC)

    Response: This is true for striped bass, but is generally not applicable in the case of the other species covered in this report. The report has been changed relative to striped bass. (pages 12)

12. Comment: Federal costs should include the cost of rearing and maintaining broodstock. (Trophy Fish)

Response: They do. Broodstock costs were calculated for all Federal fish production addressed in the report. This has been clarified in the report. (page 7)

13. Comment: Regional differences in cost are hard to compare because the fish are often of different sizes. (Ark Aquatics)

    Response: The Service uses fish of predominantly different sizes in different regions. Hence the analysis attempts to match the Service's geographic demand with the prices likely to be charged for a fish of that size and species in that region. (page 8)

14. Comment: Do the prices and costs listed in the table on page 11, relate to the same size fish as are described in the tables of Appendix 4? (Ark Aquatics, OR)

    Response: Yes.

15. Comment: Why were interest and amortization charges included for the Makah, Nisqually, and Kingsland Bay hatcheries? (ME)

    Response: The Nisqually and Kingsland Bay hatcheries have not yet been constructed, the interest costs not yet incurred. The construction and associated amortization costs will occur in the future, so it is not a sunk cost to a decisionmaker in the present. Interest costs are relevant because decisionmakers have control over whether the project moves forward which would result in Federal borrowing. These possible interest costs are, therefore, not fixed costs.

    In the Makah NFH situation, amortization and interest costs are associated with possible future construction and are relevant because the decisionmaker still has control over whether or not these costs are incurred. On the other hand, amortization and interest associated with the existing physical plant of Makah are irrelevant for purposes of deciding whether to produce or purchase fish, since these costs are sunk and fixed and, therefore, are beyond management's control. (pages 27-32)

16. Comment: The production costs on a per pound basis for Makah NFH includes costs of current construction; how can this be compared to production costs of old facilities based only on O&M expenditures? (Makah T.C.)

    Response: It is proper to compare the cost of production at contemplated facilites vs. those at existing facilities if the purpose is to help a decisionmaker choose among a range of options for increasing fish production. It is certainly a fair question to ask whether it is more cost-efficient to provide funds to make fuller use of the existing production capacity of a hatchery, expand the current production capacity at an existing hatchery, or build an entirely new hatchery. In the context of this report, it is useful for a manager to know that the construction-related costs of building a new hatchery may make that alternative far less attractive than other alternatives that might be available. (page 29)

17. Comment: The discussion of contract administration costs should be deleted because other hidden costs were also excluded. (Ark. Aquatics)

    Response: Rather than ignoring hidden costs, the Service intended to identify them all, and then discuss whether or not they are relevant. (page 10)

18. Comment: The 4% estimate for fish purchase contract administration cost is inappropriate. (ME, Casta Line, COE/KS)

    Response: More current information suggests this number is more likely to approximate 8%. The report has been changed accordingly. (page 10)

19. Comment: All hatcheries eventually experience unexpected fish mortalities. At least if this were to happen at a private hatchery contracting with the government, the government would not have to pay for the dead fish. (Peterson)

    Response: This is correct. The report has been changed accordingly. (page 15)

20. Comment: Since the private sector response to requests for price lists was small, and only half the responses were usable, the reliability of the data are questionable. (OH)

    Response: Although the size of the data base was not as large as might have been hoped, it still represents the largest and most comprehensive data base of its type ever assembled, to the best of the Service's knowledge. (page 9)

21. Comment: State, private and Federal data are for different size fish, and therefore not comparable. (Ark Aquatics)

    Response: Once the Federal Government's most commonly needed sizes of fish were determined, States and private producers were asked to submit State costs and private producers price information for fish of those sizes. The Service attempted to verify the comparability of submissions. (page 8)

22. Comment: Private sector price quotes are limited or unavailable for several species of gamefish because State and Federal governments have denied the private sector access to wild genetic strains of fish. The government has rarely offered the private sector opportunities to produce fish for government needs (i.e., there is no supply because government has not allowed any demand), and genetic strains used for stocking tend not to be commonly used in private aquaculture which concentrates on food markets. (Peterson)

    Response: State and Federal governments do often limit or preclude private sector access to certain genetic strains of fish. This is sometimes due to the fact that these fish are relatively rare and there are an insufficient number of individuals to be readily distributed

without jeopardizing fish restoration programs. In other instances, agencies may be concerned that by making many strains of fish available, there is some risk that strains in public waters may become accidentally contaminated. We agree that genetic strains of fish used for private fish production may differ from those used by the government for stocking, and that since most private growers raise fish for food, few might be interested in government contracts.

Based on various State comments on this report, there is considerable concern about the private sector's past and prospective performance with regard to meeting contract specifications for selling fish to State governments. This may partially explain the lack of demand for privately produced fish.

The report has been clarified to mention some of these issues. (page 9)

23. Comment: The report should not only focus on immediate or short-term costs, but long-term costs as well. (COE/DC)

Response: In those instances (completion of Makah, construction of Nisqually and Kingsland Bay) where a new long-term investment is contemplated, the Service performed a long-term analysis. Generally, however, the Service feels Congress was interested in the nearterm prospects of buying fish more cheaply than they can be produced by government. This sort of analysis requires only that the Service completely examine short-term variable operating costs, not to hypothesize what unusual expenditures might be necessary at an individual facility, 10 to 15 years from now. When a major future expense becomes an imminent concern, that will be the time to reconsider the option of fish purchases in light of the prospects of a major new Federal investment in plant or equipment. (page 7)

24. Comment: The Service will need to undertake hatchery rehabilitation at hatcheries that will have the effect of dramatically increasing cost at these facilities. (CF&H)

Response: When major rehabilitation expenditures seem imminent at a Federal hatchery, the Service should carefully examine whether it would be more cost-efficient to purchase fish rather than incur the anticipated rehabilitation costs. Appropriate changes have been made in the text to clarify this point. (page 9)

III.C. COMPARISON OF PRODUCTION COSTS--Federal/Service vs. State/Tribal Costs (pages 10-13)

1. Comment: Since State and tribal data were scant, it is difficult to review the adequacy of the conclusions reached (WA)

   Response: The Service generally agrees that only dramatic differences should be considered significant. The language comparing Federal and State/Tribal costs has been changed to communicate greater uncertainty in the data (pages 12 and 33)

2. Comment: If the satellite rearing programs of the Makah Tribes were included, the average cost of production would be signicantly lower. (Makah T.C.)

   Response: This might well be true, but the report did not attempt to average out all sources of Makah fish production, but to specifically address the issue of the cost of completing the Makah NFH.

3. Comment: One reason Federal costs may be lower than State costs is the Federal hatchery system's flexibility in siting facilities in the most favorable location, whereas States are restricted to sites inside their boundaries. (MN)

   Response: This is quite likely part of the explanation for those instances where State costs, defined identically to Federal costs, exceed Federal costs. One possibility to consider is for States to join together to site hatcheries at locations of the greatest mutual advantage, and then jointly fund, operate, and benefit from the facility. (page 12)

4. Comment: In some instances higher tribal costs may result from the need to locate salmon hatcheries at places that will provide fish in those locations associated with tribal fishing rights. These hatchery sites may not also be the most cost-efficient locations. (CF&H)

   Response: This point is well-taken. The report has been changed to reflect it. (page 12)

5. Comment: How can less costly State facilities that operate with smaller staffs being paid lower wages, produce fish at a higher cost than Federal facilities? (WA)

   Response: The Service does not know in detail what costs were included in State submissions. States may have included capital costs, which were excluded from Federal costs, for instance. However, economies of scale could easily explain the difference in cost. For instance, the average Federal salmon hatchery tends to be larger than the average State hatchery. A hypothetical example can demonstrate the significance of this. A State hatchery producing 80,000 pounds of fish and having a $40,000 payroll operates at $.50 of labor per pound of production. A Federal facility producing 140,000 pounds of fish and having a $60,000 payroll operates at $.43 of labor per pound of production.

III.D. COMPARISON OF PRODUCTION COSTS--Federal/Service vs. Private Sector or Commercial Costs (pages 13-15)

1. Comment: The FWS costs do not include the total cost to the government, such as revenue from sales tax, income tax, and property tax that are foregone when Federal hatcheries are the source of fish instead of private hatcheries. (Cline Trout)

   Response: It is correct the report ignores tax considerations. It is however, written from a total Federal Government, not a Service perspective. This is clear from the inclusion of interest costs on proposed new construction, such as Nisqually. These interest costs would not show up in FWS appropriations, but would be assumed by the Treasury. Sales and property taxes are paid to State and local governments, not the U.S. Government, and, therefore, are irrelevant to this analysis of Federal costs. Federal income taxes are paid by private fish producers. This factor was ignored because taxes on products in the aquaculture category are estimated by the Office of Management and Budget to yield taxes that approximate 2-3% of revenue. This amount is so small that it would not materially affect the individual comparisons presented in this report. The text of the report has been changed to mention these points. (page 9)

2. Comment: The purchase quantity of 1,000 fish might have been too small to indicate lower prices associated with large bulk orders in the tens of thousands of fish. (Cline Trout, Arkansas Aquatics, Peterson, Casta Line)

   Response: This quite possibly is true. The Service asked for existing price lists because of the need for information quickly. Changes have been made to the report to suggest bulk order prices may not have been obtained in some cases. (page 9)

3. Comment: Private growers have never been given a chance to compete with Federal programs on a bid basis. Therefore, it is premature to discuss potential cost savings. (Clear Springs)

   Response: There have been studies that have extensively chronicled State government fish purchase experience with the private sector, including a 1982 study produced by the Service entitled "Comparative Costs of Alternative Sources of Fish for Federal Management Needs." The FWS experience with fish purchasing is limited, and in recent years has been restricted to brokering contracts for rainbow trout in the Pacific Northwest for an Indian tribe. Of the numerous State comments on this report, many mentioned experiences with purchasing fish. These experiences were rarely completely satisfactory from the State's point of view.

4. Comment: Coho salmon are readily available in the Northwest, contrary to the report's statement. (WA) (OR)

   Response: The fish may be available, but private producers did not respond to requests for price lists, despite extensive telephone followup. Therefore, no data were available. Some private producers who were contacted indicated that they prefer to continue raising salmon exclusively for their food-fish market. (page 14)

5. Comment: Many private growers in the Pacific Northwest have occasionally supplied fish to saltwater pen-rearing operations and also to tribal facilities. (NWIFC)

   Response: Fish for pen-rearing operations were not addressed in this report. The Service did not discover during the course of this study that tribes were purchasing fish from private growers for release into the ocean.

6. Comment: Purchasing fish may involve transporting them from another geographic area. This poses possible problems with both genetic compatibility and handling stress. (IL)

   Response: Fish from outside the geographic region or river basin where they will be stocked may differ genetically from indiginous fish. As a result, they may not survive as well as the indiginous fish, or they many survive too well and supplant the native strains. Either outcome would be worrisome and are reasons why States tend to discourage stocking of fish that originated from out-of-state. It is also true that transporting fish over long distances can be stressful to the fish, which may result in unusually high mortalities. The report has been changed to include additional language on this subject. (page 14)

7. Comment: The report is biased against the private producers--the private sector pays as much--if not more, attention to quality. (Casta Line)

   Response: Undeniably, some private producers run excellent operations that produce quality fish. However, it has been the experience of State and Federal agencies that occasionally purchase fish, that quality can be a problem. It is hard to determine how much of this problem can be attributed to the agencies lack of familiarity with contract administration and specification development, and how much is actually the responsibility of the private sector.

IV. A. REVIEW OF PRODUCT USE--Restoration of Depleted Resources (pages 16-20)

1. Comment: The report states that the Service has trust responsibilites, however, no significant efforts of upholding this trustee duty have been demonstrated by the Service in the Pacific Northwest over the past three years. (BIA)

   Response: See response to comment I. 2.

2. Comment: The FWS "goal" of restoring fish populations to their full biological potential, as stated in the report, is, in many instances, inconsistent with restoring them to levels where they produce the maximum harvest, and is always clearly inconsistent with federal judicial law applicable to fisheries and fish management affecting Indian treaty fishing rights. (CH&F) (NWIFC)

   Response: The Service restoration goal is correctly stated in the draft report. On Federal and Indian lands, however, implementation of fishery management plans may call for maximum harvest. A change in wording was made to reference the restoration goal to the meaning in the Statement of Responsibilities and Role. (page 17)

3. Comment: The Service has not participated in "international dimensions" of managing salmon and steelhead to the same level or extent as the treaty tribes in the Pacific Northwest. The Department of Commerce has primary responsibility with international matters and concludes management business through PFMC. The tribes have taken an important lead role in implementing the new Pacific Salmon Treaty with Canada as co-managers with the States. The Service is not a managing party in implementing international salmon and steelhead responsibilities through this treaty. (BIA)

   Response: The report states that the Federal Government is involved in "international dimensions," and that Interior's Indian trust obligations are linked to these activities. The Service's role in implementing international salmon and steelhed responsibilites is not mentioned in this discussion. However, the Secretary of the Interior is ultimately responsible for administration and approval of the enhancement plans under the SSCEA and the ultimate responsibility for ensuring compliance with the Pacific Salmon Treaty is the Federal Government. As an agency of the Department of the Interior, the Service is a full resource management partner in the Pacfic Northwest. (page 17)

4. Comment: Why are coastal commercial fisheries allowed to continue fishing for species supplemented by stocking programs? (United Mobile)

   Response: Mitigation and recreational fishing plans are jointly agreed to by State and Federal officials. Each plan differs with respect to allowable fishing. Regulation of fisheries is a State function, except in specific Federal areas. (page 17)

5. Comment: Suggest adding projections and recommendations for attaining restoration objectives for weakfish. (United Moblie)

   Response: A fishery management plan for weakfish is currently being completed by the Atlantic States Marine Fisheries Commission; therefore, this matter cannot be properly addressed this subject at this time.

6. Comment: The report infers that current production for private farm ponds could be curtailed to meet restoration efforts for striped bass. If this is the intent, there should be further elucidation. (USDA/ES)

   Response: The Service is gradually converting the production of several hatcheries. The goal is to cease farm pond production and to dedicate that production capacity to clearly identified Service responsibilities. (page 19)

7. Comment: Under the discussion of Atlantic salmon restoration, it is estimated that an annual planting of 5 million fish is needed to achieve the restoration goal; for how many years will this be required? (COE/KS)

   Response: Wording has been added to indicate that stocking at this level would continue until the objective is accomplished, currently expected by the year 2000. (page 17)

8. Comment: Under the discussion of striped bass, the Service concludes a total annual Federal stocking need of 8.5 million fish to meet the restoration goal. What is the basis for this conclusion? (COE/KS)

   Response: Since the draft report was distributed for public comment, stocking requirements for striped bass in the Middle Atlantic, the South Atlantic and Gulf of Mexico have been reevaluated. The best estimates available on stocking requirements for striped bass in these areas have been incorporated into the report. (page 18)

9. Comment: "In this day of fiscal austerity and other demands for fish for Federal waters, it seems poor business to stock Federal fish into private water where access is probably restricted." (COE/KS)

   Response: See response to comment IV. 6.

10. Comment: The Federal Fish Farm Pond Program has precluded the private sector from selling fish to private pond-owners for their farm ponds. (Ark. Aquatics)

    Response: The Service is unable to assess the effect the Congressionally mandated farm pond program may have had on the development of private aquaculture. Since the Federal farm pond program is diminishing, any possible negative effects will presumably be reduced. (page 19)

11. Comment: The reference to the United States-Canada Pacific Salmon Treaty as P.L. 99-5 is incorrect. P.L. 99-5 is the domestic implementing legislation. (NWIFC)

    Response: Agree. The incorrect reference has been removed. (page 16)

12. Comment: In this report the Service claims to provide substantial technical assistance to the tribes and tribal fishery commissions. This is not correct, Service involvement in technical assistance to the tribes has all but disappeared in the Pacific Northwest. (NWIFC)

    Response: See response to comment I. 2.

13. Comment: It is implied that the Secretary of the Interior, rather than the United States, has Indian trust obligations. (NWIFC)

    Response: The Secretary of the Interior is the official who administers the Indian trust responsibilities of the United States. No change has been made in the report. (page 17)

14. Comment: Under the discussion of Atlantic salmon, it is necessary to know how the E.I.S. referred to would impact present uses of the river to understand what trade-offs are proposed. (AK)

    Response: A discussion of trade-offs is not appropriate in this report. A copy of the E.I.S. may be obtained upon request. However, the statement has been modified so as to not beg the question. (page 17)

15. Comment: Under the discussion of Atlantic salmon, something should be added about the activities underway for Lakes Ontario and Champlain and the participation by the Province of Ontario and Canada's Department of Fisheries and Oceans. (NY)

    Response: Wording has been added to the report. (page 17)

16. Comment: Other factors are equally as important as illegal fishing in discussing the obstacles to lake trout rehabilitation. (GLIFWC)

    Response: The report has been modified to include other factors. (page 18)

17. Comment: The report estimates that 3 million pounds of lake trout are illegally harvested. This may be inflated. (GLIFWC)

    Response: The figure of 3 million pounds is the estimate of the Service's Division of Law Enforcement based on Operation Gillnet concluded in 1984. (page 18)

18. Comment: It seems that the facilities geared up for striper production are far from the area of greatest restoration efforts - Chesapeake Bay. (United Mobile)

    Response: The Service agrees, but there were no alternatives if the fish were to be supplied immediately (in 1985). (pages 18-19)

19. Comment: Federal striped bass costs are high because many Federal hatcheries produce striped bass on a limited scale. Large-scale operations are more cost-efficient. (TX)

    Response: The Service is gradually increasing its production of striped bass, and fully expects these operations will become more cost-efficient. (page 19)

IV.B. REVIEW OF PRODUCT USE--Mitigation of Resource Impairment (pages 20-21)

1. Comment: There is no mention of the federally funded Mitchell Act hatcheries, and the overall "mitigation" attempted by these hatcheries. There are 15 major hydro-electric dams on the Columbia and Snake Rivers. A total of 30 hatcheries were built supposedly to mitigate salmon losses. Nineteen of these are well downstream from the Columbia Basin treaty tribes' usual and accustomed fishing areas. Mitigation for losses to tribal fisheries must be provided not only "in kind" but also in the same place, or there is no mitigation. (BIA/NWIFC)

   Response: Wording has been inserted regarding the first issue in the comment. The second issue is a complex matter needing much analysis. However, Service policy has not adversely impacted Indian fishing rights. Satisfactory mitigation for salmon and steelhead has seldom been achieved in the past with Pacific Northwest water developments. (page 20)

2. Comment: The report indicates mitigation hatchery stocking in the Columbia River Basin would continue in perpetuity whereas the restoration goal for the West Coast is to reestablish self-sustaining salmon and steelhead runs to their full biological potential. Generally, the fish management philosophies have been to incorporate hatchery contributions continually. Consequently, all the hatcheries would very likely operate into perpetuity and are necessary to supplement and maintain the full biological potential of the various fish runs. (COE/DC)

   Response: Production at hatcheries involved in restoration projects is reprogrammable. When the restoration project is accomplished, the hatchery could revert to previous or new priorities, be closed, or be transferred. (pages 17, 20)

3. Comment: The report makes no mention of the Federal responsibility for continuing mitigation of fish runs, particularly on rivers fished by Indian tribes where the Federal Government as a whole (not just the BIA or the Secretary of the Interior) has a responsibility to ensure the fulfillment of U.S. obligations to treaty Indian tribes under the Stevens Treaties of the mid-1850's. (CH&F)

   Response: There is mention by inference of the Federal responsibility for continuing mitigation and restoration of fish runs on page 20 in the second and fourth paragraphs.

4. Comment: The fish produced by the 6 FWS hatcheries funded by the NMFS have a great impact on the Columbia River Basin fish runs; however the NMFS is mentioned only briefly. (NMFS)

   Response: Additional mention of NMFS and Mitchell Act hatcheries has been included in the section "Mitigation of Resource Impairment." (page 20)

5. Comment: The report states that 22 facilities are designated to produce fish needed for the LSRCP. The types of facilities should be distinguished. (NMFS)

   Response: Wording has been added to indicate the types of facilities and whether they are State or federally operated. (page 20)

6. Comment: The 70% drop in Columbia River Basin anadromous fish runs are not due entirely to Federal dams, but are also due in part to privately owned and operated dams, irrigation and other water withdrawal projects, habitat degradation, and overfishing. (NMFS)

   Response: The statement has been modified. (page 20)

7. Comment: In the reference to the Pacific Northwest Electric Power Planning Council, the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501) and its section on the Columbia Basin Fish and Wildlife Program should also be referenced. (NMFS)

   Response: The suggested reference has been included in the report. (page 22)

8. Comment: The critical limits for mitigation of resource impairment should be further defined/clarified. (OH)

   Response: While the further definition/clarification of the critical limits for mitigation may be related background information, it is not appropriate in this report. (pages 20-21)

V. C. REVIEW OF PRODUCT USE--Settlement of Resource Conflicts (pages 21-24)

1. Comment: The interpretation of the "Belloni Decision" in the report is inaccurate as there was no court-directed allocation of catch. Instead a five-year management plan for this area was developed in 1977 and ended in 1982. No replacement allocation scheme has been inplemented by either the parties or the courts to date. (BIA, CH&F)

   Response: Wording has been changed in the report to reflect a difference between the Belloni and Boldt decisions. (page 22)

2. Comment: In this section, salmon and steelhead are referred to as "common property". This is incorrect. These species are a trust resource, the taking of which has been guaranteed by the Supreme Law of the Land, i.e. Congressionally ratified treaties. (BIA, CH&F)

   Response: The words "common property" have been removed. (page 22)

3. Comment: This section neglected to acknowledge the fact that the Salmon and Steelhead Conservation Act (P.L. 96-561) has not been fully funded and the only work concluded by the Commission responsible for implementing the Act is a general frame-work plan that has not been finalized to date. (BIA)

   Response: Wording has been inserted to acknowledge these facts. (pages 23-24)

4. Comment: There is no mention of the Pacific Northwest Electric Power Planning and Conservation Act (P.L. 96-501). (BIA)

   Response: The suggested reference has been included. (page 22)

5. Comment: It is implied in this section that dam operators are doing little if anything to help increase the survival of juvenile migrants. The fact is much is being done; water flows are dedicated to fish; juvenile fish protection structures are being constructed; etc. (COE/DC)

   Response: Wording has been included to acknowledge these actions. (page 24)

6. Comment: The report discusses the tribes' role in the implementation of the Salmon and Steelhead Conservation and Enhancement Act as an afterthought, and treats the Service as the primary actor in the basic fishery management decision process. This is "inconsistent with Federal law" and the Act. (CH&F)

   Response: Wording has been added to reflect the tribes' role in implementation of the Act. This Section of the report deals only with the factual content of the Act and some relationships to the Treaty. The Service is not mentioned in that discussion. (page 23)

7. Comment: The reference that "Judicial intervention often dramatically disrupts existing fishery allocation schemes." ignores the facts and the law. (CH&F)

   Response: The report has been clarified to indicate fishery use patterns were disrupted and caused the indicated reaction. (page 22)

8. Comment: The report states that "management plans have not been developed for the fishery resources in the poorest condition ...". This is not true for the Pacific Northwest where those fishery resources and fish stocks which have experienced the most conflict have been the first to become subjects of management plans. (CH&F)

   Response: The wording has been eliminated.

9. Comment: The suggestion that the way to solve all resource problems and user conflicts is to increase the number of downstream migrants is an unworkable solution. (CH&F)

   Response: The wording referred to has been modified. (page 23-24)

10. Comment: The report's discussion of the SSCEA is inaccurate. (CH&F)

    Response: These inaccuracies have been corrected in the report. However, the Service disagrees that Secretarial approval of the Commission's report is not required. Both the Commission's report (Page 2) and the Act (Part B, Section 110 (e)) state clearly that "approval" is required. (pages 23-24)

11. Comment: The report infers that the Pacific Salmon Treaty will "constrain" U.S. fish culture prerogatives. This is inaccurate--it improves their feasibility. (CH&F)

    Response: While this matter is somewhat conjectural, it is apparent that any significant changes in Federal fish production will change the mix and

distribution of the harvest; therefore, the Federal Government is "constrained" to continue production as assumed in the Treaty. (page 24)

12. Comment: It is stated in this section that the Great Lakes fishery resources have been depleted by overfishing. With respect to the Great Lakes salmon fishery resources, is this really what the FWS wants to say? (USDA)

    Response: The report has been revised to indicate that lake trout were overfished, not salmon. (page 21)

13. Comment: The statement that "only after restoration is achieved can higher levels of catch be carefully resumed." reflects a common misconception among those not familiar with management of fisheries exploiting mixtures of hatchery and wild stocks of differing productivities. The maximum sustainable yield from the stock complex will normally be obtained by maintaining wild stocks at less than their full biological potential. (NWIFC)

    Response: The comment refers to a "stock complex" while the report refers to a single species stock, and not necessarily in the Pacific Northwest. However, the statement is removed from the report because its meaning is apparently not clear. (page 21)

14. Comment: In the section concerning the political difficulty of changing established hatchery production patterns even where there is sound scientific justification, the report fails to support the contention and does not recognize the many changes that have already been made. (NWIFC)

    Response: The report has been modified to reflect changes to established hatchery production in recent years through agreements with Tribes, States, and other Federal agencies. (page 22)

15. Comment: In the discussion of the benefits of the Pacific Salmon Treaty, the report states that the Treaty improves the chances for success of restoration efforts, because the Nation that takes actions to increase the fishery resource will benefit in proportion to the extent of such efforts. However, the treaty does not cover all stocks and some enhancement projects can be justified with or without the Treaty. (NWIFC)

    Response: The wording has been modified to reflect this comment. (page 22)

. EVALUATION OF FUTURE PRODUCT USE--Projected Needs (pages 26-29)

1. Comment: The report indicates the future needs for fish production by the Service can be met with existing facilities, however, the report does not provide the estimated future needs of the fishery resource program. (OH, WI)

   Response: The report points out the uncertainty in forecasting production needs, and, therefore, does not provide an estimate of the total future needs of the Fishery Resources Program. Specific information is available only for a few areas of the country, where intense efforts have been made by State and Federal agencies to estimate the future needs of a specific project. Such areas include the Lower Snake River system and the Colorado River system. (page 25)

2. Comment: The report states that the Service sees no need for construction of Federal salmon or steelhead trout hatcheries in the near future. This is not supported by the rest of the report. (NWIFC, Quinault Ind. Nat., OR, CF&H, WA)

   Response: Throughout the report, alternatives to construction of new Federal hatcheries are given. These include increasing the efficiency of exisitng hatchery operations through the advancement of fish disease research, rehabilitating hatchery facilities and undertaking limited construction to expand the carrying and production capacities at existing facilities when cost effective, and increasing operational funding to more fully use the present facilities. If alternatives such as these were considered, the Service would not need any new construction to meet forseeable production needs.

3. Comment: The report makes the assertion that somehow the SSCEA recognizes the desirability and the need to emphasize the improvement of existing facilities to increase efficiencies, rather than construct new facilities. (NWIFC, CF&H)

   Response: The statement referred to has been rewritten. It was not the intent of the Service to assert what is referred to in the comment. The intent was to express the Service's view, which is that existing facilities should be improved to increase efficiencies, habitat should be restored and protected, and research on fish diseases should be advanced, before the construction of new Federal hatcheries is considered. (pages 26-27)

4. Comment: In the discussion on disease research, the statement is made that "maximizing survival to harvest is the goal - not maximzing the number of fish being planted...". However isn't restoration the goal of the FWS? Shouldn't restoration be accomplished by providing escapement, not harvest? (WA)

   Response: The statement referred to has been removed and the respective paragraph rewritten. The point the Service wanted to make is that, through the advancement of fish disease research, the survival rate of hatchery fish could be increased, from the egg stage through the rigors of downstream and upstream migration. The healthier the fish, the better the chances are for survival, and the more fish to return and aid in achieving the goal of restoration. Increasing the survival rate of fish raised in existing hatcheries is more economical than constructing new hatcheries in which the same disease problems could occur, and, therefore not increasing the total number of fish that return upstream any more than if the efficiencies of existing hatcheries were increased. (pages 26-27)

5. Comment: The role of hatchery disease control is understated and an over emphasis is placed on tne mortality of downstream migrants at hydroelectric dams and irrigation diversions. (COE/DC)

   Response: The Service recognizes that the survival rate of downstream migrants could be increased through the advancement of fish disease research. The chances for survival of healthy fish through the rigors of downstream migration are much greater than those of diseased fish. However, it is clear that providing adequate downstream fish passage is another means of increasing the survival rate, regardless of the health status of the fish. (page 26)

6. Comment: "...the emphasis on pursuing disease research should be reworded to state that normally fish disease is brought on by improper nutrition, poor cultural practices and overall poor managment. Prevention through good cultural practices would control most of the diseases except perhaps some of the viral infections." (Sal/Trout)

   Response: It is generallly recognized that fish culture practices can significantly affect the health of cultured species. However, to imply that good fish cultural practices would control most fish diseases is a major oversimplification. It is but one of many factors that affect fish health. Fish health is a direct reflection of the general environmental conditions of the hatchery. Disease organisms carried by fish in the water supply, for example, bacterial kidney disease or furunculosis, can infect otherwise healthy cultured populations despite 'good fish cultural' practices. All of these factors must be considered in fish culture operations.

7. Comment: In the discussion of Atlantic salmon, the future needs of Lakes Ontario and Champlain should be mentioned. (NY)

   Response: An interagency committee was recently formed to prepare a management plan for Lakes Ontario and Champlain and to identify the future needs for Atlantic salmon. These estimates were not available for this report.

8. Comment: The discussion on Makah NFH should mention the satellite rearing program conducted by the Makah Tribe in conjunction with the facility. (Makah T.C.)

   Response: This has been incorporated in the report. (page 29)

9. Comment: The report infers that the Indian Tribal fishery programs fall under the category of user-pay. (Quinault Ind. Nat., Makah T.C.)

   Response: In many other areas of the country, Indian Tribal fishery programs do fall under the category of user-pay. However, the inference that the Indian Tribal fishery programs in the northwest fall under this category has been removed.

10. Comment: The report states that the State of Washington prohibits private salmon production. This is incorrect. (WA, NWIFC, Sal/Trout)

    Response: This reference has been deleted from the report.

11. Comment: The supportive role of the FWS in the development and construction of the Makah NFH is not adequately discussed. (NWIFC, Makah T.C.)

Response: This section has been rewritten to more adequately address the Makah NFH.

12. Comment: The references to the Boldt Decision and the Salmon and Steelhead Conservation and Enhancement Act in the discussion of the Makah NFH are irrelevant. (NWIFC)

    Response: The Service agrees that there is not direct connection between the hatchery and either the Decision or the Act. The section on Makah NFH has been rewritten and the references in the comment have been revised. (page 29)

13. Comment: The report states there are several hundred in-river tribal fishermen who are solely dependent on ascending runs of salmon. This is incorrect - there are less than one hundred. (NWIFC, Makah T.C.)

    Response: This reference has been deleted from the report.

14. Comment: The report inappropriately suggests that cost sharing with the Tribe could be a viable alternative to Service completion of the remaining hatchery construction. (NWIFC, Makah T.C., BIA)

    Response: This section has been rewritten to more fully address the Makah NFH and the remaining construction. The Service understands that the completed hatchery would benefit not only the Tribe, but many others. However, as unpopular as it may be, cost sharing with the Tribe is still a possible alternative to full Service funding for completion of the facility. (page 29)

15. Comment: Unless the salmon species and preferred release sizes are mentioned, it is difficult to assess the goals of the Makah NFH. (AK)

    Response: Release sizes have been incorporated into the report. (page 28)

16. Comment: It should be made clear that the exorbitant cost to construct the existing incomplete facility is not the fault of the Tribe. (Makah T.C., BIA)

    Response: The construction costs of Makah NFH have been addressed. (page 27)

17. Comment: In the discussion of improving the hatchery's water supply and it's annual production, the fact that a portion of that production would be caught by Canadian fisherman is irrelevant. (Makah T.C.)

    Response: The paragraph referred to has been rewritten. (page 28)

18. Comment: The cost per pound of additional fish to be produced as a result of completion of the Makah NFH, where most of the facility is already built, would still exceed the cost per pound of fish for the proposed Nisqually facility, where no construction has been done. (CF&H)

    Response: This is partially correct. It would be more cost-effective to build the Nisqually facility from scratch than to fully complete the Makah NFH. However, if only the direct fish production related work that still needs to be done at Makah NFH were to be undertaken, it is estimated that it would be substantially more cost-effective than the total construction cost of the Nisqually facility.

V.B. EVALUATION OF FUTURE PRODUCT USE--Production and Enhancement Plans--Nisqually Indian Tribe Fish Hatchery (pages 30-31)

1. Comment: It is implied that salmon and steelhead returning to the Nisqually River must survive only an intense fishery within Puget Sound; however, they must first survive the intense fishery in the ocean waters. Then, once they get into the river they must find their way past three dams. (NWIFC, CF&H)

   Response: This discussion has been modified. (page 30)

2. Comment: The report states the Nisqually Tribe's goal is to establish a run of 10,000 harvestable chinook salmon; however, this does not accurately reflect the Tribe's priorities for the hatchery. (NWIFC, CF&H)

   Response: The respective discussion in the report has been rewritten to reflect the Tribe's priorities as provided by NWIFC. (page 30)

3. Comment: The report discusses only the plans of the Nisqually Hatchery. What about meeting trust responsibilities on other river systems? (COE/DC)

   Response: Congress specifically asked the Service to include in the report an evaluation of the proposed Nisqually Fish Hatchery. The Service meets other trust responsibilities in several ways. There are cooperative agreements with BIA, under which the Service provides technical fisheries assistance, operates three hatcheries, and provides technical assistance and fish for stocking in the Klamath River system. Other trust responsibilities met by the Service, not under cooperative agreements, includes limited technical fisheries assistance in the upper midwest, providing trout for stocking reservations in Colorado, Utah, Wyoming, Montana, and Idaho, and providing warmwater fish for stocking reservations in the southwest.

4. Comment: The report states "...the only direct effect of a Nisqually Hatchery is a possible slight reduction of fishing pressure on other vulnerable salmon strains...". However, we feel the effect of the hatchery will be to increase fishing pressure on other vulnerable salmon strains, increasing the need to constantly supplement the wild stocks using stocking strategies to maintain the wild runs. (COE/DC)

   Response: The statement in the report referred to in the comment has been left unchanged. The Service does not agree that the effect of the hatchery would be to increase fishing pressure as suggested in the comment. (page 31)

5. Comment: The report states that the SSAC agreed to exempt the Nisqually Fish Hatchery proposal from it's proposed moratorium on new hatchery construction. This is not accurate. (NWIFC, CF&H)

   Response: Appropriate changes have been made in the text to reflect this comment. (page 30)

6. Comment: The reference in the report to the Salmon and Steelhead Advisory Commission as an indirect outgrowth of the Boldt Decision controversy is incorrect. This commission was created via the authority and direction of P.L. 95-561. (BIA)

   Response: The Salmon and Steelhead Advisory Commission was created via the authority and direction of the Salmon and Steelhead Conservation and Enhancement Act. P.L. 96-561. Although it is felt that the Act is an indirect outgrowth of the Boldt decision, the report has been clarified to reflect the authority of the SSAC. (page 31)

7. Comment: The Service's role and enthusiastic support in the development stage of the Nisqually Hatchery is not evident in this report. (CF&H)

   Response: The history of the development of the Nisqually Hatchery has been accurately described in the report. (pages 30-31)

8. Comment: Why aren't the Service's strategies regarding the spring chinook also addressed in this report? (BIA)

   Response: The Service has a number of restoration plans for spring chinook in the Pacific Northwest. However, the Service does not see the need for a new hatchery for spring chinook at this time. Under the section "Meeting Other Projected Needs" (page 29), chinook salmon are considered under the category of other species.

VI. SUMMARY OF FINDINGS (pages 33-34)

1. Comment: This section is not strongly supported by the data presented. (OH)

   Response: A number of changes have been made in this section to reflect consideration of this comment.

2. Comment: This section acknowledges the Service's working relationship with regional, State, and Tribal agencies, but it does not acknowledge the Service's relationship with other Federal agencies involved with fish and fisheries. (NMFS)

   Response: This section has been reworded to acknowledge the Service's relationship with other Federal agencies involved in fish production.

3. Comment: "The report infers in several areas that perhaps the best way to realize management objectives is to overcome such problems as disease or barriers to downstream migrations, or to improve overall stocked fish quality. Yet in tne final analysis the report alludes only to cost effectiveness for providing such fish without incorporating these very roles." (IL)

   Response: New wording addresses this comment. (page 33)

4. Comment: It is not clear in this section whether the restoration efforts for Atlantic salmon and striped bass will be met with existing facilities and programs, or if additional facilities and programs will be required. (United Mobile)

   Response: New wording in the report corrects this deficiency. (page 33)

5. Comment: There should be a section discussing the plans of the Service to attain the four National Responsibilities, following the Summary of Findings. (United Mobile)

   Response: This report is not the place for the suggested section. This information can be obtained from the Service's Statement of Responsibilities and Role.

6. Comment: It may be beneficial in this section to state the purpose of the fourth responsibility as indentified by the Service. What is meant by "maintaining a Federal leadership role in managing national fishery resources"? (USDA/ES)

   Response: The Service does not feel it is appropriate to address this issue in the report. (see response to comment I.1.)

APPENDICES

1. Comment: Appendix 7; the third column references Appendix 4 - the report shows the third column referencing Appendix 5. (NMFS)

   Response: This has been corrected.

2. Comment: Appendix 3; make the following corrections: (NWIFC)

   Point No Point Tribe -- no such tribe
   Skagit Tribe -- no such tribe
   Yakima Nation -- addition

   Response: Appendix 3 has been corrected.

3. Comment: Appendix 7; Spring Creek raises fall chinook not spring chinook. (COE/DC)

   Response: This has been corrected.

Key to Reviewers

ABBREVIATIONS

	STATES
AK	Alaska - Department of Fish & Game
**	Arkansas Game & Fish Commission
**	Florida Game and Fresh Water Fish Commission
IL	Illinois Department of Conservation
KS #1	Kansas Fish & Game
KS #2	Kansas Fish & Game
ME	Maine - Department of Inland Fisheries & Wildlife
MI	Michigan - Department of Natural Resources
MN	Minnesota - Department of Natural Resources
**	Nevada - Department of Wildlife
NY	New York State Department of Environmental Conservation
NC	North Carolina Wildlife Resources Commission
OH	Ohio Department of Natural Resources
OR	Oregon - Department of Fish & Wildlife
TX	Texas Parks and Wildlife Department
WA	Washington - Department of Fisheries
WI	Wisconsin - Department of Natural Resources
	PRIVATE SECTOR
Ark Aquatics	Arkansas Aquatics, Inc.
Casta Line	Casta Line Trout Farms
Clear Springs	Clear Springs Trout Company
Cline Trout	Cline Trout Farms
Namaken	Namaken West Fisheries
Peterson	Peterson Trout Farm
Sal/Trout	Salmon & Trout Advisory Service
Trophy Fish	Trophy Fish Ranch, Inc.
United Mobile	United Mobile Sportfishermen, Inc.
	TRIBAL
CF&H	Cullen, Holm & Foster (attorneys for Nisqually Tribe)
GLIFWC	Great Lakes Indian Fish & Wildlife Commission
Makah T.C.	Makah Tribal Council
NWIFC	Northwest Indian Fisheries Commisssion
Quinault Ind.Nat.	Quinault Indian Nation
	FEDERAL
**	Tennessee Valley Authority
**	Department of the Navy
USDA-ES	Department of Agriculture - Extension Service
USDA-FS	Department of Agriculture - Forest Service
**	Department of Commerce - Economic Development Administration
NMFS	Department of Commerce - National Marine Fisheries Service
BIA	Department of the Interior - Bureau of Indian Affairs (Portland
**	Department of the Interior - Bureau of Land Management (DC)
COE/KS	U.S. Army Corps of Engineers/Kansas City
**	U.S. Army Corps of Engineers/Omaha
COE/DC	U.S. Army Corps of Engineers/Washington, D.C.

** letter received, but contained no comments which would change the text

INTRODUCTION TO THE APPENDICES

The following seven appendices provide supplemental information that supports the preceding Fish Production Report. Please note that each appendix may contain abbreviations that are defined separately at the end of each appendix. The following subject index is provided to assist in using the appendix:

FISH AND WILDLIFE SERVICE HATCHERIES OPERATED BY OTHERS THROUGH MEMORANDUM OF AGREEMENT
January 1, 1985

ALABAMA

Marion NFH

ARIZONA

* Alchesay/Williams Creek NFH

ARKANSAS

Corning NFH

GEORGIA

Cohutta NFH

IOWA

Fairport NFH
Manchester NFH

KANSAS

Cedar Bluff NFH

MINNESOTA

New London NFH

MONTANA

Miles City NFH

NEBRASKA

Crawford NFH

NEW HAMPSHIRE

Berlin NFH

NEW MEXICO

* Mescalero NFH

OHIO

Hebron NFH

PENNSYLVANIA

Tylersville NFH

SOUTH CAROLINA

Cheraw NFH

SOUTH DAKOTA

McNenny NFH
Spearfish NFH

VIRGINIA

Paint Bank NFH
Wytheville NFH

WASHINGTON

* Quinault NFH

WISCONSIN

Lake Mills NFH

* BIA funds these facilities which are operated by FWS

FISH PRODUCED AT NATIONAL FISH HATCHERY SYSTEM FACILITIES
(thousands of fish)

Resource Group	1984	1983	1982	1981	1980
Pacific Anadromous Salmonids (e.g., chinook, coho, Steelhead)	64,935	74,889	56,339	71,006	65,973
Atlantic Anadromous Salmonids (e.g., Atlantic salmon)	1,228	1,296	1,438	735	978
Other Anadromous (e.g., striped bass, American shad, shortnose sturgeon)	5,771	5,008	3,935	5,842	7,732
Warmwater and Coolwater (e.g. pike, perch)	40,512	55,760	55,281	53,101	48,798
Non-Anadromous Salmonids (e.g., rainbow trout, cutthroat trout)	19,871	24,340	23,768	25,280	30,476
Lake Trout	5,043	7,329	7,067	6,017	7,319
Endangered Species	904	138	33	--	--
TOTAL	138,264	168,760	147,861	161,981	161,276

INDIAN TRIBES OPERATING FISHERY FACILITIES IN WASHINGTON STATE IN FY 1984

Hoh Tribe
Lower Elwha Tribe
Lummi Tribe
Makah Tribe
Muckleshoot Tribe
Nisqually Tribe
Nooksack Tribe
Port Gamble
Puyallup Tribe
Quileute Tribe
Quinault Tribe
Skokomish Tribe
Squaxin Island Tribe
Stillaguamish Tribe
Suquamish Tribe
Tulalip Tribe
Yakima Nation

Table-1-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Striped Bass

Size: 1-2 inches long

Geographic Region: South

States in Region: Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 8

Estimated Federal Annual Production of this Fish in the Region: 4,000 lbs.; 3.5 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 69%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (Texas, Mississippi, Alabama, Georgia, Virginia)
Costs:			
Production	4.97	44.76	
Broodstock	.01	15.37	
Maintenance	3.70	23.66	
Support Services	5.71	21.73	
Training	0.00	.16	
Total Cost/pound	$29.75	$79.99	
Cost per fish, @ 900 fish/pound	$.03	$.09	$.02 - $.35
(Weighted Average Cost of Sample)	$67.42 per pound $.07 per fish		$.12/fish

PRIVATE:

Private Sector Price Range: $.08-.35/fish

Average Private Sector Price: $.19/fish
(average of 13 quotes)

Table-2-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Striped Bass

Size: 5-6 inches long

Geographic Region: South

States in Region: North Carolina, and South Carolina

Number of Federal Hatcheries Sampled in Region: 2

Number of Federal Hatcheries in the Region Producing this Fish: 3

Estimated Federal Annual Production of this Fish in the Region: 14,000 lbs.; 180,000 fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 85%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest	State Hatcheries
Costs:		
Production	3.64	5.08
Broodstock	0.00	.21
Maintenance	1.39	3.78
Support Services	1.77	5.84
Training	0.00	0.00
Total Cost/pound	$6.81	$14.91
Cost per fish, @ 13 fish/pound	$ .52	$ 1.15
(Weighted Average Cost of Sample)	$12.05 per pound $ .93 per fish	

PRIVATE:

Private Sector Price: $.25-$.95/fish

Average Private Sector Price: $.57/fish
(Average of 3 quotes)

Table-3-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Atlantic Salmon

Size: 6-7 inches long

Geographic Region: New England

States in Region: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island

Number of Federal Hatcheries Sampled in Region: 4

Number of Federal Hatcheries in the Region Producing this Fish: 5

Estimated Federal Annual Production of this Fish in the Region: 170,000 lbs.; 2 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 98%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (Maine)
Costs:			
Production	1.01	5.40	
Broodstock	.01	.25	
Maintenance	.20	1.12	
Support Services	1.45	4.67	
Training	.01	.11	
Total Cost/pound	$3.86	$7.30	
Cost per fish, @ 12 fish/pound	$.32	$.61	$.70
(Weighted Average Cost of Sample)	$5.43 per pound .45 per fish		$.70

PRIVATE:

Private Sector Price: $3.25/fish
(only 1 source known in geographic region)

Table-4-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Fall Chinook Salmon

Size: 3-4 inches long

Geographic Region: West Coast

States in Region: California, Oregon, Washington, and Idaho

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 7

Estimated Annual Federal Production of this Fish in the Region: 470,000 lbs.; 36 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 79%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (California, Oregon, Washington)
Costs:			
Production	.79	1.43	
Broodstock	.11	.25	
Maintenance	.10	1.77	
Support Services	.06	.41	
Training	0.00	.01	
Total Cost/pound	$1.85	$5.86	
Cost per fish, @ 77 fish/pound	$.02	$.08	$.03-.13
(Weighted Average Cost of Sample)	$2.41 per pound $ .03 per fish		$.06/fish

PRIVATE:

Private Sector Price: $.07/fish
(only 1 source known in geographic region)

Table-5-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Spring Chinook Salmon

Size: 5-7 inches long

Geographic Region: Pacific Northwest

States in Region: Washington, Oregon, and Idaho

Number of Federal Hatcheries Sampled in Region: 6

Number of Federal Hatcheries in the Region Producing this Fish: 12

Estimated Annual Federal Production of this Fish in the Region: 650,000 lbs.; 10 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 63%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State/Tribal Hatcheries (Oregon, Washington, Lummi Tribe)
Costs:			
Production	1.85	3.18	
Broodstock	.04	.64	
Maintenance	.17	.91	
Support Services	.11	.62	
Training	0.00	.05	
Total Cost/Pound	$2.41	$5.38	
Cost per fish, @ 15 1/2 fish/pound	$.15	$.35	$.20-.38
(Weighted Average Cost of Sample)	$3.29 per pound $.21 per fish		$.24/fish

PRIVATE:

Private Sector Price: No source known in geographic region.

Table-6-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Coho Salmon

Size: 4-6 inches long

Geographic Region: Pacific Northwest

States in Region: Oregon and Washington

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 5

Estimated Annual Federal Production of this Fish in the Region: 300,000 lbs.; 6.8 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 64%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State/Tribal Hatcheries (Oregon, Washington, Lummi Tribe)
Costs:			
Production	1.00	3.06	
Broodstock	.04	.25	
Maintenance	.18	1.53	
Support Services	.11	1.11	
Training	0.00	.03	
Total Cost/pound	$1.46	$5.95	
Cost per fish, @ 23 fish/pound	$.06	$.26	$.03-.21
(Weighted Average Cost of Sample)	$2.56 per pound $.11 per fish		$.13/fish

PRIVATE:

Private Sector Price: No source known in geographic region.

Table-7-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Steelhead Trout

Size: 7-8 inches long

Geographic Region: West Coast

States in Region: California, Oregon, Idaho, and Washington

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 9

Estimated Annual Federal Production of this Fish in the Region: 870,000 lbs.; 6.1 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 92%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest	- Highest	State Hatcheries (California, Oregon)
Costs:			
Production	.37	1.08	
Broodstock	.02	.09	
Maintenance	.29	.81	
Support Services	.22	.33	
Training	0.00	.01	
Total Cost/pound	$1.24	$2.05	
Cost per fish, @ 7 fish/pound	$.18	$.29	$.37-.45/fish
(Weighted Average Cost of Sample)	$1.66 per pound $ .24 per fish		$.41/fish

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PRIVATE:

Private Sector Price Range: $.20-.26/fish

Average Private Sector Price: $.23/fish
(Average of 3 quotes)

Table-8-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Lake Trout

Size: 5-6 inches long

Geographic Region: Great Lakes

States in Region: Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Pennsylvania, and New York

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 4

Estimated Annual Federal Production of this Fish in the Region: 270,000 lbs.; 7 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 93%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (Illinois, Michigan)
Costs:			
Production	.96	9.36	
Broodstock	.55	1.09	
Maintenance	.15	6.64	
Support Services	.51	6.16	
Training	.01	.52	
Total Cost/pound	$2.51	$23.77*	
Cost per fish, @ 20 fish/pound	$.13	$1.19*	$.25-1.00
(Weighted Average Cost of Sample)	$3.58 per pound $ .18 per fish		$.63/fish

* This station experienced an unusual fish kill in FY 1984 that greatly distorted unit costs. The total cost figures using FY 1983 data are $7.34/lb., $.37/fish, which better represents the normal costs at this facility.

PRIVATE:

Private Sector Price: $.30/fish
(only one source known in geographic region)

Table-9-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Channel Catfish

Size: 3-5 inches long

Geographic Region: East

States in Region: Ohio, Kentucky, Tennessee, Georgia, and Florida

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 5

Estimated Annual Federal Production of this Fish in the Region: 15,000 lbs.; 800,000 fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 95%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (Georgia)
Costs:			
Production	1.57	11.31	
Broodstock	.01	3.06	
Maintenance	1.84	3.00	
Support Services	.93	3.77	
Training	0.00	.72	
Total Cost/pound	$ 7.34	$17.27	
Cost per fish, @ 52 fish/pound	$.14	$.33	$.08
(Weighted Average Cost of Sample)	$10.49 per pound $ .20 per fish		$.08/fish

PRIVATE:

Private Sector Price Range: $.06-.40/fish

Average Private Sector Price: $.21/fish
(Average of 11 quotes)

Table-10-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Channel Catfish

Size: 3-5 inches long

Geographic Region: West

States in Region: California, Arizona, New Mexico, Utah, Colorado, Oklahoma, and Texas

Number of Federal Hatcheries Sampled in Region: 1

Number of Federal Hatcheries in the Region Producing this Fish: 3

Estimated Annual Federal Production of this Fish in the Region: 27,000 lbs.; 1.4 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 67%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries	State Hatcheries (Texas)
Costs:		
Production	$2.33	
Broodstock	.97	
Maintenance	2.16	
Support Services	2.28	
Training	0.00	
Total Cost/pound	$7.74	
Cost per fish, @ 52 fish/pound	$ .15	
		$.19/fish

PRIVATE:

Private Private Sector Price Range: $.05-.57/fish

Average Private Sector Price: $.20/fish
(Average of 26 quotes)

Table-11-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Channel Catfish

Size: 9-inches long

Geographic Region: South

States in Region: Arizona, New Mexico, Texas, Mississippi, and Louisiana

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 4

Estimated Annual Federal Production of this Fish in the Region: 83,000 lbs.; 370,00 fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 98%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (Mississippi)
Costs:			
Production	1.81	12.15	
Broodstock	.01	.27	
Maintenance	1.38	2.37	
Support Services	.47	5.39	
Training	0.00	.06	
Total Cost/Pound	$3.88	$20.18	
Cost per fish, @ 4 1/2 fish/pound	$.86	$4.48	$.15
(Weighted Average Cost of Sample)	$5.42 per pound $1.20 per fish		$.15/fish

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PRIVATE:

Private Sector Price Range: $.07-2.15/fish

Average Private Sector Price: $.47/fish
(Average of 14 quotes)

Table-12-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Rainbow Trout

Size: 3-4 inches long

Geographic Region: Northern Plains

States in Region: North Dakota and Montana

Number of Federal Hatcheries Sampled in Region: 1

Number of Federal Hatcheries in the Region Producing this Fish: 1

Estimated Annual Federal Production of this Fish in the Region: 14,000 lbs.; 800,000 fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 100%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries	State Hatcheries
Costs:		
Production	1.32	
Broodstock	.35	
Maintenance	.55	
Support Services	.40	
Training	.01	
Total Cost/pound	$2.63	
Cost per fish, @ 58 fish/pound	$ .05	

PRIVATE:

Private Sector Price Range: $.12-.30/fish

Average Private Sector Price: $.17/fish
(Average of 6 quotes)

Table-13-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Rainbow Trout

Size: 5-6 inches long

Geographic Region: Rocky Mountains

States in Region: New Mexico, Colorado, Utah, Wyoming, and Idaho

Number of Federal Hatcheries Sampled in Region: 2

Number of Federal Hatcheries in the Region Producing this Fish: 2

Estimated Annual Federal Production of this Fish in the Region: 130,000 lbs.; 2 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 100%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest	- Highest	State Hatcheries (Colorado, New Mexico, Wyoming)
Costs:			
Production	.63	.87	
Broodstock	.11	.12	
Maintenance	.29	.38	
Support Services	.27	.77	
Training	0.00	0.01	
Total Cost/pound	$1.64	$1.81	
Cost per fish, @ 15 fish/pound	$.11	$.12	$.13-.37
(Weighted Average Cost)	$1.74 per pound $.12 per fish		$.29/fish

PRIVATE:

Private Sector Price Range: $.08-.46/fish

Average Private Sector Price: $.33/fish
(Average of 9 quotes)

Table-14-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Rainbow Trout

Size: 7-8 inches long

Geographic Region: South

States in Region: Alabama, Georgia, Tennessee, Kentucky, and Missouri

Number of Federal Hatcheries Sampled in Region: 1

Number of Federal Hatcheries in the Region Producing this Fish: 2

Estimated Annual Federal Production of this Fish in the Region: 230,000 lbs.; 1.4 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 75%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries	State Hatcheries (Missouri)
Costs:		
Production	.76	
Broodstock	.14	
Maintenance	.22	
Support Services	.12	
Training	0.00	
Total Cost/pound	$1.24	
Cost per fish, @ 6 fish/pound	$ .21	$.42/fish

PRIVATE:

Private Sector Price Range: $.23-.60/fish

Average Private Sector Price: $.42/fish
(Average of 4 quotes)

Table-15-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Rainbow Trout

Size: 7-8 inches long

Geographic Region: West

States in Region: Arizona, New Mexico, Colorado, Utah, Wyoming, Montana, Idaho

Number of Federal Hatcheries Sampled in Region: 3

Number of Federal Hatcheries in the Region Producing this Fish: 5

Estimated Annual Federal Production of this Fisn in the Region: 370,000 lbs.; 2.2 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 63%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest		State Hatcheries (Colorado, New Mexico, Wyoming)
Costs:			
Production	.63	1.40	
Broodstock	.03	.07	
Maintenance	.29	.86	
Support Services	.27	.77	
Training	0.00	0.02	
Total Cost/pound	$1.56	$2.73	
Cost per fish, @ 6 fish/pound	$.26	$.45	$.22-.53
(Weighted Average Cost of Sample)	$2.16 per pound $ .36 per fish		$.41/fish

PRIVATE:

Private Sector Price Range: $.24-.75/fish

Average Private Sector Price: $.49/fish
(Average of 13 quotes)

Table-16-: Estimated Cost of Obtaining Fish for Federal Management Needs from Alternative Sources

Species: Rainbow Trout

Size: 9-inches long

Geographic Region: Southeast

States in Region: Arkansas, Missouri, Tennessee, Georgia, Kentucky, and West Virginia

Number of Federal Hatcheries Sampled in Region: 4

Number of Federal Hatcheries in the Region Producing this Fish: 5

Estimated Annual Federal Production of this Fish in the Region: 1.2 million lbs.; 4 million fish

Sampled Hatcheries' Share of Region's Federal Production of this Fish: 83%

GOVERNMENT:

	$Cost/Pound of Raising Fish In: Federal Hatcheries Lowest - Highest	State Hatcheries
Costs:		
Production	.45	.89
Broodstock	.06	.13
Maintenance	.07	.23
Support Services	.09	.26
Training	0.00	.03
Total Cost/pound	$.97	$1.27
Cost per fish, @ 3 1/2 fish/pound	$.28	$.36
(Weighted Average Cost of Sample)	$1.04 per pound $ .30 per fish	

PRIVATE:

Private Sector Price Range: $.48-1.15/fish

Average Private Sector Price: $.79/fish
(Average of 5 quotes)

Current and Potential Striped Bass Production for Restoration

Hatchery	Producing for (As of 10/1/84) Restoration	POTENTIAL		
		Prod. Increase from Program Redirection	Prod. Initiated from Program Redirection	Prod. Increase from Improvement Measures
bon Hill, AL	X	X		
moth Spring, AR			X	
aka, FL	X	X		
len, GA	X	X		
m Springs, GA	X	X		X
nkfort, KY			X	
chitoches, LA			X	
th Attleboro, MA	X			
idian, MS	X	X		
. John Allen, MS			X	
nton, NC	X			
inney Lake, NC	X	X	X	X
ecaville, OH			X	
homingo, OK				X
rs Bluff, SC	X			X
ngeburg, SC	X	X		
s Dam, TX			X	
lde, TX			X	
rison Lake, VA	X	X		
den, WV			X	

Percent of the Number of Fish Distributed by
National Fish Hatchery System Facilities in FY 1984 in
Support of Mitigation, Restoration, and other Purposes

STATE/FACILITY	MITIGATION	RESTORATION	FEDERAL LEADERSHIP	*FEDERAL LANDS	**STATE/ PRIVATE
ALABAMA					
Carbon Hill NFH	44	30			26
ARIZONA					
Alchesay NFH				100	
Williams Creek NFH				100	
Willow Beach NFH	98			2	
ARKANSAS					
Greers Ferry NFH	98				2
Mammoth Spring NFH	55			9	36
Norfork NFH	99			1	
CALIFORNIA					
Coleman NFH	100				
Tehama-Colusa FF	100				
COLORADO					
Hotchkiss NFH	99			1	
Leadville NFH	72	24		4	
FLORIDA					
Welaka NFH	15	35		9	41
GEORGIA					
Chattahoochee Forest NFH	28			72	
Millen NFH	25			4	71
Warm Springs NFH		5		2	93
IDAHO					
Dworshak NFH	100				
Hagerman NFH	100				
Kooskia NFH	100				
KENTUCKY					
Frankfort NFH	32			47	21
Wolf Creek NFH	86			14	

STATE/FACILITY	MITIGATION	RESTORATION	FEDERAL LEADERSHIP	*FEDERAL LANDS	**STATE/ PRIVATE
LOUISIANA					
Natchitoches NFH	3	6		27	64
MAINE					
Craig Brook NFH		100			
Green Lake NFH		100			
MASSACHUSETTS					
Berkshire NFH		100			
North Attleboro NFH		100			
Sunderland NSS		100			
MICHIGAN					
Hiawatha Forest NFH		100			
Jordan River NFH		100			
Pendills Creek NFH		100			
MISSISSIPPI					
Meridian NFH	2	2		1	95
Private John Allen NFH	3			48	49
MISSOURI					
Neosho NFH	70			2	28
MONTANA					
Bozeman FTC			100		
Creston NFH		4		96	
Ennis NFH			100		
NEVADA					
Lahontan NFH	100				
NEW HAMPSHIRE					
Nashua NFH	100				
NEW MEXICO					
Dexter NFH			100		
Mescalero NFH	4			96	
NORTH CAROLINA					
Edenton NFH	39	29		2	30
McKinney Lake NFH	13	37		24	26

STATE/FACILITY	MITIGATION	RESTORATION	FEDERAL LEADERSHIP	*FEDERAL LANDS	**STATE/ PRIVATE
NORTH DAKOTA					
Baldhill Dam NFH	80			20	
Garrison Dam NFH	80			20	
Valley City NFH	80			20	
OHIO					
Senecaville NFH	40			30	30
OKLAHOMA					
Tishomingo NFH	100				
OREGON					
Eagle Creek NFH	100				
Warm Springs NFH	100				
PENNSYLVANIA					
Allegheny NFH		96		4	
Lamar FTC			100		
SOUTH CAROLINA					
Bears Bluff NFH		100			
Orangeburg NFH	2	89	1	8	
Walhalla NFH	28			72	
SOUTH DAKOTA					
Gavins Point NFH	80			20	
TENNESSEE					
Dale Hollow NFH	84			16	
Erwin NFH			100		
TEXAS					
Inks Dam NFH	50			50	
San Marcos NFH & FTC			100		
Uvalde NFH				100	
UTAH					
Jones Hole NFH	83	1		16	
VERMONT					
Pittsford NFH		100			
White River NFH		100			

STATE/FACILITY	MITIGATION	RESTORATION	FEDERAL LEADERSHIP	*FEDERAL LANDS	**STATE/ PRIVATE
VIRGINIA					
Harrison Lake NFH		98		2	
WASHINGTON					
Abernathy STC	50		50		
Carson NFH	100				
Entiat NFH	100				
Leavenworth NFH	100				
Little White Salmon NFH	100				
Makah NFH		100			
Quilcene NFH		100			
Quinault NFH		100			
Spring Creek NFH	100				
Willard NFH	100				
Winthrop NFH	69			31	
WEST VIRGINIA					
Bowden NFH				100	
White Sulphur Springs NFH			100		
WISCONSIN					
Genoa NFH	60			26	14
Iron River NFH		100			
WYOMING					
Jackson NFH	80	20			
Saratoga NFH	30	25	20	25	

Abbreviations

NFH = National Fish Hatchery
FTC = Fish Technology Center
NSS = National Salmon Station
STC = Salmon Techology Center
FF = Fish Facility

* Includes FWS, military, Indian, and other Federal lands
** Includes universities, State, and private entities

Listing of National Fish Hatchery System Facilities Sampled for 1984 Comparison of Production Cost

State and Hatchery	Species Sampled for Cost Analysis	Reference to Appendix 4 Table Number
ALABAMA		
Carbon Hill NFH		
ARIZONA		
Alchesay NFH Williams Creek NFH Willow Beach NFH	Rainbow Trout	15
ARKANSAS		
Greers Ferry NFH Mammoth Spring NFH Norfork NFH	Rainbow Trout	16
CALIFORNIA		
Coleman NFH Tehama-Colusa FF	Steelhead Trout, Fall Chinook Salmon	4,7
COLORADO		
Hotchkiss NFH Leadville NFH	Rainbow Trout	13,15
FLORIDA		
Welaka NFH	Striped Bass	1
GEORGIA		
Chattahoochee Forest NFH	Rainbow Trout	16
Millen NFH	Channel Catfish	9
Warm Springs NFH		
IDAHO		
Dworshak NFH	Steelhead Trout	7
Hagerman NFH	Steelhead Trout	7
Kooskia NFH	Spring Chinook Salmon	5
KENTUCKY		
Frankfort NFH	Channel Catfish	9
Wolf Creek NFH	Rainbow Trout	16

State and Hatchery	Species Sampled for Cost Analysis	Reference to Appendix 4 Table Number
LOUISIANA		
Natchitoches NFH		
MAINE		
Craig Brook NFH	Atlantic Salmon	3
Green Lake NFH	Atlantic Salmon	3
MASSACHUSETTS		
Berkshire NFH		
North Attleboro NFH		
Sunderland NSS		
MICHIGAN		
Hiawatha Forest NFH	Lake Trout	8
Jordan River NFH	Lake Trout	8
Pendills Creek NFH	Lake Trout	8
MISSISSIPPI		
Meridian NFH		
Private John Allen NFH	Channel Catfish	11
MISSOURI		
Neosho NFH		
MONTANA		
Bozeman FTC		
Creston NFH		
Ennis NFH		
NEVADA		
Lahontan NFH		
NEW HAMPSHIRE		
Nashua NFH	Atlantic Salmon	3

State and Hatchery	Species Sampled for Cost Analysis	Reference to Appendix 4 Table Number
NEW MEXICO		
Dexter NFH		
Mescalero NFH		
NORTH CAROLINA		
Edenton NFH	Striped Bass	1,2
McKinney Lake NFH	Striped Bass	2
NORTH DAKOTA		
Baldhill Dam NFH		
Garrison Dam NFH	Rainbow Trout	12
Valley City NFH		
OHIO		
Senecaville NFH	Channel Catfish	9
OKLAHOMA		
Tishomingo NFH	Channel Catfish	9
OREGON		
Eagle Creek NFH	Coho Salmon	6
Warm Springs NFH	Spring Chinook Salmon	5
PENNSYLVANIA		
Allegheny NFH	Lake Trout	8
Lamar FTC		
SOUTH CAROLINA		
Bears Bluff NFH		
Orangeburg NFH	Striped Bass	1
Walhalla NFH	Rainbow Trout	16
SOUTH DAKOTA		
Gavins Point NFH		
TENNESSEE		
Dale Hollow NFH	Rainbow Trout	14
Erwin NFH		

State and Hatchery	Species Sampled for Cost Analysis	Reference to Appendix 4 Table Number
TEXAS		
Inks Dam NFH	Channel Catfish	11
San Marcos NFH&FTC		
Uvalde NFH	Channel Catfish	11
UTAH		
Jones Hole NFH	Rainbow Trout	13,15
VERMONT		
Pittsford NFH		
White River NFH	Atlantic Salmon	3
VIRGINIA		
Harrison Lake NFH		
WASHINGTON		
Abernathy STC	Fall Chinook Salmon	4
Carson NFH	Spring Chinook Salmon	5
Entiat NFH	Spring Chinook Salmon	5
Leavenworth NFH	Spring Chinook Salmon	5
Little White Salmon NFH		
Makah NFH	Coho Salmon	6
Quilcene NFH		
Quinault NFH		
Spring Creek NFH	Fall Chinook Salmon	4
Willard NFH	Coho Salmon	6
Winthrop NFH	Spring Chinook Salmon	5
WEST VIRGINIA		
Bowden NFH		
White Sulphur Springs NFH		
WISCONSIN		
Geona NFH		
Iron River NFH		
WYOMING		
Jackson NFH		
Saratoga NFH		

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