

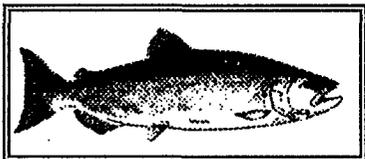
CALFED Vision for the Harvest of Fish and Wildlife

The CALFED vision for the recreational and commercial harvest of fish and wildlife dependent on a healthy Delta ecosystem is to support regulations that control daily and seasonal bag limits, size limits, limits based on sex, and open and closed harvest seasons based on time or location. Many species in decline are not harvested commercially or recreationally. This suggests that underlying problems with ecosystem processes and function and habitat condition throughout the Bay-Delta watershed are the cause of the decline. In most cases, there is a high likelihood that harvest restrictions will have little benefit in the long-term sustainability of these species. CALFED does not believe harvest control exclusively can restore fish and wildlife populations to a healthy state, but believes that present harvest management processes are sufficient to protect species and allow population increases through restoration of ecological processes that create and maintain habitat. The possible exception related to chinook salmon, and CALFED anticipates that modest harvest reductions can make a significant contribution to restoring populations to desired levels. CALFED vision for harvest is closely linked to its visions for the 14 Ecological Zones and emphasizes the reactivation or improvement of ecological processes and functions which create and maintain the habitats that support fish and wildlife populations. Conservative harvest strategies during the period that habitats are being recreated or improved will accelerate the rebuilding of fish and wildlife populations.



Specifically, this vision addresses the harvest of chinook salmon, steelhead, white sturgeon, striped bass, and waterfowl and upland game populations.

Harvest of Fish Species



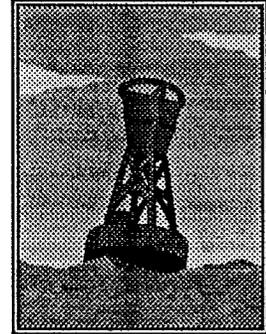
Salmon Harvest: The CALFED vision for salmon harvest is to implement strategies that support and maintain sustainable commercial and recreational fisheries in a manner consistent with ecosystem restoration and recovery of endangered species and species of special concern. CALFED has both short-term and long-term visions for harvest. The short-term vision (< 5 years) is to

support the rebuilding of chinook salmon stocks to desired levels by reducing harvest of naturally produced fish. This may require alternative harvest methods or incentives for commercial fishermen not to fish. This alternative could include actions such as reducing the size of the fleet by direct purchase of boats and permits, incentives not to fish, and incentives to offset loss of income to party boat operators. These short-term restrictions may curtail opportunities for recreational anglers but not to a greater extent than opportunities for use of other estuarine resources. The long-term vision is to increase chinook salmon populations through restoration of important ecological processes and functions and reduction or elimination of stressors that cause direct and indirect mortality. In the long-term vision, CALFED anticipates ocean commercial harvest landings of 750,000 to 1,500,000 chinook salmon and recreational landings of 500,000 to 750,000 per season.

In addition to applying the principles of traditional harvest management, we will increase our understanding of the complexities of the interactions and dependencies between harvest, health of

habitat, and the overall productivity of individual salmon populations (Ricker 1954). Harvest influences salmon productivity by reducing the number of adult fish in the spawning population, the age structure of the spawning population, and the overall fecundity of the population as older female fish are generally larger and carry more eggs. In a much broader perspective, harvest management should strive to protect the productive capacity of individual salmon stocks by pursuing the reasonable and essential objective of protecting the genetic diversity of salmon populations upon which production ultimately depends.

Extensive ocean recreational and ocean commercial troll chinook salmon fisheries exist along the California central coast and an inland recreational fishery exists in the Central Valley. Support of these economic and recreational efforts is an important component in the overall effort to restore and maintain ecological health of the Central Valley ecosystem. Elimination of chinook salmon harvest will not restore ecological health to the system: likewise, restoring ecological processes and functions in the absence of conservative short-term harvest management may not provide for a sufficiently rapid rebuilding schedule for naturally spawning chinook stocks. However, past observations indicate that Central Valley chinook populations have the ability to rapidly increase in size when interior habitat conditions and sufficient flows for juvenile rearing and emigration are present.



Overall chinook salmon harvest rates must be consistent with the CALFED ecosystem restoration objective that addresses the rebuilding of important stocks as evaluated using the Cohort Replacement Rate method (Botsford 1996). Generally, stable chinook populations will exhibit a long-term average cohort replacement rate of 1.0. During rebuilding (which may require 10-15 years), harvest and inland conditions will be improving and rebuilding will require an average replacement rate greater than 2.0.

This vision is consistent with the CALFED Solution Principle that requires solutions in one area cause no significant redirected impact in another area. However, in support of the ocean chinook salmon fishing industry, alternative harvest strategies must be developed consistent with the CALFED Solution Principles. One alternate harvest strategy may be to implement a selective fishery for hatchery stocks for the purpose of reducing the harvest of naturally produced stocks. This alternative would require the mass marking of all hatchery chinook produced at Central Valley hatcheries, and perhaps the Klamath Basin, Trinity Basin, and southern Oregon as well. A more realistic option to increase the return or naturally produce chinook salmon may include shifting some of the harvest effort north along the coast and reducing the harvest rate in the Central Valley index area.

Many conservation biologists believe that a harvest rate of about 67% is a sustainable, conservative level of harvest for naturally spawning stocks, if quality habitat conditions exist inland. Hatchery origin stocks can support higher rates, but sustaining high rates in the ocean mixed stock chinook fishery also entails high harvest of naturally produced stocks as well. Prior to 1986, harvest rates were estimated from around 65-75%, which may have been too high to support a sustainable fishery. Beginning in 1986, harvest rates increased coincident with the closure of the North Coast fishery from Fort Bragg north in order to meet harvest sharing obligations on Klamath River stocks to the Native American Tribes which in effect shifted ocean troll effort south in the Central Valley index area. Apparently, the closure of the North Coast fishery resulted in fishing effort being shifted to the south.

In 1996, the Pacific Fishery Management Council (PFMC) acted to reduce the fishery impacts on winter-run chinook salmon by 50%. This was accomplished by increasing the minimum size limits in the recreational and commercial fisheries. Reduction of harvest is one of several major elements which will contribute in both the short and long-term to restoring healthy fish populations, but will not contribute to restoring health of important ecological processes, functions, and habitat. Although selective fisheries are not generally deemed feasible or desirable at this time for chinook stocks, mass marking is a potential means to identify a hatchery-produced fish which will enable harvesters to distinguish naturally produced fish (by having an adipose or other fin used in the mass marking program).



Based on available information, it appears that a sustainable chinook salmon fishery can be maintained if habitat conditions and ecological processes and functions are restored throughout the Bay-Delta watershed, and if the ocean harvest index on naturally produced fall-run chinook salmon stocks is reduced by 10% below present levels.

Alternative actions which may support harvest reductions include a selective fishery that targets only externally marked chinook salmon and which releases unmarked fish. Selective fisheries can reduce harvest rates on unmarked fish by as much as 70-80% for gear types with low release and dropoff (shaker) mortality. However, the reduced harvest rates can be as little as 10-50% for gear types with high release and dropoff mortality rates. The application and benefits of a selective fishery for Central California Coast ocean mixed stock fishery is unknown at this time. The potential effectiveness of a selective fishery in increasing spawning escapements of unmarked fish depends on the following factors:

- The proportion of a naturally spawning stock that would be harvested by the fishery in the absence of selective regulations,
- the impact of non-selective fisheries that harvest unmarked fish which are released in selective fisheries,
- the degree to which reduction in total abundance caused by mortality resulting from application of tags or other distinguishing marks increase harvest rates in nonselective fisheries that operate under catch quotas or bag limits, and
- the magnitude of harvest rate reductions resulting from the selective fishery.

In addition to the potential implementation of a mass marking and selective fishery along the California coast, CALFED also considering the efficacy of providing economic incentives for commercial and party boat operators to offset negative economic effects of short-term reduced harvest.

The CALFED vision for chinook salmon will rely on actions by the California Fish and Game Commission and the PFMC. The PFMC and seven other regional councils were created by the Magnuson Fishery Conservation and Management Act in 1976 with the primary role of developing, monitoring and revising management plans for fisheries conducted within 3 to 200 miles of the U.S. coast. The PFMC develops plans for ocean fisheries off California, Oregon, and Washington.

The PFMC has 13 voting members including the regional director of the National Marine Fisheries Service; chief fishery officials of Oregon, Washington, Idaho, and California; and 8 private citizens appointed by the Secretary of Commerce from lists submitted by each state governor.

The ocean salmon fisheries off Washington; Oregon, and California have been managed by the Council since 1977. Annual amendments to the 1978 Fishery Management Plan (FMP) were used to provide required management flexibility each season until a framework concept was adopted. Beginning with the 1985 season, the ocean salmon fishery has been managed by a framework amendment which allows flexibility to adjust annual management regulations in response to varying stock abundance without the necessity of amending the FMP.

The framework FMP contains fixed management objectives and goals which guide the Council's choice of flexible annual management measures. Within specified limits the PFMC may vary season length, management boundaries, bag limits, gear restrictions and quotas annually to achieve the fixed objectives of the FMP. Some of the major provision of the FMP are a description of the salmon stocks comprising the management unit, management objectives, escapement goals, procedures for determining and allocating ocean harvests and in season management procedures.

It is important to distinguish the CALFED vision for chinook salmon and the roles and responsibility of other management authorities, particularly the PFMC. While the CALFED mission is to develop a long-term comprehensive plan to restore ecosystem health and improve water management for beneficial uses of the Bay-Delta system, the harvest management objectives of the PFMC are to:

Harvest Management	
1.	Establish ocean harvest rates for commercial and recreational fisheries that are consistent with requirements for optimum spawning escapements, treaty obligations, and continuance of established recreational and commercial fisheries within the constraints of meeting conservation and allocation objectives. Achievement of this objective requires that: <ul style="list-style-type: none"> a. Escapements of viable natural spawning stocks of salmon shall be sufficient to maintain or restore the production of such stocks at optimal levels. b. Escapement of hatchery stocks shall be sufficient to achieve production goals established by the management entity or entities with responsibility for establishing goals. c. In managing mixed stock salmon fishing, the level of exploitation that can be sustained by the weakest natural spawning stocks for which specific management objectives have been defined will be used by the PFMC to establish maximum fishing rates. d. Harvest allocations of salmon stocks between ocean and inside recreational and commercial fisheries shall be fair and equitable and fishing interests shall equitably share the obligations of fulfilling any treaty or other legal requirements for harvest opportunities.
2.	Minimize fishery mortalities for those fish not landed from all ocean salmon fisheries as consistent with optimum yield.
3.	Manage and regulate the fisheries so the optimum yield encompasses the quantity and value of food produced, the recreational value, and the social and economic values of the fisheries.
4.	Develop fair and creative approaches to managing fishing effort and evaluate and apply management systems as appropriate to achieve these management objectives.
5.	Achieve long-term coordination with the member states of the PFMC, the treaty Indian tribes, Canada, North Pacific Fishery Management Council, Alaska, and other management entities which are responsible for salmon habitat or production in the development of a coastwide salmon management plan.
6.	Manage consistent with any U.S.-Canada salmon treaty.



7. Support the enhancement of salmon stock abundance in fishing effort management programs to facilitate a return to economically viable and socially acceptable commercial, recreational, and tribal seasons.

In addition to its management objectives, the PFMC has established a set of conservation goals, many of which are consistent with the CALFED mission and ecosystem quality objectives. The PFMC will manage the fishery resources in its area to achieve the greatest benefit to the nation on a continuing basis. The goal of conservation is to benefit people through wise use, rather than simple preservation. In recognition that maintenance of a healthy resource is necessary to achieve continuing benefits to the nation, the PFMC will:

Conservation Goals
1. Assume a more aggressive role in the protection and enhancement of anadromous and marine fish habitat. The PFMC will play a leadership and coordination role in support of the agencies with management responsibilities and authorities.
2. Manage for viable salmon stocks and maintain genetic diversity. However, the PFMC recognizes that in areas of importance to particular stocks, habitat degradation and water development may leave no alternative but to manage for hatchery production or a combination of hatchery and natural production.
3. Strengthen its efforts to work with other jurisdictions, both domestic and international, to manage stocks of fish over their entire range.
4. Strongly support development of concepts and practices for management of mixed stock and multi species complexes and rebuilding those complexes in a manner that economic and allocation objectives of the PFMC can be best met.
5. Support additional data collection and analyses which will improve the basis for management measures.
6. Develop management measures which constrain incidental catches of fish and other animals within acceptable limits while harvesting target species.

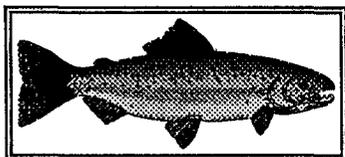
The PFMC has also established development goals and social/economic goals:

Development Goals
In recognition of the need for further development of the U.S. fishing industry, the PFMC will:
1. Support innovative efforts by the U.S. industry to develop new fisheries on underutilized species, while maintaining viable existing U.S. fisheries.
2. Achieve full utilization of U.S. fishery resources by U.S. citizens.
Social/Economic Goals
In recognition of the need to consider social and economic factors and consequences in decision making, the PFMC will:
1. Encourage cost effectiveness in management activities.
2. Take a leadership role in coordinating the development of effort control measures in cooperation with users and other management entities.
3. Encourage an environment which allows the industry and dependent communities to make long-term commitments in existing and underdeveloped fisheries by adopting management strategies which will better utilize the existing capital investment in fishing vessels and processing facilities. Establishing long-term harvest goals would aid in the effort.
4. Bring parties involved in gear conflicts together with management agencies to develop a solution. Only with failure of this effort will the PFMC impose a solution;

5. Seek to obtain the widest practical public input prior to decision making.
6. Improve the evaluation of economic and social consequences of various management options prior to decision making.

In addition, it is the policy of the PFMC to restore or maintain important natural spawning stocks of salmon to optimal levels, as presently included or to be set forth in the goals, objectives, strategies, and definitions of its salmon Fishery Management Plan.

The PFMC will be guided by the principle that there should be no net loss of the productive capacity of marine, estuarine, and freshwater habitats which sustain commercial, recreational, and native fisheries beneficial to the nation.

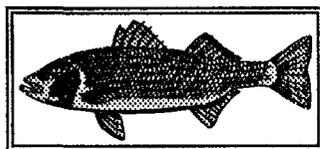


Steelhead Harvest: The CALFED vision for steelhead is to support harvest strategies that fully protect naturally spawning stocks while redirecting harvest to hatchery-produced stocks. This will require a marking program similar to the mass marking program proposed above for chinook salmon except it would be of a much lower magnitude. In this vision, adult steelhead harvest would be directed to steelhead produced at Coleman National Fish Hatchery on Battle Creek, Feather River Hatchery on the Feather River, Nimbus Hatchery on the American River, and Mokelumne River Fish Installation on the Mokelumne River. Harvest of these stocks would also occur on the main stem of the Sacramento River.

The harvest of both naturally and hatchery produced juvenile steelhead occurs throughout the Sacramento Basin. Juvenile harvest is not desirable because it reduces future adult population size, reduces the opportunity for anglers to harvest adult steelhead, and reduces the overall productivity and fecundity of the spawning populations.

More restrictive angling regulation may be necessary to protect steelhead from over-harvest, while still allowing anglers the opportunity for continued sport fishing. CALFED envisions that the following elements might be considered as additional protective measures for steelhead: catch and release fishing only, size limits to protect either juvenile fish or larger adult spawners, barbless hooks to reduce latent mortality, and not removing hooked fish from the water to decrease handling mortality.

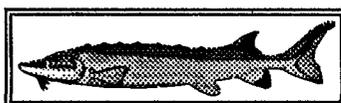
CALFED envisions that the steelhead fishery of the Yuba River will receive special recognition as an important wild steelhead fishery and that regulations will be enacted to protect this valuable stock while permitting controlled angling opportunities that have a minimal adverse effect on the spawning population. In addition, CALFED envisions that the harvest of juvenile steelhead and rainbow trout in the Yuba River will be prohibited. CALFED also envisions that recreational anglers would have opportunities to pursue wild steelhead on other streams, but would be required to release any steelhead landed in good condition.



Striped Bass Harvest: Adult striped bass support the most important sport fishery in the Sacramento-San Joaquin Estuary and the condition of this fishery is publicly recognized as a barometer of the status of the estuary and its biological resources. Statewide, over 400,000 anglers fish

for striped bass and most of this effort is directed at the Sacramento-San Joaquin Estuary population. Unfortunately, the present annual harvest of striped bass from the Sacramento-San Joaquin system is only about 80,000 fish because of the depressed state of the population. Recent annual harvest rates have ranged from 9 to 14%. In the early 1970s, when striped bass were more abundant and more anglers fished, harvest rates of 16-24% led to the harvest of over 300,000 legal-sized fish annually. Annual harvest may have reached 750,000 fish from the high populations of the early 1960s.

CALFED supports increasing legal harvest of striped bass, as it has not caused the decline in abundance that has occurred since the 1960s and 1970s. At the same time, efforts to curtail illegal harvest (taking undersized fish and catching overlimits) should be vigorously continued. CALFED envisions that the goal of increased legal harvest will be attained by maintaining present angling regulation while increasing the abundance of adult fish. Although angler participation likely will expand as fishing success increases, it is anticipated that present angling regulations will keep harvest rates at sustainable levels (<20%).



Sturgeon Harvest: White sturgeon is the object of an important sport fishery in the Bay-Delta, commercial fishing for sturgeon is prohibited in California. Historical accounts indicate that commercial fisheries greatly reduced west coast sturgeon populations, including the Sacramento-San Joaquin population, in the late 1800s. As the result of this depletion in the Sacramento-San Joaquin Estuary, all sturgeon fishing was prohibited in 1917; the fishery was reopened in 1954 to sport angling only. With the exception of the period from 1956 to 1963 when the minimum size limit was raised to 50 inches total length (TL), the sport fishery had the same regulations from its inception until 1989: a year-round season, 40 inch TL minimum size limit, and a one fish per day creel limit.

Although fluctuations in legal-sized white sturgeon abundance have been primarily dependent on variable recruitment, historical depletion by the commercial fishery indicates the population is readily subject to overharvest. Consequently, a 40% increase in annual harvest rate from a mean of 0.069 in the 1960s and 1970s to 0.097 in the 1980s was cause for concern and was the impetus for angling regulation changes in the early 1990s. Starting in 1990, a maximum size limit of 72 inches was instituted and the minimum size limit was increased in 2-inch annual increments until it reached 46 inches in 1992. The maximum size limit is designed to protect older, more-fecund females and the increased minimum size limit is designed to protect older, more-fecund females and the increased minimum size limit is designed to reduce overall harvest.

These angling regulations have achieved their purpose; estimated harvest rate has been <3% in recent years. Hence, CALFED envisions supporting the present harvest strategy which protects the white sturgeon from overexploitation while providing anglers with a sustainable trophy fishery.

Harvest of Wildlife Species

Waterfowl Harvest: The CALFED vision for waterfowl harvest is to implement strategies that support and expand current recreational harvest levels in a manner consistent with ecosystem restoration and recovery of locally breeding waterfowl. CALFED recognizes that there are two distinct populations of waterfowl within California, a resident or breeding population and the



wintering population that migrates into and through the state, a major part of the Pacific Flyway. The vision is for increased harvest of resident birds made possible by the increased waterfowl populations from the maintenance and restoration of quality, permanent habitats. These habitats will meet the needs of locally breeding waterfowl, such as mallards, by creating brood ponds, upland, molting, and forage areas. The vision is also for the increased harvest of wintering waterfowl made possible as a result of maintaining and restoring quality habitats for the needs of migrating birds throughout the Central Valley.

By providing increased acreages of high quality foods necessary for improved body conditions, wintering waterfowl will return to their nesting grounds with a much greater potential for successful breeding.

Current management strategies for harvest of waterfowl are linked to breeding success and wintering conditions and do not have a detrimental effect upon the population. CALFED realizes that harvest rates will continue to be managed because conditions in the breeding grounds outside of California remains the most important factor and is beyond its Solution Scope. Harvest rates will also be managed so that it does not interfere with ecosystem health.

CALFED realizes that public waterfowl hunting opportunities are relatively nonexistent in some of the Ecological Zones. CALFED's vision is to increase these opportunities by providing additional public waterfowl hunting opportunities in those zones.

With the potential increase for public hunting opportunities, additional measures might be necessary for increased regulation enforcement. Additional patrols will be added as needed in some areas from Department of Fish and Game Wardens.



Upland Game Harvest: The CALFED vision for upland game is to increase the harvest of upland game species and to increase the quality and quantity of public hunting opportunities throughout many of the Ecological Zones. The main focus of CALFED is to increase habitat for species such as the pheasant, valley quail, brush rabbits, black-tailed hares, and mourning dove.

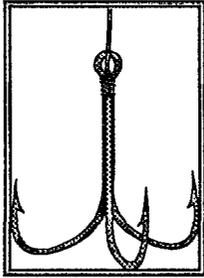
Other harvestable species include coyote, mink, beavers, and muskrats. Another notable species is the wild turkey. These species will not be the focus of CALFED but will benefit greatly from the restoration efforts. The turkey, for example, will benefit from restoration efforts along the many tributaries and upper watersheds of the estuary.

Many of the Ecological Zones identified by CALFED contain excellent habitats but public upland game hunting opportunities are limited. The Delta, for example, is an extensive agricultural area that offers very limited hunting opportunities for the public. Farming practices have also changed drastically over the years as methods have become more efficient. This has resulted in a lower quality habitat for ground nesting birds such as the pheasant. While many crops are compatible for pheasants and other birds, cover during the nesting season is usually not sufficient or available for the entire nesting season. CALFED's focus is to create large areas of permanent nesting

habitats to ensure the greatest potential for nesting success. CALFED envisions that this increased success and resulting increase in populations will support increases in harvest.

Studies have shown that harvest does not affect nesting success. However, in those areas where pheasant populations are very sparse, properly managed harvest rates may be modified to assist in a quicker recovery.

For species such as quail and dove, CALFED's focus is to restore riparian and upland areas in order to improve the opportunities for public hunting. This improved habitat can be managed to increase the health of the ecosystem. This will benefit other species such as brush rabbits and hares as well.



Illegal Harvest of Fish and Wildlife: The illegal harvest of fish and wildlife is known to be a problem throughout the Bay-Delta watershed. It may range from the illegal take of adult spring-run chinook salmon from their over-summering habitats in the upper sections of stream tributary to the Sacramento River, to the illegal take of undersized striped bass in the Delta. Illegal harvest can also be in the nature of a more commercial activity such as gillnetting of adult salmon, sturgeon, and striped bass in the Delta for clandestine sale and profit.

By its very nature, illegal harvest is difficult to control or eliminate. CALFED envisions that the California Fish and Game Code will be enforced through increased staffing of law enforcement officers, and that reductions in the illegal take of fish and wildlife could make important contributions in rebuilding depleted stocks. For example, the Department of Fish and Game's Delta-Bay Enhanced Enforcement Program (DBEEP) has shown that directed enforcement activities can reduce the magnitude of illegal harvest. This and similar programs should be included in the long-term program to restore ecosystem health to the Bay-Delta watershed and its tributary streams. CALFED also envisions that directed enforcement is only one avenue to reduce illegal harvest and that a strong public education program is critical to the success of the enforcement effort.

Linkage to Other Restoration Programs

A variety of programs exist in the Central Valley to improve fish and wildlife population sizes for numerous reasons including: 1) increasing parental populations, 2) increasing opportunity for anglers and hunters to harvest species, 3) increasing opportunities for commercial harvest, and 4) increasing opportunities for non-consumptive uses. As previously stated, the Fish and Game Commission has direct responsibility to establish regulation for the harvest of fish and wildlife species throughout the State and in the Pacific Ocean up to three miles off shore. The Pacific Fishery Management Council is vested with responsibility for federal regulation of the ocean fisheries beyond the three-mile limit up to 200 miles.