THE STATUS OF THE MAKAH NATIONAL FISH HATCHERY FOR USE IN WATERSHED PLANNING IN THE CAPE FLATTERY AREA

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This report is submitted to the Cape Flattery Comprehensive Resource Production and Management Plan Development Team. It describes fishery management considerations for all fish releases made directly from the Makah National Fish Hatchery (MNFH). However, the MNFH also routinely provides eggs and fry to the Makah Tribe in cooperative rearing projects. This report will mention all transfers from the MNFH and most of the releases, but a complete picture of the tribal program will be given in the Makah Tribe's own report to the Development Team.

The MNFH is owned and operated by the U.S. Fish and Wildlife Service (FWS). The hatchery is located on River Mile 3.0 of the Sooes River on the Makah Indian Reservation. The MNFH began releasing fish in 1982.

The Hatchery was built to supplement natural production on the northwest shore of the Olympic Peninsula and the Straits of Juan de Fuca (FWS 1983a). The motivation was that the ocean fisheries were intercepting so many coho and chinook bound for coastal Washington streams that terminal harvest of naturally-produced fish was often impossible. These problems had long been recognized and had motivated the FWS to provide releases of fish into the Cape Flattery area from other Federal hatcheries since the earlyy 1970's (Boomer 1985).

HATCHERY FACILITIES

The MNFH is large enough to handle approximately 11,675,000 eggs and its raceways are designed to rear 10,250,000 fry to subyearling smolt and 1,425,000 to yearling smolt. However, low summer flows in the Sooes River, the Hatchery's only present water supply, have prevented rearing more than 375,000 fish to yearling smolt at the hatchery. The hatchery will operate to its capacity only if an additional 13 cfs of water in August and September can be developed (FWS 1985a). Drilling wells was determined to be infeasible, but development of a two-pass water reuse system was recommended (FWS 1987).

HATCHERY OPERATIONAL GOALS

In 1979 the Makah Hatchery Steering Committee was formed to select stocks to be raised, set production levels, choose release sites, and evaluate the effect of the hatchery on mixed stock fisheries and on production of wild stocks. The current members are the FWS, the Makah Tribe, the Washington Department of Fisheries (WDF), and the Washington Department of Game (WDG).

The Committee endorsed the Hatchery Operational Plan (FWS 1983a), which specifies the species raised and their numbers. It calls for production of 4,000,000 fall chinook subyearlings for release from the hatchery, plus incubation of 1,000,000 additional fry for the Makah Tribe to rear and release outside the Sooes. This goal was set high, with the realization that production would be severely limited by broodstock availability, a limit which remains today. For this reason the immediate production goal was set at 2,000,000 (FWS 1984).

The Plan specifies 300,000 coho smolts to be released by the hatchery, based on capacity limited by low summer flows at the hatchery (FWS 1983a). If enough water were available, the goal will be raised to 750,000 smolts (Blum 1982) or 800,000 smolts (Steucke 1983). Up to 100,000 surplus fry are to be provided to the Makah Tribe for release in watersheds not now receiving full natural escapement.

The original hatchery plans called for rearing 5,250,000 chum (FWS 1985a), but the current Operational Plan is to release 3,000,000 chum smolts and to incubate an additional 1,000,000 eggs for the Tribe. The immediate objective is to rear 2,000,000 (FWS 1984). As with chinook, production is limited by brood availability. The hatchery spawns as many as return to the rack and supplements these with eggs taken from Hood Canal.

Original hatchery plans called for rearing 400,000 winter steelhead to smolt (Blum 1982). The goal was later reduced in the Operational Plan to 175,000, provided that more water were available at the hatchery. Under present conditions 65,000 are reared annually (Dave Houseworth, Manager, MNFH, personal communication). As with coho, production is limited by low summer flows. As in the coho program, surplus fry would be given to the Tribe for release into underutilized watersheds.

The original hatchery plan called for rearing 20,000 rainbow trout, but this program was dropped from subsequent plans (Blum 1982).

AFFECTED WATERSHEDS

Sooes River

The Sooes River (sometimes spelled Tsoo-Yess) has received releases of fall chinook, coho, chum salmon, and winter steelhead from the hatchery (Table 1). Of these species, fall chinook has the highest priority because of its great potential economic benefit once the run has been built up to the desired level (FWS 1983b, 1985a).

Fall Chinook. The preferred stock is the group returning to the Sooes River (Kenworthy 1986a). These fish may represent Quinault, Sooes native, Soos Creek (Puyallup system), Minter Creek, and Deschutes stocks. Future stock possibilities should be of coastal origin, such as Soleduck, Nemah, or Quinault, but none of these are now available.

Harvest will be managed for full utilization of surplus hatchery production. However, we estimate that the escapement goal of 3,200 hatchery broodstock may not be reached until 1997 (FWS 1985a). Until then, no directed fishery will be possible. However, some progress is being made in building up the run (Table 2).

The Sooes watershed is also managed for full natural production of chinook to fully use the natural rearing capacity of the watershed, to promote genetic diversity, to gain leverage for habitat protection, and to provide a margin of safety if serious problems should arise at the hatchery (Kenworthy 1985). This is to be achieved by either passing adults upstream from the MNFH once the hatchery egg take is fulfilled, or planting some of the hatchery chinook fry upstream in the interim. The number of fry is based on what would have been produced naturally by 300 adult spawners (Chitwood and Wood 1986). There is some question as to whether fish so released will survive well enough to justify the procedure. For this reason these outplants have been identified with unique coded-wire tag (CWT) codes. Management for natural production is expected to delay achievement of a directed fishery by three years (FWS 1985a).

The most apparent reason for broodstock shortages has been the absence of an effective electric weir until the fall of 1985. Since then, trapping efficiency has been satisfactory, based on spawner surveys that have revealed virtually no chinook escapement past the hatchery.

The run is being evaluated with CWT to determine survival and contribution rates of on-station releases and outplants to the upper watershed.

Coho. At present the late-returning Quinault stock is preferred to shift rack return timing because it is usually available and because its timing may be compatible with efforts to build up a local chinook brood run. However, early-returning Quilcene stock

Table 1. Releases from Makah National Fish Hatchery into the Sooes River. Sources: FWS Fishery Resource Evaluation Database and Kenworthy (1986a,b).

Species	Stock	Brood year	Date	Number	Life stage
Chinook	Makah	81	5/82	68,948	Smolt
	Makah	82	5/83	143,219	Smolt
	Makah	83	5/84	42,364	Smolt
	Makah	84	5/85	43,455	Smolt
	Makah	85	4/86	14,645	Presmolt(a)
	Makah	85	5/86	160,722	Smolt
Coho	Quilcene	80	5/82	145,091	Smolt
	Makah	81	5/83	31,403	Smolt
	Quinault	81	5/83	146,343	Smolt
	Quinault	82	5/83	5,243	Fed fry
	Makah	82	6/83	10,773	Fed fry
	Quinault	82	4/84	187,700	Smolt
	Quinault	83	4/85	257,091	Smolt
	Makah	84	4/86	256,000	Smolt
Chum	Makah	81	3/82-4/82	290,990	Fed fry
	Makah	82	4/83	351,524	Fed fry
	Quinault	82	3/83	551,978	Fed fry
	Makah	83	5/84	48,218	Fed fry
	Walcott	83	4/84	854,940	Fed fry
	Makah, Walcott	84	5/85	1,911,741	Fed fry
	Makah, Walcott	85	4/86	2,351,900	Fed fry
Steelhead	Makah	82(b)	5/83	33,553	Smolt
	Makah, Quinault	83	4/84	71,827	Smolt
	Quinault	84	5/85	65,202	Smolt
	Makah, Quinault	85	4/86	64,477	Smolt

(a) Released upstream from hatchery at RM 6.6, 8.0, and 13.4.
(b) Steelhead broodyear is considered January of the broodstocking season.

and the very late Dungeness stock have also been used as broodstock in previous years. Quilcene stock apparently contributes significantly to the rack returns.

Efforts are being made to reduce the potential of interception of chinook by not opening terminal fisheries for coho until the chinook run reaches the desired level, and by selecting for a mean coho return timing that is later than at present. However, it is not yet known whether the timing of the Quinault or native stocks is entirely compatible with efforts to build a viable hatchery chinook run. This question will not be answered until coho run timing is stabilized.

Table 2. Broodstock development at the Makah National Fish Hatchery. Sources: FWS Fishery Resource Evaluation Database: FWS 1985b; Kenworthy 1986a,b; Dave Houseworth, manager, MNFH, personal communication; and M. LaRivere, Makah Tribe, personal communication.

Species	Broodstock requirement		Return year	Rack returns
	Hatchery	Wild		
Chinook	3,200(a)	300(b)	84	32
			85	399
			86	609
Coho	280	900	83	2,523
			84	1,778
			85	3,774
			86	6,898
Chum	3,200(c)	500	83	65
			84	38
			85	136
			86	44
Steelhead	100	(d)	84	0
			85	73
			86	585
			87	919

(a) Houseworth says the goal is 3,200, but Chitwood and Wood (1986) say the goal is 1,600.
(b) Under the current agreement, all rack returns are spawned at MNFH. To mitigate for loss of natural production, fry equivalent to the progeny of 300 adults are planted upstream of the hatchery.
(c) This is a composite of 2,400 for Sooes plus 800 for Waatch (Chitwood and Wood 1986).
(d) Wild escapement goal has not been set but MNFH broodstock collection ends on Feb. 28. Some rack returns before this date may be also passed upstream to support sport fishing.

Two alternative procedures have been proposed to achieve this run separation. Chitwood and Wood (1986) recommend that "early-timed fish be retained at the hatchery and used as broodstock for off-station fry releases in small reservation streams which contain no chinook. Any excess early coho should be surplused. Broodstock for Makah Hatchery, Sooes natural escapement, and off-station fry or smolt releases should be taken from coho exhibiting natural run timing. These broodstock goals should be acheived in the order stated above." To achieve the natural escapement objective of 900, adult coho passed over the weir would be apportioned by a timing schedule which allows approximately 10% of the run in September, 75% in October, and

15% in November. In the alternative procedure (FWS 1984, Kenworthy 1986c), all the broodstock for the Sooes program would come from rack returns after November 1, and early stock would be used only for fry plants outside the Sooes and Waatch systems.

Care may also have to be taken to avoid excessively late coho return timing, to allow building the chum run. However, the chum run is now so small that its timing pattern cannot adequately be defined, so overlap with coho may not become an issue.

Once a management window is opened, harvest will be managed for efficient use of hatchery production. However, no recent directed harvests have been allowed, despite hatchery surpluses (Table 2), in order to build up the overlapping chinook and chum runs. As a result, catches have been very low. For example, in 1986, only 60 fish were taken, all of them incidental to the steelhead fishery.

CWT evaluation of contribution and survival is being delayed until a stable timing pattern is developed. Quilcene stock released in the Sooes was evaluated by CWT for 7 years ending with the 1978 release.

Chum. The preferred stock consists of returns to the hatchery rack, but to achieve hatchery goals these are regularly supplemented by eggs originating at Walcott Slough on Hood Canal. Adults returning to Walcott Slough are spawned at Quilcene National Fish Hatchery and some of the eggs are transferred to Makah. Brood is also taken from rack returns, which probably represent a mixture of Sooes native, Walcott, and Quinault stocks. Stock from Nitinat Lake in British Columbia is also under consideration but fishery managers are awaiting results of the 1987 broodyear before pursuing this question further.

The timing of this run to the MNFH is at present hard to define because of low returns. A timing overlap with later-returning coho could occur if the chinook run increases enough to allow directed harvest of coho but the chum run remains below the desired level. In such a case, terminal harvest of coho might have to be limited late in the season to protect the chum.

Harvest is eventually to be managed for full use of hatchery production, but no harvestable surpluses have occurred (Table 2). If returns do not improve soon the chum program may be discontinued.

There may be some interest in passing chum upstream from the weir as with chinook and coho, but the Steering Committee (Kenworthy 1986a) has agreed not to do so because buildup of a brood run would be delayed. The wild escapement requirement has been set at 500 adults, but this is treated as a secondary management objective.

Winter Steelhead. The preferred stock is that which now returns to the hatchery. It represents Sooes natives and possibly some Quinault stock. Only adults returning before February 28 are selected for brood, in order to create an early-returning hatchery stock. This is expected to avoid overharvest of the later-spawning segment of the run which is presumed to be native stock and is managed for natural production.

The early portion of the run is harvested to make full use of hatchery production. Present release levels have allowed commercial and sport harvest, due to excellent survival from smolt to adult. The hatchery's goal is to release 65,000 smolts on-station. The last three years' releases have been very close to this number (Table 1).

Natural production of the late portion of the run is allowed by discontinuing operation of the electric weir at the hatchery after February 28. Some early returns are also allowed upstream, either to support sport fishing or to relieve a surplus at the hatchery (FWS 1985a). However, a natural escapement goal has not yet been set.

A controversy has arisen over allocation of Sooes steelhead between the sport and tribal fisheries, because the sport fishery has generally been harvesting much less than half of the available surplus. It has not been determined whether the tribe has the right to the entire unharvested portion of the surplus, or only to half of it (Gibbons 1985).

Waatch River

The Waatch River has received plants of coho and steelhead directly from the Makah Hatchery (Table 3). the river has also received plants of chum originating at the Makah or Quilcene hatcheries and held for acclimation at a tribal facility in the Waatch system before release.

Coho. The Hatchery Plan (FWS 1983a) calls for the release of 50,000 coho smolts annually in the Waatch. The Waatch previously received Quilcene stock, and offspring of these may still contribute to the early run. However, at present Quinault stock is preferred, because it originates on the coast. Harvest will be directed on hatchery-produced fish. However, a wild escapement goal of 350 adults has been set (Chitwood and Wood 1986). This goal is of secondary management importance and its main usefulness may be to determine an optimum fry planting level. Directed fisheries have been allowed in recent years.

Chum. The river has received plants of Walcott, Minter Creek, and native stock. At present, eggs from Walcott Slough are held for a time at the Makah Hatchery and transferred to the tribal facility on Educket Creek, a tributary to the Waatch. Eggs are hatched and released on-station. If a Makah brood run can be developed, progeny will be transferred to Educket Creek.

Table 3. Releases from Makah National Fish Hatchery into the Waatch River system, including Waatch and Educket Creeks. Sources: FWS Fishery Resource Evaluation Database, FWS (1985b), and Kenworthy (1986b).

Species	Stock	Brood year	Release date	Number	Life stage
Coho	Quinault	81	5/83	39,097	Smolt
	Makah	82	5/83	52,325	Fed fry
	Quinault	82	4/84	50,000	Smolt
	Makah, Quilcene	83	3/84	100,686	Fed fry
	Quinault	83	4/85	50,000	Smolt
	Quilcene	84	5/85	236,250(a)	Fed fry
	Quinault	84	4/86	50,000	Smolt
	Makah	85	6/86	110,142(b)	Fed fry
Chum	Waatch Creek	82	4/83	180,000(c)	Fed fry
	Walcott	86	(d)	363,800(e)	Fed fry
Steelhead	Quinault	84	5/85	10,000	Smolt
	Makah, Quinault	85	4/86	16,050	Smolt

(a) Of these, 86,250 were released into Educket Creek, a tributary of the Waatch.
(b) 34,537 of these were released into Educket Creek and the remainder into the mainstem Waatch.
(c) Eyed at Makah national Fish Hatchery and transferred to the Makah Tribe's Waatch Creek Pond.
(d) Held for one day at Makah National Fish hatchery and transferred to the Makah Tribe's Educket Creek Pond; not yet released as of 5/14/87.
(e) To be released into Educket Creek.

Harvest will be managed for efficient use of hatchery production. This requires a brood of 800 fish, which may come from a combination of Waatch River, Makah National Fish Hatchery, and-or Quilcene National Fish Hatchery returns. No wild run is expected to be established due to lack of significant spawning capacity in the Waatch. The wild escapement capacity of 250 (Chitwood and Wood 1986) is considered of secondary management importance. The Makah Tribe is considering collection of broodstock for eventual release at the Educket Creek Pond by trapping or seining on Waatch Creek or the Waatch River.

Winter Steelhead. The goal of the Hatchery for the Waatch River is to release 10,000 smolts of early Makah stock annually. Harvest level will depend on hatchery production. A fin clip study has been initiated to determine the extent to which MNFH steelhead released in the Waatch stray into the Sooes. This information is expected to aid refining an outplanting strategy and harvest management.

Miscellaneous Streams on the Makah Reservation

Five independent streams on the Makah Reservation have received surplus Makah Hatchery coho fry (Table 4). These streams are selected on a case-by-case basis when the hatchery notifies the tribe there will be a surplus.

Hoko River

The Makah Tribe operates a satellite rearing facility on the Hoko River. Wild fall chinook and winter steelhead are captured in the Hoko, transferred to an isolation facility at Makah NFH, spawned, incubated, and returned to the Hoko ponds for rearing and release (Table 5). The Hoko River will no longer receive hatchery coho fry plants because wild Hoko coho have been selected as a U.S.-Canada index stock. Wild coho outmigrants will be trapped and tagged annually, primarily to determine migration and harvest patterns.

Fall Chinook. The preferred stock is Hoko wild fish. These may also represent Hoh, Soleduck, Sooes, Elwha, Finch Creek, Issaquah, White, Soos Creek, and Deschutes stocks from historical planting. Broodstock will be seined or trapped from the Hoko, and their offspring reared and microtagged at Makah. They will then be taken to the Hoko Rearing Ponds for imprinting and release. All releases will be made to rebuild natural production, and terminal harvest will be managed accordingly.

Despite the varied origin of the present stock, the wild Hoko chinook run has been chosen as an index stock for studies of marine contribution patterns under the U.S.-Canada Treaty. Wild outmigrants will be trapped and tagged annually. Therefore, releases from the Makah Hatchery, either directly or via the Hoko Ponds, must be timed differently than the wild outmigration.

Winter Steelhead. The Hoko steelhead are now being managed for natural production of all timing segments of the wild stock. The goal is to rebuild the wild run, but recent stock assessment by WDG has called into question the capacity of the river system to support greatly increased wild runs. The present wild stock may represent Hoko natives and recent plants of Bogachiel smolts and Makah fry. Releases of Bogachiel smolts have been discontinued. Future releases of Makah NFH fry may be permitted if the local broodstock is not sufficient to meet the desired escapement goal. In-river harvest is primarily from the sport fishery and is directed mainly at the early run.

Sekiu River

The Sekiu has not received plants from the Makah National Fish Hatchery due to other priorities. However, coho fry plants may be used in the future. With additional hatchery water, up to 40,000 Sekiu stock wild steelhead smolts could be released annually.

Table 4. Releases of coho as fed fry from Makah National Fish hatchery into small independent streams of the Cape Flattery area. Sources: FWS Fishery Resource Evaluation Database and Kenworthy (1986b).

Location	Stock	Brood year	Date	Number
Agency Creek	Makah, Quilcene	83	3/84	30,264
	Makah, Quilcene	85	6/86	17,134
Sail River	Makah, Quilcene	83	3/84	97,786
	Quilcene	84	5/85	100,000
	Makah	85	6/86	17,134
Village Creek	Makah, Quilcene	83	3/84	30,264
	Quilcene	84	5/85	20,000
	Quilcene	85	6/86	17,134
Red Creek(a)	Makah	85	6/86	34,563
Halfway Creek(a)	Makah	85	6/86	17,134

(a) Stream not listed in WDF catalog.

Table 5. Releases and transfers from Makah National Fish Hatchery into the Hoko River system. All releases and transfers were made as subyearlings. All transfers were made into Makah tribal rearing ponds on Hoko River. Sources: FWS Fishery Resource Evaluation Database, FWS 1985b, and Mark LaRivere, Makah Tribe, personal communication.

Species	Stock	Brood year	Date	Number	Notes
Chinook	Hoko	83	4/84	71,665	Release(a)
	Hoko	84	4/85	48,000	Transfer
	Hoko	85	5/86	139,000	Transfer
Steelhead	Hoko	85	6/85	31,000	Transfer
	Makah	86	6/86	198,200	Transfer

(a) Tribal records show a transfer to Hoko Ponds and three months rearing there before release on 6/84.

SUMMARY

1.--The Makah National Fish Hatchery was built on the Sooes River and began releases in 1982. The presence of the hatchery has had direct implications for management of the Sooes, Waatch, and Hoko watersheds, and to a lesser degree several other streams in the Cape Flattery area.

2.--On the Sooes River, fall chinook, coho, and chum will be harvested at hatchery rates, once sufficient brood runs of chinook and chum have been established. Coho are now abundant enough to support a fishery, but are not subject to a directed fishery because of the need to protect chinook and chum.

Chinook and coho will also be managed to use the watershed's capacity for natural production. To accomplish this, a certain number of chinook fry and adult coho will be released upstream of the hatchery after hatchery brood requirements are satisfied.

Early winter steelhead are managed for hatchery harvest rates and at present support a directed terminal harvest by both tribal and sport fisheries, although tribal catch predominates. Late winter steelhead are considered native stock and will be managed for natural production.

3.--On the Waatch River, hatchery plants of coho, chum, and early winter steelhead are to be harvested at hatchery rates. Surplus coho fry from the hatchery are planted in some Waatch tributaries to use what is considered underseeded habitat.

4.--On the Hoko River, the Makah Hatchery assists in restoration of local wild fall chinook and local wild winter steelhead. Hatching and early rearing are done at the Makah National Fish Hatchery. Fry are then transferred to the Makah Tribe's Hoko rearing ponds for imprinting and release as smolts.

5.--A native steelhead program could be initiated on the Sekiu River with winter steelhead if hatchery capacity were increased.

6.--A number of small streams on the Makah Reservation receive plants of surplus coho fry from the hatchery in an attempt to increase natural production from underseeded watersheds. To date these streams have included Village Creek, Agency Creek, Sail River, Red Creek, and Halfway Creek.

CURRENT ISSUES

1.--Does chinook fry planting in the upper Sooes watershed achieve sufficient survival to justify this means of using the natural rearing capacity?

2.--Is the so-called natural timing of the Sooes coho run sufficiently late to allow directed harvest of coho and still protect fall chinook?

3.--Will the chum run improve enough to justify continued rearing of this species at the hatchery?

4.--Will the chum run timing overlap the coho run to prevent harvest of late-returning coho?

5.--What can be done to achieve a larger sport share of the harvest of steelhead returning to the Sooes and Waatch Rivers?

6.--Is it economically feasible at this time to construct a water reuse system at the Makah National Fish Hatchery, as proposed? If so, how will additional fish be distributed?

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