HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Mukilteo Net Pen Coho Program
Species or Hatchery Stock:	Coho (*Onchorynchus kisutch*) Wallace River
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Puget Sound
Date Submitted:	March 17, 2003
Date Last Updated:	December 11, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Mukilteo Net Pen Coho Program

1.2) Species and population (or stock) under propagation, and ESA status.

Wallace River Coho (*Onchorynchus kisutch*) - not listed

1.3) Responsible organization and individuals

Name (and title):	Chuck Phillips, Region 4 Fish Program Manager Doug Hatfield, Snohomish Complex Manager	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

Paul Renter of Everett Chapter of Puget Sound Anglers. This club maintains the facility, feeds the fish while in the net pen and releases them. The Port of Everett provides dock space for the net pen.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Funding for fish feed is through ALEA funding provided to WDF W for Cooperative Fish Production. Fund to provide and maintain the net pen are the responsibility of Everett/ Puget Sound Anglers. Staffing is provided through volunteer labor. Feed costs are approximately $1,975.00 per year. There are no other regular operational costs that are significant.

1.5) Location(s) of hatchery and associated facilities.

Mukilteo Net Pen:	Mouth of the Snohomish River at Port Gardner Bay. Port of Everett Marina, 1720 W Marine View Drive, Everett, WA 98201
Wallace River Hatchery:	Wallace River (07.0490) RM 4 at confluence with May

Creek (07.0943)

1.6) Type of program.

Isolated harvest

1.7) Purpose (Goal) of program.

Augmentation

The goal of the program is to provide fish for harvest opportunity.

1.8) Justification for the program.

This program is intended to maximize sport harvest opportunity while minimizing straying into freshwater habitats. The fish are acclimated to the release site for several months before being released as smolts in June. Anecdotal evidence suggests that the returning adult coho will return to the release site to provide a bubble fishery. A formal evaluation of stray rates and fishery contribution may be conducted using coded-wire tags on smolts being acclimated and released from salt-water net pens (if funding is available). Yearling coho smolts are released from the net pen in June to minimized the likelihood for interaction with natural chinook salmon juveniles, which migrate seaward as sub-smolts predominately in May.

1.9) List of program "Performance Standards".

See section 1.10.

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Coho programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Meet hatchery production goals	Number of juvenile fish released - **20,000**	Future Brood Document (FBD) and hatchery records
Manage for adequate escapement where applicable	Hatchery return rates	Hatchery return records

Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Number of broodstock collected - **NA**	Rack counts and CWT data
	Stray Rates	Spawning guidelines
	Sex ratios	Hatchery records
	Age structure	
	Timing of adult collection/spawning - **NA**	Spawning guidelines Hatchery records
	Adherence to spawning guidelines - **NA**	
	Total number of wild adults passed upstream - **NA**	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records
	Out-migration timing of listed fish / hatchery fish - **April-May-June /June**	FBD and historic natural outmigration times
	Size and time of release - **15 fpp/June release**	FBD and hatchery records
	Hatchery stray rates	CWT data and hatchery records (marked vs unmarked)
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	

Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy Fish Health Monitoring Records
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	
	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

No broodstock collected at this facility.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Mukilteo, Port Gardner Bay	20,000

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

1.13) Date program started (years in operation), or is expected to start.

2001 (first release of coho in 2003)

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

These fish are intended to contribute to Puget Sound sport and net fisheries.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

NA

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

- Identify the ESA-listed population(s) that will be directly affected by the program.

- Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

Snohomish summer chinook spawning in the upper Snohomish and Skykomish basins. This is a native stock that has been classified as depressed due to chronic low escapements (1992 SASSI)

Other Snohomish Basin Chinook populations:
1) Wallace River summer/fall chinook which spawns in the Wallace River. It is a composite stock that has been classified as healthy (1992 SASSI)
2) Snohomish fall chinook stock which spawns in the Snoqualmie basin as well as the Pilchuck River, Sultan River, Woods Creek and Elwell Creek. It is considered to be a native stock and has been classified as depressed due to low escapement trends (1992 SASSI)
3) Bridal Veil Creek Fall Chinook stock spawns in the south fork Skykomish River, including Bridal Veil Creek, as well as the North Fork Skykomish up to Bear Creek (RM 13.1). It is considered to be native and its stock status is classified as unknown (1992 SASSI).

Skykomish Bull Trout:
1) A single stock that spawns in the south fork Skykomish River including West Cady Creek, Goblin Creek, Troublesome Creek, Salmon Creek and the east fork Foss Creek, tributaries to the south fork Skykomish River. This stock is considered to be a native stock that has been classified as healthy based on increasing escapement trends (1998 SASSI bull trout and Dolly Varden appendix).

2.2.2) <u>Status of ESA-listed salmonid population(s) affected by the program.</u>

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds (*see definitions in "Attachment 1").*

Critical and viable population threshholds under ESA have not yet been determined. SASSI designations are stated in 2.2.1 above.

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

1.358 : 1 for 1990 to 1999 for chinook.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Recent Escapements: (composite of summer and fall run chinook)
1989 3138

1990	4209
1991	2783
1992	2708
1993	3866
1994	3626
1995	3176
1996	4851
1997	4292
1998	6304
1999	4790
2000	6092

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Unknown

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.
- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

The release of fish as described in this HGMP could potentially result in ecological interactions with listed species. These potential ecological interactions are discussed in Section 3.5, and risk control measures are discussed in Section 10.11. Implementation of the program modifications provided in this HGMP, and the actions previously taken by the comanagers, are anticipated to contribute to the continued improvement in the abundance of listed salmonids.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

NA

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

See "take" table

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

NA

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

None

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

This program will be operated in accordance with a Cooperative Fish Production Agreement between Scott Johansen and WDFW. That agreement will be consistent with the Future Brood Document and with this HGMP.

3.3) Relationship to harvest objectives.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Not available

3.4) Relationship to habitat protection and recovery strategies.

The comanagers' resource management plans for artificial production in Puget Sound are expected to be one component of a recovery plan for Puget Sound chinook under development through the Shared Strategy process. Several important analyses have been completed, including the identification of populations of Puget Sound chinook, but further development of the plan may result in an improved understanding of the habitat, harvest, and hatchery actions required for recovery of Puget Sound chinook.

3.5) Ecological interactions.

The program described in this HGMP interacts with the biotic and abiotic components of the freshwater, estuarine, and marine salmonid ecosystem through a complex web of short and longterm processes. The complexity of this web means that secondary or tertiary interactions (both positive and negative) with listed species could occur in

multiple time periods, and that evaluation of the net effect can be difficult. WDFW is not aware of any studies that have directly evaluated the ecological effects of this program. Alternatively, we provide in this section a brief summary of empirical information and theoretical analyses of three types of ecological interactions, nutrient enhancement, predation, and competition, that may be relevant to this program. Recent reviews by Fresh (1997), Flagg et al. (2000), and Stockner (2003) can be consulted for additional information; NMFS (2002) provides an extensive review and application to ESA permitting of artificial production programs.

Nutrient Enhancement

Adults originating from this program that return to natural spawning areas may provide a source of nutrients in oligotrohic coastal river systems and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmon have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003).

Predation – Freshwater Environment

Release of fish from pens directly into marine waters minimizes the likelihood of predation occurring in the freshwater environment.

Predation – Marine Environment

WDFW is unaware of any studies that have empirically estimated the predation risks to listed species posed by the program described in this HGMP. NMFS (2002) reviewed existing information on the risks of predation in the marine environment posed by artificial production programs and concluded:

> "1) Predation by hatchery fish on natural-origin smolts or sub-adults is less likely to occur than predation on fry. Coho and chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish prey that is less than one-fifth of their length (Brodeur 1991). During early marine life, predation on natural origin chinook, coho, and steelhead will likely be highest in situations where large, yearling-sized hatchery fish encounter sub-yearling fish or fry (SIWG 1984)."
>
> "2) However, extensive stomach content analysis of coho salmon smolts collected through several studies in marine waters of Puget Sound, Washington do not substantiate any indication of significant predation upon juvenile salmonids (Simestad and Kinney 1978)."

"3) Likely reasons for apparent low predation rates on salmon juveniles, including chinook, by larger chinook and other marine predators are described by Cardwell and Fresh (1979). These reasons included: 1) due to rapid growth, fry are better able to elude predators and are accessible to a smaller proportion of predators due to size alone; 2) because fry have dispersed, they are present in low densities relative to other fish and invertebrate prey; and 3) there has either been learning or selection for some predator avoidance."

Competition

WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1) As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids."

2) NMFS (2002) noted that "..where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."

3) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource. Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment."

4) Fresh (1997) noted that "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist.

Thus, competition and predation are usually one of several plausible hypotheses explaining observed results."

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

The net pen is located in Puget Sound at Everett.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

NA

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

No broodstock collected at this facility (see Wallace River coho HGMP).

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

NA

5.3) Broodstock holding and spawning facilities.

See section 5.1.

5.4) Incubation facilities.

NA

5.5) Rearing facilities.

The Mulkiteo net pen is 13' 6" X 23' 6" X 10'.

5.6) Acclimation/release facilities.

Fish are acclimated in and released from one net pen.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

NA - new program.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

NA

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Adults returning to the Wallace River Hatchery trap.

6.2) Supporting information.

6.2.1) History.

See section 6.1.

6.2.2) Annual size.

See Wallace River coho HGMP.

6.2.3) Past and proposed level of natural fish in broodstock.

Past levels of natural fish in broodstock for this program is unknown, but all fish used presently for program are of hatchery origin.

6.2.4) Genetic or ecological differences.

None known.

6.2.5) Reasons for choosing.

Most locally adapted stock.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

NA

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

NA (see Wallace River Hatchery coho HGMP)

7.2) Collection or sampling design.

See section 7.1.

7.3) Identity.

See section 7.1.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

No broodstock collected at this facility.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

NA

7.6) Fish transportation and holding methods.

NA

7.7) Describe fish health maintenance and sanitation procedures applied.

NA

7.8) Disposition of carcasses.

NA

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

NA

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

NA (see Wallace River Hatchery coho HGMP).

8.2) Males.

NA

8.3) Fertilization.

NA

8.4) Cryopreserved gametes.

NA

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

NA

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

NA (see Wallace River Hatchery coho HGMP).

9.1.2) Cause for, and disposition of surplus egg takes.

NA

9.1.3) Loading densities applied during incubation.

NA

9.1.4) Incubation conditions.

NA

9.1.5) Ponding.

NA

9.1.6) Fish health maintenance and monitoring.

NA

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

NA

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

NA-new program.

9.2.2) Density and loading criteria (goals and actual levels).

See section 9.2.1.

9.2.3) Fish rearing conditions

See section 9.2.1.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Not available-new program.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not available.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Not available-new program.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

NA

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

NA

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

NA

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

NA

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling	20,000	15	June	Mukilteo

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse:

Release point: Mouth of the Snohomish River (RM 0, Port Gardner Bay)

Major watershed: Snohomish River (RM 0, Port Gardner Bay)

Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								
2001								
Average								

Data source:

10.4) Actual dates of release and description of release protocols.

NA-new program

10.5) Fish transportation procedures, if applicable.

NA

10.6) Acclimation procedures.

Fish will be acclimated in salt water net pen for 4-6 months prior to release.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All coho are 100% identified with an adipose-fin clip (mass marked).

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

NA

10.9) Fish health certification procedures applied pre-release.

NA

10.10) Emergency release procedures in response to flooding or water system failure.

NA

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Yearling coho smolts are released from the net pen in June to minimize the likelihood for interaction with natural chinook salmon juveniles. Release of fish from pens directly into marine waters minimizes the likelihood of predation occurring in the freshwater environment.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

The comanagers conduct numerous ongoing monitor programs, including catch, escapement, marking, tagging, and fish health testing. The focus of enhanced monitoring and evaluation programs will be on the risks posed by ecological interactions with listed species. WDFW is proceeding on four tracks:

1) An ongoing research program conducted by Duffy et al. (2002) is assessing the nearshore distribution, size structure, and trophic interactions of juvenile salmon, and potential predators and competitors, in northern and southern Puget Sound. Funding is provided through the federal Hatchery Scientific Review Group.

2) A three year study of the estuarine and early marine use of Sinclair Inlet by juvenile salmonids is nearing completion. The project has four objectives:

a) Assess the spatial and temporal use of littoral habitats by juvenile chinook throughout the time these fish are available in the inlet;

b) Assess the use of offshore (i.e., non-littoral) habitats by juvenile chinook;

c) Determine how long cohorts of juvenile chinook salmon are present in Sinclair inlet;

d) Examine the trophic ecology of juvenile chinook in Sinclair Inlet. This will consist of evaluating the diets of wild chinook salmon and some of their potential predators and competitors.

Funding is provided by the USDD-Navy.

3) WDFW is developing the design for a research project to assess the risks of predation on listed species by coho salmon and steelhead released from artificial production programs. Questions which this project will address include:

a) How does trucking and the source of fish (within watershed or out of watershed) affect the migration rate of juvenile steelhead?

b) How many juvenile chinook salmon of natural origin do coho salmon and steelhead consume?

c) What is the rate of residualism of steelhead in Puget Sound rivers?

Funding needs have not yet been quanitifed, but would likely be met through a combination of federal and state sources.

4) WDFW is assisting the Hatchery Scientific Review Group in the development of a template for a regional monitoring plan. The template will provide an integrated assessment of hatchery and wild populations.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

See Section 11.1.1.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Risk aversion measures will be developed in conjunction with the monitoring and evaluation plans.

SECTION 12. RESEARCH

12.1) Objective or purpose.

12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

12.6) Dates or time period in which research activity occurs.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8) Expected type and effects of take and potential for injury or mortality.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

12.10) Alternative methods to achieve project objectives.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

SECTION 13. ATTACHMENTS AND CITATIONS

Bilby, R.E., B.R. Fransen, and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: evidence from stable isotopes. Can. J. Fish. Aquat. Scit. 53: 164-173.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity: Net Pen Rearing				
Location of hatchery activity: Port Gardner Bay(Everett) Dates of activity: February-June Hatchery program operator: WDFW (volunteers)				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown		
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.