

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of Program:

Klickitat Coho N program - Klickitat Hatchery.

1.2) Population (or stock) and species:

Coho salmon (*onchorynchus kisutch*)

1.3) Responsible organization and individual:

Name(and title):Washington Department of Fish and Wildlife
Organization

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Other organizations involved, and extent of involvement in the program:

The coho production program is funded through the Mitchell Act via NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The program is authorized under the Columbia River Fisheries Development Program, Columbia River Fish Management Plan and U.S.vs.Oregon and the parties to this program, plan and court case are therefore involved in short and long-term production planning.

1.4) Location(s) of hatchery and associated facilities:

Broodstock Capture: Lewis River Hatchery trap - located at the Lewis River Hatchery (WRIA 27) Rkm135.7, refer to Lewis River HGMP.

Broodstock Holding to Maturity: Lewis River Hatchery - located at the Lewis River Hatchery (WRIA 27) Rkm135.7, refer to Lewis River HGMP

Fish Spawning: Lewis River Hatchery - located at the Lewis River Hatchery (WRIA 27) Rkm135.7, refer to Lewis River HGMP

Incubation and Rearing: Incubation: Lewis River Hatchery and Klickitat Hatchery (eyed egg transfers to Klickitat Hatchery).

Rearing to release: Klickitat Hatchery (WRIA 30) Rkm 351.8

GIS coordinates for Klickitat Hatchery X=121.182, Y=46.041

GIS coordinates for Lewis River Hatchery X=122.618,Y=45.938

1.5) Type of program:

The Klickitat coho program is a mitigation program, the production is to mitigate for activities within the Columbia River Basin that have decreased salmonid populations.

1.6) Purpose (Goal) of program:

The coho program is important as a source of fish for tribal mitigation programs. The goal is to provide production to sustain tribal Zone 6 fisheries, sport and tribal fisheries at the mouth of the Klickitat River, in-river sport fisheries, and mixed stock ocean fisheries. Broodstock maintenance to perpetuate the Klickitat River coho salmon program, is achieved at Lewis River Hatchery.

1.7) Specific performance objective(s) of program

- (1) produce (1,350,000 @ 20fpp) of yearling smolts coho for on-station release as mitigation for the Klickitat Hatchery Project;
- (2) minimize interactions with other fish populations through proper rearing and release strategies;
- (3) maximize survival at all coho life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens;
- (4) conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health;
- (5) communicate effectively with other salmon producers and managers in the Columbia River Basin

1.8) List of Performance Indicators designated by "benefits" and "risks"

(Note: This section and section 10 (monitoring and evaluation) are being rewritten for compatibility with current work on performance indicators in the Columbia River basin, and in the Hood Canal Summer Chum Hatchery Plan.)

Performance indicators determine the degree that program objectives have been achieved, and provide the specific parameters to be monitored and evaluated.

Separate indicators into two categories of "benefits" and "risks" the hatchery program will provide to the listed species. Where possible, use indicator list already compiled in ESU-wide hatchery plan or other strategic plans.

Some indicators examples are (1) adult:adult replacement rates of program fish; (2) trends in spawning abundance in Deer Creek measured by natural return rates and egg-to-smolt survivals; (3) predation on other species by program fish as measured by stomach content analyses; (4) genetic effects on other populations by program fish as measured by stray rates; (5) etc.

1.9) Expected size of program

Expected releases:

The current and future, expected size of the Klickitat Hatchery coho program is to

release 1,350,000 @ 20fpp yearling smolts. Coho releases shown in table 1.

Table 1. Klickitat Hatchery annual releases in to Klickitat River

Brood Year	Annual Releases
1988	1,536,200
1989	1,354,000
1990	1,250,000
1991	1,360,000
1992	1,190,000
1993	1,216,000
1994	1,468,800
1995	1,358,871
1996	1,130,000
1997	1,100,000

Adult fish harvested:

Adult fish harvested not determined at this facility.

Escapement goal; This stock is not managed to provide adequate escapement to the Klickitat Hatchery.

1.10) Date program started or is expected to start:

The program started in the early 1950's.

1.11) Expected duration of program:

The supplementation program will continue with the objective of mitigation for tribal and sport fisheries for coho in the tribal Zone 6 fisheries, tribal and sport fisheries at the mouth of the Klickitat River, in-river tribal terminal fishery, and mixed stock ocean fisheries.

1.12) Watersheds targeted by program:

Klickitat River is the targeted watershed by program, from mouth to hatchery location (WRIA 30) Rkm351.8.

GIS coordinates for Klickitat Hatchery X=121.182, Y=46.041

SECTION 2. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

2.1) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.

The supplementation program, and the HGMP describing it, are consistent with the following:

1. The Columbia River Fish Management Plan
2. The U.S. vs Oregon court decision
3. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries

2.2) Status of natural populations in target area.

For "integrated" programs (i.e., supplementation programs or other programs that involve close integration with a specific natural population), identify the natural population targeted for integration.

Coho do not seem to consistently penetrate the Klickitat River much farther than 3 km prior to laddering Lyle Falls. Therefore, no coho natural escapement goal has been set.

2.2.1) Geographic and temporal spawning distribution.

2.2.2) Annual spawning abundance for as many years as available.

2.2.3) Progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for as many brood years as available.

2.2.4) Annual proportions of hatchery and natural fish on natural spawning grounds for as many years as possible.

2.2.5) Status of natural population relative to critical and viable population thresholds. *See Instruction A.*

No escapement goal has been set.

2.3) Relationship to harvest objectives

Include past harvest rates and expected future harvest rates on fish propagated by the program and on natural populations in the target area. Explain whether artificial production and harvest management have been integrated to provide as

many benefits and as few biological risks as possible to the listed species.

Coho smolts released into the Klickitat are totally for harvest opportunity. Adult coho almost never make it up to the Klickitat Salmon Hatchery (68 km).

2.4) Relationship to habitat protection and recovery strategies.

Describe the major factors inhibiting natural production (if known), such as habitat protection efforts with expected natural production benefits over the short-term and long-term.

2.5) Ecological interactions

Describe salmonid and non-salmonid fishes or other species that could (1) negatively impact program; (2) be negatively impacted by program; (3) positively impact program; and (4) be positively impacted by program. Give careful considerations to the unlisted but listable indigenous species.

Interspecific and intraspecific competition from hatchery coho smolts released may play a significant role in the Klickitat River ecosystem. Significant predation on fall chinook juveniles by hatchery coho smolts has been documented in the Lewis River.

SECTION 3. WATER SOURCE

Incubation and early rearing take place in the hatchery building and raceways at the Klickitat Hatchery, the water source for coho is Indian Ford A spring water originating across the river from the hatchery, they remain on this source until after mass marking is complete late July-early August, then they are transferred across the river to Pond 25. The coho are reared in Pond 25 until yearling smolt age 20 ffp then they are volitionally released. The water source for Pond 25 is approximately 84% Klickitat River water and 16% Indian Ford B spring water which originates across the river from the hatchery. These water sources naturally flow into the Klickitat River and make up a part of its total volume, however they were not historically available as separate spawning/rearing waters.

SECTION 4. FACILITIES

Provide descriptions of the physical plants listed in this section, and three additional sets of information.

The Klickitat Hatchery consists of the following buildings: hatchery, shop, freezer, main water supply, generator, storage and three residences. The rearing facilities are made up of twenty-two raceways and three release ponds with six water intakes. In addition, there are an adult holding pond, fish ladder and trap, and pollution

abatement pond.

One, for programs that directly take listed fish for use as brood stock, provide detailed information on catastrophe management, including safeguards against equipment failure, water loss, flooding, disease transmission, or other events that could lead to a high mortality of listed fish.

This stock is not managed to provide adequate escapement to the Klickitat Hatchery.

For broodstock capture refer to Lewis River Hatchery HGMP.

Two, describe any instance where construction or operation of the physical plant results in destruction or adverse modification of critical habitat designated for the listed species.

There is no instance where construction or operation of the physical plant results in destruction or adverse modification of critical habitat designated for listed species. The program complies with NPDES permit effluent discharge conditions, which act to protect the quality of receiving waters adjacent to Klickitat Hatchery.

Three, describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.

The Coho supplementation program is fully consistent with standards and guidelines set forth in the Columbia River Fish Management Plan and the Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries.

4.1) Brood stock collection

This stock is not managed to provide adequate escapement to the Klickitat Hatchery.

For broodstock collection refer to Lewis River Hatchery HGMP.

4.2) Spawning

This stock is not managed to provide adequate escapement to the Klickitat Hatchery.

For spawning refer to Lewis River Hatchery HGMP.

4.3) Incubation

Klickitat Hatchery has 72 stack of FAL incubators and up to 27 of these are used for coho incubation and hatching.

4.4) Rearing

Coho fry are ponded in up to 10 raceways and reared from April through August. In August the fingerling are transferred to Pond 25 large rearing pond across the river

until release the following spring.

4.5) Acclimation/release

Fingerling are reared to release in Pond 25 a large rearing pond on Klickitat River and Indian Ford B waters for thermal acclimation.

4.6) Other

For other releases into Klickitat River refer to Washougal Hatchery HGMP.

SECTION 5. ORIGIN AND IDENTITY OF BROOD STOCK

5.1) Source

This stock is not managed to provide adequate escapement to the Klickitat Hatchery.

For broodstock collection refer to Lewis River Hatchery HGMP.

5.2) Supporting information

5.2.1) History

This stock is not managed to provide adequate escapement to the hatchery and traditionally no adult coho returns occur. Coho eggs are imported from any Mitchell Act lower river hatchery with a surplus of eggs. Most years this has been Lewis River Hatchery refer to that HGMP for further information.

5.2.2) Annual size

This stock is not managed to provide adequate escapement to the hatchery. Refer to Lewis River Hatchery HGMP.

5.2.3) Past and proposed level of natural fish in brood stock.

This stock is not managed to provide adequate escapement to the hatchery. Refer to Lewis River Hatchery HGMP.

5.2.4) Genetic or ecological differences

Describe any known genotypic, phenotypic, or behavioral differences between proposed hatchery stocks and natural stocks in the target area.

No natural or hatchery supplement coho stock is thought to be producing progeny.

5.2.5) Reasons for choosing

Describe any special traits or characteristics for which brood stock was selected.

To provide harvest opportunity.

5.3) Unknowns

Identify areas where a lack of data leads to uncertainties about the choice of brood stock.

SECTION 6. BROOD STOCK COLLECTION

Describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.

6.1) Prioritized goals

For all broodstock collection information refer to Lewis River Hatchery HGMP. This stock is not managed to provide adequate escapement to the hatchery.

6.2) Supporting information

6.2.1) Proposed number of each sex.

6.2.2) Life-history stage to be collected (e.g., eggs, adults, etc.)

6.2.3) Collection or sampling design

6.2.4) Identity

6.2.5) Holding

6.2.6) Disposition of carcasses

6.3) Unknowns

Identify any data gaps that lead to uncertainties about brood stock collection.

SECTION 7. MATING

Use standards and guidelines provided in any ESU-wide hatchery plan, or other regionally accepted protocols (e.g. IHOT) approved by the co-managers and NMFS. Explain and justify any deviations.

7.1) Selection method

For all broodstock mating information refer to Lewis River Hatchery HGMP.
This stock is not managed to provide adequate escapement to the hatchery.

7.2) Males

7.3) Fertilization

7.4) Cryopreserved gametes

7.5) Unknowns

Identify any data gaps that lead to uncertainty in mating protocols.

SECTION 8. REARING AND INCUBATION

(Note: The information requested in this section is under evaluation to determine if additional standardization is needed to assure relevancy and utility.)

Provide current and previous goals and data. Include historic data for three generations or for years dependable data are available. Use standards and guidelines provided in any ESU-wide hatchery plan, or other regionally accepted protocols (e.g. IHOT) approved by the co-managers and NMFS. Explain and justify any deviations.

INCUBATION:

8.1) Number of eggs taken and survival objective to ponding

8.2) Loading density

Include description of the incubator(refer to Section 4.4). Also, provide measurement of egg size.

8.3) Influent and effluent gas concentration

(Dissolved Oxygen, and any other parameters monitored)

8.4) Ponding

Describe degree of button up, cumulative temperature units, and mean length and weight (and distribution around the mean) at ponding. State dates of ponding, and whether swim up and ponding are volitional or forced.

8.5) Fish Health monitoring

Describe any diseases, yolk-sac malformation, and mortality.

REARING:

8.6) Number of fish ponded and survival objective to release

8.7) Density and loading.

Include a description of the rearing containers, such as start tanks, circulation, circulating ponds, flow through, etc. Refer to section 4.4.

8.8) Influent and effluent gas concentrations

(oxygen, carbon dioxide, total gas pressure).

8.9) Length, weight, and condition factor.

8.10) Growth rate, energy reserves

(hepatosomatic index - liver weight/body weight) and body moisture content as an estimate of body fat concentration.

8.11) Food type and amount fed, and estimates of feed conversion efficiency.

8.12) Health and disease monitoring.

8.13) Smolt development indices, if applicable

(e.g. gill ATPase activity).

8.14) Use of "natural" rearing methods.

8.15) Unknowns

Describe data gaps that lead to uncertainty in the incubation and rearing protocols.

SECTION 9. RELEASE

Provide current and previous goals and data. Include historic data for three generations or for years dependable data are available. Also, describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.

9.1) Life history stage, size, and age at release.

The current production goal for Klickitat Hatchery is the annual release of 1.35 million coho yearling smolts at an average size of 22.7 gms (20fpp). Fish have been reared approximately 16 months prior to April-June release. Table 2 presents Klickitat yearling smolt size at release data for brood years 1988-97.

Table 2. Size at release data for brood year 1989-97 yearling smolt releases from Klickitat Hatchery.

Brood Year	Size at Release Avg. Range (gms) (fpp)
1988	25.2gms 18fpp
1989	29.3gms 15.5fpp
1990	31.3gms 14.5fpp
1991	26.7gms 17fpp
1992	28.3gms 16fpp
1993	30.6gms 14.8fpp
1994	23.9gms 19fpp
1995	30gms 15.1fpp
1996	26.5gms 17.1fpp
1997	27.8gms 16.3fpp

9.2) Life history stage, size and age of natural fish of same species in release area at time of release.

9.3) Dates of release and release protocols.

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size such that smoltification occurs within nearly the entire population, which will reduce retention in the streams after release. Rearing on parent river water done to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations.

Various release strategies are used to ensure that fish migrate from the hatchery with the least amount of interaction with native populations. Coho yearling smolts

are volitionally released into the Klickitat River adjacent to the hatchery and the Champion Mill acclimation pond. Table 3 presents release date ranges for 1988-97 brood year yearling coho smolts produced at Klickitat Hatchery. Yearlings smolts are presently allowed to volitionally migrate from the hatchery rearing pond and Champion Mill acclimation pond in mid April to early June. The Champion Mill pond is no longer in use, brood year 1993 was last release.

Table 3. Release date ranges for brood year 1988-97 coho yearling smolts volitional releases from Klickitat Hatchery.

Brood Year	Release Date Range
1988	April 21 - June 15
1989	April 30 - June 14
1990	April 30 - June 15
1991	May 31
1992	April 26 - June 7
1993	May 1 - June 1
1994	April 1 - May 31
1995	April 15 - June 31
1996	April 17 - June 6
1997	May 3 -May 5

9.4) Location(s) or release.

Coho produced through the program are released into the Klickitat River (WRIA 30) at Rkm 351.8 and, prior to its closure, Klickitat River Champion Mill acclimation pond (WRIA) Rkm 314.1.

GIS coordinates for Klickitat Hatchery X=121.182, Y=46.041

9.5) Acclimation procedures.

Coho are reared on Klickitat River water 86%, and on Indian Ford B spring water 14%, 9 - 12 months prior to release to ensure strong homing to the Klickitat River Basin.

9.6) Number of fish released

Table 4 presents annual release numbers for the Klickitat Hatchery yearling smolt

coho program brood years 1988-97. Program goal release of 1.35 million smolts, years not met are due to on-going disease problems.

Table 4. Klickitat Hatchery annual releases in to Klickitat River

Brood Year	Annual Releases
1988	1,536,200
1989	1,354,000
1990	1,250,000
1991	1,360,000
1992	1,190,000
1993	1,216,000
1994	1,468,800
1995	1,358,871
1996	1,130,000
1997	1,100,000

9.7) Marks used to identify hatchery adults.

A proportion of each years release of coho from Klickitat Hatchery receives an adipose clip-coded wire tag marking combination. Brood years 1988-94 approximately 3% of the total release of 1.35 million fish received this marking combination, brood years 1995-97 received 100% marking with adipose clip only including Double Index groups of adipose clip & coded wire tag and coded wire tag only. For differentiation of hatchery from natural origin coho adults upon return in lower rivers and assessment of brood year fishery contribution and survival rates for fish released from Klickitat Hatchery

9.8) Unknowns

Describe data gaps that lead to uncertainty in the release protocols.

SECTION 10. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

(Note: This section and Section 1.8 are being rewritten for compatibility with current work on performance indicators in the Columbia River basin, and in the Hood Canal Summer Chum Hatchery Plan.)

This section describes how the benefit or risk performance indicators listed in Section 1.8 will be monitored and evaluated, including whether funding, staffing, and other support logistics are available or committed to allow full implementation.

The items below should be incorporated into the performance indicator list and the attendant monitoring and evaluation program.

10.1) Marking

Coho released from Klickitat Hatchery are 100% marked or tagged, 94% adipose clip only, 3% adipose clip & coded wire tagged and 3% coded wire tagged only.

10.2) Genetic data

Provide available and relevant genetic baseline information.

No baseline data for Washougal Type N coho. Weitkamp et. al (1995) reported results of baseline data for Cowlitz and Lewis River Type N coho and Grays and Lewis River Type S coho.

10.3) Survival and fecundity

Provide data on goals and past performances.

10.3.1) Average fecundity

3,346 (range: 2818-3820)

10.3.2) Survival

- a) Collection to spawning**
- b) Green eggs to eyed eggs**
- c) Eyed eggs to release**
- d) Release to adult, to include contribution to**
 - (I) harvest**
 - (ii) hatchery brood stock**
 - (iii) natural spawning**

10.4) Monitoring of performance indicators in Section 1.8

The following are examples.

10.4.1) Proportions of hatchery spawners in natural populations in target area (list all populations or spawning areas that are monitored).

10.4.2) Ecological interactions between program fish and natural fish (same and other species) in target area.

10.4.3) Disease control in the hatchery, and potential effects on natural

populations.

10.4.4) Behavior (migration, spawning, etc.) of program fish.

10.4.5) Homing or straying rates for program fish.

10.4.6) Gene flow from program fish into natural populations.

10.5) Unknowns or uncertainties identified in Sections 5 through 9

10.6) Other relevant monitoring projects

SECTION 11. RESEARCH

(Note: This section is being reviewed against Section 10 requirements and will be edited as needed.)

Provide the following information for any research programs conducted in association with the HGMP. Correlate with research described in any ESU hatchery plan approved by the co-managers and NMFS.

11.1) Objective or purpose

Need for data; benefit or effect on wild population; broad significance of project.
No research is conducted on this stock. Coded wire tag releases are used for monitoring and evaluation of hatchery fish performance.

11.2) Cooperating and funding agencies

Bonneville Power Administration, National Marine Fisheries Service and WDFW

11.3) Principle investigator or project supervisor and staff

Howard J. Fuss
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Fish and Wildlife Biologist
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- 11.4) Status of stock, particularly the group affected by project
- 11.5) Techniques: include capture methods, drugs, samples collected, tags applied
- 11.6) Dates or time period in which research activity occurs
- 11.7) Care and maintenance of live fish or eggs, holding duration, transport methods
- 11.8) Level of take: number or range of fish handled, injured, or killed by sex, age, or size
- 11.9) Potential for / estimates of injury or mortality, and methods to reduce either
- 11.10) Alternative methods to achieve project objectives
- 11.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project

SECTION 12. ATTACHMENTS AND CITATIONS

Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP.

Byrne, J. and H.J. Fuss. 1998. Annual coded-wire tag program Washington: Missing Production Groups. Annual Report 1998. Bonneville Power Administration, Portland, Or. Project Number 89-066. 107 pp.

Fuss, H.J., J. Byrne, and C. Ashbrook. 1999a. Migratory behavior and incidence of post-release residualism of hatchery-reared coho and chinook salmon released into the Elochoman River. Washington Department of Fish and Wildlife, Report No. FPT 99-08.

Fuss, H.J., J. Byrne, and C. Ashbrook. 1999b. Migratory behavior and incidence of post-release residualism of hatchery-reared steelhead and cutthroat trout released into the Elochoman River. Washington Department of Fish and Wildlife, Report No. FPT 99-09.

Fuss, H.J., J. Byrne, and C. Ashbrook. 1998. Stock characteristics of hatchery-reared salmonids and Washington Department of Fish and Wildlife Columbia River Hatcheries. Washington Department of Fish and Wildlife, Annual Report H98-03. 65 pp.

Fuss, H.J. and P. Seidel. 1987. Hatchery incubation techniques at WDF hatcheries. Washington Department of Fisheries, Technical Report 100. 86 p.

IHOT (Integrated Hatchery Operations Team). 1995. Operation plans for anadromous fish production facilities in the Columbia River basin. Volume III-Washington. Annual Report 1995. Bonneville Power Administration, Portland Or. Project Number 92-043. 536 pp.

Weitkamp, L. A., T.G. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status Review of coho salmon from Washington, Oregon and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NOAA Technical Bulletin NMFS-NWFSC-24. 258 pp.

Washington Department of Fish and Wildlife. 1998. Water resource inventory area river mile indices for the Columbia and Snake river basins. Unpublished document. Habitat Management Division, Washington Department of Fish and Wildlife, Olympia, WA.

Washington Department of Fisheries (WDF) and Washington Department of Wildlife (WDW). 1993. 1992 Washington State salmon and steelhead stock inventory - Appendix three Columbia River stocks. Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091. 580 pp.

Washington Department of Fisheries (WDF), Washington Department of Wildlife (WDW), and Western Washington Treaty Indian Tribes (WWTIT). 1992. 1992 Washington State salmon and steelhead stock inventory (SASSI). Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091 . 212 pp.

Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 1998. Co-managers of Washington fish health policy. Fish Health Division, Hatcheries Program. Washington Dept. Fish and Wildlife, Olympia.

Wood, J.W. 1979. Diseases of Pacific Salmon, their prevention and treatment, 3rd edition. Washington Department of Fisheries, Hatchery Division, Olympia, Washington. 82 p.