

**Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal**

Section 1. General administrative information

**Idaho Natural Production Monitoring And
Evaluation Program (INPMEP)**

Bonneville project number, if an ongoing project 9107300

Business name of agency, institution or organization requesting funding
Idaho Department of Fish and Game

Business acronym (if appropriate) IDFG

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Subcontractors.

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USFWS	P.O. Box 18	Ahsahka, ID 83520	Ralph Roseburg

NPPC Program Measure Number(s) which this project addresses.

3.2, 3.2C, 4.1A, 4.2A, 4.3C.1, 5.0A, 5.0B, 5.0E, 5.0F.7, 7.1C, 7.1C.3, 8.4A, 8.4B

NMFS Biological Opinion Number(s) which this project addresses.

VIII, Reasonable and Prudent Alternative to the Proposed Action, IN: Reinitiation of consultation on 1994-1998 operation of the federal Columbia River power system and juvenile transportation program in 1995 and future years. signed: 2 March 1995

Other planning document references.

Subbasin.

Salmon River subbasin, Clearwater River subbasin,

Short description.

The INPMEP collects, manages, and analyzes data describing the status and survival of spring/summer chinook salmon and steelhead populations in Idaho. The INPMEP provides long-term monitoring information necessary to evaluate recovery efforts.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish		Construction		Watershed
	Resident fish		O & M	+	Biodiversity/genetics
	Wildlife		Production	X	Population dynamics
	Oceans/estuaries		Research	+	Ecosystems
	Climate	X	Monitoring/eval.	+	Flow/survival
	Other		Resource mgmt		Fish disease
			Planning/admin.		Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
8909800	Idaho Supplementation Studies (IDFG)	8909800 supplies to the INPMEP samples for age analysis and genetic analysis, production and productivity data, and PIT tags fish used in mainstem survival analysis. Objective 2, of INPMEP is a component of 8909800.
8909802	Salmon Supplementation Studies in ID Rivers (NPT)	8909800 supplies to the INPMEP samples for age analysis and genetic analysis, production and productivity data, and PIT tags fish used in mainstem survival analysis.
8909803	Salmon Supplementation Studies in	Same as above

	ID Rivers (SBT)	
8909801	Salmon Supplementation Studies in ID Rivers (USFWS)	Same as above
9005500	Steelhead Supp.Studies in ID Rivers, (IDFG)	Same as above

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Monitor adult and juvenile spring and summer (sp/su) chinook salmon and steelhead populations in Idaho.	a	Continue coordinating the snorkeling of general parr monitoring (GPM) and other sites throughout the Salmon River and Clearwater River basins.
		b	Maintain centralized database of information collected through GPM and other sites.
		c	Continue to provide data from snorkel sites to Streamnet and Plan for Analyzing and Testing Hypotheses (PATH).
		d	Coordinate with USFS to improve compatibility between the GPM database and the USFS's Upper Columbia Basin database.
		e	Evaluate biases of snorkeling in Idaho streams.
		f	Coordinate with NMFS to determine the need to expand sp/su chinook salmon redd counts to ensure all identified metapopulations are adequately indexed.
		g	Define the relationship between sp/su chinook index areas and total escapement for the basin indexed.
		h	Use adult escapement estimates at Lower Granite Dam, hatchery records, and harvest records to

			estimate sp/su chinook salmon adults available for natural production in the Snake R. basin.
		i	Continue monitoring steelhead escapement in Idaho through aerial redd counts.
2	Estimate productivity and lifestage survival rates of sp/su chinook salmon and steelhead stocks in study streams.	a	Continue quantifying adult chinook salmon and steelhead escapement and resultant juvenile production in study streams.
		b	Continue to estimate lifestage survival and survival to Lower Granite dam of chinook salmon from study streams.
3	Identify wild/natural (w/n) salmon and steelhead smolt-to-adult survival rates (SARs) associated with mainstem smolt passage routes within specific strategies.	a	Estimate the proportion of PIT-tagged smolts that were collected and transported, collected and bypassed, and unhandled for w/n and hatchery, sp/su chinook salmon, sockeye salmon, and steelhead, for past and future years.
		b	Determine SAR for each of the groups identified in Objective 3, "a".
		c	Check the accuracy of SAR information generated by PIT-tag detections using age-at-length information from sp/su chinook salmon escapement into Idaho and length-frequency of sp/su chinook salmon passing the viewing window at Lower Granite dam.
		d	Improve steelhead SAR data by PIT-tagging additional w/n steelhead juveniles.

4	Monitor age composition of adult spring and summer chinook salmon returning to the Salmon River and Clearwater River basins.	a	Determine and implement the most accurate method of aging chinook salmon returning to Idaho.
		b	Build an archive of scales and/or otoliths of known-age chinook salmon returning to Idaho by drainage.
		c	Develop and maintain a centralized database containing freshwater age and ocean age of chinook salmon adults by drainage, rearing type, and year.
5	Monitor genetic diversity in Idaho's sp/su chinook salmon and steelhead populations.	a	Establish and maintain an archive of fin samples suitable for genetic analysis that represents major and important populations and groups of sp/su chinook salmon in Idaho.
		b	Coordinate collection of fin samples among IDFG personnel and tribal personnel from sp/su chinook salmon carcasses on spawning grounds and at hatcheries.
		c	Through coordination with NMFS, to ensure IDFG and NMFS efforts are complimentary, contract genetic assays as necessary to aid in management and recovery of Idaho's sp/su chinook salmon and steelhead.
		d	Develop and maintain a centralized database containing pertinent carcass information for fish sampled.
6	Effectively communicate	a	Consolidate, analyze, report, and

	information describing Idaho's sp/su chinook salmon and steelhead populations.		present information describing productivity, structure, status, and survival of w/n metapopulations of sp/su chinook salmon and steelhead in the Salmon River and Clearwater River basins.
		b	Continue predicting the annual wild/natural smolt emigration of sp/su chinook salmon and steelhead from Idaho.
		c	Continue providing in-season PIT-tag detection information to aid in water management and begin producing an annual PIT-tag detection report.
		d	Continue using information generated by the INPMEP for management-related activities (e.g. recommending fisheries, hatchery outplant levels, mainstem passage strategies, etc.)
		e	Predict adult returns of sp/su chinook salmon to indicator streams and hatcheries using appropriate smolt emigration and SAR estimates.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	7/1984	7/2023	10.5
2	7/1987	7/2023	28.6
3	7/1996	7/2023	32.6
4	7/1987	7/2023	7.4
5	7/1996	7/2023	4.8
6	7/1996	7/2024	16.1
			TOTAL 10000.00%

Schedule constraints.

Because the objectives and tasks of this program are monitoring and analysis, there are no constraints other than funding availability. .

Completion date.

2024. As a project designed to monitor recovery efforts, the project is expected to continue until recovery is achieved. This has been estimated to be no earlier than 2024 (U.S. Dept. of Commerce, NOAA, NMFS, 8/97, Draft, Snake R. Salmon Recov. Plan).

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel		286,278
Fringe benefits		92,949
Supplies, materials, non-expendable property		12,500
Operations & maintenance		95,050
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		13,000
PIT tags	# of tags: 25,000	\$72,500
Travel	Includes field groceries, (\$19,950)	30,150
Indirect costs		129,232
Subcontracts		
Other		
TOTAL		\$731,659

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$759,159	\$797,117	\$836,973	\$878,821
O&M as % of total	14.00%	14.00%	14.00%	14.00%

Section 6. Abstract

The Idaho Natural Production Monitoring and Evaluation Program (INPMEP) conducts monitoring, evaluation, and analysis reflecting near-term and long-term informational needs of the region and state. The goal of the project is to effect recovery of threatened spring and summer chinook salmon and steelhead. The INPMEP contributes toward this goal by collecting, managing, analyzing and communicating data and information directly related to sp/su chinook salmon and steelhead production, productivity, structure, survival, and stock identification.

The program supplies necessary information in an adaptive management framework (FWP 3.2), addresses critical uncertainties (FWP 4.1A, 4.2A), monitors indicator populations (FWP 4.3C, 7.1C.3), supplies information to Streamnet (formerly the Coordinated Information System (CIS)) (FWP 4.3C.1), addresses mainstem survival questions (FWP 5.0A, 5.0B, 5.0E, 5.0F.7), collects life history and population status information (FWP 7.1C), and collects information for stock identification (FWP 8.4, 8.4A).

Monitoring methods are based on widely accepted techniques including redd counts and carcass recovery (Hassemer 1991), emigrant trapping (Thedinga et al. 1994), and mask and snorkel counts (Petrosky and Holubetz 1986). Analysis is conducted using accepted methodologies although some methodologies are being developed by this program (e.g. estimating the proportion of undetected smolts).

The expected outcome is to develop and maintain long-term databases needed by the Region (e.g. PATH) and to provide feedback on recovery measures. The INPMEP is intended to be in place until management feedback in an adaptive framework is no longer needed (recovery).

Section 7. Project description

a. Technical and/or scientific background.

Snake River sp/su chinook salmon and steelhead are nearing extinction. Monitoring, evaluation, and analysis are required to determine the benefits gained from the funds spent to recover these fish populations. Long-term monitoring is also required to detect changes in status (e.g., escapement, production, productivity) and structure (e.g. age, genetic) of these populations, their survival in spawning and rearing areas, and survival through mainstem migration routes. Some or all of these activities are consistent with the FWP, IDFG Anadromous Plan, IDFG Salmon River subbasin plan, and the NMFS Biological Opinion, signed: 2 March 1995. The INPMEP also provides monitoring of populations identified in the draft, Snake River Salmon Recovery plan, August 1997.

From 1984-1989 this program evaluated habitat, conducted different types of habitat rehabilitation work, and measured changes in numbers of rearing chinook salmon and steelhead parr as a result of this enhancement activity. During this time period the general parr monitoring (GPM) program was started and continues today. Additionally, carrying capacity for chinook salmon and steelhead was determined for study streams, fish density relative to habitat parameters was examined, and factors affecting survival in spawning and rearing areas were determined (Petrosky and Holubetz 1985, 1986, 1987; Petrosky, Holubetz, and Everson, 1988; IDFG 1990, 1991; Rich, Scully, and Petrosky 1992; Rich, Schrader, and Petrosky 1993; Rich and Petrosky 1994; Leitzinger and Petrosky 1995; Hall-Griswold, Leitzinger, and Petrosky in press; Hall-Griswold and Petrosky 1996).

In 1987, a subproject was begun under this contract to intensively study two streams to: 1) determine smolt production, 2) develop parr-to-smolt survival rates for chinook salmon and steelhead, 3) to determine the mathematical relationship between spawning escapement, parr production, and smolt production; 4) determine migration characteristics; 5) to determine the most effective supplementation strategies; and 6) determine carry capacity. Most of these objectives were achieved to the extent possible under the escapement levels that occurred. Because of low escapement, activities in these study streams were reduced in 1996 to measuring escapement, production, productivity, and survival rates when possible (Kiefer and Forster 1991; Kiefer and Forster 1992; Kiefer and Lockhart 1993; Kiefer and Lockhart 1994; Kiefer and Lockhart 1996; Kiefer and Lockhart 1997; Kiefer and Lockhart, in progress). Between 1993 and 1996 two additional streams were added to this effort (Leitzinger, E., et al. 1996; Nemeth et al. 1996).

In 1993, an initiative was undertaken to accurately measure chinook salmon and steelhead escapement in 3 streams located in Idaho's pristine wilderness areas to determine adult-to-adult escapement under excellent spawning and rearing habitat conditions. Productivity measurements were also attempted in one of those streams (Holubetz in press FY 1993; Holubetz in press FY 1994; Holubetz in press FY 1995; Holubetz in

progress FY 1996). High stream flows in 1997 destroyed the adult weirs used in two of the three streams and damaged the other weirs. Effort will be discontinued in the streams where the weirs were destroyed. It has not been determined whether effort will be reinitiated in the third stream.

Beginning in 1996, the INPMEP began and continues to place an emphasis on managing and analyzing data collected throughout the Salmon R. basin, Clearwater R. basin, and Snake R. basin overall. The most significant piece of information as a result of this effort has been the evaluation of SARs for chinook salmon using different mainstem migration routes (Kiefer et al. in progress).

All annual reports from this work are listed in section “d”, space limitation preclude them from being listed here also.

b. Proposal objectives.

Objective 1. Monitor adult and juvenile spring and summer (sp/su) chinook salmon and steelhead populations in Idaho.

Product: The GPM database for 1992-1997, contains data on 867 sites for 143 streams and estimates percent carrying capacity (more sites and streams were sampled in earlier years). This information is incorporated into Streamnet and used in the PATH process. This information is also utilized in management activities such as determining stocking levels and habitat protection activities. A long-term database also exists for adult chinook salmon and steelhead escapement which is utilized by PATH and important for metapopulation determination and monitoring.

Objective 2. Estimate productivity and lifestage survival rates of sp/su chinook salmon and steelhead stocks in study streams.

Product: This objective produces estimates of smolts per female (or smolts per redd), smolts to Lower Granite dam, egg-to-parr and parr-to-smolt survival rates, and contributes to Snake River basin-wide smolt-to-adult survival rate estimates. Life history information is also collected.

Objective 3. Identify wild/natural (w/n) salmon and steelhead smolt-to-adult survival rates (SARs) associated with current and past mainstem smolt passage routes within specific strategies.

Product: This information should speed recovery of listed Snake R. basin anadromous species by identifying passage strategies that are not providing sufficient survival to reach recovery goals.

Objective 4. Monitor age composition of adult spring and summer chinook salmon returning to the Salmon River and Clearwater River basins.

Product: An improved understanding of chinook productivity and a means of monitoring changes in population structure. Required for metapopulation monitoring, PATH analysis, and determining brood year production and productivity for project 8909800.

Objective 5. Monitor genetic diversity in Idaho's sp/su chinook salmon and steelhead populations.

Product: This information assists hatchery broodstock and harvest management and is needed for identification of metapopulations.

Objective 6. Effectively communicate information describing Idaho's spring and summer chinook salmon and steelhead populations.

Product: More informed decision making resulting in quicker species recovery.

c. Rationale and significance to Regional Programs.

The INPMEP conducts monitoring and evaluation necessary to a fuller understanding of the status of Idaho's threatened sp/su chinook salmon and steelhead as well as the reasons causing their decline. The FWP, IDFG Anadromous Plan, and Salmon River Subbasin Plan call for long-term monitoring, indexing, life history information, and answers to mainstem survival questions; the INPMEP addresses all of those needs. This program shares and relies on information collected by projects of the Nez Perce tribe, Shoshone-Bannock tribes, U.S. Fish and Wildlife Service, and IDFG (see section 3), Lower Snake River Compensation Plan, Streamnet.

Objective 1 provides a long-term database (FWP 7.1C.3) of indicator population status (FWP 4.3C.1; 7.1C) sensitive enough to detect changes in an adaptive management framework (FWP 3.2).

Objective 2 provides information on chinook salmon and steelhead productivity and survival (FWP 4.1A; 4.2A) while at the same time providing life history and population status information (FWP 7.1C; 7.1C.3).

Objective 3 analyzes w/n salmon and steelhead survival rates associated with mainstem passage routes and is consistent with adaptive management and key uncertainties (FWP 3.2; 3.2C; 4.1A; 4.2A) and mainstem passage adaptive management (FWP 5.0A; 5.0B; 5.0E; 5.0F.7).

Objective 4 monitors age composition of chinook salmon returning to Idaho necessary for determining brood year production and monitoring changes in population structure (7.1C; 7.1C.3). This objective is consistent with adaptive management (FWP 3.2) determining

the success of management activities and associated critical uncertainties (FWP 4.2a) on population structure.

Objective 5 is to determine the genetic identity of Idaho's chinook salmon populations (FWP 4.1A; 4.2A; 7.1C; 7.1C.3; 8.4A; 8.4B) and monitor through time (FWP 3.2; 4.2A; 7.1C.3).

Objective 6 is to effectively communicate information describing Idaho's sp/su chinook salmon and steelhead populations (FWP 3.2; 3.2C; 4.2A; 7.1C).

d. Project history

- 83-7 Petrosky, C.E. and T.B. Holubetz. 1985. Idaho Habitat Evaluation for Offsite Mitigation Record. Ann. Rept. FY 1984.
- 83-7 Petrosky, C.E. and T.B. Holubetz. 1986. Idaho Habitat Evaluation for Offsite Mitigation Record. Ann. Rept. FY 1985.
- 83-7 Petrosky, C.E. and T.B. Holubetz. 1987. Evaluation and Monitoring of Idaho Habitat Enhancement and Anadromous Fish Natural Production. Ann. Rept. FY 1986.
- 83-7 Petrosky, C.E., T.B. Holubetz, and L.B. Everson. 1988. Idaho Habitat Evaluation for Offsite Mitigation Record. Ann. Rept. FY 1987.
- 83-7 Idaho Department of Fish and Game. 1990. Idaho Habitat Evaluation for Offsite Mitigation Record. Ann. Rept. FY 1988.
- 83-7 Idaho Department of Fish and Game. 1991. Idaho Habitat Evaluation for Offsite Mitigation Record. Ann. Rept. FY 1989.
- 83-7 Kiefer, R. and K. Forster. 1991. Idaho Habitat and Natural Production Monitoring. Ann. Rept. FY 1989.
- 83-7 Rich, B.A., R. Scully, and C. Petrosky. 1992. Idaho Habitat/Natural Production Monitoring, Part I, General Monitoring Subproject. Ann. Rept. FY 1990.
- 83-7 Kiefer, R. and K. Forster. 1992. Idaho Habitat and Natural Production Monitoring, Part II. Ann. Rept. FY 1990.
- 91-73 Rich, B.A., W. Schrader, and C. Petrosky. 1993. Idaho Habitat/Natural Production Monitoring, Part I, General Monitoring Subproject. Ann. Rept. FY 1991.
- 91-73 Kiefer, R. and J. Lockhart. 1993. Idaho Habitat and Natural Production Monitoring, Part II. Ann. Rept. FY 1991.
- 91-73 Rich, B.A. and C. Petrosky. 1994. Idaho Habitat/Natural Production Monitoring, Part I, General Monitoring Subproject. Ann. Rept. FY 1992.
- 91-73 Kiefer, R. and J. Lockhart. 1994. Intensive Evaluation and Monitoring of Chinook Salmon and Steelhead Trout Production, Crooked River and Upper Salmon River Sites. Ann. Rept. FY 1992.
- 91-73 Leitzinger, E.J. and C. Petrosky. 1995. Idaho Habitat/Natural Production Monitoring, Part I. Ann. Rept. FY 1993.

- 91-73 Kiefer, R. and J. Lockhart. 199. Intensive Evaluation and Monitoring of Chinook Salmon and Steelhead Trout Production, Crooked River and Upper Salmon River Sites. Ann. Rept. FY 1993.
- 91-73 Holubetz, T.B., 1995. Wild Steelhead Studies. FY 1993.
- 89-098 Leitzinger, E., K.Plaster, P. Hassemer, P. Sankovich. 1996. Idaho Supplementation Studies. Annual Report 1993. Project number 89-098, DE-BI79-89BP01466, Bonneville Power Administration, Portland, Oregon.
- 91-73 Hall-Griswold, J.A., E.J. Leitzinger, and C. Petrosky. 1995. Idaho Habitat/Natural Production Monitoring, Part I, General Monitoring Subproject. Ann. Rept. FY 1994.
- 91-73 Kiefer, R. and J. Lockhart. 1997. Intensive Evaluation and Monitoring of Chinook Salmon and Steelhead Trout Production, Crooked River and Upper Salmon River Sites. Ann. Rept. FY 1994.
- 91-73 Holubetz, T.B. and B. Leth. in press. Wild Steelhead Studies, Salmon and Clearwater River. Ann. Rept. 1994.
- 89-098 Nemeth, D., K. Plaster, K. Apperson, J. Brostrum, T. Curet, E. Brown. 1996. Idaho Supplementation Studies. Annual Report 1994. Project number 89-098, DE-BI79-89BP01466, Bonneville Power Administration, Portland, Oregon.
- 91-73 Hall-Griswold, J.A. and C. Petrosky. 1996. Idaho Habitat/Natural Production Monitoring, Part I. Ann. Rept. FY 1995.
- 91-73 Kiefer, R. and J. Lockhart. in press. Intensive Evaluation and Monitoring of Chinook Salmon and Steelhead Trout Production, Crooked River and Upper Salmon River Sites. Ann. Rept. FY 1995.
- 91-73 Leth, B.D. and T. Holubetz. in press. Evaluation and Monitoring of Wild/Natural Steelhead Trout Production. FY 1995.
- 91-73 Kiefer, R. et al. in progress. Ann. Rept. FY 1996.
- 91-73 Leth, B.D. and T. Holubetz. in progress. Evaluation and Monitoring of Wild/Natural Steelhead Trout Production. FY 1996.
- 89-098 Walters et al., in progress, The Idaho supplementation studies, cumulative report, 1991-1995.
- 91-73 Hall-Griswold, J.A. and C. Petrosky. 1998. Idaho Habitat/Natural Production Monitoring, Part I. Ann. Rept. FY 1995.

Summary of Major Results Achieved:

- Established long-term GPM database (1984 – current). Adaptive Management Implication (AMI): *Monitors success of management activities to achieve species recovery.*
- Determined the relative benefit of in-channel habitat rehabilitation work vs. out-of-channel rehabilitation measures. AMI: *Determined the rehabilitation work with the best cost:benefit ratio.*
- Increased carrying capacity in study streams for rearing chinook salmon and steelhead.
- Identified factors in the spawning and rearing environment affecting chinook salmon survival. AMI: *Identified habitat parameters affecting population rehabilitation. An*

important factor when considering funding for habitat and hatchery rehabilitation programs.

- Documented differences in chinook salmon and steelhead parr densities in grazed vs. ungrazed streams. *AMI: Identified rehabilitation work with the potential to increase natural production.*
- Estimated egg:parr survival for naturally-produced chinook salmon in study streams and in relation to sedimentation level. *AMI: Identified habitat parameters affecting population rehabilitation. An important factor when considering funding for habitat and hatchery rehabilitation programs.*
- Estimated egg (or fry):parr survival for adult outplants vs. egg outplants vs. fry releases. *AMI: Implicated a potentially more suitable strategy to increase juvenile survival relative to other strategies.*
- Estimated diversion impacts to chinook salmon survival. *AMI: Quantified a factor limiting population rehabilitation.*
- Documented differences in peak arrival time at Lower Granite Dam for hatchery-produced chinook salmon and Idaho's w/n sp/su chinook salmon. *AMI: Identified the need to manage mainstem operations taking into consideration different life history characteristics.*
- Documented lack of significantly different mortality in PIT-tagged chinook salmon juveniles vs. untagged juveniles over an extended period under natural rearing conditions.
- Established steelhead trend redd counts (1990 – current). *(AMI): Monitors success of management activities to achieve species recovery.*
- Determined smolts per female (or redds) for study streams.
- Developed a model predicting the number of sp/su chinook salmon smolts emigrating from Idaho annually.
- Determined smolt-to-adult survival rates for chinook salmon which were transported, unhandled, and collected and bypassed. *AMI: Implications for mainstem passage strategies to aid recovery.*

e. Methods.

Objective 1. Monitor adult and juvenile spring and summer (sp/su) chinook salmon and steelhead populations in Idaho.

Tasks:

1. Continue coordinating the snorkeling of general parr monitoring (GPM) and other sites throughout the Salmon River and Clearwater River basins.
2. Maintain centralized database of information collected through GPM and other sites.
3. Continue to provide data from snorkel sites to Streamnet and Plan for Analyzing and Testing Hypotheses (PATH)
4. Coordinate with USFS to improve compatibility between the GPM database and the USFS's Upper Columbia Basin database.
5. Evaluate biases of snorkeling in Idaho streams.

6. Coordinate with NMFS to determine the need to expand sp/su chinook salmon redd counts to ensure all identified metapopulations are adequately indexed.
7. Define the relationship between sp/su chinook index areas and total escapement for the basin indexed.
8. Use adult escapement estimates at Lower Granite Dam, hatchery records, and harvest records to estimate sp/su chinook salmon adults available for natural production in the Snake R. basin.
9. Continue monitoring steelhead escapement through aerial redd counts.

Methods: Snorkeling effort and data to be collected is coordinated among IDFG regions, IDFG BPA-funded projects (Idaho Supplementation Studies, Steelhead Supplementation Studies in ID rivers), the Nez Perce, Shoshone-Bannock, and U.S. Fish and Wildlife Service's Salmon Supp. Studies in Id Rivers. Information is forwarded to the IDFG GPM database manager. Once entered and error-checked data is made available to Streamnet.

Significant populations of sp/su chinook salmon have been identified in the draft, Snake River Salmon Recovery Plan (August, 1997). Through coordination with NMFS the need for additional index areas will be determined. To better understand the relationship between index counts and total escapement to a drainage, previously collected data will be used to compare know escapement to index counts, drainage-wide redd counts to index counts, and one-time counts to multiple counts.

Objective 2. Estimate productivity and lifestage survival rates of sp/su chinook salmon and steelhead stocks in study streams.

Tasks:

1. Continue quantifying adult chinook salmon and steelhead escapement and resultant juvenile production in study streams.
2. Continue to estimate lifestage survival and survival to Lower Granite dam of chinook salmon from study streams.

Methods: Adult chinook and steelhead are trapped in adult weirs with a known number by sex released above. Emigrating juveniles are estimated by mark-recapture with an emigrant trap located below the spawning area. Rearing parr are estimated by expanding mask and snorkel counts over the total available rearing area. Egg-to-parr survival is estimated by estimating the number of eggs deposited based on an average fecundity and using the parr population estimate. Parr-to-smolt survival is estimated based on the parr population estimate, parr emigration estimate, and smolt emigration estimate. Smolts to Lower Granite dam are estimated based on PIT-tag detection rates for fish tagged as parr, presmolts, and smolts and emigration estimates.

(RBK reports, ISS reports, ISS design)

Objective 3. Identify wild/natural (w/n) salmon and steelhead smolt-to- adult survival rates (SARs) associated with mainstem smolt passage routes within specific strategies.

Tasks:

1. Estimate the proportion of PIT-tagged smolts that were collected and transported, collected and bypassed, and unhandled for w/n and hatchery, sp/su chinook salmon, sockeye salmon, and steelhead, for past and future years.
2. Determine smolt-to-adult survival rate for each of the groups identified in Objective 3, "1".
3. Check the accuracy of SAR information generated by PIT-tag detections using age-at-length information from sp/su chinook salmon escapement into Idaho and length-frequency of sp/su chinook salmon passing the viewing window at Lower Granite dam.
4. Improve steelhead smolt-to-adult survival rate information by PIT-tagging additional w/n steelhead juveniles.

Methods: Utilize the PTAGIS database to compare smolt-to-adult survival rates for salmon and steelhead utilizing different mainstem passage routes. This project is pioneering this methodology. Capture and PIT-tag additional steelhead juveniles throughout the Salmon River and Clearwater River basin.

Objective 4. Monitor age composition of adult spring and summer chinook salmon returning to the Salmon River and Clearwater River basins.

Tasks:

1. Determine and implement the most accurate method of aging chinook salmon returning to Idaho.
2. Build an archive of scales and/or otoliths of known-age chinook salmon returning to Idaho by drainage.
3. Develop and maintain a centralized database containing freshwater age and ocean age of chinook salmon adults by drainage, rearing type, and year.

Methods: Conduct literature search and contact aging programs of other Northwest states, including Alaska and British Columbia to determine the best approach and equipment for aging Idaho's salmon and steelhead and implement.

Objective 5. Monitor genetic diversity in Idaho's spring and summer chinook salmon and steelhead populations.

Tasks:

1. Establish and maintain an archive of fin samples suitable for genetic analysis that represents major and important populations and groups of sp/su chinook salmon in Idaho.
2. Coordinate collection of fin samples among IDFG personnel and tribal personnel from sp/su chinook salmon carcasses on spawning grounds and at hatcheries.

3. Through coordination with NMFS, to ensure IDFG and NMFS efforts are complimentary, contract genetic assays as necessary to aid in management and recovery of Idaho's sp/su chinook salmon and steelhead.
4. Develop and maintain a centralized database containing pertinent carcass information for fish sampled.

Methods: Coordinate with projects conducting redd counts and carcass recovery in Idaho for collection of fin samples and pertinent information. Catalog and store samples. Coordinate with NMFS to adequately represent Idaho metapopulations, avoid duplication and ensure the most appropriate assay performed.

Objective 6. Effectively communicate information describing Idaho's spring and summer chinook salmon and steelhead populations in the Salmon River and Clearwater River basins.

Tasks:

1. Consolidate, analyze, report, and present information describing productivity, structure, status, and survival of w/n populations of sp/su chinook salmon and steelhead in the Salmon River and Clearwater River basins.
2. Continue predicting the annual wild/natural smolt emigration of sp/su chinook salmon and steelhead from Idaho.
3. Continue providing in-season PIT-tag detection information to aid in water management and begin producing an annual PIT-tag detection report.
4. Continue providing information generated by the INPMEP to managers for management-related activities (e.g. recommending fisheries, hatchery outplant levels, mainstem passage strategies, etc.)
5. Predict adult returns of sp/su chinook salmon to indicator streams and hatcheries using appropriate smolt emigration and SAR estimates.

Methods: Synthesize and present, in oral and written form, information pertinent to describing Idaho's sp/su chinook salmon and steelhead populations in the Salmon River and Clearwater River basins.

f. Facilities and equipment.

Capital needs are expected to be relatively small. All structural facilities are in place. Additional computers and PIT-tag readers will have to be purchased in large part due to changes in the PIT-tag program and move to the new frequency PIT tags. Other computers will have to be replaced to efficiently handle databases and information transfer via e-mail and the internet. Capital items needed for aging may have to be purchased. Most vehicles will be leased.

g. References.

Hassemer, P.F. 1991. Redd count manual. Idaho Department of Fish and Game. Boise, Idaho.

Idaho Department of Fish and Game, Anadromous Fish Management Plan, 1992-1996. Boise, Idaho.

Idaho Department of Fish and Game, Nez Perce Tribe of Idaho, and Shoshone-Bannock Tribes of Fort Hall. 1990. Salmon River Subbasin, Salmon and Steelhead Production Plan.

Leitzinger, E., K.Plaster, P. Hassemer, P. Sankovich. 1996. Idaho Supplementation Studies. Annual Report 1993. Project number 89-098, DE-BI79-89BP01466, Bonneville Power Administration, Portland, Oregon.

National Marine Fisheries Service, 2 March 1995. Reinitiation of consultation on 1994-1998 operation of the federal Columbia River power system and juvenile transportation program in 1995 and future years

Nemeth, D., K. Plaster, K. Apperson, J. Brostrum, T. Curet, E. Brown. 1996. Idaho Supplementation Studies. Annual Report 1994. Project number 89-098, DE-BI79-89BP01466, Bonneville Power Administration, Portland, Oregon.

Petrosky, C.E. and T.B. Holubetz. 1986. Idaho Habitat Evaluation for Offsite Mitigation Record. Ann. Rept. FY 1985. Project 83-7, Bonneville Power Administration, Portland, Oregon.

Thedinga, J.F., M. Murphy, S. Johnson, J. Lorenz, and K. Koski. 1994. Determination of salmonid yield with rotary-screw traps in the Situk River, Alaska, to predict effects of glacial flooding. North American Journal of Fisheries Management. 14:837-851.

U.S. Dept of Commerce, NOAA, NMFS, Schmitt, R., Stelle, W., Brentwood, M. August 8, 1997, draft, Snake River Salmon Recovery Plan.

Section 8. Relationships to other projects

Completion of many of the objectives of the INPMEP is both dependent and complimentary on other projects and agencies.

Objectives 1, 3, 4, and 5 are tied to the BPA funded projects in section 3 to supply chinook and steelhead parr density information for standard GPM sites, to PIT tag large numbers of chinook salmon and steelhead for use in mainstem passage analyses, to collect scale samples and otoliths for age analysis, and fin samples for genetic analysis. Anadromous hatcheries both BPA-funded and others also collect scale samples and otoliths for age analysis, and fin samples for genetic analysis as well as maintaining and operating adult weirs used to accurately enumerate adult escapement above a juvenile

trap. A portion of the work accomplished under Objective 2 is part of the Idaho Supplementation Studies (ISS)(project 8909800) and is reported in the ISS annual report.

The Lower Snake River Compensation Plan also assists in sample collection as well as lending expertise in analyses.

Section 9. Key personnel

Doug Nemeth, Principal Investigator, 1 FTE

Education: **Post-Grad**, *Marine, Estuarine, and Environmental Science*, University of Maryland, Cambridge, Maryland, 1985-1988.
M.S., *Biology*, Ball State University, Muncie, Indiana, 1985.
B.S., *Fishery Science*, Oregon State University, Corvallis, Oregon, 1983.

Work

Experience: *Principal Research Biologist*. Idaho Department of Fish and Game, Nampa, Idaho. Doug Nemeth, Principal Investigator, 1 FTE 1997-current.
PROJECT: Determination of the status and factors limiting Idaho's w/n sp/su chinook salmon and steelhead populations
- Determined program objectives and direction
- Coordinated program implementation
- Analyzed data and reported findings

Senior Fisheries Research Biologist, Project Leader. Idaho Department of Fish and Game, Nampa, Idaho. 1994-1997.

PROJECT: Determination of the effectiveness of hatchery supplementation at establishing and rehabilitating chinook salmon populations (project 8909800).
- Coordinated project implementation with state, federal, and tribal personnel
- Oversaw data collection and methods
- Analyzed data and reported findings

Assistant District Fishery Biologist. Oregon Department of Fish and Wildlife, Gold Beach, Oregon. 1990-1994.

PROJECT: The management of the fish and human resources of the South Coast.
- Monitored fish populations and habitat parameters
- Protected habitat from land use activities
- Wrote a version of the South Coast Basin Plan

Subbasin Planner. Oregon Department of Fish and Wildlife, Corvallis, Oregon. 1988-1990.

PROJECT: The development of fishery management plans for the Molalla/Pudding subbasin, Coast Range subbasin, Willamette subbasin, and Willamette mainstem.
- Compiled and analyzed data regarding fish populations and habitat

- Contributed to the development of management objectives and strategies
- Wrote basin management plans

Publications and Presentations

Walters et al., in progress, The Idaho supplementation studies, cumulative report, 1991-1995. Project number 89-098, DE-BI79-89BP01466, Bonneville Power Administration, Portland, Oregon.

Nemeth, D., K. Plaster, K. Apperson, J. Brostrum, T. Curet, E. Brown. 1996. Idaho Supplementation Studies. Annual Report 1994. Project number 89-098, DE-BI79-89BP01466, Bonneville Power Administration, Portland, Oregon.

Nemeth, D. and T. Unterwegner. 1993. The effectiveness of harvest-related forest practices at protecting fish habitat in a southwestern Oregon stream. (poster) Annual meeting of the American Fisheries Society, Portland, Oregon.

Jody K. Brostrom, Regional Fishery Biologist, 1 FTE Professional Experience

Idaho Department of Fish and Game *June, 1993 to Present*
Lewiston, ID

Regional Fishery Biologist: Anadromous Management Biologist and Regional Project Leader, Natural Production Monitoring and Idaho Supplementation Studies. Monitor anadromous and resident fish populations, anadromous juvenile outmigration, anadromous adult returns/redd surveys in the Clearwater and Salmon Subbasins. Compile data for Streamnet database, analyze data and write annual reports. Evaluate and comment on land use impacts to fishes and their habitat. Participate in technical teams for hatchery practices, coho reintroduction, habitat and stream restoration. Develop and implement 130k project budget. Supervise 4-person field crew.

Idaho Department of Fish and Game *January, 1990 to June, 1993*
Idaho Falls, ID

Senior Fishery Research Biologist: Project Leader, Teton River Enhancement Project. Work with private landowners to restore and enhance riparian and wetland habitats in native cutthroat range. Develop and implement cooperative grazing plans, riparian fencing, conservation easements, and stream restoration in the Teton River drainage. Develop angler access and easements. Coordinate with and comment to the Forest Service, Natural Resources Conservation Service, Corp of Engineers, Idaho Water Resources and Teton Valley Land Trust. Evaluate and monitor salmonid fish populations and life history. Collect, analyze data and write reports. Develop and implement 400k annual budget. Supervise one permanent technician and temporary field crew.

Idaho Department of Fish and Game *September, 1987 to January, 1990*

Idaho Falls, ID

Fishery Technician: Develop, coordinate, supervise and participate in data collection for the Teton River Enhancement Project. Sample fish populations through electrofishing, trapping, netting and rod and reel. Design and implement basinwide ground and aerial creel census. Develop and implement cooperative grazing plans, riparian fencing, conservation easements, and stream restoration in the Teton River drainage. Develop angler access and easements. Evaluate

and monitor salmonid fish populations and life history. Collect, analyze data and write reports. Supervise temporary field crew.

Education

Montana State University 1984 to 1987
 Bozeman, MT
MS Fisheries and Wildlife Management: Life History of Rainbow Trout and Brown Trout in Two Tributaries of the Henrys Fork Snake River, Idaho.

University of Idaho 1976 to 1981
 Moscow, ID
BS Fisheries Resources and BS Wildlife Resources

Organizations

Member, American Fisheries Society, 1984-present.
1984-Present

Judy A. Hall-Griswold, Fishery Research Biologist, 0.67 FTE 1/5/98

EDUCATION

Master of Science in Biology - Eastern Washington University, Cheney, WA, June 1985
 Bachelor of Science in Biology - Eastern Washington University, Cheney, WA, Mar. 1982

EXPERIENCE

15 years total experience in Fisheries and Limnology

Idaho Department of Fish and Game

Fishery Research Biologist	5 years	1990, 94-pres
Senior Fishery Technician	16.5 months	1992-93
Fish & Wildlife Technician	15 months	1985-87

U.S. Fish and Wildlife Service

Fishery Biologist (GS-7/9)	34 months	1982-83, 89-90
Biological Aide - Fisheries (GS-4/5)	6 months	1981

U.S. Army Corps of Engineers

Fishery Biologist (GS-7)	3 months	1986
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Eastern Washington University

Graduate Student - Limnology	18 months	1984-85
Research Asst. - Fisheries/Limnology	18 months	1980-81

Public Utility Districts (Wash. State)

Fisheries Technician	14 months	1978, 1980
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AFFILIATIONS/CERTIFICATION

American Fisheries Society USFWS Cert. Of Competence -

Electrofishing

Sawtooth Wildlife Council Member Certified SCUBA diver (NASDS 11/74)
Sawtooth Valley Rural Fire Dist., Fire Commissioner, 1998-2000

PUBLICATIONS

Transactions of the American Fisheries Society, 1992. 121:680-685.
Idaho Department of Fish & Game, 10 annual reports, 1986-1989, 1995-1997.
U.S. Fish & Wildlife Service, 2 annual reports, 1982, 1989.
E.W.U. Master's Thesis: *Water Quality Assessment of Spirit Lake, Idaho*. 1985.
Idaho Department of Fish & Game, *Idaho Wildlife Magazine*, Mar/Apr >88;
Spr/Sum=97.

Russell B. Kiefer

Fisheries Research Biologist, 1 FTE

Education

1980 - 1984 Southwest Texas State University San Marcos, TX
Master of Science in Aquatic Biology
Thesis: Thermal adaptation in large mouth bass populations inhabiting power plant cooling reservoirs.

1973 - 1978 Texas Tech University Lubbock, TX
Bachelors of Science in Zoology

Professional experience

1986 - current Idaho Department of Fish & Game Nampa, ID
Senior Fisheries Research Biologist
Research project leader estimating Chinook Salmon and Steelhead Trout natural productivity and survival in the Snake River Basin.

1985 - 1986 Texas Parks & Wildlife Department Sheldon, TX
Fish and Wildlife Technician III
Participated in fisheries field surveys and population analysis. Represented department at public meetings.

1985(summer) Texas Parks & Wildlife Department Corpus Cristi, TX
Fish and Wildlife Technician II
Maintained marine fish brood stock in a closed recirculating system.

1985(spring) Johnson's Lake Management Service San Marcos, TX
Assistant Fisheries Biologist
Fish management of private lakes and ponds.

1984 National Marine Fisheries Service Seattle, WA

Foreign Fishery Observer

Identify species and collected of biological data onboard foreign vessels fishing in U.S. territorial waters.

1982(summer) The Nature Conservancy Niobrara, NE

Aquatic Biologist

Responsible for aquatic survey of a thirty mile stretch of the Niobrara River and for tributary streams.

1981(summer) National Fish Hatchery & Technology Center San Marcos, TX

Biological Aide

Performed basic hatchery duties and maintaining test populations of fish.

1978 - 1980 Radian Corporation Austin, TX

Engineering Scientist I

Responsible for the vertebrate ecology sections of environmental studies and report

Publications

Kiefer, Russell B. and Jerald N. Lockhart. 1995b. Idaho habitat & natural production monitoring: Part II. Annual Report 1993. Idaho Department of Fish and Game Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract DE-B179-91BP21182, Project 91-73, Portland, OR

Kiefer, Russell B. and Jerald N. Lockhart. 1995a. Idaho habitat & natural production monitoring: Part II. Annual Report 1992. Idaho Department of Fish and Game Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract DE-B179-91BP21182, Project 91-73, Portland, OR

Kiefer, Russell B. and Jerald N. Lockhart. 1993. Idaho habitat & natural production monitoring: Part II. Annual Report 1991. Idaho Department of Fish and Game Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract DE-B179-91BP21182, Project 91-73, Portland, OR

Kiefer, Russell B. and Katherine A Forster. 1992. Idaho habitat & natural production monitoring. Annual Report 1990. Idaho Department of Fish and Game Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract DE-B179-84BP13381, Project 83-7, Portland, OR

Kiefer, Russell B. and Katherine A Forster. 1991. Idaho habitat & natural production monitoring. Annual Report 1989. Idaho Department of Fish and Game Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract DE-B179-84BP13381, Project 83-7, Portland, OR

Kiefer, Russell B. and Katherine A Forster. 1990. Idaho habitat evaluation for off-s

mitigation record. Annual Report 1988. Idaho Department of Fish and Game Report
U.S. Department of Energy, Bonneville Power Administration, Division of Fish and
Wildlife, Contract DE-B179-84BP13381, Project 83-7, Portland, OR

Kiefer, Russell B. 1992. Emigration characteristics of spring chinook from Crooke
River and upper Salmon River, Idaho. In, Passage and survival of juvenile chinook
salmon migrating from the Snake River basin. Proceedings of a Technical Workshop
University of Idaho, February 26-28, 1992.

JUNE L. JOHNSON, Senior Fisheries Technician, 1FTE

EDUCATION:

Iowa State University

Ames, Iowa 50011

B.S. in Fisheries and Wildlife Biology (May 1987)

FISHERIES WORK EXPERIENCE:

September 1992-present; IDFG, Senior Fishery Technician

Current duties: Consolidate and analyze PIT tag data. Develop and manage fin-
sample and age-related sample collections and databases. Determine freshwater
and ocean ages of returning sp/su chinook salmon and steelhead. Aid in data
collection. Maintain equipment.

Previous Duties: Enhance riparian areas through cooperative agreements with
private landowners.

Publications: Draft, Teton River Enhancement Project

Report Years: 1991-1995

November 1990-September 1992; Idaho Dept. of Fish and Game

Fishery Technician

Managed hatchery release and return database for Idaho anadromous hatcheries.

Aged steelhead scales. Assisted with PIT-tagging.

May 1990-September 1990; U.S. Forest Service

Fishery/ Hydrology Technician, Sawtooth National Forest. Collected habitat
information and evaluated fishery potential. Collected streamflow and substrate
measurements to determine minimum flows necessary to maintain the fishery and
stream integrity. I was also involved in mapwork, surveying, photography,
constructing instream structures to enhance fishery habitat, macroinvertebrate
sampling, assisted with stream inventories with an interdisciplinary team and
performed data entry.

June 1989-September 1989; U.S. Forest Service

Fishery/ Hydrology Technician

See entry May 1990

March 1989-April 1989; Idaho Dept. of Fish and Game
Data Entry Personnel. I entered fisheries creel census data.

September 1987-March 1989; Clear Springs Trout Company
Rail Feeder

I worked in nearly all phases of rainbow trout production, especially rail feeding and disease treatment.

June 1987-August 1987; Iowa Dept. of Natural Resources Conservation Aide.

As a conservation aide my duties included sampling lake populations and performing water chemistry measurements, general maintenance and assisting with catfish production.

Section 10. Information/technology transfer

Annual reports

Publication in peer-reviewed journals

Incorporation into Streamnet

Oral presentations at public and professional meetings

Agency website

Agency information briefs