CBFWA Survey of Data Collection Methodology (Metadata) for Salmonid Status and Trend Data

1.0 ORGANIZATION:

The Columbia Basin Fish and Wildlife Authority is completing this study for the Northwest Fisheries Science Center (NWFSC) of the NOAA Fisheries Service (NFS) which is a government agency charged with a mission of stewardship for living marine resources.

Members of CBFWA established the Authority by charter in 1987 to: Coordinate the efforts of its members to protect and enhance fish and wildlife resources of the Basin through joint planning and action; Provide an open forum for its members to exchange information on matters affecting anadromous and resident fish, wildlife resources, and habitat concerns in the Basin and develop unified positions; Assure comprehensive planning and implementation of the Northwest Power and Conservation Council's Fish and Wildlife Program; Improve the quality of fish and wildlife decision making; and, Influence other regional decision makers.

The NWFSC provides scientific and technical support to NFS for the management, conservation, and wise-use of the Northwest region's marine and anadromous resources. Status and Trend data is used to inform scientific decision making, and in particular, to meet NMFS obligations under the Endangered Species Act (ESA).

The Center is providing funding to CBFWA to complete Part 4.2 (see below) of this effort.

2.0 BACKGROUND

NFS depends on the analysis of Trend and Abundance data for the purpose of determining the health and delisting status of salmonid stocks throughout the northwest region and for management decisions. NFS is required to update on Salmonid trend and abundance status reviews every 5 years and has established groups known as Biological Review Teams (BRT) to develop these reports. These BRTs are comprised of local experts from state, federal, tribes and local agencies, within an Evolutionary Significant Unit (ESU). Most of the data that is contained in these reports and other analysis is collected by agencies other than NFS. The organizations that collect this data and other organizations also use this data for their own purposes.

The most recent report, Final Report of Updated Status of Listed ESUs of Salmon and Steelhead, 2005 http://www.nwfsc.noaa.gov/trt/brtrpt.cfm provides a brief

description of the data collection effort for this report, as follows:

"Preliminary data and analyses were reviewed by state, federal, and tribal comanagers for accuracy and completeness. Where possible, population or ESU-level estimates of the fraction of hatchery-origin spawners were obtained or calculated using information from scale analyses, fin clips, etc. Estimates of harvest were obtained for some stocks directly; for others, harvest rates on nearby indicator stocks were used to estimate the number of fish in the target population that would have returned to spawn in the absence of harvest. Appendices at the end of each species section in the BRT report provided detailed information and references for data sources."

The data that was used to make determinations of the status of each of the populations came from a variety of sources and has been identified as a set of "time series": sets of data collected at a particular location through multiple years of data collection.

To improve use of the data NOAAF needs to know more about how and where the data are collected, developed and managed. This information, commonly referred to as metadata will be used to supplement existing time-series data and will be made available to the agencies and other organizations providing it. The initial focus of this survey is on a subset of the BRT data – time series that were considered most relevant for the 2005 BRT report. There are approximately 150 individual time series in this data set.

Ideas for this survey were collected during discussions with staff at the NFS, and with representatives of state and tribal fish and wildlife agencies. As a consequence of these discussions the commencement of this effort was delayed for one year to allow other survey efforts to be completed. These other survey efforts included a State of the Salmon Consortium effort to inventory available data about Salmonid populations across the Northern Pacific (including Canada and Alaska), an effort by the Pacific Northwest Monitoring Partnership to inventory Pacific Northwest Monitoring projects and the CSMEP project. While there are similarities between these efforts and this Metadata survey (in particular they all collect some data about Salmonid Populations) this effort adds to our knowledge with particular focus on collecting metadata that is specific to individual time-series records.

3.0 PROJECT RESPONSIBILITIES:

Ken McDonald of CBFWA is the contract officer for the survey.

Stewart Toshach is NFS liaison responsible for coordinating the survey and data management components of the effort.

Jeff Cowen of the Scientific Data Management group of the NWFSC (SDM) is the lead for information system development, testing

and for maintaining the database, as it is populated by the Contractor and making it available to the contractor for preparation of contractor reports and etc. Bob Larson of the NWFSC SDM team is the Database Developer.

4.0 PROJECT COMPONENTS:

There are two main components to this survey effort (Parts 4.1 and 4.2).

4.1 Development of a survey and information management tools to manage, integrate and make the collected data available.

The data management survey and tools are being developed by the SDM group of the NWFSC in response to input from data users. Work on the data management solution to meet the functional requirements specified below began in mid January 2007 and it is expected to be ready for field testing by October 31, 2007.

The NWFSC will also provide, for the contractor's use and reference a set of relevant BRT data sets – the sets for which this project will be adding needed metadata.

In addition to providing the metadata about how the data is collected in the field and how metrics are derived from that data, the spatial location of the data collection is critical to NOAAF. In order to help facilitate collection of spatial information about the collection sites the SDM team will provide the contractor with a tool to capture the location/s of sampling sites.

4.1.1 Functional Requirements of Data Management System Needed for Survey:

- Function in offices outside of NFS network.
- Be web enabled – this is the ideal.
- Manage information so that it is FGDC compliant
- Allow more than one researcher/contributor to enter data to system at the same time.
- Allow integration of data from multiple researchers/contributors into a single data instance.
- Allow Cutting and pasting data into the system.
- Allow Key entry of data into the system – guided with an intuitive user interface.
- Allow capture of citations and live links to document.
- Allow duplication of existing tabular records – to ease data entry where there is duplicate data across records.
- Edit data in the system.
- Saving and backup.
- Contractor will need to be able to capture spatial locations for each of the time series and these records will be used by the contractor to create a spatial data layer that can be linked to the survey tabular records.

- NOAAF will supply an electronic spatial data layer of related populations and names- as contained in the NOAA BRT system.
- Output from collected data to contractor and researchers via queries and relate tabular data to geographic unit of interest for the purposes of contractor reporting.
- Download all data into NFS data system for future use.
- After validation – make the data public for all providers to use. This is important – the benefit of the project to the data users is to help them prepare metadata to document ongoing work.

4.1.2 The Survey Details

The survey is designed to collect more details about how the data used in the BRT report was collected and to help support agency needs to document internal methods.

The needed information in 4.1.3 concerns how the time series data is collected, managed and eventually used to determine the following metrics: Harvest rate, Escapement, recruits per spawner, smolt to adult survival and percent wild fish.

4.1.3 Survey Details

	SURVEY QUESTIONS	DATA DETAIL
1	Source/s of this collection information (interviewee)	**(Name, address, organization, phone, e-mail)**
2	Are you completing this questionnaire yourself or are you being interviewed?	**Radio Button**
3	Time Series Name	**Pick List provided from BRT report**
4	NSD Time Series Number	**Numberic number for reference only**
TIME SERIES DATA COLLECTION		
5	Is there a structured approach to managing data – gathering the same pieces of data from year to year, or, unstructured - gathering all available data from data collectors and then reorganizing the data to fit it into your system?	**Structured or Unstructured**
6	The method used to determine sampling site locations.	**Pick List: Sample design method - Choose one of the following:** **Convenience-based sample - non-randomly selected sites are surveyed. A subset of the target population is sampled (sample of size n is drawn from the true population of size N) whereby the site selection criteria are based on issues of convenience such as logistics or access. There is an unknown relationship or no justification for assuming a relationship between the sample data (n) and population characteristics (N).** **Judgment-based sample – non-randomly selected sites are surveyed A subset of the target population is sampled (sample of size n is drawn from the true population of size N) whereby the site selection criteria are based on judgment. This is an extension of convenience-based sampling. For example, a researcher may decide to draw the entire sample from one "representative" stream within a drainage basin, even though the population includes all streams. Index streams often fall into this category.** **Model-based sample - non-randomly selected sites are surveyed. A subset of the target population is sampled (sample of size n is**

		drawn from the true population of size N) whereby the site selection criteria are based on modeled extant knowledge and theoretical understanding of the population. Inference is based on a modeled relationship between the sample data (n) and population characteristics (N). No probability sample is required. **Design-based sample -randomly selected sites** **are surveyed. A subset of the target population is sampled (sample of size n is drawn from the true population of size N) whereby the site selection criteria are based on known, quantified certainty. Requires probability sampling. Prior knowledge and theoretical understanding as well as model-based analyses may be incorporated. Examples include simple random sampling, stratified random sampling, cluster sampling, systematic sampling, multi-stage sampling, random tessellation stratified design, etc.** **Census - all sites surveyed** **The entire target population is sampled (sample of size n is equal to the true population of size N) whereby every individual of the population of interest is counted or measu red. (Note: Do not confuse this site-selection method with a counting method such as a weir.)** **Unknown**
7	The location/s where the time series data is collected?	**GIS Coverage,** **Actual Lat/Long of site or,** **Points marked on a web served Map. (Note the contract-interviewer/s will be tasked with creating spatial data layers showing the locations of data collection points.**
8	The method/s or gear used to collect data.	**Name of data collection method used (pick list).** **Aerial, fish counts - Visual count method obtained from over flights by airplane or helicopter** **Aerial, redd counts - Count method involving quantification of redds using personnel in planes or helicopters** **Boat, fish counts or other sampling - Visual count method performed by personnel in boats. Method used to collect fish for tissue, age, length, other sampling.** **Boat, redd counts - Count method involving quantification of redds using personnel in boats**

		Bycatch sampling - Catch data for bycatch species from commercial fishery, typically obtained by on-board observer on fishing vessel **Electrofishing,Backpack - Capture method using backpack electrofisher** **Electrofishing, Boat - Capture method using boat-mounted electrofisher** **Gaff - Capture method using gaff or spear** **Ground, fish counts or other sampling -Visual count method performed by personnel on the ground or method used to collect fish for tissue, age, length, other sampling. Also called "bank-side" or "foot surveys".** **Ground, redd counts - Count method involving quantification of redds using on the ground personnel. Also called "bank-side" or "foot surveys".** **Harvest -Catch, Recreational Effort - Data on sport catch and harvest effort, typically maintained by resource agency** **Harvest Catch, Recreational Total - Total sport catch and harvest data, typically maintained by resource agency** **Harvest, Commercial Effort - Harvest data (numbers or biomass), typically maintained by resource agency** **Harvest, Commercial Total Landings - Total harvest data (numbers or biomass), typically maintained by resource agency** **Harvest, Illegal - Data (numbers or biomass) on poaching or other illegal forms of harvest typically maintained by resource agency** **Harvest, Subsistence - Harvest data for subsistence purposes** **Hooks, Longline - Capture method using long line or trotline** **Hooks, Rod and Reel - Capture method using hook and line/rod and reel** **Hooks, Troll - Capture method involving trolling with baited hooks or lures** **Hydroacoustic, Boat - Biomass estimation method using boat launched hydroacoustic gear.** **Mark/Recapture - Count method using marked individuals**

		Net, Cast - Capture method using cast net **Net, Dip - Capture method using dip net** **Net, Fyke - Capture method using fyke net (anchored net with leads)** **Net, Gill - Capture method using gill net (also includes trammel and tangle nets)** **Net, Other/Mixed - Capture method using other/multiple net types** **Net Seine, Beach - Capture method using seine deployed from river bank.** **Net Seine, Fry - Capture method using fine mesh seine for fry collections** **Net Seine, Purse - Capture method using purse or drum seine** **Net Seine, Other - Capture method using other seine type** **Net, Trap - Capture method using trap net** **Snorkel/dive, counts- Visual count method performed by snorkelers or divers** **Sonar, fish counts - Count method using acoustic technique (e.g., single beam, dual beam, split beam, multi-beam)** **Tag, Electronic** **Tag, Other/Mixed - Tagging method using non-electronic tags (including FLOY, Peterson disc, spaghetti, anchor, dart, CWT, elastomer, tattoo, brand, fin clip, maxillary clip)** **Tower, fish counts - Visual count method from a tower or structure located over stream banks.** **Trap, Fishwheel - Capture method using fishwheel** **Trap, Incline Plane - Capture method using incline plane trap, typically used in smolt studies** **Trap, Minnow - Capture method using minnow trap** **Trap, Other/Mixed - Capture method using other/multiple traps** **Trap, Rotary - Capture method using rotary screw or Archimedes trap, typically used in**

		smolt studies **Trawl, Bottom - Capture method using bottom trawl towed by vessel (e.g., beam trawl, otter trawl)** **Trawl, Midwater - Capture method using mid-water trawl towed by vessel** **Trawl, Other/Mixed - Capture method using other/multiple trawl type** **Trawl, Surface - Capture method using surface trawl towed by one or two boats** **Video, fish counts - Visual count method aided by use of video recordings Biomass,** **Weir/fence/screen/dam bypass - Visual count method at points of restricted passage. Method used to collect fish for biological sampling.**
9	Is there a field collection guide?	**Yes (and attach a copy or provide web link), or No**
10	Are data collectors trained to use the selected collection method?	**Yes or No**
11	Does the same field crew collect all samples over each season?	**Yes or No**
12	Is the collection completed by staff or seasonal contract, by partner agency staff, or a combination	**Staff, contract,partner, combination**
13	Provide a brief description of data collection quality assurance and control methods that are completed.	**A prescribed and documented method (attach copy)** **Or,** **A brief narrative (alpha numeric field).**
14	What other data is collected at each location?	**Provide the names of the data collected (brief narrative) or provide a copy of the data dictionary** **Data element Name (alpha numeric field)**
15	What is the frequency of data collection at each location?	**Select one of the following:** **_____ Peak of run** **_____ Entire run _(number of sampling events)** **_____ Partial run (number of sampling events)** **Unknown**

		_____Other – write in
16	Method of data recording E.g. Paper form, PDA, tablet PC, or other.	**Pick list:** **Paper forms,** **PDA,** **Tablet PC,** **or other**
17	How long have methods described here been used?	**Used since yyyy/mm/dd**
18	Are changes anticipated?	**Yes/No/when(yyyy-mm-dd)**
19	Contact information for the current data collection lead if different from (1) above.	**name,** **address,** **organization,** **phone** **e-mail**
DATA HANDLING AND AVAILABILITY		
20	Source/s of this data handling and availability information(interviewee) If different from contact information (1) above	**(Name, address, organization, phone, e-mail)**
21	Are you completing this questionnaire yourself or are you being interviewed?	**Radio Button**
22	What is the time duration between the date of original data collection and date when the final metric is calculated? (note original data collector may not have answer for when final metric is calculated)	**Duration in days.**
23	What is the name of the information system where this data is maintained?	**Name of data system. Location.**
24	What type of system is the data maintained in?	**Type of data system (pick list** **1. Paper** **2. Word processor** **3. Spreadsheet** **4. Database**

		5. Other (specify).
25	Is there a website?	**Yes URL/no**
26	Is all the data shareable and available to others? For example, if someone inquires today, can the data from the previous year's survey be provided to them?	**Yes/No**
27	Is there a current effort to convert historical data into a form that is compatible with current data or is the older data being left as is?	**Yes/No**
28	How long have the data collection methods described here been used?	**Used since yyyy/mm/dd**
29	Are changes to data collection methods anticipated?	**Yes/No/when(yyyy-mm-dd) (what change?)**
DATA ANALYSIS		
30	Source/s of this data analysis information (interviewee) If different from the contact information in 1 or 20 above?	**(Name, address, organization, phone, e-mail)**
31	Are you completing this questionnaire yourself or are you being interviewed?	**Radio Button**
32	What Metric or metrics are calculated from the time series data?	**Pick list:** **Harvest rate** **Escapement** **Recruits per Spawner** **Smolt to adults survival Percent Wild Fish** **Fish count**
33	How long have methods described here been used?	**Used since yyyy/mm/dd**
34	Are changes anticipated?	**Yes/No/when(yyyy-mm-dd)**
35	Provide a brief description of the Method used to calculate each metric?	**A documented method (attach copy) or Summarize the logical steps and formula used to directly calculate or derive the metric.**

36	Contact for analysis information (interviewee)	**Contact Name etc.**
37	FOR ALL INTERVIEWEES: Provide brief notes on any constraints reported to collecting developing, managing or analyzing these data sets.	**Notes**
38	What is the estimated accuracy or precision of your estimate result	**%**
39	What is the universe of inference for your estimate	**(need an example of choices here)**

4.2 Completion of the Metadata Survey, Analysis of the Results and Preparation of Narrative Reports and Spatial Data Layers.

4.2.1 Background

NOAAF will provide $92K to Columbia Basin Fish and Wildlife Foundation to complete the metadata survey and associated reports and documentation. $84,220 will be available for a contract.

The contractor staff must be generally familiar with Salmonid Data collection methods and procedures and have GIS experience and capability. The contractor will be responsible for the collection and checking of survey data and preparing a narrative report to describe the results in detail. The contractor will also develop a spatial data layer or layers to describe the site locations in a consistent and accurate format.

4.2.2 Pilot Effort

A short 2-4 week pilot survey effort will be completed to validate the survey methodology, the survey and the survey data collection tool, and integration of survey data and spatial data. Some modification of the beta data collection system may be needed after this pilot effort

4.2.3 Contractor Services Required

4.2.3.1 Description – The required work is for experienced biological or data system analysts to complete detailed interviews, analysis and reporting. The contractor staff must work independently to contact, and where necessary, schedule and conduct on-site interviews with many individuals involved in the multiple facets of regional salmonid data collection and review existing documentation.

Experience in completing detailed inventory work about biological data collection is essential for this task. Data collection efforts in the region range widely in scope and scale and the data managers and collectors represent multiple disciplines. Experience working in multi-disciplinary environments is also essential.

4.2.3.2 Identifying Interviewees

The contractor is responsible for identifying, developing and maintaining a list of interviewee/s for each time series. Key individuals in the individual entities that are collecting and managing this data will need to be contacted, and in some cases visited, to complete this effort. It is anticipated that much of the information needed to complete this report will be collected from in-person interviews with key contacts who are personally involved in managing these data collection efforts.

It may also be necessary to make contact with individuals who worked on developing relevant data sets but who now work elsewhere.

Resources to support this task include the list of potential contacts identified in Appendix A below and some notes on contacts included in the appendices to the BRT report. It is recommended that the contractor work closely with agency data managers or other senior staff to facilitate access to the individual biologists or other staff who are most knowledgeable about each time series of data and to minimize the time burden on interviewees for the collection of this data.

4.2.3.3 Completing the Interviews

The survey is designed to allow flexibility in collection method: through in person interviews, through telephone interviews or in part, by self-survey (if in the judgment of both the interviewee and the interviewer it is more efficient and provides comparable results).

Prior to completing the interviews the interviewer will need to become generally familiar with the data that is already available in the selected time series records – information that the NWFSC will make available to the interviewer and interviewees. If resources are available for collection of information beyond the subset of 150 time series, these will be identified by the NFS and CBFWF in consultation with data providers.

4.2.3.4 Collecting related information (as a part of the interview process)

The contractor must also obtain, assemble, review and accurately document available sources of information concerning regional data management systems (for example internal agency guidelines or written descriptions of operating practices).

The contractor will use these documents and interview data to document the process that is currently being used.

4.2.3.5 Reporting on the Findings

The needed product, in addition to the collected data, is a detailed description of Salmonid data collection methods and processes, the data checking and quality assurance that is completed and how it is being managed and analyzed – see the **Section 4.2 Deliverables** below. (An example of the type of needed narrative product is by Sampson and Crone[1], however, the

[1] Sampson, David B., and Crone, Paul R. (Eds) 1997. Commercial Fisheries Data Collection Procedures for the U.S. Pacific Coast Groundfish. NOAA Technical Mamorandum, NMFS-NWFSC-31.

needed product for this Statement of Work is considerably more extensive and requires more detail.)

4.2.4 Deliverables

4.2.4.1 A brief plan for the pilot survey effort - provided to the NFS Liaison.

4.2.4.2 Results of the pilot survey effort – provided to the the NFS Liaison and to be shared with CBFWA (note a final narrative is not required).

4.2.4.3 A brief plan for collecting information that was not collected in the pilot survey to be provided to the NFS Liaison.

4.2.4.4 The metadata created from the survey, entered into the NWFSC data management system (see Part I above)

Data Collection Contingency. In the event that the specified data is successfully collected within the time planned for collection the contractor will consult with the NFS Liaison to reach mutual agreement on the collection of additional time-series data.

4.2.4.5 A draft and final report consisting of diagram(s), associated narrative, tables and maps that together clearly detail and identify data collection management and analysis steps and processes; the time-line involved in completing these steps and processes for each time series. For example; what is the current status of methods and practices for data collection, analysis and management. How consistent are practices and methods across populations and ESU's? How many of the population metrics are supported by direct data collection efforts and how many are inferred from other data? How much time is needed, from data collection to data availability on a population by population basis?

The reports must be organized to provide a separate account of how each data collection entity accomplishes these tasks (for example all time series collected by the State of Washington).

4.2.5 Data Usage and Ownership

All data and reports collected for this study and will be owned by the NMFS/NWFSC. All of the study materials will be made available to contributors and with approval of the contributors, to the public.

4.2.6 Study Reports

Study plan, draft report and final report including narrative, tables, maps and any completed interview forms/tables. The

report will be provided in electronic form in Microsoft Word. Where data flow diagrams are provided Microsoft Visio is the preferred application.

4.2.7 Completion Date

Unless it can be completed without inconveniencing current data collection, interviews and data requests for this project should be scheduled for completion after the 2007 field season. A draft report shall be provided to the CBFWA Study Contact and NOAAF liaison with a final report to be provided no later than August 31, 2008.

4.2.8 CBFWA Study Contract Officer

The CBFWA Contract Officer for this work is Ken McDonald 503-229-0191. All requests for payment for services will be sent to Tom Iverson 851 SW Sixth Avenue, Suite 260 Pacific First Building Portland, Oregon 97204

Appendix 1 Contacts

Contact Information and Area of Knowledge for Potential Interviewees: It is not likely that the contractor will need to contact all the people identified on this list however it is provided for reference as needed and <u>key agency contacts have been marked in bold</u>. Data from California will not be collected as a part of the initial data set.					
Area of Knowledge	**NAME**	**AFFILIATION**	**ADDRESS**	**EMAIL**	**PHONE**
California, Coastal Oregon, Upper Willamette	Peter Adams	NOAA - Southwest Fisheries Science Center	110 Shaffer Road; Santa Cruz, CA 95060	pete.adams@noaa.gov	(831) 420-3923
California, Coastal Oregon, Upper Willamette	Sean Gallagher	California Department of Fish & Game	306 East Redwood; Fort Bragg, CA 95437	sgallagh@dfg.ca.gov	(707) 964-1492
California, Coastal Oregon, Upper Willamette	Matt House	Green Diamond Resource Company	900 Riverside Road, Korbel CA, 95550	mhouse@greendiamond.com	(707) 668-4449
California, Coastal Oregon, Upper Willamette	Kelly Moore	Oregon Department of Fish & Wildlife	28654 Highway 34; Corvallis, OR 97333	kelly.moore@oregonstate.edu	(541) 757-4263 x223
California, Coastal Oregon, Upper Willamette	Mark Wade	Oregon Department of Fish & Wildlife	90700 Fish Hatchery Rd; Leaburg, OR 97489	m.g.wade@att.net	(541) 913-4477
California, Coastal Oregon, Upper Willamette	Dave Ward	Columbia Basin Fish & Wildlife Authority	851 SW Sixth Avenue, Suite 260; Portland, OR 97204	dave.ward@cbfwa.org	(503) 229-0191
Lower Columbia, Western Washington	Erik Neatherlin	Washington Department of Fish & Wildlife	600 Capitol Way North; Olympia, WA 98501-1091	neathean@dfw.wa.gov	(360) 902-2559
Lower Columbia, Western Washington	Kris Northcut	Quileute Tribe	PO Box 187, LaPush, WA 98350	kris.northcut@quileutenation.org	(360) 374-6074
Lower Columbia, Western Washington	Dan Rawding	Washington Department of Fish & Wildlife	600 Capitol Way North; Olympia, WA 98501-1091	rawdidr@dfw.wa.gov	(360) 906-6747
Lower Columbia, Western Washington	Kit Rawson	Tulalip Tribes	7515 Totem Beach Road; Tulalip, WA 98271	krawson@tulaliptribes-nsn.gov	(360) 651-4478
Lower Columbia, Western Washington	Eric Tinus	Oregon Department of Fish & Wildlife	17330 SE Evelyn St.; Clackamas, OR 97015	Eric.Tinus@state.or.us	(971) 673-6084
Lower Columbia, Western Washington	Greg Volkhardt	Washington Department of Fish & Wildlife	600 Capitol Way North; Olympia, WA 98501-1091	volkhgcv@dfw.wa.gov	(360) 902-2779
Middle Columbia, Snake, Idaho	Rich Carmichael	Oregon Department of Fish & Wildlife	211 Inlow Hall, One University Blvd, EOU; La Grande, OR 97850	rcarmich@eou.edu	(541) 962-3754
Middle Columbia,	Brian Michaels	Nez Perce Tribe	612 S. W. 2nd St.; Enterprise,	brianm@nezperce.org	(541) 426-

Snake, Idaho			OR 97828		3198 x4
Middle Columbia, Snake, Idaho	Heather Ray	Shoshone-Bannock Tribe	PO Box 306 Pima Drive - Fort Hall, ID 83203	hray@shoshonebannocktribes.com	(208) 239-4556
Middle Columbia, Snake, Idaho	Jesse Schwartz	Umatilla Tribes	PO Box 638; Pendleton, OR 97801	JesseSchwartz@CTUIR.com	(541) 966-2380
Middle Columbia, Snake, Idaho	Sam Sharr	Idaho Department of Fish & Game	600 S. Walnut St. PO Box 25; Boise, ID 83707	ssharr@idfg.idaho.gov	(208) 334-3791
Middle Columbia, Snake, Idaho	Lynnae Sutton	Fish Passage Center	1827 NE 44th Ave., Suite 240; Portland, Oregon 97213	lsutton@fpc.org	(503) 230-4290
Middle Columbia, Snake, Idaho	Jason Vogel	Nez Perce Tribe	PO Box 365, Lapwai, Idaho 83540	jasonv@nezperce.org	(208) 843-7145 x8
Upper & Middle Columbia	John Arterburn	Colville Tribes	23 Brooks Tracts Rd; Omak, WA 98841	john.arterburn@colvilletribes.com	(509)-422-7424
Upper & Middle Columbia	Bill Bosch	Yakama Nation	401 Fort Road; Toppenish, WA 98948	bbosch@yakama.com	(509) 945-1206
Upper & Middle Columbia	Chris Jordan	NOAA - Northwest Fisheries Science Center	2725 Montlake Blvd. East; Seattle, WA 98112-2097	chris.jordan@noaa.gov	(206) 860-3423
Upper & Middle Columbia	Phil Roger	Columbia River Inter-Tribal Fish Commission	729 NE Oregon St., Ste. 200; Portland, Oregon 97232	rogp@critfc.org	(503) 731-1301
Upper & Middle Columbia	Keith Wolf	KWA Ecoscience, Inc	PO Box 1017; 15602 Main St, Ste 200; Duvall, WA 98019	kwolf@kwaecoscience.com	(425) 788-3402
California, Coastal Oregon, Upper Willamette	Peter Adams	NOAA - Southwest Fisheries Science Center	110 Shaffer Road; Santa Cruz, CA 95060	pete.adams@noaa.gov	(831) 420-3923
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Western Washington			98350	org	6074
.Lower Columbia, Western Washington	Dan Rawding	Washington Department of Fish & Wildlife	600 Capitol Way North; Olympia, WA 98501-1091	rawdidr@dfw.wa.gov	(360) 906-6747
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artprop spawn	Stephen Pastor	Federal -USFWS		Stephen_Pastor@r1.fws.gov	
artprop release	Sharon Clark	State - IDF&G		sclark@idfg.state.id.us	
artprop spawn	Laura Story	State - IDF&G		lstory@IDFG.STATE.ID.US	
artprop release	John Leppink	State - ODF&W		John.D.Leppink@STATE.OR.US	
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artprop spawn	Catie Mains	State - WDF&W		MAINSCLM@dfw.wa.gov	
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