"Distribution and Seasonal Habitat use of ESA-listed Salmonid Species in City of Portland Tributary Streams" (**Project ID: 31007**)

A Response to the ISRP's Request for Additional Information

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The ISRP has requested more information for the City of Portland's proposal to study the "Distribution and Seasonal Habitat Use of ESA-listed Salmonid Species in City of Portland Tributary Streams".

1. Provide a better description of the reaches that will be sampled, their size, and location.

Maps are attached that show the tributary streams that will be sampled.

The fish tributary surveys will utilize stream habitat survey data collected by Oregon Department of Fish and Wildlife's Natural Production Program (ODFW 1999-2002) to develop survey protocols. The ODFW stream habitat survey methodology was chosen because it was designed to be compatible with other stream habitat inventory and classification systems. This compatibility is achieved by systematically identifying and quantifying valley and stream geomorphic features.

The reaches vary in size and location based on unique valley and stream geomorphic features found in each tributary stream.

2. What is the rationale for selecting the sampling reaches?

All "significant" streams within Portland have been or will be sampled. Determination of "significance" is based on previous fish surveys, recent habitat surveys, anecdotal information, best professional judgment, or a combination of these methods. Almost all reaches within these streams have been or will be sampled.

Partitioning of streams into reaches is standard protocol during habitat surveys. Delineation is based on valley and stream geomorphic features such as landscape changes, major tributaries, or passage barriers, as well as additional features unique to urban streams i.e., road crossings, bank treatments, vegetation features. The reaches have value based on the fact that they can be generalized into frequently occurring valley channel types or translated into the nomenclature of a particular system. For example, information summarized at the reach level (valley width, channel type, slope, terrace height and width, sinuosity, width, depth, substrate, eroding banks, etc.) can be used to characterize the stream into one of the types described by Rosgen (1985) or to match the parameters collected in other quantitative (USFS) or historic (U.S. Bureau of Fisheries) surveys.

3. Will the sampling design adequately determine the extent of utilization of the lower tributary reaches by juvenile salmon?

We believe that it will. The methodologies have been chosen to identify both distribution and seasonal habitat use of the streams by juvenile salmonids. Backpack electrofishers were chosen because they have proven to be one of the most effective methodologies for sampling juvenile salmonids. The entire stream system will be surveyed during the summer low flow period by sampling 20% of the major habitat unit types (pool, riffle, glide) in each reach, in order to understand habitat availability and use throughout the watershed. In order to understand seasonal use, a multiple-pass electrofishing effort will be conducted in a 100-m length within each stream reach in summer, autumn, winter, and spring.

Sampling 20% of each reach during summer low flow provides excellent coverage, making it highly likely that all species present will be collected. This coverage usually far exceeds the accepted standard of "40 wetted widths" to adequately describe fish assemblages. This extensive sampling is not practical in all seasons; therefore we limit effort in other seasons to more intensive (multiple pass) 100-m sampling. We feel that sampling 100 m within each reach provides useful information. IBI's calculated from summer 2001 varied little between the two methods, and we have found no evidence that fewer fish species are collected during 100-m sampling. The most common alternative sampling method, downstream migrant trapping, is unsuitable for most if not all streams. Johnson Creek is large enough for a trap; however, reconnaissance revealed few suitable locations to place a trap. Johnson Creek is very prone to quick flooding, and keeping a trap in place would likely be unfeasible. The other streams are not large enough for a trap.

4. How often will each reach be sampled in each season?

Each reach is sampled twice in summer, and once in other seasons. Summer sampling includes extensive single-pass sampling over 20% of each habitat type, and during each season (including summer) effort includes a multiple-pass effort over a 100-m length of each reach. Each reach is therefore sampled for one day each season except summer, in which each reach is sampled for two days (or more if an entire reach is not completed in one day during summer).

The summer low flow surveys will be limited a single pass in each reach in each tributary (Task 1). This is to reduce as much as possible the undesirable effects of electrofishing during an already stressful period. Although the summer low flow effort is limited to a single pass, the total area sampled in each stream will be extensive, giving a higher probability of collecting an adequate representation of species present in the system.

The four seasons will be sampled using a multiple-pass electrofishing survey of 100-m lengths within each stream reach (Task 2). If salmonids are captured during the first electrofishing pass, additional passes will be conducted until no salmonids are observed (maximum of three passes).

5. What will be done with the information once it is collected?

The juvenile salmonid distribution and seasonal habitat use data will be used in watershed planning in the City of Portland. This information will be used to populate models that the City of Portland is developing to relate land-use based activities and their effects on stream condition and juvenile salmonid response.

The Index of Biotic Integrity (IBI) calculations provide a benchmark for comparison of current conditions to "pristine" conditions. Although a return to "pristine" conditions in the urban setting is not realistic, restoration to some level between current and pristine conditions is possible and desired. Periodic sampling to determine IBI's will provide one method by which to judge progress along that scale. IBI's also provide a tool by which to compare the relative integrity of fish assemblages among streams. This information will likely play an important role in developing priorities for protecting and restoring Portland's urban streams.

The instream habitat conditions and juvenile salmonid information collected in the surveys will increase the robustness of a model the City has adopted for guiding decision-making e.g. Ecosystem Diagnosis and Treatment (EDT). EDT is a species habitat-relationship model developed for anadromous and resident salmonids (Mobrand Biometrics 1999). The City of Portland has recognized the value of EDT as a process for assembling and organizing watershed information as a basis for developing and implementing recovery and management plans.

The City's watershed planning is guided by a *Framework for Integrated Management of Watershed and River Health*. The *Framework* is designed to guide city-activities meeting the City Council's Resolution to assist in recovery of salmonids (Resolution No. 35715).

6. Will presence/absence and abundance be related to habitat conditions?

Although relationships between fish populations and habitat will be explored where feasible (i.e., using habitat information that is not likely to change significantly in the short term), the emphasis should not be placed on correlating fish data to habitat data. Habitat data were collected to document existing conditions and compare those conditions to conditions preferred by salmonids (and other native species when known). This information can be used as a base from which to compare habitat data collected in the future after protection and restoration actions have been implemented. The data on fish populations are also being collected to document current status. This information (particularly IBI's) can also be used as a base from which to compare status of fish populations after habitat protection and restoration actions have been implemented. Future collections of habitat and fish data can be timed to coincide to facilitate analysis of relationships.

7. A more thorough description of the habitat sampling design, methods, kinds of data collected, and the scale of the data (i.e., valley segment scale, reach scale, channel unit scale, et.) is needed.

All habitat surveys utilize STANDARD ODFW METHODOLOGY (Moore et al. 1999). This data is always collected during summer low flow. Habitat surveys are NOT conducted during other seasons.

All of the tributary streams have been sampled by Oregon Department of Fish and Wildlife (ODFW 1999-2002). The surveys were conducted during the summer low flow months delineating stream reaches based on valley and stream geomorphic features. The following details the instream habitat survey methods and scales used to characterize habitat conditions in each tributary. The methods are described in more detail in Moore et al. (1999) conducted by Oregon Department of Fish and Wildlife's Natural Production Program (The stream habitat survey protocols have been applied across the state to provide consistent and comparable quantitative information on habitat conditions for streams throughout Oregon).

- Basin information is gathered prior to and during the course of the survey including basin name, stream name, stream order, drainage area, drainage density and elevation at the confluence with the receiving channel and at the end of the survey, stream flow, general description of land use and ownership in the basin
- Valley and channel are classified based on similar stream habitat inventory and classification systems (i.e., Rosgen 1985, Frissell et al. 1986, Cupp 1989, Ralph 1989, USFS Region 6 Level II Inventory 1992, and Hawkins et al. 1993).
- Reaches are delineated by stream segments between tributaries, changes in valley and channel form, major changes in vegetation type, or changes in land use or ownership or road crossings
- Changes in reach characteristics are flagged and numbered sequentially as they are encountered
- Channel habitat units are sequentially numbered and measured in each reach.
    - The channel habitat unit is the basic level of notation for the survey methodology
    - The survey subdivides the stream into two general classes of unit types: channel geomorphic units and special case units.
    - Channel geomorphic units are relatively homogeneous lengths of the stream that are classified by channel bed form flow characteristics, and water surface slope. With some exceptions, channel geomorphic units are defined to be at least as long as the active channel is wide. Individual units are formed by the interaction of discharge and sediment load with the channel resistance (roughness characteristics such as bedrock, boulders, and large woody debris). Channel units are defined (in priority order) based on characteristics of (1) bedform, (2) gradient, and (3) substrate.

    - Special case units describe situations where, because of stream flow level or a road crossing, the usual channel geomorphic unit types do not occur. Special case units include dry or partly dry channels, and culverts.
- Geomorphic channel units include; pools (plunge, straight and lateral scour, dammed, etc), subunit pools (alcoves, backwaters and isolated pools), glides, riffles, rapids, cascades, steps.
- Special case unit types include dry units, puddles, dry channels and culvert crossings
- Additional information includes channel type, percent flow, unit length, unit width, slope, channel shade, active channel height, active channel width, floodprone height, floodprone width, and terrace height.

8. Will habitat be sampled concurrently with fish sampling or will the information from habitat sampling in 2001 be used?

Habitat information will be used from previous sampling conducted in 1999-2002. Again, as explained in number 6 above, the emphasis will not be placed on correlating fish data to habitat data.

9. Strong justification is needed for relating habitat data collected in 2001 to fish abundance data collected in 2002, especially at the channel unit and microhabitat scale.

Please see response to number 6 above.

We recognize that habitat data collected from 1999 through 2002 provides some possible problems for relating fish distribution and seasonal habitat use in the years 2002 through 2004. Measures at the channel unit and microhabitat scale are influenced by habitat forming processes such as high flow events and have the potential to change after each flood event. Nevertheless we believe the information gained from these efforts can be valuable. The EDT model that the City is using will take current habitat conditions and knowledge of how salmonid life history strategies have traditionally responded to historic habitat conditions to set restoration objectives for watershed planning. Understanding current habitat conditions and juvenile distribution and seasonal use is vital to this effort.

In addition, the City intends to use this information as a baseline in order to evaluate the effectiveness of city-wide programmatic changes such as updates to the Stormwater Management Manual, Erosion Control Manual, Environmental Zone Code (riparian protection) and other programs to meet the City Council's resolution to assist in the recovery of salmonids. Habitat surveys will be resurveyed in five years and fish suveys repeated over the upcoming years in order to track the success or failure of the City's efforts.

10. Sampling (both fish and habitat) in fall, winter, and spring is essential to determine utilization by juvenile migrants. Although there are logistical

difficulties and safety concerns involved with sampling streams in the fall, winter, and spring, as the proposal acknowledges, the ISRP is uncertain about the City's commitment to fall, winter, and spring sampling. Sampling in the fall (e.g., October), especially, should not be a problem.

The City is committed to sampling in all four seasons. This information is vital to understanding the season habitat use and distribution strategies exhibited by juvenile salmonids using Portland's tributary streams.

All reaches sampled in summer 2001 were subsequently sampled in fall and winter. Previously conducted nearby studies were also successful in sampling during all seasons (Friesen and Ward 1996; Friesen and Zimmerman 1999). There is no lack of commitment to sample; rather, a reality check on what data can be collected. Information on salmonids can be collected with relative ease during most seasons; however, some species (e.g. sculpins) are not readily during conditions other than low flow. This precludes calculations of IBI's during most seasons. Finally, as described under number 7 above, standard habitat surveys are conducted only during summer low flow.

11. A thorough discussion of how the data will be analyzed is needed.

Please see responses to numbers 6 and 15.

The data will be used in watershed planning in the City of Portland. This information will be used to populate models that the City of Portland is developing to relate land-use based activities and their effects on stream condition and juvenile salmonid response.

The instream habitat conditions and juvenile salmonid information collected in the surveys will increase the robustness of the EDT model described in earlier sections. The EDT model will take current habitat conditions and knowledge of how salmonid life history strategies have traditionally responded to historic habitat conditions to set restoration objectives for watershed planning. Understanding current habitat conditions and juvenile distribution and seasonal use is vital to this effort.

The City's watershed planning is guided by a *Framework for Integrated Management of Watershed and River Health*. The *Framework* is designed to guide city-activities meeting the City Council's Resolution to assist in recovery of salmonids.

12. The method of estimating abundance will be based on correlations of abundance with surface area. How will the correlations be used to decide which method to employ to estimate abundance?

If abundance in a given habitat type (pools for example) is correlated with surface area, then abundance for all pools will be estimated by expanding the abundance estimate for pools sampled by the ratio of total surface are in pools to surface area of pools sampled. If abundance is not correlated with surface area, then abundance for all pools will be

estimated by expanding the abundance estimate for pools sampled by the ratio of total number of pools to number of pools sampled.

13. Will correlations of abundance and sampling unit volume be examined?

Correlations with surface area are standard; however, correlations with volume can be examined relatively easily.

14. Why not estimate abundance in several different ways (habitat unit, area, volume)?

Why not (other than time and money being the limiting factor)?

15. What does an IBI in a highly disturbed habitat provide?

Our study approach recognizes that biological integrity is best measured at the community or assemblage level because indicator species such as ESA-listed salmonids are insufficiently robust indicators due to the fact that salmonids are probably not able to inhabit all possible habitat niches due to such low numbers.

The methodologies proposed in this study will allow us to accurately document fish assemblages as well as juvenile salmonid habitat use in each stream. We will use this information to calculate an index of biotic integrity (IBI) for each stream reach in the summer.

IBI's provide a tool by which to compare the relative integrity of fish assemblages among streams. This information will play an important role in developing priorities for protecting and restoring Portland's urban streams. IBI's also provide a benchmark for comparison of current conditions to "pristine" conditions. Although a return to "pristine" conditions in the urban setting is not realistic, restoration to some level between current and pristine conditions is possible and desired. Periodic sampling to determine IBI's will provide one method by which to judge progress along that scale.

Attachment: Map