

PROJECT COMPLETION REPORT

PROJECT TITLE: Salmonid Distribution Update, Standardization and Validation Project

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Salmonid Distribution Update, Standardization and Validation Project

Project Summary

Between January and September 1999, the Oregon Dept Fish & Wildlife's Natural Resources Information Management Program was funded to expand the scope of a 1995-96 effort to develop a standardized comprehensive series of maps that illustrate the distribution of anadromous salmonids in Oregon rivers and streams. This project was designed to accomplish four objectives: 1) update the 1995 distribution information for anadromous salmonids in the Willamette basin (including the Sandy basin) to include the most recent information; 2) develop the distribution data in a standardized format so that spawning, rearing, and migratory habitats are depicted and defined consistently across the range of each species; 3) document the source of the information used to determine distribution and habitat utilization for all streams indicated to have species presence; and 4) distribute the updated information to interested users and fish and wildlife managers via the World Wide Web.

In September 1999, a related agreement was made between ODFW and the Oregon Division of State Lands (DSL). The agreement was for DSL to provide funding to ODFW to assist with documenting the data sources that support ODFW's distribution information for all native anadromous salmonid fish species that are listed by the State of Oregon as sensitive, threatened and endangered. The project that resulted from this agreement was titled the *Documentation of Essential Salmonid Habitat in the Willamette Basin Project (W-DESH2 Project)*. Because the objective of W-DESH2 was consistent with objective three described above, and the timeframe for conducting these projects overlapped, the two projects are described as one in this report. Specific references to the original project are referred to as W-DESH1 in this report.

This combined effort began on January 15, 1999 and concluded on November 30, 1999. The first product was a series of Geographic Information System (GIS) coverages and electronic map images for each species/hydrologic unit (HUC) combination. These data and maps were posted on the ODFW web site at <http://rainbow.dfw.state.or.us/data.html> and <http://rainbow.dfw.state.or.us/maps.html>, respectively. The second product was a data table containing source data documentation used to determine fish distribution and habitat usage. This information is stored in a format that allows it to be depicted on ODFW fish distribution maps. The data table was posted on the ODFW FTP site at <ftp://rainbow.dfw.state.or.us/pub/Bowers/wdesh2/>. Hardcopies of documents used to support the distribution data were provided to the StreamNet Library located in Portland, Oregon.

Background

In October 1995, ODFW sought to create a comprehensive series of salmon distribution maps based on information provided by ODFW field staff. The bulk of that process was completed by December 1996. Unfortunately, the approach for designating the utilization of fish habitat was not clearly spelled out. This resulted in a distribution dataset that was populated with significant inconsistencies. Since that time, revisions and updates have been made on an as-needed and/or opportunistic basis. The lack of a comprehensive revision process has caused distribution dataset to become out-of-date.

Most information related to fish distribution is located at individual ODFW field offices as well as several other natural resource agency offices, making it difficult to determine where the various species and their habitat occur within watersheds. While this information is time consuming and often difficult to access, using existing information as the starting point for making updates

ensures that past efforts are not wasted or duplicated. It's equally important though that established criteria, definitions, and data compilation protocols are followed to ensure that new information is compatible and consistent with existing ODFW fish distribution data layers.

Comprehensive and consistent fish distribution information that is easily assessable allows multiple species to be considered when attempting to prioritize and target areas where standard watershed evaluation, monitoring and assessment activities might take place (e.g. watershed assessments, habitat restoration/improvement, blockage removal, fish abundance surveys, habitat evaluation surveys, fish presence/absence surveys, ESA related activities, etc.) Better coordination of resource management decisions in the future could be a secondary benefit when fish distribution information is combined with information from other resource management agencies.

Methodology

The project began by depicting all currently available information on fish distribution and habitat utilization on hardcopy maps for four fish districts in the Willamette basin. ODFW District Biologists and other field staff were asked to review and update the existing distribution information with more current data. This was accomplished by drawing new information directly onto the hardcopy maps using color markers – using a unique color for each habitat use-type. Use-types were divided into three categories, spawning and rearing, rearing and migration, and migration only. The definitions for these three categories are as follows:

1. **Spawning and rearing** is defined as areas where eggs are deposited and fertilized, where gravel emergence occurs, and where at least some juvenile development occurs.
2. **Rearing and migration** is defined as areas outside primary spawning habitats where juvenile fish take up residence during some stage of juvenile development and utilize the area for feeding, shelter, and growth. Some migration also occurs as juvenile and adult fish move between the ocean and spawning areas.
3. **Migration** is defined as areas where juvenile and/or adult fish pass through as they move between the ocean and spawning and rearing areas. While all migratory corridors provide some rearing opportunities, areas with this designation are distinguished by fish moving through fairly quickly making contributions to juvenile rearing insignificant.

The project data compiler oversaw all data modifications to ensure the project criteria and definitions were adhered to, and to respond to questions about project protocols. All updated information was incorporated into an electronic database.

The project data compiler also identified supporting data sources (referred to as documentation in this report). Written information describing the observed life stage and/or behavior of a given species and run of fish in a specific stream was considered appropriate documentation if stream name, survey date, species/run observed, and number and/or type of observations (redds, total live fish, visual sighting, etc.) was included in the observation account. Other useful pieces of information included distance surveyed, specific survey location, and the extent to which fish were seen in the survey location.

Documentation was first obtained by reviewing ODFW and StreamNet Library holdings. Subsequent to that, four Willamette basin ODFW district offices were visited in order to collect additional data sources with the help and input of district staff. Each data source was carefully reviewed using established criteria, and where observations of salmonid fish species were noted, documentation was recorded in a data table. The documentation was distinguished

using three categories based on the level of geographic precision associated with the source data. These three categories were Site & Observation Specific, Site Specific, and Non-Site Specific documentation. The definitions for these three categories are as follows:

1. **Observation and Site-Specific Data Source** is defined as data sources that document one or more observations of the mapped species throughout a specific area within the stream, thereby verifying the presence of the mapped species throughout the specific area indicated.
2. **Site-Specific Data Source** is defined as data sources that document one or more observations of the mapped species somewhere within a specific area within the stream, thereby verifying the presence of the mapped species. However, the data source does not specify whether the mapped species was observed throughout the specific area indicated.
3. **Non Site-Specific Data Source** is defined as data sources that document one or more observations of the mapped species in a stream, thereby verifying the presence of the mapped species. However, the specific location of the mapped species within the stream is not identified in the data source.

As documentation records were entered in the data table, the data source for the records was assigned a reference number. This reference number was recorded with each documentation record so that the record could be linked back to its' data source. Data sources not already included in one of the library holdings were provided to the StreamNet Library, cataloged, and summary descriptions made available via the World Wide Web at www.streamnet.org/library.html.

Following the first three phases of the project (initial map review, documentation data compilation and electronic data processing), new maps were produced illustrating the revised distribution use-types, as well as areas where supporting data sources had and had not been identified. District staff were then provided an opportunity to review these maps for errors and/or omissions, identify and provide additional information needed to bring the maps up to the current state of knowledge and to identify any additional or more recent data sources. Finalized data and maps were processed into electronic format and made available on the ODFW web site at <http://rainbow.dfw.state.or.us/data.html> and <http://rainbow.dfw.state.or.us/maps.html>, respectively. The electronic data table containing the data documentation sources was posted on the ODFW FTP site at <ftp://rainbow.dfw.state.or.us/pub/Bowers/wdesh2/>.

Results

Fish Distribution Update

The fish distribution records that resulted from the W-DESH1 and W-DESH2 efforts increased the known salmonid distribution in the Willamette basin from 5,908 miles to 7,496 miles (Table 1). The data included distribution records for all 13 fourth-field HUCs within the Willamette and Sandy River Basins, and consisted primarily of records for anadromous five species (Fall and Spring Chinook, Winter and Summer Steelhead, and Coho; **Appendix 1**). Some resident fish information from specific watersheds was also obtained. The resident species and watersheds captured were Rainbow Trout and Lamprey in the South Santiam, and Cutthroat Trout in the McKenzie, Middle Fork and Coast Fork Willamette.

Table 1: Summary of changes in fish distribution mileage for the five Willamette and Sandy basin anadromous salmonid species targeted by the W-DESH1 and W-DESH2 projects.

Species ¹	Distribution miles resulting from 1995-96 development effort ²	Distribution miles resulting from the W-DESH 1 development effort ³	Distribution miles resulting from the W-DESH 2 development effort ³
Fall Chinook	365.79	538.21	584.36
Spring Chinook	1066.47	1619.95	1629.40
Winter Steelhead	2095.75	2580.27	2580.27
Summer Steelhead	951.88	1098.73	1098.73
Coho	1425.69	1603.48	1603.48
Total miles	5908.58	7440.64	7496.24

¹ Only distribution for the anadromous species is included in this table.

² Distribution mileage best represents species presence, although an attempt was made to delineate between use-types during the 1995-96 effort.

³ Distribution mileage includes spawning and rearing, rearing and migration, and migration only use-types.

Fish Distribution Documentation Update

The data table available at the conclusion of this effort contained 1,184 documentation records: 709 records from the W-DESH1 Project, and 475 records added during the W-DESH2 Project. The data included records for all 13 fourth-field HUCs within the Willamette and Sandy River Basins, and consisted primarily of records for the same anadromous and resident species mapped during the fish distribution update process.

The data source collection effort in the W-DESH2 Project focused on areas where no distribution documentation previously existed. As a result, distribution was documented for 18 HUC/Species Units that previously had no documentation. Table 2 summarizes these results.

Table 2: Summary of documentation available for each HUC/Species Unit focused on during the W-DESH1 and W-DESH2 Projects in the Willamette and Sandy Basins.

HUC	HUC Name	Summer Steelhead	Winter Steelhead	Spring Chinook	Fall Chinook	Coho
17080001	Lower Columbia	SN	SN	SN	SN	SN
17090001	Middle Fork Willamette	0	SN	S	X	X
17090002	Coast Fork Willamette	0	S	N	X	X
17090003	Upper Willamette	0	SN	SN	S	SN
17090004	McKenzie	N	SN	SN	X	X
17090005	North Santiam	S	SN	SN	S	0
17090006	South Santiam	S	SN	SN	S	X
17090007	Middle Willamette	0	S	0	S	SN
17090008	Yamhill	X	SN	0	X	SN
17090009	Molalla-Pudding	S	SN	SN	S	SN
17090010	Tualatin	S	S	X	X	SN
17090011	Clackamas	S	S	SN	S	SN
17090012	Lower Willamette	S	S	N	0	SN

HUC/Species Unit Documentation Summary Table Key:

0 = Distribution based on professional judgement, but no documentation found

X = No distribution

S = Site specific documentation available

N = Non-site specific documentation available

SN = Both site and non-site specific documentation

Shaded areas: Documentation added during W-DESH2 (where none previously existed)

For the five anadromous salmonid fish species found in the Willamette and Sandy Basins, a total of 1,104 miles of distribution were documented: 912 miles during the W-DESH1 effort and 192 miles during the W-DESH2 effort. In addition to this, 56 miles of distribution were added as a result of documentation collected and reviewed during W-DESH2. Table 3 summarizes the effects of the W-DESH 1 and W-DESH-2 Projects on ODFW's fish distribution documentation data in the Willamette and Sandy Basins.

Table 3: Summary of fish distribution stream miles supported by documentation as a result of the W-DESH1 and W-DESH2 Projects in the Willamette and Sandy Basins.

Species¹	Stream miles with documentation resulting from the W-DESH1 effort²	Stream miles with documentation resulting from the W-DESH2 effort	Number of miles with new documentation added
Fall Chinook	277.91	296.05	18.14
Spring Chinook	335.14	422.00	86.86
Winter Steelhead	282.21	291.88	9.67
Summer Steelhead	0	27.45	27.45
Coho	17.05	67.04	49.99
Total miles	912.31	1104.42	192.11

¹ Only distribution for the anadromous species is included in this table.

² Prior to W-DESH1, no electronic documented data sources records were available.

Findings/Conclusions

The significant increases (+1,588 miles total) in fish distribution mileage that result from this effort were primarily due to three factors. The first was new information that had become available since the 1995-96 distribution update process. The second factor was a better understanding of what was being asked for on the part of district staff. This better understanding resulted from providing the standardized terms and definitions prior to asking the staff to modify the existing data. The third factor that helped to increase the total distribution mileage was conducting the documentation review in conjunction with the fish distribution updating process (during the W-DESH1 effort). This served to extend several existing distribution records beyond the district staff's professional judgement.

The majority of Oregon's fish observation data exists on raw data forms or field notes, which are located in the field offices. Most of these forms and notes lack sufficient information to allow the identification of the specific location in finer detail than the stream level, and rarely did one data source verify a considerable portion of the distribution within a stream for a particular species. As the percentage of documented distribution increased, it became progressively more difficult to find data sources that verified distribution for areas that were not already documented.

Despite the challenges these findings posed, the results of this effort were beneficial. During the relatively short duration of this effort, we were able to provide a significant contribution toward more accurate and verifiable distribution data for the five anadromous salmonid fish species found in the Willamette and Sandy Basins. As an example, sixty-six percent of the anadromous fish distribution is now documented in the Willamette and Sandy Basins (Table 4). This includes the portions of streams downstream from the sections with actual documentation, and includes the Columbia River between the Willamette River and the Sandy River.

Table 4: Summary of the percentage of documented distribution for the five anadromous species found in the in the Willamette and Sandy Basins at the conclusion of the W-DESH1 and W-DESH2 Projects.

Species	Current % of distribution documented including downstream segments
Fall Chinook	100.00%
Spring Chinook	73.33%
Winter Steelhead	58.69%
Summer Steelhead	51.96%
Coho	67.37%
Percentage of distribution for all five species that are documented	65.97%

With additional time and resources, future efforts to locate distribution and documentation data could yield further benefits, including complete documentation of distribution and habitat usage for these and other species for the entire Willamette and Sandy Basin area. It should be noted however, that efforts to increase the percentage of documented distribution become more costly and time consuming as the documentation percentage increases. As stated earlier, it becomes progressively more difficult to find documentation for undocumented areas. This fact makes the positive results obtained for Fall Chinook, where we now have 100% of the distribution documented, even more remarkable. For future efforts, further collaboration with other agencies and institutions will likely be necessary to achieve similar results for the other species.

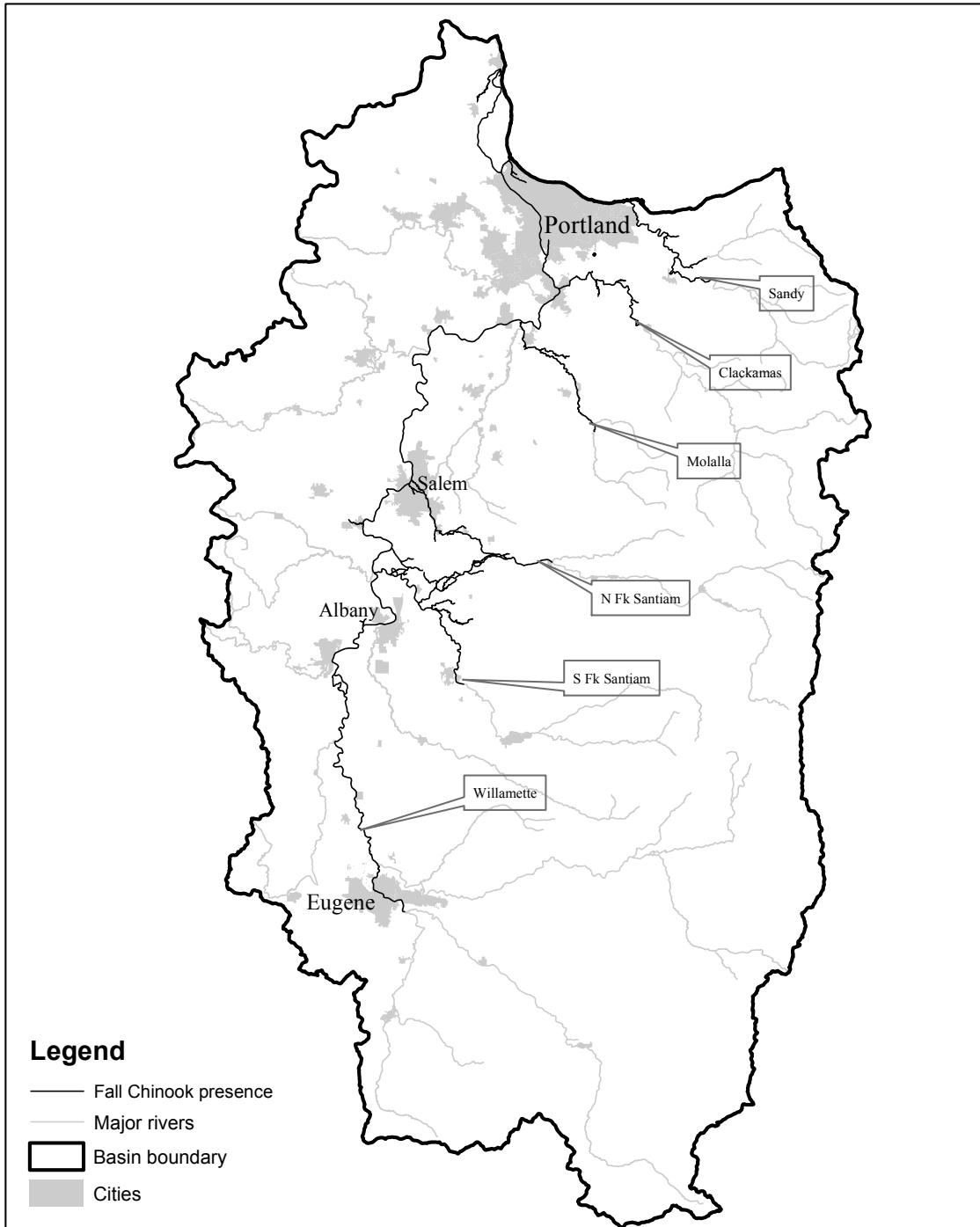
Acknowledgements

We would like to thank the many district staff and managers who gave of their time to review all the maps and provide observation records. We would especially like to recognize Briana Sounhein for her work as the Lead Data Compiler for the WDESH-1 Project, as well as for her efforts during project design, and managing the various data pieces throughout the project.

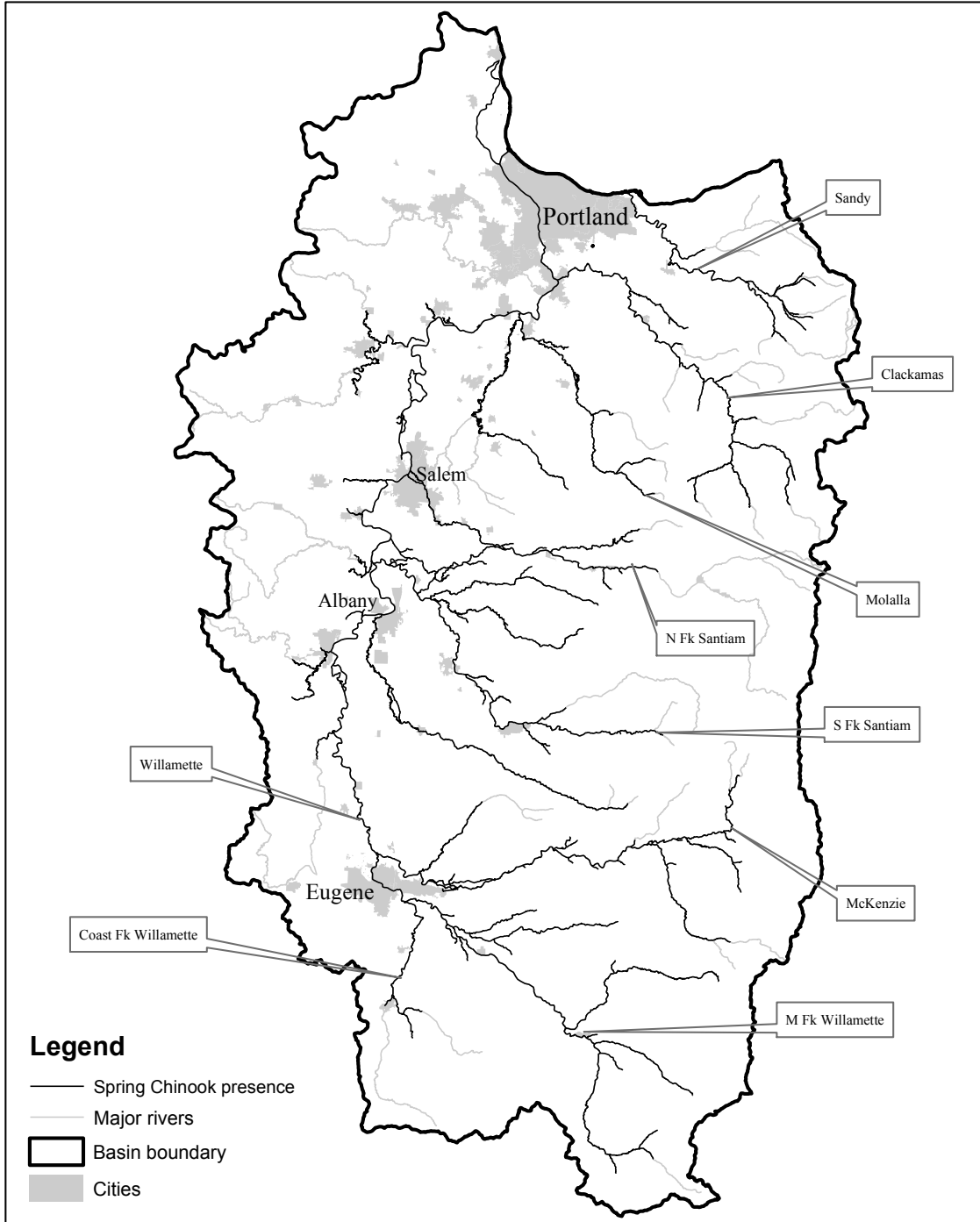
Appendix 1

Fall Chinook, Spring Chinook, Winter Steelhead, Summer Steelhead, and Coho Fish
Distribution Maps Resulting From the W-Desh1 and W-DESH2 Projects.

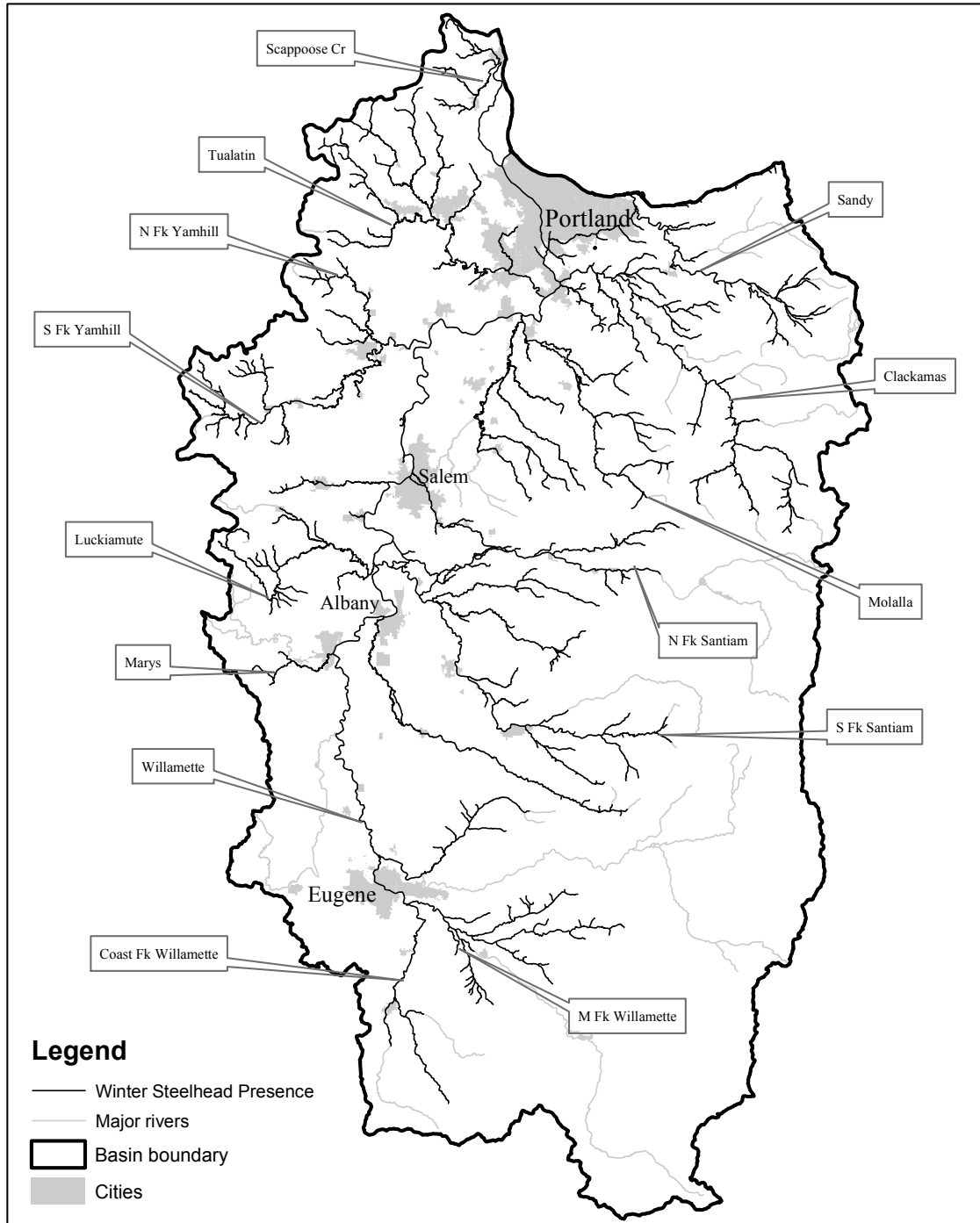
Willamette Fall Chinook



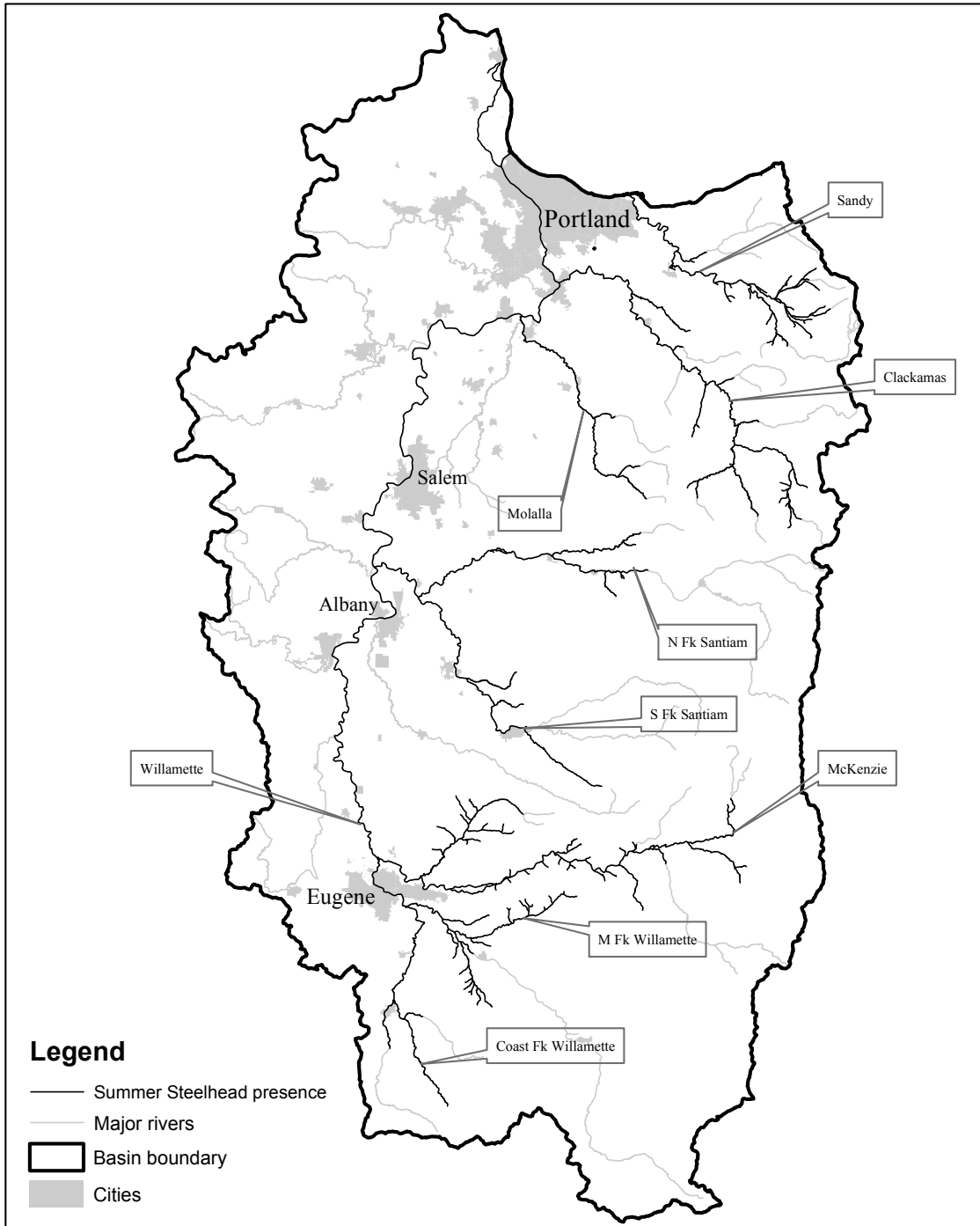
Willamette Spring Chinook



Willamette Winter Steelhead



Willamette Summer Steelhead



Willamette Coho

