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Columbia River Basin Salmon Population/Unit Crosswalk Geodatabase and Online Interactive Mapping Application

Background

In the last several years, major work groups have, independently, defined salmon populations and population boundaries in the Columbia River Basin. Often, different criteria and information were used for each of these processes. The majority of the population/unit boundaries and characteristics are similar among these efforts, but there are also important differences and discrepancies between the sets of population/units.

The region has two options as we plan for the future. We can continue with present practices, each new effort defining populations for its own use, which may accumulate additional discrepancies over time. This approach will make data management more difficult - difficult to share many types of information, and difficult to evaluate the effects of restoration efforts on fish production. Or, we can develop a new approach that creates a unifying framework that supports future activities and to which future working groups can contribute. Such a framework will support information sharing and collaboration.

We propose that the region needs a crosswalk of fish population/units already defined by each regional managing entity. The crosswalk will be a first step in a unifying framework and will be built as a geodatabase in which each manager's fish pop/units are defined spatially and displayed in an online interactive mapping application. Visualizing how similar or different we as fish managers define the attributes of our population/units and how we bound them on the landscape is the first step toward agreement of a single name and definition of a fish pop/unit. Whether we agree, or agree to disagree on the names and characteristics of fish pop/units, the crosswalk geodatabase and mapping application could allow managers to place themselves on the landscape within the bounds of their fish pop/units and know that data collected by another manager under a different name or in another watershed with overlapping boundaries are data about their fish pop/unit.

Geodatabase

CRITFC has a draft geodatabase of fish pop/units based on the 6-Level (12-digit) Hydrologic Unit Code (HUC or subwatershed) which will display the spatial distribution of species pop/units as polygons. This geodatabase currently contains, or in the near future will contain, the following datasets:



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1. Columbia River Technical Recovery Teams (TRTs) fish unit boundaries. Two TRTs operate in the Columbia Basin, for the Lower Columbia and Interior Columbia, and they have defined salmon populations differently in their areas of responsibility. They also define nested levels of fish pop/units, for example, the Interior Columbia TRT (ITRT) spatial datasets contain ESU, Major Population Groups, and Major and Minor Spawning Aggregates. This data is outdated; the TRTs data is not based on the new seamless national Watershed Boundary Dataset (WBD). CRITFC had already converted most of its spatial data based on HUCs to the new WBD and several other entities in the basin, including StreamNet have or are converting to the WBD. Some 6-Level HUC boundaries have changed from the past regional datasets, thus TRT boundaries and CRITFC boundaries currently do not match in some local areas. We will be coordinating with NOAA staff in the winter of 2011/12 to collect the new spatial data of their TRT population boundaries based on the WBD for the Fish Pop/Units Crosswalk project.
2. Population/unit boundaries based on the Subbasin Plans and a subsequent regional review coordinated by CBFWA were the foundation of a geodatabase CRITFC original built for its own purposes. Attributes about the populations, such as spawning timing, genetic fitness, and harvest management are included. This data is currently in an update phase – additional species and population from subbasin plans are being added. This list of populations may not be a complete list of all species and pop/units as defined by other management entities. A species or population could not be mapped if the subbasin plans did not define the population's distribution. Also – not all population/units were reviewed by CBFWA members.
3. Hatchery populations defined as integrated or segregated by the Hatchery Scientific Review Group (HSRG) during the Columbia Basin Hatchery Reform Process have been added to the draft geodatabase. At the time that CRITFC built data for HSRG, and due to a time constraint, we only included fish pop/unit boundaries of the spawning areas. Missing from most of this dataset is the rearing and migration distribution areas that are usually included in datasets from other managing entities. This data will need to be completed.
4. Recently we were made aware that the Washington Department of Fish and Wildlife had a spatial dataset of Washington State fish pop/units called Salmonid Stock Inventory (SaSI) and there was interest in including their populations in the latest basin data/information collection effort – Coordinated Assessment. CRITFC received a spatial data set of SaSI and was able to make some comparisons of the three pop/units data sets listed above and the SaSI data set - the SaSI dataset added pop/units to a growing list of defined population/units. Currently SaSI data are not in the database; CRITFC will need to convert SaSI linear distribution data to 6 Level HUC polygon distributions. The physical task of conversion is simple; any difficulty will be in determining which polygons should be included when linear distribution is only a fraction of the subwatershed. CRITFC will be coordinating with WDFW to make the conversion.



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5. CRITFC expects that there are other datasets of fish pop/units that should be included in the crosswalk for the Columbia Basin (Oregon, Idaho, tribes?). If true, these datasets will need to be collected and converted to the geodatabase tables.
6. Any statistics on the fish pop/units (VSP parameters, etc.) that managing entities wish to share on their defined fish pop/units could also be included in this crosswalk. Currently only the CBFWA/subbasin planning pop/units include detailed information, although statistics on the hatchery populations from the HSRG are available and could be added easily.

Interactive Mapper

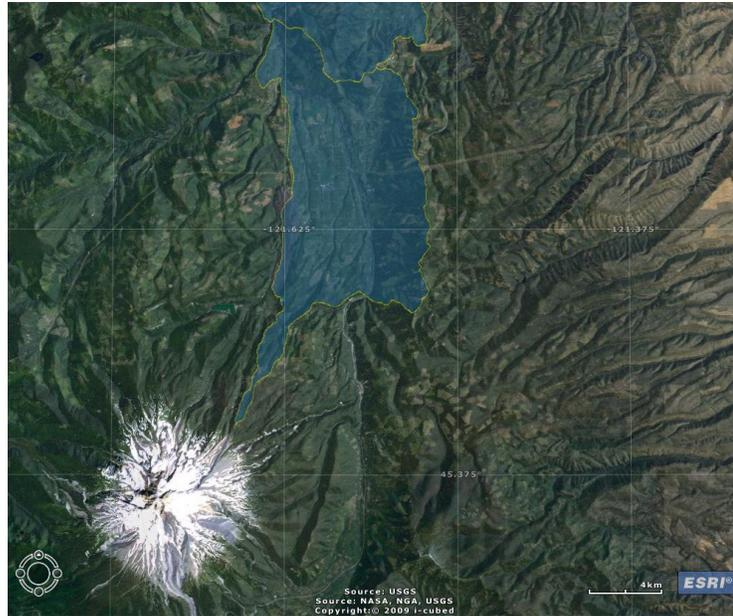
The interactive mapping tool could take on many forms. The simplest tool would display boundaries (HUCs) of a fish pop/unit when a name is selected or produce a report of all pop/units when a subwatershed HUC is selected that are within the boundaries of pop/units. A more complicated tool would have the capability to collect data corrections to pop/units attributes or distribution area, collect data to create new pop/units not included in the dataset, and could be used to identify raw data capture locations. The following components of the tools would need to be completed:

Simple Tool

- Base Map. Create a base mapping website module that uses Google or Bing maps as reference material with a WBD HUC layer as the main spatial data. The Google or Bing maps, at minimum, should have three views/base data; satellite/aerial base, USGS topo base, and a road layer base. These three views, which can be toggled on and off, will help the user identify the correct HUC. CRITFC is currently upgrading its website and our interactive mapping capabilities. With funding or other agency staff support, CRITFC could have a working template base map module within a couple of months.



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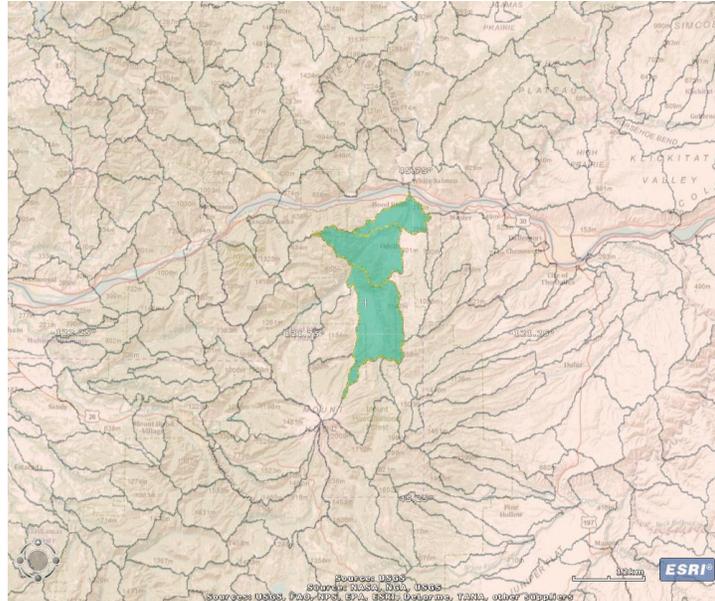


Example of a Hood River Fall Chinook HUC spatial layer overlaid on a satellite/aerial base.

- Create GIS files and web reports from geodatabase. Write (VBA) script to read fish pop/unit extents from database and create population boundaries and web reports that detail all fish pop/units present for each subwatershed (HUC6). This simple tool will allow a user to map a pop/unit and also to click on a single HUC6 on the map and receive a report of all fish pop/units with distribution in that HUC. Reports will be easily updated with the script when changes are made to the database information.



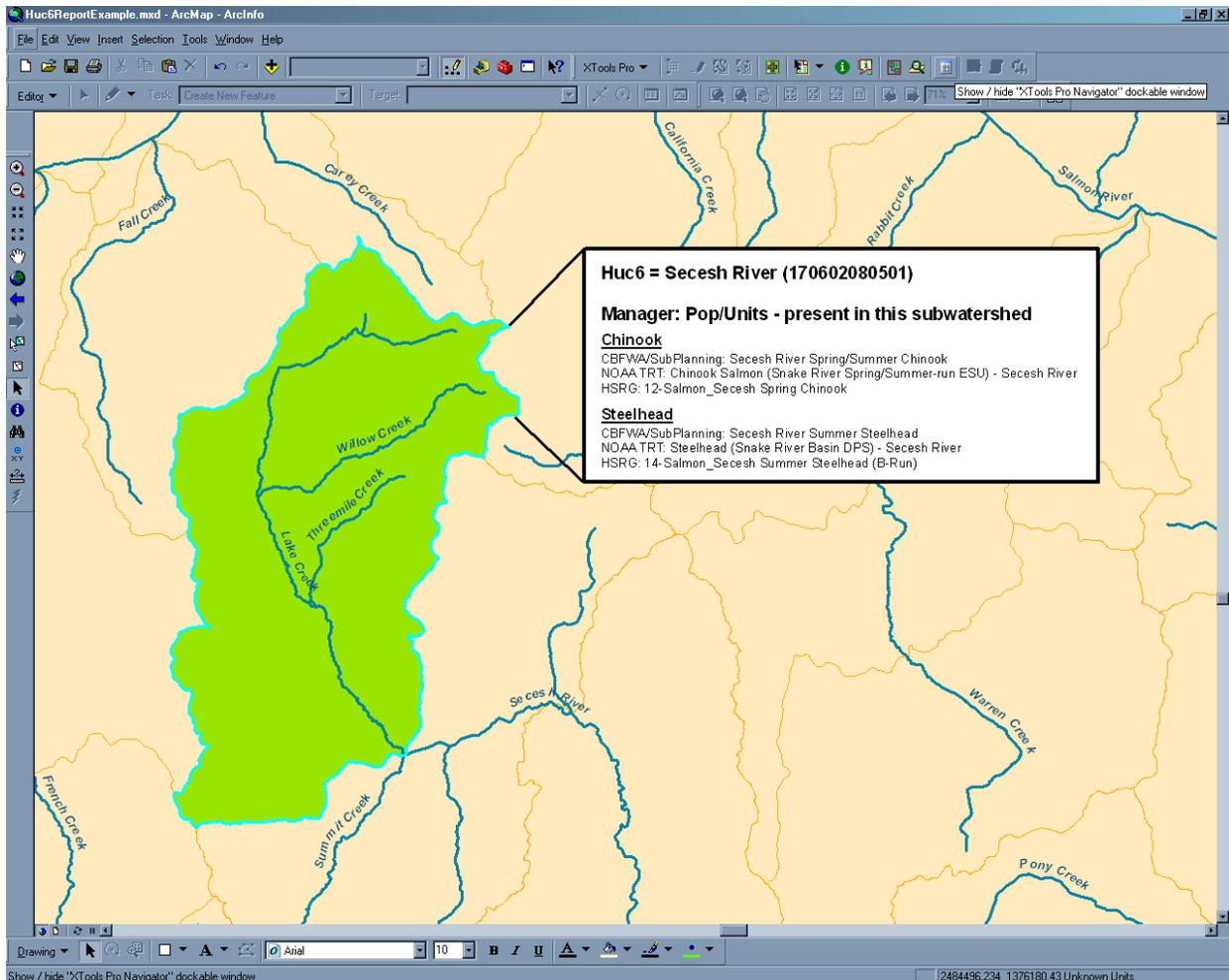
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Example of query selection return of pop/unit Hood River Fall Chinook distribution - HUCs overlaid on a topo base. Selected attributes for a query producing the map above: *Species-Chinook, Run-Fall, Subbasin-Hood, selected Hood River Fall Chinook.*



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Example of a report of all fish pop/units with distribution in a HUC6. Query returned after the HUC is selected with a mapping tool.

More Complicated Tools

- Tool for Editing. Create web-based interactive forms for data review. Create data/information collection and versioning tables in geodatabase to collect changes suggested by reviewers for editing of fish pop/units attributes and spatial distribution. A review tool would allow the user to select a pop/unit for attribute changes or select a HUC for spatial changes. Upon selection of a pop/unit or HUC a report form would be available in which the current attributes of the pop/unit can be viewed along with boxes for text to suggest changes. For the spatial distribution a form would appear for the reviewer that would allow them to indicate whether a HUC should or should not be included in the spatial distribution of a pop/unit. All information from yes/no toggles or text boxes would be saved in the geodatabase or other database for later



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editing of the pop/unit, once all reviews were complete. In edit mode, reviewers would be able to see the suggested edits of other reviewers.

- **Tool for Information Collection.** Create web-based interactive forms for data collection. This tool could take on many uses for collection of data on fish pop/unit parameters and/or display summary data. The current effort in the basin, the Coordinated Assessment Questionnaire, to collect information on pop/unit indicators has demonstrated the need to start to tie tabular data with the spatial location where data are collected, allowing managers to visualize data collection gaps for pop/units, ESUs, etc. One timely use of such a tool would be the location of raw data collection. In the same way that the Editing Tool functions, fish managers would select the HUC that contains the weir where adults are counted, or select the HUCs where spawning surveys are conducted, for example, and a form would be provided to enter information on what type of data are collected, what are the methods, what species is the target (steelhead, Chinook, etc.), etc. The information could then be linked to the pop/unit that occupies the HUC and areas of data collection could be mapped to display gaps.

Workload

Currently we have over 400 described Columbia River populations of salmon in a crosswalked list of names (crosswalk - compared spatially) from many managers, many of these names refer to the same fish. The region has recognized a need for such a set of data and tools. The Columbia River Inter-Tribal Fish Commission will work through PNAMP for coordination of working groups to organize ideas about the data sets and tools (described above) to be incorporated into the crosswalk geodatabase and interactive mapper. CRITFC will coordinate with the TRTs and WDFW on conversions of their data into the seamless national Watershed Boundary Dataset for incorporation into the Crosswalk database and tools. StreamNet has offered to help where they can on the interactive mapper and CRITFC will work with StreamNet to explore ideas of how to link this new tool with their data. Once the initial tool and data are ready for users, we will need a review of each fish pop/units defined by the fish managers. We estimate that the actual work time to finish the geodatabase and create an online interactive mapper and tools would require about nine staff months, which includes the time to facilitate a regional review, and to update the geodatabase according to the reviews (See table below for details). However, CRITFC is aware that each step of this project and several data set conversions will take coordinated efforts in workshops and meetings and that this will take time. We expect the effort will be distributed over approximately one year.



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Approximations of staff time needed to complete tasks.

Task	Staff	Time	Comments
Geodatabase QA/QC data, adding in any missing information: TRT conversion, HSRG missing HUC information	TRT staff in coordination with CRITFC	3-4 weeks, fulltime	CRITFC has 2-3 employees that could work the three geodatabase tasks simultaneously.
Geodatabase Collect fish pop/units not in database and create new datasets to be added to geodatabase such as conversion of SaSI.	CRITFC – 1 staff Or WDFW – 1 staff	2 weeks – unknown, fulltime	Depends on number of new datasets to be added, if only SaSI, 2 weeks, assuming WDFW cooperation on decisions of converting from linear to polygon version.
Geodatabase Collect and prepare tabular data on fish pop/units for linking with each fish managers dataset	CRITFC – 1 staff	2-3 months, part-time	Depends on cooperation of fish managers to create and send data.
Mapper and Tools Create a base mapping website module	CRITFC or StreamNet – 1 staff	2-4 weeks, fulltime	Depends where the website is hosted and which software is used to build the mapper.
Mapper and Tools Mapping crosswalk geodatabase for viewing only	CRITFC or StreamNet – 1 staff	2 weeks, fulltime	Build and test
Mapper and Tools Review and data capture tools	CRITFC or StreamNet – 1 staff	4 weeks, fulltime	Build and test
Mapper and Tools Run review and edit tabular and spatial data after review	CRITFC – 1 staff	3 months, part-time	Depends on the cooperation of reviewers.