

Oncor

A Geoscientific Analysis and Synthesis Database for the Columbia Estuary Ecosystem Restoration Program (CEERP)

The Project

The development of the *Oncor* database was initiated in 2012 by the U.S. Army Corps of Engineers, Portland District. Pacific Northwest National Laboratory (PNNL) researchers are developing this state-of-the-art, estuary-wide data management and information discovery/retrieval system. *Oncor* users will be able to retrieve action effectiveness and related data from monitoring and research efforts for the Columbia Estuary Ecosystem Restoration Program (CEERP). The intent is for *Oncor* to enable synthesis and evaluation of data generated by multiple entities, the results of which can then be applied in subsequent CEERP adaptive management and decision-making. The database is called *Oncor* after the genus *Oncorhynchus*, which includes Pacific salmon and steelhead, the focus of CEERP estuarine and tidal freshwater habitat restoration efforts.

The Process

The development of *Oncor* is a finite, 3-4 year project (2012-2015) to be followed by technology transfer to a regional entity for long-term support and the addition of newly generated data. Development involves the following activities:

- Design and develop an adaptive and scalable estuary data model (database structure and linkages)
- Develop data exchange templates and data reduction procedures to provide a mechanism for bringing research, monitoring, and evaluation (RME) data into *Oncor*
- Gather action effectiveness RME and related data from multiple regional entities
- Standardize and quality control check RME data to populate the *Oncor* spatial database
- Develop a web-accessible, map-based

user-interface to discover and apply data from multiple perspectives for multiple users (manager, researcher, restoration practitioner, etc.)

- Import or link regionally available datasets, to simplify access and the use of these data together with the RME data in *Oncor*
- Develop analysis questions and use cases that align with CEERP objectives to query and test the database
- Coordinate with CEERP funding agencies and regional stakeholders to ensure *Oncor* development is aligned with needs and avoids duplication of effort

The Data

Action-effectiveness monitoring data are being collected in shallow water and at restoration and reference marshes, shrub-dominated wetlands, and forested wetlands (Figure 1).



Figure 1. Tidal freshwater marsh (upper left), beaver dam in shrub-dominated wetland (upper right), riparian forest (lower left) and Sitka spruce swamp (lower right).

Photos courtesy of PNNL

The early development of *Oncor* prioritizes measurements and metrics of salmon presence and habitat use, because of the focus of the CEERP on improvements for juvenile salmon from the Columbia River Basin. In addition, selected habitat data important for the assessment and adaptive management of

ecosystem restoration are prioritized: plant communities, topography, photo points, sediment accretion/erosion rate, water surface elevation, temperature, and inundated area.

The Tools

Oncor will make the RME data collected under the CEERP available for examination and analysis together with other key datasets to enhance overall knowledge gained. For example, *Oncor* includes current and historical aerial and satellite imagery, topography and bathymetry. Tools enable bathymetry to be sampled by the *Oncor* user to produce cross-section profiles of larger channels (Figure 2). Cross-sections of smaller channels at wetland sites are surveyed under the CEERP.

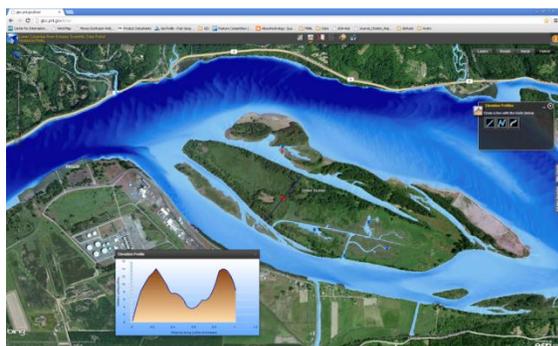


Figure 2. Web-based GIS tools/geoprocessing functions to interact with data, for example, by querying LiDAR and bathymetry data to produce cross-section profiles.

Similarly, water surface elevation and temperature data collected at CEERP sites can be paired with LiDAR topography data and aerial imagery (Figure 3).



Figure 3. Interactive selection, access and retrieval of instrument data and time-series plots (screen shot).

Users can define the time frame(s) of interest to retrieve data for analysis outside *Oncor*, or

perform typical calculations within *Oncor* (Figure 4). Related information such as streamflow gage data from nearby areas can be queried to enhance analyses at multiple spatial and temporal scales.

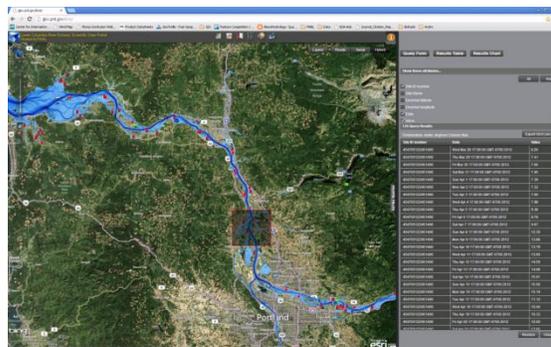


Figure 4. Retrieval of “virtual” data time-series defined by an interactive map-based box selection and user-based query filter to narrow date range and attributes of interest (e.g., water temperature, stage, etc.).

Peer Review of *Oncor* Prototype

Peer review of the *Oncor* prototype will be initiated with a demonstration by PNNL at the Lower Columbia Estuary Partnership’s Science Work Group meeting on April 23, 2013 and continued through the calendar year. The utility of *Oncor* will be strengthened by the participation of representatives from various potential user groups including CEERP managers and data generators (i.e. restoration practitioners and researchers). In addition to beta testing the prototype database, the methods for data submission developed by PNNL (data exchange templates and data reduction protocols) require review and revision through a regional process involving testing by data generators before they are released for *Oncor* data submission. The goal is to make the *Oncor* prototype web-accessible by LCRE regional stakeholders during calendar year 2013 for trial and to load 2013 field data. At the conclusion of the project, the database and tools will enable synthesis and evaluation to support the ecosystem restoration mission of the CEERP and other programs.

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