Update of Hydrology of the Beaver Creek Estuary at Ona Beach State Park near Newport,

By **Glen W. Hess**[1]

Study Objectives

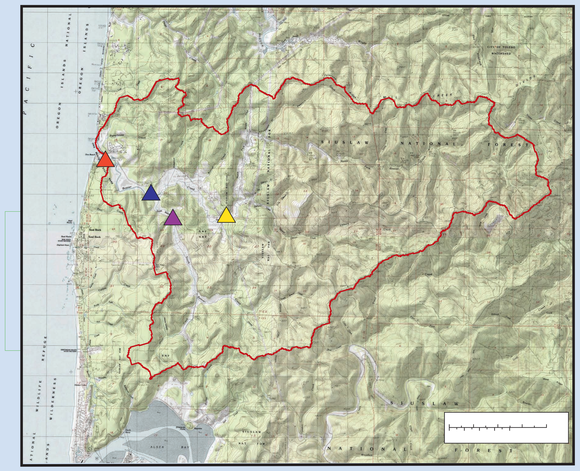
1. Collect baseline hydrologic data during 2010–2013 in the estuary at several locations and over time.

2. Assess the extent of tidal influence by observing water level fluctuations, water temperature, and salinity in the estuary over a 4-year period by determining:

- Runoff from upland areas
- Pacific Ocean tidal fluctuation and extent of estuary inundation indicated by extent and duration of saline water
- Variation of stream cross sections of water temperature and specific conductance stratification over different flow regimes

Map showing study area and outline of drainage area of Beaver Creek

near Seal Rock, OR



Explanation

- Beaver Creek drainage basin boundary
- Beaver Creek continuous monitor at Highway 101
- Beaver Creek continuous monitor just downstream of South Beaver Creek 2 miles upstream of mouth.
- Beaver Creek near NW Beaver Valley Drive
- South Beaver Creek near mouth

Methods of Data Collection

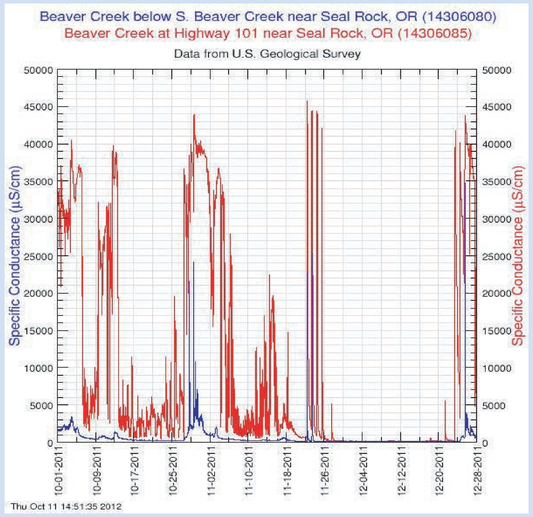
- Continuous stage, water temperature, and specific conductance (salinity) data are collected at two sites – Beaver Creek at Highway 101 and 2 miles upstream just downstream of South Beaver Creek.
- Integrated data loggers are used to store the data. Data are downloaded about every 8 weeks.
- In addition to continuous monitors, periodic streamflow measurements, water temperature, and specific conductance are collected at the continu ous data sites and two upland Beaver Creek sites just upstream of the OPRD boundary at NW Beaver Valley Drive and near the mouth of South Beaver Creek.
- Tidal data is collected from the NOAA site Yaquina Bay at Newport (not shown on map). Precipitation data is collected at Newport Airport (not shown on map) .

U.S. Department of the Interior
U.S. Geological Survey

View of Beaver Creek looking westward towards Pacific Ocean, south of Newport, OR.

Study Area Description

- The Beaver Creek State Natural Area, at the terminus of a 34 square mile basin just south of Newport, in Lincoln County, is home to native flora and fauna, and is part of Ona Beach State Park, owned by the Oregon Parks and Recreation Department (OPRD).
- Beaver Creek lies between the Yaquina River to the north and the Alsea River to the south.
- The estuary extends from the mouth of Beaver Creek at the Pacific Ocean upstream approximately 3 river miles.
- OPRD has recently acquired property in the estuary, and is developing plans for restora - tion to a more natural condition of a previously diked, channelized, and drained wetland area.
- Federal lands in the North Fork of Beaver Creek (upstream of the estuary area) are desig - nated as a Key Watershed in the Northwest Forest Plan, making it a high priority for main- tenance and restoration of aquatic habitat and species .
- The lower reaches of the Beaver Creek watershed are designated as critical habitat for coho salmon.



Variation of Tide and Salinity, and Water Temperature in the Beaver Creek Estuary for 2010–2012

Tide and Salinity: This graph from mid-October to November 2011 shows Beaver Creek specific conductance (a surrogate for salinity) data at two upstream sites – Beaver Creek at Hwy 101 and Beaver Creek 2 miles upstream of mouth. High specific conductance (above 20,000uS/cm) in water at the Beaver Creek at Hwy 101 site results from storm surges when seawater overtops a sand bar riffle near the beach (see photos). These events correlate with tides above 9.5 feet, measured at the tidal stage gage at nearby NOAA Yaquina Harbor. Specific conductance data from the most downstream Beaver Creek site, Highway 101, indicate that storm-surge conditions allowed seawater to enter the estuary 13 times during September–May in 2010–2012.

Water Temperature: Oregon State water temperature standards stipulate that a 7-day moving average of the daily maximum temperature shall not exceed 64 degrees Fahrenheit or 18 degrees Celsius. The 7-day moving average of maximum water temperature exceeded 18.0 C during the 2010–12 period at these gages: For the Hwy 101 gage, 25% days in 2010–2012 exceeded the standard. For the gage below South Beaver Creek, 20% of da ys in 2010–2012 exceeded the standard. For the gage at NW Beaver Valley Drive, 0% of days exceeded the standard. These water temperature data can be an indicator of estuary hydrology and thermal regimes in the study area.

View of Beaver Creek near mouth and (inundated) low water riffle during high tide, November 12, 2012

View of Beaver Creek near mouth and exposed low water riffle during low tide, November 23, 2010

Future Studies

- Additional analysis of baseline data over 2010-2013 to evaluate the results of ongoing restoration efforts. Stage, flow, thermal, and salinity characteristics at several locations within the basin need to be investigated. A history of 2010-2012 detailed stream cross sections of water temperature and specific conductance at the three sites are providing additional information about WT and SC stratification during storm surge periods. These data will guide park managers to understand flora and fauna possibilities for future Beaver Creek ecosystem restoration efforts.

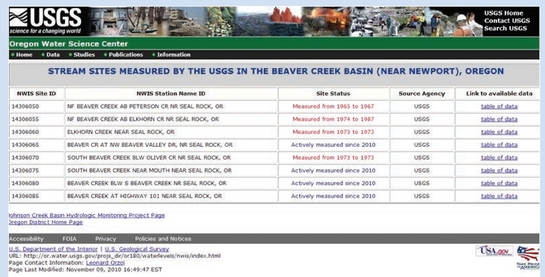
Resources

Oregon Parks and Recreation Department
- *http://www.oregonstateparks.org/park_261.php*

USGS Beaver Creek page and data online
- *http://or.water.usgs.gov/beaver_creek*

USGS Data Grapher
- *http://or.water.usgs.gov/cgi-bin/grapher/graph_setup.pl?basin_id=ncoast&site_id=14306065#ste*

Real-time Monitors & Streamflow:
- *http://or.water.usgs.gov/beaver_ona/streams/index.html*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STREAM SITES MEASURED BY THE USGS IN THE BEAVER CREEK BASIN (NEAR NEWPORT), OREGON

NWIS Site ID	NWIS Station Name ID	Site Status	Source Agency	Link to available data
14306050	NF BEAVER CREEK AB PETERSON CR NR SEAL ROCK, OR	Measured from 1965 to 1967	USGS	table of data
14306055	NF BEAVER CREEK AB ELKHORN CR NR SEAL ROCK, OR	Measured from 1974 to 1987	USGS	table of data
14306060	ELKHORN CREEK NEAR SEAL ROCK, OR	Measured from 1973 to 1973	USGS	table of data
14306065	BEAVER CR AT NW BEAVER VALLEY DR, NR SEAL ROCK, OR	Actively measured since 2010	USGS	table of data
14306070	SOUTH BEAVER CREEK BLW OLIVER CR NR SEAL ROCK, OR	Measured from 1973 to 1973	USGS	table of data
14306075	SOUTH BEAVER CREEK NEAR MOUTH NEAR SEAL ROCK, OR	Actively measured since 2010	USGS	table of data
14306080	BEAVER CREEK BLW S BEAVER CREEK NR SEAL ROCK, OR	Actively measured since 2010	USGS	table of data
14306085	BEAVER CREEK AT HIGHWAY 101 NEAR SEAL ROCK, OR	Actively measured since 2010	USGS	table of data

Johnson Creek Basin Hydrologic Monitoring Project Page
Oregon District Home Page

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