

NOAA 2014 Protected Species Studies of Eulachon in Oregon and Washington

PROGRESS REPORT

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Reporting Period: January 1, 2015 to June 30, 2015

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Project accomplishments by objective are:

A). Stock Assessment Objective

1. *Complete larval sampling in the Columbia River and Oregon and Washington coastal rivers December 1- May 31.*

Season One: December 1, 2014–May 31, 2015

Staff from ODFW visited three Oregon coastal streams – Cummins, Tenmile and Big creeks – during the January – June reporting period to: (1) collect ichthyoplankton samples to quantify outflow of larval eulachon smelt (Big, Cummins and Tenmile creeks) and (2) collect water quantity data to develop models relating discharge and water level (Big and Cummins creeks; see sub-objective 2). Ichthyoplankton samples were collected regularly (i.e., weekly) from Cummins and Tenmile creeks, however, due to a delayed response from another state agency responsible for granting permission to access the Big Creek site, sampling in that water body did not commence until March 4, 2015. During this reporting period, staff from ODFW visited Big, Cummins and Tenmile creeks on 13, 27 and 28 different occasions, respectively, collecting 26 ichthyoplankton samples from Big Creek, 56 from Cummins Creek, and 53 from Tenmile Creek. Throughout season one of field activities – encompassing the first and second reporting periods – field personnel collected a total of 147 ichthyoplankton samples. In addition, during the current reporting period, ODFW staff collected 10 discharge samples from Big Creek and 25 samples from Cummins Creek (season one total = 38 samples; Table 1). As described previously (Mallette 2014), conditions (i.e., elevated water levels and increased velocity) in Tenmile Creek precluded collection of information necessary to estimate instantaneous

discharge and thus no data characterizing water quantity were collected in that stream during the entirety of the first sampling season.

Table 1. Distribution of sampling episodes and ichthyoplankton and stream discharge samples collected in Big, Cummins and Tenmile creeks during season one.

Reporting Period	Water Body	Sampling Period	Sampling Trips	Ichthyoplankton Samples	Discharge Samples
Jul.–Dec., 2014	Big Cr. ^a	n/a	n/a	n/a	n/a
	Cummins Cr.	12/09/2014–12/30/2014	4	5	3
	Tenmile Cr.	12/09/2014–12/30/2014	3	7	n/a ^b
Jan.–Jun., 2015	Big Cr.	03/04/2015–05/05/2015	13	26	10
	Cummins Cr.	01/08/2015–05/05/2015	28	56	25
	Tenmile Cr.	01/08/2015–04/28/2015	27	53	n/a ^b
Total			75	147	38

note: ^a sampling did not commence until March 4, 2015 due to delays in permitting (i.e., the permit was not received until 3/3/2015).

^b Conditions (i.e., water level and velocity) precluded the installation of a water-level logger and the collection of data necessary to estimate instantaneous discharge. Thus, only larval outflow was/will be quantified.

Season Two: December 1, 2015 – May 31, 2016

(Work not scheduled to occur during this reporting period.)

Season Three: December 1, 2016 – June 21, 2017

(Work not scheduled to occur during this reporting period.)

2. *Complete calculations of river discharge by July 31.*

Season One: December 1, 2014 – May 31, 2015

In both Big and Cummins creeks, for sampling events during which ichthyoplankton tows were conducted, water data characterizing velocity ($\text{m}\cdot\text{sec}^{-1}$) and depth measurements (m) were collected at regular intervals along a transect. These data, and measurements of stream width (i.e., transect width), were used to calculate instantaneous discharge ($\text{m}^3\cdot\text{s}^{-1}$). Instantaneous discharge values estimated throughout the sampling period were then used in conjunction with water level measurements (m), recorded by water-level data loggers, to develop predictive models relating discharge and water level (Figures 1 and 2). Water-level data loggers were installed in Cummins Creek and Big Creek on December 9, 2014 and March 4, 2015, respectively (Malette 2014), and data were downloaded at both sites on 5/13/2015. Predictive models were then applied to water-level data recorded by data loggers to predict discharge during intervals when it was not quantified directly. To evaluate these

relationships, an ordinary least-squares (OLS) model was fit to untransformed data collected from Cummins and Big creeks, separately. Assessment of the model assumptions indicated heteroscedastic and non-normal errors. In light of this, a second OLS model was fit after log transforming both response (discharge) and independent (water level) variables. Reassessment of the model assumptions indicated that the transformation effectively stabilized the variance and helped normalize residuals; thus, log-log formulations of the models were used for predictive purposes.

As stated previously, the water body-specific discharge-water level relationships were applied to water-level data to predict discharge during intervals when it was not quantified directly. Because the models were developed based on log-transformed data, output was back-transformed by taking the anti-log of the predictions. To account for bias associated with back-transformation, a correction factor (MSE/2) was applied, as proposed by Baskerville (1972). Lastly, mean daily discharge predictions ($\text{m}^3 \cdot \text{s}^{-1}$) were converted to daily discharge values ($\text{m}^3 \cdot \text{d}^{-1}$; Figures 3 and 4).

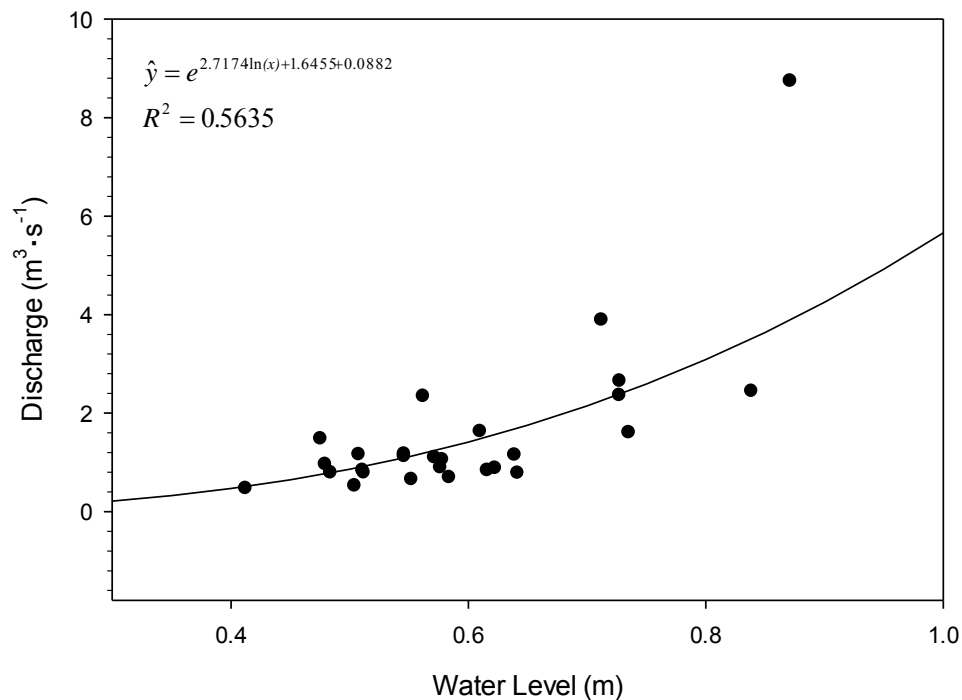


Figure 1. Relationship between water level and discharge in Cummins Creek. Data used in model development were collected from 12/9/2014–5/5/2015.

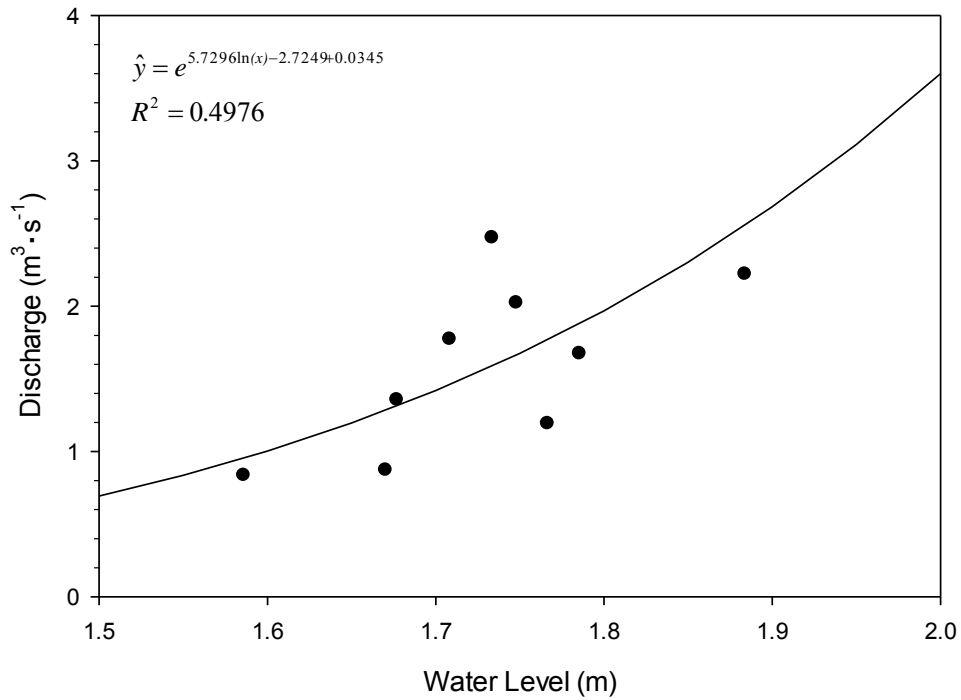


Figure 2. Relationship between water level and discharge in Big Creek. Data used in model development were collected from 3/4/2015–5/5/2015.

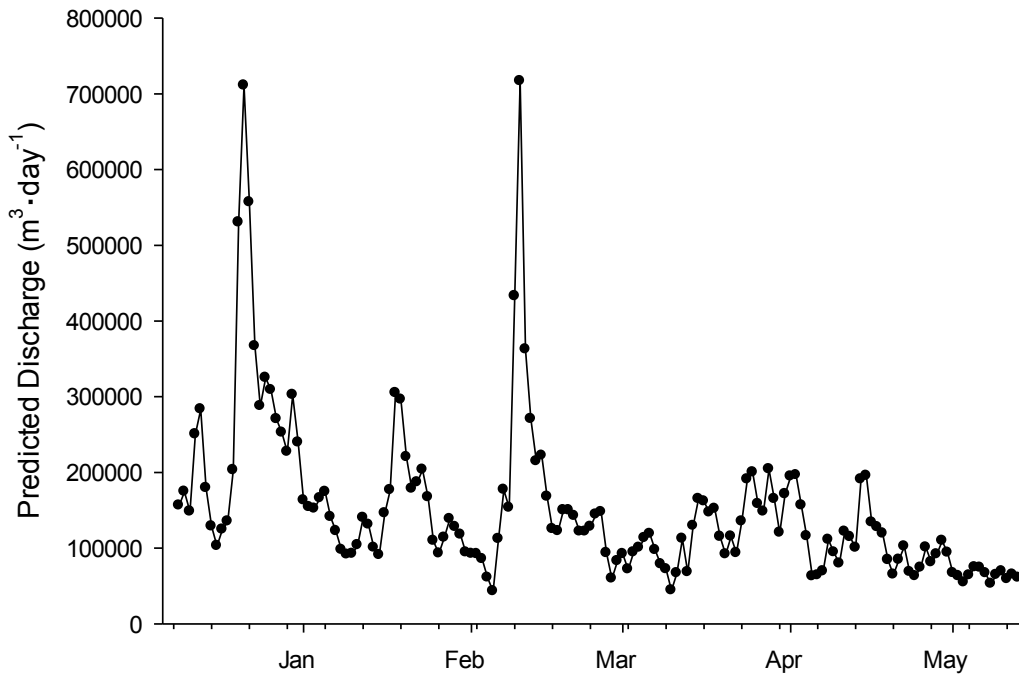


Figure 3. Predicted discharge in Cummins Creek.

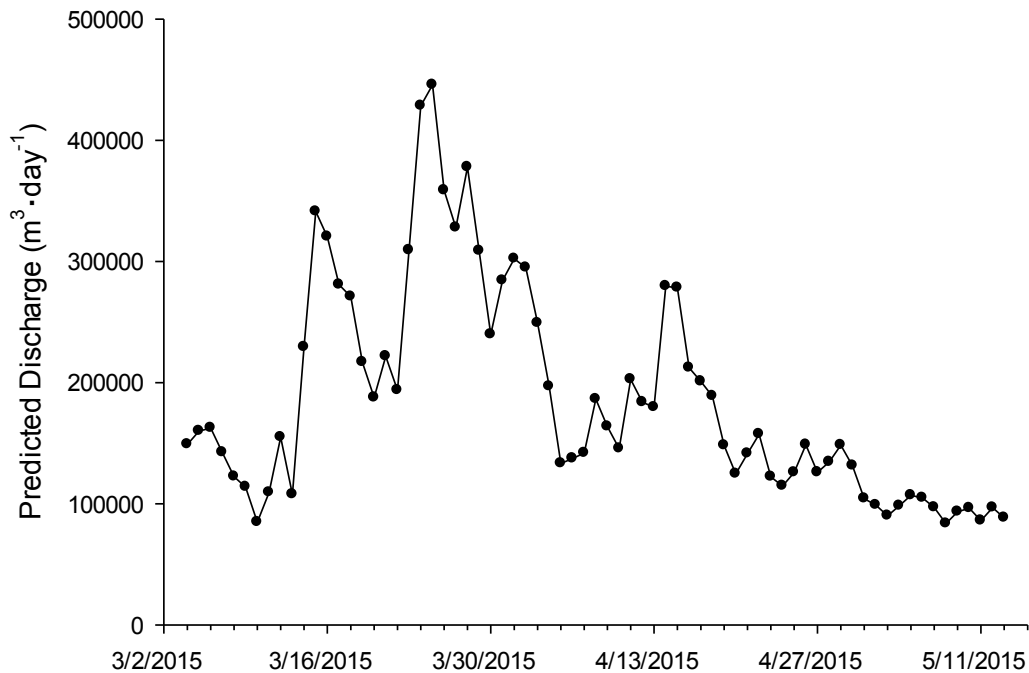


Figure 4. Predicted discharge in Big Creek.

Season Two: December 1, 2015 – May 31, 2016

(Work not scheduled to occur during this reporting period.)

Season Three: December 1, 2016 – June 21, 2017

(Work not scheduled to occur during this reporting period.)

3. *Complete laboratory work (larval densities in samples) by August 31.*

Season One: December 1, 2014–May 31, 2015

From December 9, 2014 – May 5, 2015, staff from ODFW collected a total of 147 individual ichthyoplankton samples from Cummins, Tenmile and Big creeks (Table 1). Processing of all samples collected during season one was completed by May 12, 2015. Eulachon larvae were encountered in two samples collected on March 10, 2015 from Big Creek. Calculated densities of eulachon larvae varied among the two samples, with the smallest estimate being 1.06 individuals·m⁻³ and the largest, 3.93 individuals·m⁻³.

To support data management and analyses (e.g., linear model development, density estimation, etc.), staff from ODFW developed a database relating field and laboratory parameters. This database will be maintained and refined throughout the project.

Season Two: December 1, 2015 – May 31, 2016

(Work not scheduled to occur during this reporting period.)

Season Three: December 1, 2016 – June 21, 2017

(Work not scheduled to occur during this reporting period.)

4. *Complete calculation of Spawning Stock Biomass calculations by September 30.*

Season One: December 1, 2014 – May 31, 2015

We developed and implemented a sampling design that would allow collection of information necessary to estimate Spawning Stock Biomass (SSB) for Big and Cummins creeks (see above and Mallette 2014). However, constraints including lack of encounters with eulachon larvae in Cummins Creek and delays in receiving permission from the Oregon Parks and Recreation Department (OPRD) to access Big Creek will preclude estimation of SSB for the first season. To address the first constraint, in preparation for the upcoming season, staff from ODFW will assess the feasibility and merits of sampling an additional coastal stream for the purpose of estimating SSB in that water body. Because the permit we received from OPRD to access Big Creek is valid for the duration of this project, sampling conducted during seasons two and three will encompass the entire, putative, spawning period (i.e., December–May).

Season Two: December 1, 2015 – May 31, 2016

(Work not scheduled to occur during this reporting period.)

Season Three: December 1, 2016 – June 21, 2017

(Work not scheduled to occur during this reporting period.)

B) Genetic Analysis Objective.

1. *Complete collection of genetic samples in conjunction with activities under objective A by June 30.*

Season One: December 1, 2014 – May 31, 2015

Eulachon larvae encountered during examination of samples from Big Creek have been preserved in individual vials and labelled with unique identifiers. These samples will be transferred to the Washington Department of Fish and Wildlife's Molecular Genetics Laboratory for future genetic analysis.

Season Two: December 1, 2015 – May 31, 2016

(Work not scheduled to occur during this reporting period.)

Season Three: December 1, 2016 – June 21, 2017

(Work not scheduled to occur during this reporting period.)

2. *Complete all laboratory work (genetic sample processing) by August 31, 2017.*

Samples collected from Oregon coastal streams will be processed diligently each year (see above) and will be transferred to the Washington Department of Fish and Wildlife's Molecular Genetics Laboratory to allow for subsequent genetic analysis.

3. *Complete all genetic analyses by September 30, 2017.*

Samples collected from Oregon coastal streams for genetic analysis (see above) will be transferred to and analyzed by the Washington Department of Fish and Wildlife's Molecular Genetics Laboratory.

C) Outreach and Education Objective.

1. *Complete webpage development and populate webpages with information from previous studies by December 31, 2014.*

The ODFW/WDFW project completion report for the FY 2010-13 eulachon Section 6 Grant has been uploaded to the ODFW website (http://www.dfw.state.or.us/fish/OSCRP/CRI/docs/section_6_eulachon_final_Report_2014_0922cm.pdf). Project staff at ODFW will continue to update, and develop additional content for, a eulachon-specific webpage.

2. *Complete annual webpage update by October 31.*

Year One: July 1, 2014 – June 30, 2015

Updates will be made regularly following creation of the web page.

Year Two: July 1, 2015 – June 30, 2016

(Work not scheduled to occur during this reporting period.)

Year Three: July 1, 2016 – June 30, 2017

(Work not scheduled to occur during this reporting period.)

3. *Incorporate more eulachon information into the displays and activities at the City of Vancouver, WA/WDFW Annual Sturgeon Festival.*

Year One: July 1, 2014 – June 30, 2015

ODFW staff plans to participate in, and develop material for, the Vancouver, WA/WDFW Annual Sturgeon Festival that will be held on September 19th 2015.

Year Two: July 1, 2015 – June 30, 2016

(Work not scheduled to occur during this reporting period.)

Year Three: July 1, 2016 – June 30, 2017

(Work not scheduled to occur during this reporting period.)

4. *Attend and present work at a regional meeting and a conference or workshop annually.*

Year One: July 1, 2014 – June 30, 2015

No public regional meetings, conferences, or workshops have occurred to date.

Year Two: July 1, 2015 – June 30, 2016

(Work not scheduled to occur during this reporting period.)

Year Three: July 1, 2016 – June 30, 2017

(Work not scheduled to occur during this reporting period.)

5. *Present findings of previous work and preliminary year one work at the national meeting of the American Fisheries Society at Portland, OR in August 2015.*

(Work not scheduled to occur during this reporting period).

D) Reporting.

6. *Complete semi-annual progress reports for each objective by June 30 and December 31.*

Year One: July 1, 2014 – June 30, 2015

This is the second progress report for the current grant prepared and submitted by the Oregon Department of Fish and Wildlife. The co-awardee (WDFW) will be filing separate progress reports as separate awards were granted to both agencies listed in the joint-state proposal.

Year Two: July 1, 2015 – June 30, 2016

(Work not scheduled to occur during this reporting period.)

Year Three: July 1, 2016 – June 30, 2017

(Work not scheduled to occur during this reporting period.)

7. *Complete comprehensive report of study by December 31, 2017.*

(Work not scheduled to occur during this reporting period).

8. *Document and distribute datasets from the study by December 31, 2017.*

(Work not scheduled to occur during this reporting period).

9. *Complete submission of articles to peer reviewed journals by December 31, 2017.*

(Work not scheduled to occur during this reporting period).

Expenditures (Estimated; ODFW only, excludes expenditures by co-awardee):

Total expenditures January 1 – June 30, 2015: **\$ 3,446**

References

Baskerville, G. L. 1972. Use of logarithmic regression in the estimation of plant biomass. *Can. J. For. Res.* 2:49-53.

Malette, C. 2014. Studies of eulachon smelt in Oregon and Washington. Project completion report by the Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife. Submitted to the National Oceanic and Atmospheric Administration.