Essential Fish Habitat project status report

Reporting date: 10/31/12

Project number: 2012-4

Title: Otolith Microchemical Fingerprinting: Assessing Juvenile Pacific Cod Habitat Utilization in the Gulf of Alaska

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Funding year: FY2012

Funding amount: $32,267

Status: ☐ Complete ☒ Incomplete, on schedule ☐ Incomplete, behind schedule

Planned completion date if incomplete: Data analysis will be completed in summer 2013. We anticipate submitting a draft manuscript for publication in a peer-reviewed journal by fall 2013.

Reporting: Have the project results been reported? If yes, state where the results were reported and attach an electronic copy of the report.
No.

Results:
To date, otoliths from 167 age-0 Pacific cod have been prepared and analyzed for trace element signatures using laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS). For each otolith, two transects were analyzed. The first transect ("life-history transect") ran from the sulcus through or near the core to the distal edge of the otolith to evaluate changes in elemental signatures over the lifetime of the fish (Fig. 1). The second transect ("edge transect") ran parallel to the otolith edge (averaging the most recent ~10-20 days of life) to characterize the environment the fish was exposed to at time of capture (Fig 1). We hope to use the first transect for identification of life history events such as hatching or entry into nursery areas from offshore spawning areas. The edge transect will be used to discriminate among fish collected from different nursery sites.

Analytes measured included ^{7}Li, ^{11}B, ^{24}Mg, ^{25}Mg, ^{43}Ca, ^{52}Cr, ^{55}Mn, ^{59}Co, ^{65}Cu, ^{66}Zn, ^{85}Rb, ^{86}Sr, ^{111}Cd, ^{138}Ba, ^{139}La, and ^{208}Pb. Thus far, boron, strontium, magnesium, and barium have all displayed strong signals (Fig. 2) and may prove useful in discriminating between otoliths collected at different nursery sites. In particular, a large peak in ^{138}Ba noted in some specimens may correspond to upwelling events or freshwater run-off into nursery bays.

A further 229 otoliths will be prepared and analyzed by LA-ICPMS in January 2013. Elemental data post-processing is currently underway and will be completed by March 2013. A subset of otoliths will be aged by viewing daily rings to correct for potential differences in hatch dates among sites. Regional variation in otolith trace element signatures will be assessed using multivariate statistics.

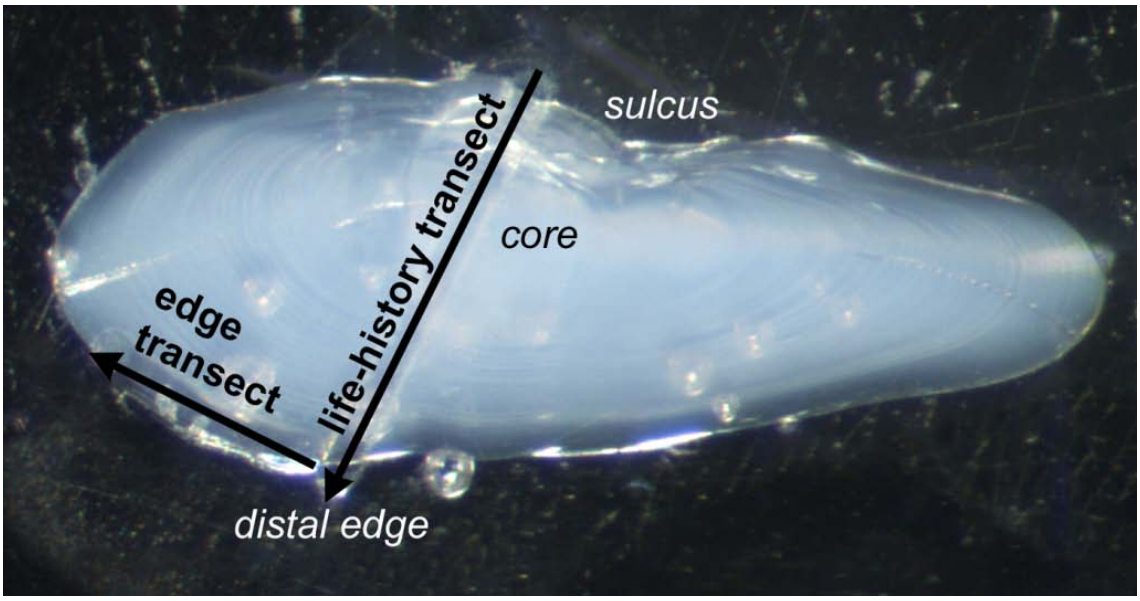

Figure 1. Photograph of age-0 Pacific cod otolith that has been sampled for trace elements along two transects.

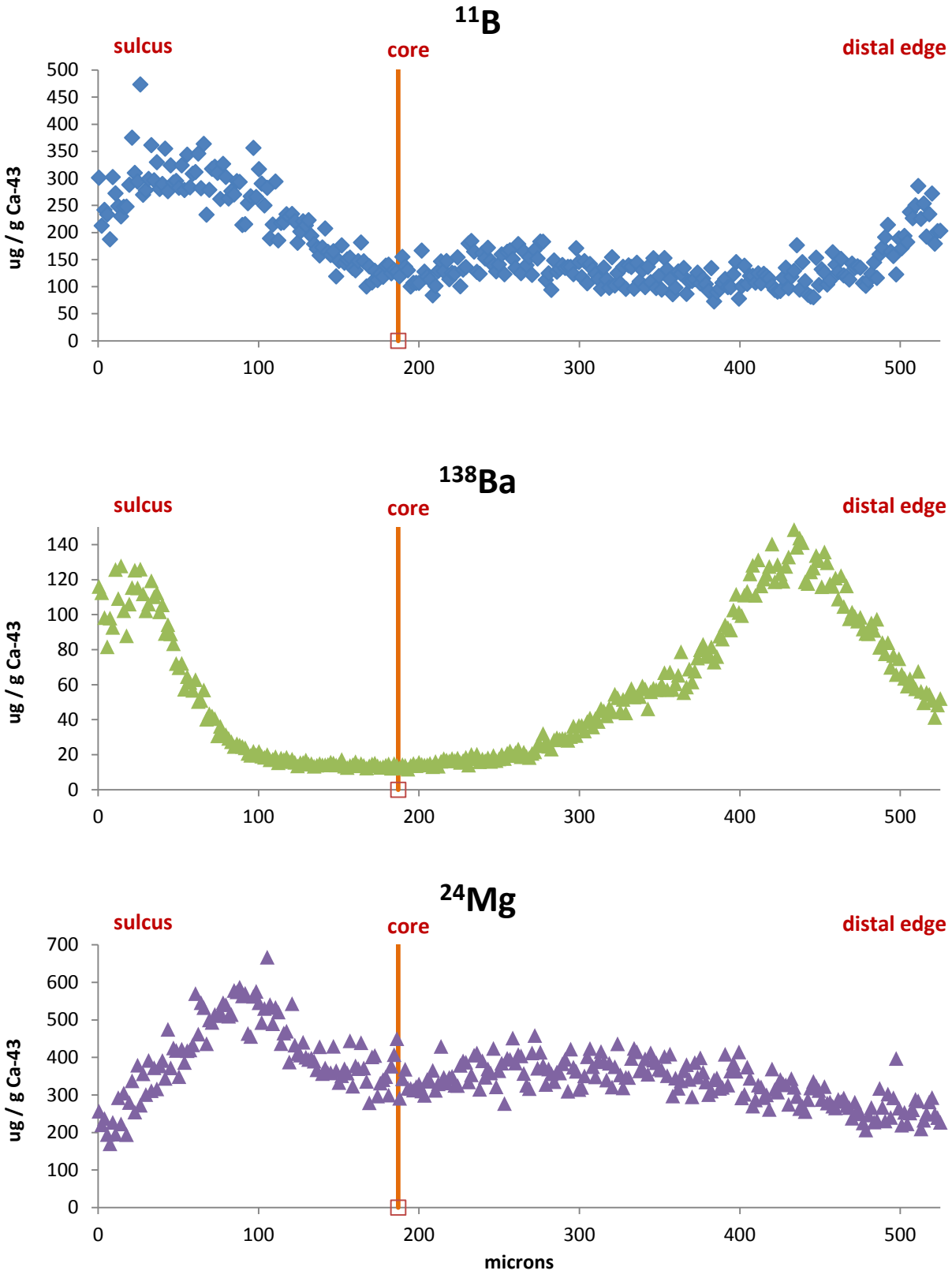

Figure 2. Trace element signatures along life-history transect for same Pacific cod otolith as shown in Figure 1. (Portion of ablation through resin not shown.)