



Figure 1. Beach Lake parcel in relation to the Elwha River. Parcel is less than 1 mile from main river channel and less than 1,200 feet from the easternmost channel of the delta. Rapid expansion of the delta is occurring as a result of sediments made available by the removal of 2 dams from the river - it is anticipated that the project site will be within the delta complex shortly. (AerialPhoto: Andy Ritchie, USGS April 2015)



Figure 2. Beach Lake Acquisition and Restoration Project and Elwha Dam Removal Sediments. The dominant direction of sediment transport at the project shoreline will deliver material from the expanding delta to the project site. Acquisition and removal of shoreline armor will encourage natural deposition of beach building sediments as delta evolves. Derelict armor being planned for removal is directly adjacent to delta.



Figure 3. Beach Lake was historically a lagoon hydrologically connected to both the mainstem Elwha River and floodplain high flow channels.

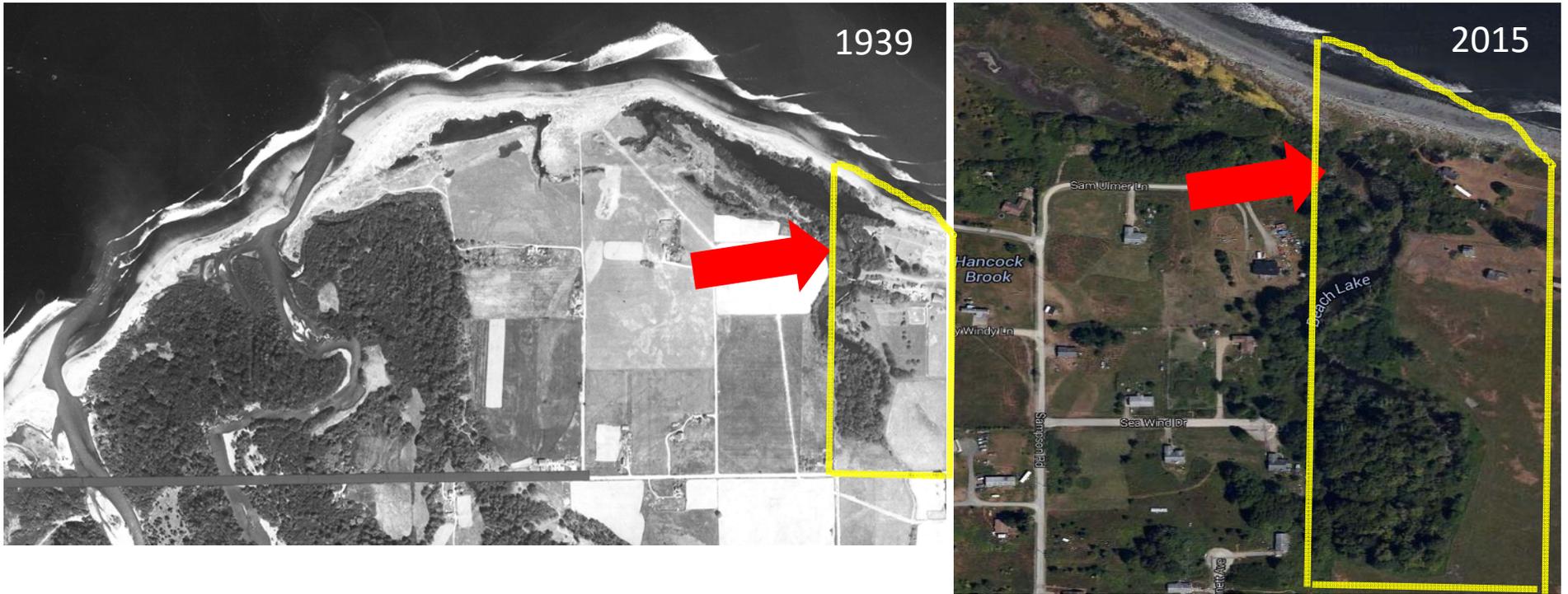


Figure 4. Beach Lake has transitioned to a much smaller isolated lake as a result of coastal erosion exacerbated by sediment starvation associated with the former river dams. Arrow depicts same location in both graphics. Now that the dams have been removed, it is anticipated that the shoreline at the project site will become incorporated into the Elwha River delta estuary. Removal of failed shoreline armor will improve the capacity of the project area shoreline to receive beach forming sediments and allow unimpeded Beach Lake evolution.



Figure 5. Approximately 2,070 linear feet of failed armor litter the upper and lower intertidal in front of and adjacent to the Beach Lake property. This proposal will design for the removal of derelict armor to encourage natural deposition of beach forming substrate made available by dam removal. Points 1 and 2 indicate current coastal flood breach points. (AerialPhoto: Andy Ritchie, USGS Feb 2015)



Figure 6. Current and historic beach condition at Beach Lake property shoreline.
(Photo: U.S. National Archives)

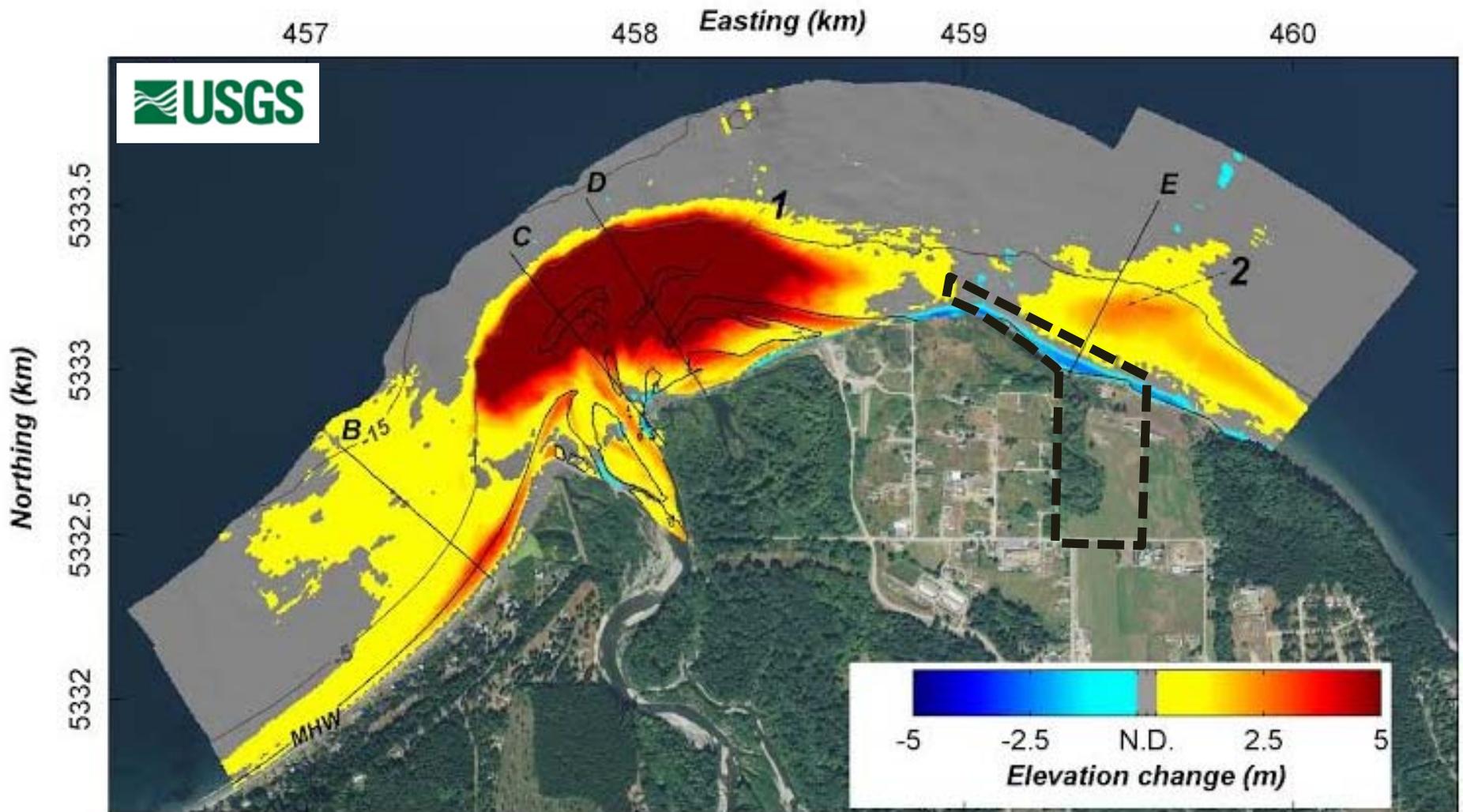


Figure 7. January 2015 USGS survey data showing significant erosion at the project site. Deposition of dam-removal sediments has occurred on the lower intertidal terrace, but no permanent deposition has occurred landward of the 2,700 linear foot stretch of derelict armor that is scattered throughout the intertidal at the project site. (Graphic, USGS)

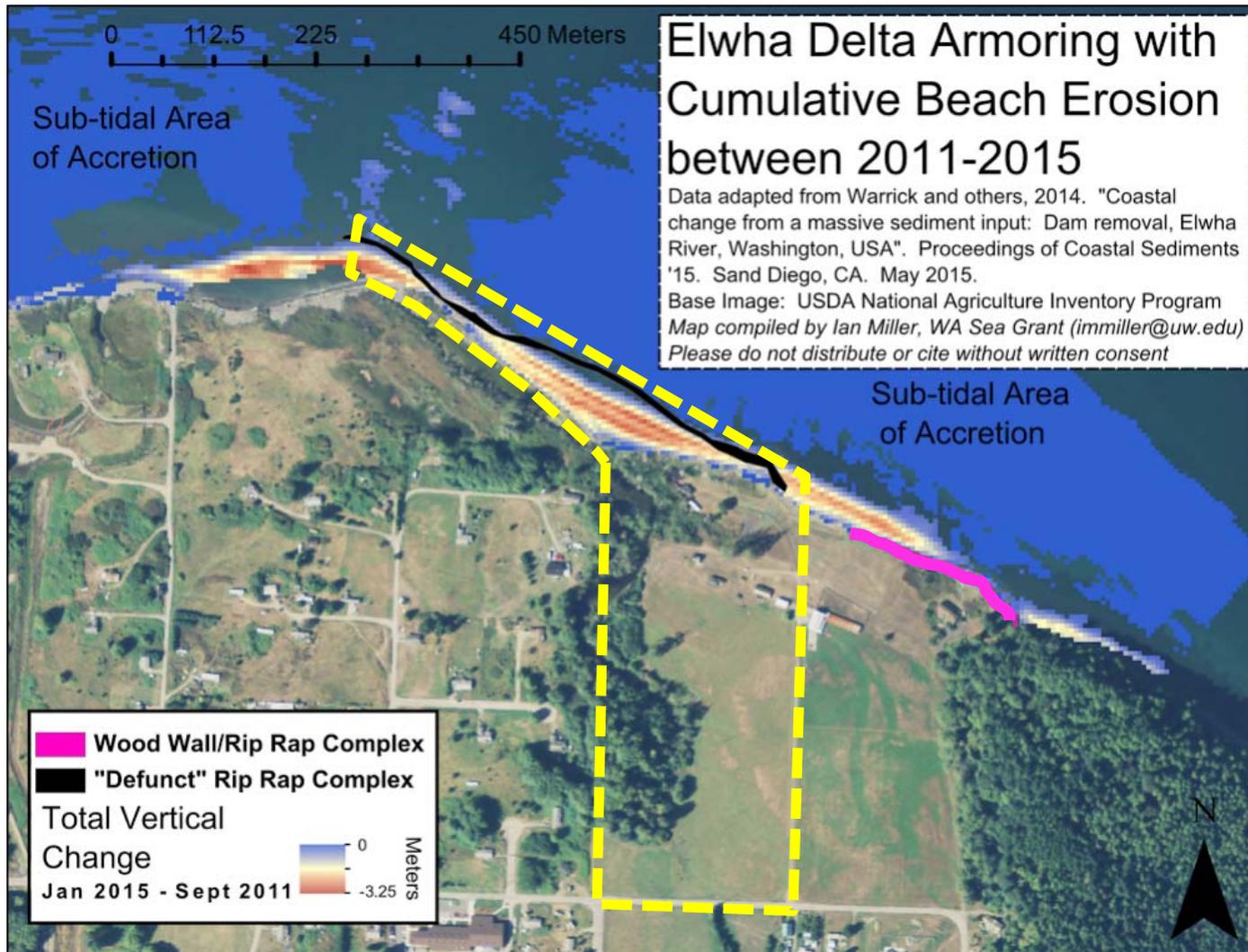


Figure 8. January 2015 survey data showing significant erosion at the project site behind 2,070 linear feet of armor and sub-tidal deposition of dam removal sediments in front of armor. East of the project site are 700 linear feet of unpermitted newly modified wood/rock armoring on private property . If this project is funded, efforts will be made to coordinate removal of armor at the project site with removal of armor from neighboring property.

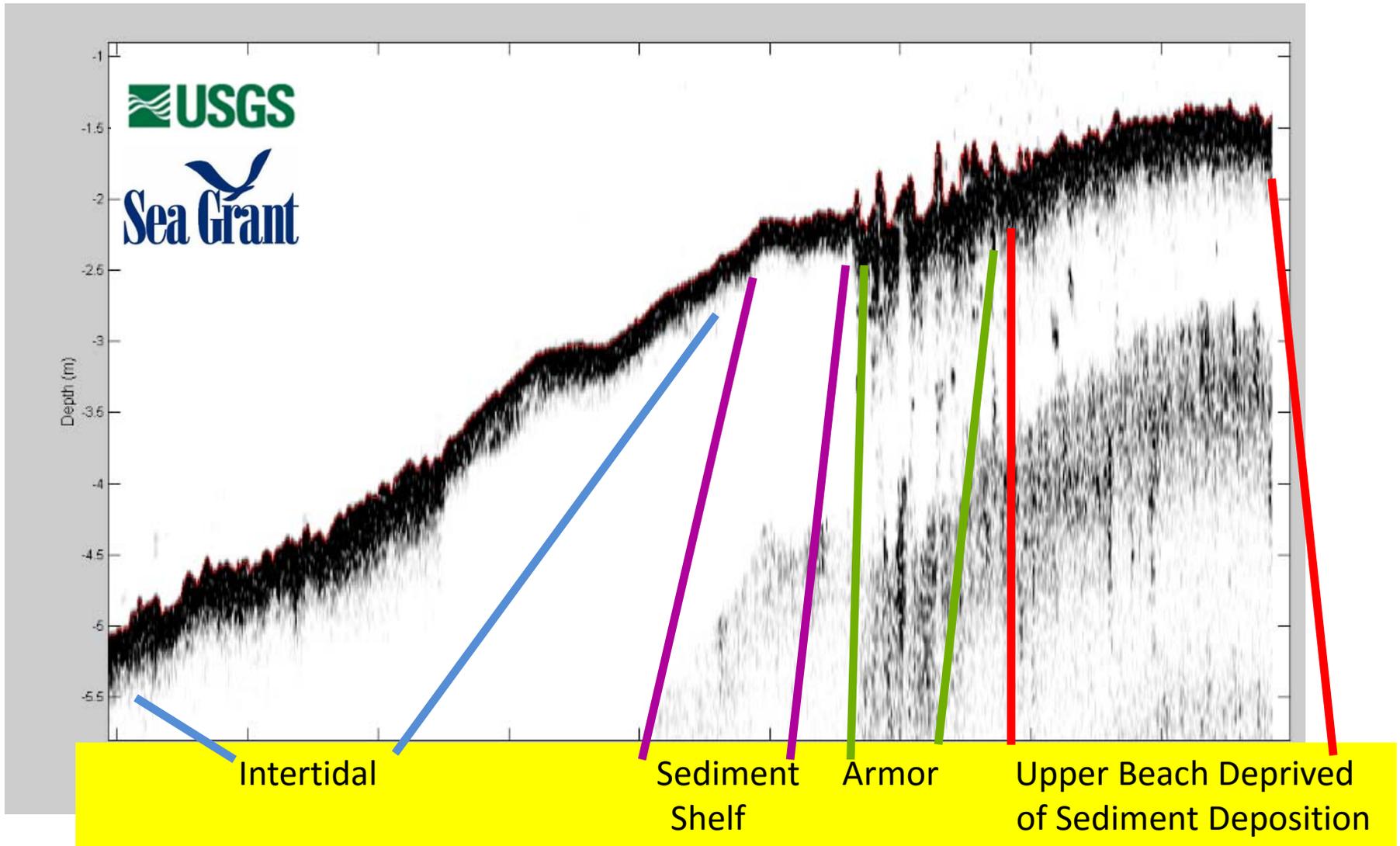


Figure 9. USGS Bathymetric and SeaGrant Topographic data indicating that armor at the project site is impeding deposition of cross beach sediment transport.

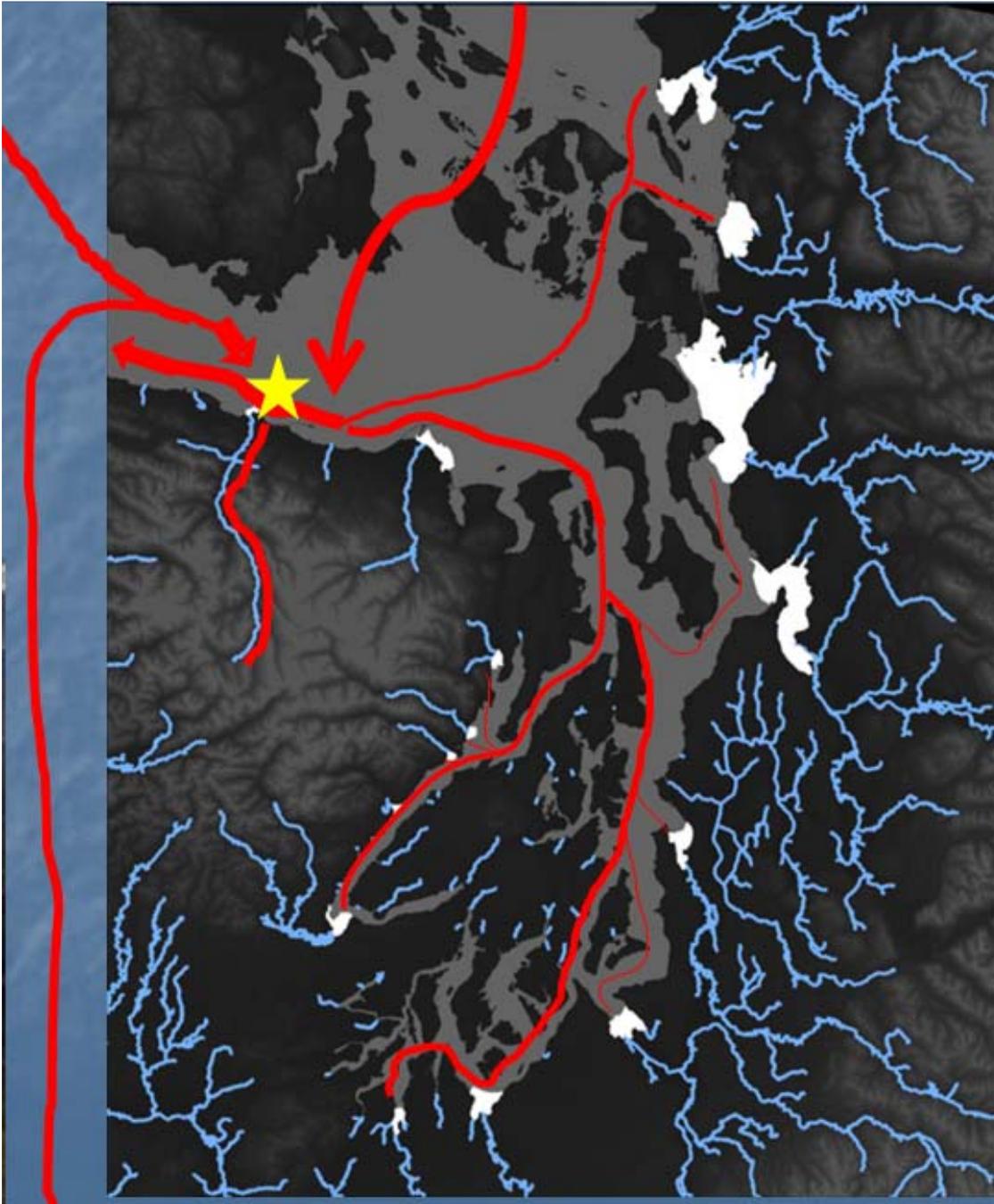


Figure 10. Project site is located at a migratory convergence point of significance to the Pacific salmon population. Fish originating from all watersheds of Puget Sound migrate past and utilize the Elwha River estuary and nearshore. Salmon originating from distant coastal rivers including the Columbia, Fraser and Klamath River systems have been documented at the Elwha estuary.

Flood Hazard Areas



Legend

-  **Base flood elevation**
-  **Flood hazard area**
Q3, not yet updated
-  **Preliminary DFIRM**
Subject to change
-  **Floodway**
-  **1% annual chance**
Floodplain

Sea Level Rise and Coastal Flooding Impacts



Figure 11. Approximately 21 acres of the 25 acre Beach Lake parcel are mapped in the 100 year floodplain. All buildings planned for removal are located in the 100 year floodplain. The entire parcel is less than 15 feet above sea level. Sea Level is projected to rise by almost 2 feet at the project site by 2100 (NAS, 2012) permanently inundating Beach Lake.

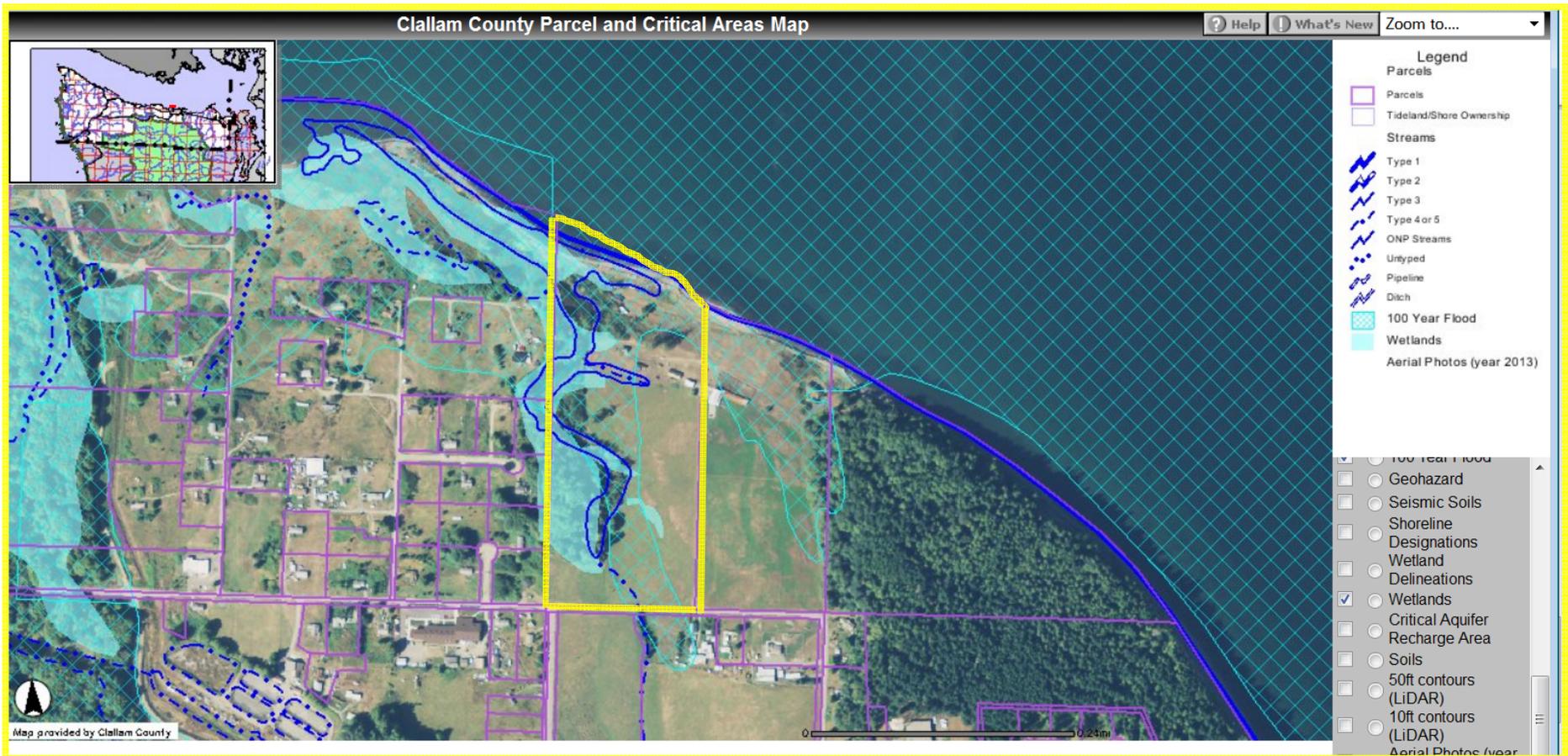


Figure 12. Project parcel layer showing wetlands, historic extent of Beach Lake, coastal floodplain and Type 4 streams draining into Beach Lake.

Project Area Map and Potential Project Actions Along Elwha Drift Cell



Figure 13. Beach Lake restoration will serve as a pilot program and demonstration site for armor removal. Lessons learned at Beach Lake will be incorporated into USACE sediment transport modeling investigations to evaluate opportunities to remove some portion of armor from 5.5 miles of heavily armored shoreline that could receive sediments made available by dam removal.



Figure 14. Threat to project site. Adjacent residential parcel recently placed ~700 linear feet of new rock armor on beach to repair failing bulkhead and protect infrastructure on property. The Beach Lake property is currently on the market and it is likely that a new buyer would pursue similar actions to defend built infrastructure from erosion. Beach Lake Acquisition and Restoration project will remove infrastructure and armor rock from the project site and prevent future armoring to ensure habitat sustaining natural beach evolution that is unimpeded by human actions at the project site. A coastal engineering analysis will ensure that armor removal at project site does not adversely affect neighboring property.