

# Examining the Elwha

## Measuring Sedimentation Post-Dam Removal

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### Introduction

- Post-removal sediment dynamics are critical, yet poorly quantified.
- Does dam removal trigger significant increases in sediment deposition downstream?**
- Deposition:** The settling of eroded sediment when water flow slows, building up riverbeds or deltas<sup>1</sup>.
- Erosion:** The wearing away of surfaces by water, wind, or ice, transporting sediment downstream<sup>2</sup>.



### Conclusion

- Dam removal led to **significant increases in sediment deposition** in the delta and lower river.
- Targeted areas saw **dramatic** adjustments
- Rapid** systematic response to dam removal.

### Future Applications

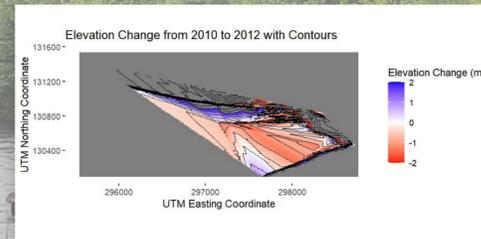
- Restoration Monitoring
- Ecosystem Management
- Methodological Transferability

### Objective

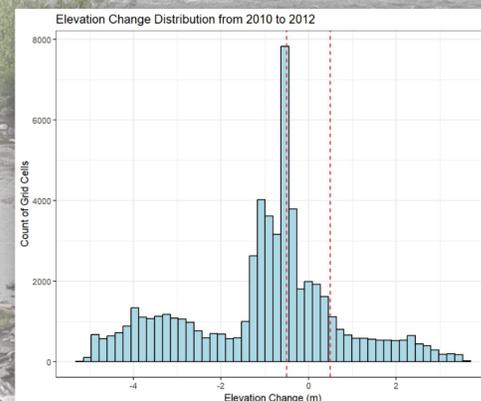
To quantify post-dam erosion and deposition using LiDAR data and R analytics and test if deposition dominates downstream areas.

### Methods

- Topographic data was compiled from the USGS (2010–2022), including XYZ point measurements referenced to TM Zone 10N.
- Elevation change was calculated by differencing surfaces.
- Each grid cell was classified as erosion, deposition, or stable using a  $\pm 0.5$ m threshold.



**Figure 1.** Elevation change map with contours and erosion (red) and deposition (blue) on the Elwha River delta from 2010 to 2012.



**Figure 2.** Histogram of elevation changes for grid cells from 2010 to 2012. Significant erosion ( $< -0.5$  m) or deposition ( $> +0.5$  m) are marked by the red dashed lines.

### Results

- The contour map reveals distinct zones of erosion and deposition across the Elwha River delta (Figure 1).
- Downstream regions show elevation gains (up to +2 meters), reflecting substantial sediment deposition.
- Notably, a considerable number of cells fall beyond the threshold ( $\pm 0.5$  meters of elevation change), confirming widespread and measurable landscape adjustment (Figure 2).

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Works Cited

- [1] British Geological Survey. "Deposition." Discovering Geology, [www.bgs.ac.uk/discovering-geology/geological-processes/deposition/](http://www.bgs.ac.uk/discovering-geology/geological-processes/deposition/).  
[2] "Erosion." Encyclopædia Britannica, Encyclopædia Britannica, Inc., [www.britannica.com/science/erosion-geology](http://www.britannica.com/science/erosion-geology).