

Integrating human dimensions into shoreline restoration monitoring: A new survey for Puget Sound



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Puget Sound shorelines are naturally dynamic

- Sediment erosion and movement
- Log accumulation
- Tides and currents
- Species adapted



How humans reshaped the shoreline

- Stabilization for shoreline infrastructure
- Hardened shorelines
- Disrupted ecological processes and access



Great Northern Railway's "Empire Builder" streamliner between Everett and Seattle, Washington 1963

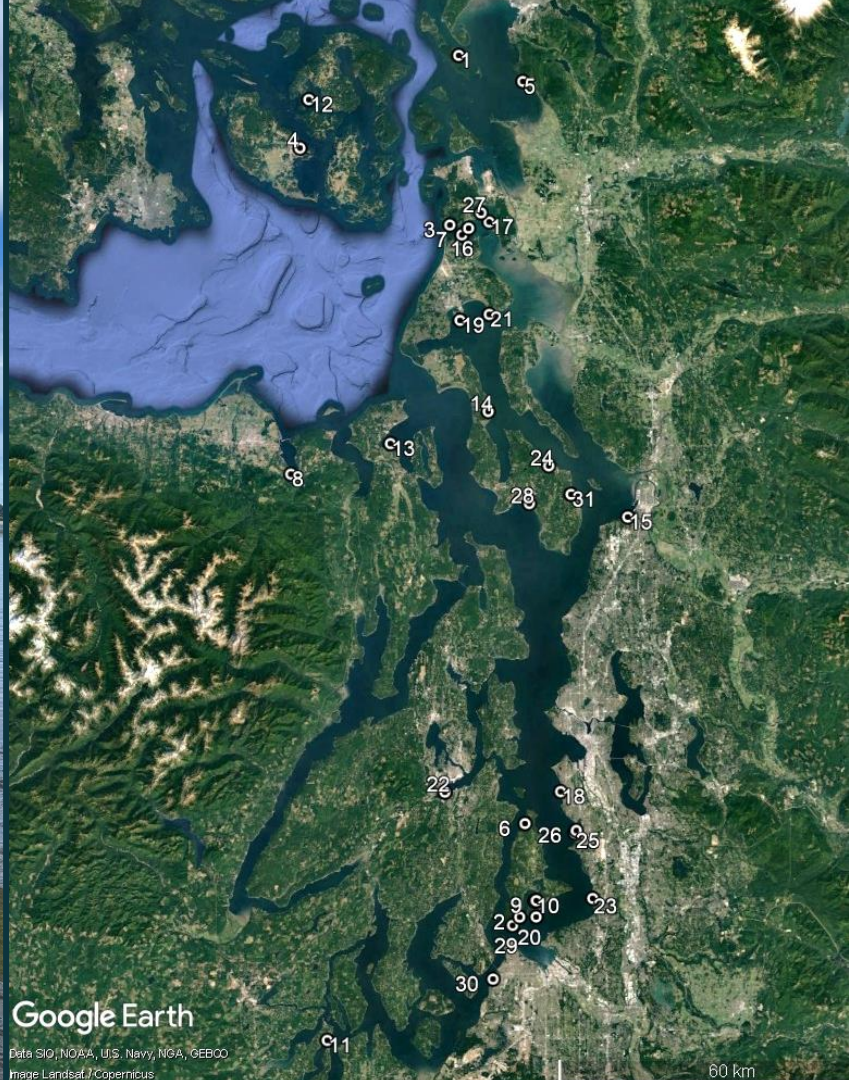
What restoration aims to repair

- Reactive natural processes
- Remove armoring
- Re-vegetate + add sediment + logs



Shoreline Monitoring Toolbox

- Over 30 restoration sites with active data collection
- Monitored annually



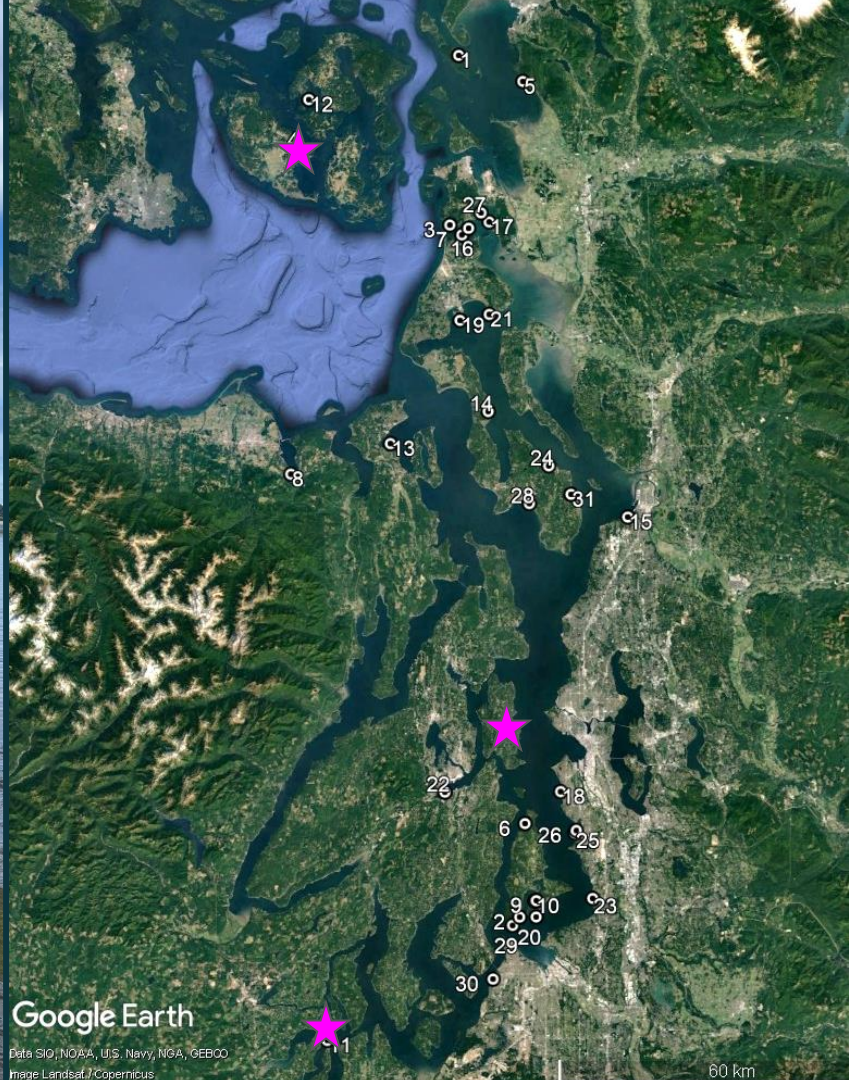
Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

60 km

Shoreline Monitoring Toolbox

- Over 30 restoration sites with active data collection
- Monitored annually



Shoreline Monitoring Database

Animals



Epibenthic invertebrates



Insects



Surface epifauna & algae



Benthic invertebrates



Birds



Fish



Forage fish eggs



Olympia Oysters



Predators



Wrack invertebrates

Vegetation, Algae, and Logs



Beach wrack



Logs



Riparian vegetation



Bull kelp



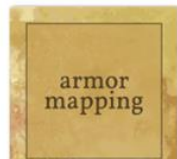
Eelgrass



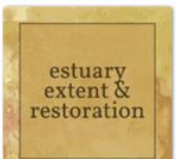
Vegetation

- Community scientist engagement
- Historical focus on biophysical monitoring

Habitat



armor mapping



estuary extent & restoration



photo points

Armor mapping

Estuary extent & restoration

Photo points

Physical



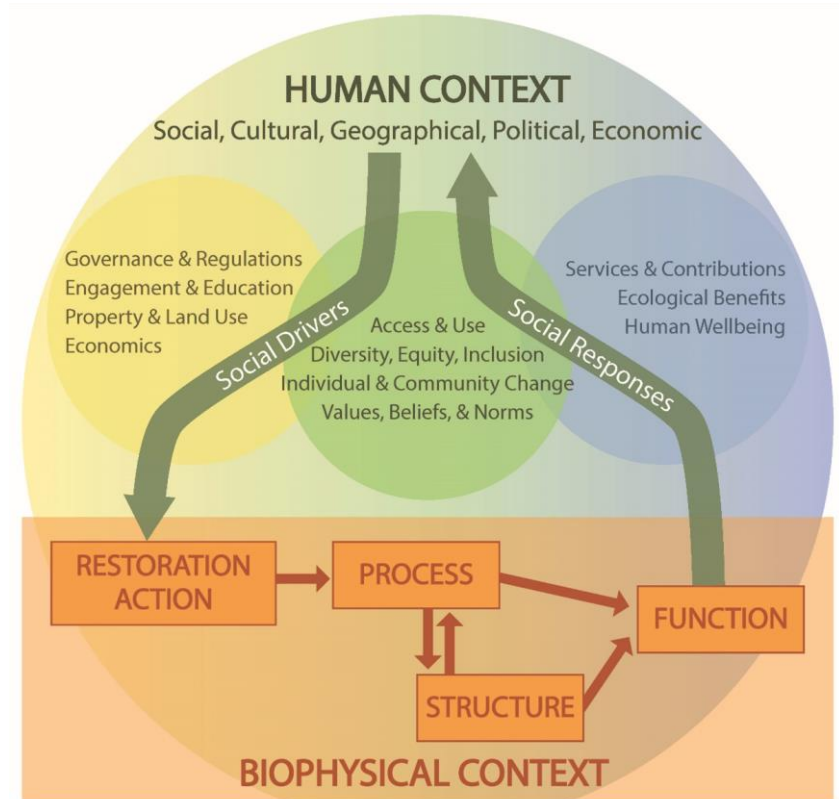
Sediment size



Beach profile

Human dimensions of restoration

- Humans part of shoreline ecosystems
- Social drivers and social responses to restoration
- Align ecological and community priorities

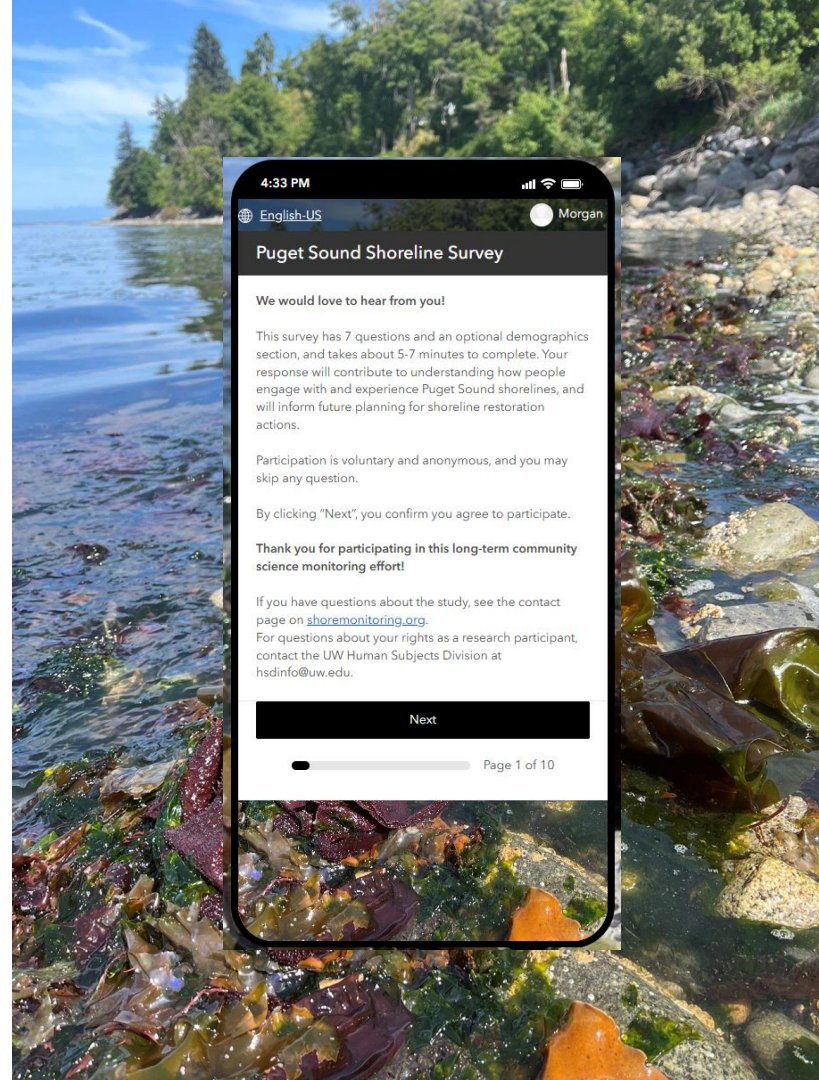


A new human dimensions protocol

- (1) Place-based experiences and attachment to shorelines in Puget Sound
- (2) Community views on shoreline restoration

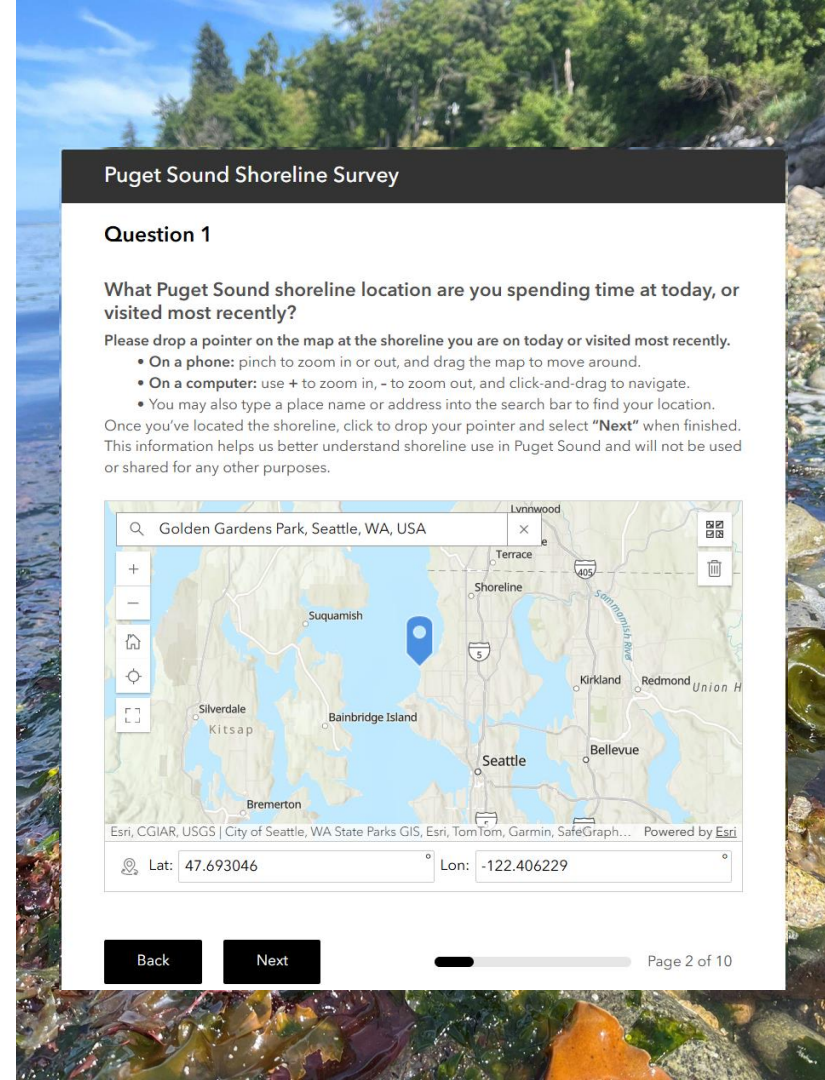


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Anchoring to place (Q1)

- Map pins responses to a specific shoreline
- Aligns with the scale of Toolbox monitoring



How people interact with shorelines (Q2)

- What people do and how often
- Adapted from Puget Sound Partnership Human Wellbeing Vital Signs survey

A screenshot of a survey interface titled "Puget Sound Shoreline Survey". The question is "Question 2: What activities did you participate in at this shoreline location over the past 12 months? Please select all that apply." The options are: Aquaculture (such as growing shellfish, seaweed), Boating/Canoeing/Paddleboarding, Camping including Tent, RV, Car, Cabin, Yurt etc., and Connecting with nature. Below this is another question: "Over the last 12 months, about how often, on average, did you visit this shoreline location? Please select one response below." The options are: 1 day or less per month and 2-4 days per month. The background of the survey is a scenic view of a shoreline with trees and water.

Puget Sound Shoreline Survey

Question 2

What activities did you participate in at this shoreline location over the past 12 months?
Please select all that apply.

Aquaculture (such as growing shellfish, seaweed)

Boating/Canoeing/Paddleboarding

Camping including Tent, RV, Car, Cabin, Yurt etc.

Connecting with nature

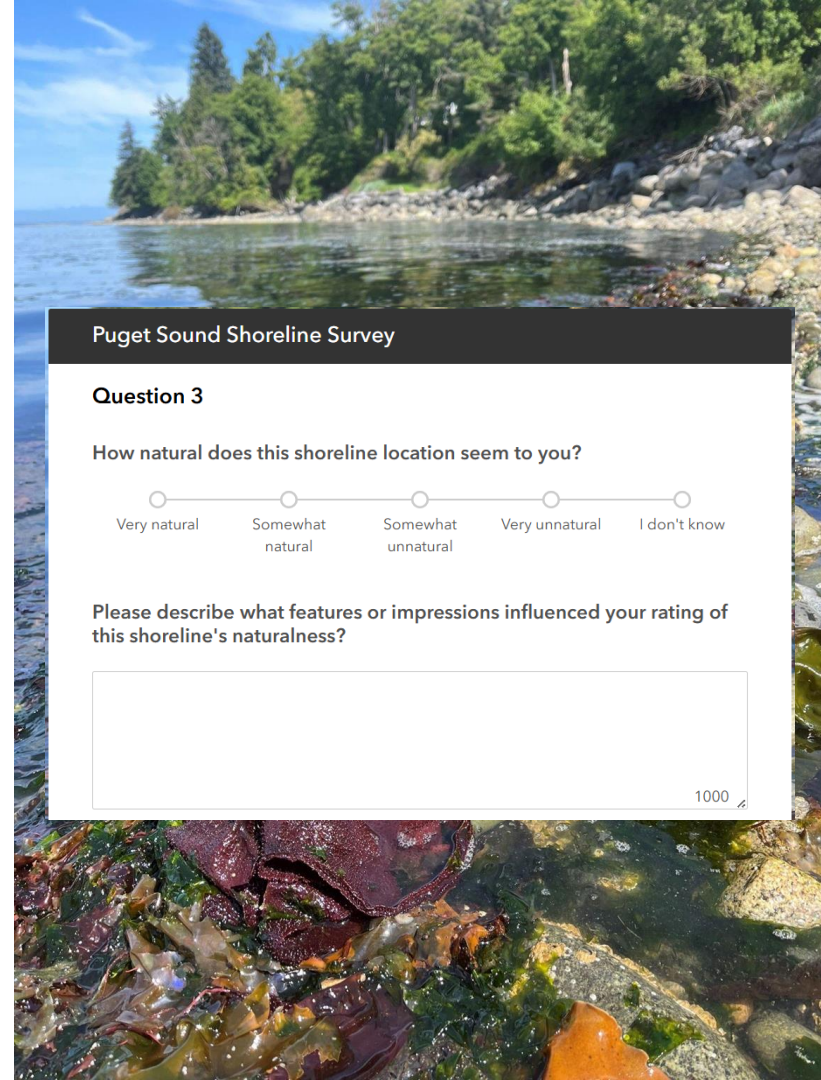
Over the last 12 months, about how often, on average, did you visit this shoreline location?
Please select one response below.

1 day or less per month

2-4 days per month

How people perceive shoreline naturalness and health (Q3)

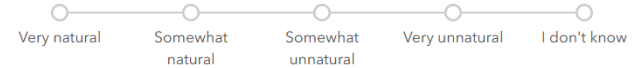
- Naturalness + ecological health
- Rating and open response
- Compare to biophysical monitoring



Puget Sound Shoreline Survey

Question 3

How natural does this shoreline location seem to you?



Please describe what features or impressions influenced your rating of this shoreline's naturalness?

1000

Sense of place (Q4)

- Attachment, identify, responsibility, dependence
- Predicts stewardship
- Builds on work from Trimbach et al. 2022

A screenshot of a survey interface titled "Puget Sound Shoreline Survey". The background of the survey is a scenic photograph of a forested shoreline with water and rocks. The survey content is displayed in a white box with a dark header. The question is "Question 4: How strongly do you agree with the following?" and asks the respondent to select one response for each of four statements. The response options are: Strongly Agree, Somewhat Agree, Neutral, Somewhat Disagree, Strongly Disagree, and I don't know. Each option is represented by a radio button. The statements are: "I feel very attached to this shoreline", "This shoreline is important to my identity", "I feel responsible for taking care of this shoreline", and "I feel dependent on this shoreline for recreation, work, community activities, and/or relaxation". At the bottom of the survey box, there are "Back" and "Next" buttons, a progress indicator, and the text "Page 5 of 10".

Puget Sound Shoreline Survey

Question 4

How strongly do you agree with the following?
Please select one response for each of the following statements.

	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree	I don't know
I feel very attached to this shoreline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This shoreline is important to my identity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel responsible for taking care of this shoreline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel dependent on this shoreline for recreation, work, community activities, and/or relaxation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Back Next

Page 5 of 10

Proximity (Q5)

- Proximity to place of residence



Puget Sound Shoreline Survey

Question 5

Which option best describes the distance between this shoreline location and your place of residence?
Please select one response.

I live within 0-5 miles

I live within 6-30 miles

I live further than 30 miles away

Other

Are you the property owner of this shoreline location?

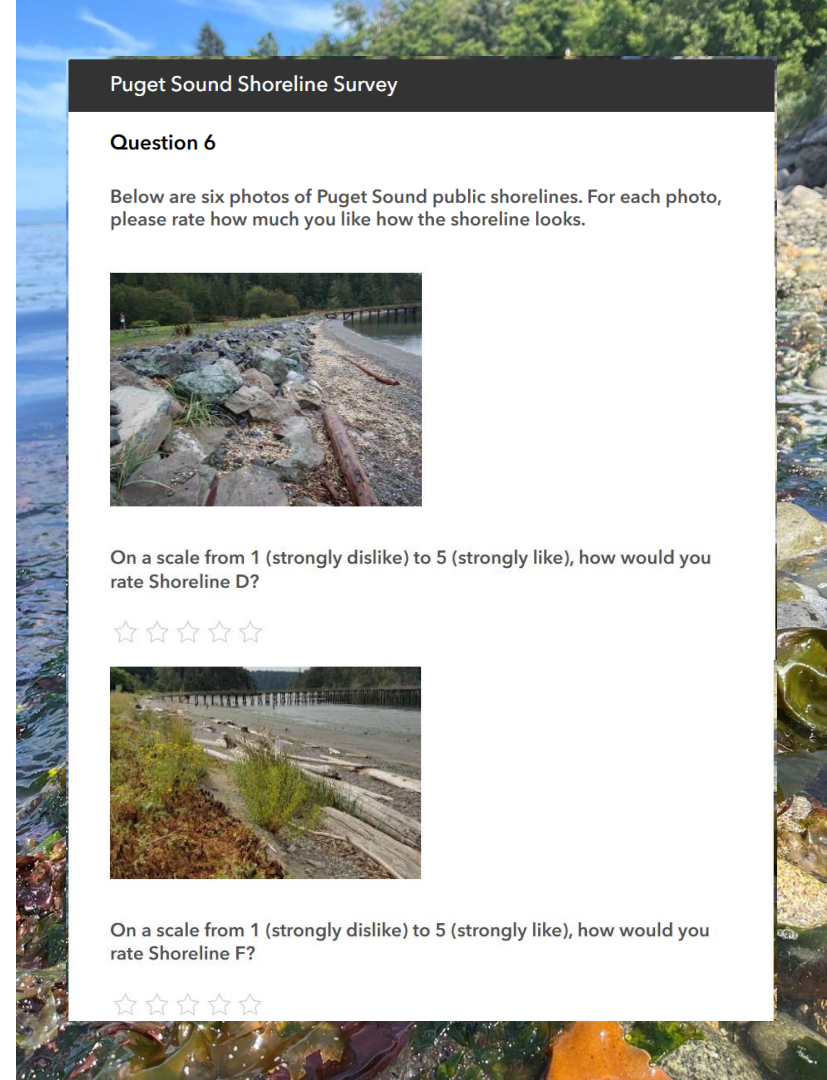
Yes

No

Other

Visual preferences

- Rank aesthetic preferences of three shorelines, each pre- and post-restoration



Puget Sound Shoreline Survey

Question 6

Below are six photos of Puget Sound public shorelines. For each photo, please rate how much you like how the shoreline looks.



On a scale from 1 (strongly dislike) to 5 (strongly like), how would you rate Shoreline D?

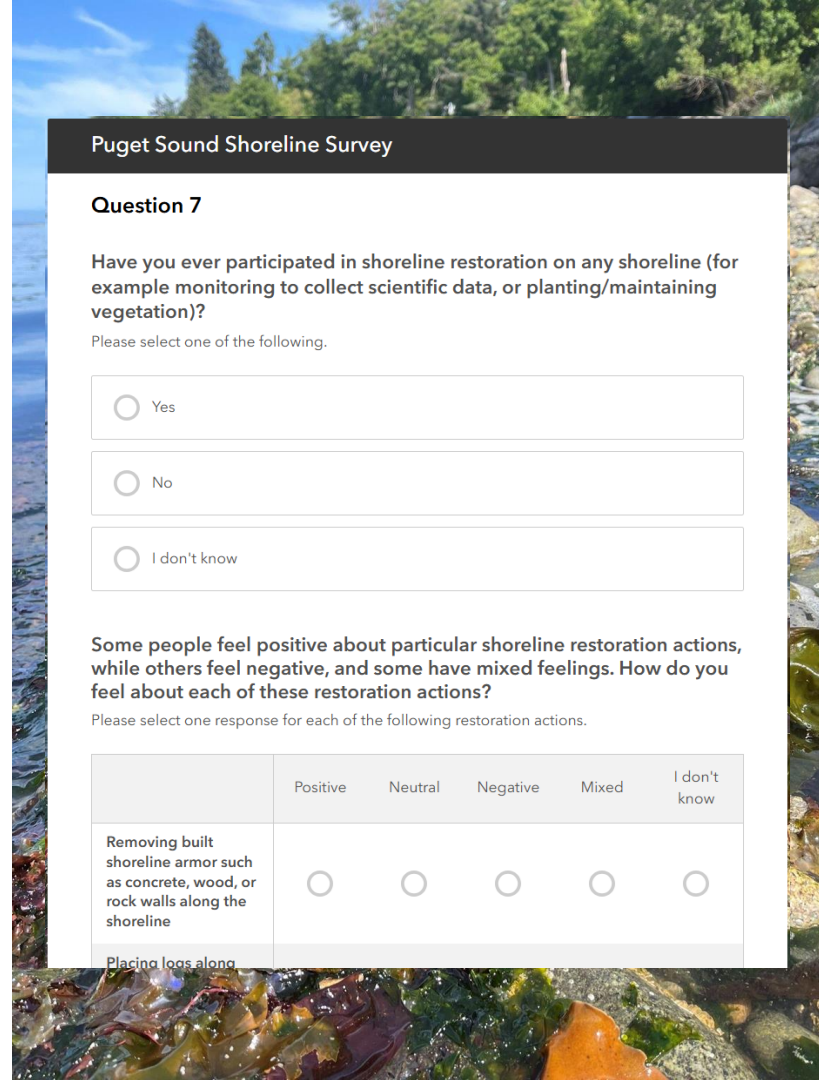


On a scale from 1 (strongly dislike) to 5 (strongly like), how would you rate Shoreline F?



Participation + feelings toward restoration

- Prior participation
- Feelings about specific restoration actions
- Open response



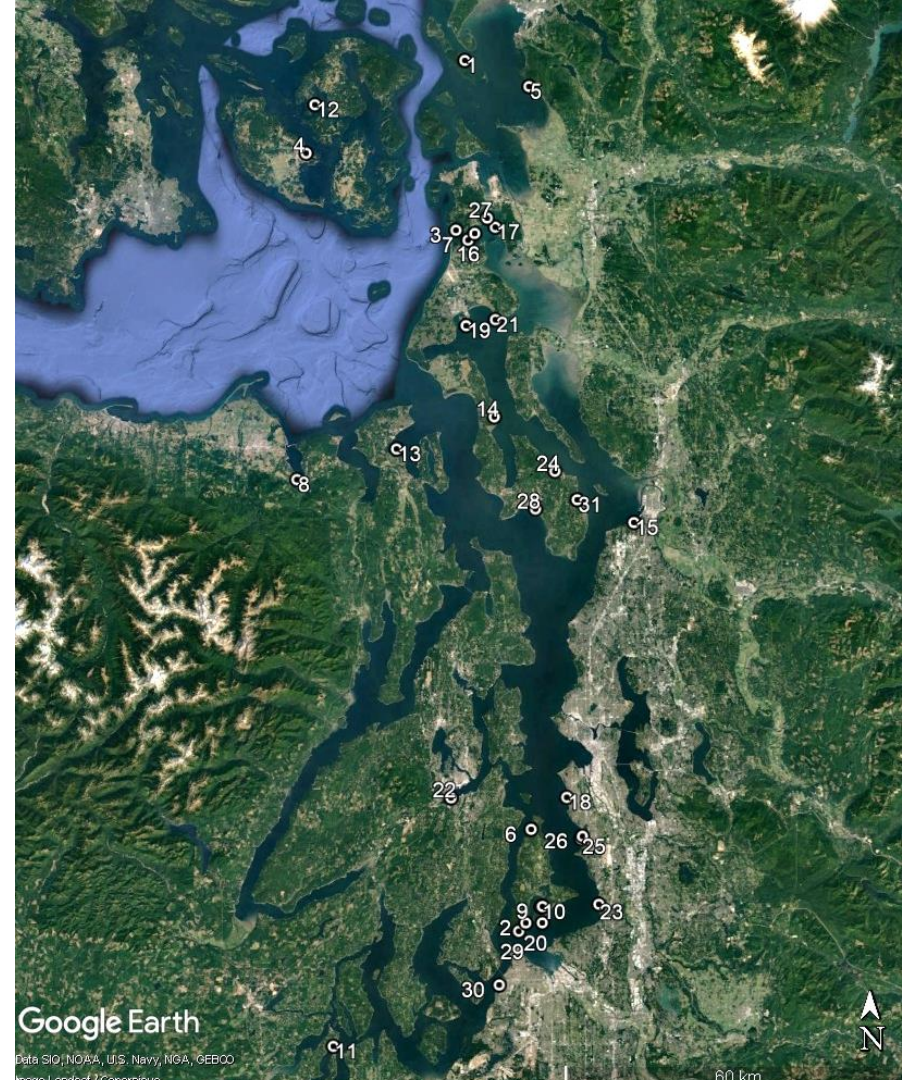
Optional demographics

- Understand whose perspectives are represented



Insights from place based experiences

- Location-specific:
 - Patterns of use
 - Perceptions of shoreline naturalness and health
 - Shoreline features of importance
 - Sense of place and place attachment



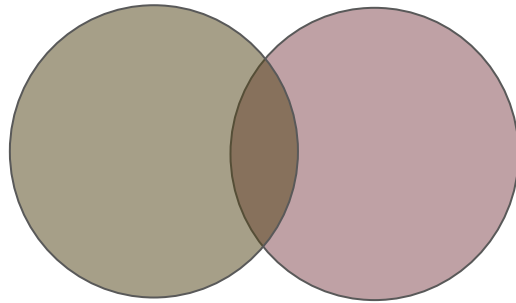
Insights from community views on restoration

- Feelings toward shoreline restoration and specific restoration actions
- Engagement effects
- Aesthetic preferences



Together

Together, these layers explore how people relate to shorelines and how restoration fits into those relationships.



Place-based
experiences

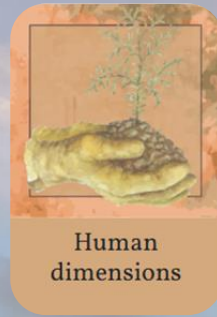
Restoration
attitudes



Why this matters for restoration

- Community-science approach
- Alignment with biophysical monitoring
- Social and environmental insights
- Adaptive management support





shoremonitoring.org

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