National Estuarine Research Reserve System Science Collaborative

Dataset: Data Collected to Support Eco-Social Metrics of Saltmarsh Restoration in Alsea, Coos, and Yaquina Bays in Oregon

This document provides detailed information about a dataset that was generated through a 2021-2022 catalyst project titled *Developing and Integrating Social Measures of Estuarine Restoration Success*. This document also provides information about the project. The project was supported by the National Estuarine Research Reserve System (NERRS) Science Collaborative, which is funded by the National Oceanic and Atmospheric Administration. All Science Collaborative supported projects that collect new data adhere to federal data sharing and archiving requirements.

Seven related datasets are described in this document:

1. Baseline and Post-Project Vegetation Dataset ("Baseline_and_post_project_data.xlsx")
2. Photopoints Dataset ("Photopoints_FINAL.docx")
3. Sinuosity Dataset ("Sinuositydata_FINAL.xlsx")
4. Report Mining Dataset ("Reportminingdata_FINAL.xlsx")
5. Ecological Scorecard Dataset ("eco_metrics_scorecard_FINAL.xlsx")
6. Raw, Deidentified Data and Factor Analysis of Qsort data ("factor analysis of Qsort data")
7. Social Scorecard Dataset ("social_scorecard_FINAL.xlsx")

About the Associated Project

Project title: Developing and Integrating Social Measures of Estuarine Restoration Success

Name of reserve(s) involved in the project: South Slough, OR

Project Period: January 2021 - March 31, 2022

Project lead and contact information:
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Purpose:
Through a 2020 catalyst project, university, reserve, and restoration practitioners partnered to understand social perceptions of saltmarsh restoration in Oregon to identify ways to better incorporate socially relevant information in restoration metrics, increase outreach efficacy and, ultimately, improve restoration success.

Abstract:
Understanding why estuarine habitat restoration is viewed as successful or not is critical for evaluating completed projects and garnering support for future projects. Particularly important, and often overlooked, are the perceptions of partners and the surrounding community which play an integral role in shaping the future of coastal habitats. Restoration metrics rarely include human dimensions even though community support for restoration can promote or thwart potential projects and the long-term success of completed projects. Working with the South Slough NERR, this catalyst project worked to more fully account for and understand the impacts of estuarine habitat restoration by developing social metrics for restoration success and linking them to ecological monitoring metrics.

Using South Slough NERR, The Wetlands Conservancy, and other restoration projects in Oregon as case studies, the project involved a two-pronged approach to data collection: 1) synthesis of existing and newly collected ecological data from nine salt marsh restoration projects to derive commonly used ecological metrics and 2) focus groups in three Oregon locations (South Slough, Alsea, and Yaquina) to understand public perceptions about marshes. The team then connected the social and ecological datasets conceptually to create a matrix linking the datasets and indicating mismatches between ecological data and social values. Based on these steps, the team was able to provide recommendations to help improve restoration design and implementation, including more inclusive and effective communications surrounding estuarine restoration.

About the Project Datasets

1. Baseline and Post-Project Vegetation Dataset ("Baseline_and_post_project_data")

General description of data:
Past reports and datasets were collected and searched to obtain baseline and post-project vegetation data, and additional data collected in 2021 (vegetation and sinuosity data) were obtained from each project location by the research team. This dataset includes final sinuosity measurements, but another dataset is listed here that documents sinuosity transect locations and final sinuosity ratio calculations.

Search keywords:
vegetation, hydrology, restoration data, South Slough, Alsea Bay, Yaquina Bay

More about the data:
Table 1. Lists all of the column headers present in this dataset and there general descriptions

Column Headers	Column Description
bay	bay in which restoration takes place
project	restoration project name
year_of_implementation	year the restoration occurred

year_of_data	year the data was collected
date	data that the measurement was taken
old_location_transect	the original name of the location the measurement was taken, or transect - from the original document/report
location_transect	our grouping of the location transect - sometimes combined multiple locations/transects into one "umbrella" name to summarize data at an appropriate scale
listed_elevation_cat	elevation category assigned in original dataset/report
transect_elevation_avg	Average transect value based on the range of elevation values of a transect given in reports
transect_elevation_num	numerical value for transect elevation assigned by data collectors/report writers
Plot_name	Name assigned to plot or area of data collected, if listed
metric_cat	the metric category as determined by the Catalyst group
quad	Name assigned to quadrat, if listed
species_6letter	species 6 letter identifier (see "Veg_naming" sheet for full list of species)
perc_cover	percent cover of vegetation
channel_order	channel order of marsh channel assigned by data collectors
channel_length	length of channel
valley_length_m	length of valley
sinuosity	calculated sinuosity value from previous 3 measurements
site_avg_SET	An average SET value from multiple measurements taken across the site
turbidity	turbidity in NTU
elevation_NAVD88	elevation - numerical value
avg_temp_diff	average water temperature difference relative to a reference area
refr_index_diff	difference in refractive index relative to reference site
salinity_diff	difference in salinity relative to reference site (PPT)
DO_diff	difference in DO relative to reference site (ppm)
pH_diff	difference in pH relative to reference site
width_depth_ratio	Ratio of channel width to channel depth

Data collection period: 1996 to 2021

Geographic extent: Data collected spanned 9 project areas across three bays in coastal Oregon, Alsea, Coos, and Yaquina Bays. See the Photopoints dataset for project locations (second dataset section).

File format: Excel (.xls), 1.9 MB

File name(s): Restoration_data_raw_FINAL

Data access and archival:
These data are available via the following Dryad Repository:
https://datadryad.org/stash/share/pP38-AMjM53yleyk_0xQ3c1qsKU8J_IQonuMneEf1dY

Maps and schematics for data collection: Below is a map of the sample locations (spans three bays in coastal Oregon, including South Slough NERR), and a table listed which projects were sampled within each bay. Due to the broad geographic expanse of this project, no unique coordinate can be given to determine a single project location. All measured transects with each site, within each bay, are associated with the coordinates used to locate them within a given sample year.

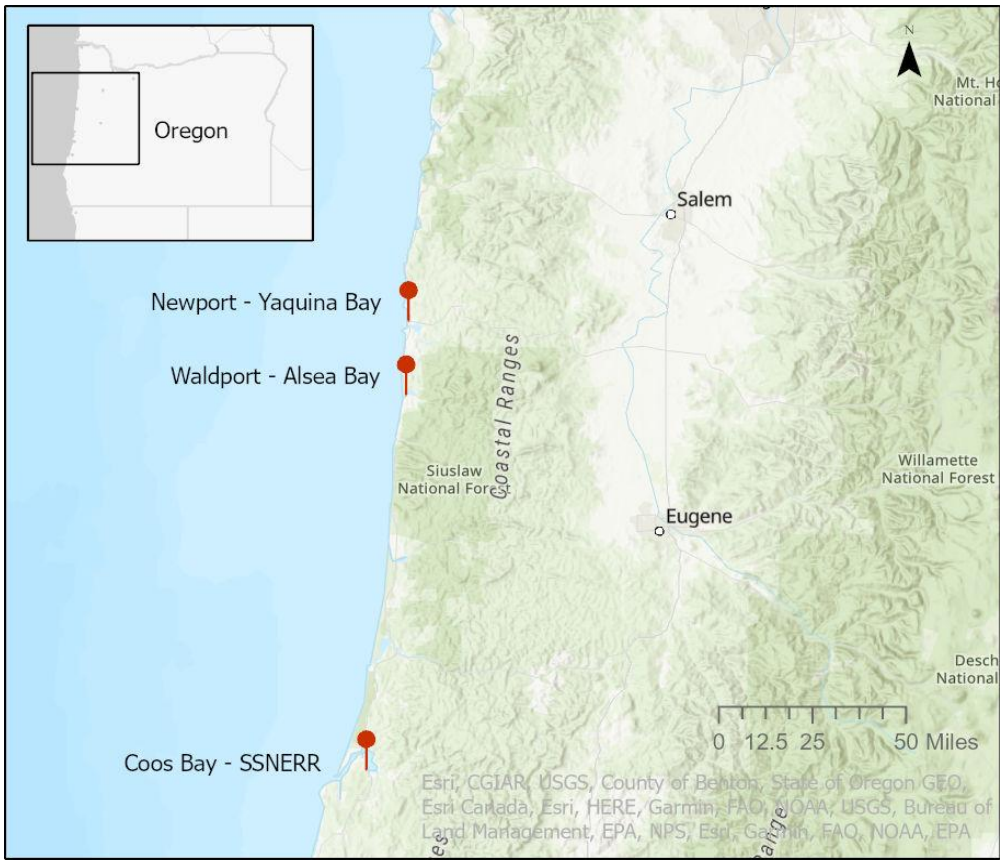

Figure 1. A map of all three bays where past data collection was sourced, and where data collection occurred in 2021. Within each bay, specific restoration projects were visited in 2021 for collection of vegetive data. Past data collected for this project spans all three of these bays.

Table 2. Lists all bays included, their associated individual restoration projects therein, and the metrics measured at each project site.

Bay ID	Project Name	Metric Measured (as relevant to this work)
Coos	Dalton	Vegetation, Sinuosity, Fish
Coos	Frederickson	Vegetation, Sinuosity
Coos	Kunz	Vegetation, Sinuosity, Fish
Coos	Cox	Vegetation, Sinuosity, Fish, Mammals
Yaquina	Poole Slough	Vegetation, Sinuosity
Yaquina	Y3	Vegetation, Sinuosity
Yaquina	Y27	Vegetation, Sinuosity, Fish
Alsea	Lint Slough	Vegetation
Alsea	Lower Drift Slough	Vegetation, Sinuosity

2. Photopoints Dataset ("Photopoints")

General description of data: At each project site, two sets of photopoints were collected to document the general context of each project from a visual perspective. These data were added to a single document for contextual reference and received no analysis.

More about the data: Adventitious locations were selected from each project site that overlooked the most characteristic area of the site, or in the case of smaller sites-encompassing the entire project area. A rugged tablet was used to take three images from left to right, that spanned the horizon and then three images spanning the ground in front of the photographer, again from left to right. At each location a set of coordinates was collected in case future replication was desired, however this work would not include multi-year replication. The tablet application, "SurveyCam" (2021) was used to take each image. This application included an image title ("[Sitename], VegData"), date/time, and the coordinate location of each image.

Search keywords: photopoint (s), restoration data, South Slough, Alsea Bay, Yaquina Bay

Data collection period: September 2021 to November 2021.

Geographic extent: Data collected spanned three bays in coastal Oregon, Alsea, Coos, and Yaquina Bays. Each image is associated with a set of coordinates to document its location, however the entire project spans three bays, and thus a single location cannot be given to identify the project area, multiple must be given to represent the project's entire geographic span.

File format: Word doc (.doc)

File name(s): “Photopoints”

Data access and archival: These data have been archived by the NERRS Centralized Data Management Office. You can request the data at this page.

Maps and schematics for data collection:
Table 3. List coordinate locations of each site’s set of photopoints, their associated bay and project name.

Bay ID	Project Name	Coordinates (UTM, NAD 88, Easting, Northing)
Coos	Dalton	10T392951 4792533 (+/- 5m)
Coos	Frederickson	10T 392939 4792099 (+/-13m)
Coos	Kunz	10T 392939 4792101 (+/-10m)
Coos	Cox	10T393071 4791808 (+/- 13m)
Yaquina	Poole Slough	10t 419877 4935857 (+/-3m)
Yaquina	Y3	10T 424973 494057 (+/-3m)
Yaquina	Y27	10T 428259 4939002 (+/-3m)
Alsea	Lint Slough	10T 415746 4918935 (+/-3m)
Alsea	Lower Drift Slough	10T 419762 4919601 (+/-3m)

3. Sinuosity Dataset (“Sinuositydata_FINAL”)

General description of data: Aerial imagery from each project site was used in the winter of 2021 to measure site-wide sinuosity of major channels, as seen in a sinuosity ratio.

More about the data: Google Earth aerial imagery (Google Earth 2021) was used to view pre-project site conditions and post project site conditions to the most recent year. Within each site or project, in both pre- and post- project conditions, all or up to 50% of the visible channels were traced along the center of the channel, and then a straight line was drawn from the start point of the traced line to the end point. These 2 lines were measured in meters and combined to create a ratio: Curved channel / straight line, after Stone et al. 2012, which resulted in an index value. Each site/project within each bay was thus associated with a sinuosity index value, which was recorded into the master data sheet. Percent change was calculated for channel sinuosity ratios from early or pre-project implementation to 2021.

Table 4. Lists all column headers and their respective descriptions.

Project	These values denote which project within each bay is associated with

	each sinuosity value
Bay_id	These values denote which bay is associated with each sinuosity value
Project_Year	These values denote when the original restoration project was begun
Collection_year	These values denote when this data was collected for the NERRS Catalyst
latitude	latitude of the transect start location, in decimal degrees (+/- 3 meters)
longitude	longitude of the transect start location, in decimal degrees (+/- 3 meters)
line_length (m)	The full length of the traced channel segment following its total curvature to a notable end point of said channel
straight_shot_length (m)	The length of the straight line between the start and finish of the "line_length (m)", not following the segment's curvature
sinuosity_ratio	per row: the line_length (m) value is divided by the straight_shot (m) value to derive a ratio
transect_number	These values denote which transect within each project is associated with each sinuosity value

Search keywords:sinuosity, channel complexity, saltmarsh channel
Data collection period: September 2021 to December 2021.
Geographic extent: Data collected spanned three bays in coastal Oregon, Alsea, Coos, and Yaquina Bays. Each sinuosity value is associated with a channel within a single project, or site. The entire project spans three bays, and thus a single location cannot be given to identify the project area. Within the dataset sinuosity measurements location are associated with their appropriate records.

File format: Excel (.xls)

File name(s): “Sinuositydata_FINAL”

Data access and archival: These data have been archived by the NERRS Centralized Data Management Office. You can request the data at this page.

4. Report Mining Dataset (“Reportminingdata_FINAL”)

General description of data: Eighteen project reports related to the 9 projects considered in this work were mined for mentioned goals and objectives using the Atlas.Ti software in order to contextualize the ecological data with numerical representations of unique terms used and their frequency. This data was collected on the bay-by-bay scale, and was used to compare social and ecological scoring of each bay to manager prioritization as seen by project reports.

More about the data: Using the Atlas.Ti software, a list of thematic coding terms (Saldaña 2021) were developed to match these goals to the six metric categories: Fish Use, Bird Use,

Mammal/Invertebrate Use, Hydrology, Vegetation, and Human Impacts. All project reports related to each project were identified and loaded into Atlas,Ti. All reports were then searched for mention of the terms: “goal”, “goals”, “objective”, “objectives”, “purpose”, and/or “purposes”. Each found occurrence within a phrase or paragraph were documented in the “goalsandObjecives” tab within the “Reportminingdata_FINAL” dataset. Records were associated with project name, project bay, implementation year, data collection year, the report title, goals listed, restoration actions used to achieve said project goals or objectives, and the report was read to identify whether the author confirmed, denied, or did not address the achievement of the listed goal or objective. The identification of language describing goals was used to develop a list of goals that fit within the six metric categories, and thus the identified goals were condensed into six categories. One or multiple goals were listed within each record, depending on the nature of the text. The terms used to describe goals and objectives with the six metric categories were then used to develop a list of thematic coding terms for each metric (see table below for search terms). Atlas.Ti was used to search all project reports for these specific lists of terms which describe the six metric categories. These instances were counted, and the totals were summed on a bay-by-bay scale and were recorded in the “GoalsDescription” tab of the “Reportminingdata_FINAL” dataset. The total number of mentions of each metric category for each bay was then included in the “Linking Matrix” for comparison to each bay’s ecological and social score.

Table 5. Lists the column headers and their respective descriptions.

"ObjectivesandGoals" Tab	this sheet/tab contains information that characterizes the objectives and goals mentioned in individual reports, in addition to relevant project information listed in these reports
project	restoration project name
bay	bay in which restoration takes place
project_goals	keywords Searched to locate Objectives include: "objectives", "goals", "purpose"
restoration _action	the actions described in relevant reports that were used to restore a given project
active_or_passive	categorization of the "restoration_action", was determined by the researchers
year_of_implementation	year the restoration occurred
year_of_data	year the report was published, from which this data was collected
Doc_Title	report title as used in this project
objective_met	yes or no, based on the project reports listing of achieving the listed project goal as seen by specific metrics

Descriptive language referenced, Keywords Searched: "objectives", "goals", "purpose"	direct quotes from individual reports that were found by using the text search function in Atlas.Ti software that contain the search terms: "objectives", "goals", "purpose"
"GoalsDescriptions" Tab	this sheet/tab lists terms used to search reports for specific mention of terms related to each "associated_metric" (listed as "Metric Category" in this sheet/tab) as related to specific Project goals revealed by the report searching in the "ObjectivesandGoals" sheet/tab.
project goals	A list of numeric value representing project goals as identified in the "GoalsDescriptions" tab
project_goals-description	minor description of the goals listed using common terms found in reports
associated_metric	the listed metric associated with a goal
thematic_coding_terms	terms used to describe each goal as seen in the reports
"AdditionalInformation" tab	This sheet/tab lists the number of mentions as seen in reports associated with each bay across the 5 metric categories, and also lists which practitioners ranked which projects
Shared Metrics	lists the metric categories
Alsea Bay-# of mentions in reports	number of mentions of search terms related to each category as seen by Alsea Bay reports
Yaquina Bay-# of mentions in reports	number of mentions of search terms related to each category as seen by Yaquina Bay reports
Coos Bay-# of mentions in reports	number of mentions of search terms related to each category as seen by Coos Bay reports

Search keywords: manager priorities, ecological report mining

Data collection period: December 2021 to April 2022.

Geographic extent: Data reports referenced here, and thus the resulting data set represented here spanned three bays in coastal Oregon, Alsea, Coos, and Yaquina Bays. The entire project spans three bays, and thus a single location cannot be given to identify the project area.

File format: Excel (.xls)

File name(s): “Reportminingdata_FINAL”

Data access and archival: These data have been archived by the NERRS Centralized Data Management Office. You can request the data at this page.

5. Ecological Scorecard Dataset ("eco_metrics_scorecard_FINAL")

General description of data: An ecological scorecard we developed in order to synthesize overall ecological performance on the bay-by-bay level. Pre-restoration and present day data for vegetation and hydrology was present, so we were able to assign scores for these categories. Although other categories of ecological function were considered, data for these were not recorded by previous projects, and thus are not represented here.

Search keywords: manager priorities, ecological report mining

More about the data: For the vegetation category, we assessed multiple vegetation parameters, including: invasive species and cover of invasives, salt tolerant species and percent cover, dominant plant species, plant diversity, and native plant species and cover of natives. We took into account both the final value (present day) of each parameter and the change from pre or just post implementation to present day ("lift" of the restoration). We created a "change index" where we calculated percent change, normalized those data and put them on a 1-10 scale. We also created a "2021 value index" by assessing the average value of each vegetation parameter across transects for the data collected in 2021, normalizing those data and putting them on a 1-10 scale. These index values were then added together to produce a "performance score" for each vegetation parameter, which were binned on a 1-10 scale. We averaged vegetation parameters to come up with an overall vegetation score. If there was more than one dominant species, we included only the native dominant species with the highest percent cover, and only the invasive dominant species with the highest percent cover at the end, if present. We also only included the highest scoring value for either % change or species richness variables (invasive species, native species, salinity-tolerant species). We also measured sinuosity pre-restoration and for present day aerial imagery (see detailed methods above). We again created a "change index" for sinuosity data where we calculated percent change, normalized those data and put them on a 1-10 scale. We also created a "2021 value index" by assessing the average channel sinuosity for each project across transects for the data collected in 2021, normalizing those data and putting them on a 1-10 scale. These index values were then added together to produce a "performance score" for channel sinuosity, and these values were binned on a 1-10 scale.

Table 6. Lists all metrics used and descriptions of the metrics

Metric	The four metric categories that were used to score projects
Factors Contributing to Score	The specific metrics we included for each metric category to help determine an overall score, each metric was scored and then averaged to produce an overall score for each metric category
Change index scoring	How the change index was scored; the bins we used to determine the scores

Value index scoring	How the value index was scored; the bins we used to determine the scores
Max score	The max possible score for each index
original value	The original value of the metric, pre- or just post- restoration
2021 value	The 2021 value that we collected from plant surveys or imagery analysis
% change value	The value associated with the amount of change from the original to the 2021 value of that metric
change index	The index value created using the bins in "change index scoring"
value index	The index value created using the bins in "value index scoring"
Max score	The max possible score for each index
original value	The original value of the metric, pre- or just post- restoration
2021 value	The 2021 value that we collected from plant surveys or imagery analysis
change index	The index value created using the bins in "change index scoring"
value index	The index value created using the bins in "value index scoring"
score (performance)	The performance score, calculated using the formula "(change index^(3/2))+value index"
score index	The index value created using bins that span the entire possible range of scores

Data collection period: September 2021 to May 2022.
Geographic extent: Data reports referenced here, and thus the resulting data set represented here spanned three bays in coastal Oregon, Alsea, Coos, and Yaquina Bays. The entire project spans three bays, and thus a single location cannot be given to identify the project area. See the map in the “Restoration_data_raw_FINAL” data set to locate study bays.

File format: Excel (.xls)

File name(s): “eco_metrics_scorecard_FINAL”

Data access and archival: These data have been archived by the NERRS Centralized Data Management Office. You can request the data at this page.

6. **Raw, Deidentified Data and Factor Analysis of Qsort data (factor analysis of Qsort data)**

General description of the data: This section provides information about the Q-sort and aggregated results from the factor analysis. Participants are de identified.

Search keywords: Q-sort, Q-methodology, subjective measurement, marsh restoration values

More about the data: Datasheets include the metadata, the list of Q-sort statements, how each participant ranked each statement on their Q-sort, the correlation matrix, the unrotated factor matrix, the cumulative communalities matrix, factor loadings with defining sorts flagged, free distribution data results, factor scores with corresponding ranks, factor score correlations, factor scores for each factor and their weights and correlations, descending arrays of differences between factors, factor Q-sort values for statements sorted by consensus vs. disagreement, factor characteristics, standard errors for differences in factor Z-scores, distinguishing statements for each factor, consensus statements, and relative ranking statements for each factor.

Table 8

Project Name	ALL Sorts
Total Number of Statements	34
Q-sort Design	-4,-4,-3,-3,-3,-2,-2,-2,-2,-1,-1,-1,-1,-1,0,0,0,0,0,0,1,1,1,1,1,2,2,2,2,3,3,3,4,4
Total Number of Q sorts	41
Analysis Process	
	ALL Sorts data loaded from Excel Type 1 file
	Extracted 8 Principal Components
	Selected 6 factors for rotation
	Varimax rotation applied
Autoflagging set to $p < 0.05$ and a majority of common variance was required	
Analysis completed on:	2022-03-10 at 09-40
Ken-Q Analysis Version Number:	1.0.6

Data collection period: August 2021

Geographic context: Yaquina, Alsea and Coos Bays, Oregon

File format Excel (.xls)

File names factor analysis of Qsort data

Data access and archival: These data have been archived by the NERRS Centralized Data Management Office. You can request the data at this page.

7. Social Scorecard Dataset ("social_metrics_scorecard_FINAL")

General description of data: A social scorecard we developed in order to synthesize overall social performance on a bay-by-bay level.

Search keywords: social indicators, human values, restoration assessment

More about the data: In August of 2021, we conducted focus group interviews in each of Coos Bay, Alsea Bay, and Yaquina Bay in Oregon, U.S, with 15, 17, and 12 participants, respectively. Focus group participants included restoration managers, direct receivers of information about restoration (such as port managers), and indirect receivers of information (such as area residents who may learn about the restorations from the news). We held two activities during the focus groups to gather quantitative social information to compare with environmental monitoring data. The first was a Q-sort (forced ranking) activity where participants were prompted with the phrase "I value estuaries for..." and ranked provided statements according to that phrase. We compiled statements into the same broad metric categories that were used to compile environmental data. We also included three additional categories, "Bird Use", "Invertebrate Use" and "Human Factors", to encompass social data that could not be categorized under the environmental metric categories. For example, we assessed how participants valued estuaries for their ability to support oyster and clam farming, which were included in the "Invertebrate Use" category. We also held a photo ranking exercise during the focus groups using a pair of photos for each of five metric categories (i.e.,. bird use, fish use, mammal use, vegetation, hydrology), where one photo of each pair was chosen to portray a "high ecological function" representation of that metric category and the other photo to show a "low function" representation. Participants in the breakout groups had to come to a consensus on how to rank these ten photos. We developed a social scorecard using the quantitative social data obtained from the Qsort and photo-ranking activities in the focus groups. Qsort statement rankings were binned on a 1 to 10 scale. The photo rankings for the high ecological function photos were also binned on a 1 to 10 scale, and scores from the Qsort and photo ranking were averaged to produce the overall social score per bay.

Table 9. Lists all metrics used and descriptions of the metrics

Social Scorecards of each bay:	includes a tab/sheet for each the 3 bays sampled: Alsea, Coos, and Yaquina, each of which has the same column and rows. Each bay however has uniques scores values within each template.
Metric Categories	each scorecard is first divided into metric categories (vegetation, water quality, fish use, bird use, mammal and invertebrate use, and human impacts).

Associated Project Goals	the metric categories are then subdivided into project goals that are uniquely associated with each category. These goals were identified by the report mining exercise documented in the dataset named "Reportminingdata_FINAL".
Ranked Statement Scores	represents a group of scores associated with statements ranked from -4 to +4 during a focus group
Photoranking Scores	represents a group of scores associated with a photoranking exercise conducted during a focus group
QSORT and Image Scores averaged across metrics	the average score of a given category, includes scores from the "Ranked Statement" and "Photo Ranking" excercises
Score calculations	all of the categories represented here were included 3 times within this tab, one for each bay.
Statement#	numeric value associated with each unique statement
Statement	the statement ver batum as presented to focus group participants for ranking on a scale of -4 to +4
Score	the numeric score given to each statement (ranges 1-10) based on which "bin" they were grouped into
Bin breaks	each bay's set of statements were split into ten bins based on the following equation: statement set min- statement set max divided by 10
Weighted score	the weighted score of each statement as related to its ranking by project participants on a scale from -4 to +4
Metric Category	the metric category associated with each statement

Data collection period: September 2021 to May 2022.
Geographic extent: Data set spanned three bays in coastal Oregon, Alsea, Coos, and Yaquina Bays. See the map in the “Restoration_data_raw_FINAL” data set to locate study bays.

File format: Excel (.xls)

File name(s): “social_metrics_scorecard_FINAL”

Data access and archival: These data have been archived by the NERRS Centralized Data Management Office. You can request the data at this page.