North Central Coast State of the Region Assessment (2010-2015) Portfolio Product

Document Title: Integrating Socioeconomic & Ecological Data: Exploring new methods to support long-term MPA monitoring and sustainable fisheries

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About: This product is part of a portfolio of documents developed to inform the *State of the California North Central Coast: A Summary of the Marine Protected Area Monitoring Program 2010-2015.* It was internally reviewed by California Ocean science Trust. For more information about the State of the Region Assessment, visit oceanspaces.org/nccsotr.

Integrating Socioeconomic & Ecological Data

Exploring new methods to support long-term MPA monitoring and sustainable fisheries

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About this report

This report was produced by California Ocean Science Trust, with maps produced by Point 97. This project was led by California Ocean Science Trust, working in collaboration with the California Department of Fish and Wildlife (CDFW) and North Central Coast Baseline Program researchers from Point 97, Partnership for Interdisciplinary Studies of Coastal Oceans, and California State University, Monterey Bay.

Convening Editors

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Citation

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Background

Socioeconomic and ecological data are often collected on incompatible spatial and temporal scales due to inherently different data collection methodologies. Because both types of data were generated as part of the North Central Coast MPA Baseline Program, providing a unique opportunity to examine methods to bring these data together. However, standard methods for integrating socioeconomic and ecological data do not exist. Exploring and testing methodologies to link and integrate these often disparate types of data has the potential to create new knowledge that can inform MPA management under the Marine Life Protection Act (MLPA) and fisheries management under the Marine Life Management Act (MLMA), among others. This could also inform future MPA monitoring needs, enhance our understanding of the utility of fisheries and ecological data, and contribute to a greater understanding of California's coastal ecosystems.

Project Goals

As we work toward the region's five-year MPA management review and begin planning long-term MPA monitoring, this project aimed to:

- develop an approach and guidance for integrating socioeconomic and ecological data,
- explore ideas for how such methods can inform efforts to evaluate MPA effectiveness,
- cultivate cost-effective, long-term MPA monitoring methods, and
- realize the value of MPA monitoring data to inform fisheries management.

Project Overview

Our main objective was to map the socioeconomic and ecological datasets in similar spatial and temporal scales to gain a greater understanding of opportunities for integrating these two, disparate data types. The resulting maps illustrate geographic patterns of fish distribution and the corresponding fishing pressure across California's North Central Coast region. Visualizing these patterns will enable scientists, managers, and decision makers to consider these data together for the first time, strengthening interpretation of any changes in fish populations and fishing pressure in the region, particularly in support of the first MPA management review and long-term monitoring.

There are very few instances where socioeconomic and ecological data have been collected or analyzed alongside one another; MPA monitoring in California is an exceptional case. Ecological data considered here include those collected through MPA monitoring, such as species abundance, size, and distribution. Socioeconomic data include fisheries data routinely collected by the California Department of Fish and Wildlife, and those collected through MPA monitoring, such as relative value of fishing grounds.

This work has uncovered new information about how to best pursue similar mapping and data collection efforts, identified potential avenues for future analyses for exploring linkages within these datasets, and strengthened our understanding of how to leverage these linkages in support of MPA and fisheries management.

Mapping Methodology & Products

We focused our efforts on mapping data from the baseline program with the most overlap and relevance to integrating socioeconomic and ecological data (Table 1). As a first step, we considered which datasets overlap taxonomically. We then considered spatial and temporal intersections of datasets to decide the geographic and temporal focus of the project.

Project Name & Dataset	Dataset Description & Mapping Technique
Baseline Characterization of Human Uses (*led by Point 97)*	
Commercial fishing data (Commercial)	Commercial landings of nearshore finfish (pounds) per ten-mile by ten-mile fishing block for 2011
Recreational fishing data (CPFV)	CPFV catch of rockfish per ten-mile by ten-mile fishing block for 2011
Baseline Characterization of Soft and Rocky Deep Water Ecosystems (*led by CSUMB & MARE)*	
Ecological data from ROV surveys of mid-depth and deep habitats (ROV)	Total abundance of finfish (commercial maps) and rockfish (CPFV maps), per transect, per fishing block for 2011
Baseline Characterization of Kelp Forest Ecosystems by PISCO (*led by PISCO)*	
Ecological data from SCUBA surveys of kelp and shallow rock habitats (PISCO)	Total abundance of finfish (commercial maps) and rockfish (CPFV maps), per site, per fishing block for 2011

Since no single fishing block contained all four datasets, each map produced as a part of this project illustrates a different subset of data and at varying geographic scales. Commercial and recreational fisheries region-wide maps are also depicted on separate maps to better visualize the data. The four maps produced are:

1. Region-wide map that depicts commercial nearshore finfish fishing data together with ecological data from PISCO and ROV surveys (Appendix A);
2. Region-wide map that depicts the recreational rockfish fishing data together with ecological data from PISCO and ROV surveys (Appendix B);
3. A close-up view of Point Area where the commercial nearshore finfish fishery is active, CPFV for rockfish is not as well as many PISCO dive sites and one ROV transect data (Appendix C);
4. A close-up view of the Farallon Islands depicting commercial nearshore finfish fishery, CPFV for rockfish, and ROV transect data (Appendix D).

Outcomes & Lessons Learned

This test case confirmed that spatial comparisons between socioeconomic and ecological data are possible using the MPA baseline monitoring data. It has also provided a means to thinking about the future of MPA monitoring as we move from the more broad and deep baseline monitoring into targeted long-term monitoring for this and other MPA regions in California.

This project laid the groundwork and methodology for comparing socioeconomic and ecological data of fished species beyond the examples presented here. It has also identified opportunities to pursue additional data manipulations to better allow comparisons of these two datasets in the future, should the potential results be considered a priority for MPA monitoring programs. These other analyses may result in a greater understanding of the interaction between fish harvesting and species abundance observed both inside and outside of MPAs. Furthermore, understanding the gradient of fishing pressure across a region or statewide could be useful to planning ecological and socioeconomic data collection in and around MPAs and for interpreting results.

There are many disparities across these datasets making them difficult to compare, such as differences in data collection methodology, as well as the geographic and temporal scales of data collection. By completing this test case, we gained a greater understanding of how to enable comparisons across results from different disciplines, specifically the temporal, spatial, and taxonomic scales necessary to do so. This new knowledge will inform the approach to long-term monitoring efforts across the state.

The maps and lessons learned from this project should continue to support the conversation and planning for long-term monitoring in California as well as integrating MPAs into fisheries management (as a continuation of the outcomes documented in the CDFW document "Proceedings of the Marine Protected Areas and Fisheries Integration Workshop).

As California managers identify information needs for managing MPAs and fisheries, monitoring methodologies, including sampling design, should continue to evolve. For example:

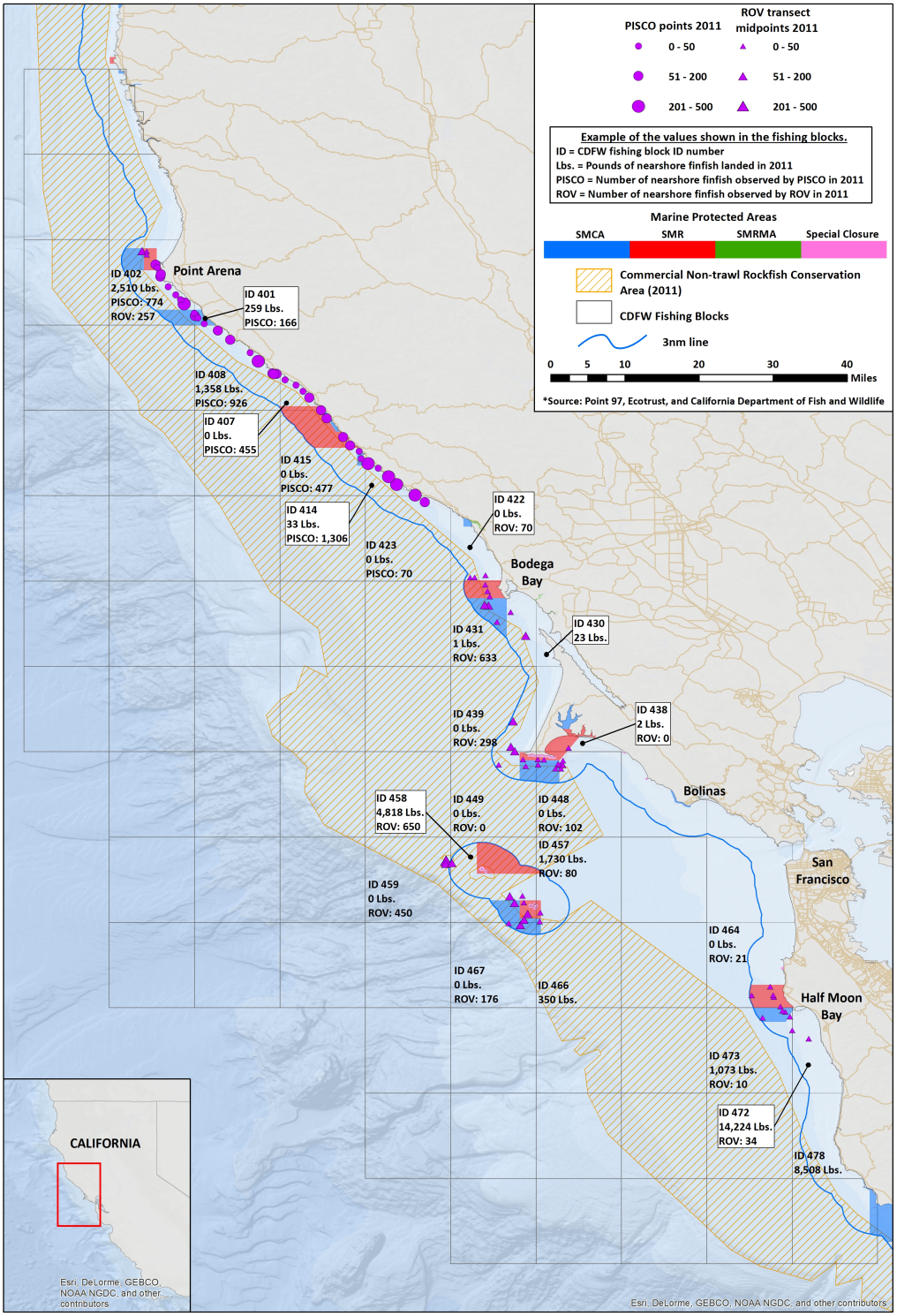
- At what spatial and temporal scale should ecological sampling and fisheries reporting occur to ensure compatibility across disciplines?
- How could ecological sampling and post-processing methodologies be updated to ensure documentation of targeted fishery species and metrics of interest to resource managers?
- How could commercial and recreational fishing data collection methodologies and post-processing be updated to improve alignment with ecological monitoring data?
- When selecting sites and sampling dates, to what extent should ecological monitoring consider fishing regulations, such as open and closed fishing seasons?
- How can we find efficiencies in collection of different types of long-term monitoring data to both answer the most relevant management questions and maximize value of all datasets?

Conclusion

By generating socioeconomic and ecological data on compatible spatial, temporal, and taxonomic scales, these data can be integrated and leveraged to inform multiple management mandates. Through this project, we gained an understanding of how to steward MPA and fisheries monitoring toward a compatible future. While acknowledging the potential limitations of integrating these often disparate datasets, we generated example products and guidance based on lessons learned through this case study. Integrating socioeconomic and ecological data builds a greater understanding of the value of MPA and fisheries monitoring, reveals opportunities to leverage data to inform management, and can maximize the value of long-term monitoring.

Appendix A: Region-wide map that depicts commercial nearshore finfish fishing data together with ecological data from PISCO and ROV surveys

California North Central Coast Commercial Nearshore Finfish - Live - Fixed Gear
Number of Fish Harvested and Number of Fish Observed - Summarized to CDFW Fishing Blocks - Post MPA (2011)* - All Ports



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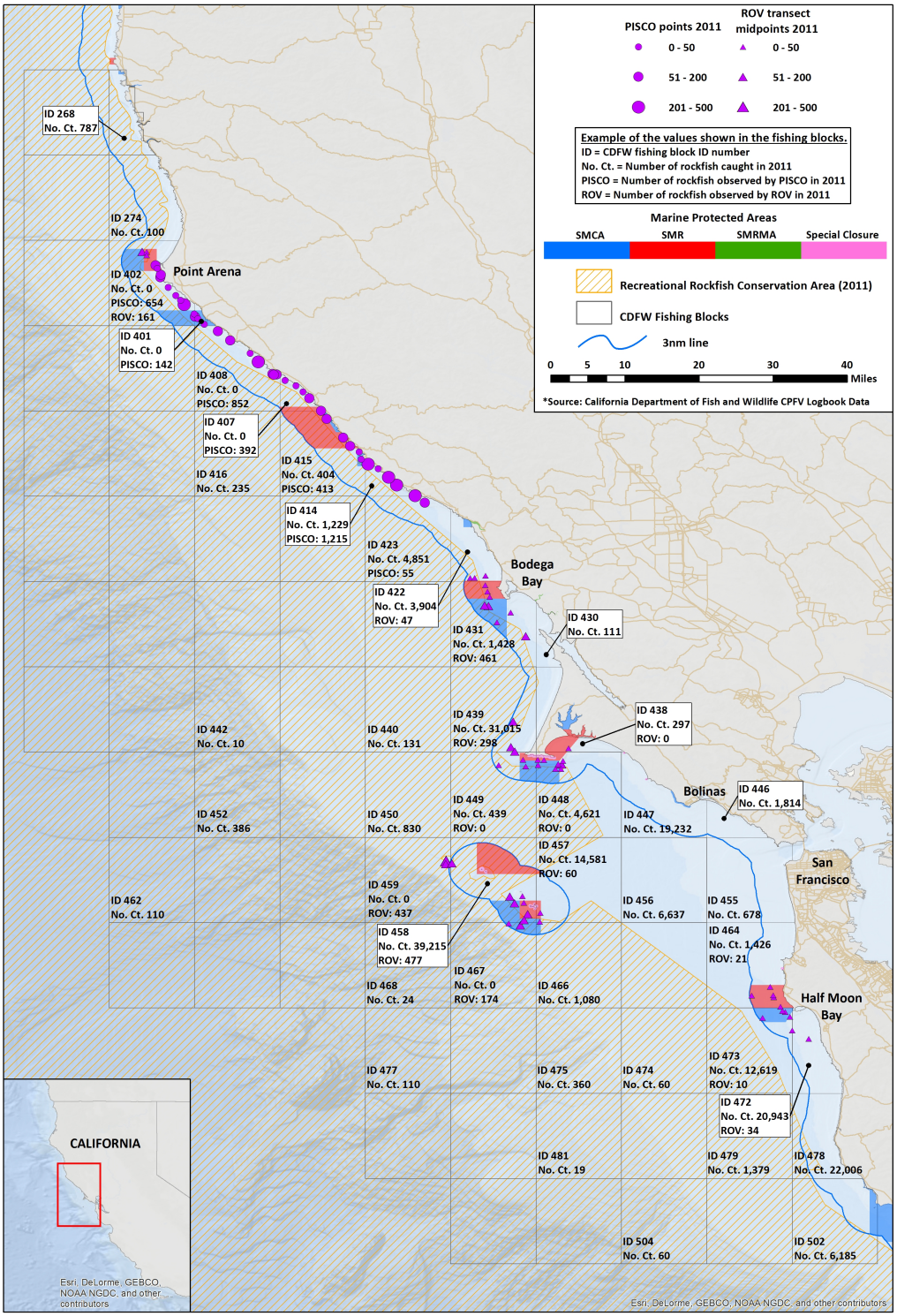
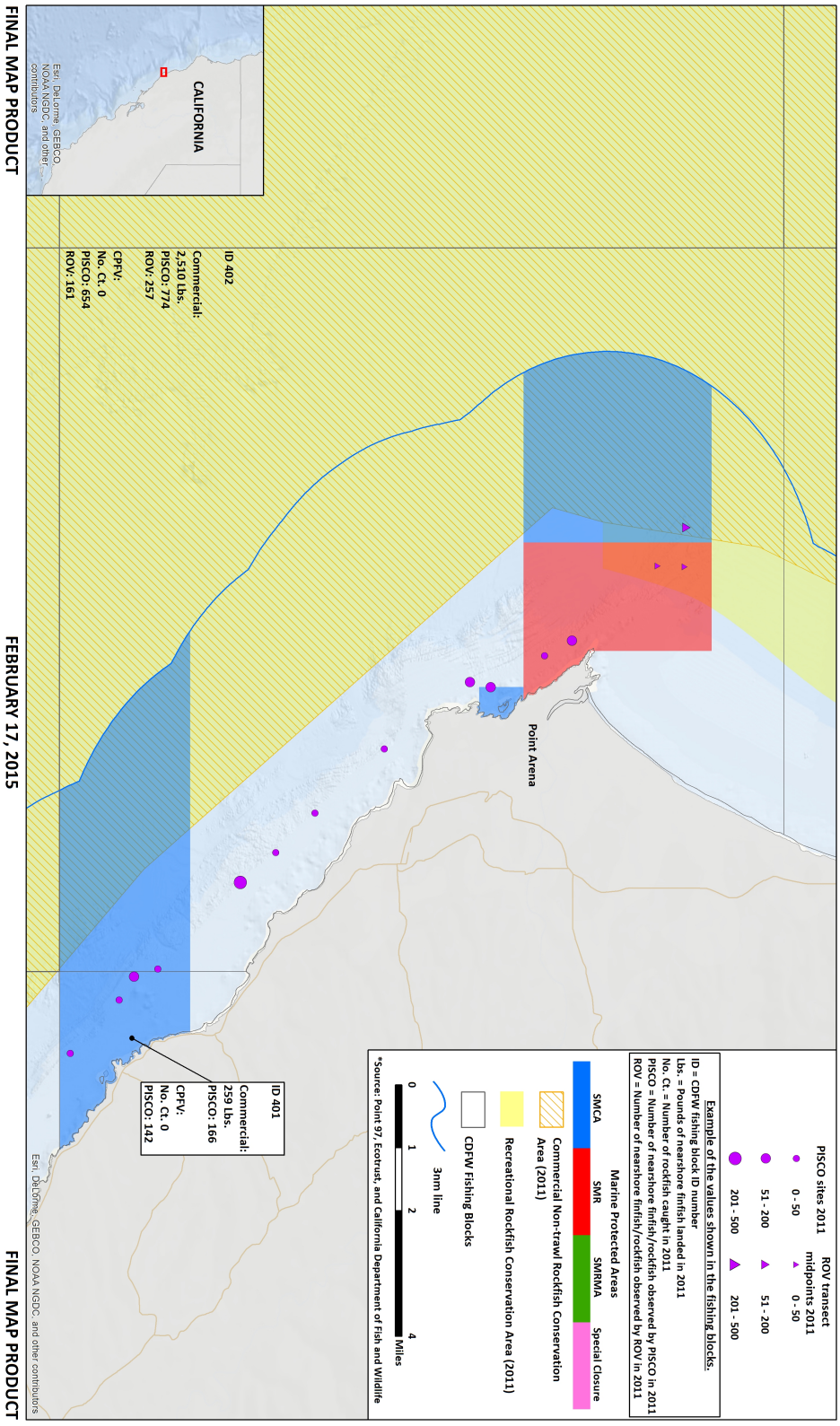
Appendix B: Region-wide map that depicts the recreational rockfish fishing data together with ecological data from PISCO and ROV surveys

California North Central Coast Commercial Passenger Fishing Vessel Landing Blocks
Number of Rockfish Caught and Number of Rockfish Observed - Post MPA (2011)* - All Ports



FINAL MAP PRODUCT **FEBRUARY 17, 2015** **FINAL MAP PRODUCT**

Appendix C: A close-up view of Point Area where the commercial nearshore finfish fishery is active, CPFV for rockfish is not as well as many PISCO dive sites and one ROV transect data



Appendix D: A close-up view of the Farallon Islands depicting commercial nearshore finfish fishery, CPFV for rockfish, and ROV transect data