Assessing and Managing Marine Debris in the Proposed Chumash Heritage National Marine Sanctuary

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OBJECTIVES

The primary aim of this project is to aid NOAA's Office of National Marine Sanctuaries (ONMS) West Coast Regional Office (WCRO) in analyzing marine debris accumulations, spatial patterns, and sources in watersheds, beaches, and the marine environment within and around the proposed Chumash Heritage National Marine Sanctuary (CHNMS; Figure 1, see Appendix). This research will allow the WCRO to track marine debris levels in CHNMS pre- and post-designation, and compare these levels to other west coast sanctuaries, including Channel Islands National Marine Sanctuary (CINMS) and Monterey Bay National Marine Sanctuary (MBNMS), which border the proposed CHNMS (Figure 2, see Appendix). Specific objectives include:

1. Conduct a baseline assessment of marine debris in the proposed sanctuary using citizen science data from beach clean up mobile apps and databases.
2. Create a reproducible hotspot analysis of marine debris accumulations in this area using geographic information systems (GIS) to identify beaches that function as collection areas for marine debris. Identify the geographical factors that influence this spatial distribution of marine debris, including beach orientation to prevailing wind conditions, ocean currents, and proximity of beaches to marine debris sources such as fishing hotspots, watersheds, public access areas, and urban centers.
3. Compare management strategies across west coast national marine sanctuaries and offer recommendations for marine debris mitigation and management that incorporate Indigenous and local community perspectives.

SIGNIFICANCE

Marine debris is defined as any persistent, solid material that has been anthropogenically manufactured or processed, and directly or indirectly discarded, disposed, or abandoned in a coastal or marine environment [14] [4]. Globally, the damaging impacts of marine debris have been extensively researched and reported; adverse effects include: plastic ingestion and entanglement in marine birds, mammals, and fish; the leaching of toxins into marine environments; increasing levels of microplastics; hazards to ships; declines in aquaculture due to increasingly contaminated catches; loss of tourism income; and increased costs of cleanup operations [13] [15] [3] [16] [12].

The state of California contains 3,400 miles of coastline that includes both major metropolitan areas and remote shorelines. California also supports large fishing and coastal tourism industries. These factors make California both vulnerable to the damaging impacts of marine debris as well as a major source of marine debris. California is also home to four national marine sanctuaries that protect both coastal and offshore marine ecosystems including estuaries, kelp forests, benthic communities, and seamounts, and provide important habitats for a diverse array of marine species [5]. If designated, the proposed CHNMS would become California's fifth national marine sanctuary, and would recognize and bring important protections to Indigenous lands and cultural heritage sites, as well as to an internationally-significant ecological transition zone where northern temperate waters meet subtropical waters, which provides critical habitat for a variety of marine mammals, invertebrates, sea birds, and fish [6]. All existing national marine sanctuaries in California have acknowledged marine debris as a priority in their management plans [8] [9] [10] [11], and the two national marine sanctuaries bordering the proposed CHNMS (MBNMS and CINMS) have established ongoing marine debris monitoring programs with support from NOAA's Marine Debris Program (MDP). However, little is known about the quantities and impacts of marine debris in the proposed CHNMS. **The aim of this project is to assess marine debris in the proposed CHNMS to inform the WCRO and management partners of CHNMS to establish a more robust marine debris monitoring and mitigation program as part of the management of this new sanctuary.** This project comes at an especially unique and opportune time, as it will provide marine debris analysis and management recommendations prior to designation of a new

national sanctuary, thus laying invaluable groundwork and a solid baseline for the proposed CHNMS to build from, and for already-established national marine sanctuaries to learn from.

BACKGROUND

The WCRO oversees the management of 15,333 square miles of marine protected areas around Channel Islands, Cordell Bank, Greater Farallones, Monterey Bay, and Olympic Coast. Each of these national marine sanctuaries are intimately connected with each other as well as to the entire coast from Alaska to Baja, and to the global ocean via ocean currents. The WCRO is also managing the designation process for the proposed CHNMS. NOAA's MDP is a national program that works with national marine sanctuaries across the U.S. The WCRO works closely with NOAA's MDP to monitor and mitigate marine debris in all of the west coast sanctuaries.

As proposed, CHNMS would span 156 miles of central California coastline and approximately 7,000 square miles of coastal and marine habitat, stretching from the southern border of MBNMS in San Luis Obispo County, to Gaviota Creek in Santa Barbara County and the northwestern border of CINMS, and extend offshore to include Santa Lucia Bank, Rodriguez Seamount, and Arguello Canyon [2] [6]. The proposed CHNMS has only completed the first step of the designation process: the public scoping period. NOAA anticipates releasing draft designation documents in spring 2023, after which the public will have another opportunity to provide comments. ONMS staff will then review these comments, make adjustments, and produce the final designation documents in early 2024.

EQUITY

The proposed CHNMS includes the ancestral land of Chumash and Salinan tribes and is the first national marine sanctuary to be nominated by a community coalition led by an Indigenous group [1][2]. A key priority for the proposed CHNMS is to highlight and honor the cultural heritage of Indigenous peoples, the first stewards of the lands and waters encompassed by the proposed sanctuary. CHNMS proposes protections for important tribal cultural sites and natural resources, and an organizational framework that supports Indigenous collaborative management [7]. The Indigenous knowledge and stewardship of this region is invaluable for creating an equitable and sustainable management plan for this sanctuary, and more broadly for incorporating Indigenous perspectives in the international effort to conserve 30 percent of the world's land and waters by 2030 [1]. This project hopes to inform management strategies for marine debris mitigation by incorporating Indigenous and local community perspectives and knowledge to develop community-based management practices for the proposed CHNMS.

AVAILABLE DATA

This project will use national marine sanctuaries data as well as the following publicly available data:

- Trash Information and Data for Education and Solutions (TIDES): Ocean Conservancy data from the Clean Swell citizen science mobile app that includes thousands of data points from marine debris collections along the coast within and around the proposed CHNMS, including data on location, collection date, and debris type.
- Surfrider Foundation: Beach cleanup data from multiple beaches within the proposed CHNMS, including data on location, collection date, and debris type.
- Marine Debris Tracker: NOAA MDP's database of citizen science marine debris observations within the proposed CHNMS including data on location, collection date, and debris type.
- California Coastal Commission: State-wide data by year and county on citizen beach clean-up events including data on location, collection date, and marine debris type.

- Central and Northern California Ocean Observing System (CeNCOOS) and Southern California Coastal Ocean Observing System (SCCOOS): Includes regional data on shoreline types, public beach access, and oceanic conditions.

POSSIBLE APPROACHES

- Determine areas of coastline within the proposed CHNMS most impacted by marine debris:
    - Utilize MBNMS methodology (currently internal, but the authors of this project were given access) for categorizing and analyzing the data.
    - Map marine debris location and type based on citizen science and beach cleanup data from mobile apps and databases.
- Compare management strategies between national marine sanctuaries for marine debris:
    - Conduct a literature review of the management plans for CINMS, MBNMS, and the proposed CHNMS. Refer to other sanctuary management plans and staff interviews as appropriate.
- Determine the sources of marine debris:
    - Conduct a literature review of marine debris spatial patterns and sources.
    - Utilize GIS analysis and spatial modeling to identify coastal hotspots of marine debris and potential sources that contribute to these hotspots.
- Recommend strategies for reducing marine debris, strengthening national marine sanctuaries' management techniques, and incorporating Indigenous and local community perspectives:
    - Conduct a literature review and interview staff (sanctuaries, Surfrider, Coastal Commission, NOAA's MDP, etc.) on best practices for marine debris management.
    - Review public comments from Indigenous and local communities on the proposed CHNMS draft management plan related to marine debris.

DELIVERABLES

- A GIS map and interactive Shiny app of the proposed CHNMS detailing marine debris locations, types, and sources.
- A roadmap for standardization of marine debris data collection and analysis so marine debris can more easily and reliably be compared between national marine sanctuaries in the future.
- A review and comparison of marine debris management techniques across CINMS, MBNMS, and the proposed CHNMS, as well as other sanctuaries, national estuarine reserves, and other NOAA programs.
- Recommendations and strategies for reducing marine debris in the proposed CHNMS and strengthening management techniques.

INTERNSHIP

The client (WCRO) is willing to host one intern to support this project over the summer. Internship funding is currently pending, but the WCRO is working on securing ~$8,000 for 10-12 weeks. The authors of this proposal are also in communication with the National Marine Sanctuary Foundation and the California Marine Sanctuary Foundation to develop potential summer internship projects that support the work of this proposal, and potential funding opportunities for these internships.

BUDGET AND JUSTIFICATION

This project should not need funding beyond the given $1,300 from the Bren School.

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APPENDIX

Figure 1. Looking north from Point Conception, an area of coastline within the proposed boundaries of CHNMS [6]. *Credit: Robert Schwemmer, NOAA.*

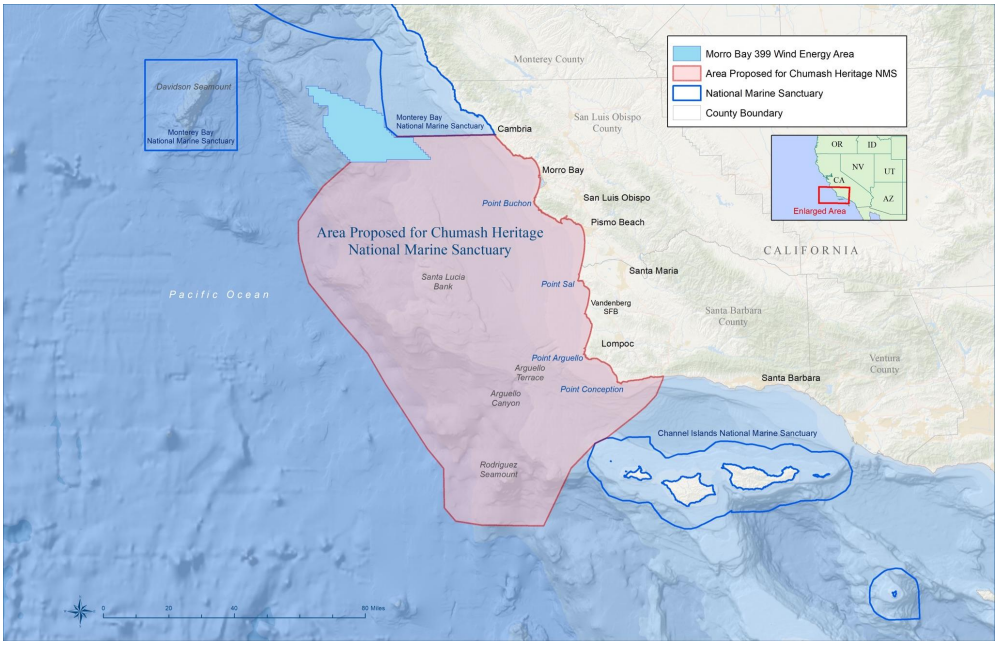

Figure 2. Map of the proposed CHNMS. *Credit: NOAA.*

GLOSSARY OF ACRONYMS

CeNCOOS: Central and Northern California Ocean Observing System

CHNMS: Chumash Heritage National Marine Sanctuary

CINMS: Channel Islands National Marine Sanctuary

GIS: Geographic Information Systems

MBNMS: Monterey Bay National Marine Sanctuary

NOAA: National Oceanic and Atmospheric Administration

NOAA'S MDP: NOAA's Marine Debris Program

ONMS: Office of National Marine Sanctuaries

SCCOOS: Southern California Coastal and Ocean Observing System

TIDES: Trash Information and Data for Educations and Solutions

WCRO: West Coast Regional Office

UNITED STATES DEPARTMENT OF COMMERCE
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January 26, 2023

Group Project Committee
Bren School of Environmental Science & Management
2400 Bren Hall
UC Santa Barbara, CA 93106

Dear Group Project Committee:

I am writing to affirm support for the group project proposal, "Assessing and Managing Marine Debris in the Proposed Chumash Heritage National Marine Sanctuary." The proposal was written in partnership with the West Coast Regional Office (WCRO) of NOAA's Office of National Marine Sanctuaries (ONMS), which is a government agency working to promote responsible, sustainable ocean uses that ensure the health of our most valued ocean places. The WCRO oversees the management of 15,333 square miles of marine protected areas within Channel Islands, Cordell Bank, Greater Farallones, Monterey Bay, and Olympic Coast national marine sanctuaries. Through the National Marine Sanctuaries Act, NOAA can identify, designate, and protect areas of the marine and Great Lakes environment that have special national significance.

A large community consortium led by the Northern Chumash Tribal Council submitted a nomination for the proposed Chumash Heritage National Marine Sanctuary (CHNMS) in July 2015. The federal government is currently considering sanctuary designation to protect the region's important marine ecosystem, maritime heritage resources, and cultural values of Indigenous communities. The proposed sanctuary stretches along 152 miles of coastline adjacent to San Luis Obispo and Santa Barbara counties, and would provide a haven for marine mammals, invertebrates, sea birds, and fishes, create an overarching framework for community-based spatial management for many threats, and recognize Indigenous and tribal history and culture in the area. WCRO staff is drafting designation documents for the proposed CHNMS, to be released for public review and comment in spring 2023. The draft management plan for the new sanctuary will likely contain a strategy related to assessing and reducing marine debris in CHNMS. This project will provide a rare and timely opportunity to assess the pollution load of marine debris, predominantly plastics, into the proposed CHNMS before it is designated as a new sanctuary.

Specifically, this Bren School proposal will provide analysis of existing data that is crucial to establishing a baseline awareness of marine debris in the proposed CHNMS prior to designation. Management recommendations born from this project will guide early sanctuary management with regard to marine debris assessment and mitigation. In addition, this project will serve as a means to compare and contrast marine debris conditions and management strategies for other west coast national marine sanctuaries. This project will address the need for comprehensive and standardized assessment of marine debris in the central California region, something the WCRO would not be able to accomplish to the same degree otherwise. This project will not only benefit U.S. west coast national marine sanctuaries, but will also serve as a model for assessing and managing marine debris in any coastal community around the world, with an emphasis on prioritizing Indigenous and local community engagement in marine debris management strategies.

As the client for this project, we are committed to providing consultation and relevant data throughout the entire duration of the project. In addition, the WCRO is committed to hosting an intern to advance this project during the summer of 2023. The internship will be paid. Further, we do not anticipate this project requiring more funding than the budget provided by the Bren School for each group project. However, we understand that if additional financial needs arise, the WCRO will seek to provide the necessary support.

If you need additional information or have any questions, please contact Laura Ingulsrud (laura.ingulsrud@noaa.gov, (831) 583-8857).

Sincerely,

William J. Douros
Regional Director