

Promoting Sea Otter Stewardship in SCUBA Divers in Morro Harbor

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Background

SCUBA divers have long enjoyed exploring the rich ecosystems of the protected waters of Morro Bay Harbor. Two of the most popular dive locations are at Target Rock and Coleman Beach. Target Rock is a unique dive environment within the harbor as it's the only kelp forest habitat. Target Rock has a small patch of Giant Kelp, *Macrocystis pyrifera*, which ebbs and flows with the tides and the seasons, forming a surface canopy that typically persists through summer and fall. Coleman Beach is an easy beach entry dive site that provides access to explore the diverse, rich eelgrass and sand bottom environments. The easy access and relatively calm diving conditions make these sites popular with a diverse group of dive enthusiasts of all levels and interests. These sites are regularly visited by dive instructors with students, divers looking to capture photos of the unique critters and environment, spearfishing divers, and the divers which just enjoy exploring the underwater world.

The numbers of sea otters regularly inhabiting the waters inside Morro Harbor have significantly increased over the last decade. During the 1990s through 2010 the number of otters inside the Bay were generally well below ten. Since 2010 the numbers have increased with the 2016 survey counting 45 sea otters inside the protected waters of the Morro Bay Harbor. As both sea otter and marine recreationist numbers increase it's reasonable to predict a substantial increase in sea otter/human interactions in the harbor. When the *Macrocystis* canopy is present at Target Rock, 20-30 sea otters may be resting in the kelp bed. At Coleman Beach, sea otters gather in groups of 2-20 in the shallow open water 10-70 meters from shore or within eelgrass beds at low tide. Sea otters in the harbor may be part-time residents or they may feed, rest, and rear their pups entirely within its sheltered waters (US Geological Survey, unpublished data). Sea otters often seek surface canopy of kelp or eelgrass to anchor themselves while resting singly or in groups called rafts. Canopy availability in the harbor is dependent on tide level, currents, and seasonal persistence of kelp and eelgrass, with the Target Rock ledge providing the only suitable rocky substrate needed for *Macrocystis* to thrive. Sea otters on the San Luis Obispo county coast spend between 10 and 12 hours resting or sleeping each day (US Geological Survey, unpublished data). During rest sea otters digest food, minimize heat loss by keeping exposed fur dry, and conserve energy. Since they do not store energy efficiently in the form of fat, they are "income" strategists, relying on a steady supply of food (Riedman and Estes 1990). Activity cost energy and chronic disturbance to rest can add up to an energetic burden, particularly for females that are carrying an already heavy energetic burden due to the cost of rearing a pup (Thometz *et al.* 2014).

With the help of our volunteer-based citizen science team, Sea Otter Savvy collects data to help us understand the effect of marine recreation activities on sea otter behavior and energy budgets. During monitoring sessions, our citizen scientists have observed disturbances to resting sea otters by various recreational activities (kayak, SUP, tour boats, fishing boat, surfers, and divers). Since Target Rock and Coleman Beach are specific access points for the SCUBA diving community, Sea Otter Savvy has taken special interest in monitoring this activity to provide insight into ways our outreach messaging may help correct actions leading to sea otter disturbance. SCUBA diving disturbances most often occur when

divers, intentionally or accidentally, surface very near the raft causing a “full flush”, when all raft members dive suddenly in response to a perceived threat. Placement of dive flags too near a resting sea otter raft, and surface swimming by divers to and from access locations have also been reported as sources of disturbance. Additional reports of diver-caused disturbances to sea otters have been communicated to us by U.S. Geological Survey and California Department of Fish and Wildlife sea otter biologists, SeaLife Steward volunteers, Morro Bay Natural History Museum docents, and concerned citizens. As the kelp bed at Target Rock continues to thrive, it is likely to attract both sea otters who want to rest in the canopy and divers who want to explore the forest underneath. While similar diver-caused disturbances have not been observed at Coleman Beach, the proximity of popular diving sites to sea otter resting locations make disturbance probable.

The Sea Otter Savvy program uses research and a science based approach to develop our outreach and education program with the goal of reducing human-caused disturbance to sea otters in California. For the last two years we have been working with members of the community in both Monterey and San Luis Obispo counties (where most human-sea otter interactions occur) to engage them in a cooperative effort to educate the public and foster an ethic of stewardship for all coastal wildlife. Our goal is to enlist many of the local businesses that cater to marine recreationists in this effort, so that they feel a part of a positive movement to protect sea otters as valuable assets to the community. We have met with most local operators to discuss etiquette around sea otters, and have incorporated their feedback into the design for our kayak adherent decals (now distributed to most kayak and SUP vendors in Morro Bay), and a ecotour guide to the natural history of the southern sea otter. Those businesses who use the decals and/or demonstrate other “sea otter savvy” practices are recognized on our social media. To further engage the community, we host community events like our Wildlife Awareness Workshop (March 2016), work with the Morro Bay Harbor department to reach harbor residents and permit holders, give talks to docents from SeaLife Stewards and Sea Otter Experience, and give public and private presentations on an invitational basis. Together with Cara O’Brien, Sea Otter Savvy is currently developing our “Respect Wildlife” certification program, which would officially certify and promote businesses and organizations that comply with a defined standard of stewardship. More information on the Sea Otter Savvy program, mission, and scope can be found at www.seaottersavvy.org and on our Facebook Page.

Sea Otter Savvy, California Department of Fish and Wildlife, and California State Parks have joined our expertise and skills together to help the diving community become more effective wildlife stewards in Morro Bay. We have taken the first steps to reach out to key leaders in the San Luis Obispo diving community, and staff from both SLO Ocean Currents and Depth Perceptions have shown support for this project. The next step is to reach out to dive clubs, instructors, and dive shops in the Central Valley that use Coleman and Target Rock as their classrooms for diver certification, refreshers dives, and dive meet-up destinations. Outreach to Central Valley dive shops, divers, and dive instructors including, Central Valley SCUBA Center in Tulare, Aqua Sports and Bob’s Dive Shop in Fresno and Bakersfield SCUBA will be a priority for outreach. Dive clubs including Fresno SCUBA Frogs, and San Joaquin Sport Divers will be contacted and offered outreach programs.

Our solution

We believe that an inclusive outreach approach that incorporates the spatial needs of sea otters and preserves diver enjoyment will have the best chance of success. Our proposed strategy includes three elements:

1. Engaging the SCUBA diving community: Reaching out to key members and leaders of the community, dive shops, and SCUBA organizations to collaborate on strategies and materials that most effectively educate divers on best practices to prevent disturbance while preserving diver experience.
2. Installing educational signage at key diver access points: Boulder mounted interpretive panels would provide information targeting SCUBA divers at two popular diver access locations that are adjacent to sea otter resting locations ([Figure 1](#)). Panels would be located prominently where divers prep and enter the water and would be identified by the dive flag symbol to attract diver attention. We believe the boulder-mounted signage ([Figure 2](#)) simplifies installation and integrates attractively into the existing rock features at both locations. The panels might include ([Figure 3](#)):
 - a. Map showing diver access location(s) and sensitive sea otter areas (variable by site)
 - b. Tips for diving safely and responsibly in sea otter habitat with the dual goal of preventing disturbance and aggressive encounters
 - c. Underwater image of location (variable by site)
 - d. Images of common kelp forest fauna (above and below surface, kelp forest fauna at Target Rock and eelgrass at Coleman Beach)
 - e. Why rest is important for sea otters
 - f. Dive flag to draw diver's attention to sign

3. Creating educational dive map/guide for distribution to SLO county dive shops: We would engage help from local dive shops to create:
 - a. Water-resistant maps of the relevant diving locations (water-resistant paper is a key element in making these durable and practical for use at diver access sites)
 - b. Tips identifying features and safety tips specific to each dive site
 - c. Information on responsible diving around sea otters and other marine wildlife,
 - d. Field guides to marine life divers might encounter in Morro Harbor

These could be handed out to divers renting gear, distributed at diving classes, and used by dive instructors as a visual aid to guide pre-dive talks. See [Figure 4](#) for an example.

We hope to implement elements 2 and 3 within the context of a collaboration with the diving community as described in element 1. *In this application, we are specifically requesting funds for element 3, highlighted in the box above.* Our goal is to provide information that is of use to divers wishing to explore these locations, helps ensure diver safety in sea otter habitat, and promotes a sense of good stewardship and awareness towards sea otters and other marine wildlife among divers.

Our plan for development and distribution of element 3:

1. Engage with leaders from Depth Perceptions and SLO Ocean Currents to develop the dive map/guide, to assure we are producing something that will be a genuine benefit to their clients and others in the diving community. Investment by the dive shops in creating the product will be essential to insuring its use and distribution.
2. Distribute to diving community via dive shops: By providing an item that provides a service to both local and Central Valley divers, we ensure that our dive map/guide becomes an integral

component of the diver training programs of dive shops, and is distributed to all SCUBA students and clients renting equipment for a Morro Bay dive.

3. Promote and distribute to a broader diving community: Additionally, we can introduce the dive map/guide to an even broader audience by offering it at gatherings of the diving community such as the annual Diver Education Conference organized by Depth Perceptions in spring, and at other public, ocean-themed events and venues.

References

Riedman, M, and J.A. Estes. 1990. "The Sea Otter (*Enhydra Lutris*): Behavior, Ecology, and Natural History." *Biological Report (USA)*. No. 90 (14).

Thometz, N. M., M. T. Tinker, M. M. Staedler, K. A. Mayer, and T. M. Williams. 2014. "Energetic Demands of Immature Sea Otters from Birth to Weaning: Implications for Maternal Costs, Reproductive Behavior and Population-Level Trends." *The Journal of Experimental Biology* 217 (12): 2053–61.

Figure 1 Map of section of Morro Harbor showing proposed locations for interpretive panels at diver access points (red Xs) adjacent to sensitive sea otter resting areas (blue ellipses).



Figure 2 Examples of boulder-mounted interpretive panels



Figure 3 Draft sample of proposed content for Target Rock interpretive panel



Figure 4 Example of dive map with underwater view



Estimated Budget

	Graphic Design by Wildways 11 x 17 size (preferred)	Graphic Design by Wildways 11 x 8.5 size	Printing costs Waterproof paper, folded, 500 count	Printing costs Waterproof paper, folded, 1000 count	Total 500, 11 x 17	Total 1000, 11 x 17
Estimated cost of guide/map	\$3500*	\$3000*	\$1343	\$1626	\$4843	\$5126
Requested funding MBNEP	\$3500	\$3000	\$1500	\$1500	\$5000	\$5126

*A Note on the Graphic Design by Wildways Illustrated: Wildways Illustrated creates original custom artwork that is included in the price of the design. Their products have proven on past projects to get results because they are attractive and engaging for product users. Wildways Illustrated staff has proven to be reliable, timely, and generous with assistance without charge in adapting pieces and providing files for use in other applications. See [Figure 5](#) for an example of their work that is conceptually similar to element 3. [Figure 6](#) is included to show their prior sea otter-related work.

[illegible]

Figure 6 Wildways sample: sea otters



From Grant Application: The proposed project must work to implement, at a minimum, one of the Action Plans that address the Priority Issues listed above. Please list the relevant Action Plans that will be addressed by this project below. The Action Plans are detailed within the Management Plan which can be found at MBNEP.org or from the Estuary Program’s office.

This project addresses the Environmentally Sound Estuarine Resource Use (USE-1) Action Plan by seeking to support recreational use of the bay and estuary, while educating recreationists to demonstrate good stewardship toward an ecologically important Morro Bay inhabitant, the sea otter. All facets of this proposal, from public interpretive signage to engagement with the diving community, fall within the Education and Outreach (EO-1) objectives described in the CCMP.

Additionally, we contend that, as sea otters are a keystone species known to promote biodiversity where they live and feed, their persistence in Morro Bay is likely to promote biodiversity and estuary health. Recent studies have linked the presence of sea otters to increased recovery and resilience of eel grass beds, a critical ecological community in Morro Bay. Encouraging the persistence of sea otters in Morro Bay by protecting them from human-caused disturbance is one way to support the presence of this species that may have a critical role in the health and recovery of estuary habitats in a manner consistent with multiple Action Plans under the category of Ecosystem Conservation and Recreation.