SeaSketch for Safe Passage

Collaborative mapping helps conflicting marine interests work toward shared goals

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The process of collaboratively mapping out ideas and overlaying layers of data can help diverse groups come to a common understanding of an area. By overlaying map data describing the distribution of human activities, natural resources, and infrastructure, stakeholders can use these data to discover conflicting uses and explore potential solutions.

In 2015–2016, a working group including shipping industry members, whale biologists, military representatives, resource managers, air quality managers, environmental interests, and the U.S. Coast Guard used SeaSketch, a novel mapping platform, to discuss local solutions to manage marine traffic more sustainably in the Channel Islands region. Like its predecessor, MarineMap, SeaSketch is built to help such groups communicate about existing uses and management options across coastal waters, allowing diverse stakeholders to link their opinions and ideas to shared maps and come to a common understanding of competing needs and perspectives.

Process Context

In September 2007, the National Oceanic and Atmospheric Administration (NOAA) received reports of five blue whale carcasses between Santa Cruz Island and San Diego. On October 11, 2007, NOAA's National Marine Fisheries Service (NMFS) designated the blue whale deaths as an "unusual mortality event." In response to these deaths, the Channel Islands National Marine Sanctuary (CINMS) Advisory Council has been working to develop both short- and long-term management measures to reduce the ship strike threat to large whales in CINMS and the Santa Barbara Channel region listed on the Endangered Species Act.[1]

One such measure is their ship strike subcommittee, which produced recommendations adopted in 2009. As a result, the shipping lanes through the channel were modified in 2013 to decrease traffic overlap with areas of observed high whale concentrations. In addition, a

Members of the CINMS Advisory Council working group, stakeholders, and the general public attend a meeting where SeaSketch is used to present map data, sketch prospective management zones, and record feedback on options. Photo by Will McClintock, Ph.D.

Sanctuary Advisory Council Marine Shipping Working Group

Primary Goals:

- Reduce the risk of ship strikes on endangered whales.
- Decrease air pollution and greenhouse gas emissions.
- Improve navigational safety and promote efficient maritime shipping throughout the region.
- Manage ship traffic to minimize naval operation interruptions and reduce conflicts with other ocean users (e.g. fishing and whale watching concessionaires)

general call for voluntary speed reduction in the Coast Guard's weekly Local Notice to Mariners bulletin has evolved into a trial financial incentives program to reduce vessel speed.

A marine shipping working group of the CINMS Advisory Council was convened to build upon this previous and ongoing work, and to provide a collaborative forum for local stakeholders and experts to share knowledge and generate solutions. They came together to produce recommendations addressing four primary goals to broaden the scope of the working group's charge. Beyond just ship strikes, these goals incorporated a holistic look at how marine shipping affects marine resources and the broader maritime community in and around the sanctuary.

The working group members and support staff participated in five all-day meetings as well as multiple supplemental remote webinars. These meetings included expert presentations to inform the process as well as the facilitation of discussions to design spatial and non-spatial management recommendations. The final report offers more detail about the process and resulting recommendations.[2]

SeaSketch for Geodesign in Marine Spatial Planning

The working group's integrated approach aligns well with best practices for marine spatial planning:

- examining existing and potential use of ocean space comprehensively to identify conflicts between user groups and sustainability goals
- designing plans to reduce these conflicts

Geodesign, the iterative sketching and analysis of spatial designs, provides a useful framework for shaping the collaborative process.[3] To support this process, mapping tools allow decision-making participants to view relevant data and information, express ideas on the map, evaluate prospective plans, and discuss these ideas with other participants throughout the process. The features of the SeaSketch platform were developed to meet these specific needs common to a geodesign process for collaborative, data-driven marine spatial planning. Because SeaSketch is web-based, participants have access to a central planning hub where they can continue work and interact remotely between in-person meetings.

Decision support tools for area-based planning are wide-ranging. Some are sophisticated models that may be, but aren't necessarily, parameterized and vetted in a participatory process and run by skilled technicians like Marxan, InVest, etc. Other tools may be more like web-based atlases that democratize geographic information, making it accessible for participants and the general public. SeaSketch provides facilities for the evaluation of plans, including some integration with popular modeling tools, as well as easy-to-use map visualization that allows non-technicians to dive into science and information relevant to a planning decision.

The Software as a Service (SaaS) architecture allows every group implementing SeaSketch to leverage out-of-the-box features common to all projects and customize the platform to meet their specific needs in an administrative dashboard. Every planning process is unique and evolves, making use of different features and tools in different phases of the process. A few of the tasks common to configuring SeaSketch for a specific planning context include:

- gathering information and curating maps to populate the data layers of a project
- configuring sketching tools tied to analytics specifically relevant to that planning context
- managing user groups and discussion forums

Project leads work with a user-centered design approach to create a platform that intuitively meets the needs of multiple user groups.

Developing Safepassage.seasketch.org

The remainder of this article will describe how the CINMS Advisory Council working group process specifically configured and made use of the SeaSketch tools.

Data Layers

The first step involved creating a SeaSketch project site with a unique URL—safepassage.seasketch.org—and populating it with some publicly available data layers we anticipated would be useful for the working group

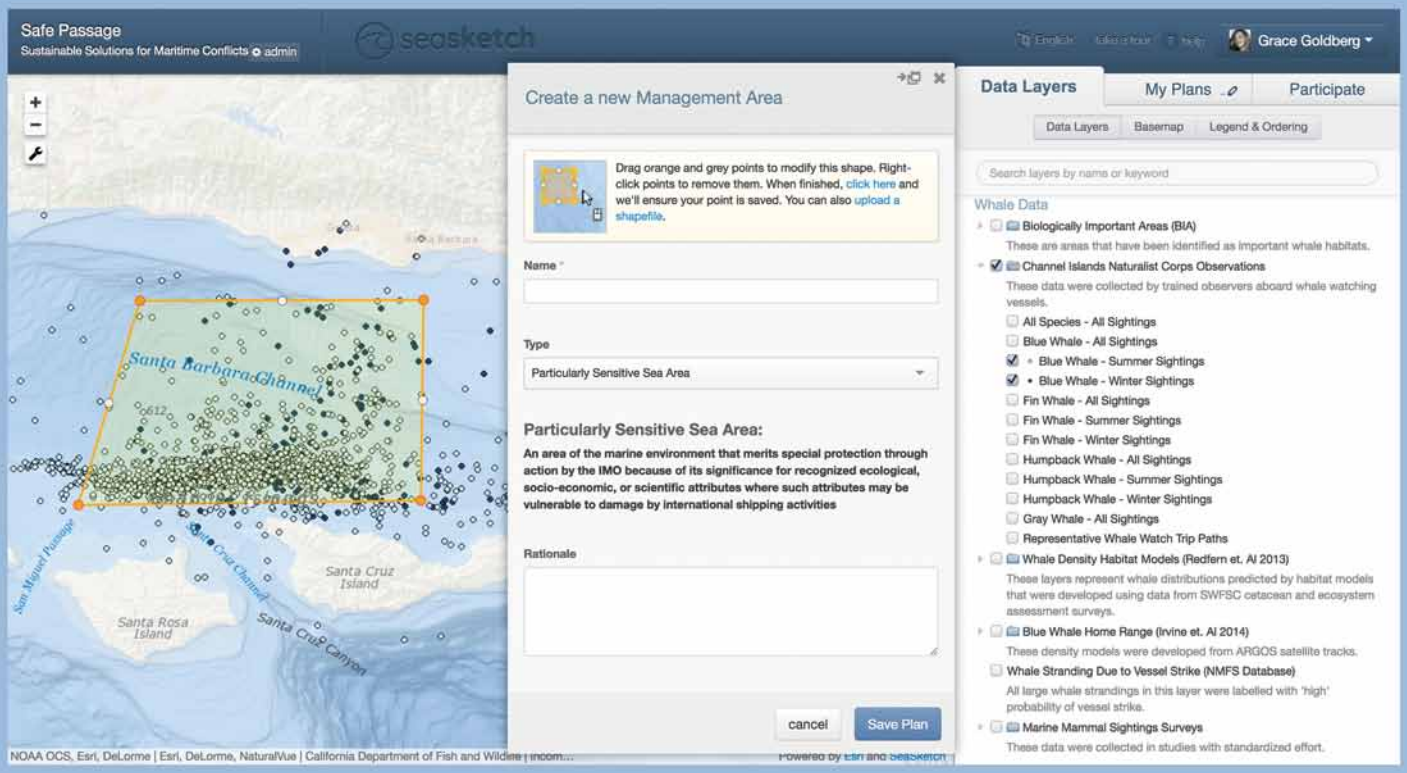
ahead of their first meeting. The distributed architecture of SeaSketch allowed us to leverage existing investment in data infrastructure from state and federal agencies in addition to publishing new map and analytical services, per project request. When the working group members were introduced to SeaSketch, the site already included authoritative boundaries and reference layers as well as some relevant biophysical layers pulled directly from the California Department of Fish and Wildlife servers and the NOAA/Bureau of Ocean Energy Management Marine Cadastre.[4]

At their first meeting, the working group discussed their charge, reviewed the work already completed on the issues, and were introduced to the SeaSketch platform and available information. This was the beginning of an iterative process soliciting data needs from working group members and working with them to build an authoritative data set based on their diverse expertise.

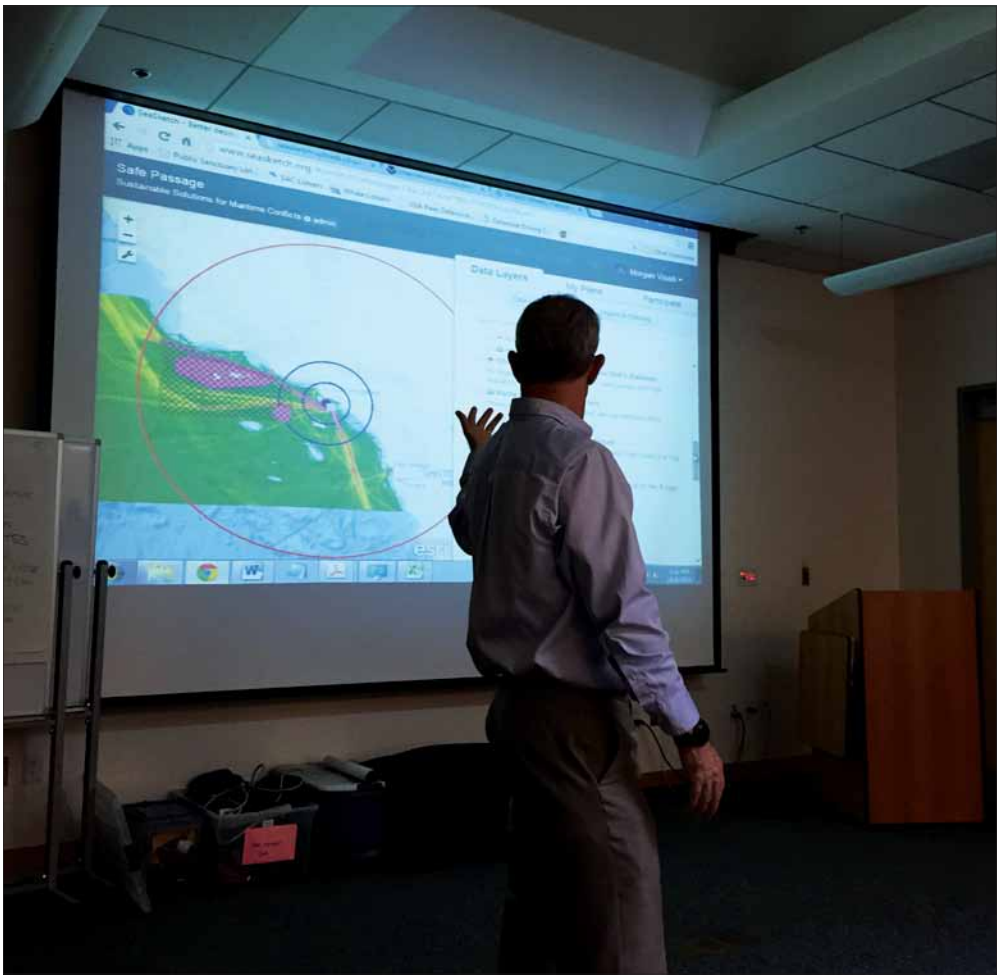
For the tool to be effective, it needed to provide the resources they saw as important for informing their process. For example, a representative from the U.S. Navy was able to provide a more detailed map of military use across the region. The Coast Guard provided automatic identification system data summaries for the region specifically applicable to the group's needs, allowing them to look at traffic density and speed patterns between vessel types, between months, and also interannual variation.

These data sets about the distribution of human uses were overlaid with a wealth of information about the distribution of whale populations. Marine mammal experts from the NMFS and other whale biologists engaged in the process created an exhaustive list of the data that could potentially be used. The spatial data sets were mapped, brought into SeaSketch, and provided the basis for a dedicated webinar on the topic.

In this remote, collaborative webinar meeting, the group members viewed SeaSketch on a shared screen and discussed the merits and limitations of various data sets, identifying five that would remain in the platform through the process. Some data sets offered better coverage in the area of interest, some described one species better than others, and some synthesized products that gave a continuous *prediction* of whale density over space rather than simply point out observations. This group also curated custom "metadata" documents to help the remaining participants use the data sets appropriately.



A screenshot of SeaSketch is used to view map layers depicting the distribution of whale sightings and then sketch a management zone to be designated as a Particularly Sensitive Sea Area. Graphic by Grace Goldberg



A meeting facilitator uses SeaSketch to present map data and record working group ideas for managing ship speed in the Santa Barbara Channel. Photo by Will McClintock

Sketching and Analysis Tools

As the process progressed, the working group needed to determine what types of management tools they might want to consider when building their recommendations. They roughly knew that routing measures might be appropriate, and the creation of no-go and slow-down zones might become a part of the proposal.

They received presentations from experts on what could be achieved through existing International Maritime Organization frameworks, such as traffic separation scheme shipping lane designation and Areas to be Avoided (ATBAs), as well as presentations on how Seasonal and Dynamic Management Areas (SMAs and DMAs, respectively) were being used around major ports of the Atlantic coast to reduce ship strikes on North Atlantic right whales. The working group used these discussions to create a list of what they might want to sketch out in their subsequent planning conversations.

In SeaSketch, we created three primary sketching tools, or "sketch classes." The "shipping lane" tool allows a user to sketch a multi-segment line on the map, designate the width of the lane, and automatically produce a traffic separation scheme along the sketched route. A "management zone" tool allows users to create a polygon, select from many zone types as attributes (i.e., SMA, DMA, ATBA, etc.) and, depending on which type is selected, fill out additional attributes (see page 79). In addition, users could place multiple shipping lanes and zones in a folder, creating a cohesive, multi-part plan to be analyzed together.

Similar to the iterative process to bring together authoritative data sets described above, we worked collaboratively with working group members to create analytical tools that would be helpful as they compared prospective plans. These informal, first-cut analyses were designed to help users with little specific technical knowledge make science-based decisions. For example, some simple feasibility flags alerted users when a shipping lane was sketched too close to existing infrastructure or no-go zones. Analytics co-developed with industry representatives and the Santa Barbara Air Pollution Control District staff allowed users to roughly compare potential emissions reductions based on routing and slow-down zones they had drafted.

Remote Collaboration

In addition to exposing easy-to-use mapping features online, SeaSketch provides discussion forums and survey tools to promote remote participation. Project leads can create private user groups and give them a space to iterate on plan ideas, share sketches and other documents, and link their conversation to relevant data layers.

In other SeaSketch projects, these same features provide space for public engagement rather than internal planning. In this case, the discussion forum allowed working group members and support staff to create new topic threads and post announcements throughout the process.

Using the Platform for Map-based Facilitation

The process of creating the tools in collaboration with users continued, with adaptations and modifications

added concurrently throughout implementation. In-meeting activities relied on SeaSketch for map visualization, design tools, and to capture ideas as notes in dedicated forum threads. Remote access to the tool built continuity between the in-person process steps.

Where information gathering and knowledge sharing dominated the initial working group activities, the second and third in-person meetings held the meat of the idea generation and negotiation around possible management recommendations. A professional facilitation team gave these meetings structure and guided the conversation.

SeaSketch was projected on a screen, with a dedicated individual using SeaSketch to display maps relevant to group member comments and capturing ideas as sketches in real time. For example, participants posed questions about the spatial extent of existing slow-speed incentive programs at the Ports of Los Angeles and Long Beach, California, which could be quickly answered by bringing up those boundaries. Members could then smoothly proceed to designing management recommendations to complement the existing program based on a shared understanding of the authoritative maps.

These seemingly small map interactions add up over the course of an all-day meeting. Where every question posed could add uncertainty to the decisions being discussed, and perhaps would not have been answered until a follow-up email or subsequent meeting, SeaSketch helped participants build a common understanding and more productively explore where their opinions and perspectives diverged. Members could walk up to the projector and point to an area where a zoning measure would be appropriate, and the SeaSketch driver could capture that as a polygon that could be edited through the continuing conversation.

Interestingly, even participants who never took the time to create an account and sketch out an idea themselves stressed the value of having the platform as an anchor during and between meetings, keeping the conversation tied to specific places and meaningful negotiations.

In addition to the in-person facilitation, SeaSketch was used to engage the participants remotely at key process junctures. For example, leading up to the second meeting, working group members were asked to submit straw-dog spatial plans—either routing or zoning measures—anonymously. These sketches provided a valuable foundation for the initial planning meeting as concrete fodder to debate the pros and cons of various management tools and places that might have been recommended. Later in the process, working group members were asked to comment in a discussion thread leading up to meetings, providing ideas on draft recommendation ideas to be discussed in more detail in person.

Conclusion

The first step to reducing complex spatial conflicts is empowering diverse voices to co-develop the possible solutions—but collaboration requires they develop a shared understanding of the space. The members of the CINMS Advisory Council working group represented conflicting perspectives ready to work collaboratively toward shared goals; some saw the region primarily as a shipping highway, or a missile testing area, or an ecologically important area for whales.

At the end of the process, the Safe Passage SeaSketch project held dozens of ideas, comments, and supporting documents contributed by the participants. Through their work, rather than coming to a consensus on next steps, they provided a suite of education, research, and management recommendations—including context about management options that had been considered and rejected. Their final report captured the nuance of why various participants supported some aspects of the recommendations over others that had been captured and fleshed out in map-based discussions over the course of the process.

By sharing knowledge and interacting with information in the SeaSketch mapping platform, the working group members were able to leverage their diverse expertise and come to a common understanding of the geography, allowing them to collaborate productively.

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Endnotes:

1. Abramson, L.; Polefka, S.; Hastings, S.; Bor, K. 2009. Reducing the Threat of Ship Strikes on Large Cetaceans in the Santa Barbara Channel Region and Channel Islands National Marine Sanctuary. Prepared and adopted by the Channel Islands National Marine Sanctuary Advisory Council. 73 pgs. Online at www.channelislands.noaa.gov.

2. https://channelislands.noaa.gov/sac/group_meetings_archives.html.

3. McClintock, W.J., 2013. GeoDesign: Optimizing stakeholder-driven marine spatial planning. *Proceedings of the Marine Safety & Security Council, the Coast Guard Journal of Safety & Security at Sea,* Fall 2013, pp 63–67.

4. According to its website, found at https://marinecadastre.gov, this is a joint Bureau of Ocean Energy Management and NOAA initiative providing authoritative data to meet the needs of the offshore energy and marine planning communities.