

Draft Preliminary Results Report
Statewide Marine Mapping Planning Workshop

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California State University, Monterey Bay
Seaside, California

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1. EXECUTIVE SUMMARY

This Draft Preliminary Report presents an overview of the objectives for and the initial results from the Statewide Marine Habitat Mapping Planning Workshop held at CSU Monterey Bay, December 12-13, 2005. The overall goal of the project is to create a strategic plan for completing the mapping of all seafloor habitats within California State Waters (shoreline out to 3 nm). The approach was to involve key stakeholders in a gap analysis of existing data coverage, identification and ranking of current mapping information needs, and the prioritization of areas for new field data acquisition. The specific objectives for the workshop were to:

- Summarize for each participating organization a description of their existing data holdings, current data needs and planned data collection efforts.
- Perform a gap analysis to identify priority areas where data are still missing.
- Create a prioritized list of areas for future mapping within state waters.

In addition to setting state-wide mapping priorities, the sponsor requested a separate ranking of mapping priorities to support an anticipated RFP for seafloor mapping confined to the state waters extending from Monterey Bay north to Bodega Bay (hereafter referred to as the Central Coast RFP Area).

The two-day workshop attracted 56 invited participants representing 38 institutions including regional, state and federal resource management agencies, universities, research institutions, NGO's and private industry. A surprising degree of overlap was discovered among the participants regarding their need for mapping data products including:

- MPA mapping in support of the MLPA process
- Environmental monitoring and change detection
- Sediment transport dynamics (erosion, deposition and beach nourishment)
- Geologic hazards (faults and landslides capable of producing tsunamis)
- Habitat maps for fisheries management, stock assessment and identification of biological hot spots
- Safe navigation in shallows, bays, harbors and estuaries
- Economical sources of sand
- Data to support wave, current, sediment transport and oil spill prediction models
- Location of ship wrecks with potential for oil leaks
- Location of derelict fishing gear

Identification and ranking by the participants of areas for future mapping within state waters was conducted through a voting process making use of the existing 10' CDFG commercial fishing block designations. In the state-wide priority voting exercise, 6 of the top 11 blocks were in southern California (Ventura and Oceanside), 2 were at San Nicolas Island, two along the central coast (Big Creek Reserve and Cambria) and one in northern California (Trinidad Head) (Table 1). Other areas of high interest can be seen in on the Statewide Priority Block Map (Figure 3).

Exhibit 2: 2005 Coastal and Marine Mapping Workshop report (draft)

In the Central Coast RFP Area voting exercise, the majority of the votes fell within blocks along the coast between Ano Nuevo and just north of the Golden Gate, and around the Farallon Islands (Table 2). Other areas of high interest can be seen on the Central Coast RFP Area Priority Block Map (Figure 4).

Recommendations for data acquisition and final products were obtained during group and breakout sessions regarding critical elements key to the success of a statewide mapping effort. These elements included: data acquisition, level of interpretation, metadata, and dissemination.

There was consensus that the minimum universal seafloor mapping information should cover all “lands” from the shore strand line (MHHW) out to the 3 nm state water limit and include:

- Seabed geomorphology (relief via xyz digital elevation models - DEM)
- Texture (substrate type via backscatter mosaics).
- Ground truthing (via video or physical samples)
- Meet or exceed IHO order 1 standards, and be carried out at the maximum resolution obtainable using state-of-the-industry tools.
- Best available geodetic positioning technology (vertical and horizontal)

And where appropriate and possible

- Subsurface structure, sediment thickness and stratigraphy via subbottom profiles & coring

All present acknowledged the ultimate need for and great value in full geologic and habitat interpretation of collected mapping data. However, it was also recognized that mapping is expensive and that the state of California currently has limited financial resources, leading to a debate about where to focus financial resources. The participants fell into three camps as to the minimum level of interpretation and classification that should be funded as part of a large regional mapping project supported with limited resources; those favoring: 1) reduced field data collection so as to fund maximum interpretation of all survey data collected, 2) maximizing field data collection coverage combined with basic cost-effective derivative products easily created using automated GIS analysis tools (shaded relief, slope, rugosity, contours, autoclassification) saving full interpretation of the data for later “matching” contributions by interested organizations, and 3) a balanced weighting of data collection and interpretation to maximize field data while simultaneously producing certain thematic maps with high-priority resource management information.

Finally, all acknowledged the critical importance for data to meet FGDC metadata standards. For archiving and dissemination, the recommendation was for a tiered system of accessible databases (ftp with links, http download sites, website images of data that link to data sources, internet GIS map servers [e.g. Arc IMS]).

The final report for this project will be submitted at the end of February 2006.

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2. BACKGROUND AND PURPOSE

In November 2005, California State University, Monterey Bay Foundation was contracted by the California Coastal Conservancy to develop a strategic plan for statewide seafloor mapping in California state waters, in consultation with relevant stakeholders, including academic institutions, management agencies, and other mapping data consumers. This work builds on previous priority-setting exercises including the 2000 California Marine Habitat Mapping Task Force Workshop; as well as reviews of existing inventories of data and maps. A major objective of the workshop was to update and complete the inventory of seafloor mapping data coverages in support of the gap analysis needed to identify where future mapping efforts should be focused. This review and compilation of existing data is ongoing having benefited from attendee input before, during and after the workshop. Those data sets identified in advance of the workshop including prior reviews conducted by the SFML, GFNMS and CBNMS were compiled and provided to the participants in map form (Appendix A).

Here, in the Draft Preliminary Report we present an overview of the project objectives and the initial results from the Statewide Marine Habitat Mapping Planning Workshop held at CSU Monterey Bay, December 12-13, 2005.

3. GOAL

The overall goal of the project is to create a strategic plan for completing the mapping of all seafloor habitats within California State Waters (shoreline out to 3 nm). The general approach has been to involve relevant stakeholders in a gap analysis of existing data coverage, identification and ranking of current mapping information needs, and the prioritization of areas for new field data acquisition. The stakeholders were also to provide recommendations pertaining to data quality, acquisition, resolution, interpretation and classification.

In addition to setting state-wide mapping priorities, the sponsor requested a separate ranking of mapping priorities confined to the state waters extending from Monterey Bay north to Bodega Bay (hereafter referred to as the Central Coast RFP Area). The results of this more regional analysis and the stakeholder recommendations for data acquisition and interpretation are to support the framing of an RFP for mapping work within the Central Coast RFP Area beginning in 2006. This RFP for targeted habitat mapping is to be released early February after the Coastal Conservancy approves the project on 2/3/06.

4. OBJECTIVES & TASKS

Stakeholder Workshop - Overview

The primary effort of this project has been to design, plan and implement an inclusive 2-day workshop with stakeholders that updates the findings of the 2000 California Marine Habitat Mapping Task Force Workshop. The specific objectives for the workshop were to:

- Summarize for each participating organization a description of their:
existing data holdings

Exhibit 2: 2005 Coastal and Marine Mapping Workshop report (draft)

current data needs

planned data collection efforts

- Perform a gap analysis that compares 2000 priority areas with other recent (within past 6 years) data collection efforts to identify priority areas where data is still missing.
- Create a prioritized list of areas to be mapped for all state waters and for the Central Coast Project Area
- Summarize recommendations for standardization of mapping protocols and dissemination of mapping data
- Propose strategies or opportunities for leveraging funds for data acquisition, using in-kind resources (staff, equipment, etc.) and matching funds

The workshop objectives were to be met by having the stakeholders complete the following tasks during the two-day event:

- Provide overview of state of knowledge related to marine habitat mapping
- Identify common needs for habitat maps and data coverage
- Define appropriate scales of resolution and coverage based on specific needs
- Discuss and develop guidelines for the applications of various habitat mapping technologies and methods based on specific information needs
- Develop guidelines for the application of various habitat classification schemes based on specific information needs
- Develop guidelines for the application of various methods of mapping data analysis and interpretation required to support different habitat classification schemes
- Review and adopt GIS metadata and quality control standards for mapping data
- Define procedures for processing and inclusion of existing & pending data sets
- Identify mapping data gaps
- Define criteria for prioritizing sites for mapping
- Prioritize sites to be included in future mapping efforts based on current information needs
- Specify methods for filling data gaps
- Discuss and recommend strategies for archiving and dissemination of mapping data and products

The focus of this Preliminary Report will be to present the results of the workshop in time for the upcoming COPC meeting on January 13, 2006.

Workshop structure

In order to meet the objectives, conference organizers gathered lists of agencies' data needs and data holdings prior to the workshop to help foster a discussion of common needs and holdings at the conference. The organizers designed data needs survey and data holdings survey around the Fish and Game fishing blocks that have been used in stock management for years (see Appendix A). In this way, data could be easily quantified to show gaps in data holdings as well as overlaps in areas of common interests. The invited resource agencies were provided with maps of the fishing blocks and the data needs and

holdings surveys and were asked to identify where they needed habitat information, and where they already had existing data. This data was then summarized and provided in both tabular and map format for discussion at the meeting.

The meeting was coordinated to meet all of the objectives in the two-day timeframe (see meeting agenda Appendix A). A large group discussion was held on the need for habitat maps and the importance of seafloor mapping to obtain the habitat information. Using the information collected prior to the workshop, breakout groups identified important fishing blocks and added to the list of mapping needs and holdings in each region (Northern, Central, and Southern), plus determined the top priorities for mapping in each region.

Pre-Workshop Assessment

IDENTIFYING POTENTIAL INVITEES

The meeting was publicized as an important event designed to extend and update the 2000 California Marine Habitat Mapping Task Force effort for creating a multi-agency cooperative aimed at producing a comprehensive habitat map of the California continental shelf. The primary difference was that the focus of the 2005 workshop was exclusively on mapping within California State Waters. The meeting design included those agencies and organizations with a vested interest in mapping California marine habitats. Within those agencies, meeting organizers sought to identify the most qualified experts to represent the needs of their institutions (Appendix A). An invitation outlining the meeting scope was sent out to a limited number of agencies throughout California. The response was overwhelmingly positive. Agencies and representatives that accepted the invitation were sent follow-up materials in preparation for the workshop.

INVITATION & SURVEY MATERIALS

After accepting their invitation the workshop participants were asked to provide a preliminary assessment of their agencies' mapping needs and selection criteria, and data holdings. Survey sheets and reference maps were provided to each participant, as well as a list of suggested guidelines for selecting and prioritizing mapping areas (Appendix A).

This information was compiled into maps and tables in advance of the workshop to show the distribution of existing or planned data sets (Appendix A). The summaries were used to perform a data gap analysis that was presented at the beginning of the meeting and used to focus the discussions on setting mapping priorities and data sharing. In this document, marine habitat mapping is defined as 'spatial quantification of those physical parameters of greatest value in defining seafloor habitat (e.g. depth, substrate type, slope, and aspect)'.

DEFINING MAPPING SITES

Discussions of mapping needs were conducted at several different regional scales. Because the sponsor's highest short-term need was related to the pending Central Coast RFP, this area (Monterey Bay to Bodega Bay) was singled out for separate discussion and voting. Additional group discussions were then held separately for California coastal waters north and south of the Central Coast RFP Area. Priority voting was conducted at

Exhibit 2: 2005 Coastal and Marine Mapping Workshop report (draft)

two spatial scales: state-wide including all state waters, and for the Central Coast RFP Area. The existing 10' CDFG commercial fishing block designations were used to define priority areas for marine habitat mapping within the larger regions.

REGIONAL DATA NEEDS & HOLDINGS

To identify the current marine habitat data holdings and mapping needs of contributing agencies survey materials including worksheets, regional maps, and instructions were sent to each attendee prior to the meeting (Appendix A). Each organization's representative was asked to return information relating to their data needs and data holdings. This review and compilation of existing data is ongoing having benefited from attendee input before, during and after the workshop. Those data sets identified in advance of the workshop including prior reviews conducted by the SFML, GFNMS and CBNMS were compiled and provided to the participants in map form (Appendix A). Final data coverage maps will be completed and presented in the final project report based on a few contributions still pending.

DATA NEEDS INSTRUCTIONS & WORKSHEETS

The attendees were asked to list all of the reasons that their agency would want a site or sites mapped. Examples of these reasons included: areas of use conflict, areas of multiple use (potential conflict), designated areas (special use, harvest areas, reserves, preserves, sanctuaries, etc.), areas of high political interest, high use areas, and agency-specific management priorities.

Each institution completed one data needs worksheet for each specific area in which they had habitat mapping needs. On this worksheet, representatives described where they needed to map (in some cases, mapping needs were less than one fishing block, and in other cases the needs spanned many blocks), why they needed to map (including their mapping criteria), what type of data they need (bathymetry, sidescan sonar, substrate type, etc), what resolution they needed the data at, and how and when the mapping should be done.

DATA HOLDINGS INSTRUCTION & SURVEY WORKSHEET

Data holdings were acquired from each institution in order to identify areas of potential overlap for data sharing and new data acquisition. The representatives used the same fishing block maps and a data holdings worksheet to convey that information.

Representatives completed one data holding worksheet for each specific area for which their institution had existing habitat, substrate, or multibeam bathymetry data, or plans for obtaining those data. Similar to the data needs worksheet, the representative described where, why, what, how, and when the mapping was or would be done. These blocks were marked on a single fishing block map for each region.

Workshop Sessions

During registration on the first day of the workshop each attendee was provided with a folder containing the meeting agenda, attendee list, summary sheets and maps of data

Exhibit 2: 2005 Coastal and Marine Mapping Workshop report (draft)

holdings and needs, blank maps with designated fishing blocks and worksheets for contributing additional information on data needs and holdings (Appendix A).

UPDATES ON SEAFLOOR MAPPING TECHNOLOGY, COVERAGE & ANALYSIS

A primary goal of the workshop was to provide all participants with an update and overview of the capabilities, limitations and applications of current seafloor mapping technologies. This goal was accomplished through a series of invited presentations by many of the attendees, as listed in the workshop agenda (Appendix A). These presentations will be placed online at the workshop website hosted by the CSUMB Seafloor Mapping Lab and the NOAA funded CSU CICORE Program.

DATA NEEDS AND HOLDINGS UPDATE

Each participant was given the opportunity to discuss their institutions mapping needs and holdings and add to the needs and holdings databases developed from the pre-workshop surveys. Note takers recorded the contents of these discussions, and the summarized notes will be provided with the final report. A major finding from these discussions was not only the great breadth in reasons for mapping, but also in how many of these were held in common among the attendees.

IDENTIFICATION OF PRIORITY HABITAT MAPPING LOCATIONS

A facilitated discussion was held for participants to describe their data holdings and needs for the Central Coast RFP Area, and two breakout sessions were held for the regions north and south of the Central Coast RFP Area. The three working sessions began with the facilitator reviewing wall-size tables and maps summarizing the pre-workshop surveys and proposing guidelines & criteria for additional site selection based on the second workshop notice information (Appendix A).

Based on priority block identification for each separate region, participants were instructed to determine block priorities based on specific economic and environmental habitat parameters/ criteria (e.g. fishery management, parallel use conflicts, zoogeographical importance, etc) for all regions and blocks (Ballots in Appendix A). Each participant was given 10 priority "dots" to assign to regional blocks and criteria where they felt habitat-related data were lacking. Wall-sized data tables (Worksheet B) were used to capture "dot" assignments. Participants could "vote" in any number of ways: a) they could place 10 votes (dots) in 10 different blocks, b) they could place all 10 votes in one block, or c) some other combination. Partial (1/2) votes were allowed. Dots were tallied after final voting to rank individual blocks. This process was carried out twice, once for the Central Coast RFP Area, and once for all State Waters.

5. RESULTS

Participants

Of the more than 65 invited participants, 56 attended the workshop despite the very short notice, indicating a high interest in and need for the event. The participants represented 38 individual institutions (Appendix B), including regional, state and federal resource

management agencies, universities, research institutions, NGO's and private industry all sharing a vested interest in the development of comprehensive seafloor map products and information for the California state waters.

Data & information needs

The group discussion regarding the needs for and applications of mapping data by the participants demonstrated not only a pressing need for such information, but also a remarkable diversity of needs shared by many of the agencies represented (Appendix B – Data needs group discussions notes). There was a surprising and near universal consensus expressed regarding the need for bathymetric and habitat information for the intertidal and shallow subtidal depths (+2 m to -8 m water depths) to support a wide array of applications. (It was also noted that this depth range is the most difficult and expensive in which to obtain high resolution data.) Common seafloor mapping data need themes expressed in these discussions included:

- MPA mapping in support of the MLPA process
- Environmental monitoring
- Sediment transport dynamics (erosion, deposition and beach nourishment)
- Geologic hazards (faults and landslides capable of producing tsunamis)
- Habitat maps for fisheries management & stock assessment
- Base maps for environmental change detection via repetitive mapping
- Safe navigation in shallows, bays, harbors and estuaries
- Habitat maps of existing marine protected areas
- Identification of biological hot spots (especially areas of high relief, submarine canyons and shelf break)
- Economical sources of sand
- Data to support wave, current and oil spill impact prediction models
- Location of ship wrecks with potential for oil leaks
- Location of derelict fishing gear

This diversity in the need for marine mapping data applications is reflected in the results for the state-wide and central coast RFP area priority voting (Figures 1 and 2, and Appendix B Tables 1 and 2). The highest ranking needs for statewide and central coast mapping identified by the participants were: baseline maps for monitoring and assessment (53% and 59%), identification of critical natural areas or biological hot spots (15% and 9%), fisheries management (9% and 5%), and use conflicts and impact analysis (8% and 4%).

Priority voting for future mapping

The results from the priority voting exercise were compiled and are presented below in table and map formats. The rationales for future mapping efforts have already been discussed in the section above, and are presented in Figures 1 and 2, Appendix B Tables 1 and 2 below.

STATEWIDE PRIORITY VOTING RESULTS

In the state-wide voting exercise, 6 of the top 11 blocks were in southern California (Ventura and Oceanside), 2 were at San Nicolas Island, two along the central coast (Big Creek Reserve and Cambria) and one in northern California (Trinidad Head) (Table 1). Other areas of high interest can be seen in on the Statewide Priority Block Map (Figure 3). It should be noted, however, that there is reason to believe that a significant number of participants constrained their statewide voting choices to fall outside of the Central Coast RFP Area, thinking that the Central Coast RFP Area blocks had already been considered during that voting exercise. Thus, the relative weighting of blocks within the Central Coast RFP Area blocks during the statewide vote may be somewhat underrepresented.

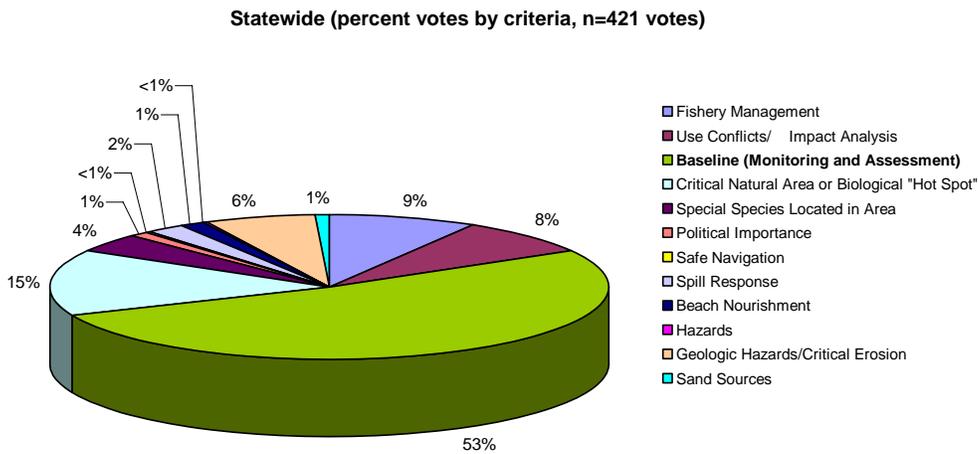


Figure 1. Distribution of state-wide priority mapping votes by management/information need criteria.

Block #	General Location	Votes
664	Ventura	16
822	Oceanside	14
665	Ventura	13
683	Ventura	12
813	San Nicolas Island	12
814	San Nicolas Island	11
602	Cambria	11
132	Trinidad Head	10
547	Big Creek Reserve	10
801	Oceanside	10
821	Oceanside	10

Table 1. State-wide priority voting results: Top 11 blocks identified in state waters (0-3nm) for mapping based on state-wide priority voting exercise.

Statewide Priority Blocks 2005

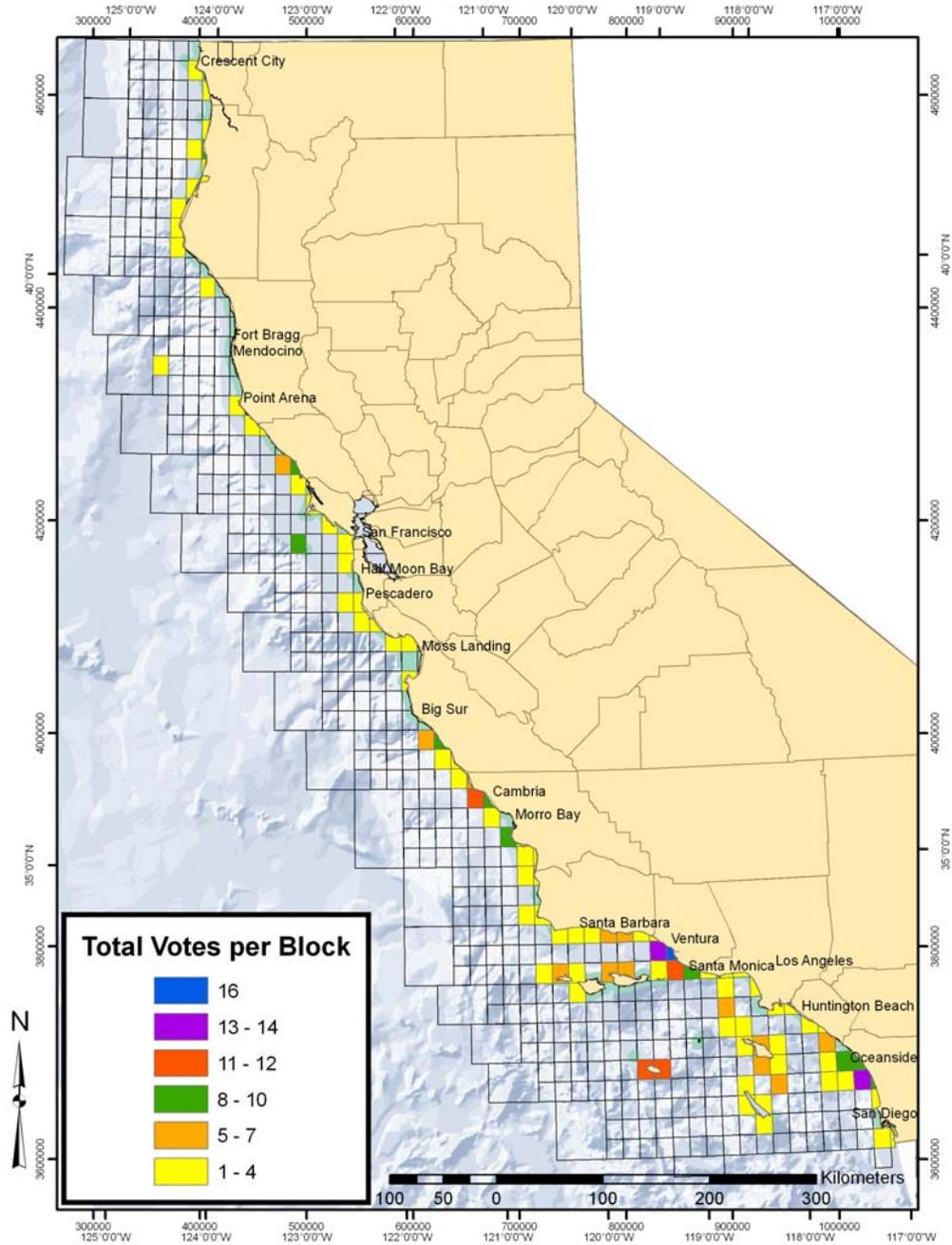


Figure 2. Spatial distribution of number of votes cast per block for state-wide priority mapping needs.

CENTRAL COAST RFP AREA PRIORITY VOTING RESULTS

In the Central Coast RFP Area voting exercise, the majority of the votes fell within blocks along the coast between Ano Nuevo and just north of the Golden Gate, and around the Farallon Islands (Table 2). Other areas of high interest can be seen on the Central Coast RFP Area Priority Block Map (Figure 4).

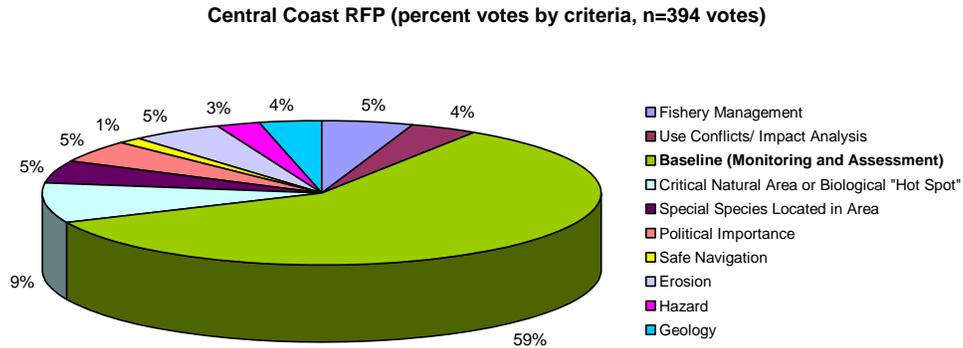


Figure 3. Distribution of Central Coast RFP Area priority mapping votes by management/information need criteria.

Block #	General Location	Votes
464	N. of Half Moon Bay	16
446	N. of Golden Gate	14
478	Pt. Ano Nuevo	13
455	S. of Golden Gate	12
502	S. of Ano Nuevo	12
472	Half Moon Bay	11
458	Farallon Islands	11
422	Bodega Bay	10
438	N. Pt. Reyes	10
431	Dillon Beach	10

Table 2. Central Coast RFP Area priority voting results: Top 11 blocks identified in state waters (0-3nm) for mapping based on Central Coast priority voting exercise.

Central Coast RFP Priority Blocks 2005

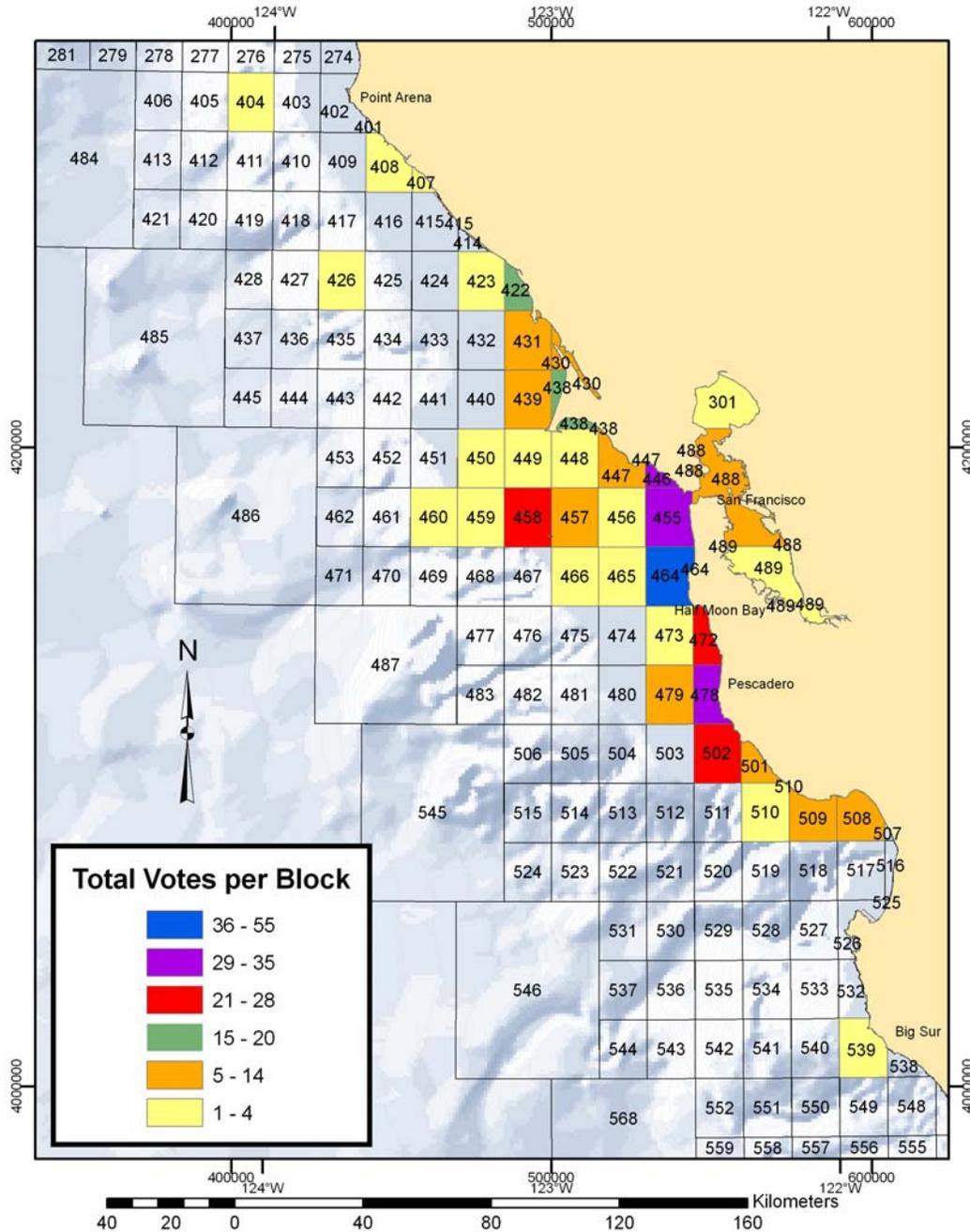


Figure 4. Spatial distribution of number of votes cast per block for the Central Coast RFP Area (Monterey Bay to Bodega Bay) priority mapping needs.

Recommendations

During the group and breakout sessions the participants considered and made specific recommendations regarding critical elements key to the success of a statewide mapping

effort. These elements included: data acquisition, level of interpretation, metadata, and dissemination. Notes of these discussions were recorded and are included in Appendix B. Summaries of the recommendations are presented below. These recommendations generally fell into two categories, 1) minimum necessary and 2) highly desirable, reflecting the groups' acknowledgement that resources available for comprehensive mapping of state waters are likely to be limited.

DATA ACQUISITION & BASIC PRODUCTS

Given the application and information needs described by the participants and outlined above, there was consensus that the minimum universal seafloor mapping information should include seabed geomorphology (relief via xyz digital elevation model - DEM) and texture (substrate type). These two data sets are the minimum needed to support basic habitat classification. It was also noted, that adequate ground truthing (e.g. via video or physical samples) of acoustic and optical remote sensing data used to create the DEM and surface texture data sets would be needed to verify the classifications. Where appropriate and possible, subsurface structure (sediment thickness and stratigraphy via subbottom profiles & coring) would be highly desirable.

In terms of data quality and resolution, the consensus was that all data acquisition should meet or exceed IHO order 1 standards, and be carried out at the maximum resolution obtainable using state-of-the-industry tools. It was agreed that coverage should include all "lands" from the shore strand line (MHHW) out to the 3 nm state water limit. The participants acknowledged that obtaining this coverage will require the application of multiple acquisition sensors including both acoustic (e.g. multibeam and sidescan sonar) and optical (e.g. LIDAR, hyperspectral, multispectral).

There was also considerable discussion devoted to the geospatial accuracy and geodesy, with the recognition that the best available positioning instrumentation be used (e.g. RTK or satellite GPS correction service), and that a common vertical datum be agreed to and used. The consensus among the most experienced surveyors present was to do all bathymetric and topographic surveying on the ellipsoid (e.g. ITRF or WGS84), thereby facilitating more accurate tidal corrections, data fusion and conversion to other datums.

INTERPRETATION AND HABITAT CLASSIFICATION

All present acknowledged the ultimate need for and great value in full geologic and habitat interpretation of collected mapping data. However, it was also recognized that mapping is expensive and that the state of California currently has limited financial resources, leading to a debate about where to focus financial resources. The participants fell into three camps as to the minimum level of interpretation and classification that should be funded as part of a large regional mapping project supported with limited resources. The first camp favored reduced field data collection so as to fund maximum interpretation of all survey data collected. Their reasoning was that the data obtained from such a project would be of greatest value to the largest number of users if the results were fully and uniformly interpreted using consistent methods.

Exhibit 2: 2005 Coastal and Marine Mapping Workshop report (draft)

At the other end of the spectrum, the second camp recognized that if funds are limited, more interpretation means less area surveyed for a given level of funding. Their thinking was that scarce mapping funds should be allocated to maximize the acquisition of high quality, high resolution data, and the creation of those basic seafloor information layers that can be generated “automatically” and very efficiently using GIS analysis tools (e.g. gridded xyz bathymetry, DEM’s in shaded relief, contour lines, relief and slope analyses, backscatter/sidescan mosaics showing seafloor texture, etc.). Once the basic mapping data and information layers are processed, archived and made available, then the more detailed and labor intensive “manual” interpretation and attributing for specific geological or habitat needs at a specified scale could be conducted. Given the strong interest in and varied institutional needs for these levels of interpretation, the availability of the basic high quality survey data would induce many institutions to support the additional work needed for the full interpretation of these data.

Taking the middle ground, the third camp endorsed a balanced weighting of data collection and interpretation to maximize field data while simultaneously producing certain thematic maps with high-priority resource management information. Under this scenario, full interpretation recommended by the first camp would only be performed for those areas designated as “high” need sites by the sponsors, while the suite of basic derivative mapping products recommended by the second camp would be applied everywhere else.

METADATA, ARCHIVING, DISSEMINATION

The participants all acknowledged the critical importance of accurate and complete metadata and strongly recommended that all data must meet FGDC metadata standards. For archiving and dissemination, the recommendation was for a tiered system of accessible databases (ftp with links, http download sites, website images of data that link to data sources, internet GIS map servers [e.g. Arc IMS]).

6. APPENDICES – A: PRE-WORKSHOP DOCUMENTS

Data holdings coverage map – Northern California

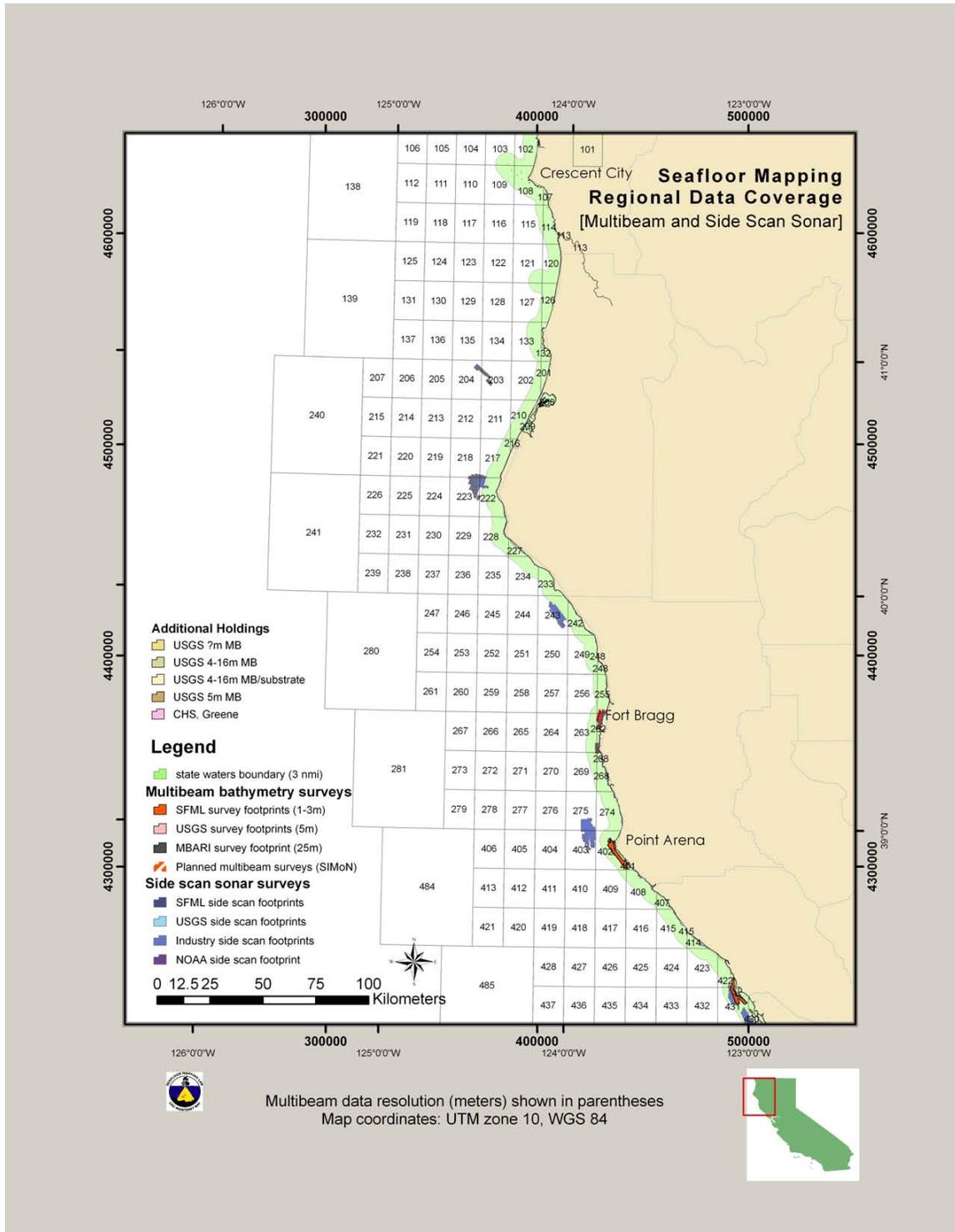


Figure 5. Spatial distribution of current multibeam and sidescan sonar data holdings for Northern California compiled by from various sources prior to the date of the workshop. Additional coverages identified during the workshop will be added to the maps in the final report.

Data holdings coverage map – Central California

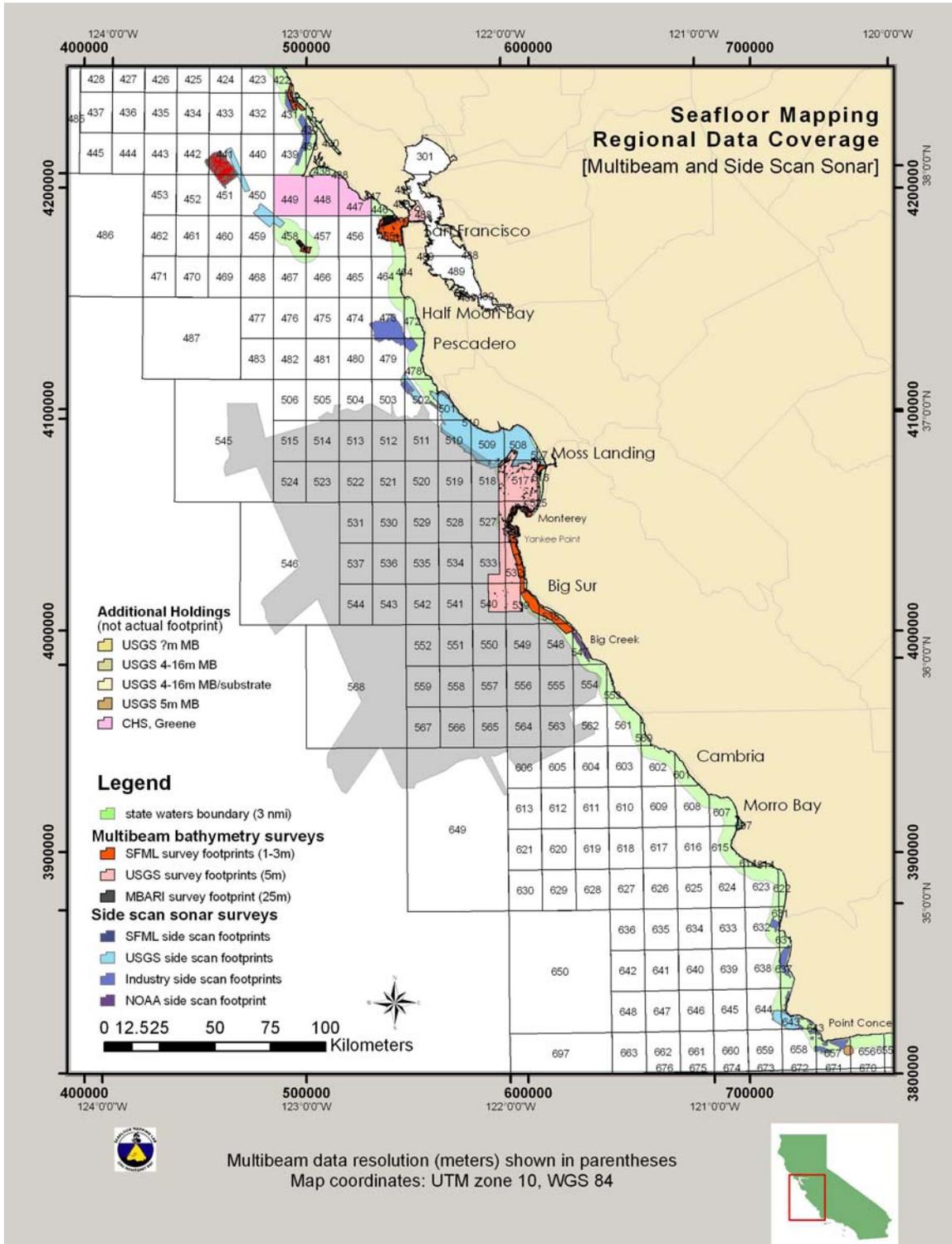


Figure 6. Spatial distribution of current multibeam and sidescan sonar data holdings for Central California compiled by from various sources prior to the date of the workshop. Additional coverages identified during the workshop will be added to the maps in the final report.

Data holdings coverage map – Southern California

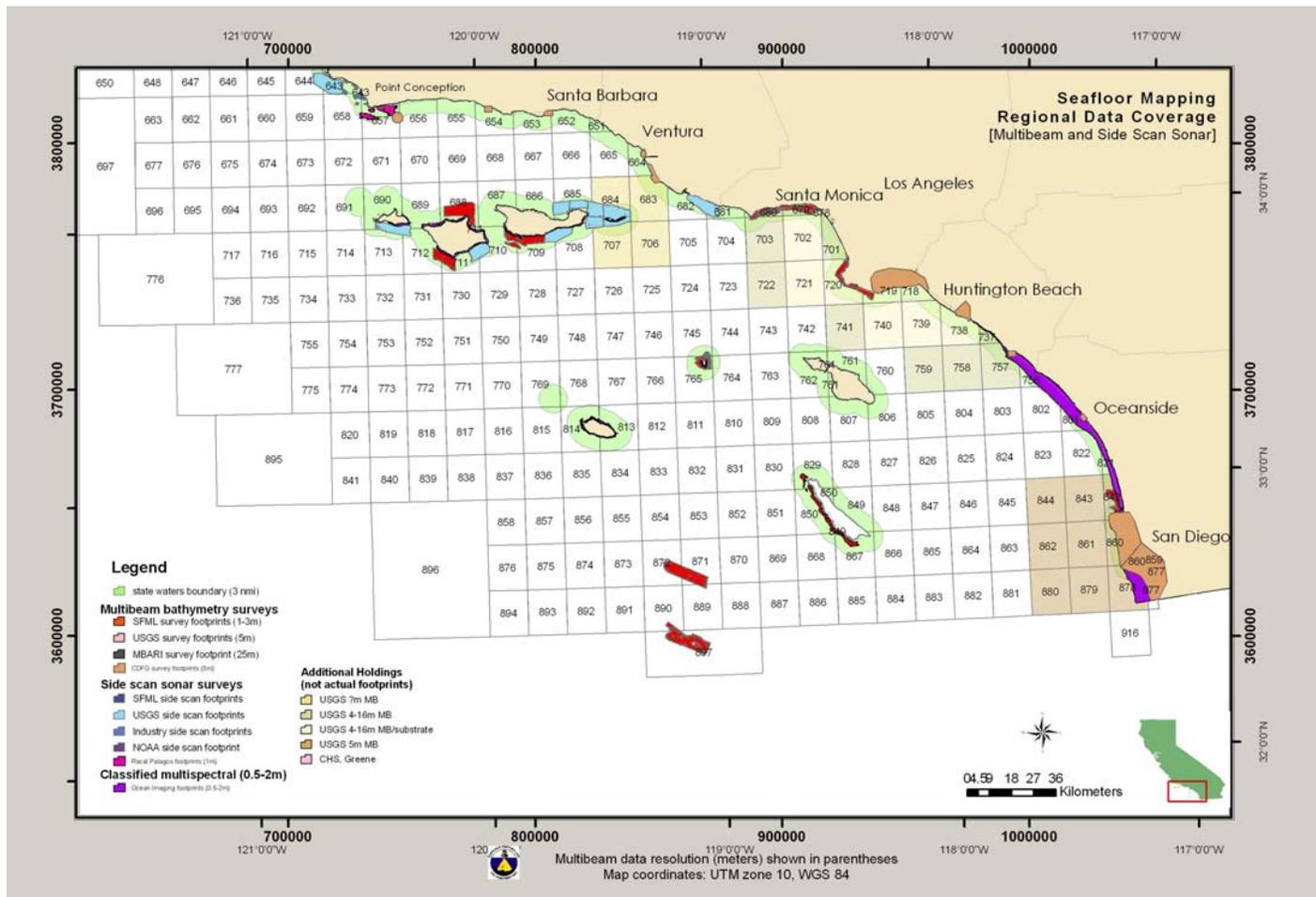


Figure 7. Spatial distribution of current multibeam and sidescan sonar data holdings for Southern California compiled by from various sources prior to the date of the workshop. Additional coverages identified during the workshop will be added to the maps.

Data holdings coverage map – Central Coast RFP Area

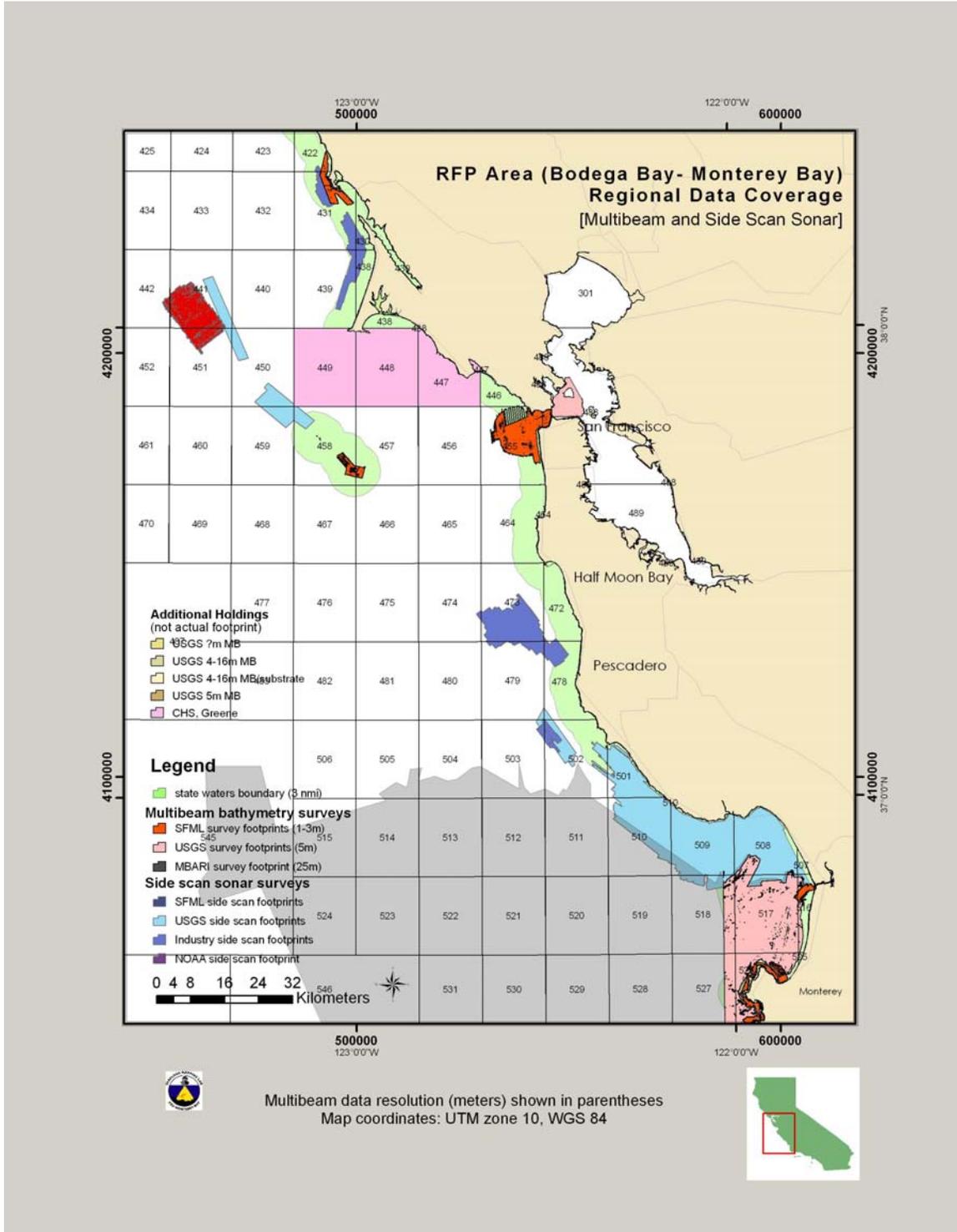


Figure 8. Spatial distribution of current multibeam and sidescan sonar data holdings for Central Coast RFP Area compiled by from various sources prior to the date of the workshop. Additional coverages identified during the workshop will be added to the maps.

Workshop Attendee Folder Contents

The following documents are included under separate cover:

Agenda

Attendee List (invited participants and organizers)

Data Holdings form

Data Needs form (yellow)

Worksheet A- Data Needs Worksheet (yellow)

Pre-workshop Participants Data Needs table, w/ Selection Criteria list

Current Data Holdings maps (3 regions)

RFP Area (Bodega Bay- Monterey Bay) map

Map of Priority sites from California Marine Habitat Task Force Workshop 2000

Central Coast RFP Priority Blocks BALLOT (green)

Statewide Priority Blocks BALLOT (white)

Blank Reference Maps w/ Fishing Blocks (3 regions)

7. APPENDICES – B: POST-WORKSHOP DOCUMENTS

Acronyms

BLM	Bureau of Land Management
CBNMS	Cordell Bank National Marine Sanctuary
CDFG	California Department of Fish and Game
CenCOOS	Central and Northern California Ocean Observing System
CICORE	Center for Integrated Coastal Observation, Research and Education
COPC	California Ocean Protection Council
CSU	California State University
CSUMB	California State University, Monterey Bay
DEM	Digital Elevation Model
FGDC	Federal Geodetic Data Committee
GFNMS	Gulf of the Farallones National Marine Sanctuary
GIS	Geographic Information System
GPS	Global Positioning System
HSU	Humboldt State University
IHO	International Hydrographic Organization
IMS	Internet Map Server
ITRF	International Terrestrial Reference Frame
LIDAR	Light Detection And Ranging
MBARI	Monterey Bay Aquarium Research Institute
MBNMS	Monterey Bay National Marine Sanctuary
MHHW	Mean Higher High Water
MLPA	Marine Life Protection Act
MMS	Mineral Management Service
MPA	Marine Protected Area
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NOAA	National Oceanographic and Atmospheric Administration
NPS	National Park Service
RFP	Request for Proposal
SFML	Seafloor Mapping Lab
SIO	Scripps Institution of Oceanography
SPAWAR	Space and Naval Warfare Systems Command
SWFSC	Southwest Fisheries Science Center
SWRCB	State Water Resources Control Board
UCSB	University of California, Santa Barbara
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WGS84	World Geodetic System 1984

Exhibit 2: 2005 Coastal and Marine Mapping Workshop report (draft)

Attendees

Strategic Planning Workshop for California Marine Habitat Mapping

California State University Monterey Bay - December 12-13, 2005

Workshop

Organizers

Name	Affiliation	Email
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State-wide priority voting results by need criteria

Statewide Priority Blocks

Block #	Fishery Management	Use Conflicts/ Impact Analysis	Baseline (Monitoring and Assessment)	Critical Natural Area or Biological "Hot Spot"	Special Species Located in Area	Political Importance	Safe Navigation	Spill Response	Geologic Hazards/Critical Erosion	Sand Sources	Total Votes
664		4	11			1					16
822	5		6						2	1	14
665		3	8			1			1		13
683		4	7			1					12
813	2		3	2	5						12
602			7	3				1			11
814	2		2	2	5						11
132	1		6	3							10
547	1	1	7					1			10
801	2		6	2							10
821	4		6								10

Table 2. Top 11 blocks in rank order that received the highest number of votes from the workshop participants for future mapping within all California State Waters (shoreline to 3nm). Rationales for mapping needs are listed across the top of the table, with the number of votes cast per block per rationale shown in the cells below. Total votes cast per block are shown in far right column. These results are displayed graphically on the preceding map.

Central Coast RFP Area priority voting results by need criteria

Central Coast RFP Priority Blocks

Block	Reference Location	Fishery Management	Use Conflicts/ Impact Analysis	Baseline (Monitoring and Assessment)	Critical Natural Area or Biological "Hot Spot"	Special Species Located in Area	Political Importance	Safe Navigation	erosion	hazard	geology	RFP Total
464	N. of Half Moon Bay	4	1	25	8	3	7		7			55
446	N. of Golden Gate		3	19	5		7			1		35
478	Pt. Ano Nuevo	4	2	19		5			3	1		34
455	S. of Golden Gate			16			6	3	3	1	3	32
502	S. of Ano Nuevo	4		15	5	3				1		28
472	Half Moon Bay	4	2	19		2						27
458	Farallon Islands	2		14	5	1			1			23
422	Bodega Bay		2	14		2				2		20
438	N. Pt. Reyes	1		12	1					1		15
431	Dillon Beach		2	7		2			2	1		14

Table 3. Top 10 blocks in rank order that received the highest number of votes from the workshop participants for future mapping within the Central Coast RFP Area (Monterey Bay to Bodega Bay). Rationales for mapping needs are listed across the top of the table, with the number of votes cast per block per rationale shown in the cells below. Total votes cast per block are shown in far right column. These results are displayed graphically on the preceding map.

Data needs lunch time group discussion – Central Coast RFP Area

Data needs identified by participants and compiled from notes taken during group discussion (note takers: Mary Young & Soari Zurita).

Mark Johnsson (California Coastal Commission)

- Information on habitat: indicate rugosity/relief in addition to sediment classification
- Sediment movement for management purposes
- Sufficient detailed sub-bottom bathymetry for landslide and seismic purposes
- Beach nourishment, offshore sediment resources/nourishment management especially important in Southern California

Mary Yoklavich (NOAA/NMFS-SWFSC)

- Fish stock assessment (characterizing habitat)
- Locating and monitoring MPA sites
- Deeper water, 50 – 400m (i.e.: heads of sub-canyons) along central coast
- Future MLPA sites in state waters

Tommy Albo – Greeninfo

Data availability/access

Dirk Rosen (Marine Applied Research and Exploration)

Habitat classification for use with fisheries and biodiversity
Potential MPA sites

Gary Greene (MLML)

- Anything that hasn't been mapped yet

Michael Reichle (California Geological Survey)

- Geologic, Tsunamis and Seismic Hazards (Any bathymetric and subbottom data that shows recent landslides and faultings)
- Any geologic info would be of great interest.

Arthur Shak (Army Corps of Engineers)

- Navigation
- Nearshore coastal

Jerry Wilson (Fugro Pelagos)

- Throughout State
- Santa Monica Bay

Cliff Davenport (Coastal Sediment Management Workgroup)

Critical eroded coastal areas
Areas with excess sediment
Nearshore areas

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Offshore conditions of specific areas
Low and high relief reefs
Potential economic sources of sand (sand traps)

Dick Seymour (SIO)

- Directional properties of waves
- Accurate Bathymetric data from 300m to shallows

Dave Caress (MBARI)

- Physical and biological oceanography studies associated with upwelling.
- Need bathy for rest of continental shelf from Moss Landing north to Santa Cruz

Larry Espinosa (CDFG)

- Data for nearshore shallows where greatest impact of oil spills are likely to occur
- Biological component
- Shipwrecks that could cause oil leaks

Paul Veisze (CDFG)

- MPA sites
- Filling data gaps in current coverages for state waters

Dan Specht (Army Corps of Engineers)

- Nearshore data
- Habitat classification
- Areas of erosion, scouring and deposition
- Areas requiring or involved in beach nourishment
- Hydrographic surveys of ship channels

Keith Jones (CalTrans)

- ASBS data
- SF Bay area to Ano Nuevo (especially Ano Nuevo and James Fitzgerald Marine Reserve)

Ben Becker (NPS Point Reyes National Seashore)

- Habitat Data
- MPA sites

Mary Elaine Dunway (Minerals Management Service)

- Block 456 – Beach nourishment
- Offshore areas for high wind and waves

Sophie DeBeukelaer (MBNMS)

- MLPA site designations

Dale Roberts (NOAA Cordell Bank NMS)

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- Around Marin County
- Farallones

Holly Lopez (Center for Habitat Studies, MLML)

Canyons

Bedforms in San Francisco Bay

Irina Kogan (GFNMS)

- MLPA process
- Oil Spill Response
- Nearshore and Deep
- Some federal waters
- Farallones, Cordell Bank, Fitzgerald Marine Reserve
- Estuaries – Tomales Bay and Bolinas Lagoon
- Ano Nuevo – Pescadero Point (rocky area)
- Submarine canyons and Shelf/slope break to find biological hotspots
 - Farallones escarpment
 - Pioneer canyon
- Dynamic processes of canyons

John Butler (NOAA/NMFS-SWFSC)

- High resolution data of the rocky intertidal out to 10m in South California (for black abalone)

Neal Driscoll (SIO)

- Tectonic deformation
 - Subsurface data with high spatial density
- Areas that subside
- Deeper cores in the shallow areas

John Orcutt (SIO)

- Behavior of California coastline
- Coastal Bathymetry especially southern California

Chris Wills (CDFG)

- Geologic processes (offshore)
- Offshore and onshore sediment tracking (relate to watersheds)
- Pt. Reyes and Point Half Moon Bay

Chuck Katz (SPAWAR Systems Center San Diego, Navy)

- Bays
- Estuaries
- Nearshore
- Cover up current data gaps

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Brian Edwards (USGS)

- Shelf Break
- High resolution 3D subbottom data for benthic habitat conservation

Pete Darnell (USGS)

- Computer techniques
- Southern California

Sam Johnson (USGS Coastal and Marine Geology)

- Coastal Erosion/ Sediment Transport
- A lot of data w/in 3 miles of shore (including 3rd dimension)
- Offshore fault data
- Tsunami hazards

Heather Kerkering (CenCOOS)

- Pt. Conception to Oregon
- San Francisco Bay (for navigation and sediment transport)
- Placement of MPAs

Sophie DeBeukelaer (MBNMS)

- MPA process – need good habitat information
- Ano Nuevo
- Mapping in already designated MPAs

Paulo Serpa (CDFG)

- MLPA mapping
- Pigeon Point to Ano Nuevo
- Above Pigeon Point to San Francisco
- Groundfish habitat
- Nearshore LIDAR for entire coast

Chad King (MBNMS)

- Monitoring information
- Data gaps
- Current and future reserves
- Santa Cruz and San Mateo Counties
- The shelf break in the south

Dave Lot (MBNMS)

- Support the MLPA process – mapping MPAs

Steve Watt (Sea Engineering, Inc)

- Habitat Change – repetitive mapping
- Sediment transport modeling

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Greg Benoit (CA Coastal Commission)

- Habitat Classification
- Sediment transport
- Entire state waters

Rick Hanks (Bureau of Land Management)

- San Mateo Coast
- Point Reyes to Point Arena
- Offshore mapping
- Blue strip along coast (LIDAR)

Gerry Wheaton (NOAA Ocean Service)

- Updates nautical charts for:
 - Monterey
 - Moss Landing
 - Santa Cruz
 - Half Moon Bay (sediment)
 - Bodega Bay
 - Nearshore (especially near Ft. Ord)
 -

Kirsten Gilardi (UC Davis, SeaDoc Society)

- Moss Landing to Point Lobos (sidescan for derelict fishing gear)
- Areas of intensive fishing especially Dungeness fleets
- Areas reachable by divers
- Fairly shallow waters
- San Mateo County
- North of San Francisco

Mary Gleason (The Nature Conservancy)

- MLPA process
- Biodiversity hot spots
- Potential MPA sites
- Pigeon Point to Point Arena

Unidentified participant

- Near Sewage outfalls,
- Near large municipalities
- Around larger developed areas
 - Nearshore around storm runoff/outfalls
- Areas of Biological Significance
- Around Marin County

Statewide data needs – Lunchtime group discussion

California Coastal Conservancy

- Funded near shore mapping from Camp Pendleton, Oceanside to San Diego
- Complete maps Santa Barbara, Ventura, LA counties
- Complete map of the California Bight

Jerry Wilson – Fugro Pelagos, Inc

- Entire southern region south of Point Conception especially Santa Monica Bay
- Decide on what is priority bathy or sss?
- Holdings: LIDAR data from Dana Point south to the Mexican border
- IHO standards for navigation safety (non-habitat mapping)

Mary Elaine Dunway – Minerals Management Services

- Point Conception south to Ventura in the Santa Barbara Channel
- Scouring/sediment transport areas
- Are changes needed for pipelines?

Sam Johnson – USGS Coastal and Marine Geology

- Gas facilities off Ventura
- Bathy data of shoals
- Faults related to Northridge quake
- Transverse ranges offshore to better understand tectonics

Art Shak – USACE

- Gap in near shore around LAX
- Coastal zone habitat mapping to better understand erosion, dredging, shore protection, sedimentation

Michael Reichle – California Geological Survey

- Complete bathy and sub-bottom data extending out to federal waters
- Areas around Morro Bay and Cambria for faulting in line scarps

Mary Yaklovich – NWFS

- Offshore banks in federal waters
- Southern California: San Nicholas Island (blocks # 813, 814 for groundfish species stock assessments)
- Inside and outside comparisons of MPA sites

Cliff Davenport – Coastal Sediment Management Workgroup

- Bathy data of canyons and wetlands

Mark Johnsson – California Coastal Commission

- Potential sand deposit areas
- Location of current habitats (Oceanside to San Diego, Encinitas to Solana Beach)
- Accurate bathy data off LA ports, Long Beach, and San Diego coast)

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- Past events (landslides) repeat intervals
- Cabrillo deep water ports
- Oxnard – liquefy natural gasline (one of first major gaslines to be placed in decades)
- Characterize needs for MPA's

Kirsten Gilardi – SeaDoc Society

- Morro Bay
- Fine scale mapping around Catalina Island (backside of Catalina)
- Rocky habitats off Point Loma and Palos Verdes

Dominic Gregorio – SWRCB

- Near shore gaps where storm water runoff occurs
- Mouth of Mugu Lagoon (possibly block # 682, not sure)
- Julia Pfeiffer Burns near shore where landslide occurred, severe sediment scour
- Orange County mouths: Laguna Beach and Crystal Cove
- San Nicholas and San Clemente Islands
- Catalina Island (2 harbors area)
- Quarry on Catalina Island
- Data gaps of Channel Islands MPA network
- Proposed MLPA sites from Big Creek to Cambria

Paulo Serpa – DFG

- Julia Pfeiffer Burns
- Multibeam and sss for Big Creek
- Data gaps of Point Sal
- Cambria very important (block 601)
- Data gaps in current Channel Island MPA's

Pete Dartnell – USGS Coastal and Marine Geology

- Santa Barbara Channel regions
- Fill data gaps from Dana Point to La Jolla Canyon
- Offshore: geologic habitat maps in deeper waters

Brian Edwards – USGS

- SSS – detailed (pixel by pixel) work and extend this approach to deeper water
- Multibeam of the coastline (...to Huntington Beach) to better understand sediment pathways (material from Bolsa Chica being placed offshore)

Don Cadien – LA County Sanitation District

- High priority habitat areas: unmapped areas of Northern Channel Islands

Dick Seymour – SIO

- Should near shore areas be mapped more than once (blueline coast)?

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- SIO taking monthly surveys of blocks: 738,802, 842 (back beach to 8m depth) using ATV's, jet skis every 100m
- Want to do seasonal shoal type investigation

John Orcutt – SIO

- Extend map into Baja
- LIDAR data (Newport/Inglewood fault): tectonics offshore have large impact on sediment
- Deconstruction of Matillaba dam in Ventura. Large quantities of sediment released into ocean (Blocks: 662, 664, 654)

Jeff Babcock – SIO

- Bathymetry and sub-bottom high resolution maps from Huntington Beach south to the border (Huntington Beach to San Diego especially important)
- Near shore LIDAR combined with sub-bottom
- Repetitive mapping along with bathy data
- Sediment thickness (what happens when certain events occur?)
- Relate sub-bottom to tectonics and biological habitat

Dave Caress – MBARI

- Question: “What frequency is needed by SIO to determine near shore sediment thickness?”

Jeff Babcock – SIO

- Answer: “...from past experiments (Neil Driscoll) the Edgetech uses a lower frequency for sediment (approx. 1 to 6 khz) and a higher frequency is used for bathymetry”

John Butler – NOAA/NMFS SWFC

- Black abalone (0 – 10m)
- Crescent City to Punta Abreojos
- San Nicholas Island
- Catalina
- Northern Channel Islands
- Point Conception south to Point Loma (rocky habitat)
- Offshore banks located in federal waters (300 – 500m)

Dan Specht – USACE

- Sand sources and sinks
- Question: “What would be the consequences of not getting the data needs?”

Jerry Wilson – Fugro Pelagos, Inc.

- Discussions by federal agencies about “noise” affects on specific species in ocean

Mark Johnsson – California Coastal Commission

- Increasing concerns about “noise”

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Chuck Katz, SPAWAR Systems Center San Diego, Navy

- List of products that will be produced from mapping

Don Cadien – LA County Sanitation Districts

- Prioritizing
- Question of stability over time

Mary Gleason – The Nature Conservancy

- Looking for biodiversity hot spots along central coast
- Potential MPA sites need better habitat maps
- Pigeon Point to Point Arena

Marina Cazorla - California Coastal Conservancy

- Focus on Monterey Peninsula and north
- Want as much done as possible between Monterey Bay and Bodega Bay and possibly north of Point Arena

Data needs group discussion – Northern California

These notes were recorded December 12, 2005 during the Northern California (Monterey canyon and north) mapping priority area breakout meeting. The discussion was facilitated by Gary Greene of Moss Landing Marine Labs.

Note: Asterisks indicate areas identified by the group as priority areas.
(Notes taken by Josh Sampey and Kendra Wong.)

Objectives:

- 1) Identify areas of data needs
- 2) Identify products that should come out
- 3) Prioritize the above

Discussion topics: 1) target areas 2) data types

Areas of interest (what are the areas that are important and why?)

- Farallon islands within state waters should concentrate on the south east Farallon
- The geological features extending from the Farallon Islands out to Cordell banks as this is a potential biological hotspot.
- *Proposed and agreed by many individuals in the discussion, the area extending from just south of the golden gate to the west of the Farallons and returning to Pt. Reyes should be an area of high priority as there is potential for MPAs in this area.
- Green- This is a large area and we have to keep in mind the time it takes to survey and the ability to survey it.

After this comment by Greene discussion ensued as to the reasons that this area is very critical and in need of priority mapping.

- While the area is large it is an important fishery area and biological hotspot that should be mapped with high detail.
- This area is critical due to MPA considerations, Navigation, Sediment transport, Tectonic activity, and contaminants/water quality.
- Area from shelf to Gwala? River under consideration for inclusion into sanctuary.
- Area north of the Golden Gate out to the shelf should be mapped due to high bird rookeries, potential oil spill and oil drilling impacts and emergency response.

Areas were identified within the state waters boundary which require different mapping technologies.

- 1) Deep areas that are within the 3 mile state boundary. These areas best suited for multibeam
- 2) Shallow area inaccessible by boat best suited to LiDAR.
- 3) Offshore areas should be done with backscatter.

Near shore areas are the most important areas to map, due to the interaction with land and sea. However, this interface is the hardest to map.

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- Coastal commission- The data gap from 0-10 meters needs to be addressed. This is an area in which the site habitat greatly affects policy decisions. It is critical that a habitat map be created for this zone for all near shore California.
- Question: Would LiDAR be able to be used in the Surf Zone?
Answer (Fugro): LiDAR will not penetrate white water the reflectivity is too high. For LiDAR to be utilized a low surf day would be advisable.
- Since LiDAR is being flown in the near shore area the survey of coastal wetlands should be considered and possibly conducted at the same time where possible.
- The estuaries most in need of mapping are those from San Francisco to Santa Cruz.

It was realized by the group that much of the north coast has not been mapped and some method/ criteria needed to be in place to decide priority areas.

- Question: Could we conduct a low resolution survey for the coast to get a sense of the habitat along the north coast.
- Answer (Greene): The nature of the systems does not really permit a Low resolution survey to be conducted.

Fugro person: Another option is to look at the Original NOAA data which is presented on Mylar sheets in higher sounding densities and use that to aid in identifying key areas.

Green & others: Also could use terrestrial geologic maps and interpret what may be in the water and map based on those sorts of interpretations.

The discussion then focused on working up along the coast identifying critical areas that individuals or groups thought would be most critical

- Estuaries in general should be mapped due to the biological significance. Also, repetitive surveys would also be desired.
- Santa Cruz and Davenport area has a lot of habitat.
- Ano Nuevo and Pescadero Point is of interest due to the rock habitat. Also, there is MPA considerations within this area.
- Fitzgerald Marine Reserve would be important due to habitat, hazards, MPA, and geology.
- Devil's Slide – Caltrans plan to build a tunnel could cause hazards to the local area
- *Cuddy Cove- of interest is geology, subbottom and habitat.
- Areas along the north coast which are hotspots for recreational abalone diving.
- Areas such as river mouths and fishing grounds. River mouths may be candidates for repetitive future mapping.
- *Vandam (area south of Mendocino) this is a shallow habitat area. The USGA would be very interested in this site.
- *Ft. Bragg area
- * Trinidad to Patrick's Pt. (blocks 132-133)- This area is important for several reasons

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- 1) Biological significant
 - 2) Water quality
 - 3) Large fishery especially groundfish, salmon, and crabs
 - 4) The rocky habitat is not impacted by sediment
 - 5) shoreline erosion.
 - 6) fisheries management
 - 7) this area are marine mammal habitats/haul outs and is important for many marine birds
- * Mad River to Trinidad.
 - 1) Razor clams (Clam Beach)
 - 2) Shifting Mad River Mouth
 - 3) The area is a multiple use area with public recreation, shipping and active fishing.
 - 4) Mapping would facilitate the understanding of Rip Currents which are prevalent in the area.
 - 5) Many thrust faults exist in the area.
 - * Rest of Humboldt Bay, outside the jetties and around the outfall (possible LiDAR usage).
 - *Crescent City- Hazards study following the Tsunami 1960's?
 - * Klamath River to Crescent City
 - 1) Navigation
 - 2) Sediment Transport
 - 3) Fishery
 - *St Gorge Reef ?
 - Smith river mouth – potential fish habitat and seal houlouts
 - *Smith River (largest undammed river in CA)
 - Water quality, fisheries

The North Coast was arbitrarily divided into 4 zones

A – Santa Cruz to Ocean Beach

B – Ocean Beach to lower Mendocino Coast

C – Mendocino Coast to South of Humboldt

D- Humboldt to Oregon

Suggestion: we should have some sort of preliminary surveys, such as low resolution swath mapping, to figure out what should be prioritized. This would be beneficial in areas that have not yet been mapped.

Data needs group discussion – Southern California

Data needs identified by participants and compiled from notes taken during group discussion (note takers: Mary Young & Soari Zurita).

Unknown (California Coastal Conservancy)

- Nearshore around San Diego
- Nearshore (Santa Barbara, L.A., and San Diego Counties)

Jerry Wilson (Fugro Pelagos)

- San Juan Bay
- South of Point Conception

Mary Elaine Dunway (Minerals Management Service)

- Santa Barbara Channel
- South of Point Conception
- Areas of seeps and scouring

Sam Johnson (USGS Coastal and Marine Geology)

- Nearshore
- Shoal bathymetric data
- Faults (continuation of faults)
 - Understanding tectonic ring
- Offshore Ventura

Art Shak (Army Corps of Engineers)

- Habitat Mapping in Coastal zone (shore protection, beach erosion, dredging, and disposal of dredge spoils)
- Shoal in Ventura and Santa Barbara Counties
- Littoral Zone

Michael Reichle (California Geological Survey)

- Complete Bathymetric and Sidescan
- Morro Bay to Cambria – Faulting line scarps

Mary Yoklavich (NOAA/NMFS-SWFSC)

- State waters blocks 814 and 813
 - Stock assessment of groundfish
- Point Conception → North to Vandenburg
- Julia Pfeiffer Burns
- North of Big Creek and adjacent areas

Unknown (Army Corps of Engineers)

- Critically Eroding areas (still in the process of prioritizing)

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- Some Federal sites
- San Clemente
- Surfside
- Offshore
- Wetlands
- Bathymetry and Sediment deposition areas

Mark Johnson (California Coastal Conservancy)

- Current habitat
- Sand deposits
- Oceanside
- San Diego
- Tsunami modeling
- Accurate Bathymetry for the ports of LA and Long Beach
- Off the coast of San Diego

Unknown

- Identify landslide risks
 - Santa Monica Bay
- Hazards
 - Cabrillo water port (off Malibu)
 - Natural gas pipeline off Oxnard
- MLPA
 - Characterize protected areas

Kirsten Gilardi (SeaDoc Society)

- Morro Bay
- Backside of Catalina
- Fine Scale Resolution around Channel Islands
- Rockier points
 - Pt. Loma
 - Palos Verdes
- Derelict Fishing Gear
- Fill in unmapped areas

Unidentified participant

- Nearshore – storm water runoff
- Mouth of Magu Lagoon
 - Block 682
- Julia Pfeiffer Burns area
 - Landslides
 - Sediment scour effects
 - Filled cove
 - Time series data
- Creek mouths in Orange County

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- San Nicolas and San Clemente Islands
- Catalina Island
 - 2 Harbors – marine activity
 - road sediment
 - quarry – localized impacts

Unknown

- Channel Islands – unmapped areas
- Big Sur South to Cambria for MLPA

Paulo Serpa (CDFG)

- Julia Pfeiffer Burns
- Big Creek Sidescan and Additional multibeam (for MLPA process)
- Filling in data gaps to Pt. Sau
- Cambria (Block 601)
- Data gaps in the Channel Islands
- Pt. Loma
- La Jolla Coast
- Torrence to LA Breakwater

Pete Dartnell (USGS)

- Santa Barbara Channel
- Gap between ? Point and La Jolla Canyon
 - Habitats and Geologic Maps
- Deeper water habitats

Brian Edwards (USGS)

- Single, Multibeam, and backscatter
- Detailed Backscatter maps
 - Extend to deeper water habitats off San Diego
- Coastline (sediment transport)
- LA margin (beach nourishment)
 - Point Source dispersal of sediment

Chuck Katz (SPAWAR Systems Center San Diego, Navy)

- Environmental impacts
- Baseline monitoring

Don Cadien (LA Sanitation)

- Complete North Channel Islands
- North of Point Conception
- Between Pt. Ras and Pt. Sau
 - Geology

Dick Seymour (SIO)

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- Blue Line Along Coast
- Blocks 738, 802, 842
 - Monthly surveys
 - Beach to 8m depth (ATVs)
 - Every 100 meters
- Do seasonal shoals investigations
- Map seasonal changes to find out how often to do coast

John Orcutt (SIO)

- Understanding of environment South of Border
- High resolution data for faults
 - Change in offshore sediments
 - Coincidental data
- Matillaha Dam – dumping of sediment
 - Behavior of sediment
- Blocks 654, 682, 653, 664

Jeff Babcock (SIO)

- High resolution (<1 meter) 500 meters to 100 meters water depth
- Huntington Beach to San Diego
- LIDAR data in the nearshore
- Sub bottom data collected with multibeam
 - Baseline of sediments
 - Repetitive studies
 - Decadal change
 - El Nino change
 - Thickness of sediments
 - Resources
 - Erosion – Offshore
 - Tectonics
 - Habitat areas
 - Sands versus hard substrate
 - Faulting and seismic in high accuracy

Dave Caress (MBARI)

- Frequency range of sub bottom for nearshore sand forms
- Shallow water sandy environment

John Butler (NMFS)

- 0-10 meters Crescent City to Punto Abrejos (abalone)
- San Nicolas Island
- Catalina
- Northern Channel Islands
- Point Conception to Point Loma – shallow rocky habitat
- Offshore banks

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Dan Specht (USACE)

- Characterization of Sediments
 - Sand sources and sinks

Mary Elaine Dunway (Minerals Management Service)

- Start Broader (use tiered approach)
- Work on problem areas

Art Shak (Army Corps of Engineers)

- Intertidal areas
 - Topo and bathy
- Morro Bay

Jerry Wilson (Fugro Pelagos)

- Bathy for navigation safety
- Optimize Bathy or backscatter
- Biological impacts of acoustical noise
 - Eco-sounders

Mark Johnsson (California Coastal Commission)

- Response to above
 - Higher frequencies cause less problems
 - Biological ramifications

Chuck Katz (SPAWAR Systems Center San Diego, Navy)

- Maps and data products

Don Cadien (LA Sanitation)

- Stability over time
- Frequency with regard for stability

Recommendations for Minimum Requirements of Final Products

Notes from group discussion (Saori Zurita – note taker).

Dick Seymour – SIO

- Current state of the art “shoals” (surf zone to extinction level)
- Classified database broadly available (backscatter, xyz’s)

Keith Jones – CalTrans

- Purpose for products produced
- Keep track of water quality (to what extent will multibeam help)

Cliff Davenport – Coastal Sediment Management Workgroup

- Valuable products from substrate maps would be geologic maps (identify location, volume, and depth)
- Sub-bottom profiles of substrate maps to determine where mud belts are located
- Repetitive mapping of river mouths
- Begin with backscatter data to determine critical locations (ie: erosion)

John Butler – NOAA/NMFS SWFC

- Habitat maps (more backscatter)
- Better classification maps that would be more useful for MPA selection and fishery management

Dale Roberts – Cordell Bank National Marine Sanctuary

- Resolution of habitat maps should be dependent on site, depth, and species of interest

Paul Banks – DFG

- Time factor rates
- Work backwards from 2011 timeline
- Must determine whether year 2011 timeframe will be met

Gary Greene – MLML

- Determine what data is available (Do we need to build upon that?)
- Specific needs of management, policies, and objectives before specifications like resolution are determined

Guy Cochrane – USGS Coastal and Marine Geology

- 3 tiered structure - xyz & backscatter grids --> numerical derivative such as topographic index grid --> attributed GIS polygons (may increase costs by approximately 50%)

Irina Kogan – Gulf of the Farallones National Marine Sanctuary

- Backscatter useful in near shore, shallow, areas with habitat

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- Backscatter useful for MLPA process
- Images of substrate data done first then detailed habitat maps and groundtruthing

Art Shak – USACE

- Baseline map of current shoreline with MLLW lines
- Good basemap from shore out to navigational depths

Rikk Kivitek – CSUMB

- Shoreline important boundary for legal purposes
- Shoreline is moving so important to have the shoreline mapped

Gerry Wheaton – NOAA Ocean Service

- Data all uniform
- Define data acquisition

Mary Elaine Dunway – Minerals Management Service

- Tiered approach is cost effective and has been very useful to biologists
- Multibeam and backscatter groundtruthing, use AUV's

Gary Greene – MLML

- Knowledge of geologic processes that lead to educated guesses about substrate

Rikk Kivitek – CSUMB

- Groundtruthing should be included as a minimum requirement

Guy Cochran - USGS Coastal and Marine Geology

- Groundtruthing increase costs by approximately 25%

John Butler – NOAA/NMFS SWFS

- Groundtruthing needs to be a focus if species are dependent on area mapped (i.e.: slopes)

Chris Wills – California Geological Survey

- Habitat mapping: polygons of substrate important for policy makers
- Evaluate fault processes, sediment processes (sub-bottom profiles)

Mary Elaine Dunway – Minerals Management Service

- Need for groundtruthing to move forward

Gerry Wheaton – NOAA Ocean Service

- RFP's have potential outcomes (What is RFP going to accomplish?)

Dick Seymour – SIO

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- Clarification on groundtruthing
- We need to be concentrating on making specifications of minimum requirements

Doug Lockhart – Fugro Pelagos, Inc.

- Deliverables of data is easy to determine quality total propagated processes
- Obtain data first then determine how useful it is

John Butler – NOAA/NMFS SWFS

- Columns in voting block determine what type of data is needed

Recommendations for data acquisition

Notes from breakout group discussion (Saori Zurita – note taker)

***Objective:** To create a strategic plan for California state waters by defining the minimum standards for data acquisition.

- Base map of existing datasets is a good step to work from synthesis of existing datasets/what type of analyses have been done for each site map
- In addition to remote sensing data provide other information that exists with that data
- Include sub-bottom profiling with surveys so extra vessel time is eliminated
- Survey time is doubled if include a towfish while running multibeam unless the sub-bottom is hull mounted
- It is more efficient to run 2 vessels: Use multibeam image to guide sub-bottom instrument

SUB-BOTTOM IN STATE WATERS:

- Sand bodies hard to image (need low frequency which would reduce resolution)
- Sub-bottom and video groundtruthing should be post bathy and backscatter
- Not many devices to image sand, faults, etc.
- Tiered studies allow you to determine where and when sub-bottom and groundtruthing should occur
- Frequency versus resolution changes due to species of interest, sediment, and processes
- USGS study: Camera tows on a continuous trackline using a sled. Coverage is less than that of a ROV
- Sled with a camera gives sediment grain size
- Data acquisition tier (shoreline out to 3 mile limit)
 1. Multibeam and backscatter
 2. Sub-bottom and video camera
 3. Physical samples
- Narrow strip of hard to reach areas – geoswath used by Fugro (shore to water in flat areas)/ Need to run a tideline
- Ocean Imaging – multispectral dependent on cloud cover
- Specify needs first then determined instruments used
- Multispectral displays data differently than acoustic
- LIDAR better to use for 0 – 10m depths
- Datasets co-registered wherever possible
- Include water column along with Acoustic Doppler Current Profiler for temperature, current, salinity (what's in the water?)
- ADCP would require another person to manage and not as easy to use on smaller vessels
- IHO standards: possible modifications and implications

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- Does the order of 1 standard decrease data if changed?
- IHO = 10% at 40m mainly for navigable reasons/change to 5% at 40m for habitat analyses would work better
- Must maintain manufacturers specs to meet IHO standards
- New Reson system has 0.5 degree beams (512 beams across 150 degree swath)
- Verify acoustic compliance with regards to marine mammal regulations
- Shallow water mapping based on IHO order 1 standard (most cost efficient)
- High resolution data using hull mounted system of 0.5 degree beams
- LIDAR best if 2x2m @ 400m altitude (IHO standard requires two flights of 2x2m data)
- Habitat surveying versus navigation surveys dependent on processing possibility
- Fugro surveys based on ellipsoid and calculate back to tide (found data fits better), total propagated error is reduced by RTK use

DATA ACQUISITION SUMMARY

- Towed sled with continuous video (if needed use ROV for more intense studies)
- IHO order 1 standards provides appropriate resolution for habitat, deeper water IHO may change
- Exceed IHO standards (0.5 degree beam, higher resolution for habitat in deeper water)
- Additional instruments such as an ADCP would be better if collaboration with other agencies is good
- Marine mammal regulatory compliances
- Sub-bottom and other instruments power outputs are well below regulatory levels
- Use of ROV instead of towing a sled in hard to reach areas like Big Sur

Summary Recommendation for Final Products

Recommendations from group discussion (Saori Zurita – note taker).

DATA MINIMUM REQUIREMENTS

- Xyz and backscatter (LIDAR, hyperspectral, multibeam, multispectral)
- Data available
- DEM bathy contour map (resolution based on usage of map)
- Rugosity and substrate type (gridded xyz data used for geology habitat)
- Vectors showing faults and other structures
- Highest resolution possible within limits
- Data interpreted to greatest detail at specific resolution
- Confidence of interpretation indicated
- Gather background data in two ways:
 1. 100% coverage
 2. existing data incorporated into interpretive process
- Analysis of collected data to determine future data acquisition
- Groundtruthing should be included and at least should be obtained at least once during actual data acquisition

METADATA, ARCHIVING, DISSEMINATION

- FGDC standards
- Basic descriptions of data processing steps
 - Navigation precision
 - Acquisition methods
 - Sonar data processing and mosaicing
 - Resolution changes and reprojections.
- Description of files (i.e. original projections,)
- Consider new FGDC standard developed by Sanddag
- Dissemination of tiered system for database (ftp with links, website images of data that link to data sources, IMS)
- Register with Geographic search engines and web search engines such as Google
- Video data archiving to DVD, since video tape does not last
- Existing IMSs' available, but no one has volunteered, (the RFP may need to request a contractor to oversee and maintain website and IMS)