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*This report presents the capital costs, operation and maintenance costs, mooring facility and personnel needs to meet the existing and forecasted on-the-water requirements of the National Marine Sanctuary Program.*

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## Executive Summary

The information presented in this study demonstrates that the NMSP will require approximately $14.4M over the next ten years to fulfill its on-the-water small boat requirements through the purchase of 21 new and 16 replacement vessels (see **Figures 1** and **2**). An additional $14.5M will be required over this period to provide for the operation and maintenance (O&M) of these vessels (see **Figure 3**). O&M is expected to range from approximately $250K in year one to $2.5M in year 10. The distribution of funding requirements over the ten-year period is based on the expected growth and evolution of the NMS System (**Appendix I**) and a detailed *NMSP Small Boat Survey*, which was conducted this spring. Upper and lower estimates are shown for both capital and O&M costs, because of variability associated with types of vessels within each of the three NMSP type categories. Consequently, the "best estimate" used to approximate capital and O&M requirements is the average, also shown in each graph.

**Figure 1.** Vessel Requirements Over Time

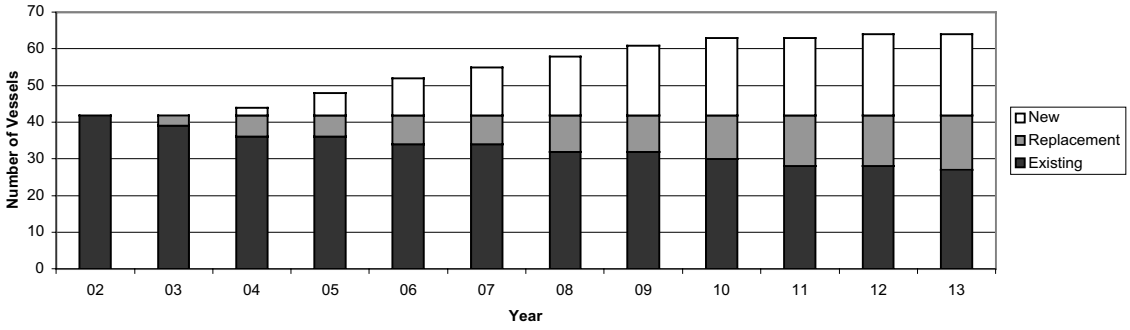



**Figure 2.**
Capital Cost of New and Replacement Vessels by Year

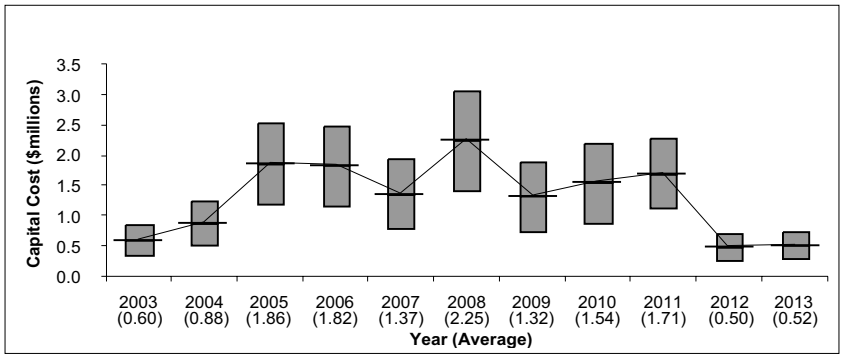
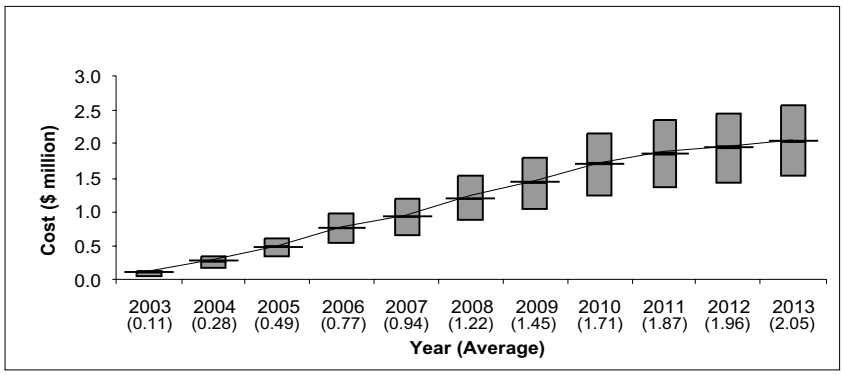



**Figure 3.**
Cumulative Operations and Maintenance Cost for New and Replacement Vessels



# I. Introduction

The mission of NOAA's National Marine Sanctuary Program (NMSP) is to serve as trustee for a system of special marine areas of national significance and to conserve, protect and enhance their biodiversity, ecological integrity and cultural legacy. More than a quarter century of program experience has shown that there is a critical need to have a presence on the waters of the sanctuaries in order to fulfill this important stewardship role; therefore, small boats are essential to enable the NMSP to accomplish the critical tasks of:

- enforcing sanctuary regulations;
- conducting research to better understand the ecological systems or submerged cultural resources being managed;
- monitoring key activities and resources to understand how the environment is responding to changing human uses and environmental conditions;
- educating the sanctuary community about site management;
- responding to oil spills or groundings.

**A Critical Requirement**

National marine sanctuary personnel must be a presence on the water to ensure effective and efficient sanctuary management and protection of sanctuary resources. Vessels are needed to support:

- Ecosystem-focused research, monitoring and resource characterization.
- Submerged cultural resource research, monitoring and characterization.
- "Interpretive" enforcement and monitoring regulatory compliance.
- Emergency response to spills and groundings.
- Maintenance of sanctuary infrastructure (mooring buoys, ocean observatories, special navigation markers, environmental remediation sites).
- Monitoring human uses of sanctuaries.
- Education, outreach and VIP visits.

Vessels must be operated by well-trained and experienced captains and crew; meet rigorous NOAA small boat safety requirements; be outfitted to support multiple missions; be well maintained and have appropriate shoreside facilities to protect this investment from the perils of the sea.

Like the national park manager or national wildlife refuge manager who patrols protected areas with trucks and all-terrain vehicles, sanctuary managers must be able to maintain safe access to, and effective presence in, their site areas. However, unlike the relatively safe environment of land-based vehicles, the marine environment is a very challenging and dynamic place in which to conduct business. Many sanctuaries are more than 25 miles offshore and frequently subject to rough seas and bad weather. Activities conducted onboard ocean-going vessels can be life threatening and vessels may be subject to equipment failures within such challenging environmental conditions. NOAA has stringent standards for vessels working at sea and, more particularly, as it pertains to diving from these vessels—another essential activity at most sanctuaries. The cost to acquire appropriate vessels to support essential, waterborne work (and meet the necessary high standards for safety) is considerable. However, vessels

such as these are an essential cost of doing business in the national marine sanctuaries.

Consequently, there is need to develop a comprehensive, program-wide strategy for maintaining existing small boats as part of the essential pool of waterborne assets, and acquiring and maintaining the additional vessels needed to meet growing program requirements. **The requirements survey and the results presented here represent the first step towards: 1) systematically determining the full requirements of the program, and 2) developing a capital investment and operations and maintenance (O&M) fund.**

## *Background*

In December 2001, the National Marine Sanctuary Program initiated an effort to: 1) complete an inventory of all small boats owned and operated by the program and 2) assess how well these boats met site requirements for conducting research, enforcement, education and outreach activities. In the past, small boats have been acquired, operated and maintained on an individual site basis. Many of these boats have been "used" vessels—the best an individual site could either afford or acquire opportunistically through a government transfer program. Funds to support these boats have been allocated by each site through their annual operations, research and facilities (ORF) appropriation. Accordingly, no specific consideration has ever been given to the marine infrastructure (boat or on-the-water requirements) of the NMSP. Under these circumstances, site personnel did their best with the resources at hand. With so few waterborne assets, especially for very large sites, it has been challenging to fully engage both the public and the program's professional partners.

## *The Role of Private Charters and NOAA Vessels*

Small boats are not the only option available for conducting sanctuary on-the-water activities. Sites may sometimes charter private vessels (and often do) to support specialized research activities that require the use of advanced technologies (e.g., remotely operated vehicles). However, in addition to this, many sites are finding they must charter vessels to conduct even routine operations. A recent NMSP study determined that 172 total charter-days were used by sites in FY2001 at a cost of over $810,000. While some of these charters were necessary due to a particular platform or equipment requirement, many trips were for personnel transfers, teacher workshops, wildlife surveys and the like—missions much better suited for program small boats, had vessels been available.

While chartering a vessel reduces the need to maintain one on-site, there are a number of drawbacks that make chartering ill suited for supporting the daily routine of sanctuary activities. Bad weather conditions frequently cause delays in planned operations, requiring the site to cover additional costs for "weather days" or even reschedule or cancel trips. For activities such as monitoring, where data must be collected on a regular schedule and factors such as seasonality may be critical, such a delay can make results considerably less useful. Finally, available charter vessels may not meet NOAA's stringent safety

standards. In this case, sometimes the vessel is used and safety compromised, or the site will work with the operator to upgrade the equipment to meet those standards; either way, the sanctuary pays more. Chartering vessels, therefore, is not necessarily the most efficient, cost-effective or safest option by which to conduct routine activities at sites. There will always be a role for chartered vessels in the NMSP, but these are best reserved for unique, one-time operations requiring more highly specialized equipment and gear.

NOAA ship time is also part of the essential toolbox for on-the-water activities. These cruises—generally in support of longer, multiple-objective research missions—are planned more than a year in advance as part of the fleet allocation process. They provide platforms from which to conduct interdisciplinary research and monitoring, requiring instrument-handling equipment far exceeding the capabilities of site-based small boats. However, whereas the program small boat fleet is tactical, the use of NOAA ships is strategic. NOAA vessels are crucial to conducting long-term research within sites, but they simply are not appropriate for the repetitive, short duration trips required by routine activities such as monitoring, enforcement and constituent education.

The mix of on-site small boats, charters and NOAA ship time is complex and driven by individual site requirements. All must be safe, capable and available for sanctuaries to meet their management goals. This study seeks not to do away with private charter or NOAA vessel use; however, these external assets are simply not the best tools for conducting daily and routine NMSP management activities. Only a robust, small boat program can give sanctuary managers the assets required to maintain an effective and continuous on-the-water presence.

### *System Growth*

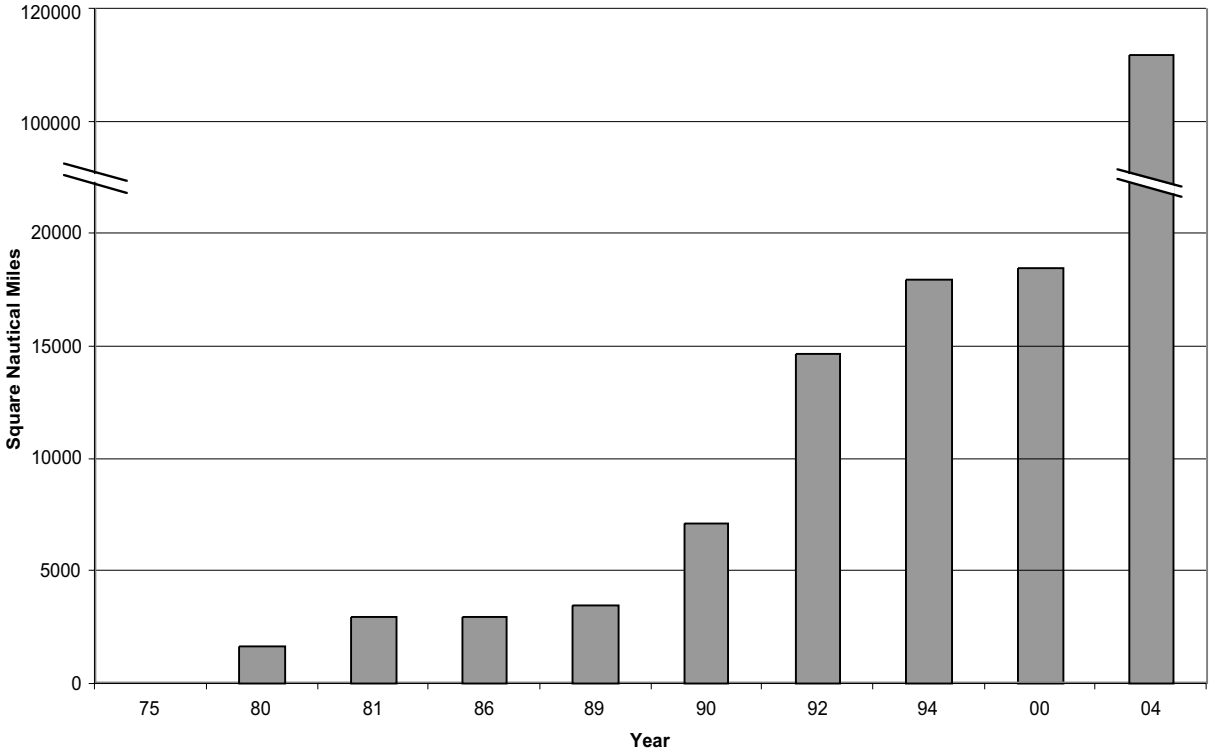
A significant variable in the analysis of the program's small boat requirements is the issue of maturation and growth of the NMS System. In the early life of the program, the overall size of the sanctuaries was small and the need for site vessels minimal. Over the last three decades, however, the geographic area encompassed by the program has grown substantially (see **Figure 4**). The system today includes 18,492 $nm^2$ of ocean, coastal and Great Lakes waters. This total does not include the immense water space (almost 100,000 $nm^2$) of the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. Currently in the process to be designated as the 14$^{th}$ National Marine Sanctuary (but already under NMSP management), this addition to the program will increase the system's total area by almost an order of magnitude.

This rapid growth has outstripped the ability of the existing small boat fleet to conduct needed research, monitoring, enforcement, educational and outreach needs of the program. In response, this study represents the first step toward closing this gap by identifying a strategic path toward building a small boat program that will better meet the daily management needs of each individual site.

## *The Alternative*

The alternative to this strategic plan for small boat acquisition is to continue past practices. This largely involves funding future small boat operations out of existing annual ORF accounts. The existing fleet would be supplemented by chartered vessels, as funding and availability permit. New vessel acquisition—particularly for the larger vessels required for research, monitoring and education—would largely depend upon availability of old vessels being removed from the service of the U.S. Coast Guard or from U.S. Customs seizures. Some smaller vessels might be able to be funded from existing accounts but new construction would, in general, be prohibitively expensive.

**Figure 4.** Growth of National Marine Sanctuary Program Waterspace: 1975—2004[1]




[1]Only years when sites were designated are shown. 2004 is estimated the year of Northwestern Hawaiian Islands sanctuary designation; however, this site is already under NMSP management.

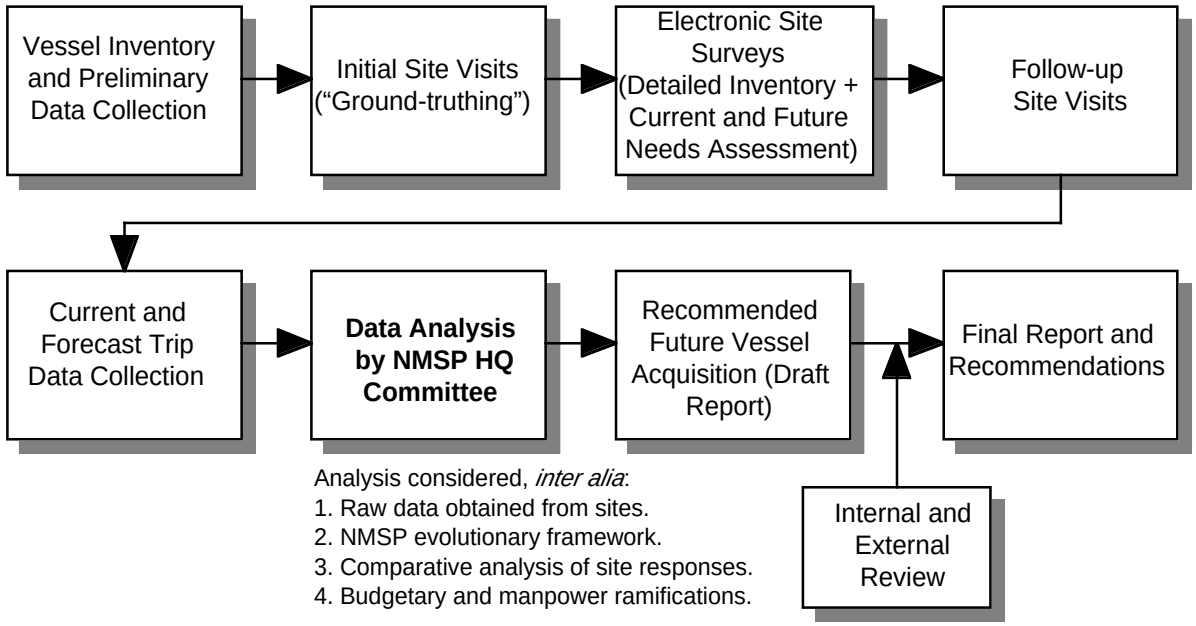
Because it is impossible to forecast when such used vessels might become available, it is difficult to say if the fleet would grow at the rate required to meet future NMSP requirements. However, reliance upon such opportunistic sources (while helpful) has historically not provided vessels of the type, capability and numbers required. Continued reliance on such external sources to support site small boat needs would almost certainly result in too few boats of the wrong type to meet management requirements; therefore, many on-the-water demands would continue to go unmet.

In addition, while the capital costs of acquiring a second-hand vessel might seem low, the cumulative, lifetime cost of providing for the maintenance and upkeep of a diverse fleet of second-hand craft can be substantially greater than if a standardized fleet of boats were carefully planned. Finally, a fleet comprised of many different types of boats means that standardized training and maintenance programs cannot be developed, resulting in a decrease in safety, efficiency and reliability. This study, then, is also intended to wean the program off second-hand assets in order to realize the many benefits of a standardized fleet.

## II. Methodology

The recommendations and conclusions presented in this study represent the end result of over six months of data collection and analysis. The process, which began with an inventory of the existing small boat fleet and concluded with extensive internal and external reviews, was designed from the ground up to provide a sound, factual basis by which to guide future decision making. **Figure 5** provides a simplified flowchart of the process followed during this study.

**Figure 5.** Small Boat Requirements Study Process Flowchart




This analysis began by surveying individual sanctuaries in order to inventory all small boats and equipment owned and operated by each site. This preliminary data collection was verified via site visits by experienced NMSP staff in order to "ground-truth" the results and determine more accurately the current state of the small boat fleet program-wide. Every small boat in the inventory was personally inspected by the study's team leader at this early stage.

Based on this initial inventory, a comprehensive survey was developed in order to provide a more detailed assessment of the vessels operated at each site, as well as current and future small boat use. This review and analysis augmented a survey previously undertaken by NOAA's Office of Marine and Aviation Operations (OMAO) for all small boats in NOAA. The information in the survey was collected from site managers, research coordinators, vessel operations personnel and others in the field with the experience and expertise in how vessels are used at each site. These personnel are best positioned to identify what challenges and obstacles are encountered in the acquisition, use and maintenance of site vessels, and—especially—what critical needs are not currently being met with the existing small boat fleet. No more competent collection of experts could be consulted than the site personnel who have the day-to-day responsibility for managing these sanctuaries.

The two-part survey gathered extraordinary amounts of data regarding existing small boats and equipment, current usage and future requirements (an example of a survey response is included in **Appendix I**). This information included: 1) the type and condition of boats; 2) how they are used and 3) how well the combination of existing boats meet the management requirements of each site. The survey also addressed elements such as deck gear, communications equipment, engine type and condition, operators and maintainers, and the missions to which boats are applied.

The survey also asked sites to identify (in detail) their current and forecast small boat requirements. These estimates were based on the capabilities needed to implement existing management plans as well as anticipated changes as these plans matured. Sites were also asked to include missions currently not being met and the characteristics of a vessel (or vessels) that would fulfill such needs. These results were verified by another round of site visits and interviews with field staff.

To better quantify both current and forecast vessel use, each site was also asked to report the number of trips taken by each boat over the past 12 months. To maximize accuracy, vessel logs and sanctuary records were consulted. Four separate parameters were used to describe each individual trip:

**1) Purpose of Trip.** Sanctuaries were asked to select the purpose of each trip from the following mission-related options: 1) enforcement 2) research 3) monitoring 4) education or 5) other. Examples of activities in the category "other" include buoy maintenance, VIP visits, media opportunities and personnel shuttle. Almost all vessels are used for more than one purpose.

**2) Duration of Trip.** The duration of a trip was captured by estimating the actual time on the water and then categorized in four groups: 1) zero to 2 hours; 2) 2 hours to half a day; 3) full day trips and 4) overnight. Actual vessel logs were used to identify underway duration.

**3) Type of Vessel.** Vessels were divided into three group sizes (or "types"), based on length at the waterline.

**4) Trips per Season.** Seasons were chosen as the simplest method to divide the year into useful increments. Also, operations at many sanctuaries are affected by seasonal conditions, so this helped to indicate operating needs.

Survey results, past trip history and forecast vessel use was then subjected to a thorough review and analysis by a team of NMSP Headquarters personnel led by a recently retired senior officer from the NOAA Corps. Members of this review team included a senior policy advisor to the director (and former sanctuary manager), the staff economist, and an analyst with 7 years experience in the U.S. Navy. This team tempered the raw survey results by looking objectively at the data against the background of program history and future site evolution. In addition, the results were subjected to a comparative review of needs in sites that have similar characteristics. Finally, the small boat activities of the Florida Keys NMS—the most mature NMSP site in terms of management development—was used as a yardstick against which less-mature site projections were measured. Final recommendations presented here on future vessel acquisitions are the result of this analysis. Additional details regarding the forecast results and the analysis process will be discussed in **Section IV**.

Once completed, the draft analysis was reviewed across the program by managers and superintendents, branch chiefs and others from the NMSP Leadership Team, as well as selected NOAA offices (including OMAO) having direct experience with small boat issues. Feedback from these reviews is reflected in this final document.

Great care was taken to ensure that the data used in this analysis was the best available and solicited from personnel with the greatest expertise and experience regarding small boats. In addition, the analysis was made as robust as possible (given the absence of relevant, independent forecasting models) to help guide this process. The results—reviewed by experts within each field—are not a "wish list" but a strategic analysis grounded in hard numbers and guided by current management requirements and future program evolution.

# III. Inventory and Current Use

## *The Inventory*

As of April 2002, the inventory of NMSP small boats consisted of 42 vessels distributed among 11 sanctuaries (see **Table 1**). Vessels have been categorized as one of three "types" and based on size:

- Type I vessel—up to 29 feet length overall
- Type II vessel—30 to 49 feet
- Type III vessel—50 feet or greater

These three categories were generated for the purpose of this study and do not correspond with NOAA vessel "classes" or other such categorizations. Of the 42 boats in inventory, 20 are Type I vessels, 16 are Type II and 6 are Type III.

**Table 1.** The National Marine Sanctuary Small Boat Inventory: April 2002

| Sanctuary | Vessel Type | Size (ft) | Primary Use | Comments |
|---|---|---|---|---|
| **Stellwagen Bank** | | | | |
| Whaler | I | 18 | Enforcement | Good condition but flat calm use only |
| Hawk | II | 30 | Research, Education | Scheduled to be sold at auction |
| **Monitor** | | | | |
| None | | | | |
| **Gray's Reef** | | | | |
| Joe Ferguson | II | 41 | Research, Diving | FY01 acquisition |
| Go Fast | II | 32 | Research, Diving | Open boat, day use in good weather only |
| **Florida Keys Upper** | | | | |
| Zodiac | I | 11 | Education, Research, Team Ocean | Good condition/meets needs |
| Whaler | I | 13 | Education, Research, Team Ocean | Good condition/meets needs |
| Whaler | I | 17 | Education, Research, Team Ocean | Good condition/meets needs |
| Carolina Skiff | I | 21 | Research, Damage Assessment | Good condition/meets needs |
| Mako | I | 22 | Education, Research, Team Ocean | Fair hull, poor engine |
| Mako | I | 25 | Research, Damage Assessment | Good condition/meets needs |
| Robalo | I | 25 | Research, Diving | Good condition/meets needs |
| Gulfstream | I | 28 | Enforcement | Good condition/meets needs |
| Corsa | II | 30 | Research, Damage Assessment | Maintenance planned |
| Manta | II | 30 | Enforcement | Good condition/meets needs |
| Sea Vee 1 | II | 30 | Enforcement | Good condition/meets needs |
| Sea Vee 2 | II | 30 | Enforcement | Good condition/meets needs |
| Agassiz | II | 39 | Research, Buoys | Meets mission needs |
| Sabina | II | 43 | Research, Diving | On loan to NURC to support Aquarius |
| Odyssey | III | 53 | Research, Diving | Good condition/ meets needs |
| **Florida Keys Lower** | | | | |
| Caribe RHIB | I | 10 | Shuttle | Meets needs |
| Whaler | I | 13 | Education, Research | Meets needs |
| Whaler | I | 15 | Education, Research | Meets needs |
| Whaler | I | 25 | Education, Research | Meets needs |
| Whaler | I | 25 | Education, Research, Team Ocean | Refurbishing |
| Gulfstream | I | 28 | Research, Diving | Meets needs |
| Scarab Sport | II | 30 | Not in Service | Scheduled to be sold at auction |
| Rachel Carson | II | 39 | Research, Buoys | Maintenance planned |
| USCG Utility boat | II | 41 | Research | Good condition/meets needs |
| USCG Utility boat | II | 41 | Enforcement | Good condition/meets needs |
| Dante Fascell | III | 53 | Research, Diving | Good condition/meets needs |
| Irene C | III | 61 | Research, Diving | Good condition/meets needs |
| Pt Monroe | III | 82 | Research | FY01 acq., USCG Cutter received 8/01 |
| Pt Lobos | III | 82 | Research | USCG Cutter - received 10/01 |
| **Flower Garden Banks** | | | | |
| Point Glass | III | 82 | Research, Enforcement, Diving, ROV | FY01 acq., USCG Cutter received 8/01 |
| **Channel Islands** | | | | |
| Xantu | I | 29 | Research, Education, Shuttle | Limited day use, good condition |
| Catamaran | III | 60 | Research, Educ., Enforcement, Diving | FY02 acquisition, to be delivered 9/02 |
| **Monterey Bay** | | | | |
| Shark Cat | I | 28 | Research, Diving, Enforcement, Buoys | Limited to fair conditions, 2 days max |
| Catamaran - 60 ft - Purchase | III | 60 | Research, Diving, Enforcement, Buoys | Planned FY05 acquisition |
| **Gulf of Farallones/Cordell Bank** | | | | |
| Phocoena | I | 28 | Research, Nearshore Sampling | Limited day use |
| Gaski | II | 33 | Research, Net Tow Sampling | FY01 acquisition, received 7/01 |
| **Olympic Coast** | | | | |
| Tatoosh | II | 42 | Research, Enforcement, Diving | Recent overhaul, very good condition |
| OC – 2: RHIB | I | 22 | Research | Meets needs |
| **Hawaiian Is Humpback Whale** | | | | |
| Shark Cat | I | 22 | Research, Diving | FY01 acquisition, new construction |
| **Thunder Bay** | | | | |
| None | | | | |
| **Fagatele Bay** | | | | |
| None | | | | Local Gov't provides small boat for use |
| **NW Hawaiian Islands** | | | | |
| Mana Cat | II | 34 | Research | FY02 acquisition, to be delivered 6/02 |

Florida Keys NMS, with its large area and significant enforcement challenges, is by far the largest user of the current fleet, operating 29 vessels of various sizes. Most sites operate only one or two vessels and occasionally share assets. Three sanctuaries—Monitor, Thunder Bay and Fagatele Bay—currently do not own or operate any of their own small boats.

## *Existing Use*

Site responses indicate that NMSP vessels undertook approximately 3,200 trips in the last 12 months. The survey tool enabled a great deal of specific data to be collected from the sites concerning these trips, as well as current small boat requirements. This section discusses significant findings relating to existing usage.

Survey responses indicate most small boat trips occur in the spring and summer months, last full days and are for enforcement or scientific purposes (see **Table 2**). Generally, full day trips are the most frequent, accounting for almost 90 percent of all trips; brief trips under two hours and overnight trips are rare. Over 40 percent of current trips support scientific research and monitoring; over a third are for enforcement. All other categories trail distantly.

Site responses also indicate interesting trends in vessel use by size (see **Table 3**). Enforcement operations are almost always conducted by the smaller boats. Presently, Type I and Type II vessels account for all law enforcement trips (currently over 1,000 a year). The Type II vessels involved in this work are on the small end of the size range and it's probably fair to say that boats 30 feet or less in length handle nearly all enforcement missions. Type II vessels are used almost exclusively for full day (usually research) outings, while the largest vessels are predictably reserved for full day and overnight use.

**Table 2.** Summary of Existing Small Boat Usage for All Sites by Season: Circa FY2002

| Category | Average Trips per Season | | | | Average Trips per Year | |
|---|---|---|---|---|---|---|
| | Spring | Summer | Fall | Winter | Total | Percent of Total |
| **Trip Duration** | | | | | | |
| 0 – 2 hour(s) | 13 | 14 | 12 | 7 | **46** | **1.4** |
| 2 hrs – Half-day | 92 | 93 | 24 | 22 | **231** | **7.2** |
| Full Day | 947 | 1,030 | 566 | 338 | **2,881** | **89.5** |
| Overnight | 17 | 19 | 24 | 0 | **60** | **1.9** |
| Totals | 1,069 | 1,156 | 626 | 367 | **3,218** | **100.0** |
| **Trip Type** | | | | | | |
| Enforcement | 459 | 417 | 85 | 113 | **1,074** | **33.4** |
| Research | 303 | 265 | 262 | 60 | **890** | **27.7** |
| Monitoring | 141 | 155 | 101 | 84 | **481** | **14.9** |
| Education | 75 | 222 | 108 | 49 | **454** | **14.1** |
| Other | 91 | 97 | 70 | 61 | **319** | **9.9** |
| Totals | 1,069 | 1,156 | 626 | 367 | **3,218** | **100.0** |

**Table 3.** Summary of Existing Small Boat Usage for All Sites by Vessel Type: Circa FY2002

| Category | Average Trips per Vessel Type | | | Average Trips per Year | |
|---|---|---|---|---|---|
| | I (0' – 29') | II (30' – 50') | III (50' +) | Total Trips/Year | Percent of Total |
| **Trip Duration** | | | | | |
| 0 – 2 hour(s) | 37 | 9 | 0 | **46** | **1.4** |
| 2 hrs – Half-day | 221 | 10 | 0 | **231** | **7.2** |
| Full Day | 1,701 | 1,062 | 118 | **2,881** | **89.5** |
| Overnight | 3 | 0 | 57 | **60** | **1.9** |
| Totals | 1,962 | 1,081 | 175 | **3,218** | **100.0** |
| **Trip Type** | | | | | |
| Enforcement | 474 | 600 | 0 | **1,074** | **33.4** |
| Research | 673 | 165 | 52 | **890** | **27.7** |
| Monitoring | 365 | 84 | 32 | **481** | **14.9** |
| Education | 417 | 32 | 5 | **454** | **14.1** |
| Other | 33 | 200 | 86 | **319** | **9.9** |
| Totals | 1,962 | 1,081 | 175 | **3,218** | **100.0** |

It should be noted that in addition to employment by sanctuary staff, these vessels currently undergo significant use by partner agencies (including other NOAA elements) and academic researchers conducting scientific research in support of sanctuary management. While information on such external partnership use was not specifically collected by this study, the degree of partnership appears to vary greatly from site to site and in some cases can be significant. For example, Florida Keys NMS (FKNMS) has reported that approximately 25 percent of its overall vessel use (and perhaps 80 percent of all science-related missions) is in support of external agency and academic researchers conducting research in partnership with the sanctuary. Examples of partners supported by FKNMS small boats include: 1) academic and research institutions (University of North Carolina, Florida Institute of Oceanography, University of South Florida, University of Miami, Mote Marine Laboratory); 2) federal agencies (NMFS, EPA, National Park Service, U.S. Navy) and 3) state government (Florida Fish and Wildlife Commission).

Sites (particularly smaller ones) also tend to be entrepreneurial with their existing vessels in order to gain access to better research capabilities. Gray's Reef NMS, which is co-located with the Skidaway Institute of Oceanography (SKIO), has an informal agreement with SKIO to trade three days of use on the sanctuary small boats for one day of time on their research ship R/V *Savannah*, thus providing the site with cost-effective access to a larger and more capable vessel. Having access to this larger vessel allows the sanctuary to attract scientists to conduct research in the site on issues and questions relevant to management–a significant proposition for this small, offshore site.

These arrangements are notable because research conducted by partners currently constitutes the bulk of research activity currently taking place within the program. Indeed, sites are highly dependant upon this external activity as it provides a scientific capability far in excess of what the program otherwise might

provide. Notably, in many cases, it is the ability of a particular sanctuary to provide vessel time that largely dictates if such research takes place.

While only a small amount of data was collected in the survey on such external utilization, it can be expected that the demand for these partnerships will increase. This growth will occur as sites mature and the need for additional research to support management decisions increases. An expanded small boat fleet designed to meet the scientific requirements for each site will go a long way towards supporting this demand. This adds considerably to the value of these assets to NOAA, other federal and state agencies and the greater academic research community, all willing and able partners on whom the NMSP relies upon to help meet management and objectives.

# IV. Forecasting Requirements FY2003—FY2013

## *The Forecasting Process*

The NMSP is maturing: evolving from a collection of individual sites just achieving a threshold of effective management into a system of fully-evolved sanctuaries operating efficiently both individually and as a cohesive system. The NMSP has developed a framework (see **Appendix II**) projecting the evolution of site and headquarters' support needs associated with the operation of the NMSP over the next 10 to 20 years. The goal of this initiative is to describe what the program will look like, how it is likely to operate in the coming years and what the likely costs will be. This evolutionary process drives critical sanctuary elements such as vessel acquisition and operations.

The evolution of the NMSP can be described as a six-step process and is directly linked to the issue of the evolution of the system's small boat fleet (see **Figure 6**). Requirements for sanctuary vessels vary greatly as the program matures and on-the-water requirements increase in support of the core missions of research, monitoring, education and enforcement:

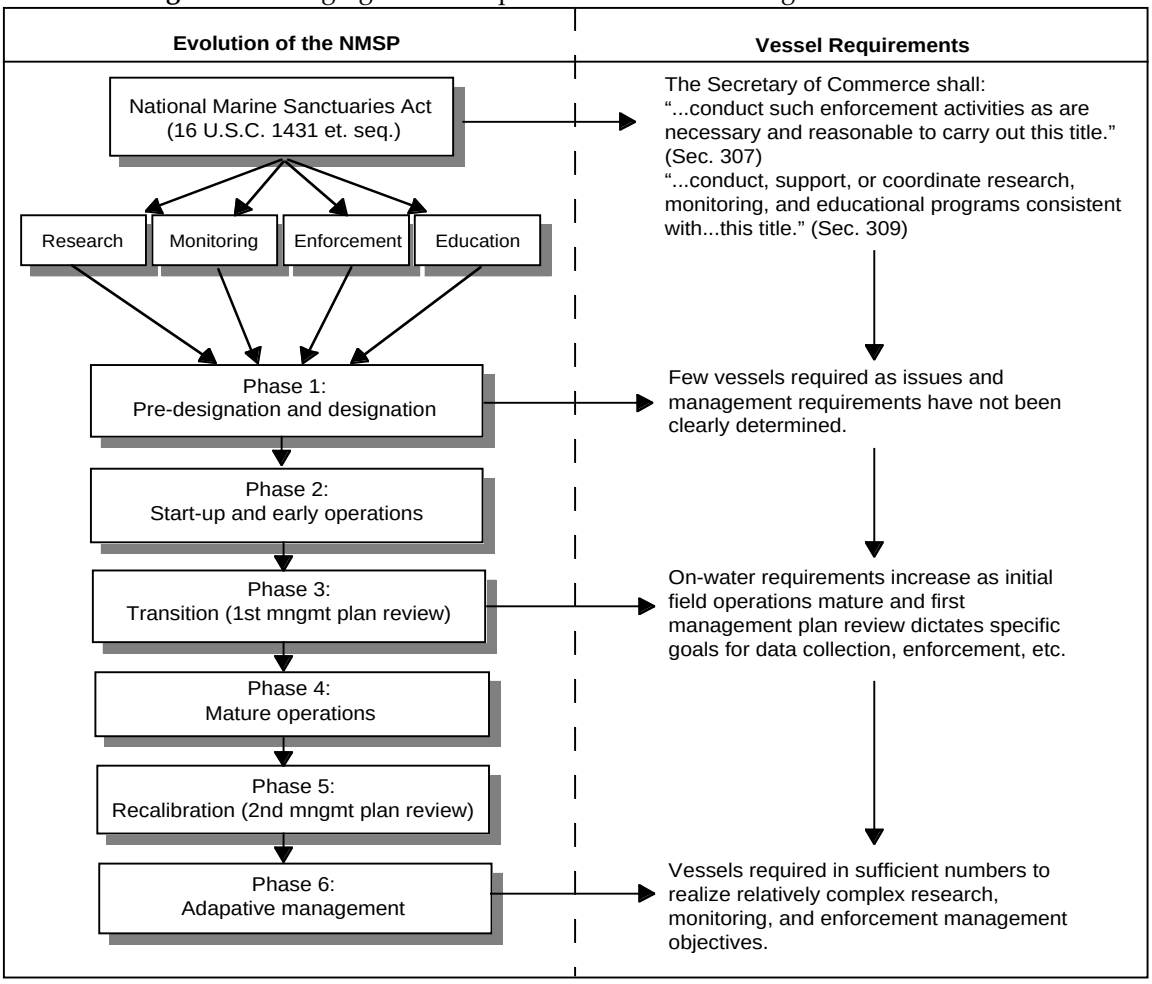
- **Phase 1 (Pre-designation and designation).** Sites are evaluated for addition to the NMS System. Extensive public involvement is used to determine what sanctuary resources and qualities are potentially at risk and how threats could best be addressed. The acquisition and use of small boats in this phase is relatively uncommon, as needs have not been clearly assessed and management priorities have yet to be established.

- **Phase 2 (Start-up and early operations).** Priorities at this stage include: 1) filling resource information gaps; 2) addressing routine management functions (such as inter-agency cooperation); 3) developing initial scientific and educational programs; 4) laying the groundwork for long-term programs and 5) gathering data to support the first management plan review (Phase 3). Smaller vessels may be acquired to support initial field research, limited monitoring, some enforcement and, perhaps, education or trips to the sanctuary for local stakeholders.

- **Phase 3 (Transition and first management plan review).** An important milestone for a site, the first management plan review marks the transition from initial "vision" to more concrete management objectives. Assisted by public input, sites seek to identify emerging issues, create measures of effectiveness for management interventions and develop specific management objectives and long-term programs. Vessels are used in this phase primarily to collect information on the status of site resources.

- **Phases 4—6 (Mature operations, second management plan review and adaptive management).** As sites mature, small boat requirements evolve in response to specific, long-term management objectives as identified through the second (and subsequent) management plan review and specific action plans. This will include relatively complex and sophisticated research, monitoring and enforcement activities requiring a substantial, on-the-water presence in order to meet pre-defined measures of effectiveness. At these stages, managers have sufficient resources to "flex" their assets in response to crises, emerging issues, or shifting priorities. Currently, Florida Keys NMS best represents what sanctuary operations might look like during these later stages of site evolution.

**Figure 6.** Changing Vessel Requirements Based on Program Evolution



**How Are Projections Made?**

Projections of future needs involve:

- Detailed and comprehensive needs assessment survey of the sites based on management documents and action plans.
- Site visits to "ground-truth" inventory and survey results.
- Review and analysis of survey results by HQ team (including NOAA Corps officers) with relevant experience and/or expertise.
- External review by experts from OMAO Small Boat Operations.

Analysis and findings based on:

- Requirements as described in existing and anticipated management plans.
- 30 years of small boat history in NMSP (particularly in Florida Keys NMS, a mature site).
- Comparative analysis of site responses (needs identified by individual sites were compared with needs identified by similar sites).
- Application of framework for program evolution as model for future system growth and development.
- Best professional judgment of experts from site, HQ and external reviewers.
- Budgetary and manpower considerations.

The forecast for future small boat use was initiated by each site via a comprehensive survey document (see example in **Appendix I**). Using their best professional judgment, sanctuary managers, vessel operators, research coordinators and other experienced site personnel estimated future trip requirements based on current and evolving missions using the evolutionary framework as a guide. Specific, detailed vessel needs grew out of this analysis, down to the exact equipment, transit time, endurance requirements, operators and—most importantly—the roles and missions requiring the new or replacement platform.

Program headquarters' staff (after further site visits and consultations) then made adjustments to these raw numbers. Factors taken into consideration included how sanctuaries adjacent or in close proximity to one another might share small boats as their programs continue to develop until new or replacement boats come on line. In addition, forecasts for sanctuaries similar in size and mission requirements were compared and adjusted to ensure forecasts fell within a reasonable range.

Finally, the review committee evaluated other budgetary and manpower issues not fully considered at the site level, as well as issues such as berthing and shore infrastructure requirements. The result was the recommended new and replacement vessel acquisition figures described in this study.

Throughout this process existing, proposed, and anticipated management plans served to guide both current needs and forecasted vessel use. Some sites also

had detailed "action plans" available for such missions as *Enforcement*, *Education and Outreach*, *Research and Monitoring* and *Infrastructure Maintenance*. These comprehensive management documents (both existing and anticipated) provided a sound basis for forecasting vessel use, grounded firmly in the management requirements of the National Marine Sanctuary Act, with input and participation from the public, local experts, professional managers and advisory councils.

For sites currently lacking such specifics, FKNMS provided a useful "yardstick" by which they might estimate future requirements. Because of its long management history, FKNMS has a very comprehensive management plan containing detailed action plans for ten key missions. Many other sites currently are in the management plan review process and are creating similarly detailed action plans based on the experience gained from early years of management; other sites will be undergoing the management plan review process shortly. In these cases, when existing plans of this detail were unavailable, the FKNMS experience served as a valuable guide for establishing initial requirements. These needs will be further "calibrated" once new management plans are approved and in place.

## *Forecast Small Boat Use: FY2003—FY2013*

Based on the analysis described above, it is predicted that by FY2013 nearly 3,000 additional trips a year will be required to meet management demands (see **Tables 4** and **5**). Most of these (58 percent) are expected to support full-day operations, with more modest increases expected in half-day, overnight and short duration excursions. More than half of these additional trips—nearly 1,500 a year—will be supporting sanctuary enforcement, with research comprising almost half of the remainder. Smaller increases are expected in education, monitoring, and trips for other purposes. Many of these forecast trips (1,336) are expected to require the services of Type II boats, with the difference fairly evenly divided between the other vessel classes. Larger Type III vessels are expected to be required for an additional 879 trips a year, mostly for extended research and monitoring missions.

## *Comparison of Existing and Forecast Use*

Comparing existing vessel usage with forecast use indicates a sharp increase in requirements over the next ten years, particularly in full-day enforcement and research operations (see **Figures 7** through **9**). The largest requirement increase by far is for enforcement. These critical missions are predicted to increase significantly: from 1,074 a year to nearly 2,500. Another cornerstone of sanctuary operations—research—is forecast to significantly increase: from 890 a year to 1,600. This need currently exists but is unattainable given the small numbers of adequate boats available to support contemporary research methods and is only now being partially met through the use of charters. Another notable trend is the requirement for overnight operations (currently only 60 a year). The present inventory of Type III vessels (those best suited to support such multi-day missions) will clearly not be able to cover the 455 yearly trips forecast for FY2013.

**Table 4.** Summary of Forecast Increase in Small Boat Usage of All Sites by Season

| Category | Average Trips per Season | | | | Average Trips per Year | |
|---|---|---|---|---|---|---|
| | Spring | Summer | Fall | Winter | Total | Percent of Total |
| **Trip Duration** | | | | | | |
| 0 – 2 hour(s) | 15 | 23 | 20 | 12 | **70** | **2.4** |
| 2 hrs – Half-day | 176 | 220 | 156 | 138 | **690** | **23.5** |
| Full Day | 435 | 483 | 458 | 344 | **1,720** | **58.6** |
| Overnight | 84 | 131 | 140 | 100 | **455** | **15.5** |
| Totals | 710 | 857 | 774 | 594 | **2,935** | **100.0** |
| **Trip Type** | | | | | | |
| Enforcement | 445 | 469 | 302 | 277 | **1,493** | **50.9** |
| Research | 78 | 214 | 222 | 196 | **710** | **24.2** |
| Monitoring | 65 | 92 | 87 | 18 | **262** | **8.9** |
| Education | 69 | -14 | 94 | 45 | **194** | **6.6** |
| Other | 53 | 96 | 69 | 58 | **276** | **9.4** |
| Totals | 710 | 857 | 774 | 594 | **2,935** | **100.0** |

**Table 5.** Summary of Forecast Increase in Small Boat Usage for All Sites by Vessel Type

| Category | Average Trips per Vessel Type | | | Average Trips per Year | |
|---|---|---|---|---|---|
| | I (0’ – 29’) | II (30’ – 50’) | III (50’ +) | Total Trips/Year | Percent of Total |
| **Trip Duration** | | | | | |
| 0 – 2 hour(s) | 75 | -5 | 0 | **70** | **2.4** |
| 2 hrs – Half-day | 547 | 104 | 39 | **690** | **23.5** |
| Full Day | 88 | 1,133 | 499 | **1,720** | **58.6** |
| Overnight | 10 | 104 | 341 | **455** | **15.5** |
| Totals | 720 | 1,336 | 879 | **2,935** | **100.0** |
| **Trip Type** | | | | | |
| Enforcement | 500 | 726 | 267 | **1,493** | **50.9** |
| Research | 87 | 231 | 392 | **710** | **24.2** |
| Monitoring | 72 | 70 | 120 | **262** | **8.9** |
| Education | -11 | 132 | 73 | **194** | **6.6** |
| Other | 72 | 177 | 27 | **276** | **9.4** |
| Totals | 720 | 1,336 | 879 | **2,935** | **100.0** |

**Figure 7.** Comparison of Existing and Forecast Requirements by Trip Duration

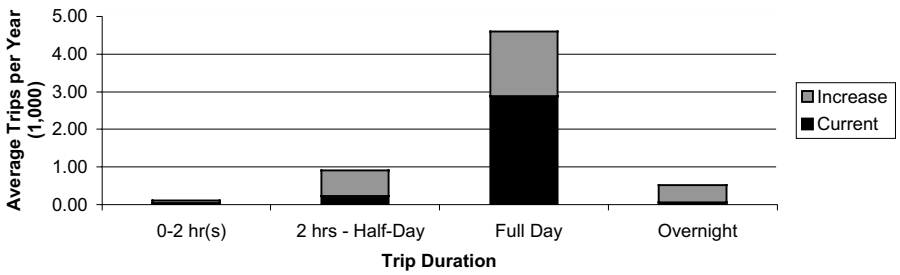



**Figure 8.** Comparison of Existing and Forecast Requirements by Trip Type

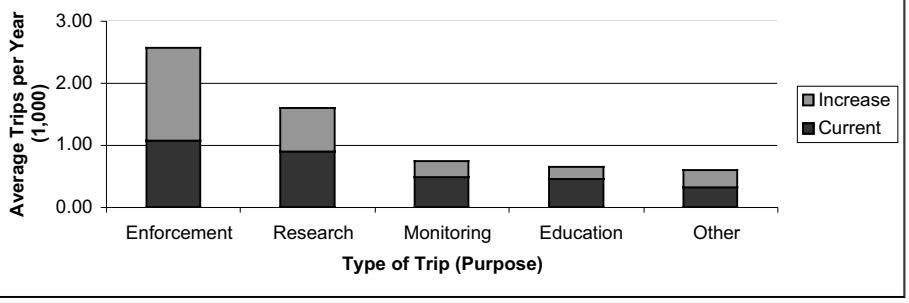
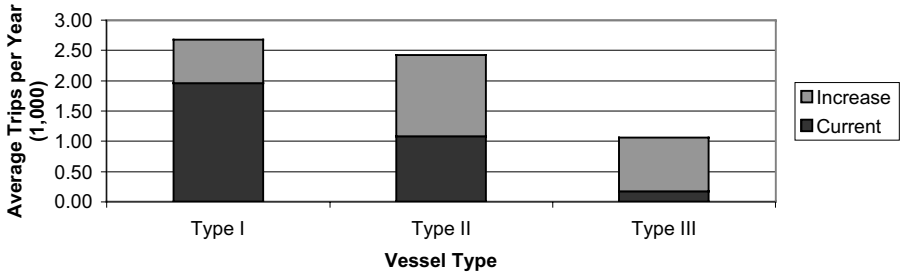



**Figure 9.** Comparison of Existing and Forecast Requirements by Vessel Type




## *Forecast Vessel Acquisitions*

**Table 6** summarizes projected acquisitions of new vessels and the replacement of existing vessels over the next 10 years based on forecast vessel demand as determined by sites and analyzed through the process described above. A total of 21 new and 16 replacement vessels of various classes are the anticipated mix which will meet these needs. As previously noted, this represents a starting point based on current projections. As sites continue to progress through the management plan review process and the "evolutionary framework," the numbers and composition of this fleet may change in response to newly identified and clarified management responsibilities. Therefore, these forecast requirements represent only a starting point and will be "calibrated" in the future as additional information is realized.

New acquisitions were prioritized using current usage and the program evolutionary framework as primary guides. Those sites with the most glaring gap between need and existing capability are the first to receive new assets. Sites currently sharing vessels out of necessity when the need for an additional vessel is clearly demonstrated are also priority fills. Vessels marked for replacement were selected based on their material condition, remaining useful life, cost effectiveness and ability to continue to conduct their mission for the sanctuary safely and efficiently. In some cases, if the situation warrants, a replacement vessel will take the place of an older vessel of a different vessel type.

**Table 6.** Forecast Vessel Acquisitions: FY2003—FY2013[1]

| Sanctuary | Existing | | | Vessel Requirements FY03 – FY13 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | New | | | Replacement | | |
| | I | II | III | I | II | III | I | II | III |
| Stellwagen Bank | 1 | 1 | | | 1 | | 1 | 1 | |
| Monitor | | | | | | | | | |
| Gray's Reef | | 2 | | | 2 | | 1[3] | | |
| Florida Keys (Upper) | 8 | 6 | 1 | 5 | | | 2 | | |
| Florida Keys (Lower) | 6 | 4 | 4 | 2 | | | 2 | 2 | 1 |
| Flower Garden Banks | | | 1 | | 1 | | | | 1 |
| Channel Islands | 1 | | | 2 | 2 | | 1 | | |
| Monterey Bay | 1 | | | | | 1 | 1 | | |
| Gulf of the Farallones[2] | 1 | 1 | | | 1 | | | | |
| Cordell Bank[2] | | | | | | | | 1 | |
| Olympic Coast | 1 | 1 | | | | | 1 | 1 | |
| Hawaiian Humpback Whale | 1 | | | | 1 | | | | |
| Thunder Bay | | | | | 1 | | | | |
| Fagatele Bay | | | | | 1 | | | | |
| Northwestern Hawaiian Islands[4] | | 1 | | | | 1 | | | |
| **TOTAL** | **20** | **16** | **6** | **9** | **10** | **2** | **9** | **5** | **2** |

[1] Based on analysis from the "NMSP Small Boat Survey"
[2] Cordell Bank and Gulf of the Farallones NMS share existing assets. CBNMS's "replacement" will actually be its first boat of its own.
[3] Vessel will replace existing Type II
[4] Site undergoing designation process

# V. Estimating Funding and Other Requirements

To generate funding requirements, cost estimates were made for four categories: 1) capital costs; 2) operations and maintenance (O&M); 3) mooring and facilities requirements and 4) personnel. Specific factors considered by each cost category are described below. In general, once a series of factors was decided upon, a "high" and "low" cost estimate was generated. The mean (average) of these estimates was then used as the final, "best" estimate.

## *Definitions*

**Capital Costs.** Capital costs are one-time acquisition and outfitting costs by vessel size and defined by characteristics such as engine type, hull type, accommodations and deck equipment. Length, width and draft are usually the basis for estimating costs of vessels; this document will also consider hull material (fiberglass and aluminum) and hull design (monohull or catamaran).

Although NMSP vessels can potentially be used for meeting any sanctuary need, vessel design and acquisition was based on the two primary missions which represent the bulk of on-the-water hours—enforcement and research—because the needs of these two missions requires two different platform types. Enforcement missions generally look to high-speed and maneuverability on a smaller platform (i.e., Type I vessel). Research and monitoring vessels require a stable working deck, enough space for labs and, perhaps, berthing capabilities as well as adequate range and endurance to cover all sanctuary grounds (Type II and III vessels). All program vessels should offer some diving capability irrespective of size.

The range of costs for each size vessel is based primarily on design and construction materials. Although some older wood and steel vessels exist in the current inventory, future acquisitions will consider only fiberglass and aluminum due to the superior performance, durability, strength and speed achievable with these materials. In most cases, fiberglass is only considered for smaller Type I vessels where the specific use and cost makes fiberglass more practical. To maximize return on investment (ROI), new Type II and Type III vessels will largely consider aluminum because of its superior performance, long life and structural integrity.

**Operational and Maintenance Costs.** Operational costs are based on the actual costs of operating a vessel of each Type based on fuel expense and the number of hours per year these vessels have operated. Other incidental costs factored into operational costs includes oil, first aid equipment, foul weather gear and some habitability items (as well as their maintenance). In larger vessels, operational costs might include charts and navigation devices as well as consumables for the galley and head.

Maintenance costs are based on size of vessel and operating hours. For smaller vessels, the operator and mechanic can do most routine cleaning and inspections. For these vessels, a local boat shop performs contract work such as tune-ups and over-hauls. Larger Type II and Type III vessels have more complex equipment and operate (on average) more hours per year. These vessels require regular hands-on checks by the vessel staff. The man-hours for these vessels are directly related to the size and complexity of their on board systems. As vessels' scientific equipment complement increases, so does the required number of man-hours to maintain that equipment. For example, a hydraulic winch and A-frame/J-frame on a Type II vessel may only require random inspection and hose replacement. A Type III vessel may include a full A-frame with oceanographic winch with conducting wire and remote read-outs. Larger vessels are more likely to carry auxiliary engines for generators and compressors, as well as a small boat with hydraulic crane. Their costs increase accordingly and are reflected here.

**Mooring and Facilities.** Every vessel program needs to consider the facility and manner in which the vessels are or will be moored. This will vary greatly, depending on the size of the vessel. For example, a Type I vessel approximately 20 feet long might be kept on a suitable trailer not far from a boat ramp. On the other hand, a Type III vessel displacing approximately 50 tons not only needs a dedicated slip, but must also have support services such as power, water and equipment storage. In this study, mooring and facility costs consider the following for each vessel type:

- Renting or owning a protected slip or mooring at an appropriately sited marina.
- Trailer and foul-weather storage for smaller vessels.
- For larger vessels, appropriate on-site office, workshop and maintenance space.
- Maintenance and upkeep of the waterfront facilities, moorings, etc.

**Personnel Requirements.** Currently, small boat personnel are a mix of Full-Time Equivalent (FTE) positions and contractors. This combination is expected to continue in the future. In the long term, FTEs will be used when justified and are preferred because the investment made in training, as well as experience, can reap many benefits over the long haul with subsequent (and considerable) increases in safety, continuity and reliability. However, in the short term, contractors probably represent the most immediate solution. This analysis considered a range of personnel mixes and options projecting cost ranges over the next decade.

In addition, there is a desire on the part of the NMSP to integrate more NOAA Corps personnel into the program, particularly junior officers completing their first sea tours. This might provide a challenging professional opportunity for these individuals as well as allowing the NMSP to benefit from their training and experience. OMAO has indicated that for the near future, it is not well placed to provide additional uniformed personnel to the small boat fleet. However, this

partnership would probably benefit both offices tremendously and is an opportunity worth exploring as the program further develops.

Personnel costs take several factors into consideration based on the size of the vessel and include the following:

**Vessel Operators**. For smaller Type I vessels, the operator will normally have passed a boat-handling course and have demonstrated a responsible attitude and years of experience with small boats. For large vessels where the number of potential passengers increases as well as the complexity of the mission, the operator likely holds a Coast Guard license or is a bridge- certified commissioned officer. In the case of Type III vessels, all operators are either licensed civilian masters or NOAA Corps officers.

**Crew**. A crewmember on any vessel is specifically assigned to assist the operator with the operation of the vessel and completion of the sanctuary mission. For smaller Type I vessels, crew requirements will be determined by the complexity of the operation or potential for severe conditions. In the case of large Type II vessels, a crewmember is considered part of the operational complement and may require specific certifications. For Type III vessels, the crewmember may be a mate capable of operating all equipment on board the vessel.

**Maintenance Staff**. The maintenance staff for all vessels are responsible for the upkeep, inspection and maintenance of engineering equipment, deck equipment and other systems such as electrical or plumbing. For Type I vessels only, it is assumed that the operator can receive appropriate training from the engine manufacturer to maintain and troubleshoot the engine. In the case of larger Type II and Type III vessels, the maintenance person is probably an experienced mechanic who is required to receive regular training to properly maintain the engineering equipment and other associated systems on the vessel. Many Type III vessels, due to their complex equipment, require an engineer to either maintain the vessel during imports or while the vessel is underway.

## *Analysis of Specifications*

As previously mentioned, surveys of existing sanctuary vessels as well as the goal to standardize (as much as possible) vessel types and requirements led the program to divide the fleet into three general boat categories: Types I, II and III. These categorizations are based largely on size. However, boats of the same type also share other characteristics in terms of outfitting, powerplant, personnel, support and maintenance requirements. These range from the minimally equipped, easily maintained Type I boats to relatively large, sophisticated Type IIIs. Vessels of the same type also share an additional characteristic: cost. The purchase price of a new Type I boat ranges from $75,000 to $175,000, while a fully-outfitted Type III vessel may top $1.5 million. **Table 7** shows the analysis specifications and assumptions used to estimate overall costs. This table also allows alternative scenarios of vessel requirements to be analyzed and to

routinely calibrate estimates as new data becomes available and are worked into this table.

**Table 7.** Analysis Specifications by Vessel Type

| | | Type I | Type II | Type III |
|---|---|---|---|---|
| **Acquisition Specifications** | **Construction** | Fiberglass | Fiberglass / Aluminum | Aluminum |
| | **Characteristics/ Equipment** | - Dive platform<br>- High-speed<br>- Canopy/small cabin | - Dive platform and ladder<br>- J-frame or A-frame<br>- Winch<br>- High-speed<br>- Full cabin | - Dive platform with ladder<br>- Full A-frame<br>- Oceanographic winch<br>- Small boat/crane<br>- High speed/endurance<br>- Crew quarters/galley<br>- Wet/dry lab space |
| | **Cost Range** | $75K – $175K | $200K – $500K | $750K – $1500K |
| | | | | |
| **Operations and Maintenance** | **Powerplant** | Twin outboard engines (100 hp avg.) | Twin inboard diesels | Twin inboard diesels + Auxiliary gen. Set |
| | **Fuel Usage** | 15 gal/hr | 20 gal/hr | 30 gal/hr |
| | **Annual Use** | 1000 hr/yr | 1500 hr/yr | 1500 hr/yr |
| | **Operations Cost** | $15K/yr | $35K/yr | $70K/yr |
| | **Maintenance:** | | | |
| | **Operator** | 20 man hours/yr | 80 man hours/yr | 100 man hours/yr |
| | **Mechanic** | N/A | 100 man hours/yr | 150 man hours/yr |
| | **Boat Yard** | $10K/yr (boat shop) | $25K/yr | $40K/yr |
| | **Other** | Operator maintained | Haul-out and repair | Haul-out and overhaul |
| | **Cost Range** | $15K – $35K | $45K – $75K | $80K – $100K |
| | | | | |
| **Mooring and Facilities** | **Mooring Facility** | Trailer/boat ramp | Pier or trailer | Pier w/power |
| | **Seasons Required** | Seasonal usage | Extended season | Year-round |
| | **Capital Required** | N/A | Rent / own | Owned |
| | **Vessel Storage** | Yard / canvas | Yard / warehouse | In-water |
| | **Buildings** | N/A | Office | Office & workshop |
| | **Maintenance** | N/A | Minimal upkeep | Berth upkeep / power |
| | **Cost Range** | $3K – $6K | $7K – $9K | $10 – $12K |
| | | | | |
| **Personnel Requirements** | **Operator** | Boat Course Training | Licensed Captain | Commissioned Officer/ Licensed Captain |
| | **Crew** | N/A | Assistant / mechanic | Mate |
| | **Maintenance Staff** | Local boat shop | N/A | Engineer / mechanic |
| | **Operations Staff** | N/A | Manager / supervisor | Operations supervisor |
| | **Cost Range** | $25K – $35K | $80K – $110K | $120K – $180K |

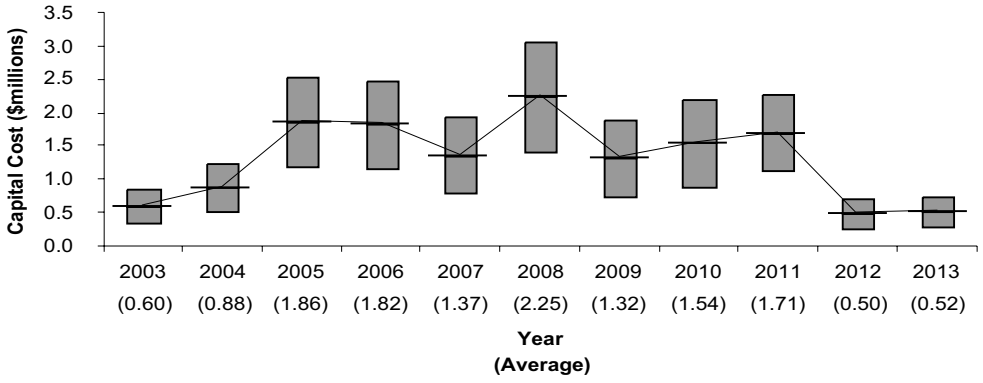
# VI. Funding Requirements: FY2003—FY2013

The summaries below show the capital investment, operations and maintenance, mooring and facilities and personnel costs over the next ten years. These are mean estimated costs and assume a 4 percent annual inflation rate (the figure bars represent the high/low range of each yearly estimate). Capital funding costs are one-time expenses to purchase new hardware; the remaining requirements (personnel, O&M and facilities) are yearly to support ongoing operations.

## *Capital Funding Requirements*

Capital funding costs are essentially one-time costs towards the purchase of new vessels. The capital investment over the next decade required to fund the small boat requirements outlined in this study vary from year to year based on the specific vessel type requirements (see **Figure 10**). Capital investment is initially $0.6M in FY2003, rises to a peak of $2.25M in FY2008 and declines to around $0.5M by FY2013. Cumulatively, $14.4M is required to acquire the 37 new and replacement vessels needed to meet anticipated requirements over that period.

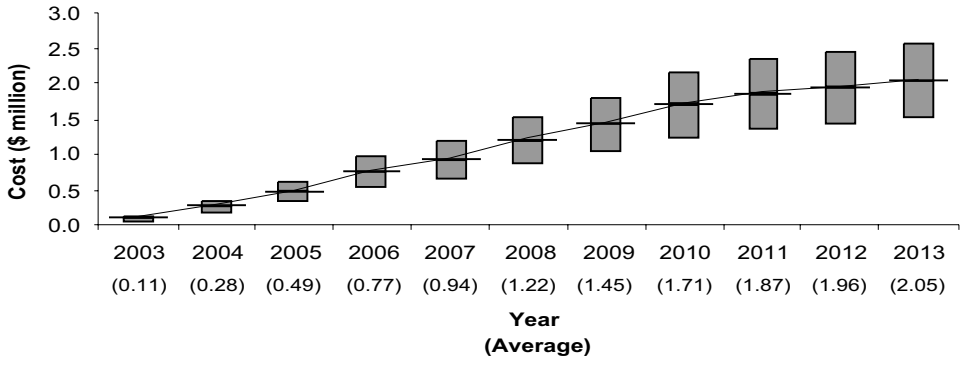
**Figure 10.** Capital Cost of New and Replacement Vessels by Year




## *O&M Funding Requirements*

Operations and maintenance investment over the same period will rise continuously as new vessels are added to the fleet. **Figure 11** shows the estimated cumulative cost of operating these new and replacement boats; these figures account for a 4 percent yearly rise in inflation. Annual O&M costs will range from $0.1M in FY2003 (when three new vessels come online) to just over $2.0M in FY2013 when all 37 proposed vessels have been acquired. This funding level will have to be maintained past FY2013 to support continued operations.

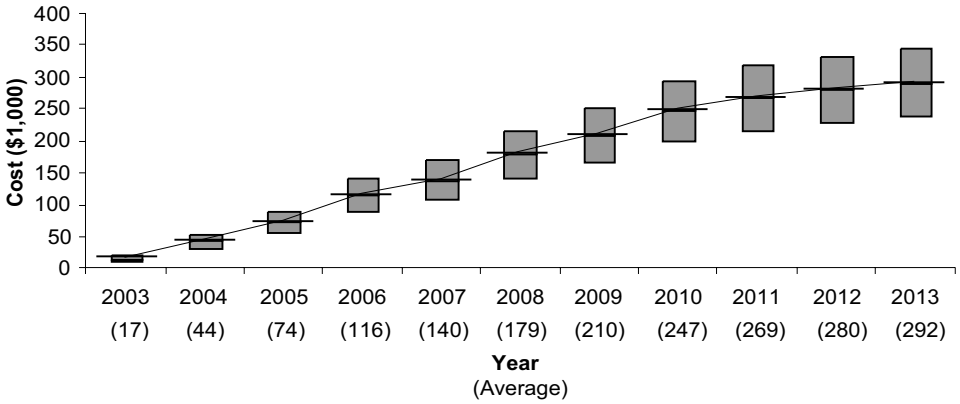
**Figure 11.** Cumulative Operations and Maintenance Cost for New and Replacement Vessels




## *Mooring and Facilities Requirements*

**Figure 12** shows the estimated mooring and facilities requirements over the next ten years based on the needs of the proposed vessels. These are cumulative costs driven by the addition of new vessels. Costs will begin at around $17,000 in FY2003, rising steadily until reaching nearly $300,000/year in FY2013.

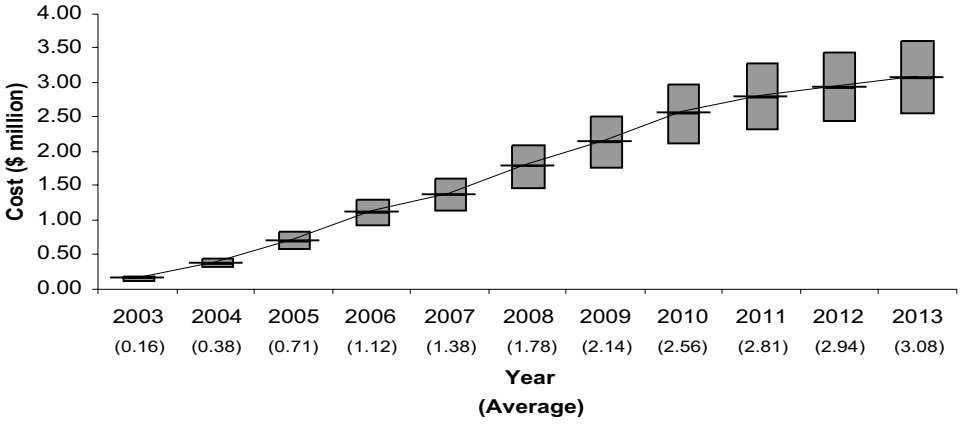
**Figure 12.** Mooring and Facilities Investment Over Time




## *Personnel Considerations*

Cumulative personnel costs will also increase steadily with the acquisition of new vessels (see **Figure 13**). Initial personnel costs will be $0.2M in FY2003, rising to a peak of approximately $3.0M/year in FY2013. Forecasting the exact number of personnel is tricky. Maintenance personnel might be shared across boats, for instance, and NOAA Corps officers used in place of contractors and other personnel. The range presented below, as with the other estimates, best represents the most likely options. As for personnel numbers, based on the number of new boats required, it is assumed some 24 new positions (14 operators and crew; 10 mechanics) will be needed over the ten-year period.

**Figure 13.** Personnel Investment over Time



# VII. Conclusion

The mission of the National Marine Sanctuary Program requires a commitment from site personnel to be *on the water*. Whether the objective is monitoring and protecting these ecosystems and cultural resources, educating the public to build appreciation and understanding of their marine environment, responding to an accident or emergency, or researching the coastal processes that make these places special, it is crucial that the means are readily available to ensure that the managers, scientists and researchers can properly perform their duties and that the public have the opportunity to visit these unique underwater parks.

Results of this strategic analysis indicate that this requirement is currently not being met. Furthermore, given the program's increasing responsibilities and growing geographic scope, this gap can be expected to significantly widen over the next ten years if no action is taken. This study represents a proactive first step in the development of a plan to prevent this from occurring. $14.4 million in new construction funding over the next decade—enough to purchase 21 new and 16 replacement vessels—is proposed to meet anticipated on-the-water requirements as they are now estimated. A cumulative total of $14.5 million will be required over the same period to provide for the O&M costs for these vessels. Regarding estimates, the following points should be made:

- **Requirements**. Small boat requirements are based on actual and projected enforcement, research, education and monitoring requirements as dictated by existing management plans and anticipated future demands. These requirements recognize the maturing scale and scope of the entire program and are the result of estimated increase expectations in the dramatic, overall growth of NMSP budgets.

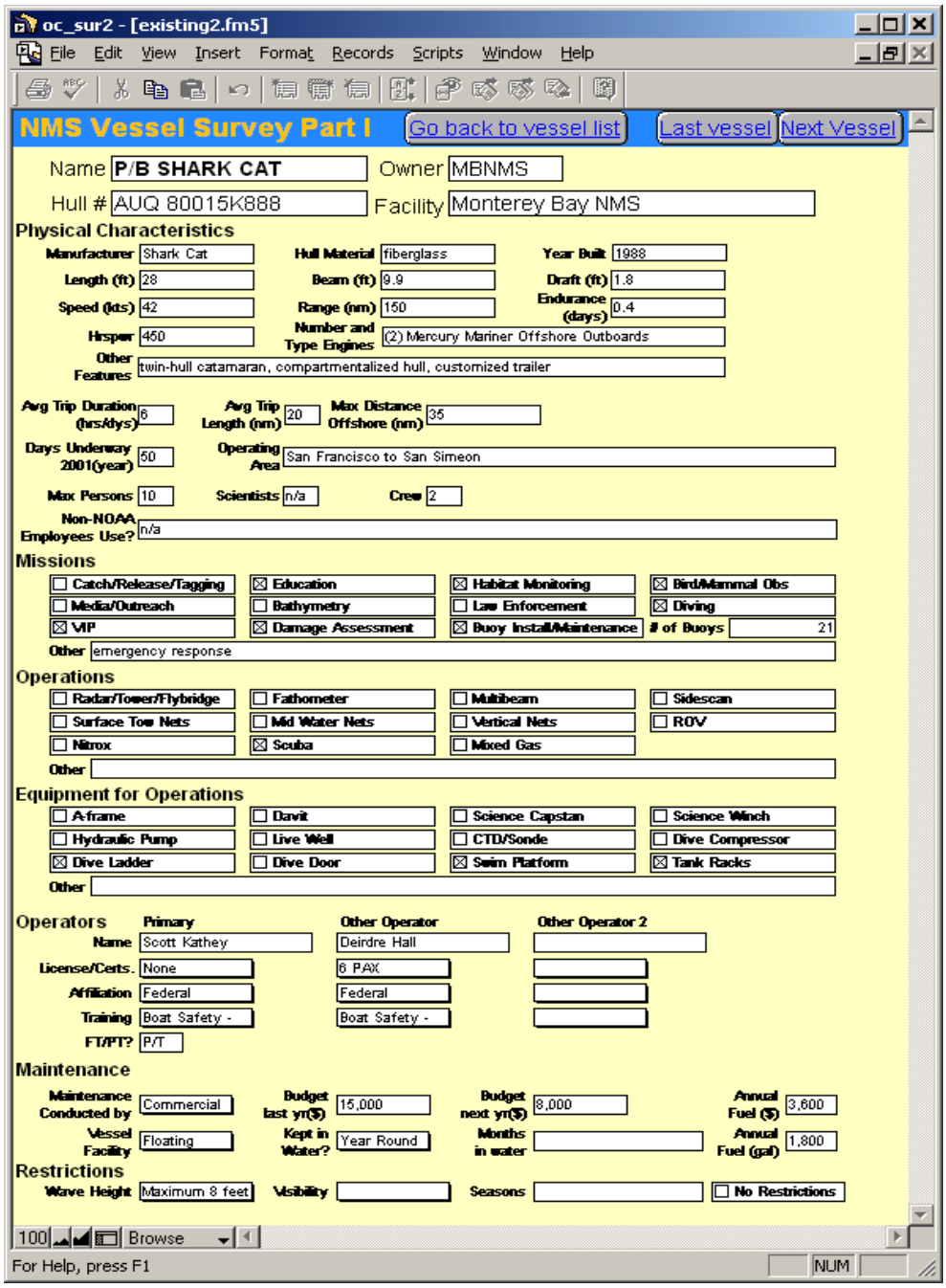
- **Conservative Estimates**. The cost estimates used throughout this study are considered "conservative" and have been thoroughly investigated. Good data exists to support the high and low costs in every category; the average value is cited throughout to ensure fair representation. If anything, true costs may be understated.

- **Timing Issues**. The timing of new fleet acquisitions is based on a ten-year plan that is consistent with the program's site development schedule as well as current and anticipated management requirements. This schedule is the current driving force behind the entire program's evolution. Plans are to revisit this schedule annually to ensure a continuous calibration of program requirements.

The NMSP will be 30 years old this year. The last three decades have seen vast changes in the scope, nature and breadth of the program. As it continues to mature and grow, it follows that a well-developed, strategic plan for small boat operations should be developed and funded to allow the program to meet its many obligations as steward for our nation's underwater treasures.

# Appendix I

The following pages contain a partial electronic survey response from Monterey Bay NMS. Part I gathers data on an existing site vessel. Part II (2 pages) captures currently unmet needs and future site requirements. Note that trip data was only generally collected here; a separate process (including review of vessel logs) was used to collect exact trip figures.



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File Edit View Insert Format Records Scripts Window Help

**NMS Vessel Survey Part I** | Go back to vessel list | Last vessel | Next Vessel

Name: P/B SHARK CAT | Owner: MBNMS

Hull #: AUQ 80015K888 | Facility: Monterey Bay NMS

**Physical Characteristics**

| | | | | | |
|---|---|---|---|---|---|
| Manufacturer | Shark Cat | Hull Material | fiberglass | Year Built | 1988 |
| Length (ft) | 28 | Beam (ft) | 9.9 | Draft (ft) | 1.8 |
| Speed (kts) | 42 | Range (nm) | 150 | Endurance (days) | 0.4 |
| Hrspwr | 450 | Number and Type Engines | (2) Mercury Mariner Offshore Outboards | | |
| Other Features | twin-hull catamaran, compartmentalized hull, customized trailer | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Avg Trip Duration (hrs/dys) | 6 | Avg Trip Length (nm) | 20 | Max Distance Offshore (nm) | 35 |
| Days Underway 2001(year) | 50 | Operating Area | San Francisco to San Simeon | | |
| Max Persons | 10 | Scientists | n/a | Crew | 2 |
| Non-NOAA Employees Use? | n/a | | | | |

**Missions**

| | | | | |
|---|---|---|---|---|
| ☐ Catch/Release/Tagging | ☒ Education | ☒ Habitat Monitoring | ☒ Bird/Mammal Obs | |
| ☐ Media/Outreach | ☐ Bathymetry | ☐ Law Enforcement | ☒ Diving | |
| ☒ VIP | ☒ Damage Assessment | ☒ Buoy Install/Maintenance | # of Buoys | 21 |
| Other | emergency response | | | |

**Operations**

| | | | |
|---|---|---|---|
| ☐ Radar/Tower/Flybridge | ☐ Fathometer | ☐ Multibeam | ☐ Sidescan |
| ☐ Surface Tow Nets | ☐ Mid Water Nets | ☐ Vertical Nets | ☐ ROV |
| ☐ Nitrox | ☒ Scuba | ☐ Mixed Gas | |
| Other | | | |

**Equipment for Operations**

| | | | |
|---|---|---|---|
| ☐ A-frame | ☐ Davit | ☐ Science Capstan | ☐ Science Winch |
| ☐ Hydraulic Pump | ☐ Live Well | ☐ CTD/Sonde | ☐ Dive Compressor |
| ☒ Dive Ladder | ☐ Dive Door | ☒ Swim Platform | ☐ Tank Racks |
| Other | | | |

**Operators**

| | Primary | Other Operator | Other Operator 2 |
|---|---|---|---|
| Name | Scott Kathey | Deirdre Hall | |
| License/Certs. | None | 6 PAX | |
| Affiliation | Federal | Federal | |
| Training | Boat Safety - | Boat Safety - | |
| FT/PT? | P/T | | |

**Maintenance**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Maintenance Conducted by | Commercial | Budget last yr($) | 15,000 | Budget next yr($) | 8,000 | Annual Fuel ($) | 3,600 |
| Vessel Facility | Floating | Kept in Water? | Year Round | Months in water | | Annual Fuel (gal) | 1,800 |

**Restrictions**

| | | | | | |
|---|---|---|---|---|---|
| Wave Height | Maximum 8 feet | Visibility | | Seasons | ☐ No Restrictions |

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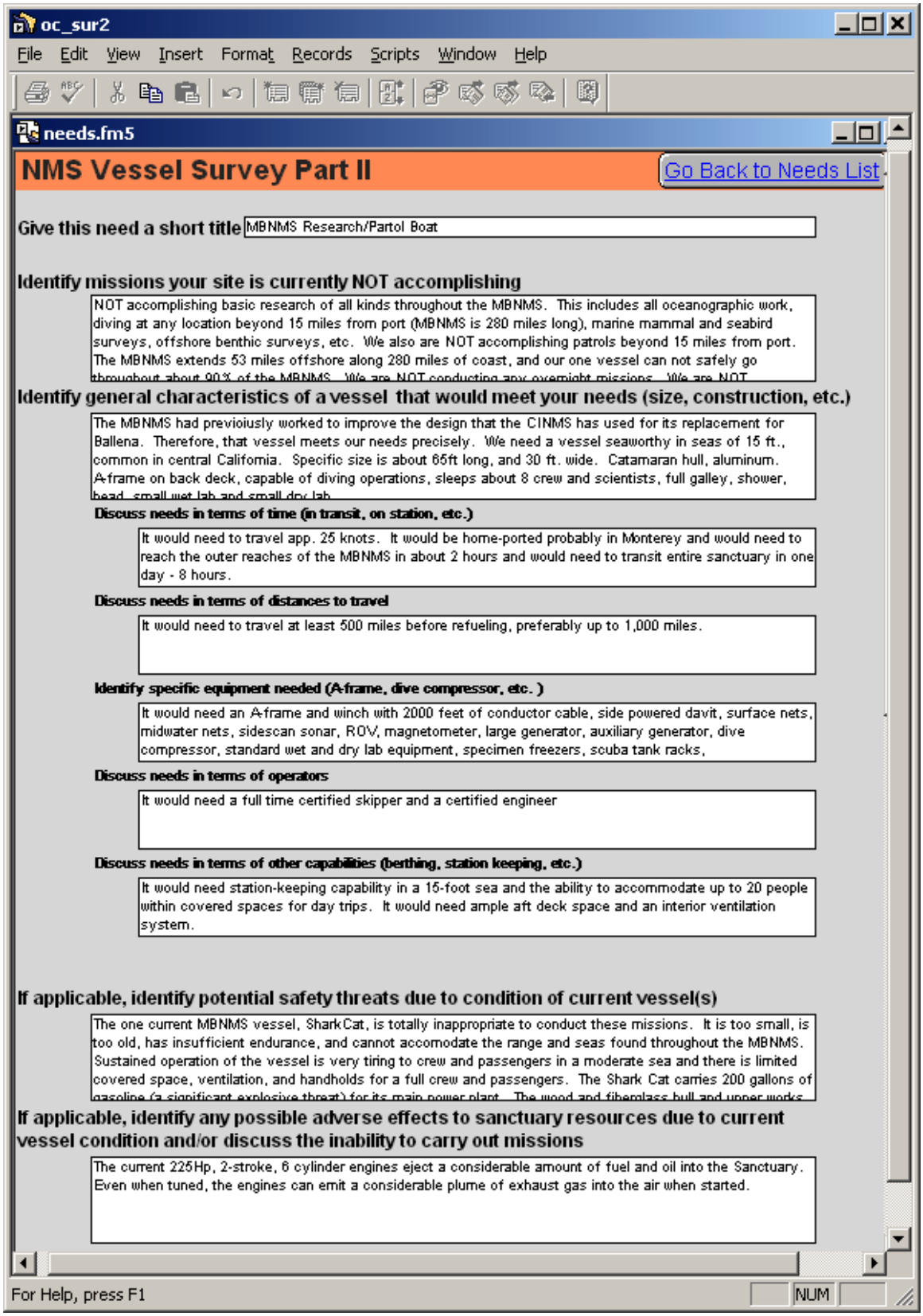
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needs.fm5
NMS Vessel Survey Part II
Go Back to Needs List
Give this need a short title
MBNMS Research/Partol Boat
Identify missions your site is currently NOT accomplishing
NOT accomplishing basic research of all kinds throughout the MBNMS. This includes all oceanographic work, diving at any location beyond 15 miles from port (MBNMS is 280 miles long), marine mammal and seabird surveys, offshore benthic surveys, etc. We also are NOT accomplishing patrols beyond 15 miles from port. The MBNMS extends 53 miles offshore along 280 miles of coast, and our one vessel can not safely go throughout about 90% of the MBNMS. We are NOT conducting any overnight missions. We are NOT
Identify general characteristics of a vessel that would meet your needs (size, construction, etc.)
The MBNMS had previoiusly worked to improve the design that the CINMS has used for its replacement for Ballena. Therefore, that vessel meets our needs precisely. We need a vessel seaworthy in seas of 15 ft., common in central California. Specific size is about 65ft long, and 30 ft. wide. Catamaran hull, aluminum. A-frame on back deck, capable of diving operations, sleeps about 8 crew and scientists, full galley, shower, head, small wet lab and small dry lab
Discuss needs in terms of time (in transit, on station, etc.)
It would need to travel app. 25 knots. It would be home-ported probably in Monterey and would need to reach the outer reaches of the MBNMS in about 2 hours and would need to transit entire sanctuary in one day - 8 hours.
Discuss needs in terms of distances to travel
It would need to travel at least 500 miles before refueling, preferably up to 1,000 miles.
Identify specific equipment needed (A-frame, dive compressor, etc. )
It would need an A-frame and winch with 2000 feet of conductor cable, side powered davit, surface nets, midwater nets, sidescan sonar, ROV, magnetometer, large generator, auxiliary generator, dive compressor, standard wet and dry lab equipment, specimen freezers, scuba tank racks,
Discuss needs in terms of operators
It would need a full time certified skipper and a certified engineer
Discuss needs in terms of other capabilities (berthing, station keeping, etc.)
It would need station-keeping capability in a 15-foot sea and the ability to accommodate up to 20 people within covered spaces for day trips. It would need ample aft deck space and an interior ventilation system.
If applicable, identify potential safety threats due to condition of current vessel(s)
The one current MBNMS vessel, SharkCat, is totally inappropriate to conduct these missions. It is too small, is too old, has insufficient endurance, and cannot accomodate the range and seas found throughout the MBNMS. Sustained operation of the vessel is very tiring to crew and passengers in a moderate sea and there is limited covered space, ventilation, and handholds for a full crew and passengers. The Shark Cat carries 200 gallons of gasoline (a significant explosive threat) for its main power plant. The wood and fiberglass hull and upper works
If applicable, identify any possible adverse effects to sanctuary resources due to current vessel condition and/or discuss the inability to carry out missions
The current 225Hp, 2-stroke, 6 cylinder engines eject a considerable amount of fuel and oil into the Sanctuary. Even when tuned, the engines can emit a considerable plume of exhaust gas into the air when started.
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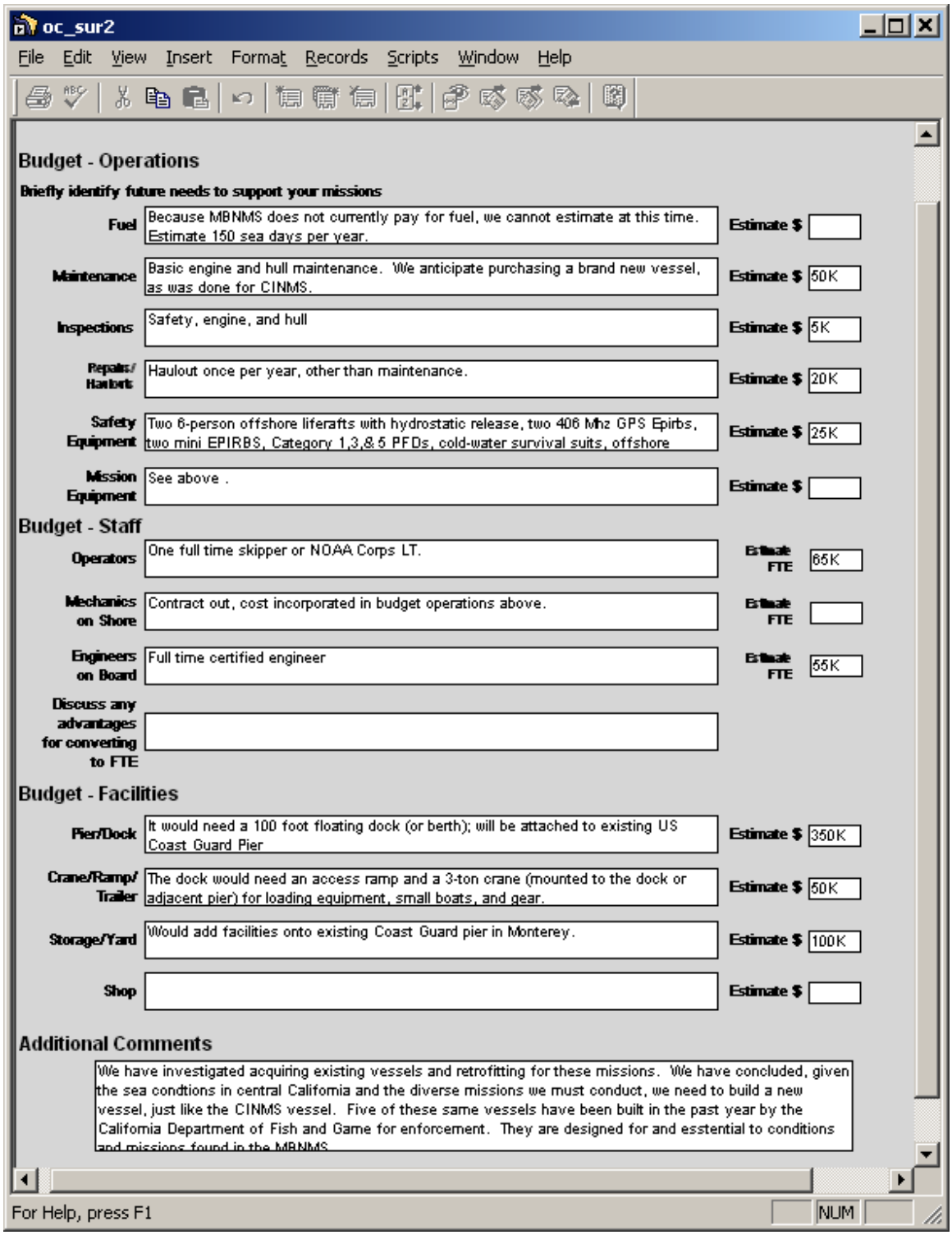
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Budget - Operations
Briefly identify future needs to support your missions
Fuel
Because MBNMS does not currently pay for fuel, we cannot estimate at this time. Estimate 150 sea days per year.
Estimate $
Maintenance
Basic engine and hull maintenance. We anticipate purchasing a brand new vessel, as was done for CINMS.
Estimate $ 50K
Inspections
Safety, engine, and hull
Estimate $ 5K
Repairs/ Haulouts
Haulout once per year, other than maintenance.
Estimate $ 20K
Safety Equipment
Two 6-person offshore liferafts with hydrostatic release, two 406 Mhz GPS Epirbs, two mini EPIRBS, Category 1,3,& 5 PFDs, cold-water survival suits, offshore
Estimate $ 25K
Mission Equipment
See above .
Estimate $
Budget - Staff
Operators
One full time skipper or NOAA Corps LT.
Estimate FTE 65K
Mechanics on Shore
Contract out, cost incorporated in budget operations above.
Estimate FTE
Engineers on Board
Full time certified engineer
Estimate FTE 55K
Discuss any advantages for converting to FTE
Budget - Facilities
Pier/Dock
It would need a 100 foot floating dock (or berth); will be attached to existing US Coast Guard Pier
Estimate $ 350K
Crane/Ramp/ Trailer
The dock would need an access ramp and a 3-ton crane (mounted to the dock or adjacent pier) for loading equipment, small boats, and gear.
Estimate $ 50K
Storage/Yard
Would add facilities onto existing Coast Guard pier in Monterey.
Estimate $ 100K
Shop
Estimate $
Additional Comments
We have investigated acquiring existing vessels and retrofitting for these missions. We have concluded, given the sea condtions in central California and the diverse missions we must conduct, we need to build a new vessel, just like the CINMS vessel. Five of these same vessels have been built in the past year by the California Department of Fish and Game for enforcement. They are designed for and esstential to conditions and missions found in the MBNMS
For Help, press F1
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# Appendix II

The figure below represents the expected evolution of each sanctuary through a number of phases. The dates given are approximate, based on an evaluation of the current state of sanctuary maturity, the scheduled date for the first management plan review and a nominal five year lapse between the first and second management plan review. The rate at which sites are expected to progress varies greatly based on individual circumstances at each sanctuary. More established sites move from the first management plan review (Phase 3) to the mature operations phase (Phase 4) relatively quickly. Other sites remain in start-up phase (Phase 2) for a while after their management plan review as new programs are initiated and developed. All sites will move into adaptive management (Phase 6) after the second management plan review (Phase 5).