U.S. NAVY STRATEGIC PLANNING PROCESS FOR MARINE SPECIES MONITORING

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EXECUTIVE SUMMARY

The U.S. Navy has engaged in a strategic planning process to enhance its marine species monitoring program in association with Marine Mammal Protection Act and Endangered Species Act regulatory compliance. The purpose of this process are to more effectively and efficiently address objectives of the Integrated Comprehensive Monitoring Program (ICMP) and achieve top-level monitoring goals established by the Navy in coordination with the National Marine Fisheries Service (NMFS). This process improvement is part of the adaptive management review of ongoing compliance monitoring within Navy at-sea training and testing range complexes.

Recommendations from a Scientific Advisory Group (SAG) and multiple NMFS and Navy adaptive management discussions have concluded that previous metric-based monitoring mandated through various area-specific authorizations is not an effective approach to addressing top-level monitoring goals and in some aspects hinders progress.

The Navy has developed the Strategic Planning Process for Marine Species Monitoring to establish the guidelines and processes necessary to develop, evaluate, and fund individual projects based on objective scientific study questions. The process uses an underlying framework designed around top-level goals, a conceptual framework incorporating a progression of knowledge, and in consultation with the SAG and other regional experts.

"Compliance" with the Navy's monitoring requirements is evaluated through the annual reporting and adaptive management review process in coordination with NMFS and the Marine Mammal Commission (MMC), as opposed to arbitrary effort-based metrics previously incorporated into regulatory requirements. In addition, the Navy will implement an independent program review process involving members of the SAG as well as other regional experts to provide feedback on program performance and progress in addressing ICMP goals and objectives.

US NAVY STRATEGIC PLANNING PROCESS

FOR MARINE SPECIES MONITORING

1.0 INTRODUCTION

The U.S. Navy is instituting systematic improvements to its marine species monitoring program in association with Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) regulatory compliance. The goal of this strategic planning process is to more effectively and efficiently address both the objectives of the Integrated Comprehensive Monitoring Program (ICMP) and the top-level monitoring goals established by the Navy in coordination with the National Marine Fisheries Service (NMFS). This process improvement is part of the adaptive management review of ongoing compliance monitoring within Navy at-sea training and testing range complexes. Current top-level monitoring goals are described in an Integrated Comprehensive Monitoring Program (ICMP) plan developed in coordination between NMFS and the Navy in 2009 and updated most recently in 2010 (DoN 2010).

The ICMP is a planning tool that focuses Navy monitoring priorities pursuant to MMPA and ESA requirements and co-ordinates monitoring efforts across all regions where the Navy conducts training and testing activities. The Navy monitoring program was initially composed of a collection of "range-specific" monitoring plans, each developed individually as part of MMPA and ESA compliance processes as environmental documentation was completed. These individual plans establish specific monitoring requirements for each range complex and are collectively intended to address the ICMP top-level goals. Current Navy metric-based monitoring obligations are summarized in Appendix A.

A 2010 Navy-sponsored marine species monitoring meeting initiated a process to critically evaluate the current range-specific Navy monitoring plans and begin development of revisions and updates to existing region-specific plans as well as the ICMP. Discussions at that meeting as well as subsequent annual adaptive management review meetings between the Navy and NMFS established a way ahead for continually refining of the Navy's monitoring program. This process included establishing a technical expert Scientific Advisory Group (SAG).

The Navy established the SAG in 2011 with the initial task of evaluating current Navy monitoring approaches under the ICMP and existing Letters of Authorization (LOAs) and developing objective scientific recommendations that would form the basis for this Strategic Planning Process. While recommendations were fairly broad from a geographic perspective, the SAG did provide specific programmatic recommendations that serve as guiding principles for the continued evolution of the Navy Marine Species Monitoring Program and associated Strategic Planning Process development.

2.0 OBJECTIVE

The objective of the Strategic Planning Process is to continue the evolution of Navy marine species monitoring towards a single integrated program, incorporating expert review and recommendations, and establishing a more transparent framework for evaluating and implementing monitoring work across the Navy range complexes and study areas. The Strategic Plan is intended to be a primary component of the ICMP and provide a "vision" for Navy monitoring across geographic regions - serving as guidance for determining how to most efficiently and effectively invest the marine species monitoring resources to address ICMP top-level goals and satisfy MMPA LOA regulatory requirements.

This Strategic Planning Process is designed to integrate various elements including:

- Integrated Comprehensive Monitoring Program top-level goals (DoN 2010)
- Scientific Advisory Group recommendations (SAG, 2011)
- Integration of regional scientific expert input
- Ongoing adaptive management review dialogue between NMFS and Navy
- Research and Development investments from other Navy-funded marine science programs [1]
- Lessons learned from previous Navy permit-required monitoring

3.0 STRATEGIC PLANNING APPROACH

The Navy and NMFS have recognized through multiple adaptive management discussions that effort-based monitoring (requiring a set number of items, for example, 2 passive acoustic monitoring devices, or completion of a specific number of survey days) mandated through various range complex-specific authorizations is not the most effective approach to addressing top-level monitoring goals of the ICMP (**Appendix A**) and in some aspects may actually hinder progress. The SAG program review supports this assessment and their recommendations report (SAG, 2011) laid out both over-arching and range-specific recommendations that follow a framework of knowledge which considers the occurrence of marine mammals, particular Navy training activities, potential response to those activities, and potential consequences of the interactions. The SAG recommendations include defining a conceptual framework centered on developing information on "occurrence, exposure, response, and consequences" as a progression of knowledge on marine species and their interaction with Navy activities.

[1] Office of Naval Research (ONR) Marine Mammals and Biology (MMB) program supports basic and applied research and technology development related to understanding the effects of sound on marine mammals, including physiological, behavioral, ecological effects and population-level effects. Chief of Naval Operations, Energy & Environmental Readiness Division's (CNO-N45) Living Marine Resources (LMR) program's mission is to develop, demonstrate, and assess information and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. See **Appendix B** for additional detail.

Notable keystone recommendations from the SAG include:

- Working within a conceptual framework of knowledge, from basic information on the occurrence of species within each range complex, to more specific matters of exposure, response, and consequences.
- Strive to move away from a "box-checking" mentality - monitoring studies should be designed and conducted according to scientific objectives, rather than on merely cataloging effort expended
- Approach the monitoring program holistically and select projects that offer the best opportunity to advance understanding of the issues, as opposed to establishing range-specific requirements
- Facilitate collaboration among researchers in each region, with the intent to develop a coherent and synergistic regional monitoring and research effort

In addition to broader programmatic and conceptual recommendations, the SAG evaluated each range complex for a series of factors including level of Navy activity, diversity and density of marine mammals, need for information on basic occurrence, presence of species of concern, and ability to most effectively address questions related to exposure, response, and consequences. The result was a matrix of suggested monitoring priorities across all geographic regions that serve as important guidance for selection of specific monitoring projects. **Table 1** summarizes the SAG's evaluation of ICMP top-level goals as they can most appropriately be addressed within each range complex.

Table 1. SAG prioritization of conceptual framework across major navy range complexes

	HRC	SOCAL	AFAST	NWTR	GOA	MIRC
Need for information on basic occurrence	*Med*	*Low*	*Low/Med*	*Low/Med*	*Med*	*High*
Ability to address exposure/response	*High*	*High*	*Med*	*Low*	*Low*	*Low*
Ability to address consequences	*Med*	*Med*	*Med/High*	*Low*	*Low*	*Low*

4.0 IMPLEMENTATION OF THE STRATEGIC PLANNING PROCESS

The Marine Species Monitoring Program for US Navy Fleet training has been formally established within the Program Objectives Memorandum (POM) cycle and receives an annual budget appropriated by Congress. The Navy is responsible for selecting and funding the most appropriate combination of monitoring projects within budgetary and logistic constraints for the coming fiscal year(s) based on the approach discussed below, including coordination with NMFS and the Marine Mammal Commission (MMC) at several key steps through the Adaptive Management Process.

The Strategic Planning Process has five major implementation steps:

1. Identify overarching intermediate scientific objectives
2. Develop individual monitoring project concepts
3. Evaluate, prioritize, and select monitoring projects
4. Execute selected monitoring projects
5. Report and Evaluate progress and results

These steps serve three primary purposes: 1) facilitate the Navy in developing specific projects addressing one or more intermediate scientific objectives; 2) establish a more structured and collaborative framework for developing, evaluating, and selecting monitoring projects across all areas where the Navy conducts training and testing activities; and 3) maximize the opportunity for input and involvement across the research community, academia, and industry.

4.1 Identify Overarching Intermediate Scientific Objectives

The general conceptual framework proposed by the SAG is used to structure a set of intermediate scientific objectives that serve as the basis for developing specific study questions and field projects throughout Navy range complexes. The applicability of the intermediate scientific objectives to the ICMP top-level goals expressed simply as "Occurrence, Exposure, Response, Consequences" is presented in **Table 2**. These intermediate scientific objectives drive the strategic planning process and selection of specific projects to fund across the suite of Navy range complexes as described in section 4.2. Both NMFS and MMC may be involved with this step through the Adaptive Management Process.

4.2 Develop Individual Monitoring Project Concepts

Individual monitoring projects should have a well-defined objective, problem statement, or hypothesis directly related to one or more of the intermediate scientific objectives. Each project will identify a specific location, technical approach, and anticipated outputs. The Navy will consider input from sources including academic researchers, NMFS science center staff, private institutions, and industry with expertise across disciplines, species, and techniques. Input may be in the form of conceptual research questions, informal project proposals, or specific study questions and will be received through a variety of channels including 1) workshops with regional scientists and experts; 2) recommendations generated by the monitoring program's primary contractor and team members; and 3) input via online sources (MARMAM, monitoring program web portal, etc).

Table 2. Overarching intermediate scientific objectives

Intermediate Scientific Objectives	Which components of the conceptual framework does this question address?
Determine what species and populations of marine mammals and sea turtles are present in Navy range complexes	Occurrence
Estimate the density of marine mammals and sea turtles in Navy range complexes and in specific training areas	Occurrence
Continue development of passive acoustic monitoring techniques and tools for detecting, classifying, and tracking marine mammals	Occurrence, Response
Determine what populations of marine mammals are exposed to Navy training and testing activities	Occurrence, Exposure
Establish the baseline habitat uses and movement patterns of marine mammals where Navy training and testing activities occur	Occurrence, Response
Establish the baseline vocalization behavior of marine mammals where Navy training and testing activities occur?	Occurrence, Response
Determine what behaviors can most easily be assessed for potential response to Navy training and testing activities	Response
Develop analytic methods to evaluate behavioral responses based on passive acoustic monitoring techniques	Exposure, Response
Evaluate behavioral responses by marine mammals exposed to Navy training and testing activities	Exposure, Response
Evaluate trends in distribution and abundance of populations that are regularly exposed to sonar and underwater explosives	Exposure, Response , Consequences
Assess existing data sets which could be utilized to address the above objectives	Occurrence, Exposure, Response, Consequences

4.3 Evaluate, Prioritize, and Select Monitoring Projects

Potential monitoring projects across all geographic regions for the upcoming year will be reviewed and evaluated by Navy monitoring program managers and the Fleets to determine the most appropriate combination of work to fund with the available budget. The following criteria will be used in Evaluating and selecting the suite of monitoring projects to be funded for the coming year(s) with the goal of creating a balanced portfolio of ongoing monitoring work:

- Must directly address one or more of the ICMP top-level goals as embodied by the current intermediate scientific objectives
- Expected data and products must clearly fit within the conceptual framework of occurrence, exposure, response, and consequences
- Should collectively include a variety of short and long term efforts covering a cross section of the conceptual framework
- Should collectively cover a variety of rage complexes and geographic regions subject to the ICMP and monitoring requirements under current LOAs
- May be a continuation of existing projects, refinement of previously, implemented methods, or development of new projects and associated study designs
- Must be compatible with current fiscal budgetary constraints

Both NMFS and MMC may be involved with this step through the Adaptive Management Process. Although program budget planning may require an annual deadline for immediate consideration of new projects, the Navy will continually evaluate new input and proposals for potential implementation based on applicability to ICMP objectives, logistic considerations, and resource availability.

4.4 Execute Selected Monitoring Projects

Selected monitoring projects will be submitted through the Navy's primary contractor as a Request for Proposal (RFP) including a detailed statement of work. The contractor is responsible for assembling an appropriate team of scientists and subject matter experts to successfully accomplish the requested work as well as managing the day to day execution of the project once it is initiated. Proposals for a specific project include a detailed cost breakdown and work plan. Contractual negotiations and a Task Order award are typically made within 60 days of an RFP.

4.5 Reporting and Evaluation of Progress and Results

The annual adaptive management review process provides an opportunity to present NMFS with progress and results from recent monitoring work as well as to re-evaluate and modify current intermediate scientific objectives and discuss planned monitoring projects for the coming fiscal year. Annual monitoring program summary reports will include overviews of information on all projects and work completed over the previous year, including quantative summaries of total investment and effort associated with each project. "Compliance" with MMPA monitoring requirements will place a high priority on the use of a qualitative, results-oriented evaluation of performance based on a review of the merits of the science performed and data generated. Factors may include considerations such as:

- Did the proposed monitoring task or project accomplish its objectives?
- Do the results address a specific monitoring question directly applicable to one or more of the intermediate scientific objectives identified in Step 1 of the Strategic Planning Approach?
- Do the results inform future monitoring investments and research?
- Are the data and results applicable to other geographic regions, species, or populations?
- Have the analysis and results been widely disseminated and/or peer-reviewed?

- Has the data been made available to the general public?
- Has the project made an acceptable return on the investment?

The evaluation of progress and results will inform the Adaptive management discussion and help guide decision making regarding future projects and direction. In addition to the Adaptive Management Review process with NMFS and MMC, a periodic external scientific program review will serve to evaluate progress and provide recommendations for the future direction of the Navy's marine species monitoring program. Input from individuals involved with this external review will be incorporated into the Strategic Plan as appropriate.

Reports from individual monitoring events, results of analyses, publications, and periodic progress reports for specific monitoring projects will be posted to the US Navy Marine Species Monitoring web portal as they become available. The Web Portal will also be used as a public forum to make known details of current and planned monitoring projects.

5.0 CONCLUSIONS

This Strategic Planning Process serves as the single marine species monitoring requirement for all Navy testing and training activities subject to the Atlantic Training and Testing (AFTT) and Hawaii-Southern California Training and Testing (HSTT) MMPA LOAs, and will integrate additional training and testing areas in the future. Along with the ICMP it clearly identifies the goals and objectives of the Navy monitoring program, presents the guidance and expert review that will be used to direct efforts, and defines the process for evaluating and selecting how the Navy's marine species monitoring program budget is invested. Performance or "compliance" will be evaluated annually through the adaptive management review process and required annual reporting which involve both NMFS and MMC participation. In addition, a periodic external program review will be conducted to continue the process of gathering expert guidance and to ensure consistent steady progress towards reaching the top-level goals established under the Integrated Comprehensive Monitoring Program.

References

Department of the Navy (DoN). 2010. Integrated Comprehensive Monitoring Plan-20 December 2010. Chief of Naval Operations, Office of Energy and Environmental Readiness. 65 p.

Scientific Advisory Group (SAG). 2011. Scientific Advisory Group for Navy Marine Species Monitoring-Workshop Report and Recommendations.

Appendix A. Navy Integrated Comprehensive Monitoring Program top-level monitoring goals (December 2010)

• An increase in our understanding of the likely occurrence of marine mammals and/or ESA-listed marine species in the vicinity of the action (i.e., presence, abundance, distribution, and/or density of species);

• An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammals and/or ESA-listed species to any of the potential stressor(s) associated with the action (e.g., tonal and impulsive sound), through better understanding of one or more of the following: 1) the action and the environment in which it occurs (e.g., sound source characterization, propagation, and ambient noise levels); 2) the affected species (e.g., life history or dive patterns); 3) the likely co-occurrence of marine mammals and/or ESA-listed marine species with the action (in whole or part) associated with specific adverse effects, and/or; 4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and/or ESA-listed marine species (e.g., age class of exposed animals or known pupping, calving or feeding areas);

• An increase in our understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, e.g., at what distance or received level);

• An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: 1) the long-term fitness and survival of an individual; or 2) the population, species, or stock (e.g., through effects on annual rates of recruitment or survival);

• An increase in our understanding of the effectiveness of mitigation and monitoring measures;

• A better understanding and record of the manner in which the authorized entity complies with the Incidental Take Authorization and Incidental Take Statement;

• An increase in the probability of detecting marine mammals (through improved technology or methods), both specifically within the safety zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals; and

• A reduction in the adverse impact of activities to the least practicable level, as defined in the MMPA.

Appendix B. Overview of primary Navy marine science funding programs and their relation to marine species monitoring under the ICMP and Strategic Planning Process.

The Navy is one of the world's leading organizations in assessing the effects of human activities on the marine environment, and provides a significant amount of funding and support to marine research. They also develop approaches to ensure that these resources are minimally impacted by current and future Navy operations. Navy scientists work cooperatively with other government researchers and scientists, universities, industry, and non-governmental conservation organizations in collecting, evaluating, and modeling information on marine resources, including working towards a better understanding of marine mammals and sound. From 2004 to 2012, the Navy has provided over $230 million for marine species research. The U.S. Navy sponsors 70 percent of all U.S. research concerning the effects of human-generated sound on marine mammals and 50 percent of such research conducted worldwide. Major topics of Navy-supported marine species research directly applicable to AFTT activities include the following:

- Better understanding of marine species distribution and important habitat areas;
- Developing methods to detect and monitor marine species before and during training;
- Understanding the impacts of sound on marine mammals, sea turtles, fish, and birds;
- Developing tools to model and estimate potential impacts of sound

The goal of the Navy's R&D program is to enable collection and publication of scientifically valid research as well as development of techniques and tools for Navy, academic, and commercial use. The two Navy organizations that account for most funding and oversight of the Navy marine species research program are the Office of Naval Research (ONR) Marine Mammals and Biology (MMB) Program, and the Office of the Chief of Naval Operations (CNO) Energy and Environmental Readiness Division (N45) Living Marine Resources (LMR) Program.

The ONR Marine Mammals and Biology program supports basic and applied research and technology development related to understanding the effects of sound on marine mammals, including physiological, behavioral, ecological effects and population-level effects. Current program thrusts include, but are not limited to:

- Monitoring and detection;
- Integrated ecosystem research including sensor and tag development;
- Effects of sound on marine life including hearing, behavioral response studies, diving and stress physiology, and Population Consequences of Acoustic Disturbance (PCAD);
- Models and databases for environmental compliance.

The mission of the LMR program is to develop, demonstrate, and assess information and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. This mission is accomplished by:

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- Providing science-based information to support Navy environmental effects assessments for research, development, acquisition, testing and evaluation (RDAT&E) as well as Fleet at-sea training, exercises, maintenance and support activities
- Improving knowledge of the status and trends of marine species of concern and the ecosystems of which they are a part
- Developing the scientific basis for the criteria and thresholds to measure the effects of Navy generated sound
- Improving understanding of underwater sound and sound field characterization unique to assessing the biological consequences resulting from underwater sound (as opposed to tactical applications of underwater sound or propagation loss modeling for military communications or tactical applications)
- Developing technologies and methods to monitor and, where possible, mitigate biologically significant consequences to living marine resources resulting from naval activities, emphasizing those consequences that are most likely to be biologically significant

The program is focused on three primary objectives that influence program management priorities and directly affect the program's success in accomplishing its mission:

1. Collect, Validate & Rank R&D Needs: Expand awareness of R&D program opportunities within the Navy marine resource community to encourage and facilitate the submittal of well-defined and appropriate needs statements.

2. Address High Priority Needs: Ensure that program investments and the resulting projects maintain a direct and consistent link to the defined user needs.

3. Transition Solutions & Validate Benefits: Maximize the number of program-derived solutions that are successfully transitioned to the Fleet and system commands .

The LMR program primarily invests in the following areas:

- Developing Data to Support Risk Threshold Criteria;
- Improved Data Collection on Protected Species, Critical Habitat within Navy Ranges;
- New Monitoring and Mitigation Technology Demonstrations;
- Database and Model Development;
- Education and Outreach, Emergent Opportunities

While the ICMP and Strategic Planning Process only directly apply to monitoring activities under applicable MMPA and ESA authorizations, they also serves to facilitate coordination among the Navy's marine species monitoring program and the basic and applied research programs discussed above. **Figure 1** gives a graphic representation of the relationship among these programs

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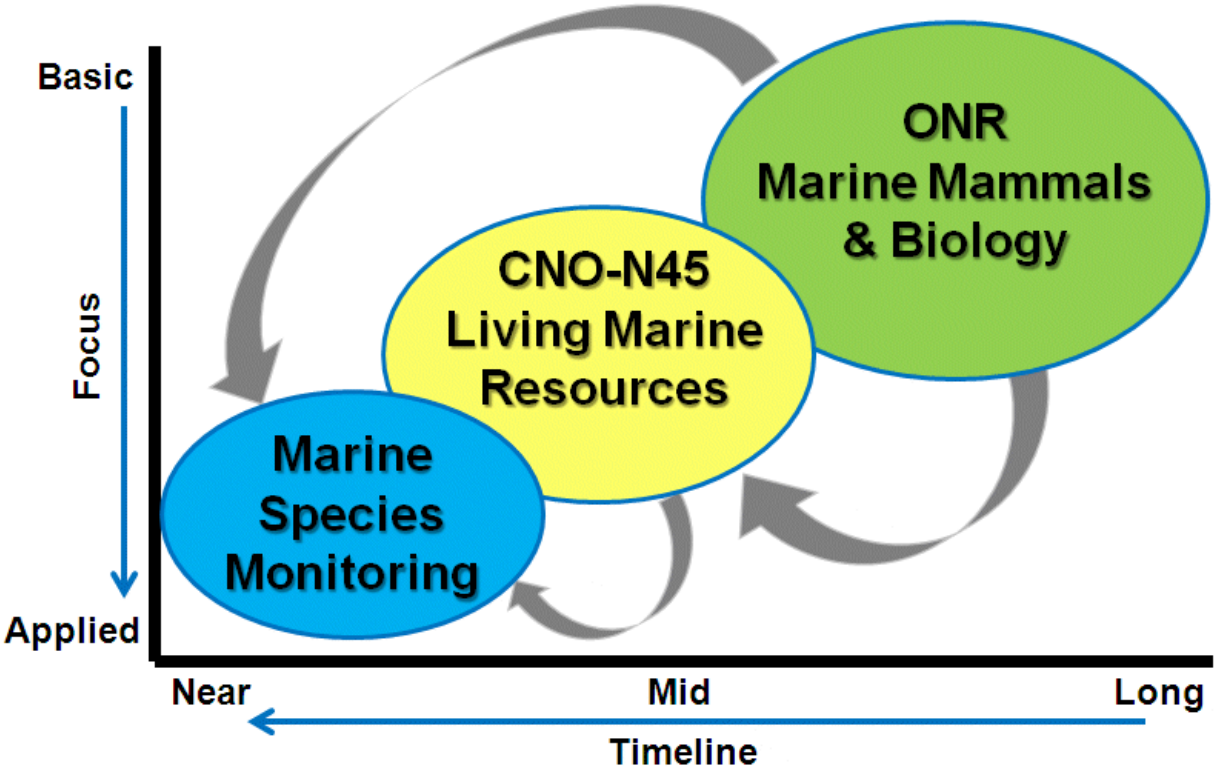

Figure 1. Conceptual pathway for ONR basic (6.1) and early applied (6.2) research to late stage applied research with the N45 LMR 6.4 program, and ultimately to the operational navy monitoring programs. The x-axis indicates the respective timelines for Navy programs and the y-axis indicates the focus. Arrows indicate the potential pathways for information and technology.

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