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***NOAA Deep-Sea Coral and Sponge
Research and Management Strategic Plan***

DRAFT – September 2008



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71 **Introduction**

72
73 The National Oceanic and Atmospheric Administration (NOAA) is the lead Federal
74 agency mandated to protect and preserve the Nation’s marine resources, including deep-
75 sea coral and sponge ecosystems. As our understanding of these resources has grown, so
76 too has the need to target research and management actions. The *NOAA Deep-Sea Coral
77 and Sponge Research and Management Strategic Plan* represents a concerted effort to
78 identify exploration, research, management, and international activities that provide the
79 necessary information to implement appropriate management measures to protect and
80 conserve deep-sea coral and sponge ecosystems.

81

82 **Overview of Deep-Sea Coral and Sponge Ecosystems**

83

84 Complex benthic (bottom) habitats that are created by larger sessile organisms are known
85 to play an important role in marine ecosystems. In deeper or colder oceanic waters,
86 complex habitats are most often formed by species of corals or sponges that are adapted
87 to these unique environmental conditions. Deep-sea corals and sponges form remarkably
88 complex and fragile ecosystems throughout the world’s oceans, both within and beyond
89 areas of national jurisdiction. In U.S. waters, deep-sea coral communities are found in
90 the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean and occur primarily on
91 hard substrate on continental shelves and slopes, in offshore canyons and on oceanic
92 island slopes and seamounts. Deep-sea sponge communities have not been well mapped,
93 but are often found on similar substrates and may be collocated with deep-sea corals.
94 Beyond U.S. waters, deep-sea coral and sponge ecosystems have gained interest as
95 vulnerable marine ecosystems and have been the focus of international efforts to address
96 the impacts of fishing on them, especially in areas beyond national jurisdiction.

97

98 **Deep-Sea Corals**

99 Deep-sea corals, also referred to as cold-water corals, are a taxonomically and
100 morphologically diverse collection of organisms distinguished by their occurrence in
101 deeper or colder oceanic waters. The calcified skeletons of certain branching stony coral
102 species form large reef-like structures in deep water. Gorgonians, gold corals, and black
103 corals often have branching tree-like forms and either occur singly or form thickets of
104 many colonies. The three-dimensional features formed by many deep-sea corals provide
105 habitat for numerous fish and invertebrate species and, like shallow-water tropical corals,
106 appear to enhance the biological diversity of many deepwater ecosystems. A number of
107 deep-sea corals are also of commercial importance; in particular, black, pink, and red
108 corals are the basis for a large jewelry industry.

109

110 Deep-sea corals lack symbiotic algae (zooxanthellae). Unlike their shallow water
111 relatives, which rely heavily on photosynthesis by their symbionts to produce food, deep-
112 sea corals assimilate plankton and organic matter for much of their energy needs. They
113 generally grow much more slowly than their shallow water counterparts.

114 **Deep-Sea Sponges**

115 Deep-sea sponges also provide important three-dimensional structure to benthic habitats,
116 and are thought to play similar ecological roles to deep-sea corals. Sponge-dominated
117 habitats in deeper waters may be more widespread than are coral-dominated habitats. In
118 the northeast Pacific, glass sponges (Class: Hexactinellida) form unique sponge reefs up
119 to 19 m high and many kilometers long (Krautter et al. 2001). Although much less is
120 known about deep-sea sponges, they have been identified as habitat for managed fish
121 stocks in certain regions and face many of the same threats as deep-sea corals. A large
122 variety of chemical compounds, many with significant biological activity, have been
123 isolated from sponges, and a number are currently in use in pharmaceuticals or
124 undergoing clinical trials.

125

126 **Threats to Deep-Sea Coral and Sponge Communities**

127 Deep-sea corals are generally slow-growing and fragile, making them and their
128 associated communities vulnerable to human-induced impacts, particularly physical
129 disturbance. With the exception of a few areas (e.g., the *Oculina* Banks), the full extent of
130 habitat degradation resulting from these threats is largely unknown. Less is known about
131 the long-term impacts of human activities on deep-sea sponges or their ability to recover.

132 Disturbances to deep-sea coral communities from bottom-tending fishing gear, especially
133 bottom trawl gear, are the best documented and pose the most widespread threat (Rogers
134 1999; Koslow et al. 2000; Hall-Spencer et al. 2001; Fosså et al. 2002; Roberts 2002;
135 Grehan et al. 2005; Wheeler et al. 2005; Waller et al. 2007). Disturbances from bottom
136 trawls and dredges have also been documented in U.S. waters (e.g., Krieger 2001; Koenig
137 et al. 2005; Stone 2006) and are considered the major threat to deep-sea corals in most
138 U.S. regions where such fishing is allowed (Hourigan et al. 2007). Studies of sponges
139 indicate that they are also damaged to a large extent when hit by bottom-trawl gear
140 (Sainsbury et al. 1997, Freese et al. 1999, Freese 2003, Løkkeborg 2005). The National
141 Research Council (2002) concluded that bottom trawling and dredging reduce habitat
142 complexity by removing or damaging the physical structure of the seafloor and by
143 causing changes in species composition.

144 Other activities that can directly impact deep-sea coral communities include other
145 bottom-set fishing gears (e.g., gillnets and longlines); coral harvesting; oil, gas, and
146 mineral exploration and extraction; and submarine cable/pipeline deployment (Freiwald
147 et al. 2004; Hourigan et al. 2007). Deep-sea sponge communities are likely to be
148 vulnerable to many of these impacts. Invasive species, climate change, and ocean
149 acidification represent additional potential threats that have not been adequately explored.
150 The extent of impact from these activities and the type of stressors that cause the most
151 degradation vary among regions.

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154

Deep-Sea Coral and Sponge Definitions:

Structure-forming deep-sea corals: Any colonial, azooxanthellate corals providing vertical structure above the seafloor that can be utilized by other species. It includes both deep reef-building stony corals (e.g., *Lophelia pertusa*) as well as individual branching colonies of corals (e.g., gorgonians, black corals). These are often referred to as habitat-forming deep-sea, deep-water, or cold-water corals.

Structure-forming deep-sea sponges: Any sponges generally occurring at depths below 50 m that provide vertical structure above the sea floor and can occur at a density such that they promote the development of associated communities.

Deep-sea coral communities: Habitats formed by azooxanthellate corals that occur deeper than 50 m and other species of organisms associated with these deep-sea coral habitats.

Deep-sea sponge communities: Assemblages of structure-forming deep-sea sponges and other associated species below 50 m.

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Purpose

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The *NOAA Deep-Sea Coral and Sponge Research and Management Strategic Plan* is a 5-year strategic plan that identifies goals, objectives, and approaches to guide NOAA’s deep-sea coral and sponge research, management, and international activities for Fiscal Years 2009 through 2013. It is intended to integrate research and conservation needs and to be a flexible, evolving document that allows NOAA and its partners to address our growing understanding of new management challenges and allow new issues and priorities to be addressed as appropriate. The primary goal of the Plan is to improve research, conservation, and management of deep-sea coral and sponge ecosystems.

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168

Over the next five years, NOAA will develop implementation plans that will identify specific activities and allow for the refinement of the objectives and approaches identified in the *NOAA Deep-Sea Coral and Sponge Research and Management Strategic Plan*.

171

This will require NOAA to further focus limited funds, respond to emerging issues and changing priorities, and take advantage of technologies developed to better understand and manage deep-sea coral and sponge ecosystems.

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Scope

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The *NOAA Deep-Sea Coral and Sponge Research and Management Strategic Plan* is designed to guide NOAA activities for deep-sea coral and sponge ecosystems by establishing a framework and strategies in three sections: (I) Exploration and Research;

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181 (II) Conservation and Management; and (III) International Cooperation. The Plan covers
182 deep-sea coral and sponge ecosystems under the jurisdiction of the United States; and is
183 written for a broad audience, including resource managers, scientists, policy decision-
184 makers, and the public.

185

186 Section I identifies the role of research in management, including NOAA’s priorities and
187 objectives for research and exploration of deep-sea coral and sponge ecosystems and
188 anticipated deliverables for each objective. The goal of NOAA’s exploration and
189 research on deep-sea coral and sponge ecosystems is to provide sound science to enable
190 effective ecosystem-based management. Section II lays out objectives and approaches
191 that NOAA will undertake to enhance protection of deep-sea coral and sponge
192 ecosystems working with the Fishery Management Councils (FMC), other Federal
193 agencies, and interested partners. NOAA’s strategy for managing deep-sea coral and
194 sponge ecosystems is centered on the authority provided to NOAA through the
195 Magnuson-Stevens Fisheries Conservation and Management Act (MSA) and National
196 Marine Sanctuary Act (NMSA). Section III, describes NOAA’s participation in
197 international activities to protect and/or conserve deep-sea corals and sponges
198 ecosystems. These three goals and associated objectives are summarized in Table 1.
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200 **Table 1. NOAA’s goals and objectives for enhanced exploration and research,**
201 **conservation and management, and international cooperation to protect deep-sea**
202 **coral and sponge communities.**

Exploration and Research	<ol style="list-style-type: none">1. Locate and characterize deep-sea coral and sponge habitats.2. Understand the biology and ecology of deep-sea corals and sponges.3. Understand the biodiversity and ecological function of deep-sea coral and sponge ecosystems.4. Understand the extent and degree of impact caused by fishing and other human activities.5. Understand the impacts of climate change and past oceanic conditions.
Conservation and Management	<ol style="list-style-type: none">1. Protect areas containing major known deep-sea coral or sponge communities from impacts of bottom-tending fishing gear.2. Protect areas that may support such communities where mobile bottom-tending fishing gear has not been used recently as a precautionary measure.3. Develop regional approaches to further reduce interactions between fishing gear and deep-sea corals and sponges.4. Enhance conservation of deep-sea coral and sponge communities in national marine sanctuaries.5. Assess and encourage avoidance or mitigation of adverse impacts of non-fishing activities on deep-sea coral and sponge communities.6. Provide outreach to enhance public understanding of these resources.
International Cooperation	<ol style="list-style-type: none">1. Promote international partnerships to conserve deep-sea coral and sponge ecosystems through the sustainable management of activities impacting those resources2. Ensure that international trade of deep-sea coral and sponge species, and their parts and products, is sustainable3. Increase international collaborative research and exploration of deep-sea coral and sponge ecosystems.

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Requirements and Drivers

NOAA has the statutory authority and scientific expertise to take a lead role in conducting research and management of deep-sea coral and sponge ecosystems. The primary and secondary requirement drivers for the *NOAA Deep-Sea Coral and Sponge Research and Management Strategic Plan* are listed below (see Appendix A and B for additional information).

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214 **Primary Requirements:**

- 215 ◇ Magnuson-Stevens Fisheries Conservation and Management Act (16 U.S.C. §1801
- 216 et seq.) as reauthorized in 2006 (Public Law 109-479). NOAA manages fisheries in
- 217 federal waters through Fishery Management Plans (FMPs) developed in conjunction
- 218 with the Regional Fishery Management Councils (the Councils).
- 219 ▪ Deep-Sea Coral Research and Technology Program (Sec. 408)
- 220 ▪ Deep-sea coral discretionary provisions [Sec. 303(b)(2)(b)]
- 221 ▪ Minimize bycatch [Sec. 301(a)(9)]
- 222 ▪ Identification and conservation or enhancement of essential fish habitat for
- 223 managed species [Sec. 305(b)]
- 224 ◇ National Marine Sanctuary Act (16 U.S.C. 1431 et seq.). Authorizes NOAA to
- 225 identify and protect nationally significant habitats and resources throughout U.S.
- 226 waters. Deep-sea corals are known to exist within the boundaries of seven National
- 227 Marine Sanctuaries: Florida Keys, Flower Garden Banks, Channel Islands,
- 228 Monterey Bay, Gulf of the Farallones, Cordell Bank, and Olympic Coast.
- 229 ◇ Presidential Proclamation: Establishment of the Northwestern Hawaiian Islands
- 230 Marine National Monument (2006)
- 231 ◇ Presidential Memorandum on Promoting Sustainable Fishing and Ending
- 232 Destructive Fishing Practices

233

234 **Secondary Requirements:**

- 235 ◇ American Fisheries Act (PL 105-277)
- 236 ◇ Convention on International Trade in Endangered Species of Wild Fauna and Flora
- 237 ◇ Endangered Species Act (16 U.S.C. 460 et seq.)
- 238 ◇ Executive Order 13158: Marine Protected Areas (2000)
- 239 ◇ Deep Seabed Hard Mineral Resources Act (30 U.S.C. 1404 et seq.)
- 240 ◇ Fish and Wildlife Coordination Act (16 U.S.C. 1531 et seq.)
- 241 ◇ Government Result and Performances Act (31 U.S.C. 1115 et seq.)
- 242 ◇ High Seas Fishing Compliance Act (16 U.S.C. 5501 et seq.)
- 243 ◇ National Environmental Policy Act (42 U.S.C. 4321 et seq.)

244

245

246 **Measuring Performance**

247

248 As a science-based agency, NOAA depends on long-term, systematic research and

249 development to meet its goals through incremental improvements in its products, services

250 and science applications. Performance measures will be developed to help evaluate the

251 attainment of the outcomes of this Plan to ensure our Nation remains resilient in the face

252 of challenges, competitive in taking advantage of opportunities, and informed in

253 assessing those challenges and opportunities presented for deep-sea coral and sponge

254 ecosystems. Measures will incorporate mechanisms to ensure accountability and high

255 quality, including rigorous and independent peer-review procedures.

256

257 **Links to NOAA’s Strategic Plans**

258
259 NOAA’s mission is to “understand and predict changes in the Earth’s environment and
260 conserve and manage coastal and marine resources to meet our Nation’s economic, social
261 and environmental needs.” This strategy builds on NOAA’s goal to protect, restore and
262 manage the use of coastal and ocean resources through an ecosystem approach, and is
263 designed to guide NOAA’s research, management and international activities related to
264 ecosystems containing deep-sea coral and sponges.

265
266 In 2008, NOAA published a research plan entitled **Research in NOAA, A Five-Year**
267 **Plan: Fiscal Years 2008-2012**. The Plan links to the following priority research activity
268 in NOAA’s **Five-Year Research Plan**:

- 269
270
 - Improve the understanding of deep-sea (or cold-water) coral and sponge
271 ecosystems including their role and function in supporting various life stages of
272 living marine resources, the factors controlling their distribution, and their
273 potential as paleo-environmental indicators.

274
275 The projected outcomes of the *NOAA Deep-Sea Coral and Sponge Research and*
276 *Management Strategic Plan* are also directly related to the outcomes for the NOAA
277 Ecosystems Mission Goal as stated in the **NOAA Strategic Plan**:

- 278
279
 - Healthy and productive coastal and marine ecosystems that benefit society.
 - A well-informed public that acts as steward of coastal and marine ecosystems.

280
281
282 Furthermore, the activities recommended under this strategic plan address the following
283 **NOAA Ecosystem Mission Goal Performance Objectives**:

- 284
285
 - Increase number of regional coastal and marine ecosystems delineated with
286 approved indicators of ecological health and socioeconomic benefits that are
287 monitored and understood.
 - Increase number of habitat acres conserved or restored.
 - Increase portion of population that is knowledgeable of and acting as stewards for
289 coastal and marine ecosystems.

290
291
292 **Data Management and Reporting**

293
294 Appropriate research and development is needed to maximize the quality and efficiency
295 with which NOAA acquires, manages and distributes its data and associated products and
296 services to ensure they are accurate, reliable, secure, understandable, timely, appropriate
297 and readily accessible. To ensure that information from NOAA’s exploration and
298 research on deep-sea coral and sponge communities is available to the research and
299 management communities, NOAA will take the following steps:

- 300
 - Provide access to NOAA deep-sea coral and sponge data and information,
301 including metadata, links to online data (i.e. regional map servers), products and

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- 302 publications. Addresses *Deep Sea Coral Research and Technology Program*
303 requirement (Appendix A: MSA Sec. 408(a)1).
- 304 • Prepare mandated biennial reports to Congress and the public on steps taken by
305 NOAA to identify, monitor, and protect deep-sea coral areas, including
306 summaries of the results of mapping, research, and data collection performed
307 under the program. Addresses *Deep Sea Coral Research and Technology*
308 *Program* requirement (Appendix A: MSA Sec. 408(b)).
 - 309 • Develop and produce a quadrennial report on the State of Deep-sea Coral and
310 Sponge Ecosystems of the United States.
- 311

**NOAA’s Deep-Sea Coral and Sponge Community
Exploration and Research Strategy**

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NOAA, as the Federal agency responsible for managing marine living resources in the U.S., is well-positioned to locate, characterize, and conduct targeted exploration and research to improve the understanding of deep-sea coral and sponge ecosystems. Sound management of these ecosystems requires scientifically-based information on their condition, the causes and consequences of that condition, and the costs and benefits of possible management actions to maintain or improve their condition. The goal of NOAA’s exploration and research on deep-sea coral and sponge ecosystems is to provide sound science to enable effective ecosystem-based management. To this end, NOAA, in consultation with the Councils, will engage other Federal, state, and local agencies; academia; the private sector; and the international community to address the following exploration and research objectives for deep-sea coral and sponge ecosystems.

- NOAA’s Deep-sea Coral and Sponge Exploration and Research Objectives:**
1. Locate and characterize deep-sea coral and sponge habitats.
 2. Understand the biology and ecology of deep-sea corals and sponges.
 3. Understand the biodiversity and ecological function of deep-sea coral and sponge ecosystems.
 4. Understand the extent and degree of impact caused by fishing and other human activities.
 5. Understand the impacts of climate change and past oceanic conditions.

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These objectives respond to NOAA’s overall mandates and mission to conduct exploration and research as they apply to deep sea coral and sponge ecosystems, including the requirements of the Deep Sea Coral Research and Technology Program as authorized under MSA Section 408 (Appendix A). The priority exploration and research activities for the objectives include the specific actions required under the MSA. The linkages among these Objectives and the Management Objectives are shown in Appendix C.

Essential to addressing most of the stated exploration and research objectives for deep-sea corals and sponges is availability of and access to advanced underwater technologies. Deep-sea coral and sponge ecosystems exist at depths greater than 50 m. Thus, for scientists to study them, they require a ship outfitted with specialized, deep-sea capable technologies such as, human-occupied submersibles, remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs), and other relevant technologies.

344 **1. LOCATE AND CHARACTERIZE DEEP-SEA CORAL AND SPONGE**
345 **HABITATS**

346

347 The first step in developing appropriate management strategies is to locate and
348 characterize deep-sea coral and sponge communities. Despite an increase in research on
349 deep-sea coral and sponge ecosystems in the past twenty years, there is still very little
350 known about their distribution and extent. NOAA, working in collaboration with the
351 Councils and other partners, will identify priority areas for habitat characterization by
352 reviewing existing information (e.g., historical collection records, trawl and bycatch
353 records, underwater video footage, and previous exploration and research results) and
354 conduct surveys of areas suspected or known to contain deep-sea coral and sponge
355 habitats.

356

357 Given the high costs associated with deep-sea habitat characterization surveys (which
358 include mapping, filming, and collecting samples using submersibles, AUVs, ROVs, and
359 other advanced undersea technologies), there is a continuing need to improve NOAA's
360 ability to target areas suspected to contain deep-sea coral and sponge communities.
361 Development of scientific modeling or other such methods will improve NOAA's ability
362 to predict where deep-sea coral and sponge communities are likely to be present and
363 prioritize research in these areas.

364

365 Priority exploration and research activities to meet this objective are:

366

- 367 1.1 Locate and conduct a baseline characterization of priority areas suspected or
368 known to contain deep-sea coral and sponge habitats using appropriate survey
369 technology including low-resolution, broad-scale surveys to identify potential
370 targets and high-resolution surveys for creating detailed maps.
- 371 1.2 Characterize the abiotic and biotic aspects of deep-sea coral and sponge
372 communities (e.g., salinity, temperature, dissolved oxygen, pH, current patterns,
373 turbidity, topography, nutrients, and substrate type) and quantify the distribution
374 of deep-sea coral and sponge species.
- 375 1.3 Create, test, evaluate, and refine models and survey methods that predict where
376 deep-sea coral or sponge habitats are located using the best available scientific
377 information on the type of deep-sea coral and sponge habitats present and their
378 associated abiotic and biotic factors and records of bycatch of corals and sponges.

379

380 **Anticipated deliverables from these efforts will include:**

381

- 382 • Detailed maps showing the distribution of deep-sea coral and sponge
383 communities, as well as substrate and geological features.
- 384 • Databases using Geographic Information System software that include the exact
385 location (boundaries), spatial extent, and physical and biological characteristics of
386 deep-sea coral and sponge habitat.
- 387 • Annotated video and still photography depicting deep-sea coral and sponge
388 communities.
- 389 • Deep-sea coral and sponge samples and specimens.

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- 390 • Models for predicting where deep-sea coral and sponge habitats are located.
- 391 • Maps of predicted distributions of deep-sea coral and sponge habitats and
- 392 prioritized list of areas to direct research or conservation efforts.

393

394

395 **2. UNDERSTAND THE BIOLOGY AND ECOLOGY OF DEEP-SEA CORALS**

396 **AND SPONGES**

397

398 Given the limited number of investigations, many deep-sea coral and sponge species that
399 structure complex habitats are unknown or poorly understood. Even for described
400 species, there is a lack of knowledge regarding their basic biology or life history (e.g.,
401 reproductive strategies, feeding habits and patterns, dispersal strategies, and recruitment)
402 and impacts of stressors, which are critical to understanding their growth rates, resilience
403 to stress, and rate of recovery from stress or damage. Understanding the relationships
404 between deep-sea coral and sponge species and their environment is important for
405 developing conservation management strategies for systems that are under stress or to
406 determine remediation strategies to aid in the recovery of communities that have been
407 damaged.

408

409 In addition to understanding the biology and ecology of deep-sea corals and sponges,
410 there is a need to collect specimens for identification and curation, and to develop
411 taxonomic expertise in deep-sea organisms. The study of taxonomy and systematic
412 biology is a declining field of interest for young scientists and as such, threatens to
413 hamper our future ability to properly identify organisms based on morphological
414 characteristics. Taxonomists are a critical capacity gap needed to address this objective.

415

416 Priority exploration and research activities to meet this objective are:

417

- 418 2.1 Determine growth and mortality rates of structure-forming deep-sea coral and
- 419 sponge species and investigate how abiotic and biotic factors influence their
- 420 growth rates and development.
- 421 2.2 Investigate how species reproduce, disperse, and recruit and determine the
- 422 influence of abiotic and biotic factors on these patterns and processes.
- 423 2.3 Determine larval source-sink patterns and gene flow among deep-sea coral and
- 424 sponge populations at local, regional and ocean-basin scales.
- 425 2.4 Determine sources of food for deep-sea corals and sponges both spatially and
- 426 temporally.
- 427 2.5 Determine the tolerance ranges of deep-sea coral and sponge species to
- 428 environmental controlling factors and identify sources of stress.

429

430 **Anticipated deliverables from these efforts will include:**

431

- 432 • Deep-sea coral and sponge specimen banks, in partnership with existing
- 433 institutions housing collections.
- 434 • Taxonomic descriptions of deep-sea coral and sponge species.

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- 435 • Databases containing information on deep-sea coral and sponge taxonomy, life
436 histories, genetic data, and environmental conditions (including tolerance limits).
- 437 • Annotated video and still photography describing reproductive behavior of deep-
438 sea corals and sponges.
- 439 • Descriptions and models of larval distribution pathways for different deep-sea
440 coral and sponge species.

441

442

443 **3. UNDERSTAND THE BIODIVERSITY AND ECOLOGICAL FUNCTION OF** 444 **DEEP-SEA CORAL AND SPONGE ECOSYSTEMS**

445

446 Many deep-sea coral and sponge communities form three-dimensional structures that are
447 used by a variety of fish and invertebrate species seeking shelter, food, and spawning
448 areas. Such areas can be as small as a solitary deep-sea coral colony, or as large as a
449 well-developed reef comprised of numerous colonies of multiple species extending for
450 miles. Past investigations have identified such areas, and have begun to describe how
451 these communities function ecologically. However, many questions remain concerning
452 how the ecological function of these communities compare to other structurally complex,
453 non-coral habitats such as rocky hard-bottom areas, and how these habitats might be used
454 by associated species at different stages in their life history.

455

456 Priority exploration and research activities to meet this objective are:

457

- 458 3.1 Inventory species associated with deep-sea coral and sponge habitats.
- 459 3.2 Determine the role and function that deep-sea coral and sponges play in
460 supporting various life stages of commercially and ecologically important species,
461 including the habitat utilization patterns of species associated with deep-sea coral
462 and sponge habitats, as well as other structurally complex, non-coral substrate.
- 463 3.3 Describe food web dynamics for deep-sea coral and sponge communities,
464 including characterizing trophodynamics and benthic-pelagic interactions of
465 organisms associated with these communities.
- 466 3.4 Determine the levels of biodiversity (i.e., genetic, species, and ecosystem
467 diversity) associated with deep-sea coral and sponge ecosystems.
- 468 3.5 Determine the life histories of commercially or ecologically important species
469 associated with deep-sea coral and sponge habitats at varying temporal and spatial
470 scales.

471

472 **Anticipated deliverables from these efforts will include:**

473

- 474 • Inventory of species associated with deep-sea coral and sponge habitats and their
475 habitat utilization patterns.
- 476 • Annotated video and still photography describing associative behavior.
- 477 • Specimen identification and stomach content data analyses.
- 478 • Descriptions and graphic depictions of trophic structures and food web models.
- 479 • Information to inform review and refinement of essential fish habitat designations
480 for Federally-managed species.

- 481 • Information to inform required consultations for permitting energy exploration
482 and production, cable laying, and other human disturbances.

483

484

485 **4. UNDERSTAND THE EXTENT AND DEGREE OF IMPACT CAUSED BY**
486 **FISHING AND OTHER HUMAN ACTIVITIES**

487

488 Understanding the effects of human activities that may impact deep-sea coral and sponge
489 ecosystems is a key priority for developing and implementing management strategies.
490 Bottom trawling is currently the primary direct threat to these communities in areas
491 where such fishing is allowed. However, other human activities, both at a local and
492 broader scale may also contribute to the decline of deep-sea coral and sponge ecosystems.
493 These activities include, but are not limited to, use of other bottom-set fishing gears,
494 mineral resource exploration and extraction, energy exploration and production, cable
495 laying, introduction of invasive species, marine debris, and harvesting. The extent and
496 degree of impact caused by fishing and other human activities varies among regions
497 under U.S. jurisdiction and not all threats listed are uniform across U.S. waters. (Note:
498 impacts of climate change and ocean acidification are dealt with in Objective 5.)
499

500

Priority exploration and research activities to meet this objective are:

501

- 502 4.1 Determine the distribution of effort and intensity of use of specific gear types for
503 commercial, recreational, and artisanal fisheries that occur in locations where
504 deep-sea coral and sponge communities are known or likely to occur based on the
505 best available information.¹
- 506 4.2 Conduct cooperative research in cooperation with fishing industry participants
507 and other stakeholders on deep-sea corals and sponges, and on survey methods.
- 508 4.3 Develop technologies and methodologies cooperatively with fishing industry
509 participants and other stakeholders to reduce interactions between fishing gear
510 and deep-sea corals and sponges.
- 511 4.4 Identify and characterize fisheries with high coral or sponge bycatch and areas
512 with the highest concentrations of bycatch.
- 513 4.5 Identify mineral and energy exploration and extraction activities, cable routes,
514 alternative energy infrastructure, or other activities occurring in the vicinity of,
515 traversing, and/or impacting known deep-sea coral and sponge communities and
516 collaborate with appropriate partners (e.g., U.S. Minerals Management Service) in
517 their determination of impacts of these activities.
- 518 4.6 Identify potential invasive species and determine their distribution and impacts on
519 deep-sea coral and sponge communities.
- 520 4.7 Determine habitat impact rates, sensitivity of habitat features to disturbance, and
521 recovery rates following disturbance, including documentation of damaged
522 habitat from human disturbances.

¹ NOAA will protect all confidential information (such as the location of fishing activity or mineral extraction) received, collected, maintained, or used by the agency as required by law.

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523 4.8 Model habitat impacts to estimate the effects of human disturbances to deep-sea
524 coral and sponge habitats.

525 4.9 Determine techniques, tools, and technologies to offset unavoidable impacts to
526 deep-sea coral and sponge communities.

527

528 **Anticipated deliverables from these efforts will include:**

529

530 • Maps depicting the distribution and intensity of fishing and other human activities
531 in areas known to contain deep-sea coral and sponge communities.

532 • Annotated video and still photography describing the condition of, and impacts to,
533 these communities, as well as to serve as a baseline for studying ecosystem
534 recovery.

535 • Technologies or methods designed to reduce interactions between fishing gear
536 and deep-sea corals.

537

538

539 **5. UNDERSTAND THE IMPACTS OF CLIMATE CHANGE AND PAST** 540 **OCEANIC CONDITIONS**

541

542 Similar to their shallow water counterparts, the skeletons of deep-sea corals are made up
543 of calcium carbonate and other trace elements and isotopes. The trace elements and
544 isotopes that are incorporated into their skeletons reflect the physical and chemical
545 conditions present at the time the skeleton was formed. Thus, coral skeletons can be used
546 as a proxy for determining past oceanic conditions. The worldwide distribution of many
547 deep-sea corals and their age (i.e., a few deep-sea corals have been dated to be hundreds
548 to thousands of years old) increase their potential as tools to discern and reconstruct past
549 oceanic conditions and determine potential linkages to climate change.

550

551 Climate change, in particular increases in carbon dioxide levels primarily from the
552 burning of fossil fuels, may impact deep-sea corals by causing changes in ocean
553 carbonate chemistry that result in lower pH levels. This process is known as ocean
554 acidification. The lowering of the seawater pH and the subsequent reduction in the
555 availability of carbonate ions may reduce the calcification rates of deep-sea corals. The
556 impacts of ocean acidification on deep-sea corals may be direct (e.g. decreased growth
557 and recruitment) and indirect (e.g. changes to food supply). The degree and extent to
558 which deep-sea corals are affected by ocean acidification will depend on their skeletal
559 composition (aragonite vs. calcite), geographical location, and depth. Other changes
560 associated with climate change, including changes in temperature and current patterns,
561 may affect both deep-sea corals and sponges and their associated species.

562

563 Priority exploration and research activities to meet this objective are:

564

565 5.1 Provide information on past ocean and climate conditions derived from deep-sea
566 corals to climate modelers to validate or refine existing climate change models or
567 develop new models.

568 5.2 Reconstruct past oceanic conditions using deep-sea corals.

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569 5.3 Investigate how increased ocean acidification may impact calcification rates of
570 deep-sea coral species, and how this may subsequently affect growth and
571 reproduction rates.

572

573 **Anticipated deliverables from these efforts will include:**

574

575 • Improve existing as well as contribute to developing climate change models.

576 • Estimated ages of various deep-sea corals.

577 • Reports on the potential effects of climate change (e.g. ocean acidification and
578 hypoxia) on deep-sea coral and the communities they structure.

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NOAA’s Deep Sea Coral and Sponge Community Conservation and Management Strategy

NOAA is the lead Federal agency mandated to protect, restore and manage the nation’s living marine resources, and as such, recognizes the need to conserve deep-sea coral and sponge communities within areas under its jurisdiction. The Strategic Plan sets out objectives and approaches that NOAA will undertake to enhance protection of these communities working with the Regional Fishery Management Councils (Councils), other Federal agencies and interested partners.

NOAA’s Primary authorities for deep-sea coral and sponge protection addressed in this strategy (See also Appendix A for additional authorities):

- Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 *et seq.*)
 - Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. (Title III, Sec. 301(a)(9)). *[Note: Bycatch of corals or sponges occurs in multiple fisheries. Avoiding bycatch is preferable to attempts to minimize mortality, since corals and sponges caught as bycatch are unlikely to reattach to the substrate upon their return to the ocean.]*
 - Minimize to the extent practicable adverse effects on essential fish habitat caused by fishing, and identify other actions to encourage the conservation of such habitat (Title III, Sec. 303(a)(7)). *[Note: Habitats where deep-sea corals or sponges occur have been identified as essential fish habitat for a number of fisheries.]*
 - *Discretionary provisions:*
 - Designate zones in areas where deep-sea corals are identified to protect deep-sea corals from physical damage from fishing gear, or to prevent loss or damage to such fishing gear from interactions with deep-sea corals (Title III, Sec. 303(b)(2)(b)).
 - Include management measures in the plan to conserve target and non-target species and habitats, considering the variety of ecological factors affecting fishery populations (Title III, Sec. 303(b)(12))
 - Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. (Title III, Sec. 301(a)(1)). *[Note: In certain cases, deep sea corals or sponges may themselves be managed species (e.g., precious corals in the Western Pacific)]*
- National Marine Sanctuary Act (16 USC 1431 *et seq.*). Maintain the natural biological communities in the national marine sanctuaries, and to protect, and where appropriate, restore and enhance natural habitats, populations and ecological processes (Sec. 301(b)(3)).

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592 Most U.S. deep-sea coral and sponge communities occur in the EEZ, rather than in state
593 waters. As NOAA, in partnership with the Councils, is the federal agency responsible for
594 managing fisheries in the EEZ, managing fishing threats to these communities is a
595 primary focus of this Strategic Plan. NOAA has determined that certain fishing practices,
596 especially those using mobile bottom-tending gear (including beam and otter trawls,
597 dredges, and other mobile fishing gear that is dragged along the ocean floor), may
598 adversely affect deep-sea corals and sponges and the communities that depend upon them
599 (70 FR 39,700, July 11, 2005). Bottom trawling is currently the major threat to these
600 communities where such fishing is allowed (NRC 2002, UNGA 2006, Hourigan et al.
601 2007), though other bottom-tending gear, including bottom-set longlines and gill nets,
602 and to a lesser extent traps, have also been identified as threats to deep-sea corals
603 (Reviewed by Hourigan et al. 2007) and sponges (UNGA 2006, Krautter et al. 2001).

604
605 Current NOAA management and regulations have kept gear interactions with these
606 communities from becoming a threat in certain regions. For example, in 1983, the
607 Western Pacific Fishery Management Council recommended, and NOAA implemented a
608 prohibition on the use trawl gear, bottom-set long lines, and bottom-set gill nets in the
609 entire EEZ under the Council’s jurisdiction. More recently, prohibitions on certain gears
610 have also been implemented over large portions of other Council jurisdictions.

611
612 The Ocean Action Plan encourages all Councils to take action, where appropriate, to
613 protect deep-sea corals when developing and implementing regional fishery management
614 plans. NOAA’s precautionary approach to reduce adverse impacts of fishing on deep-sea
615 coral and sponge communities is contained in Management Objectives 1-3 and outlined
616 graphically in Figure 2. All actions to protect deep-sea coral and sponge communities in
617 the EEZ from the impacts of fishing gear will be carried out through established NOAA
618 and Council processes.

619

NOAA’s Deep-sea Coral and Sponge Management Objectives:

1. Protect areas containing major known deep-sea coral or sponge communities from impacts of bottom-tending fishing gear.
2. Protect habitat areas where mobile bottom-tending fishing gear has not been used recently as a precautionary measure.
3. Develop regional approaches to further reduce interactions between fishing gear and deep-sea corals and sponges.
4. Enhance conservation of deep-sea coral and sponge communities in national marine sanctuaries.
5. Assess and encourage avoidance or mitigation of adverse impacts of non-fishing activities on deep-sea coral and sponge communities.
6. Provide outreach to enhance public understanding of these resources.

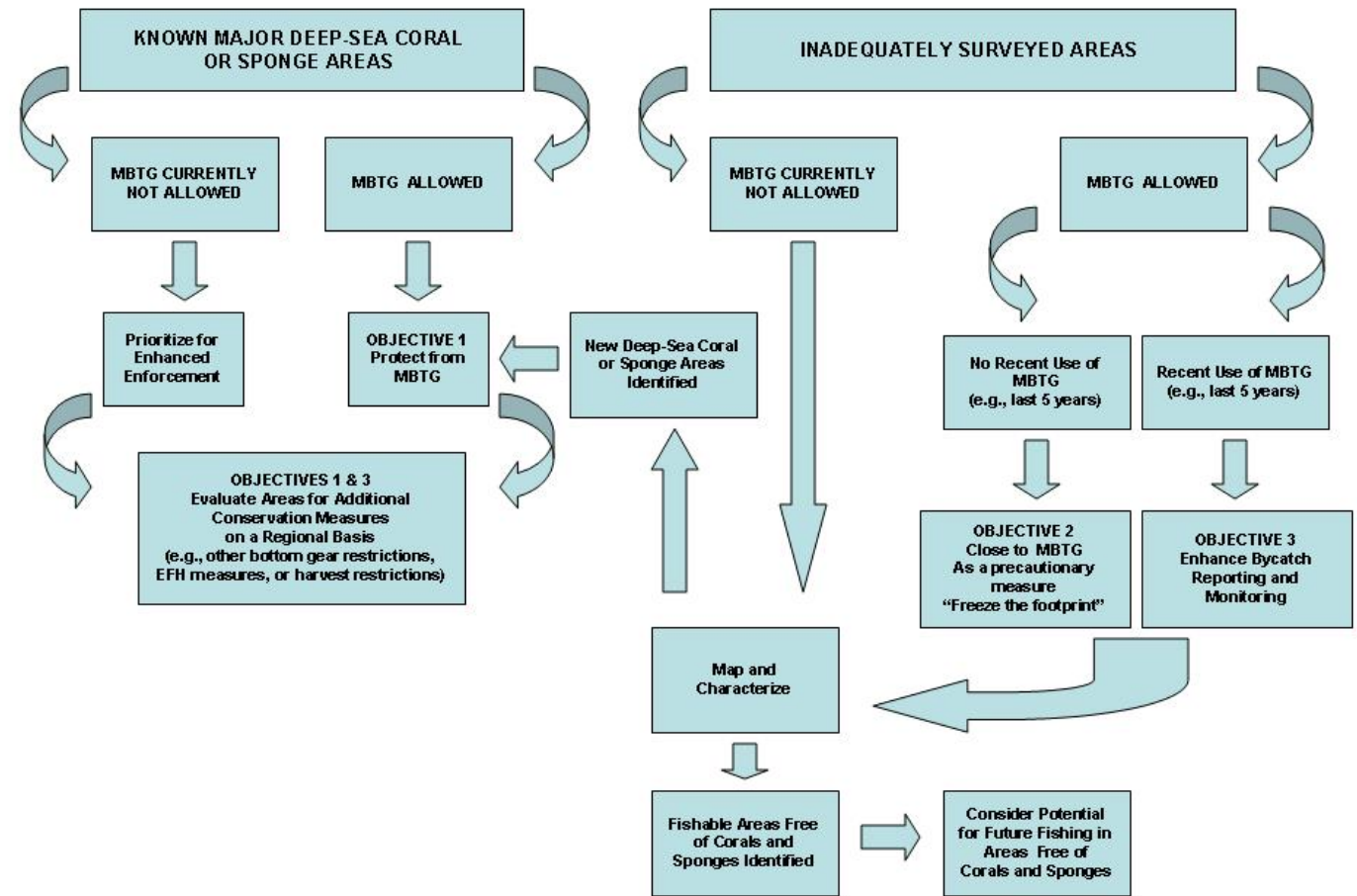
620

621 In addition to fishing, oil, gas, and mineral exploration and extraction; submarine
622 cable/pipeline deployment; and other human activities may adversely impact deep-sea

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623 coral and sponge communities. NOAA, in partnership with co-trustees, can manage
624 these stressors directly within National Marine Sanctuaries (Objective 4). Elsewhere,
625 NOAA will encourage enhanced protection of these communities through partnerships
626 with applicable management agencies (Objective 5) and through outreach to the public
627 and resource users (Objective 6). The linkages among these Objectives and the
628 Exploration and Research Objectives are shown in Appendix C.
629
630

Approach to Manage Mobile Bottom-Tending Gear (MBTG) Impacts



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634 **1. PROTECT AREAS CONTAINING MAJOR KNOWN DEEP-SEA CORAL AND** 635 **SPONGE COMMUNITIES FROM IMPACTS FROM BOTTOM-TENDING GEAR** 636

637 Research by NOAA and its partners has identified a number of major deep-sea coral and sponge
638 communities within the U.S. EEZ. In many cases, NOAA and the Councils have already taken
639 significant steps to protect known areas from impacts of fishing gear. However, new research is
640 revealing additional deep-sea coral and sponge areas that are currently unprotected. Closures to
641 mobile bottom-tending gear are particularly useful for protecting biogenic habitats such as deep-
642 sea corals and sponges (NRC 2002). Under this objective, NOAA will work with the Councils to
643 ensure that fisheries that may interact with identified major deep-sea coral and sponge
644 communities are identified, monitored, and that these communities are adequately protected from
645 impacts by fishing gear. For the purposes of this objective, “major known communities” refers
646 to large aggregations or high concentrations of structure-forming deep-sea corals or deep-sea
647 sponges and their associated fauna.
648

649 NOAA, in consultation with the Councils will:

- 650 1.1 Identify areas containing high concentrations of structure-forming deep-sea corals or
651 sponges and their current level of protection from interactions with fishing gear. An
652 initial list of such major deep-sea coral areas with limited or no protection from
653 interactions with bottom-tending fishing gear is included in the first *Report to*
654 *Congress on Implementation of the Deep Sea Coral Research and Technology*
655 *Program* (NOAA 2008). NOAA will:
 - 656 • Present this information to the appropriate NOAA programs involved in
657 mapping and conservation, as well as to partners and Councils for
658 consideration of measures to protect these areas.
 - 659 • Develop standards for future identification of such areas under MSA Section
660 408.
 - 661 • Improve and refine the list of major known areas, adding new areas, including
662 sponge areas, as they are identified through research by NOAA and its
663 partners.
664
- 665 1.2 Request Councils to evaluate these areas known to contain major deep-sea coral and
666 sponge communities for adoption of measures, including closure to mobile bottom-
667 tending gear, and as needed other bottom-tending gear, in order to:
 - 668 • minimize bycatch of deep-sea corals and sponges,
 - 669 • protect deep-sea coral areas pursuant to MSA Sec. 303(b).
670
- 671 1.3 In cases where corals or sponges have been identified as EFH, minimize to the extent
672 practicable adverse effects on such habitat caused by fishing.
673
- 674 1.4 Enhance surveillance and enforcement, as needed, of areas closed for deep-sea coral
675 and sponge protection.

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Anticipated deliverables from these efforts will include:

- A current list of major deep-sea coral and sponge areas in each Council region.
- A list of areas that are likely to support deep-sea coral and sponge communities, but for which additional research is required to verify their existence
- Information on current levels of protection from fishing of major deep-sea coral and sponge communities to provide to Congress and the public.
- Standards developed for identification of areas containing high concentrations of deep-sea corals or sponges that may require enhanced protection in the future.
- Enhanced protection from fishing gear impacts of areas known to contain high concentrations of deep-sea corals or sponges.

2. PROTECT AREAS THAT MAY SUPPORT DEEP-SEA CORAL AND SPONGE COMMUNITIES WHERE MOBILE BOTTOM-TENDING FISHING GEAR HAS NOT BEEN USED RECENTLY AS A PRECAUTIONARY MEASURE

The expansion of fisheries using mobile bottom-tending gear beyond current areas is of management concern. Potentially, many undocumented and relatively pristine deep-sea coral and sponge communities may exist in untrawled (or relatively untrawled) and unmapped areas. This objective takes a precautionary approach to “freeze the footprint” of fishing using mobile bottom-tending gear in order to protect areas that are likely to support deep-sea coral or sponge communities until research surveys demonstrate that proposed fishing will not cause serious or irreversible damage to such communities in those areas. Special emphasis is placed on mobile bottom-tending gear (e.g., bottom trawling), as this gear is the most damaging to these habitats (NRC 2002). This objective only applies to areas where use of such gear is allowed. If subsequent surveys identify portions of these areas that do not contain deep sea corals or sponges, Councils may recommend that suitable these areas be opened for fishing using such gear.

NOAA, in partnership with the Councils, will:

- 2.1 Identify the current “footprint” of trawl and other bottom-tending fishing gear use.
- 2.2 Identify areas in each Council region that have not been subject to mobile bottom-tending gear (based on a review of recent and historic fishing patterns as appropriate, e.g., in the past 5 years) that have a reasonable expectation of supporting deep-sea coral or sponge communities.

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717 2.3 Request Councils to evaluate and take action, where appropriate, to temporarily
718 close such areas to fishing using mobile bottom-tending gear as a precautionary
719 measure to avoid bycatch and protect deep-sea corals, until NOAA has determined
720 through necessary surveys, mapping, and research that such fishing activities would
721 not be likely to cause serious or irreversible damage to major deep-sea coral and
722 sponge communities in these areas.

723

724 **Anticipated deliverables from these efforts will include:**

725

- 726 • Maps of areas that have and have not been subject to mobile bottom-tending gear over
727 the past five years according to best estimates.
- 728 • Maps of recent fishing activities in Federally-managed fisheries within the EEZ by gear
729 type.
- 730 • Areas recommended by the Councils for precautionary closure to mobile bottom-tending
731 gear.

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734

735 **3. DEVELOP REGIONAL APPROACHES TO FURTHER REDUCE INTERACTIONS**
736 **BETWEEN FISHING GEAR AND DEEP-SEA CORALS AND SPONGES**

737

738 Management Objectives 1 and 2 identified NOAA’s national efforts to gather and disseminate
739 information needed by Councils and NOAA to address impacts of fishing gear in areas where
740 there were known major deep-sea coral or sponge communities, or where mobile bottom-tending
741 gear had not yet been widely used and information on the distribution of such habitats was
742 lacking. There are other currently fished areas where deep-sea corals or sponges are likely to
743 occur, but where there is insufficient information on their distribution, concentration or condition
744 to merit immediate closure. Scientific modeling and fishery dependent data (e.g., bycatch) may
745 be used to identify steps necessary for additional conservation of deep-sea coral and sponge
746 resources in areas already fished using mobile bottom-tending gear. In addition, certain areas
747 that have experienced historic impacts may now have patchy distributions of corals or sponges,
748 but may still merit further protection to allow for recovery potential. There are also other
749 management tools besides closure areas that may be appropriate to conserve deep sea corals and
750 sponges. This objective provides a framework for the Councils and NOAA to utilize their
751 management authorities and partnerships to enhance information on bycatch of corals and
752 sponges and apply this information to better manage areas that are already under stress from
753 fishing, balancing the importance of fishery resources on the continental shelf and slope to
754 fishing communities. These issues are best addressed on a region-by region basis.

755

756 NOAA will:

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- 758 3.1 Monitor fishing in locations where deep-sea corals and sponges are known or likely
759 to occur, and enhance bycatch monitoring and reporting of corals and sponges.
760 NOAA will:
- 761 • Establish targeted efforts to map the distribution and intensity of specific gears
762 across broader management areas (e.g., through logbooks, permits or vessel
763 monitoring systems) while ensuring appropriate confidentiality of fishing
764 statistics.
 - 765 • Enhance fishery observer training to collect coral and sponge bycatch
766 information and supplement coverage on trawl vessels operating in areas of
767 known or suspected deep-sea coral or sponge communities.
- 768
- 769 3.2 Develop or improve methodologies to utilize bycatch reports and research trawl
770 information to identify new coral and sponge areas for protection.
771
- 772 3.3 Provide information to fishing industry participants to assist them to avoid areas of
773 high bycatch and to identify gear or fishing methods that minimize bycatch of deep-
774 sea corals and sponges.
775
- 776 3.4 Develop and implement regional implementation plans for mapping, monitoring,
777 research, and additional management actions, where applicable.
778
- 779 3.5 Work with partners to implement regional plans through regulations and enhanced
780 outreach and education efforts to fishery managers, scientists, fishermen, tribes, and
781 other stakeholders in each region.
782

Anticipated deliverables from these efforts will include:

- 783
- 784 • Regional plans designed to reduce bycatch and other interactions between fishing
785 gear and deep-sea corals and sponges.
 - 786 • Recommendations to appropriate Councils (and national marine sanctuaries as
787 applicable) that identified areas be closed year round to the use of mobile bottom-
788 tending gear and be evaluated with regard to the need for protection from other
789 bottom-tending gear.
 - 790 • Fishery observer coverage and training on trawl vessels operating in areas of known
791 or suspected deep-sea coral or sponge communities.
 - 792 • Habitat maps of potential habitats of deep-sea coral and sponge communities, as well
793 as maps of known deep-sea coral and sponge communities, the distribution of fishing
794 effort and intensity.
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798 Regional implementation planning will allow refinement of the research and management needs
799 identified in the Strategic Plan to further focus limited funds, respond to emerging issues and

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800 changing priorities, and take advantage of increasing knowledge developed during the next five
801 years.
802

Planning for Regional Implementation:

Regional implementation planning represents a key element of the *Conservation and Management Strategy*. NOAA will develop national guidelines for criteria of vulnerability. NOAA regional teams, in cooperation with the Councils and with the input of stakeholders, will produce implementation plans, or incorporate this information into existing regional plans (e.g., bycatch reduction plans) based on assessments developed in response to this national strategy. Timelines will be developed in concert with national policy and guidance on deep-sea coral and sponge ecosystems. The timing of implementation will vary, depending on regional needs.

The approach could include:

- Criteria, consistent with national guidelines, for identifying “vulnerability” of deep-sea corals and sponge species to adverse impacts of bottom-tending gear.
- Application of those criteria to identify the most vulnerable deep-sea coral and sponge species and communities.
- Identification of serious impacts from fishing practices.
- Identification and evaluation of alternatives for reducing bycatch and other adverse impacts, including at least the elimination of bottom trawling in areas of concentrated deep-sea corals and sponges or in areas where rare or particularly vulnerable species of deep-sea corals or sponges are known to exist.
- Recommendations for modification of fishing gear and/or fishing practices.
- Recommendations for area restrictions on fishing as appropriate.

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4. ENHANCE CONSERVATION OF DEEP-SEA CORAL AND SPONGE COMMUNITIES IN NATIONAL MARINE SANCTUARIES AND THE PAPAĀNAUMOKUĀKEA NATIONAL MARINE MONUMENT

810 The National Marine Sanctuaries Act (NMSA) authorizes NOAA to identify and protect
811 nationally significant habitats and resources throughout U.S. waters. Deep-sea corals and
812 sponges are known to exist within the boundaries of eight National Marine Sanctuaries with
813 mandates that include their conservation: Stellwagen Bank, Florida Keys, Flower Garden Banks,
814 Channel Islands, Monterey Bay, Gulf of the Farallones, Cordell Bank, and Olympic Coast. The
815 Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands is the
816 nation’s largest comprehensively protected marine area. It is managed jointly by three co-
817 trustees—the Department of Commerce; Department of the Interior and the State of Hawaii. The
818 Monument contains rich deep-sea coral resources.

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Each national marine sanctuary and the Marine National Monument will:

- 4.1 Evaluate the occurrence of deep-sea coral and sponge communities within their boundaries.
- 4.2 Make recommendations for the conservation of deep-sea coral and sponge communities under their jurisdiction in their management plans in consultation with the states and regional fishery management councils (NMSA section 304 (a) (5)), co-trustees, and other stakeholders as appropriate.

Anticipated deliverables from these efforts will include:

- Sanctuary and/or Monument management plans that incorporate conservation of deep-sea coral and sponge communities.
- Outreach and education materials that enhance the understanding of visitors about deep-sea coral and sponge communities within each sanctuary.

5. ASSESS AND ENCOURAGE AVOIDANCE OR MITIGATION OF ADVERSE IMPACTS OF NON-FISHING ACTIVITIES ON DEEP-SEA CORAL AND SPONGE COMMUNITIES.

In addition to fishing, other activities can have adverse impacts on deep-sea coral and sponge communities (e.g., dredging, cable and pipeline deployment, energy and mineral exploration and development activities). Outside of National Marine Sanctuaries and the Papahānaumokuākea Marine National Monument, and with the exception of approval of licenses for deep-seabed hard mineral exploration and development pursuant to the Deep-seabed Hard Mineral Resources Act (30 U.S.C. 1401, et seq.), NOAA does not have authority to directly regulate such non-fishing activities. However, NOAA is authorized to monitor activity in locations where deep-sea corals are known or likely to occur (MSA Sec. 408 (a) (3)) and information gathered through NOAA’s research programs can assist in avoiding or mitigating impacts from these activities. In addition, in cases where corals and or sponges have been identified as EFH, any Federal agency that takes an action that may have an adverse effect on EFH must consult with NOAA Fisheries. NOAA Fisheries will then provide conservation recommendations to minimize or mitigate impacts of that action where it finds that such action would adversely affect EFH. NOAA can also comment through the National Environmental Policy Act (NEPA) process on other Federal actions that may affect these communities.

NOAA will:

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861 5.1 Provide information on the location of deep-sea coral and sponge communities to
862 other federal agencies, and work with them to identify current and potential
863 impacts or stressors to these communities associated with non-fishing activities.

864
865 5.2 Work with industry and federal partners to utilize NOAA research to develop
866 measures to avoid or minimize these impacts.

867
868 5.3 Consult with Federal agencies on their proposed actions that may adversely affect
869 deep-sea coral or sponge habitats identified as EFH, and provide conservation
870 recommendations for conserving those habitats.

871
872 **Anticipated deliverables from these efforts will include:**

- 873
- 874 • Maps of non-fishing activities that may adversely impact known or suspected deep-
875 sea coral or sponge habitats.
- 876 • Development of best management practices for non-fishing activities that may impact
877 deep-sea coral and sponge communities.
- 878

879 880 881 **6. PROVIDE OUTREACH AND COORDINATED COMMUNICATION EFFORTS TO** 882 **ENHANCE PUBLIC UNDERSTANDING OF THESE RESOURCES**

883
884 Improving outreach and communication is central to helping people understand the value of
885 deep-sea coral and sponge ecosystems and ways to avoid damaging them. Reducing human
886 impacts on these ecosystems often requires changing behavior, beliefs, and decision making
887 criteria. An informed, engaged public (including resource users, policymakers, industry
888 representatives, nongovernmental organizations, and other stakeholders) is fundamental to
889 achieving the goals of the Strategic Plan. People will be more likely to alter their actions and
890 support conservation if they understand why these ecosystems are important, realize how their
891 actions affect the condition of deep-sea coral and sponge communities. The need for effective
892 outreach and education cuts across all goals of the *NOAA Deep-sea coral and Sponge Research*
893 *and Management Strategic Plan*, and progress depends on fully integrating outreach and
894 education into research and management initiatives.

895
896 NOAA will:

897
898 6.1 Develop outreach materials to enhance public understanding of deep-sea coral and
899 sponge ecosystems and their conservation.

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901 6.2 Work with partners to identify key stakeholders and develop targeted outreach and
902 education materials tailored to increase their understanding of deep-sea coral and sponge
903 ecosystems and specific actions that can enhance their conservation.
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Anticipated deliverables from these efforts will include:

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- Outreach materials to increase understanding of the public and key stakeholder groups about deep-sea coral and sponge ecosystems and their conservation.
- Recommendations for expanding education and outreach activities, with specific roles identified for NOAA’s Office of Education, NOAA’s Office of Communications, NOAA’s Office of Ocean Exploration, National Marine Sanctuary Program and National Marine Fisheries Service.
- Biennial reports to Congress and the public on steps taken to identify, monitor, and protect deep-sea coral areas, including summaries of the results of mapping, research, and data collection performed.

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NOAA’s Deep-sea Coral and Sponge International Strategy

Since deep-sea coral and sponge communities occur both within and beyond national jurisdictions, effective and comprehensive research, conservation, and management measures will benefit from complementary national, regional and global initiatives. NOAA, in cooperation and consultation with the Department of State, Department of Interior and other relevant governmental agencies, participates in a number of international fora with the authority to manage activities impacting and/or conserving deep-sea corals and sponges. NOAA has and will continue to advance the United States’ position on conserving and managing deep-sea ecosystems in these multilateral and bilateral arrangements.

NOAA’s Strategic Objectives to Enhance International Conservation of Deep-sea Coral and Sponge Communities:

1. Promote international partnerships to conserve deep-sea coral and sponge ecosystems through the sustainable management of activities impacting those resources.
2. Ensure that international trade of deep-sea coral and sponge species is sustainable.
3. Increase international collaborative research and exploration of deep-sea coral and sponge ecosystems.

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1. PROMOTE INTERNATIONAL PARTNERSHIPS TO CONSERVE DEEP-SEA CORAL AND SPONGE ECOSYSTEMS THROUGH THE SUSTAINABLE MANAGEMENT OF ACTIVITIES IMPACTING THOSE RESOURCES.

The decline of near shore fisheries and the advent of improved capacity of fishing vessels have led to increased fishing efforts in the deep seas. In some cases, the rate of expansion has surpassed our knowledge of the deep sea target species and their associated habitats. Many of these deep sea fish species may be especially vulnerable to fishing pressures as result of slower rates of growth and reproduction. Further, vulnerable benthic ecosystems, such as deep-sea corals, may take decades or longer to recover from the impacts of mobile bottom tending gears. The U.S has been an international leader for the protection of vulnerable habitats from destructive fishing practices, guided by President Bush’s 2006 Memorandum to the Secretaries of State and Commerce, which highlights the importance of addressing destructive fishing practices that destroy the long-term natural productivity of fish stocks or habitats such as seamounts, corals, and sponge fields for short term gain,. The President directed the Department of State and NOAA to work diplomatically within international fora to promote sustainable fishing practices, and to call upon all nations to prohibit their vessels from engaging in destructive fishing practices on the high seas until appropriate conservation and management measures are in place.

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951
952 The international community has acknowledged the need to sustainably manage deep sea fisheries
953 and protect the associated vulnerable marine ecosystems (VMEs). Annually, all member States of
954 the United Nations General Assembly (UNGA) negotiate a fisheries and an oceans related
955 resolution that guides international policy and management on a range of marine issues,
956 including issues that bear on the conservation of deep-sea corals and sponges. The 2006 UNGA
957 sustainable fisheries resolution (A/Res/61/105) provides a framework for protecting vulnerable
958 marine ecosystems (VMEs), such as seamounts, cold-water corals and hydrothermal vents, from
959 significant adverse impacts of fishing on the high seas. States and Regional Fisheries Management
960 Organization and Arrangements (RFMO/As), with guidance from the U.N. Food and Agriculture
961 Organization (FAO), are currently in the process of developing management measures to fulfill this
962 mandate.
963
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The 2006 UNGA Sustainable Fisheries Resolution (A/Res/61/105) calls upon Regional Fisheries Management Organizations/Arrangements (RFMO/As) to:

- Assess whether individual bottom fishing activities would have significant adverse impacts on VMEs and, if so, manage such fishing to prevent such impacts or not authorize it to proceed;
- Identify where VMEs are and determine if bottom fishing would cause significant adverse impacts to the VMEs and long term sustainability of deep-sea fish stocks through, among others, scientific research, data collection and sharing, and new and exploratory fisheries;
- Close areas to bottom fishing if VMEs are present or are likely to be, based on the best available scientific information, and not allow such fishing to proceed unless conservation and management measures are in place to prevent significant adverse impacts on VMEs;
- Cease bottom fishing if a VME is encountered and report the location so that appropriate measures can be adopted with respect to the relevant site; and
- Make the relevant measures adopted in accordance with resolution 61/105 public.

The resolution calls for RFMO/As to comply with these provisions by December 31, 2008, and interim measures by December 31, 2007 for States participating in negotiations to establish new RFMO/As to regulate bottom fisheries. Further, States should adopt and implement the above measures or cease authorizing bottom fishing in areas where there is no competent RFMO/A or where no interim measures have been adopted in conjunction with new RFMO/A negotiations. Finally, States agreed to review actions taken in accordance with the resolution, and, if necessary, propose further recommendations at the 2009 UNGA fisheries resolution negotiations. The 2007 UNGA sustainable fisheries resolution (62/177) reaffirmed the call for RFMO/As and Flag States to implement these measures.

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967 To this end, NOAA will take the following actions:

968
969 1.1. Support national implementation and multilateral cooperation for compliance with
970 UNGA resolution 61/105

971 NOAA, in cooperation with the State Department, will work with international partners to
972 promote compliance with UNGA resolution 61/105 through support of conservation and
973 management measures to prevent significant adverse impacts to VMEs by the deadlines
974 established in the resolution. NOAA will take needed steps to ensure compliance by its flag
975 fisheries. Additionally, NOAA will support and participate in collaborative research on the
976 identification of VMEs globally and the assessment of the impact of fishing on known VMEs.

977 Additionally, pursuant to the Magnuson-Stevens Fishery Conservation and Management
978 Reauthorization Act of 2006 (MSRA), NOAA Fisheries published the legislative definition of
979 Illegal, Unreported and Unregulated (IUU) fishing, which includes fishing activities that have an
980 adverse impact on seamounts, hydrothermal vents, and cold water corals located beyond national
981 jurisdiction, for which there are no applicable conservation or management measures or in areas
982 with no applicable international fishery management organization or agreement. The Department
983 of Commerce is in the process of developing regulations to implement measures of the Act that
984 will seek to address IUU fishing, and will work closely with our international partners in its
985 application.

986
987 1.2. Promote compliance with the UNGA Fisheries resolution in RFMO/As with the
988 competence to regulate bottom fisheries

989
990 NOAA shall, in collaboration with the Department of State, advance compliance with the 2006
991 UNGA fisheries resolution within those RFMOs with the authority to regulate bottom fisheries
992 and within which the U.S. is a member. The 2006 UNGA fisheries resolution calls upon
993 RFMO/As with the authority to regulate bottom fisheries, to adopt and implement relevant
994 measures for their respective regulatory areas by December 31, 2008.

995
996 Currently, four RFMO/As have the competency to manage bottom fishing, the Northwest
997 Atlantic Fisheries Organization (NAFO), North East Atlantic Fisheries Commission (NEAFC),
998 South East Atlantic Fisheries Organization (SEAFO), and Convention on the Conservation of
999 Antarctic Marine Living Resources (CCAMLR). Of those, the United States is party to NAFO
1000 and CCAMLR. Through United States leadership, CCAMLR and NAFO adopted strong
1001 conservation and management measures that are consistent with UNGA resolution 61/105,
1002 including the identification of VMEs, assessment of bottom fishing activities and the adoption of
1003 subsequent management measures, if necessary, and the cessation of bottom fishing if a VME is
1004 encountered. The United States will continue to work with these organizations for the full and
1005 effective implementation of these guidelines.
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1.3. Support negotiations for the development of new RFMO/As with the competence to regulate bottom fisheries

NOAA will, in cooperation with the Department of State, provide technical support and leadership during negotiations for the establishment of new RFMO/As in areas where no such organization or arrangement exists, and support, adoption and implementation of interim measures to prevent significant adverse impacts on VMEs. The 2006 UNGA fisheries resolution calls for States negotiating relevant new RFMO/As to adopt interim measures by December 31, 2007.

The U.S. is currently participating in negotiations to establish two new regional fisheries management organizations or arrangements to manage bottom fisheries: one in the Northwest Pacific and one in the South Pacific. In 2007, both organizations agreed to interim non-binding provisions that are fully consistent with UNGA resolution 61/105, as well as provisions for data collection and monitoring, and measures to freeze current bottom fishing both in terms of effort or catch and areas fished. As participants in the Mechanism for the Management of High Seas Bottom Fisheries in the Northwestern Pacific Ocean, the United States, Japan, the Republic of Korea and the Russian Federation, adopted these measures in February 2007, and refined them in October 2007. In the South Pacific RFMO, participants including Australia, Russian Federation, Japan, New Zealand and Chile, agreed to interim measures in May 2007. Participants further developed an interim benthic assessment framework, and an assessment process to assist flag States and the interim Scientific Working Group in its role to evaluate the assessments provided by States.

1.4. Support the United Nations Food and Agriculture Organization (FAO) development of technical guidance and assistance to address significant adverse impacts of fishing on vulnerable marine ecosystems (VMEs)

NOAA will promote and support FAO implementation of the relevant provisions of the 2006 UNGA fisheries resolution. NOAA will participate in the FAO process to develop management guidance for deep-sea fisheries, including criteria for the identification of vulnerable marine ecosystems (VMEs) and significant adverse impact on VMEs.

In August 2008, governments in cooperation with the FAO adopted a document entitled, “International Guidelines for the Management of Deep-Sea Fisheries in the High Seas,” which includes standards and criteria for identifying vulnerable marine ecosystems beyond areas under national jurisdiction and the impacts of fishing activities on such ecosystems, in order to facilitate the adoption and the implementation of conservation and management measures by RFMO/As and flag States.

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1050 1.5 Review actions taken to implement the UNGA resolution and identify next steps.

1051

1052 NOAA, in coordination with the Department of State and other relevant government agencies,
1053 and with input from stakeholders, will review global and multilateral progress to implement the
1054 2006 UNGA fisheries resolution, identify gaps in implementation and formulate strategies to
1055 address any such gaps in advance of the 2009 informal UNGA negotiations. NOAA will
1056 continue to work with these partners to regularly review subsequent progress to protect VMEs.

1057

1058

1059 **2. ENSURE THAT INTERNATIONAL TRADE OF DEEP-SEA CORAL AND SPONGE** 1060 **SPECIES, AND THEIR PARTS AND PRODUCTS, IS SUSTAINABLE**

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1062 Certain deep-sea corals and sponges are traded internationally, and if not well managed, harvests
1063 to supply this trade result in habitat damage and threats to the species. These threats have been
1064 recognized internationally, particularly for coral species used in the jewelry trade. Black corals
1065 have been listed in Appendix II of the Convention on the International Trade in Endangered
1066 Species (CITES) since 1981. Under Appendix II, an export permit or re-export certificate issued
1067 the Management Authority of the State of export or re-export is required. An export permit may
1068 be issued only if the specimen was legally obtained and if the export will not be detrimental to
1069 the survival of the species. Given recent concern regarding the status of other deep-sea corals,
1070 three pink coral species (genus *Corallium*) have been listed by China on CITES Appendix III
1071 Appendix III lists those species included by the request of a Party State which needs help in
1072 regulating trade to prevent exploitation of that species.

1073

1074 The United States is a major importer of products made from precious corals. In light of the
1075 global concern over deep-sea corals and other VMEs, and because of the prominent role of the
1076 U.S. as a consumer of coral products, it is in the national interest of the U.S. to insure both
1077 sustainable collection and trade.

1078

1079 2.1 Support Convention on the International Trade in Endangered Species
1080 (CITES) Appendix II listing for precious coral (*Corallium*) species

1081

1082 NOAA, in collaboration with other governmental agencies, promoted the addition of precious
1083 coral (*Corallium*) species in Appendix II of CITES at the 14th Conference of the Parties, in May
1084 of 2007. While this measure did not pass, NOAA will work bilaterally and multilaterally to build
1085 support for their listing at the 15th Conference of the Parties to be held in 2010. NOAA will
1086 work with the U.S. Fish and Wildlife Service and other interested Parties and groups to explore
1087 whether other deep-sea coral species in trade with similar life-history characteristics may be
1088 appropriate for future listing proposals.

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1093 3. INCREASE INTERNATIONAL RESEARCH AND EXPLORATION OF DEEP-SEA 1094 CORAL AND SPONGE ECOSYSTEMS

1095

1096 NOAA has unique scientific expertise, programs, and technical and ship assets that can support
1097 or contribute to international research and exploration of deep-sea coral and sponge ecosystems.

1098 NOAA has and will continue to make a concentrated effort to work with the global community
1099 to identify critical information needs to increase our understanding of the distribution and

1100 ecological importance of deep-sea corals and sponges and collaborative efforts to fulfill these

1101 information needs. A particular focus of international cooperation in the next five years will be

1102 identification of deep-sea coral and sponge communities in areas beyond national jurisdiction

1103 that may contribute to potentially vulnerable marine ecosystems.

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1105

1106 3.1 Coordinate bilateral and multilateral research, cruises and exploration.

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1109 3.2 Support inclusion of U.S. data on deep-sea coral and sponge species and
1110 communities in multilateral database efforts.

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1113 3.3 Support U.S. participation in international symposiums, conferences or other fora
1114 that facilitates information exchange.

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1286 Glossary

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- azooxanthellate:** Corals without symbiotic photosynthesizing algae.
- biodiversity:** The variability among living organisms from all sources including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems (Convention on Biological Diversity).
- bycatch:** Marine organisms, which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. In the context of this strategic plan it includes, in particular, deep-sea corals and sponges.
- commercial fishing:** Fishing in which the fish harvested, either in whole or in part, are intended to enter commerce or enter commerce through sale, barter, or trade.
- coral:** Species of the phylum Cnidaria having continuous or discontinuous calcium carbonate or horn-like skeletal elements (Cairns 2007), including: (A) all species of the orders Antipatharia (black corals), Scleractinia (stony corals), Gorgonacea (horny corals), , Alcyonacea (soft corals), Pennatulacea (sea pens) and Helioporacea (blue coral and lithotestelids), and species in the family Gerardiidae (gold corals) of the class Anthozoa; and (B) calcified species in the order Anthoathecatae (stylasterid corals and fire corals) or the family of the class Hydrozoa .
- deep-sea coral communities:** Habitats formed by azooxanthellate corals that occur deeper than 50 m and other species of organisms associated with these deep-sea coral habitats.
- deep-sea sponge communities:** Assemblages of structure-forming deep-sea sponges and other associated species below 50 m.
- ecosystem:** A geographically specified system of organisms, the environment, and the processes that control its dynamics. Humans are an integral part of an ecosystem.

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essential fish habitat:	Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Essential fish habitat (EFH) is described and identified for Federally-managed fisheries species through fishery management plans prepared by the Councils or NOAA.
fish:	As defined under the MSA, “fish” includes finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds.
fishery:	One or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics. Also includes any fishing for such stocks.
marine protected area:	Any area of the marine environment that has been reserved by Federal, state, territorial, commonwealth, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.
marine reserve:	An area protected from extractive uses (i.e., no-take area).
stakeholder:	An individual or a group with a particular interest, or stake, in the management and functioning of a given resource. Stakeholders in the context of deep-sea coral and sponge ecosystems may include fishers, other commercial or recreational users, researchers, and students. Also referred to as “constituent” or “user.”
Structure-forming deep sponges: (sponges)	Any species Generally occurring at depths below 50 m that provide vertical structure above the sea floor and can occur at a density such that they promote the development of associated communities.
stressor:	A physical, chemical, or biological factor that adversely affects organisms; an agent, condition, or similar stimulus that causes stress to an organism.
Structure-forming deep-sea corals: (deep-sea corals)	Any colonial, azooxanthellate corals that provide vertical structure above the sea floor that can be utilized by other species. It includes both deep reef-building stony corals (e.g. <i>Lopheliapertusa</i>) as well as individual branching colonies of corals, such as gorgonians, black corals, etc. These are often referred to as habitat-forming deep-sea, deep-water, or cold-water corals. In contrast to shallow-water corals, deep-sea corals general occur at depths below 50 m.

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twilight zone: Zone between 50 to 200 m. The corals that subsist in this environment are adapted to low light conditions and colder water. This is a transition zone between shallow-water corals and sponges and true deep-sea species. This zone may include both zooxanthellate and azooxanthellate corals.

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1289 **Appendices**

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1291 **Appendix A. NOAA Statutory Authorities and Executive Policy**
1292 **Authorities Specific to Research and Conservation of Deep-Sea**
1293 **Coral Communities**

1294

1295 The following are statutory authorities and other policy authorities that apply to NOAA and make specific
1296 reference to deep-sea (or cold-water) corals.

1297

1298 **Legislative Authorities:**

1299

1300 **Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 *et seq.*)**

1301 The Magnuson-Stevens Fishery Conservation and Management Act (MSA) was reauthorized in 2006 and
1302 amended to two sections with specific references to management and research on deep-sea corals:

1303

1304 **MSA Section 303(b). Discretionary Provisions.** Any fishery management plan which is
1305 prepared by any Council, or by the Secretary, with respect to any fishery, may—

1306

1307 (2)(A) designate zones where, and periods when, fishing shall be limited, or shall not be
1308 permitted, or shall be permitted only by specified types of fishing vessels or with specified
1309 types and quantities of fishing gear;

1310

1311 (B) designate such zones in areas where **deep sea corals** are identified under section 408,
1312 to protect **deep sea corals** from physical damage from fishing gear or to prevent loss or
1313 damage to such fishing gear from interactions with **deep sea corals**, after considering long-
1314 term sustainable uses of fishery resources in such areas.

1315

1316 **MSA Section 408. Deep Sea Coral Research and Technology Program**

1317

1318 (a) IN GENERAL- The Secretary, in consultation with appropriate regional fishery
1319 management Councils and in coordination with other federal agencies and educational
1320 institutions, shall, subject to the availability of appropriations, establish a program—

1321

1322 (1) to identify existing research on, and known locations of, deep-sea corals and submit
1323 such information to the appropriate Councils;

1324 (2) to locate and map locations of deep-sea corals and submit such information to the
1325 Councils;

1326 (3) to monitor activity in locations where deep-sea corals are known or likely to occur,
1327 based on best scientific information available, including through underwater or remote
1328 sensing technologies and submit such information to the appropriate Councils;

1329 (4) to conduct research, including cooperative research with fishing industry participants,
1330 on deep-sea corals and related species, and on survey methods;

1331 (5) to develop technologies or methods designed to assist fishing industry participants in
1332 reducing interactions between fishing gear and deep-sea corals; and

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1333 (6) to prioritize program activities in areas where deep-sea corals are known to occur, and
1334 in areas where scientific modeling or other methods predict deep-sea corals are likely to
1335 be present.

1336
1337 (b) REPORTING- Beginning 1 year after the date of enactment of the Magnuson-Stevens
1338 Fishery Conservation and Management Reauthorization Act of 2006, the Secretary, in
1339 consultation with the Councils, shall submit biennial reports to Congress and the public on
1340 steps taken by the Secretary to identify, monitor, and protect deep-sea coral areas, including
1341 summaries of the results of mapping, research, and data collection performed under the
1342 program.

1343
1344
1345 **High Seas Driftnet Fishing Moratorium Protection Act (16 U.S.C. 1826d et seq.)**
1346 The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, amended
1347 the High Seas Driftnet Fishing Moratorium Protection Act to include fishing activity that has an adverse
1348 impact on cold water corals (=deep-sea corals) under the definition of IUU fishing.

1349
1350 **SEC. 609. Illegal, Unreported, or Unregulated Fishing....**

1351
1352 (e) Illegal, Unreported, or Unregulated Fishing Defined-

1353 (1) IN GENERAL- In this Act the term 'illegal, unreported, or unregulated fishing' has the
1354 meaning established under paragraph (2).

1355
1356 (2) SECRETARY TO DEFINE TERM WITHIN LEGISLATIVE GUIDELINES- Within 3
1357 months after the date of enactment of the Magnuson-Stevens Fishery Conservation and
1358 Management Reauthorization Act of 2006, the Secretary shall publish a definition of the term
1359 'illegal, unreported, or unregulated fishing' for purposes of this Act.

1360
1361 (3) GUIDELINES- The Secretary shall include in the definition, at a minimum--

1362 (A) fishing activities that violate conservation and management measures required under
1363 an international fishery management agreement to which the United States is a party,
1364 including catch limits or quotas, capacity restrictions, and bycatch reduction requirements;

1365 (B) overfishing of fish stocks shared by the United States, for which there are no
1366 applicable international conservation or management measures or in areas with no
1367 applicable international fishery management organization or agreement, that has adverse
1368 impacts on such stocks; and

1369 (C) fishing activity that has an adverse impact on seamounts, hydrothermal vents, and **cold**
1370 **water corals** located beyond national jurisdiction, for which there are no applicable
1371 conservation or management measures or in areas with no applicable international fishery
1372 management organization or agreement.

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1377 **Other Policy Authorities:**

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1379 **U.S. Ocean Action Plan (December 2004)**

1380 Under the heading “Promote Coral Reef and Deep Coral Conservation and Education,” the
1381 Ocean Action Plan recognizes that deep sea corals are related, but distinct from tropical coral
1382 reefs, and commits the administration to “Research, Survey, and Protect Deep-Sea Coral
1383 Communities.”

1384

1385 **Presidential Memorandum on Promoting Sustainable Fishing and Ending Destructive** 1386 **Fishing Practices**

1387 On October 2, 2006 President Bush issued a memorandum “Promoting Sustainable Fishing and
1388 Ending Destructive Fishing Practices” directing the Secretaries of State and Commerce to work
1389 with other countries, international organizations and Regional Fishery Management
1390 Organizations to implement five policies to reduce destructive fishing practices on the high seas.
1391 Destructive fishing practices are defined as those “practices that destroy the long term natural
1392 productivity of fish stocks or habitats such as seamount, **corals** and **sponge fields** for short term
1393 gain.”

1394 **Appendix B. NOAA Statutory Authorities and Executive Policy**
1395 **Authorities Relevant to Research and Conservation of Deep-sea**
1396 **Coral and Sponge Communities**
1397

1398 The following is a list of major Statutory Authorities and Executive Orders or other policy
1399 authorities that apply to NOAA research, conservation and management as they relate to deep-
1400 sea coral and sponges. A brief description for each authority and an explanation of its
1401 application to deep-sea coral and sponge communities is included.
1402

1403 **Legislative Authorities:**
1404

1405 **Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 *et seq.*)**

1406 The Magnuson-Stevens Fishery Conservation and Management Act (MSA) establishes exclusive
1407 federal management authority over fishery resources of the Exclusive Economic Zone. It is the
1408 principal Act governing U.S. fisheries policy, and the primary statutory authority for
1409 management actions under this Strategy. The MSA requires among other things, that
1410 conservation and management measures, to the extent practicable, (A) minimize bycatch and (B)
1411 to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch (§
1412 301(a)(9)). It also requires the identification and conservation or enhancement of essential fish
1413 habitat for managed species (§ 305(b)).
1414

1415 In 2006, the Act was reauthorized and amended to include new discretionary authority for FMPs
1416 to designate zones for the protection of **deep sea corals** (§303(b)(2)(B) – See Appendix A), and
1417 to include other management measures to conserve target and non-target species and habitats,
1418 considering the variety of ecological factors affecting fishery populations (§303(b)(12). Also
1419 included was authorization for a **Deep-sea Coral Research and Technology Program** (§ 408 -
1420 See Appendix A).
1421
1422

1423 **National Marine Sanctuaries Act (Title III 16 USC 1431 *et seq.*)**

1424 The National Marine Sanctuaries Act (NMSA) authorizes the Secretary of Commerce to protect
1425 and manage the resources of significant marine areas of the United States. This authority has
1426 been delegated to NOAA. NOAA’s administration of the marine sanctuary program involves
1427 designating marine sanctuaries and adopting management practices to protect the conservation,
1428 recreational, ecological, educational, and aesthetic values of these areas.
1429

1430 **American Antiquities Act (16 USC 431-433)**

1431 The Antiquities Act gives the President authority to protect natural and cultural objects through
1432 designation of a national monument. Although this authority has been largely used to protect
1433 terrestrial resources, the President used it to designate the Papahānaumokuākea Marine National
1434 Monument (Presidential Proclamation 8031) on June 15, 2006

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Endangered Species Act (16 USC 1531 *et seq.*)

The Endangered Species Act (ESA) requires that the Secretary of Commerce list any species that is threatened with extinction in all or a significant portion of its range and designate critical habitat for that species. At this time there are no deep-sea corals or sponges listed as threatened or endangered under the ESA, however, *Oculina varicosa* has been identified as a “species of concern” by NMFS. Endangered Hawaiian monk seals (*Monachus schauinslandi*) are known to forage in beds of precious coral below 300 m in the subphotic zone, which are habitat for known monk seal prey items such as eels (Parrish et al., 2002).

Fish and Wildlife Coordination Act (16 USC 661-666e)

The Act requires federal departments and agencies that undertake an action, or issue a federal permit or license that proposes to modify any stream or other body of water, to first consult with the U.S. Fish and Wildlife Service, Department of the Interior; the National Marine Fisheries Service, Department of Commerce; and appropriate state fish and wildlife agencies. The purpose of the Act is to ensure that wildlife conservation receives equal consideration, and be coordinated with other aspects of water resources development.

National Environmental Policy Act (42 USC 4321 *et seq.*)

The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet NEPA requirements federal agencies prepare a detailed statement known as an Environmental Impact Statement (EIS), and are required to consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved.

American Fisheries Act (PL 105-277)

The American Fisheries Act (AFA) covers management of the pollock fishery in the Bering Sea and Aleutian Islands (BSAI) management area. It also covers the other groundfish fisheries in the BSAI, the groundfish fisheries in the Gulf of Alaska (GOA), the King and tanner crab fisheries in the BSAI, and the scallop fisheries off Alaska.

Deep-seabed Hard Mineral Resources Act (30 USC 1401 *et seq.*). The Deep Seabed Hard Mineral Resources Act establishes an interim domestic legal regime for deep seabed mining pending adoption of an acceptable international regime. The Act establishes a licensing regime that ensures protection of the marine environment, safety of life and property at sea, prevention of unreasonable interference with other uses of the high seas, and conservation of mineral resources. The Act encourages other nations that embark on ocean-mining ventures to manage their activities in a similar fashion, and to respect licenses and permits issued under the Act.

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1477 **Other Policy Authorities:**

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1479 **Marine Protected Areas Executive Order (No. 13158)**

1480 Executive Order 13158 is intended to strengthen management and protection of marine protected
1481 areas (MPAs). The EO requires the Secretaries of Commerce and Interior, in consultation with
1482 other agencies and affected States and territories, to develop a national system of MPAs, to share
1483 information, to develop an MPA website, and to publish a list of MPAs. The EO also requires
1484 each federal agency to take appropriate steps to enhance protection for existing MPAs or to
1485 recommend, if appropriate, new MPAs.

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Appendix C. Linkages between Research and Management Objectives

Management Objectives	Research Objectives						
	1) Locate and characterize habitats	2) Understand biology and ecology	3) Model distribution of habitats	4) Understand biodiversity and ecological function	5) Understand impacts Fishing	Other activities	6) Understand past oceanic conditions and impacts of climate change
1) Protect known deep-sea coral or sponge communities	X				X		
2) Freeze footprint of mobile bottom-tending fishing gear	X				X		
3) Develop regional plans	X	X	X	X	X		
4) Enhance conservation in national marine sanctuaries	X	X	X	X	X	X	
5) Address impacts of non-fishing activities	X	X	X	X	X	X	X
6) Outreach	X	X	X	X	X	X	X

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