HABITAT AREAS OF PARTICULAR CONCERN (HAPC) PROPOSAL

Date: January 9, 2004

Please check applicable box (es):
☑ GOA Groundfish FMP
☑ BSAI Groundfish FMP
☑ Scallop FMP
☑ BSAI Crab FMP
☑ Salmon FMP

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Title of Proposal.
North Pacific Seamounts Marine Reserve Network

HAPC Site Location.
(*Specific latitude/longitude or geographic reference. Include NOAA Chart number, if known.)*
Bowers Seamount (540500, -1744700);
Dickins Seamount (543000, -1370000);
Denson Seamount (540000, -1371500),
Brown Seamount (550000, -1383000);
Welker Seamount (550700, -1402000);
Quinn Seamount (561500, -1451500);
Dall Seamount (581000, -1453500);
Ely Seamount (561500, -1454000);
Giacomini Seamount (562500, -1462500);
Kodiak Seamount (565200, -1491500);
Odessey Seamount (543000, -1494500);
Smook Seamount (550900, -1500700);
Patton Seamount (544000, -1503000);
Hecht Seamount (534500, -1512000);
Marchand Seamount (545000, -1514500);
Chirikof Seamount (545000, -1530000);
Putnam Seamount (513300, -1602500);
Sirius Seamount (520000, -1605000);
Derickson Seamount (525000, -1611500);
Unimak Seamount (534000, -1623000);
Atka Seamount (501600, -1751000);
Adams Seamount (500100, -1761400);
Thurmond Seamount (50.8333, -182).

Summary Statement of the Proposal.
(*Provide a brief paragraph concisely describing the HAPC.*)
The Ocean Conservancy proposes the protection of twenty-three named seamounts within the Aleutian Islands, Bering Sea, and Gulf of Alaska as no-take marine reserves. Substantial

research has demonstrated that seamounts serve as important habitat for a variety of marine species, including several commercially valuable fish species. Scientific research has also documented a high probability for seamounts to host endemic species that occur nowhere else in the world. In furtherance of both the NPFMC's and National Standard's explicit commitment to precautionary management, TOC proposes closing these relatively unfished and discrete areas to all forms of fishing and mineral development. Understanding the need for adaptive management and ecological control areas, TOC proposes that that the seamounts remain open to research activities that will further our understanding of these sensitive marine environments. TOC further proposes that areas which are individually closed as marine reserves be networked as a system of larger marine protected areas. Suggested boundaries for these areas are included on maps in Appendix B.

Statement of Purpose and Need.
(Provide a specific purpose as why the HAPC needs to be identified.)
Rising sharply from the ocean floor, Alaska's North Pacific seamounts are typically very isolated, being the only hard bottom for miles around, and provide unique habitat in otherwise open water far from the coast. Seamounts are subsurface islands of incredible species richness and high biological productivity compared to surrounding deeper waters (Probert et al. 1997). Alaska's seamounts are a unique type of deep-sea habitat that remains relatively unexplored.

The isolation of seamounts is enhanced by specialized current flows that may help retain larvae, on or near their slopes. Because of the extreme isolation of seamount habitats, they represent potential hotspots for the creation of new species. In fact, scientists have found that many of the species on a given seamount may be endemic or genetically isolated from the next nearest population (AXYS Consulting 2000; NOAA 2002). In addition, species have been found to exist on seamounts in conditions under which they were not previously known to exist. Other organisms, such as fish, marine mammals, and seabirds are also thought to be attracted to seamounts as they transit along migratory feeding routes (AXYS Consulting 2002).

NPFMC's own draft EA published in January 2000 concluded that seamount areas "should receive the highest priority in HAPC type designation" and that the seamount habitat type met all HAPC criteria (NPFMC 2000). Despite recognition that seamounts and their resident species are unique and sensitive to human-caused degradation from fishing and potentially deep-sea mining (WWF Germany 2003), little research has been done on seamounts throughout Alaska's North Pacific.

Seamounts need to be designated as no-take marine reserves for the following reasons: 1) the high species diversity suspected to exist at these locations; 2) the potential for future discovery of endemic species in the proposed reserves; 3) the habitat provided by seamounts for species that are known or suspected to congregate in the areas for spawning and mating; 4) the link between human activity and the decline in biodiversity on seamounts; 5) the apparently limited dispersal between seamounts, the extreme longevity and slow recruitment of many species, and the limited fixed habitat that make seamount fauna sensitive to the impact of fishing; 6) the likelihood that habitat recovery on seamounts may take decades or even centuries; and 7) the use of longlines, driftnets and purse seines on or near seamounts are known to impact seabirds, cetaceans, and turtles via incidental catch. (Gubbay 2003).

Habitat Type and Species Information.
(Identify any habitat type(s) and FMP species of the HAPC.)
Limited research over the past two decades has demonstrated that seamount summits in the Gulf of Alaska provide unique habitat for crab, rockfish, sablefish and grenadier (Raymore 1982). More recently, seamounts and pinnacles such as the Sitka pinnacles area have been found to provide important refuge for aggregations of juvenile and adult rockfish as well as spawning habitat for lingcod (NPFMC 2000).

Although the National Marine Fisheries Service (NMFS) has not included seamounts in EFH mapping efforts, managed species and their prey are known to exist on several of the seamounts. Furthermore, seamount research in the North Pacific and around the globe indicates that seamounts provide unique and important habitat for a variety of managed species and the other species upon which they depend.

Sampling and photographic investigation from five of the proposed seamounts (i.e. Patton, Giacomini, Welker, Quinn, and Dickens) revealed the following EFH species: sablefish *(Anoplopoma fimbria)*, Tanner crab *(Chionoecetes tanneri)*, golden king crab *(Lithodes aequispina)*, deep-sea red king crab *(Lithodes couesi)*, grenadier, rockfish and squid (Raymore 1982; Hughes 1981). In addition to these commercially valuable species, sampling also revealed a "wide species diversity of considerable scientific interest" (Hughes 1981).

During a submersible dive on Patton seamount in 1999, Dr. Bradley Stevens observed an abundance of invertebrates at depths less than 1000m including corals, sponges, feather and brittle stars, and crabs. Giant, large-clawed spider crabs (*Macoregonia macrocheira*) were recorded at depths of up to 3,300 meters; the giant crab was not previously known to exist as far north as Patton seamount or at such depths (Kodiak Daily Mirror, 6/18/2002). Two other unexpected species of crab (*Paralomis verrilli* and *Paralomis multispina*) were also observed during the dive. The dive also documented the presence of the Grooved Tanner crab, Golden king crab, scarlet king crab, and two types of squat lobsters (AFSC/NOAA 1999).

A similar dive in 2002 documented the existence of several types of corals including bamboo coral and bristlestars (AFSC/NOAA 2002). Golden king crabs were observed to depths of approximately 500m, and scarlet king crabs were noted on the seamount from 500m to 1000m in depth. During the dive, scientific samples were taken for 10 species of crabs, 7 species of coral, 10 species of sponges, and 18 species of seastars (Kodiak Daily Mirror 8/6/99).

Tagging of sablefish on seamounts in the Gulf of Alaska has demonstrated that seamount to continental slope migration of sablefish and perhaps other species does occur. Sablefish tagged on Welker and Giacomini seamounts were later recovered in the U.S. commercial fishery on the continental slope. A report on the tagging study noted the possibility that seamounts are used as "stepping stones" on the journey (Maloney 2002).

Seamount research is currently underway at Canada's proposed Bowie Seamount marine reserve and marine protected area (MPA). The proposed Canadian MPA abuts the US exclusive economic zone and would be directly adjacent to the proposed Denson Seamount reserve if the respective proposals are adopted. Bowie seamount is known to host the following EFH species: Pacific halibut, sablefish, squid, rougheye rockfish and yelloweye rockfish. The area has been proposed for protection by the Canadian government to preserve its rich biological productivity,

support of unique plant and animal communities, and vulnerability to human pressures and activities (FOC 2001).

The Ocean Conservancy seamount proposals provide a wide range of habitat types due to the varied relief of the seamounts. Summit depths of the proposed seamounts range from 168m (Patton Seamount) to 4517m (Atka Seamount) and the seamounts each contain unique geologic structure and bathymetry. In addition to the EFH species already noted, a wide-range of non-commercial species have also been found to commonly reside on seamounts such as sponges, gorgonians, black corals, scleractinian corals, antipatharian corals, anemones, brisingid seastars and crinoids (Boehlert and Genin 1987). Enhanced currents that sweep around seamounts provide ideal conditions for suspension feeders and these are often the species that dominate the benthos (Rogers 1994). Seamounts are known to host the following suspension feeders: sponges, hydroids and ascidians, crinoids, asteroids, ophiuroids, holothurians, mollusks and decapods. (WWF Germany 2003).

Describe How the Proposal Addresses the each of the 4 HAPC Considerations (*50CFR 600.815*):

The NPFMC has already concluded in the draft HAPC EA published in January 2000 that seamount areas "should receive the highest priority in HAPC type designation" and that the seamount habitat type met all HAPC criteria (NPFMC 2000). Nevertheless, we have further documented below that seamounts meet all four HAPC considerations.

[√] The **IMPORTANCE** of the ecological function provided by the habitat.

As previously noted, seamounts are subsurface islands of incredible species richness and high biological productivity compared to surrounding deeper waters (Probert et al. 1997). It has long been known that fish aggregate on seamounts but why is only partially understood (Probert 1999). Based on research throughout the world's oceans, individual seamounts have been shown to support species that occur nowhere else in the world or which are genetically isolated from the next nearest population. (AXYS Consulting 2000).

As previously noted, limited research over the past two decades has demonstrated that seamount summits in the Gulf of Alaska provide unique habitat for crabs, rockfish, sablefish, and grenadier, and potentially provide important refuge for these and other species (Raymore 1982). More recently, seamounts and pinnacles such as the Sitka pinnacles area have been found to provide important refuge for aggregations of juvenile and adult rockfish as well as spawning habitat for lingcod (NPFMC 2000).

Although the National Marine Fisheries Service (NMFS) has not included seamounts in EFH mapping efforts, managed species and their prey are known to exist on several of the seamounts. Furthermore, seamount research in the North Pacific and around the globe indicates that seamounts provide unique and important habitat for a variety of managed species and the other species upon which they depend, possibly including unknown and undiscovered endemic species.

Distribution of seamount species and levels of endemism are likely to be determined largely by plate tectonic history and the degree to which ridge systems and seamount chains provide 'stepping stones' between areas (Butler et al. 2001). The concept of 'stepping stones' is thought

to be more relevant where seamounts lie close to continental shelf or occur in chains. (WWF Germany 2003).

The ecological importance of seamounts for top predators and marine mammals is emphasized by the fact that some far ranging pelagic species concentrate their mating and spawning on seamounts (WWF Germany 2003). Within the North Pacific Ocean, Baird's beaked whales have been sighted in deep waters over the continental shelf and particularly in regions with submarine escarpments and seamounts (NMFS 2000). Similarly, blue whales have been found to have a close association with the seamounts near the Kamchatka Peninsula (Moore et al. 2002).

[√] The extent to which the habitat is **SENSITIVE** to human-induced degradation.

Many invertebrate and fish species associated with seamounts are known to have a very low rate of productivity and extreme longevity and are therefore extremely vulnerable to overfishing. Furthermore, recovery of such populations is projected to take decades or even centuries (Koslow 1997). In addition, growth-rate estimates for deep-water corals that are typically present on seamounts indicate that the recovery time for corals could take at least as long (Wilson 1979).

In the past, commercial fisheries on seamounts have a record of being unsustainable and may cause strong and persistent damage to epifauna such as corals, sponges and gorgonians (Koslow et al. 2000). For example, fishing over the southern Emperor Seamounts and seamounts in the northern Hawaiian Ridge drove pelagic armourhead (*Pseudopentaceros wheeleri*) to commercial extinction within 10 years of their discovery (WWF Germany 2003).

In a study on Bowie Seamount, Beamish and Neville (In prep.) contend that due to the longevity and slow growth to maturity, sablefish are vulnerable to overfishing (WWF Canada 2003). This is particularly relevant as sablefish are expected to be the most common finfish on Gulf of Alaska's seamounts (Hughes 1981). Sablefish, which is a highly valuable commercial species, has suffered population declines in the past and are susceptible to overfishing (Sigler et al 2003).

Bottom trawling has been shown to be particularly harmful to the benthos of some seamounts. Recent research revealed that the substrate of a heavily fished Tasmanian seamount is now mostly either bare rock or coral rubble and sand, unlike the lightly or unfished seamounts that were also researched (Koslow et al. 2001). The abundance and species richness of the benthic fauna on heavily fished seamounts was also markedly reduced (WWF Germany 2003).

Fishing also has indirect impacts on avian and other species. The use of longlines, driftnets and purse seines have been shown to impact thousands of seabirds, cetaceans and turtles through 'incidental catch' (Gubbay 2003). This is an important consideration as both marine mammals and avian species have been known to congregate above pinnacles and seamounts.

Although fishing is clearly the most significant current threat to seamount biodiversity, it is not the only threat. The exploration of seamounts by mining companies for ferromanganese crust and polymetallic sulphides would have direct physical impacts on seamounts as well as adjacent areas. (WWF Germany 2003).

√ Whether, and to what extent, the activity **STRESSES** the habitat type.

Effects of fishing on seamounts are difficult to distinguish from the effects of deep-sea fisheries in general since catch statistics are often pooled for relatively large areas. Furthermore, in most cases fishing has taken place before there was a reasonable understanding of the biology of the species and habitat being targeted (WWF Germany 2003). Nevertheless, the research available has consistently demonstrated the damaging effects of commercial fishing on seamount biomass and biodiversity.

As previously noted, many species of fish associated with seamounts have been found to have a very low rate of productivity and extreme longevity and are therefore extremely vulnerable to overfishing. Due to these characteristics, recovery of such populations is projected to take decades or even centuries (Koslow 1997). In addition, growth-rate estimates for deep-water corals that are typically present on seamounts indicate that the recovery time for corals could take at least as long (Wilson 1979).

Based on research from the Northeast Atlantic Ocean and North and South Pacific Oceans, commercial fisheries on seamounts have a record of being unsustainable and may cause strong and persistent damage to epifauna such as corals, sponges and gorgonians (Koslow et al. 2000). For example, fishing of the pelagic armourhead (*Pseudopentaceros wheeleri*) over the southern Emperor Seamounts and seamounts in the northern Hawaiian Ridge drove the species to commercial extinction within 10 years of their discovery (WWF Germany 2003).

In a study on Bowie Seamount in the North Pacific, Beamish and Neville (In prep.) contend that due to the longevity and slow growth to maturity, sablefish are vulnerable to overfishing (WWF Canada 2003). This is particularly relevant as sablefish are expected to be the most common fin-fish on Alaska's North Pacific seamounts (Hughes 1981).

In a separate study in the South Pacific, benthic biomass on unfished Tasmanian seamounts was found to be 106% higher than that of heavily-trawled seamounts. Bottom trawling has been shown to be particularly harmful to the benthos of some seamounts. The substrate of heavily fished Tasmanian seamount is now mostly either bare rock or coral rubble and sand, unlike the lightly or unfished seamounts that were also researched (Koslow et al. 2001). The abundance and species richness of the benthic fauna on heavily fished seamounts was also markedly reduced (WWF Germany 2003). As noted above, the result has been a record of overexploitation and major crashes in fisheries stocks associated with seamounts (WWF Germany 2003).

√ The **RARITY** of the habitat type. (*Mandatory requirement*).

The rarity of seamounts is well-established even though the habitats of seamounts, their values, and their relationship with surrounding waters and the neighboring seabed are not well understood. (Commonwealth of Australia 2002). As previously noted, seamount benthic habitats in Alaska's North Pacific are typically very isolated, being the only hard bottom for miles around in a vast water column. These areas represent a unique type of deep-sea habitat that remain relatively unexplored.

Probert states in his 1999 paper that "although seamounts are numerous, they represent in areal extent a relatively scarce habitat when compared to the deep sea as a whole." In general, seamounts appear to support highly diverse, distinctive faunas and because of the extreme isolation of seamount habitats, they represent potential hotspots for the creation of new species and scientists have found that many of the species on a given seamount may be endemic. (Probert 1999; NOAA 2002)

For example, surveys of over a dozen seamounts in southern Tasmania have revealed 279 species comprising 242 species of inverterbrates and 37 species of fish (Koslow et al. 2001; Koslow and Gowlett-Holmes 1998). The surveys found approximately 60 species that are believed to be new to science (Koslow and Gowlett-Holmes 1998). A subsequent comparison of seamount studies demonstrated a high level of endemism of Tasmanian seamounts (Richers de Forges et al. 2000).

In addition, seamounts appear to provide discrete habitat for deep-water predators and marine mammals based on the fact that some far ranging pelagic species concentrate their mating and spawning on seamounts (WWF Germany 2003). Within the North Pacific Ocean, Baird's beaked whales have been sighted in deep waters over the continental shelf and particularly in regions with submarine escarpments and seamounts (NMFS 2000). Similarly, blue whales have been found to have a close association with the seamounts near the Kamchatka Peninsula (Moore et al. 2002).

Objectives of the Proposal.
(List objectives specific to the identification of the HAPC.)
The objectives of this proposal are to: 1) Preserve known and unknown fish and invertebrate species and habitat associated with Alaska's North Pacific seamounts by providing protection for these unique and rare habitats from incidental disturbance caused by fishing effort and other human development; 2) Provide sanctuary for FMP and non-commercial fish and invertebrate species; and 3) Preserve these relatively unknown but pristine ecosystems for future conservation and fisheries research.

Describe any Proposed Solutions to Achieve These Objectives
(*How might the problem be solved? Include concepts of methods of measuring progress towards those objectives.)*
Alaska's North Pacific seamounts face two significant problems: 1) there is a general lack of information and understanding of the physical environments and biological communities of these unique systems; and 2) seamounts have been shown to be very sensitive to human-induced degradation. Therefore, the proposed solutions entail further research and a precautionary management approach until we can develop a better working knowledge of these systems.

Proposed activities to achieve the above-stated objectives include:

- Designate the 23 seamounts identified in this proposal as a network of no-take marine reserves.
- Create an inventory of the physical environments and biological communities that inhabit Alaska's North Pacific seamounts;
- Improve our knowledge of the structure, function, and variability of seamount ecosytems;

- Develop a more comprehensive understanding of the interaction between seamounts and other oceanic and nearshore ecosystems;
- Further our understanding of the relationships and population dynamics between commercial and non-commercial species which inhabit seamounts;
- Further our understanding of the known and potential human-induced threats to seamount habitat and biodiversity; AND
- Further our knowledge of the local effects of establishing a harvest refugia on commercially and non-commercially fished species and the value of harvest refugia as a fisheries and marine management tool.

Describe any Proposed Management Measures for the HAPC.
(Include specific objectives, if appropriate.)
Although marine reserves have recently been shown to have significant benefits to ocean fisheries and habitat health, reserves encompass less than 1 percent of the world's oceans and less than 0.01 percent of U.S. waters (PISCO 2002). The Ocean Conservancy proposes that the 23 named seamounts within the Exclusive Economic Zone be designated and managed as no-take marine reserves. The proposed management boundary for each seamount is a 15 nautical mile radius from the summit as defined on NOAA charts (please refer to Maps A and B and the latitude and longitude descriptions provided under "HAPC Site Location").

The 15 nautical mile radius is proposed as a uniform marine reserve boundary for each of the 23 seamounts discussed in this proposal in order to ensure the most simple and intuitive management and enforcement. A 15 nautical mile radius is the minimum size reserve necessary to encompass the entire base of the largest proposed seamounts (Sirius and Patton Seamount) according to GIS analysis. Within the no-take marine reserve boundaries, the areas would be open to continued research and closed to future fishing and mineral development.

In addition to the designation of individual seamounts as no-take marine reserves, we propose the designation of five larger marine protected areas (MPAs) encompassing several of the above-described marine reserves on the Patton Seamount Province (Maps G and H), Kodiak Seamount Province (Maps C, D and E), Gulf of Alaska Seamount Province (Map F), Sirius Seamount Cluster (Map I) and the Adams-Atka Seamount Cluster (Map J).

The proposed MPAs would be managed to ensure an emphasis on conservation and fisheries research. Within the MPA boundaries but outside of the proposed marine reserves, future fishing would be allowed with experimental fishing permits and a minimum of 100 percent observer coverage. Several possible MPA suboptions have been offered for the Patton Seamount Province (Map G-Suboption A and Map H-Suboption B) and the Kodiak Seamount Province (Map C-Suboption A, Map D-Suboption B, and Map E, Suboption C).

We believe that this seamount management strategy mirrors the precautionary management direction on New Zealand seamounts, which has proven itself very successful. Our expectation is that the management will evolve incrementally as knowledge of the biological and physical characteristics of seamounts and the effects of trawling and other types of fishing on seamount biodiversity is reviewed.

Identify any Expected Benefits to Habitat or FMP species.
(Include specific information regarding a species life history stage, if known.)
Most well-enforced marine reserves result in relatively large, rapid and long-lasting increases in population sizes, numbers of species and reproductive output of marine mammals and plants. For example, average biomass, or weight of all animals and plants, in studied areas was more than four times greater in reserves than in unprotected areas nearby. Furthermore, average density, or number of animals in an area, triples, and the number of species was 1.7 times higher in marine reserves than unprotected areas. Likewise, average body size of animals was 1.8 times larger in reserves than in fished areas. This statistic is particularly important because larger fish and invertebrates typically produce substantially more young (PISCO 2002).

Through spillover and export, marine reserves may also influence populations in adjacent waters. Some adults or juveniles may swim or crawl into neighboring areas to move into less-crowded areas to avoid competition for food and living space. In addition, larvae and plant propagules may drift out of a reserve and seed the surrounding waters (PISCO 2002). Research benefits might include studies on life-history requirements, dispersal and recruitment, genetic connectivity, regional and local oceanographic influences, natural biodiversity, natural mortality, refugia design and effectiveness, and human impact (WWF Canada 2003).

Identify Fishery, Stakeholders, and/or Communities, which may Benefit from the Proposed HAPC.
(Who may or may not benefit from the proposal? Include any known or indirect socioeconomic costs.)
The concept of establishing seamounts as marine reserves is not a new idea and one that has found support within the fishing community in the past. Alan Haig-Brown's August 1999 article noted that some fisherman from the Pacific Northwest have already stated their support for the protection of seamounts as marine reserves (Haig-Brown 1999).

Based on the data available from the NPFMC, there is currently no active fishing on any of the twenty-three seamounts recommended in this report. Due to the proximity of many of the seamounts to the EEZ boundary and corresponding large distances from shore, it is unlikely that these areas are or will be of particular interest to the fishing community. We do not anticipate any direct or indirect socioeconomic costs.

The proposal will benefit the fishing community, research community and general public through the development of a more thorough understanding of seamounts and their interaction with nearshore and other oceanic systems. We also believe that these closed systems will provide an important resource for future research of both commercial and non-commercial species and habitats.

Support Data or Information Sources
(List data sources, information resource, literature, and any traditional knowledge for the proposal.)

Please refer to Appendix A.

APPENDIX A-LITERATURE CITED

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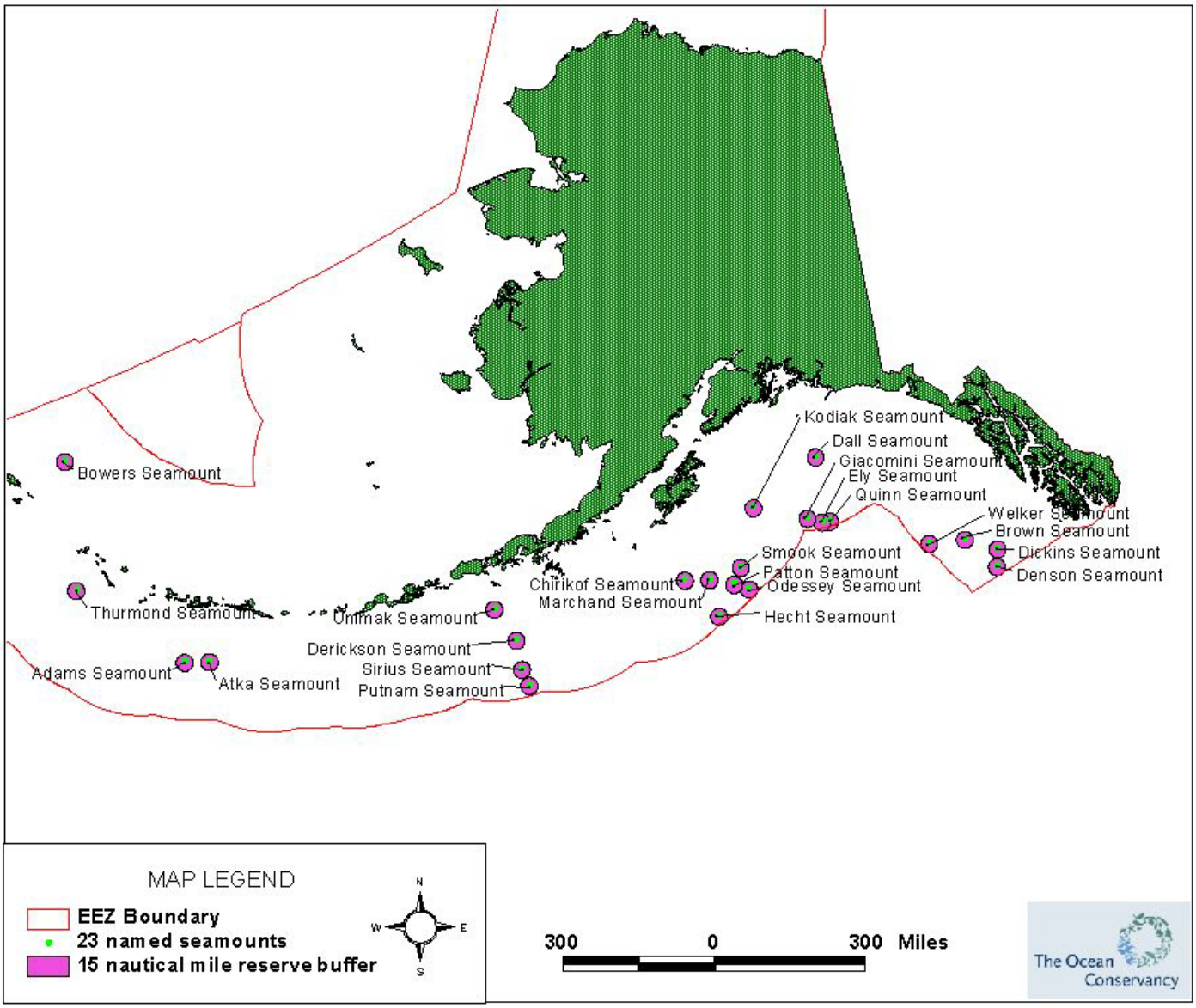
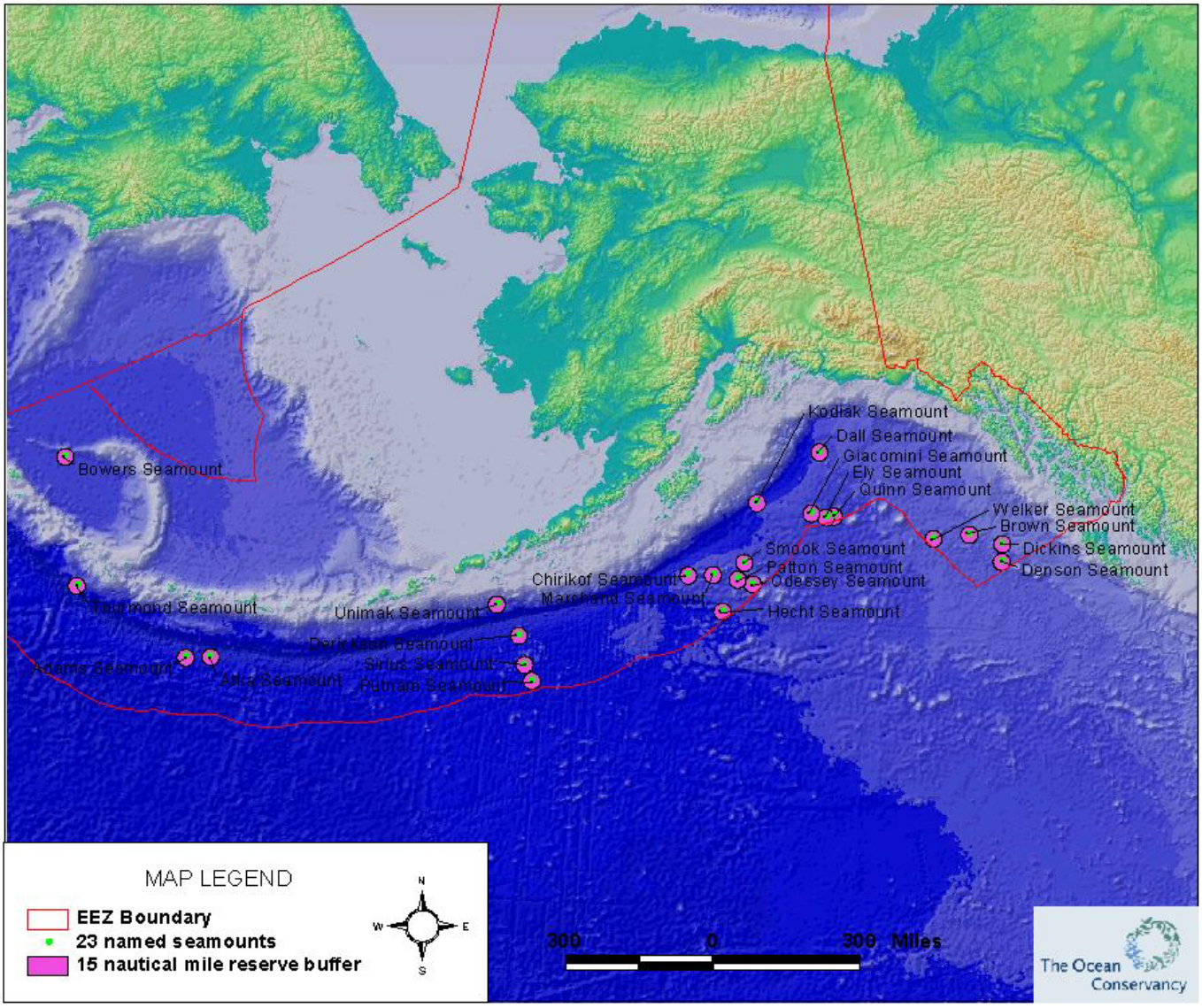
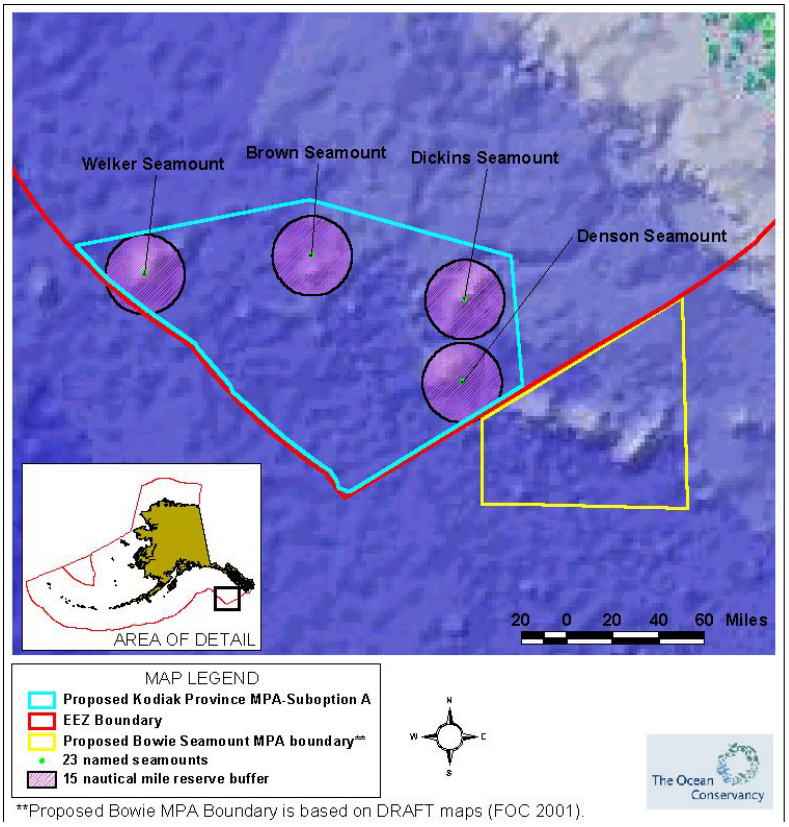
APPENDIX B-MAPS



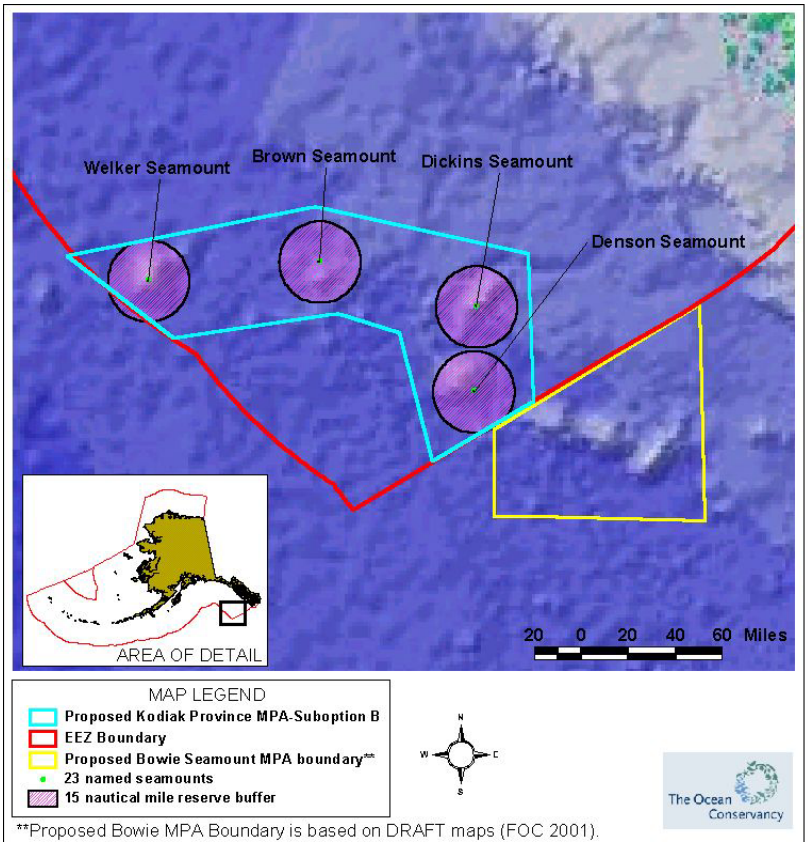
MAP A. Seamounts with 15 nautical mile reserve boundary



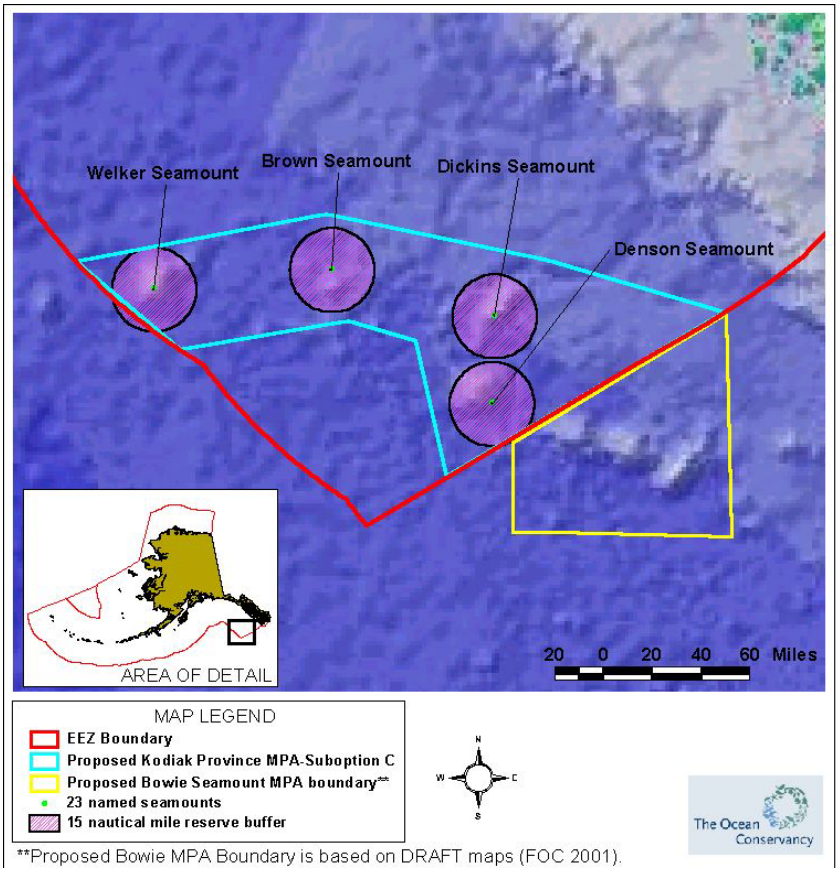
MAP B. Seamounts with 15 nautical mile reserve buffer (depth background)



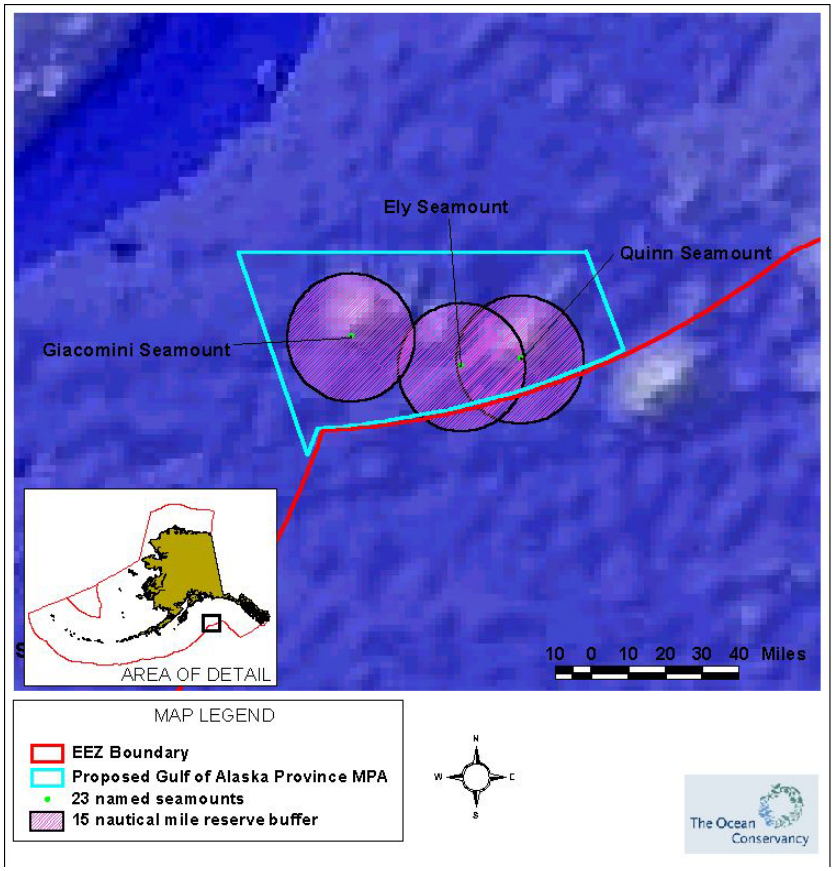
MAP C. Proposed Kodiak Seamount Province MPA-Suboption A



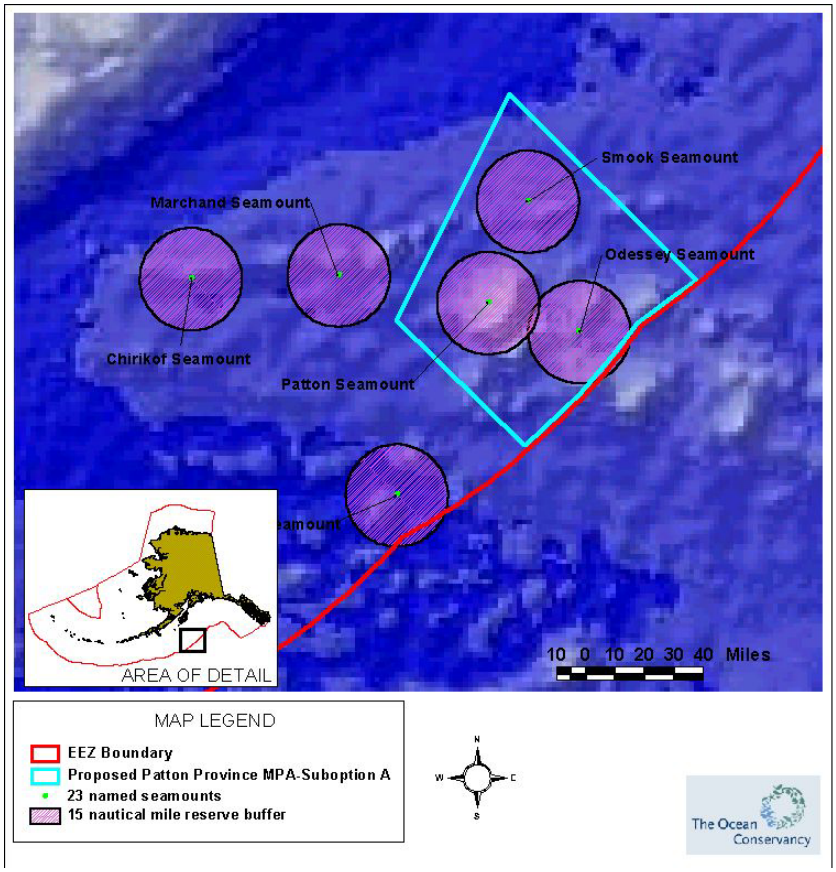
MAP D. Proposed Kodiak Seamount Province MPA-Suboption B



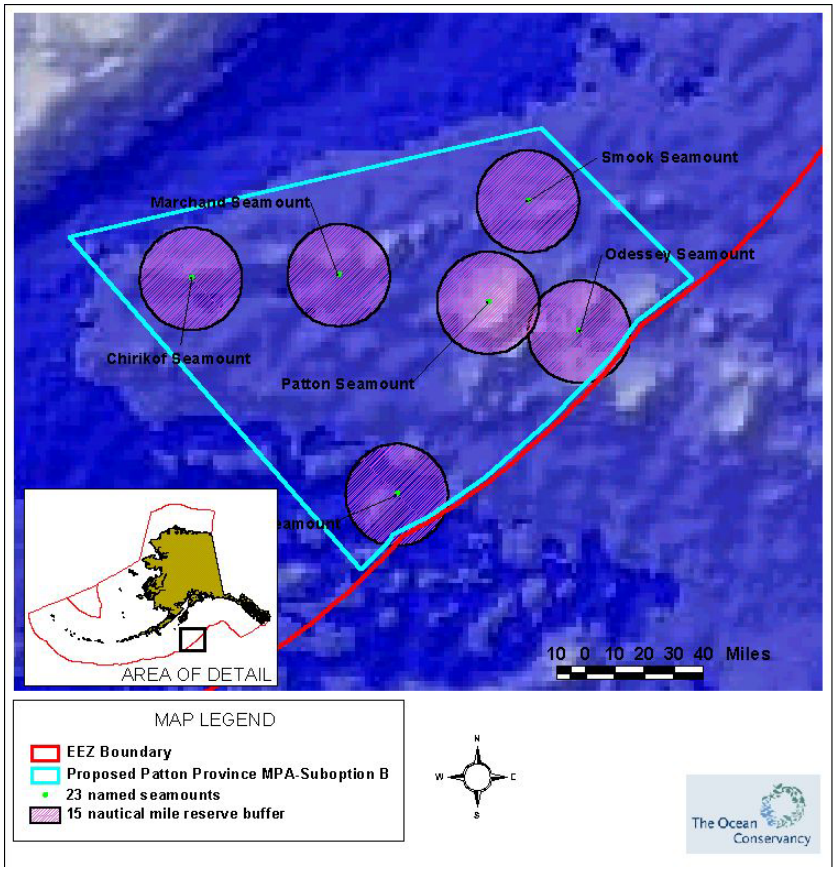
MAP E. Proposed Kodiak Seamount Province MPA-Suboption C



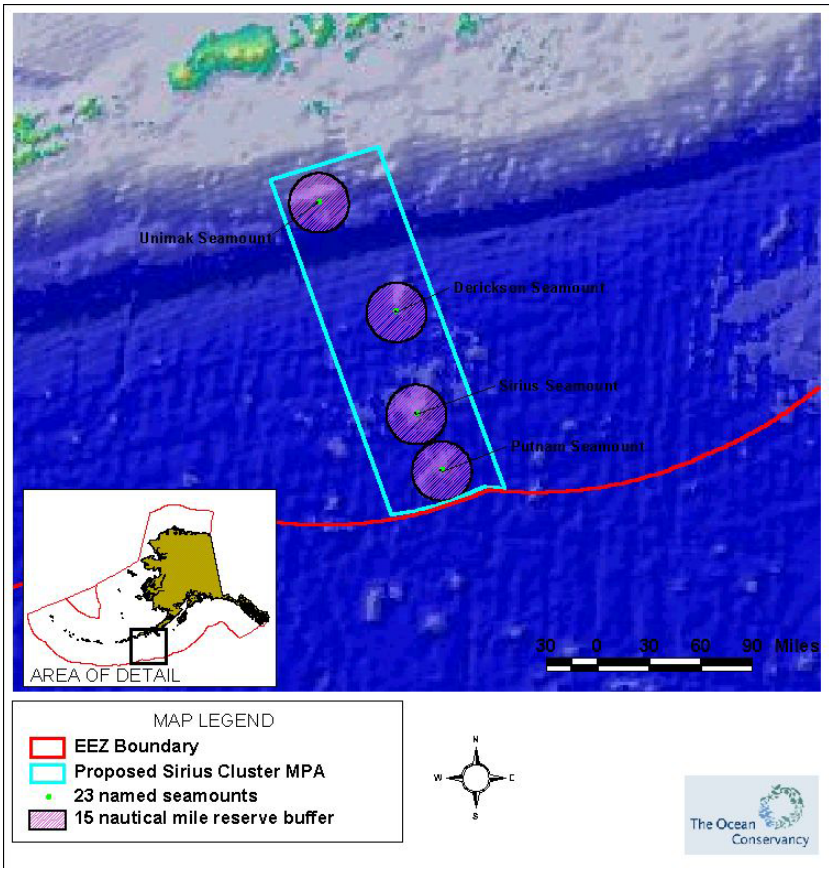
MAP F. Proposed Gulf of Alaska Seamount Province MPA



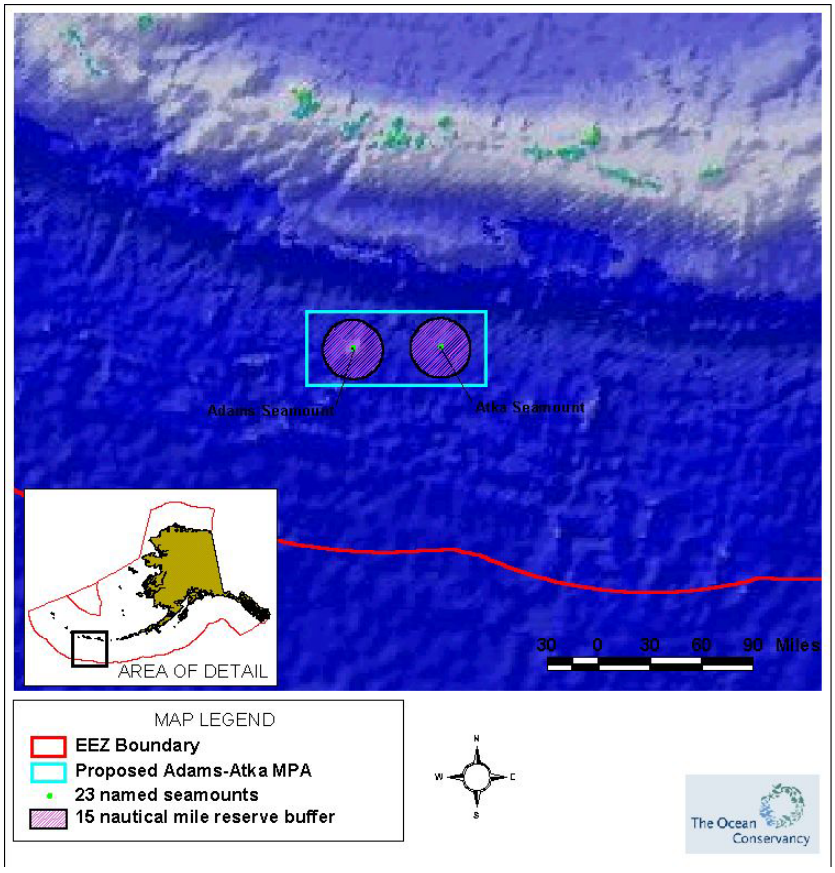
MAP G. Proposed Patton Seamount Province MPA-Suboption A



MAP H. Proposed Patton Seamount Province MPA-Suboption B



MAP I. Proposed Sirius Seamount Cluster MPA



MAP J. Proposed Adams-Atka Seamount Cluster MPA