DEEP-SEA CORAL RESEARCH AND RESTORATION SCOPING DOCUMENT

In June 2023, under Future Council Meeting Agenda and Workload Planning Agenda Item C.8, the Office of National Marine Sanctuaries (ONMS) notified the Pacific Fishery Management Council (Council) of the intention to present select areas for scoping additional fisheries management measures in locations that are suitable for deep-sea coral (DSC) research and restoration. In order for the Council to adequately prepare for this request, ONMS developed this document that provides the basis for scoping should the Council take the opportunity to prepare draft regulations under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §§ 1801 et seq.) for fishing, as deemed necessary. This scope of action provides ten areas[1] total within five larger locations for the Council to consider as they address the request to provide protected areas for DSC research and restoration (Table 1).

Table 1. Scope of action for consideration: Ten areas identified to analyze to determine the most appropriate areas for potential DSC research and restoration.

Location	**Area Name**
Offshore South Point Arena: Three mutually-exclusive proposed areas that are each a different size with partially overlapping boundaries.	Offshore South Point Arena 1 (OSPA-1)
	Offshore South Point Arena 2 (OSPA-2)
	Offshore South Point Arena 3 (OSPA-3)
The Football: Two mutually-exclusive proposed areas that are each a different size with partially overlapping boundaries.	The Football 1 (F-1)
	The Football 2 (F-2)
Cochrane Bank/Fanny Shoals: Two mutually-exclusive proposed areas. One where the Cochrane Bank area is fully encompassed and another connecting Cochrane Bank to Fanny Shoals	Cochrane Bank (CB)
	Cochrane Bank/Fanny Shoals (CBFS)
Año Nuevo-Ascension Canyon Complex: Two proposed areas that do not overlap	Ascension Canyon (AC)
	Año Nuevo Canyon (ANC)
Sur Ridge: One proposed area	Sur Ridge (SR)

[1] For the purposes of this document, a "location" is a general geographic area and an "area" is a more precise place within that location.

The scope of actions outlined in this document is not a list of preferred alternatives, nor are they measures that will necessarily be included in an action. No management measures have yet been analyzed for their effectiveness or impacts. Comments early in the development of this scope of action will help identify effective management alternatives and issues of concern to be addressed during this scoping process.

Purpose and Need

This scoping document represents ONMS's need for DSC research and restoration areas and is intended for Council consideration to scope the designation of places where DSC research and restoration may occur without intentional impacts to the seafloor from bottom-contact fishing gear.

The purpose is to consider designating areas that: are of sufficient size to outplant DSC, including sufficient buffers for propagules from DSC (existing or outplanted) to disperse to the surrounding region and establish additional DSC populations; are of sufficient size to answer research questions related to understanding DSC species and communities at different depths; and, are of sufficient size for enforcement via a vessel monitoring system (VMS). The geographic focus is within Greater Farallones and Monterey Bay National Marine Sanctuaries (GFNMS and MBNMS) at depths between approximately 150-5,118 feet (50-1,560 meters[2]) for research and restoration purposes using methodologies for DSC outplanting that have been successful in MBNMS.

ONMS selected areas to meet all of the following needs for establishing DSC research and restoration areas:

- Protection from benthic fishing impacts in order to conduct long-term[3] research and potential future outplanting;
- DSC collection and processing for outplanting;
- DSC outplanting;
- Restoration effectiveness monitoring; and
- Research on the reproductive biology, feeding, growth, density, and diversity of DSC in the designated areas, and other community-level research (e.g., fish habitat associations and historical ocean chemistry) related to understanding DSC communities at different depths.

The purposes and policies of the National Marine Sanctuaries Act (NMSA) include supporting, promoting, and coordinating scientific research on; long-term monitoring of; and restoring and enhancing natural habitats, populations, and ecological processes of national marine sanctuaries

[2] The depth range of DSC is defined by NOAA as approximately 50 meters to 6,000 meters below the ocean's surface. However, is it not feasible at this time to conduct research and restoration at depths greater than 1,560 meters.

[3] As DSC restoration is a new field, there is little information on the time frame over which we expect to see different phases of success (e.g., survival, growth, propagation). However, a minimum of 10 years or longer is needed to allow these slow-growing organisms to proliferate and grow and to allow them to experience the range of ocean conditions that may occur over a decadal time scale which would influence their growth and survival.

(16 U.S.C. § 1431). This includes research on DSC survival, growth, reproduction, genetic connectivity, density, diversity, associations with other species, and recovery and restoration from damage in designated areas. Preventing impacts from direct human activities such as drilling, dredging, or other alteration of the seafloor including from bottom-contact fishing gear may allow scientists and managers to observe, study, and restore DSC communities in natural conditions over time. Information about DSC life history may contribute to a coordinated and comprehensive approach to the conservation and management of deep-sea habitats within GFNMS and MBNMS, would contribute to the DSC research mandates in the Magnuson Stevens Act [16 U.S.C. § 1884 (a)], may further our understanding of fish associations with DSC, and may help describe and identify essential fish habitat (EFH).

When sanctuary resources are injured, NOAA pursues damage claims on behalf of the public to secure compensation for sanctuary injuries and lost uses resulting from those injuries. The NMSA directs ONMS to "restore, replace, or acquire the 'equivalent' of injured sanctuary resources." NMSA section 312 (16 U.S.C. § 1443) establishes liability for destroying, causing the loss of, or injuring sanctuary resources. DSC restoration within protected seafloor areas, in the absence of intentional fishing impacts, would benefit established and translocated long-lived corals and the many species that use the coral structure for living space, associated food sources, or nursery areas. DSC research in places without intentional impacts from fishing to the seafloor may improve or enhance our understanding of the function of EFH for groundfish.

Background

A Draft Restoration Plan and NEPA Evaluation for the YFD-70 Dry Dock (Draft YFD-70 Restoration Plan) was released by NOAA for public comment in December 2022 and closed March 15, 2023. The goal of the Draft YFD-70 Restoration Plan is to restore resources, habitat, and biota. In response to injuries to DSC from the sinking of a large dry dock, NOAA developed a proposed DSC restoration project focused on coral outplanting[4] in up to five locations that are closed to bottom trawl fishing from both federal (i.e., groundfish) and state (e.g., pink shrimp) fisheries in bottom trawl EFH Conservation Areas (EFHCAs) and were closed at the time[5] to non-trawl commercial groundfish and non-tribal commercial directed halibut in the Non-Trawl Rockfish Conservation Area (RCA).

The Draft YFD-70 Restoration Plan is the result of a Natural Resource Damage Assessment (NRDA) process that began after the dry dock sank in 2016. The NRDA process is driven by law, science, economics, and public input. Through the NRDA process, NOAA determined the extent of injuries and developed a restoration plan that describes the methods, amounts, and locations for compensation.

In February 2023, GFNMS and MBNMS sent a joint letter and informational report to the Council to share the Draft YFD-70 Restoration Plan and provide additional details on coral

[4] Coral outplanting is a process that takes coral segments "source corals" from healthy colonies and transplants them to a new location.

[5] Some of these areas are expected to be opened to non-trawl groundfish and non-tribal directed commercial halibut in January 2024 through the Non-Trawl Sector Area Management Measures package (Amendment 32 to the Pacific Coast Groundfish Fishery Management Plan (FMP)).

restoration locations planned for restoration actions beginning in 2025. At the March 2023 Council meeting, ONMS encouraged the Council to consider pathways to protect potential coral restoration sites from groundfish bottom-contact fishing gear in the future.

Since the March 2023 Council meeting, ONMS has reviewed NOAA's long-term DSC restoration needs for the Draft YFD-70 Restoration Plan, and for subsequent restoration projects that could be supported through the mandates of the NMSA. ONMS also considered research related to understanding DSC communities at different depths and looked more closely at areas within the five identified locations that may contribute to answering research questions relevant to the DSC research mandates under the MSA.

The Draft YFD-70 Restoration Plan coupled with the non-trawl area management action was the catalyst for ONMS engagement with the Council at the March 2023 meeting. However, ONMS has since assessed the potential for other DSC restoration and research projects in GFNMS and MBNMS as well as potential future funding, and determined that the best path forward is to share the range of ten areas within five identified locations where long-term DSC research and restoration may be successfully implemented.

DSC Research and Restoration Areas Design Process

This document incorporates by reference the Draft YFD-70 Restoration Plan which provides background information on location selection criteria for DSC outplanting and details on the methodologies used for successful DSC outplanting.

In May 2023, ONMS held two workshops with fifteen DSC research and restoration experts from around the country to receive input on specific areas in each of the five locations. The scientists were provided background on the selection criteria that resulted in the selection of the five locations for DSC research and restoration.

The scientists were provided access to spatial information (see list below) for the five selected locations, and a list of identified research questions and needs, and were asked to provide feedback about the suitability for DSC research and restoration for each location. They were given access to maps in the NOAA GeoPlatform that included the following information:

- Bottom trawl EFHCAs (no bottom trawl; midwater trawl is allowed);
- Bathymetry;
- Substrate type;
- Locations of identified DSC;
- Transect locations from past research and exploration surveys;
- National Marine Fisheries Service (NMFS) West Coast bottom trawl survey catch and bycatch by effort (2003–2010);
- Fishing effort and coral bycatch;
    - Relative intensity of commercial bottom trawling before gear modifications and no-trawl EFHCAs (Jan 2002–June 2006);
    - West Coast groundfish observer program coral and sponge bycatch by effort (Jan 2002–June 2006); and

- Habitat suitability probability distribution and known locations from remotely operated vehicle (ROV) surveys of adult yelloweye rockfish.

Each expert was then given access to a NOAA GeoPlatform drawing tool where they could draw a DSC research and restoration area and explain the rationale behind the shape. This information was captured in the tool for ONMS review. The experts did not see designs or shapes from other experts. The project team from ONMS reviewed all of the drawn shapes subsequent to the workshops, which provides the basis for the proposed areas (presented below).

Appendix A to the Supplemental ONMS Report 1, March 2023, includes specific data collected in several areas within the identified locations. These data provide more detailed information on the coral species, substrate, and groundfish species of interest in each of the five locations.

ONMS has selected ten areas for consideration within the five locations based on expert input. The ten areas are presented below in the "Summary of Areas" section.

The Importance of Research and Restoration of DSC for Ecosystem Health and Management

DSC and other species in GFNMS and MBNMS are important for ecosystem health, function, and local diversity. There are many functions that DSC and deep-sea sponge communities provide to the ocean ecosystem (Stone et al., 2005; Taylor et al., 2014; and King et al., 2021). DSC provide habitat and food for many species of fish and invertebrates throughout the ocean ecosystem at different depths of the continental shelf, slope, deep-sea, and in canyons. Because many DSC are long-lived and record past environmental conditions in their skeletal structures, they provide another service by providing a living record, helping scientists understand past climate fluctuations and how they may have impacted biological communities (Hill et al., 2011 and Roark et al., 2005).

This document incorporates by reference the description and importance of DSC and coral reefs in the NOAA Fisheries Deep Sea Coral Research and Technology Program 2022 Report to Congress (DSCRTP Report), NOAA Office of Habitat Conservation's Restoration Center Programmatic Environmental Impact Statement (RC PEIS), and the Draft Restoration Plan and NEPA Evaluation for the YFD-70 Dry Dock.

The DSCRTP Report is provided to the U.S. Congress every two years. The 2022 report summarizes the collaborative four-year research initiative in U.S. West Coast waters. The report states that DSC create habitat for countless species off every coastal state in the country, offering significant ecological value and supporting U.S.-managed fisheries. They provide spawning grounds, sustenance, and shelter for commercially-important fish and invertebrates. They also harbor an unknown number of species that are new to science, many of which could be useful in ways we do not yet understand.

Generally, the RC PEIS describes coral reefs as among the most productive of marine ecosystems and critically important for the ecosystem services they provide. These services include providing habitat and food for thousands of species of fish, shellfish, and other marine

life. In addition to their exceptionally important ecological role, coral reefs also provide numerous human use values. For a more detailed discussion, refer to Chapter 3 of the RC PEIS.

The YFD-70 Restoration Plan states that the transplanting of DSC is likely to enhance the seafloor area with structure-forming coral habitat. In addition to the immediate presence of coral, the outplanted coral will be releasing propagules within and beyond the restoration site. Species that form biogenic structures tend to promote both biodiversity and a variety of ecosystem functions. Efforts to translocate healthy or rehabilitated DSC may accelerate the recovery of local diversity and ecosystem function in coral and sponge communities that have been disturbed or destroyed by human activity (Boch et al., 2019 and 2020). The YFD-70 Restoration Plan also states that the restoration of DSC will replace lost, slow-growing species with similar fauna, thus providing habitat that is living and structure-forming for a range of species that exist in both GFNMS and MBNMS. The first DSC restoration project is planned to start in 2025 and will be funded by the YFD-70 Dry Dock settlement. ONMS has taken a "seascape approach[6]" consistent with the NOAA Mitigation Policy for Trust Resources to develop restoration actions to address the injuries to sanctuary resources. However, other restoration projects may occur in the future, which could lead to a more comprehensive understanding of DSC communities at different depths.

Summary of Areas for Consideration

ONMS is requesting that the Council consider locations for scoping additional fisheries management measures to protect areas that are suitable for DSC research and restoration within GFNMS and MBNMS, and is requesting public input on all aspects of this action (Table 1; Figure 1). Within each of the five restoration locations, ONMS has developed 1–3 more specific areas to consider for focusing DSC research and restoration needs (Table 2). The purpose is to consider designating areas that are of sufficient size to outplant DSC, include sufficient buffers for regional settlement and growth of additional DSC, are of sufficient size for enforcement via a vessel monitoring system (VMS), and to answer research questions regarding DSC species and communities at different depths.

Note that within three of the restoration locations - Offshore South Point Arena, The Football and Cochrane Bank/Fanny Shoals - ONMS is proposing mutually exclusive, nested areas that offer alternatively-sized configurations for restoration within the larger DSC location. For instance, a final action could include adoption of F-1 (smaller area) or F-2 (larger area) within The Football, but not both research and restoration areas. The Ano Nuevo - Ascension Canyon Complex DSC location offers two different areas that could both be adopted; Sur Ridge has only one restoration area within that DSC location. See Figure 2 for an illustration of these areas.

[6] Mitigation recommendations and decisions should be made using a holistic landscape and/or seascape approach, with a goal of selecting the area that best achieves the conservation objectives for the affected NOAA trust resources. This approach allows for the consideration of a wide range of mitigation areas including off-site and out-of-kind compensation in addition to on-site and in-kind compensation. This holistic approach can also allow for the development of multi-use mitigation strategies to encourage a broad range of ecological benefits.

Table 2. Summary of areas for potential DSC research and restoration areas.

Location	Area Name	Size (sq. nautical miles)	Depth Range feet (fathoms and meters)	Target Coral Species Suitable for Outplanting	Potential Source Coral Locations
Offshore South Point Arena	Offshore South Point Arena 1 (OSPA-1)	10.06	524–1,541 *(87–256 fm; 160–470 m)*	*Swiftia* sp. *(stalk and fan morphology), Paragorgia arborea*	Within and adjacent to the Point Arena South Biogenic Area EFHCA
	Offshore South Point Arena 2 (OSPA-2)	16.52	524–1,935 *(87–322 fm; 160–590 m)*	*Swiftia* sp. *(stalk and fan morphology), Paragorgia* spp. *(*e.g., bubblegum, peppermint), *Plumarella longispina*	
	Offshore South Point Arena 3 (OSPA-3)	22.01	524–1,935 *(87–322 fm; 160–590 m)*	*Swiftia* sp. *(stalk and fan morphology), Paragorgia* spp. (e.g, bubblegum, peppermint), *Plumarella longispina*	
The Football	The Football (F-1)	5.04	623–787 *(103–131 fm; 190–240 m)*	*Swiftia farallonesica*	Within and adjacent to the Football and Point Arena South Biogenic Area EFHCA
	The Football (F-2)	6.57	623–918 *(103–153 fm; 190–280 m)*	*Swiftia farallonesica*	
Cochrane Bank/ Fanny Shoals	Cochrane Bank (CB)	4.58	295–524 *(49–87 fm; 90–160 m)*	*Chromoplexaura marki*	Cordell Bank, Farallon Escarpment at shelf break
	Cochrane Bank/Fanny Shoals (CBFS)	15.11	196–524 *(32–87 fm; 60–160 m)*	*Chromoplexaura marki*	
Año Nuevo-Ascension Canyon Complex	Ascension Canyon (AC)	2.96	1,640–4,790 *(273–798 fm; 500–1,460 m)*	*Keratoisis* sp.	Sur Ridge
	Año Nuevo (ANC)	6.5	1,574–4,658 *(262–776 fm; 480–1,420 m)*	*Paragorgia* sp., *Keratoisis* sp., *Swiftia* sp.	
Sur Ridge	Sur Ride (SR)	36.64	2,690–5,118 *(448–853 fm; 820–1560 m)*	*Trissopathes* sp., *Lillipathes* sp., *Isidella tentaculum*, *Keratoisis* sp., *Parastenella* sp., *Acanthogorgia* sp., *Swiftia kofoidi*, *Paragorgia arborea*, *Sibogagorgia cauliflora*, *Corallium* sp.	Sur Ridge

Figure 1. Potential locations for DSC research and restoration within GFNMS and MBNMS.

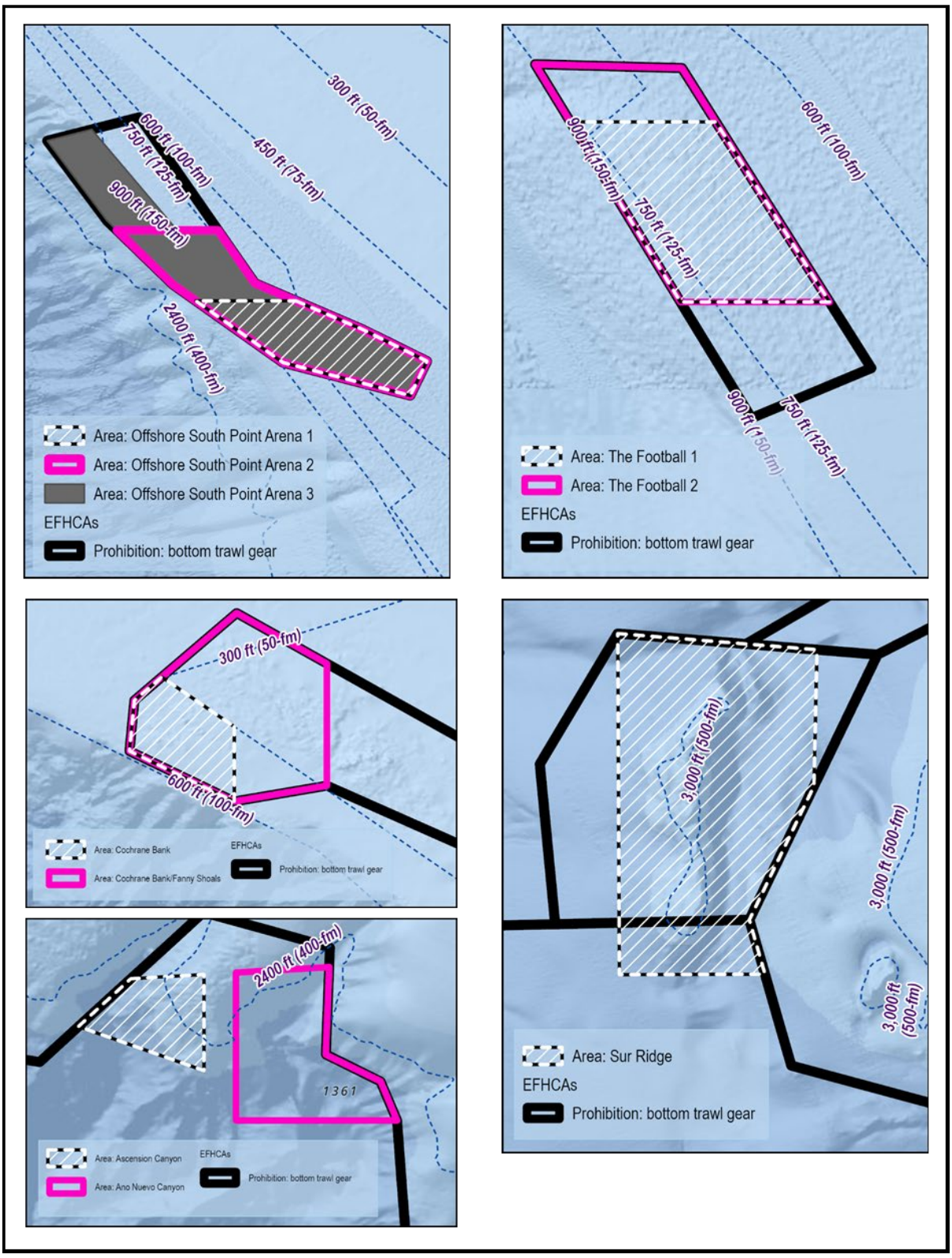

Figure 2. Areas considered for DSC research and restoration within the five restoration locations: Offshore South Point Arena, The Football, Cochrane Bank/Fanny Shoals, Año Nuevo-Ascension Canyon Complex, and Sur Ridge.

Scientific Criteria for Area Selection

The initial set of criteria included identifying areas: (1) with suitable depth, which is greater than 164 feet (27 fathoms or 50 meters) for research based on known DSC habitat and between 360 feet and 5,118 feet (60-853 fathoms or 110-1,560 meters) for restoration; (2) have bathymetric mapping data available and known hard and hard-mixed substrate; and (3) where corals are known to historically or currently occur. The five locations selected meet this initial set of criteria. Additional considerations were added during the workshops and included procuring "source corals" (coral segments from healthy colonies) from nearby locations and the ability to access the areas with available research vessels. The potential source coral locations are included in Figure 2.

Location 1: Offshore South Point Arena

There are three scoping areas presented for this location that range in size from 10.06 nm^2 (Figure 3) to 22.01 nm^2 (Figure 5) and all have habitat suitable for DSC research and restoration:

- OSPA-1 (Figure 3) is the shallowest area with a depth range of 524-1,541 feet (87-256 fathoms or 160-470 meters). This area includes a cluster of known rocky features that have been visually explored via ROV and one additional area where the interpreted substrate is at a suitable depth for research and restoration.
- OSPA-2 (Figure 4) and OSPA 3 (Figure 5) have the same depth ranges between 524-1,935 feet (87-322 fathoms or 160–590 meters). The depths at OSPA-2 and OSPA-3 include a greater diversity of DSC and would allow for additional species of corals that may be suitable for outplanting, which could result in additional studies about fish associations at different depths (see Table 2). At the shallowest extent of both areas (at the eastern boundary) there are high relief rocky features that have been visually explored via ROV and are considered to be fish hotspots with numerous, very large cowcod, yelloweye, lingcod, bocaccio, and canary rockfish. There was also a high density of krill in the water column (Graiff et al., 2021).
- OSPA-3, the largest area, has a high presence of rocky substrates as predicted from habitat models with observations of DSC at more locations than OSPA-1 and OSPA-2 that are at suitable depths for research and restoration.

Substrate types within the shallower extent of the depth range at the Offshore South Point Arena location are similar to those observed at a low-relief rocky feature located to the south referred to as The Football (Figure 1). There is scientific interest in the connectivity between Offshore South Point Arena and The Football, including whether one area provides a source of propagules for the other, and whether corals from one area could be a source for outplanting to the other. The Offshore South Point Arena location has seen the most fisheries management changes in the past two decades, compared to the other four locations presented. In particular OSPA-2 and OSPA-3 are within and adjacent to the high relief rocky features that have been visually explored via ROV, which are considered to be fish hotspots as referenced above.

The Point Arena South Biogenic Area EFHCA that prohibited bottom trawling changed in 2020. In 2018 and 2019, visual data were collected by ROV in areas that were within this EFHCA, as designated prior to 2020, areas that were proposed to remain within this EFHCA in 2020, as well

as areas that were open to groundfish fishing prior to 2020 and proposed to close as part of a new Point Arena South Biogenic Area EFHCA in 2020 (Graiff et al., 2021; Laidig et al., 2021). Relative intensity of commercial bottom trawling before gear modifications in the early 2000s and the first designation of bottom trawl EFHCAs in June 2006 (71 FR 27408) indicate that this larger location experienced impacts from bottom trawling. OSPA-3 includes three places where visual surveys were conducted in areas previously opened to groundfish fishing that are now currently closed as part of the current Point Arena South Biogenic Area EFHCA; OSPA-2 includes one area and OSPA-1, the smallest area, has been part of a designated EFHCA since June 2006. However, all three DSC research and restoration areas include appropriate substrate types to add new corals where there may have been previous fishing activity prior to the establishment of any EFHCAs. These areas all can provide an opportunity to study how the corals respond by establishment and growth if the area is fully closed and protected from direct fishing impacts, although OSPA-2 and OSPA-3 would provide an opportunity to look at the changes from 2020. Research in this location could help answer questions such as how DSC respond to restoration in historically disturbed areas and how they may provide structural habitat for other species of invertebrates and fish.

There are "potential source corals" within all three OSPAs. There was also an area to the west of the proposed areas that may be appropriate for procuring "source corals". Multiple areas both inside and outside of the current EFHCA within this larger location have imagery and samples collected during an Exploration Vessel (E/V) *Nautilus* cruise in 2019, including environmental DNA (eDNA).

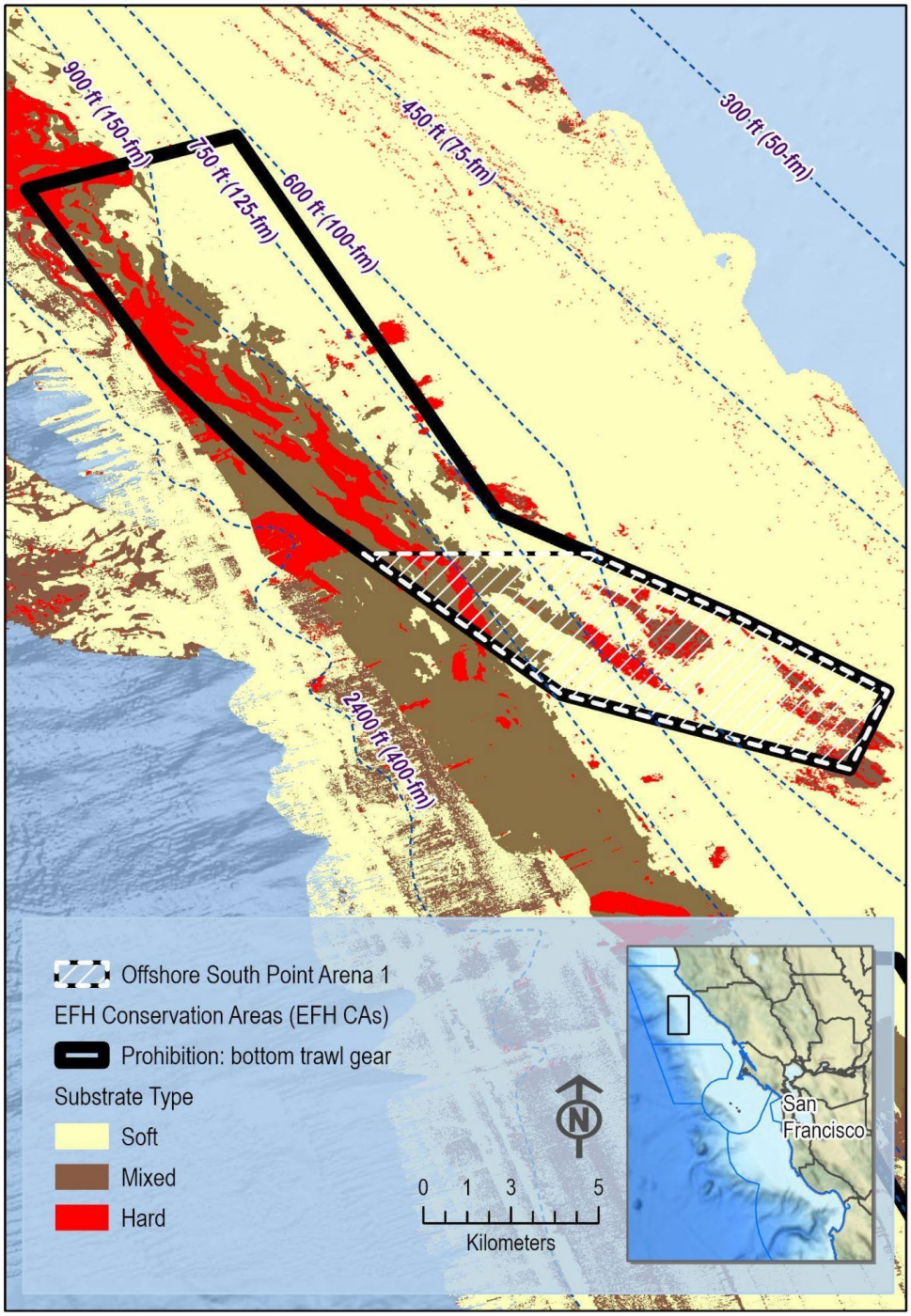

Figure 3. Area: Offshore South Point Arena 1 (OSPA-1).

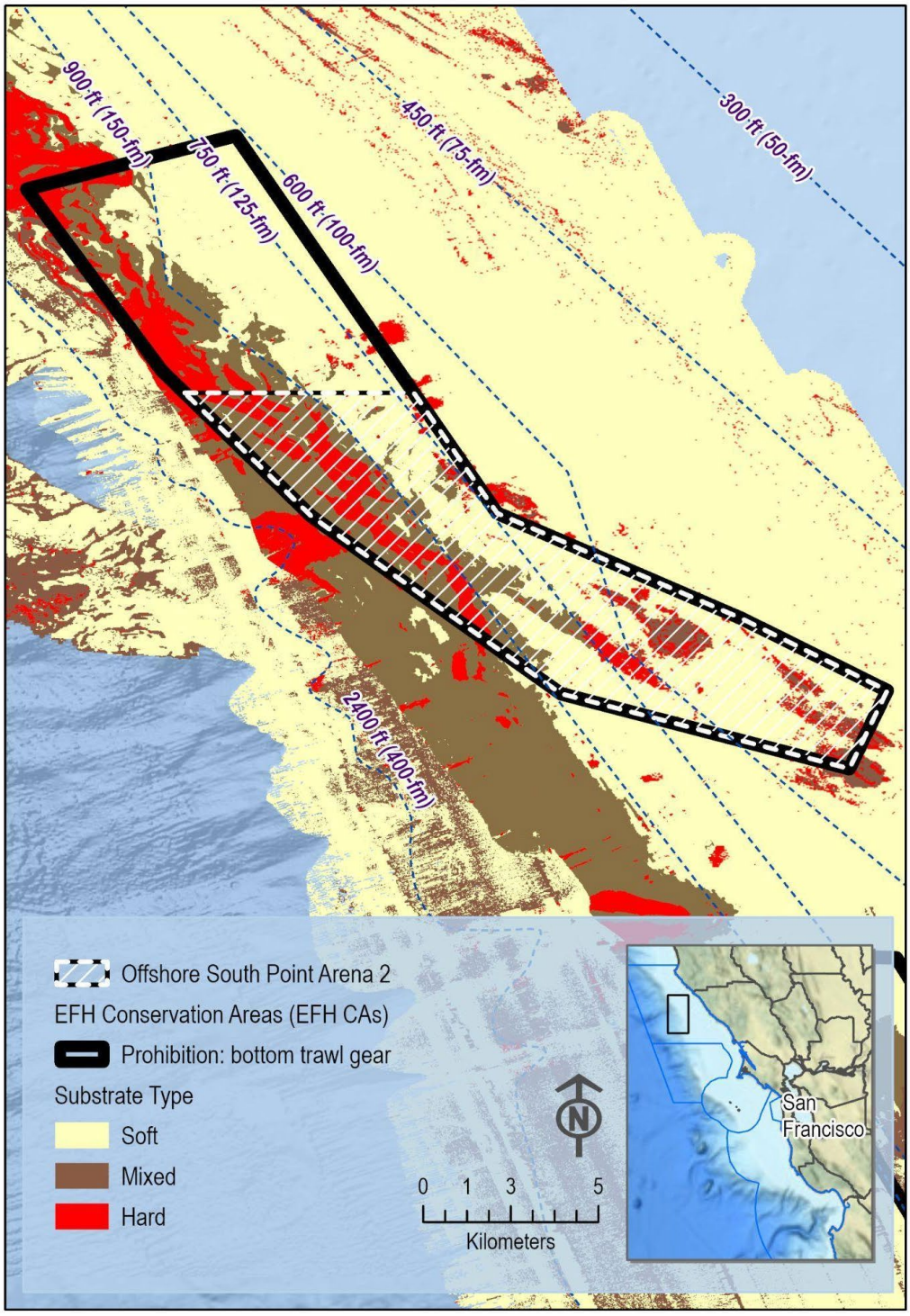

Figure 4. Area: Offshore South Point Arena 2 (OSPA-2).

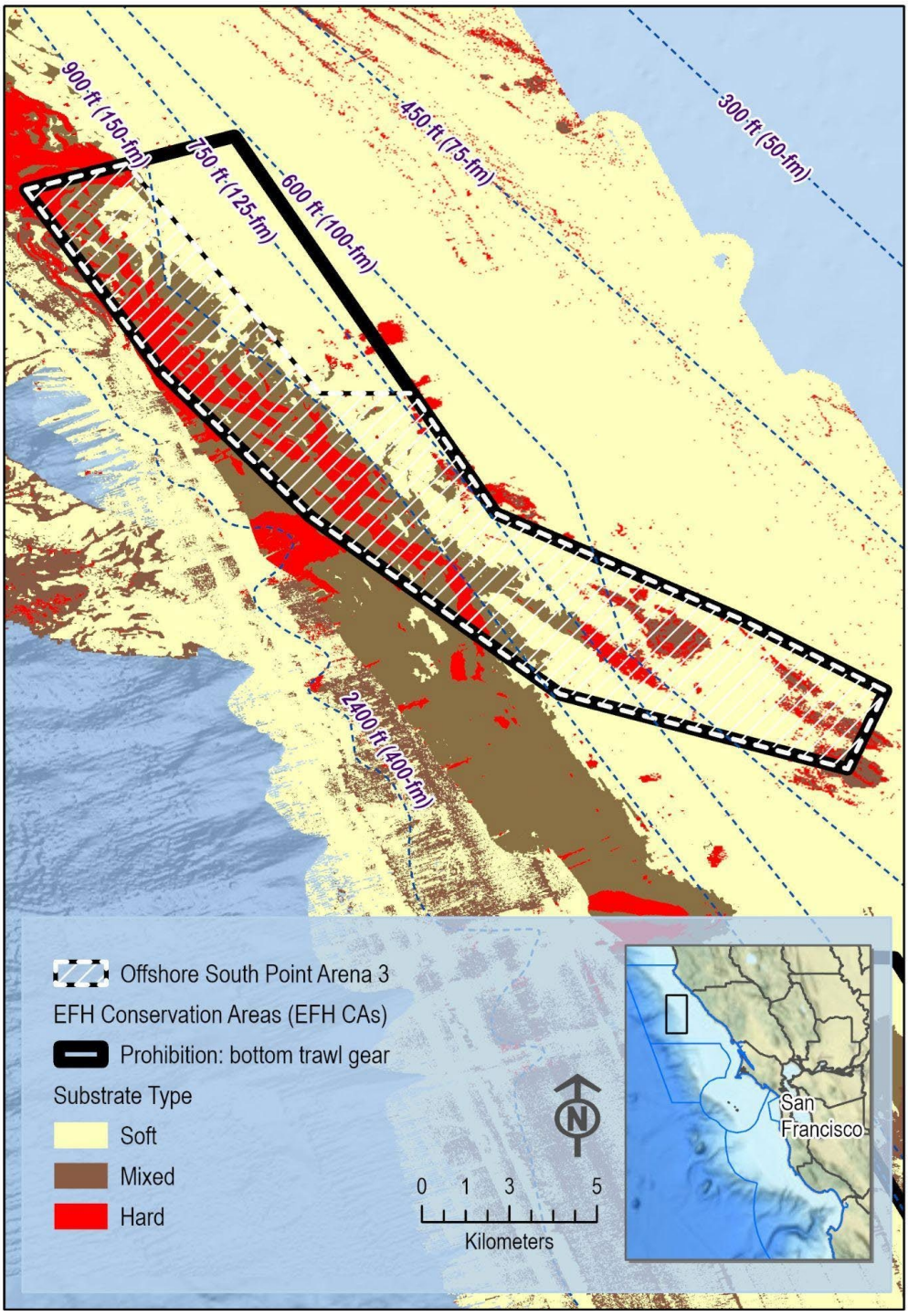

Figure 5. Area: Offshore South Point Arena 3 (OSPA-3).

Location 2: The Football

There are two scoping areas presented for this location that range in size from 5.04 nm^2 (Figure 6) to 6.57 nm^2 (Figure 7). The depth range for F-1 is 623-787 feet (103-131 fathoms or 190–240 meters), while F-2 depth range is 623-787 feet (103-153 fathoms or 190–280 meters). The primary species of interest for outplanting at The Football location is *Swiftia farallonesica,* which was collected and described from this area (Williams and Breedy, 2016). *Swiftia farallonesica* comprised 36% of total corals observed on quantitative transects at The Football (Graiff et al., 2016). However, this location could be appropriate for bubblegum coral (*Paragorgia arborea*) at the deeper end of the depth range on the slope; the F-2 area offers more opportunity for outplanting this additional species. The F-2 area also includes more rocky and mixed substrate that may be suitable for coral restoration.

Corals for this location could potentially be sourced from within or nearby The Football or from areas within or adjacent to the Offshore South Point Arena location. There is scientific interest in the connectivity between The Football and Offshore South Point Arena, including whether one location provides a source of propagules for the other location, and whether corals from one location could be a source for outplanting to the other.

Mapping was completed in this location in 2009 and visual surveys were completed in 2014. High densities of rockfish were observed in areas of layered rock within both F-1 and F-2 (Graiff et al., 2016). Hard substrate is present and is not highly rugose. This type of low-relief hard substrate, and areas of layered rock as illustrated in The Football Story Map can be ideal for DSC outplanting given the consistency of the habitat for adding structure forming DSC. This can result in additional habitat for the high densities of rockfish found in these areas. The F-2 area has more available low relief in the north. Although some of the F-2 area has not been visually groundtruthed, it is likely the additional predicted habitat in F-2 will provide more suitable places for DSC restoration given the unique habitat in the entire location of The Football.

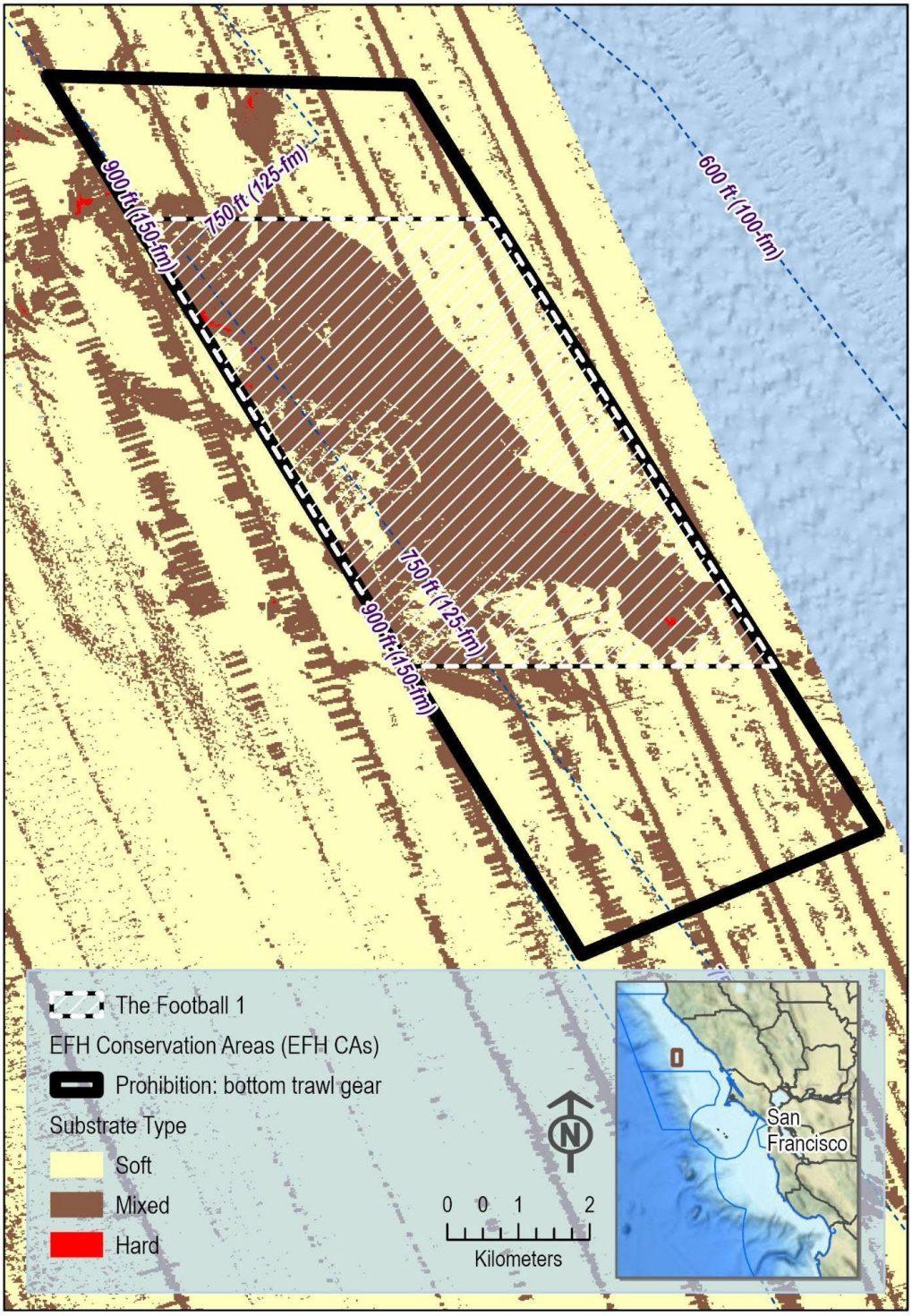

Figure 6. Area: The Football 1 (F-1).

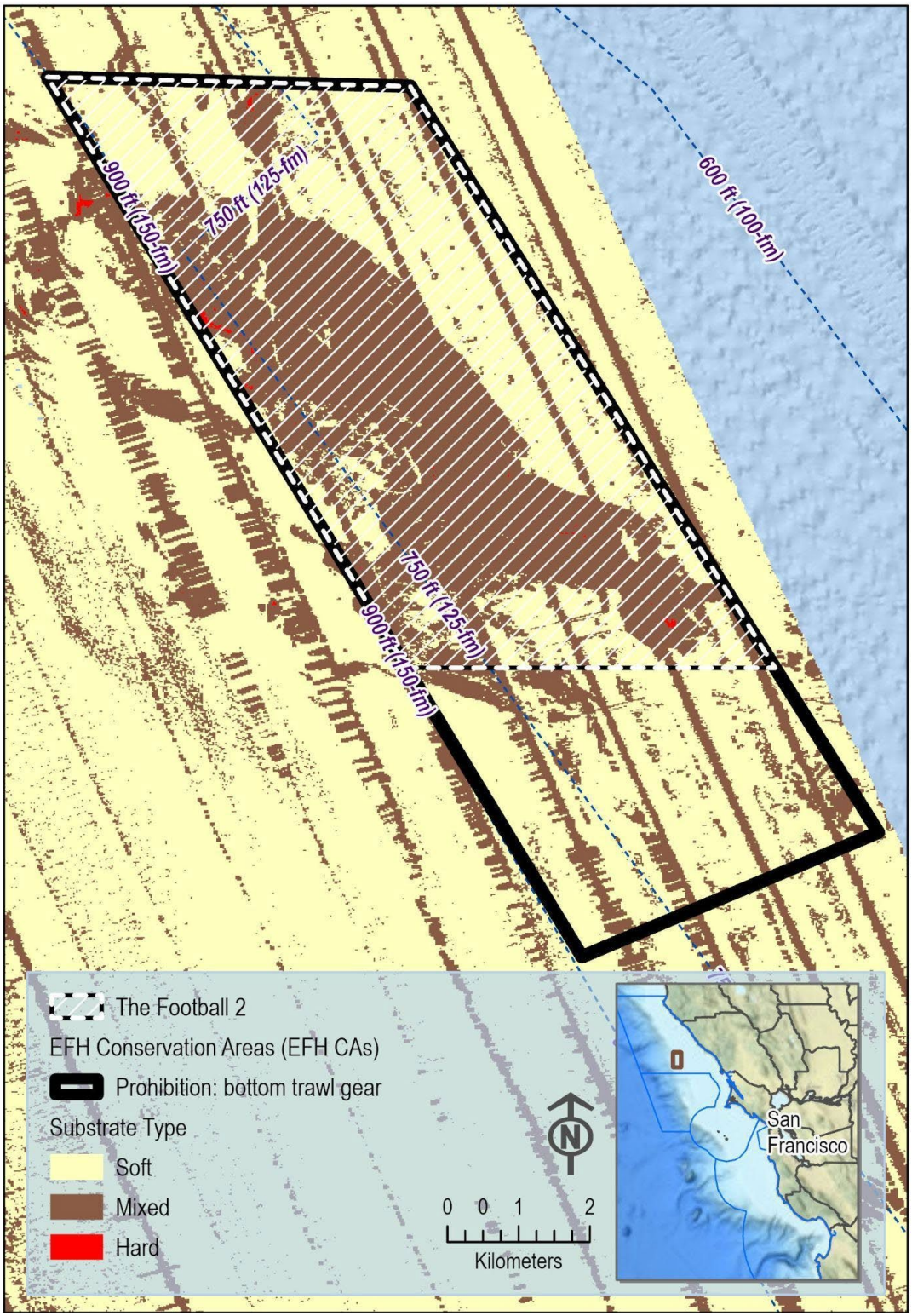

Figure 7. Area: The Football 2 (F-2).

Location 3: Cochrane Bank/Fanny Shoals

There are two scoping areas presented for this location that range in size from 4.58 nm^2 (Figure 8) to 15.11 nm^2 (Figure 9). The Cochrane Bank/Fanny Shoals location is the shallowest of all the locations and provides unique opportunities for DSC research at shallower depths and restoration of a DSC species, the Red Whip Gorgonian (*Chromoplexaura marki*) that is unique to these depths.

- The depth range for the Cochrane Bank (CB) area is 295-524 feet (49-87 fathoms or 90–160 meters). Most of the habitat observed is cobble and mixed substrate (high and low relief; Etnoyer et al., 2014).
- The depth range for the Cochrane Bank/Fanny Shoals (CBFS) area is 196-524 feet (32-87 fathoms or 60–160 meters). The interpreted habitat at Fanny Shoals is hard substrate and the rugosity is not known.

Relative intensity of commercial bottom trawling before gear modifications and before the addition in 2020 of Cochrane Bank to the current EFHCA indicate that the Cochrane Bank/Fanny Shoals location has experienced impacts from bottom trawling. Fixed-gear groundfish data from 2002-2017 indicate that areas adjacent to this location have experienced impacts from other benthic fishing gear such as vertical lines and traps/pots. The entire CB area is currently closed to fixed gear fishing. The eastern portion of the CBFS area is currently open to fixed gear fishing[7].

The history of trawling and historic other fishing coupled with the current protections could make this location an ideal place to study how fisheries management actions may affect the recruitment of growth of DSC. Passive restoration of DSC could also be studied at this location to see how corals may recruit and grow based on changes to fisheries management measures over time. The CBFS area offers additional research benefits as it includes an area currency open to fixed gear fishing at the shallowest depth of all the locations.

A unique finding from this location was the collection of a black coral that was identified as *Antipathes dendrochristos,* commonly referred to as the Christmas tree coral. This observation represents the northernmost occurrence of *Antipathes dendrochristos* to date (Etnoyer et al., 2014). How the area is affected by the California Current is an important research question to answer at this location. This area lies in a stratification layer of the California coastal zone with distinct layers of water. There is an oxygen minimum zone at ~85m, which is possibly why black coral has been observed. In particular, propagation of the black coral species *Antipathes dendrochristos* is of interest and could be tracked as part of a passive restoration project.

Density estimates of fish were not estimated from the 2012 ROV surveys because fish were identified from still images (vs video transects). However, the presence of yelloweye rockfish was recorded in several places within the CB area.

[7] Note that in March 2023 the Council recommended final changes to the non-trawl RCA under Amendment 32 which would open a portion of the CB and CBFS areas to groundfish fishing gear. Implementation is expected in January 2024.

The Farallon Escarpment or Cordell Bank could serve as potential “source corals” areas for the Red Whip Gorgonian (*Chromoplexaura marki*).

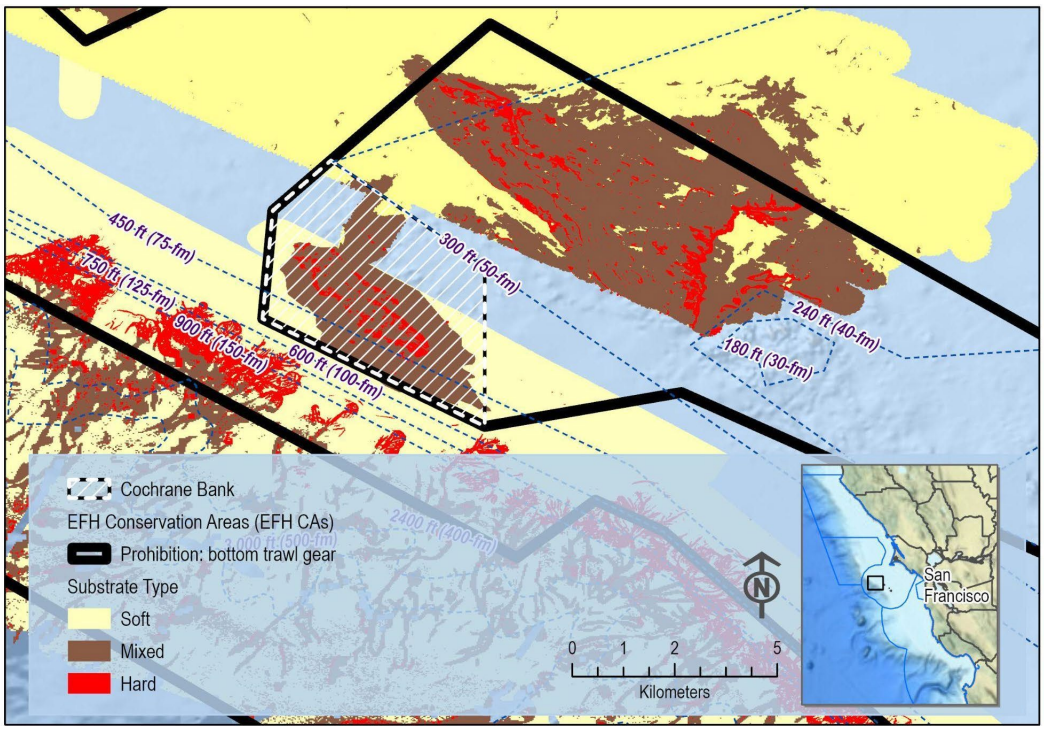

Figure 8. Area: Cochrane Bank (CS).

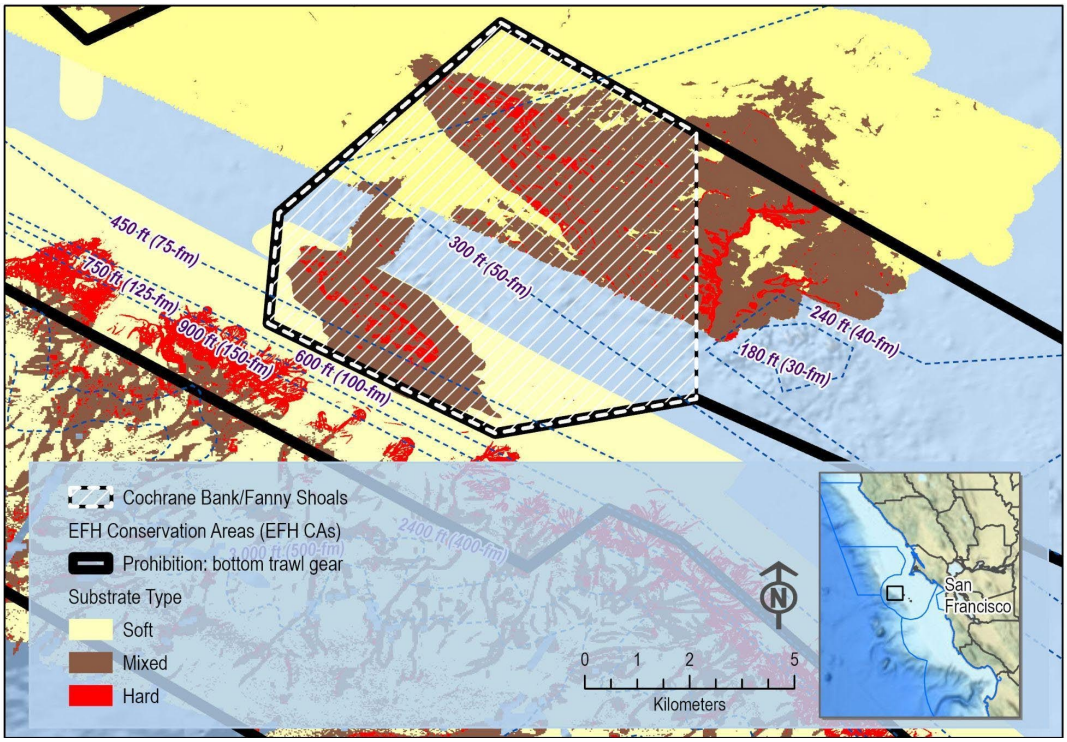

Figure 9. Area: Cochrane Bank/Fanny Shoals (CBFS).

Location 4: Año Nuevo-Ascension Canyon Complex

Through a collaborative process in 2013, MBNMS worked with scientists, fishermen, conservation non-governmental organizations (NGOs), and other agencies to identify special deep-sea areas within the sanctuary to focus research efforts and better understand, monitor and if necessary enhance protections. In total, the process involved the collection and evaluation of over 150 GIS data layers and ultimately the identification of 16 Sanctuary Ecologically Significant Area (SESAs) within MBNMS. The Año Nuevo-Ascension Canyon Complex is a SESA.

There are two scoping areas presented for this location that range in size from 2.96 nm^2 (Figure 10) to 6.5 nm^2 (Figure 11). The depth range for the AC area is 1,640-4,790 feet (273-798 fathoms or 500-1,460 meters). The depth range for the ANC area is 1,574-4,658 feet (262-776 fathoms or 480–1420 meters). These are two separate areas that could both be considered for adoption as research and restoration areas.

This canyon complex is in a highly productive area, based on the upwelling originating from Año Nuevo. With high densities of krill, rock fishes associated with corals in the shallower areas, and a seasonal high volume of marine snow, the area supports large gorgonian corals such as *Keratoisis* and *Paragorgia* species. The corals live on rock outcrops, surrounded by fine sediment habitat, and bamboo corals are particularly abundant. It has been studied by at least four different research groups with a camera sled, an autonomous underwater vehicle, a human-occupied submersible, and a ROV; however, much of the area is yet to be explored.

Both canyon heads are very different from the two deeper areas presented (AC and ANC areas) in terms of species and habitat. After discussions among experts in the workshop, it was concluded that there are research needs in the upper canyon areas, but outplanting DSC should be focused in deeper areas of the canyons. Additionally, the upper canyons are too steep for current DSC outplanting methods. Both Año Nuevo and Ascension Canyons are not “active” (long-shore sediment transport is not funneled down in turbidity flows) which minimizes disturbances that impact coral recruitment, growth, and instrument/translocated coral placements. DSC recruitment is expected to be more successful when water is not turbid and when currents sweep the substrata clean of detritus; however, it is possible that there is sediment flowing in some lower areas of these canyons. Research questions related to the effects of sedimentation, water flow, and depth could be addressed in this canyon complex. Some known, specific areas are suitable for DSC restoration.

There are large DSC colonies existing in parts of Ascension and Año Nuevo canyons that could serve as a source for coral branch translocations, and Sur Ridge is another potential source, with a much higher diversity of species to select from.

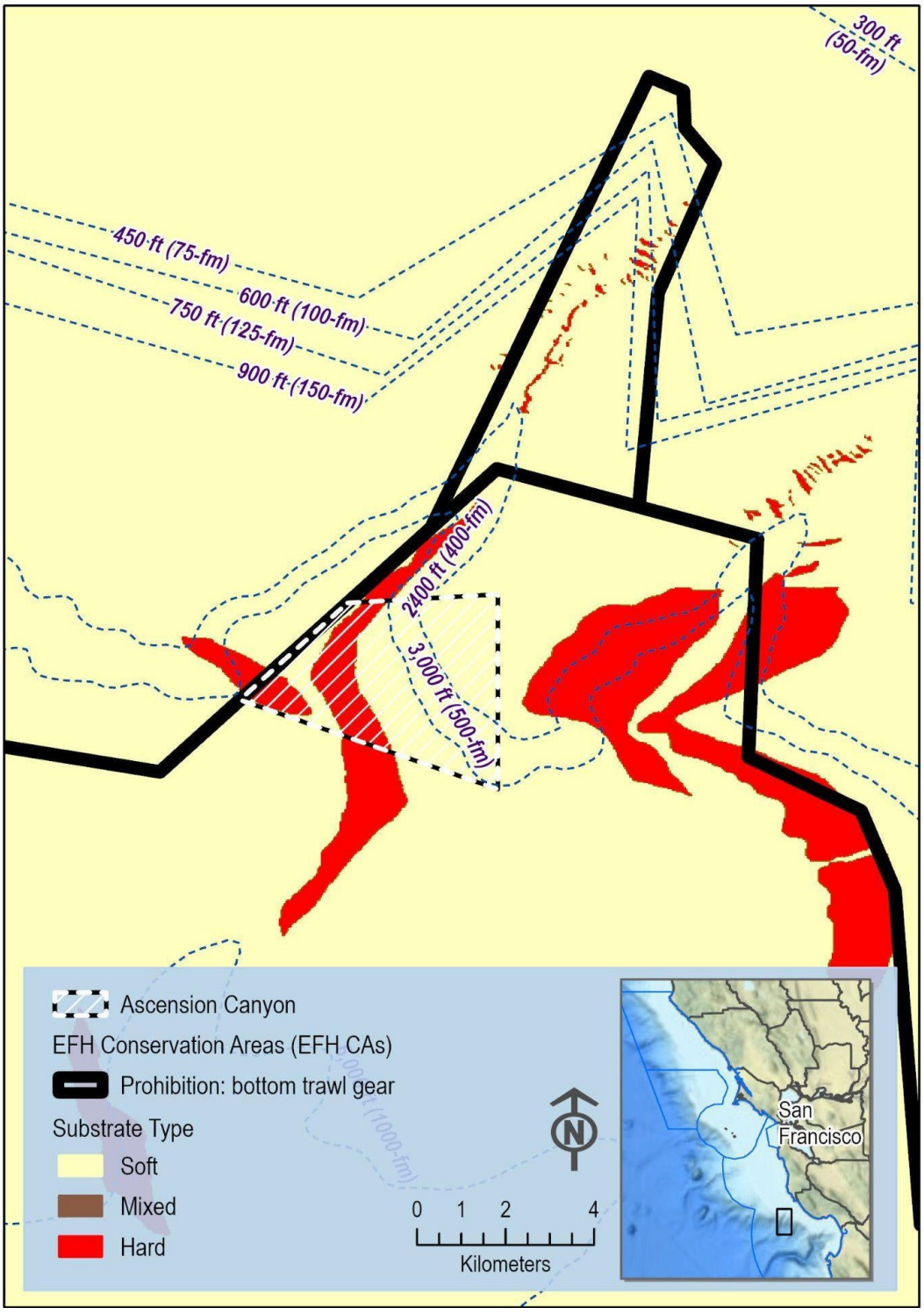

Figure 10. Area: Ascension Canyon (AC).

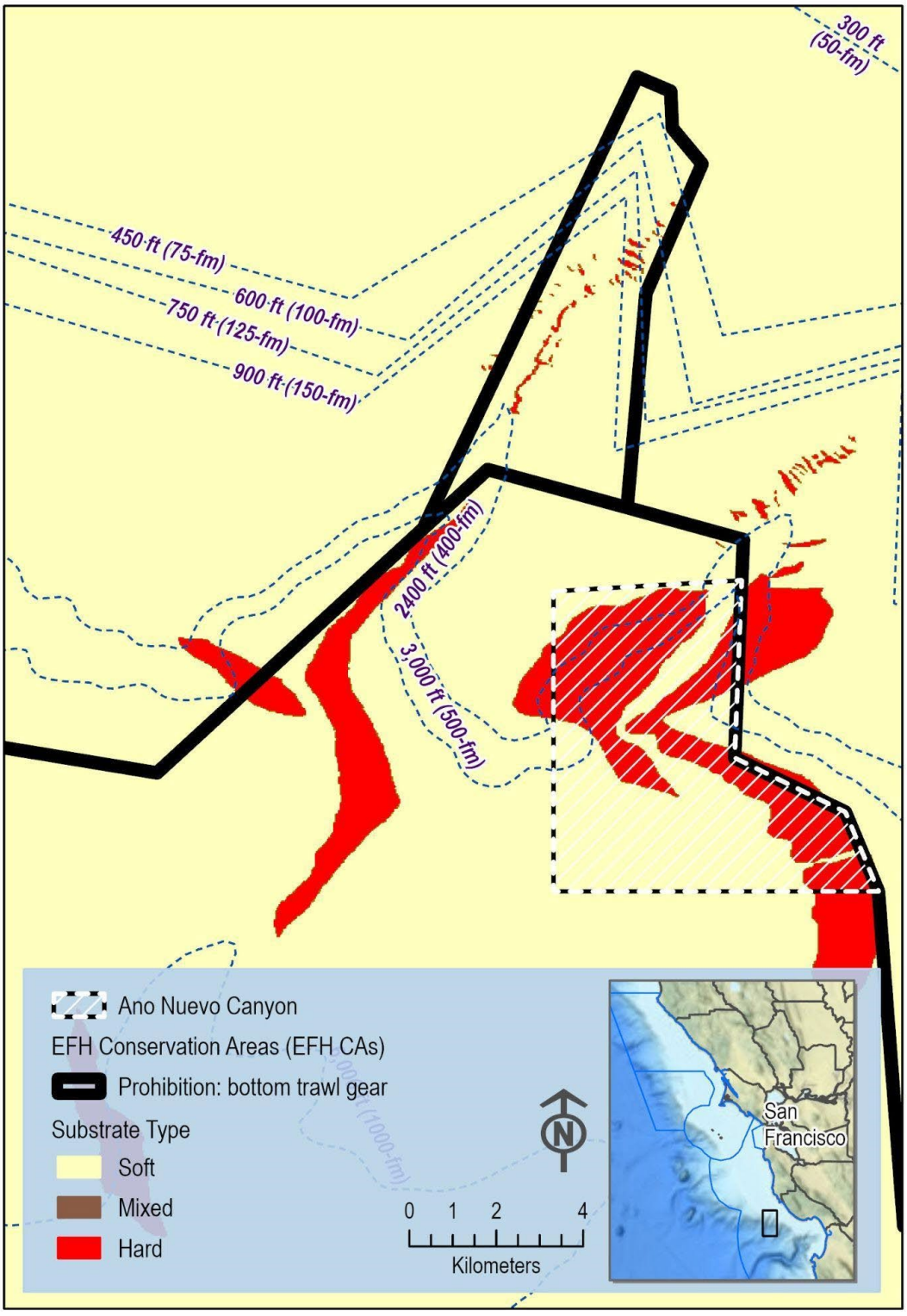

Figure 11. Area: Año Nuevo Canyon (ANC).

Location 5: Sur Ridge

The single area presented for scoping at the Sur Ridge location is 36.64 nm^2 (Figure 12). The depth range for the Sur Ridge (SR) scoping area is 2,690-5,118 feet (448-8,853 fathoms or 820-1,560 meters). This is overall the deepest location of the five areas. Sur Ridge is also a SESA.

DSC communities have been studied more extensively within the SR area compared to other areas in this document, and it is the site where the methods for DSC outplanting were developed. Since 2013, research cruises to study corals within the SR area have occurred at the average frequency of three times per year. It has become the site of a Monterey Bay Aquarium Research Institute (MBARI)-led DSC observatory, with maintained equipment including: in-situ coral cameras, current meters, particle traps, and a physical oceanography profile mooring. Other, less permanent equipment at the site includes a respirometer to study coral metabolism under different ocean conditions, eDNA samplers, and markers that are visited regularly to assess coral growth. A hydrophone is maintained within the SR area, as part of the national Sanctuary Soundscape Monitoring Project. A taxonomic guide for DSC at Sur Ridge was published in 2017. Sur Ridge is spectacular for its diversity and abundance of DSC species, with bamboo corals numbered in the thousands of individuals.

Since July 2014, eight groups of various corals have been successfully translocated in the northern portion of Sur Ridge proper. The successful translocations, alive for almost a decade, include: *Lithopathes* sp., *Isidella tentaculum*, *Keratoisis* sp., *Swiftia kofoidi*, and *Corallium* sp. The bamboo transplants are producing visible eggs. Branches from these DSC species have successfully been transported on a ship to other areas within the SR area, but no attempts have been made to transport them as far north as GFNMS. Sur Ridge currently has enough corals to be a significant donor site. Areas on the west and south sides of the SR area have been trawled, providing an opportunity for outplanting areas. Protecting the SR area from benthic habitat impacts would benefit restoration efforts, while also protecting all of the research equipment associated with the MBARI coral observatory.

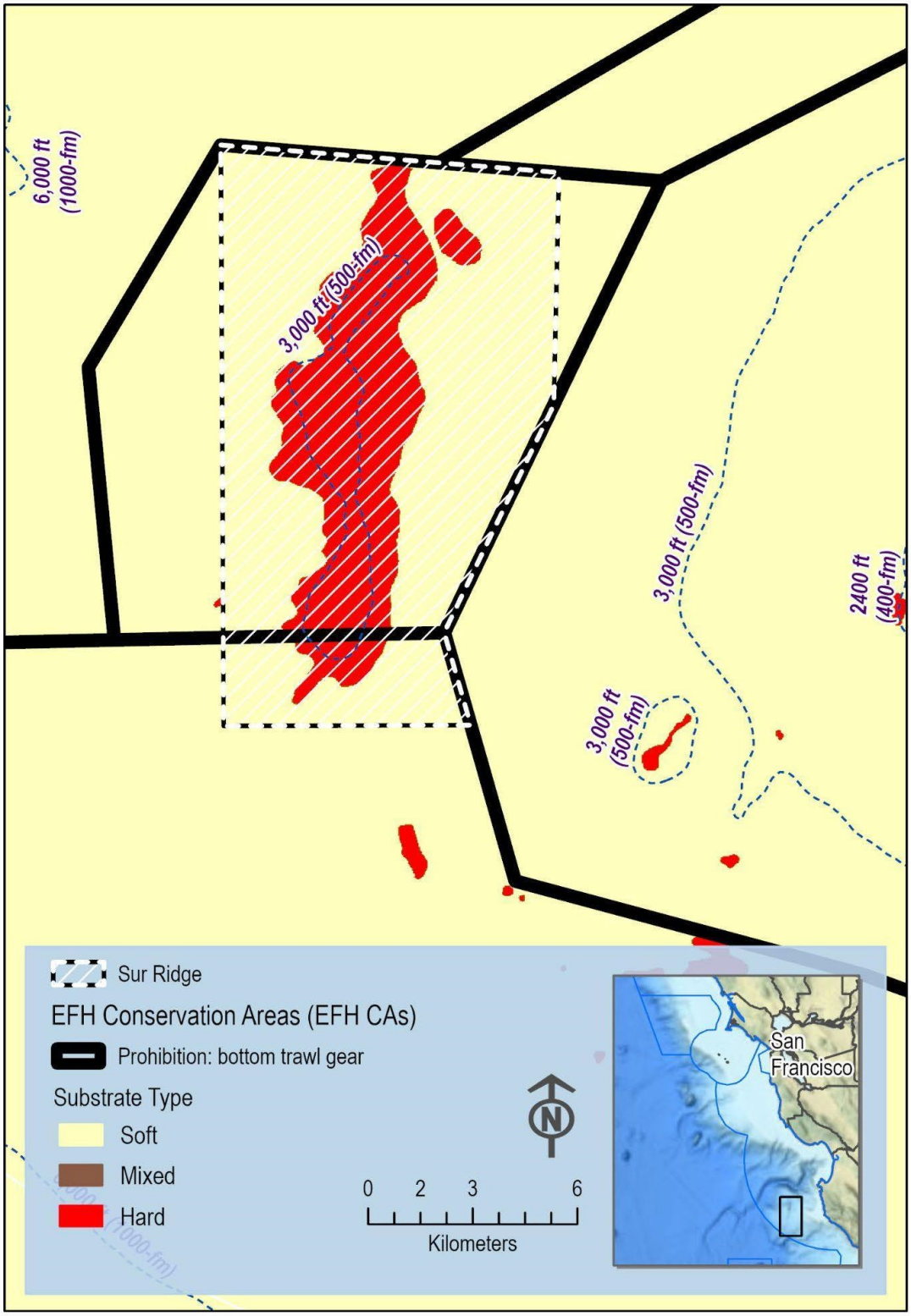

Figure 12. Area: Sur Ridge (SR).

Preliminary Socioeconomic Considerations

ONMS is working closely with NMFS and Council staff on this scope of action, and will incorporate information on fishing effort from their analyses for all of the commercial and recreational fishing sectors in order to minimize socioeconomic impacts. As mentioned previously, the five locations and ten areas were selected based on scientific criteria related to habitat suitability for DSC research and restoration, and we expect to incorporate additional information on socioeconomics into the list of preferred alternatives for these DSC research and restoration areas. The proposed areas would close a maximum of 90 nm^2 to bottom contact fishing activity.

As a starting point, ONMS reviewed and noted potential impacts to fixed-gear fishing of the groundfish fishery that may be impacted by this Council action. All areas are within designated bottom trawl EFHCAs. A portion of the areas at Offshore South Point Arena is within the planned changes to the groundfish Non-trawl RCA (8.96 nm^2), and the larger area, OSPA-3, includes 19.49 nm^2 currently open to fixed-gear fishing. The two areas at The Football are within the planned changes to the Non-trawl RCA, as well as a small area (2.13 nm^2) that is currently open to fixed-gear fishing. The areas at Cochrane Bank/Fanny Shoals are within planned changes to the groundfish Non-trawl RCA (1.09 nm^2), and the CBFS area includes a 9.58 nm^2 area currently open to fixed-gear fishing. Most depths at the Año Nuevo-Ascension Canyon Complex and all depths at the SR area are not expected to impact current fixed-gear fishing based on observer data and the depth ranges of the proposed areas.

ONMS has reviewed the relative intensity of commercial bottom trawling before gear modifications and EFHCAs (Jan 2002–June 2006). There are places within the five locations that have been historically trawled. Based on data from the most recent fishing effort report for the groundfish fisheries (Agenda Item H.6.a, NMFS Report 6 (Electronic Only), June 2023), there appears to be recent (2011-2021) observed fixed gear activity in and adjacent to the Ano Nuevo-Ascension Canyon complex and Point Arena as well as near Cochrane Bank. ONMS looks to NMFS and Council expertise in characterizing the fishing effort associated with the areas under consideration.

Enforcement Considerations

All shapes have been designed based on feedback from enforcement consultants from the state of California and NOAA to follow either the EFHCA boundaries for ease of compliance or by choosing lines that are on the same latitude or longitude. The length and width of the shapes are also larger than 1 nm which is the typical distance needed for an area closure to be enforced effectively with Vessel Monitoring Systems (VMS) reporting.

Stakeholder Engagement

GFNMS and MBNMS staff are committed to stakeholder engagement as a guiding principle of making informed government decisions. The GFNMS and MBNMS advisory councils advise the sanctuary superintendent on priority issues and connect local communities with the sanctuary. Sanctuary advisory councils provide an opportunity for information exchange on issues affecting the health of the sanctuary. Meetings of a sanctuary advisory council are open to the public and

provide a place where community interests, support, and concerns are heard. The advisory councils provide an invaluable service as experts in their fields, advice on potential sanctuary management decisions, and represent the broader community. The GFNMS and MBNMS advisory councils were informed of ONMS's request for the Council and NMFS to initiate a scoping process (see link on page 1, June 9, 2023 ONMS letter).

In addition to engaging the GFNMS and MBNMS advisory councils, GFNMS and MBNMS staff will provide presentations to appropriate advisory bodies of the Council and host workshops with fishermen and interested stakeholders to receive feedback on the scoping areas. Staff will share the information gathered with the Council.

Potential Pathways

NOAA recommends that the Council consider a scope for this action of exclusion areas for all bottom-contact groundfish gear, in both the recreational and commercial sectors, in order to minimize impacts to research and potential outplanting of DSC. This would involve utilization of an existing closure mechanism specified in the FMP (such as the groundfish exclusion areas being created in Amendment 32) or the creation of a new closure mechanism. If the Council recommends excluding gear in other Council fisheries that may occur in the area that create similar risks, NOAA recommends the Council consider creating a new type of closure that would apply across relevant FMPs. A new closure mechanism could be created through the discretionary authority under MSA § 303(b)(2)(A) or (B).

Depth considerations are important as DSC provides habitat and food for many species of fish and invertebrates throughout the ocean ecosystem at different depths of the continental shelf, slope, deep sea, and in canyons. The five locations and ten areas for consideration are at different depths on the continental shelf and in canyons. All areas can meet the need for DSC research and potential DSC outplanting, and are thus suitable for restoration for future projects. Each area also offers a unique depth range that can help answer management questions related to associations with other species (including fish), which change at different depths.

Given that depth is an important consideration, ONMS recommends that the Council consider packaging areas either by area or by depth ranges. This scoping document presents all areas by Area.

Scope of Action

NOAA recommends that the Council move forward with the ten proposed DSC research and restoration areas and analyze the areas presented in this scoping document for a range of alternatives that would meet the needs as described in the purpose and need section.

Council staff in coordination with ONMS and NMFS would develop an analytical document for the March 2024 Council meeting that identifies the affected FMPs and describes potential management measures in further detail to develop a purpose and need and range of alternatives. Additionally, if the Council or its advisory bodies have input on potential alternatives for the management measure concepts, they could include that guidance at the March 2024 meeting for incorporation.

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