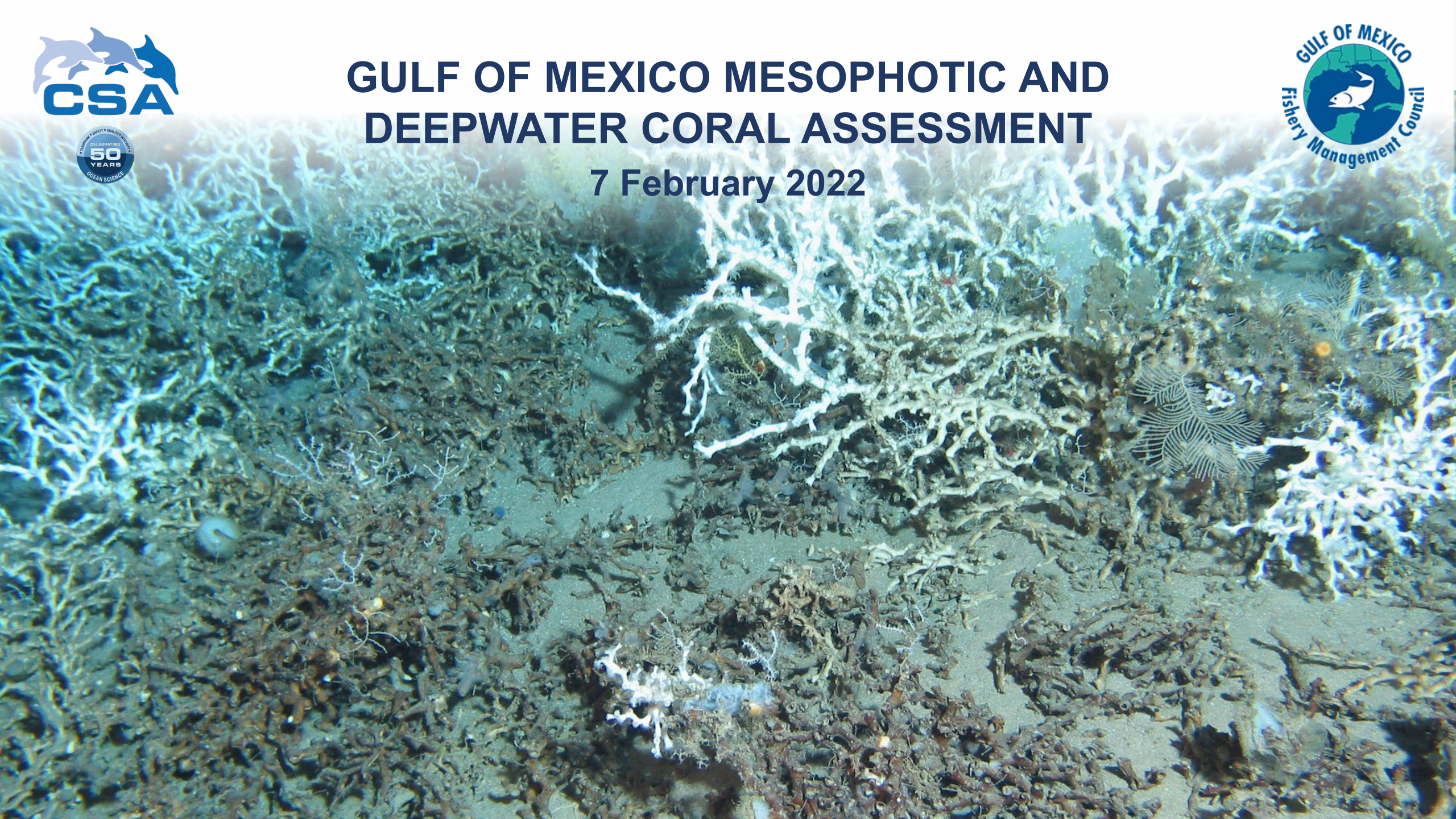




GULF OF MEXICO MESOPHOTIC AND DEEPWATER CORAL ASSESSMENT

7 February 2022



Gulf of Mexico Mesophotic and Deepwater Coral Assessment Progress Report

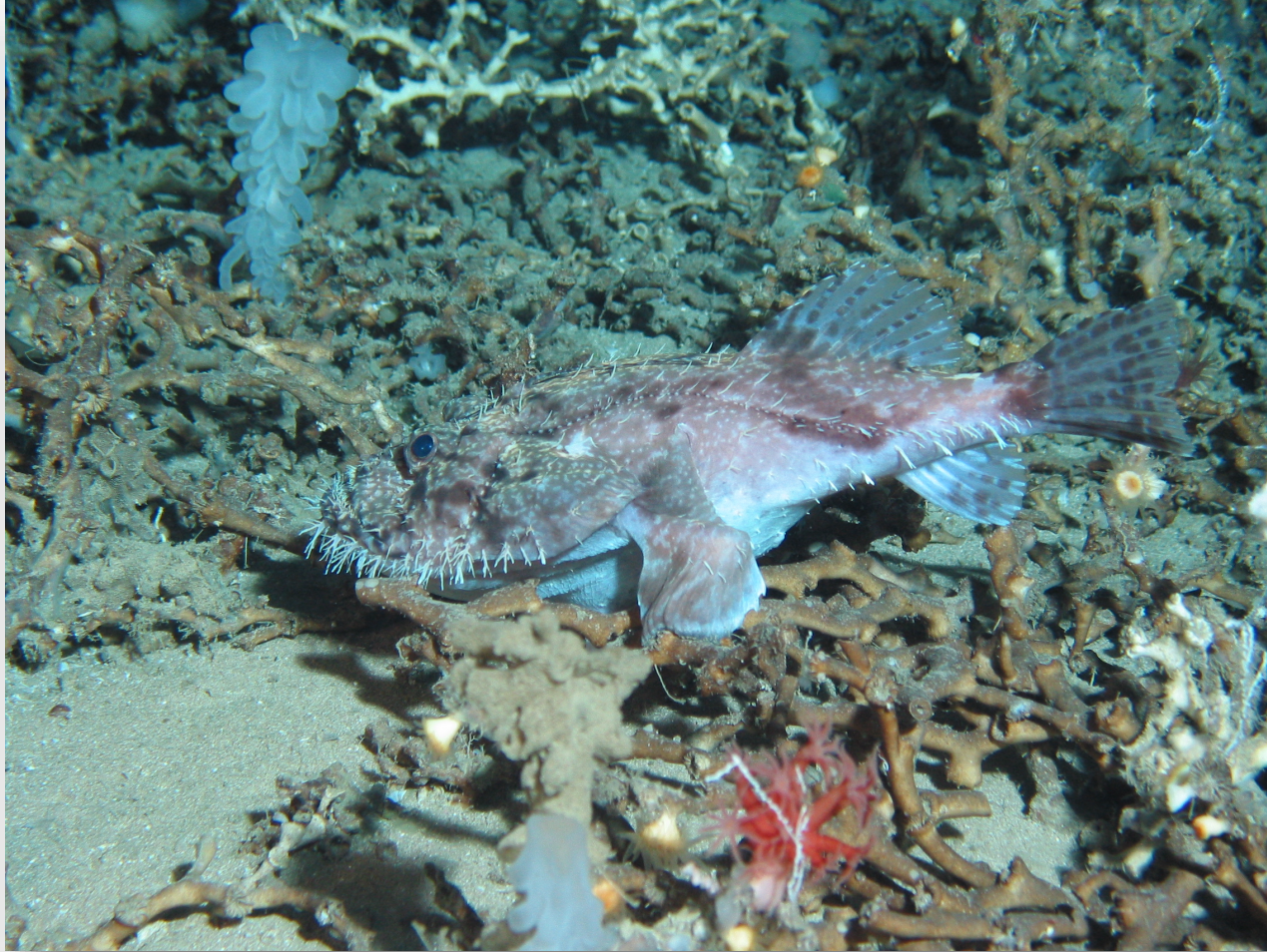
February 7, 2022



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AGENDA

Project Purpose

Projects Tasks

Task 1 – Selection of Coral Areas for Analysis

Task 2 – Comprehensive Literature Review

Task 3 – Ecological Assessment of Selected
Coral Areas

Task 4 – Geodatabase and Web-Based Dashboard

Results and Discussion

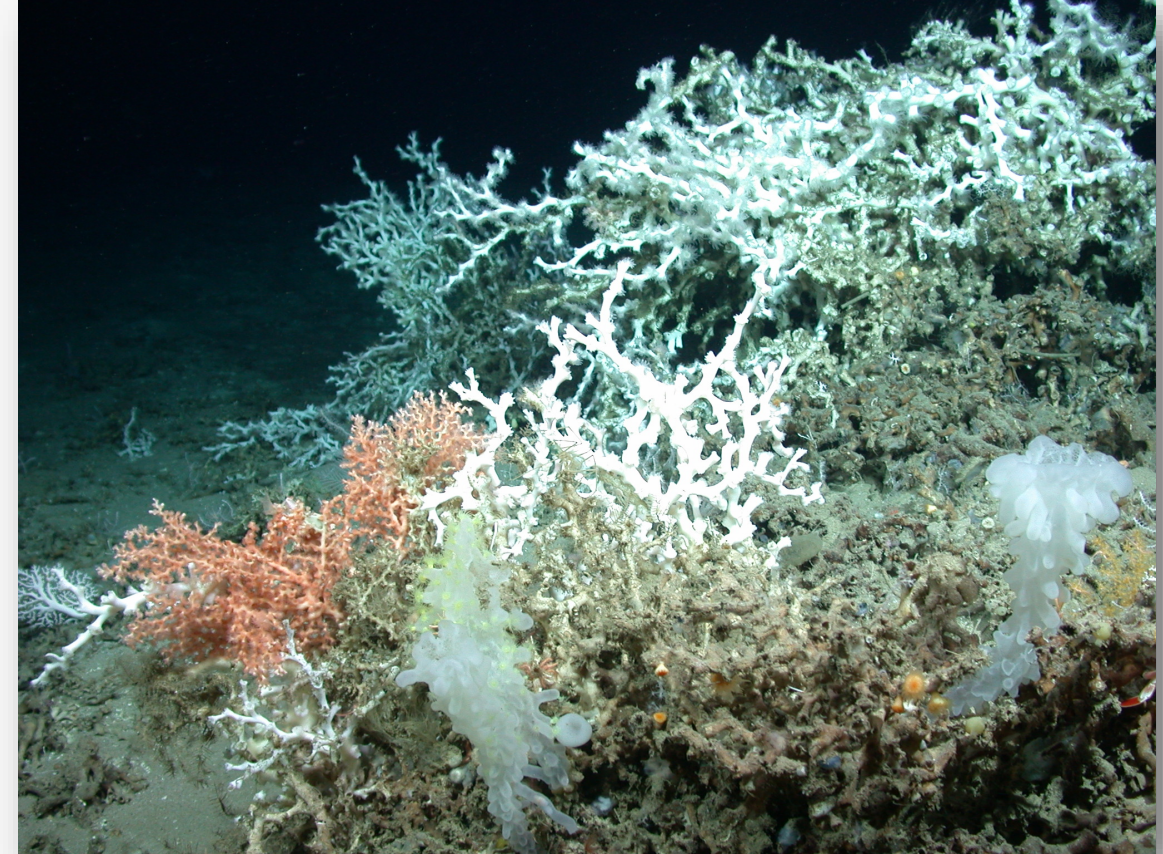
Conclusions



PROJECT PURPOSE



“To compile and synthesize information on deep-water coral and coral related habitats throughout the Gulf of Mexico, focusing on mesophotic (30 – 150 m) and deep-water corals (deeper than 50 m) in federal waters of the Gulf of Mexico from 9 to 200 nautical miles offshore in areas identified by the Coral Working Group in 2014 and identify other ecologically important coral habitat that may benefit from management measures.”





PROJECT TASKS

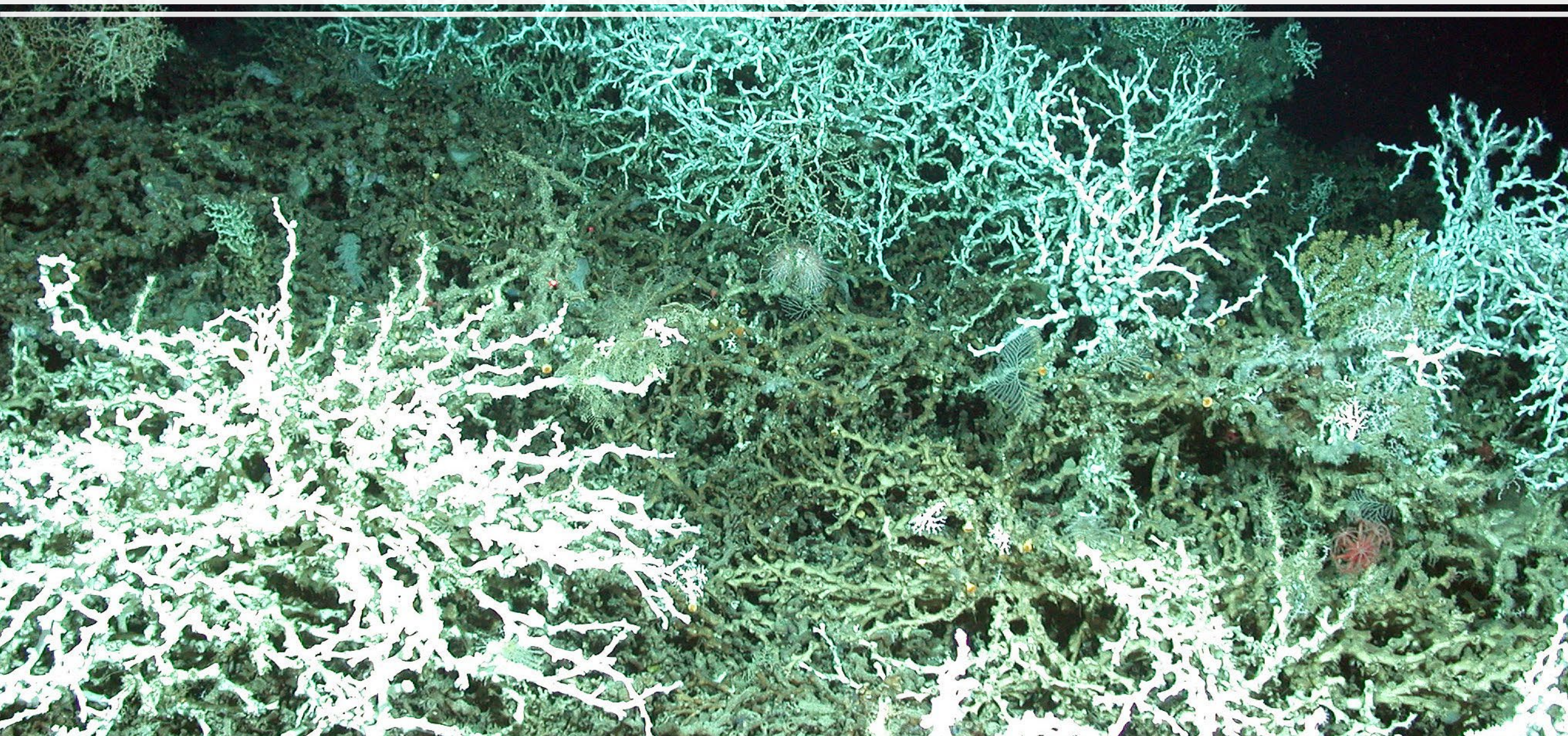


1. Select a set of coral areas for analysis
2. Conduct a comprehensive literature review
3. Design and produce a general ecological assessment of selected coral areas
4. Design a web-based dashboard with an interactive map displaying the shape/area and coordinates of the selected coral areas



Image source: NOAA.gov

TASK 1 – SELECTION OF CORAL AREAS FOR ANALYSIS





SELECTION OF CORAL AREAS FOR ANALYSIS



“Select a set of sites, or areas initially identified by the Coral Working Group for the focus of the project, considering both historical survey reports or recent data and reports for new, additional information on site conditions.”

- The Council supplied the CSA Team with the following supportive information (reports), providing lists of areas (hereafter termed project sites) for review that include existing HAPCs that may benefit from additional management measures:
 - Joint Coral Scientific and Statistical Committee and Coral Advisory Panel Summary (Joint Coral Scientific and Statistical Committee and Coral Advisory Panel, 2015);
 - Coral Working Group Summary, Gulf Council Office, Tampa, FL (Coral Working Group, 2014); and
 - Coral Habitat Areas Considered for Habitat Area of Particular Concern Designation in the Gulf of Mexico (Coral Amendment 9) (Gulf of Mexico Fishery Management Council, 2018).
- Additional areas of coral habitats in the region were reviewed as potential candidate sites, based on CSA Team experience in these areas.



SELECTION OF CORAL AREAS FOR ANALYSIS



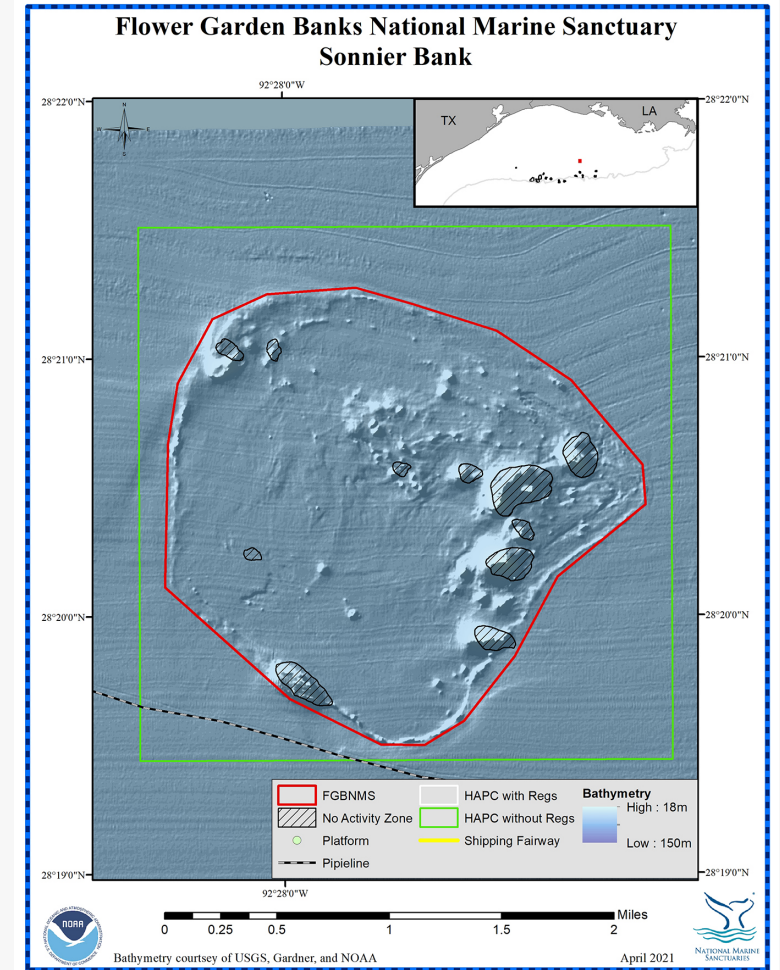
- After reviewing Coral Amendment 9 (GMFMC, 2018) and other supportive information provided by the Council, a preliminary list of **67** project sites within four major regions of the Gulf of Mexico (GoM) were proposed for this project.
- On October 19, 2021, communications between the Council and the CSA Team determined that some proposed reef/bank locations would be eliminated from the project site list because they had already received some level of protection.
- The final list of sites considered included **44** project sites, which includes three “megasites” (defined as a larger conglomerate of sites which includes a subset of individual project sites).



SELECTION OF CORAL AREAS FOR ANALYSIS



Region	Area	Site	
		Number	Name
SOUTHEASTERN GoM	Northern West Florida Slope	1	Northern West Florida Slope ¹
		2	North Reed Site
		3	Long Mound
		4	Many Mounds
		5	West Florida Wall
	Southern West Florida Slope	6	Southern West Florida Slope ¹
NORTHEASTERN GoM	Pinnacles Reefs	7	Okeanos Ridge
		8	Pinnacles Reefs ¹
		9	Triple Top Reef
		10	Double Top Reef
		11	Shark Reef
		12	Far Tortuga
		13	Patch Reef Field
		14	Solitary Mound
		15	Mountain Top Bank
		16	Pinnacle 1 Near West
		17	West Pinnacle ²
		18	Cats Paw Reef ²
		19	Porgy Reef ²
		20	Yellowtail Reef ²
	DeSoto Canyon	21	DeSoto Canyon Rim ²
	Destin Dome	22	Destin Dome 51/52 ²
		23	Destin Dome 99; 55/56/57 ²
		24	Destin Dome 617 ²

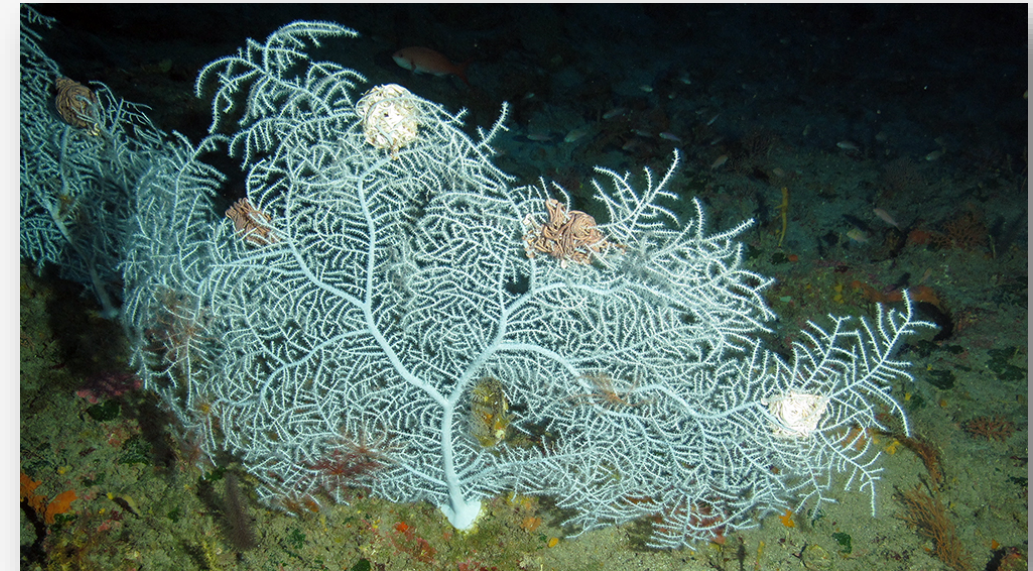




SELECTION OF CORAL AREAS FOR ANALYSIS

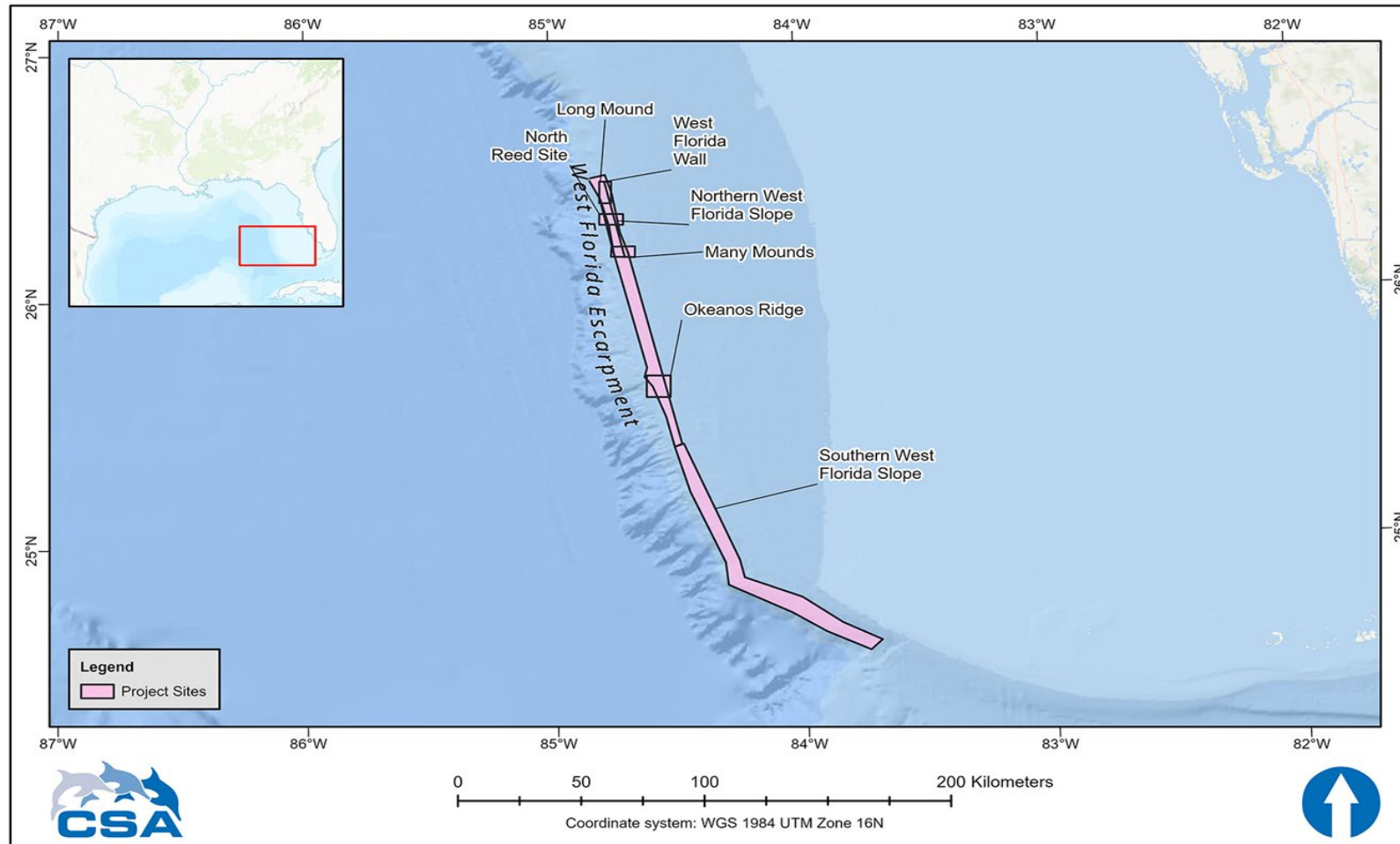


Region	Area	Site	
		Number	Name
NORTHWESTERN GoM	Shelf-Edge Banks	25	Sonnier Bank
		26	29-Fathom Bank
		27	MacNeil Bank
		28	Alderdice Bank
		29	Bouma Bank
		30	Horseshoe Bank
		31	Rankin Bright Bank
		32	Geyer Bank
		33	Elvers Bank
		34	Rezak Sidner Bank
		35	Parker Bank
		36	Jakkula Bank
SOUTHWESTERN GoM	South Texas Banks - North	37	Baker Bank
		38	Hospital Bank
		39	North Hospital Bank
		40	Aransas Bank
	South Texas Banks - South	41	Dream Bank
		42	Mysterious Banks
		43	Big Adam Rock/Big Adam Bank
		44	Blackfish Ridge



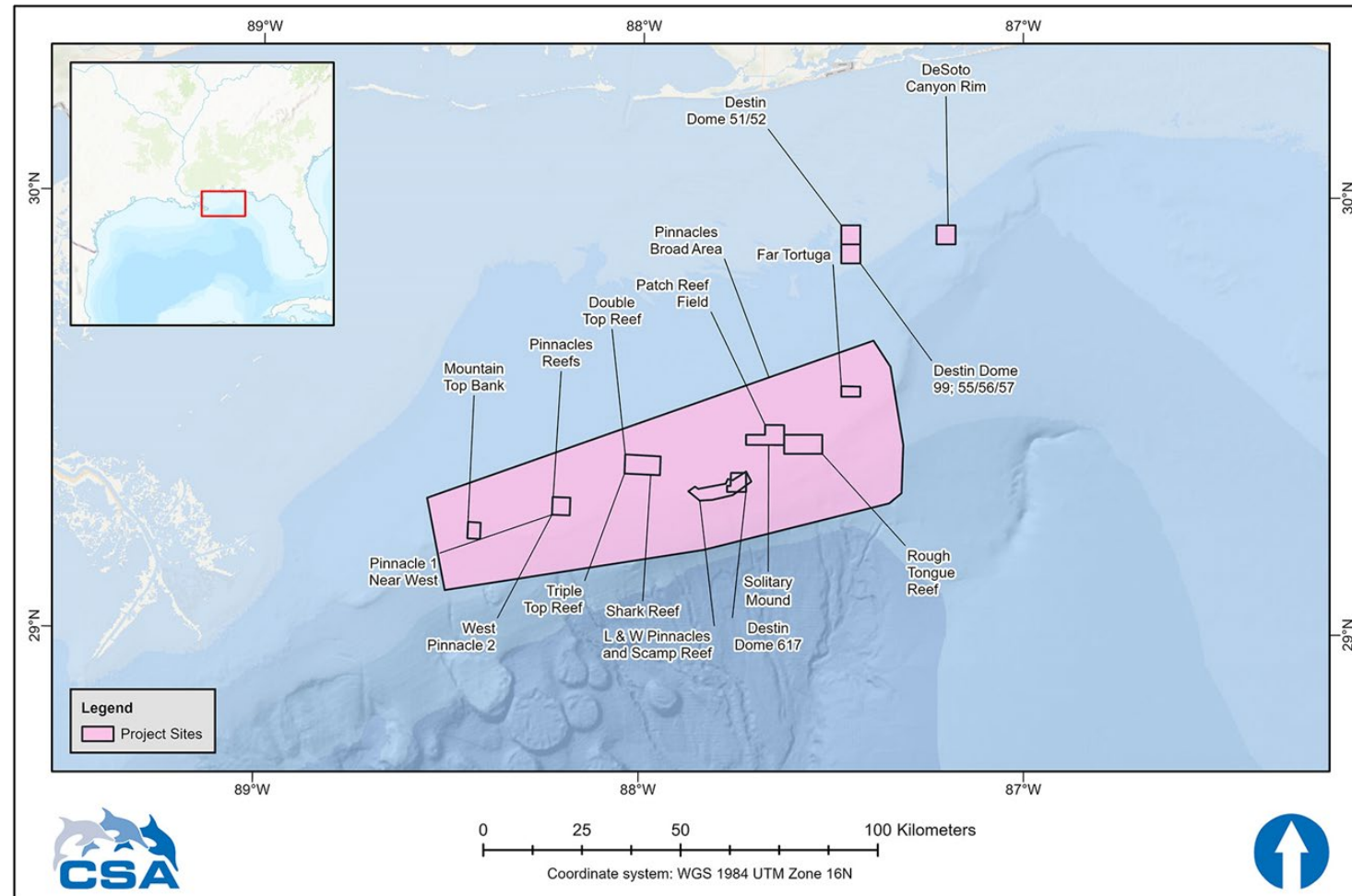


SELECTION OF PROJECT SITES: SE GoM REGION



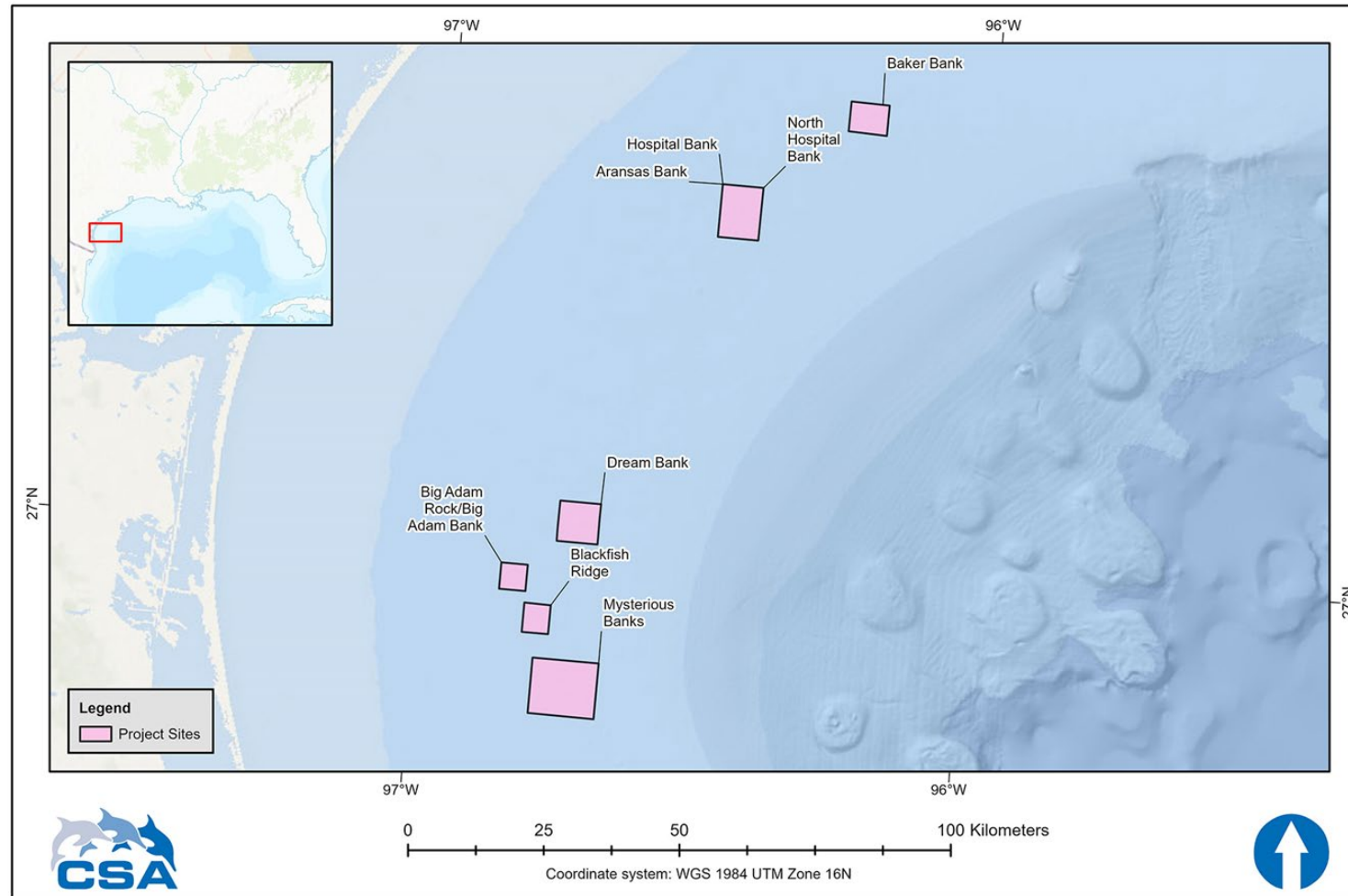


SELECTION OF PROJECT SITES: NE GoM REGION



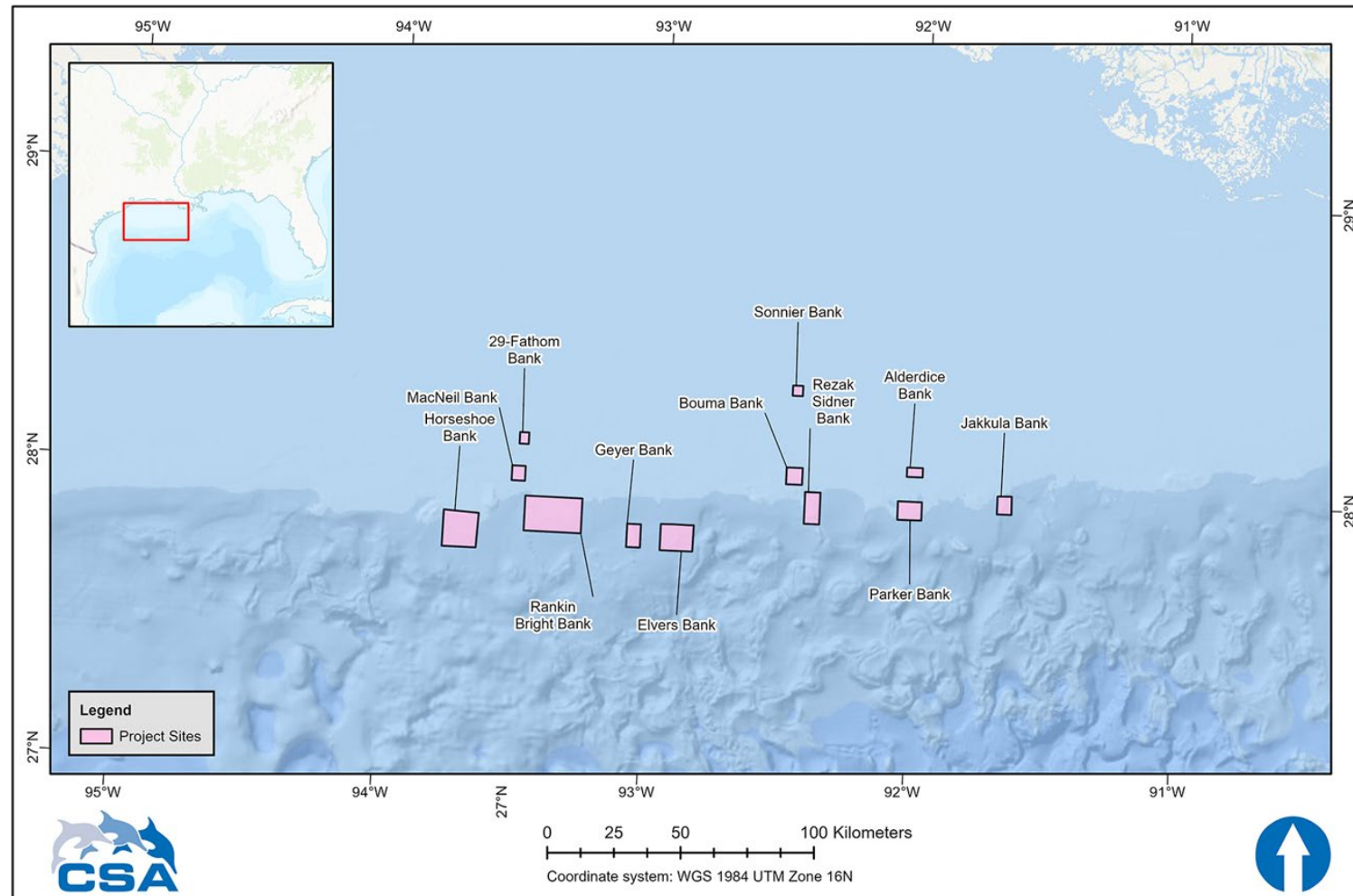


SELECTION OF PROJECT SITES: NW GoM REGION





SELECTION OF PROJECT SITES: NW GoM REGION



TASK 2 – COMPREHENSIVE LITERATURE REVIEW





COMPREHENSIVE LITERATURE REVIEW



“Conduct a comprehensive literature review of the selected coral areas (providing citations and source information for each area/region considered, in Mendeley compatible bibliographic format [e.g., RIS]).”

Identification of relevant source material began with an extensive search of scientific and technical databases on Proquest Dialog™.

Relevant books, proceedings, technical reports, and gray literature were also located using OCLC WorldCat.

(1) Preliminary broad topic search conducted using the following search statement combinations (generated 1,474 citations):

- (coral or corals or octocoral* or cnidaria*);
- (deepsea or mesophotic or "deep sea" or coldwater or "cold water" or "deep ocean"); and
- ("gulf of mexico" or atlantic).

(2) Subset of the above search was selected to address disease, temperature, and stress using the following search statement combinations (generated 517 citations):

- (coral or corals or octocoral* or cnidaria*);
- (temperature or disease? or stress*);
- (deepsea or mesophotic or "deep sea" or coldwater or "cold water" or "deep ocean"); and
- ("gulf of mexico" or atlantic).



COMPREHENSIVE LITERATURE REVIEW



These searches resulted in an unmanageable number of citations relative to the scope of the project. Attempts to narrow the results by specifying that search terms must be found in the title or key word fields and limiting results to the last 10 years did not solve the problem (The numbers of citations listed above [1,474 and 517] were reduced to 524 and 239, respectively, when narrowed to the last 10 years).

Although valuable references were located and acquired in these searches, CSA determined that a search for each specific reef or bank name as well as the larger sub-regions was required to produce a body of information that was informative at the site level but capable of being reviewed within existing resources.



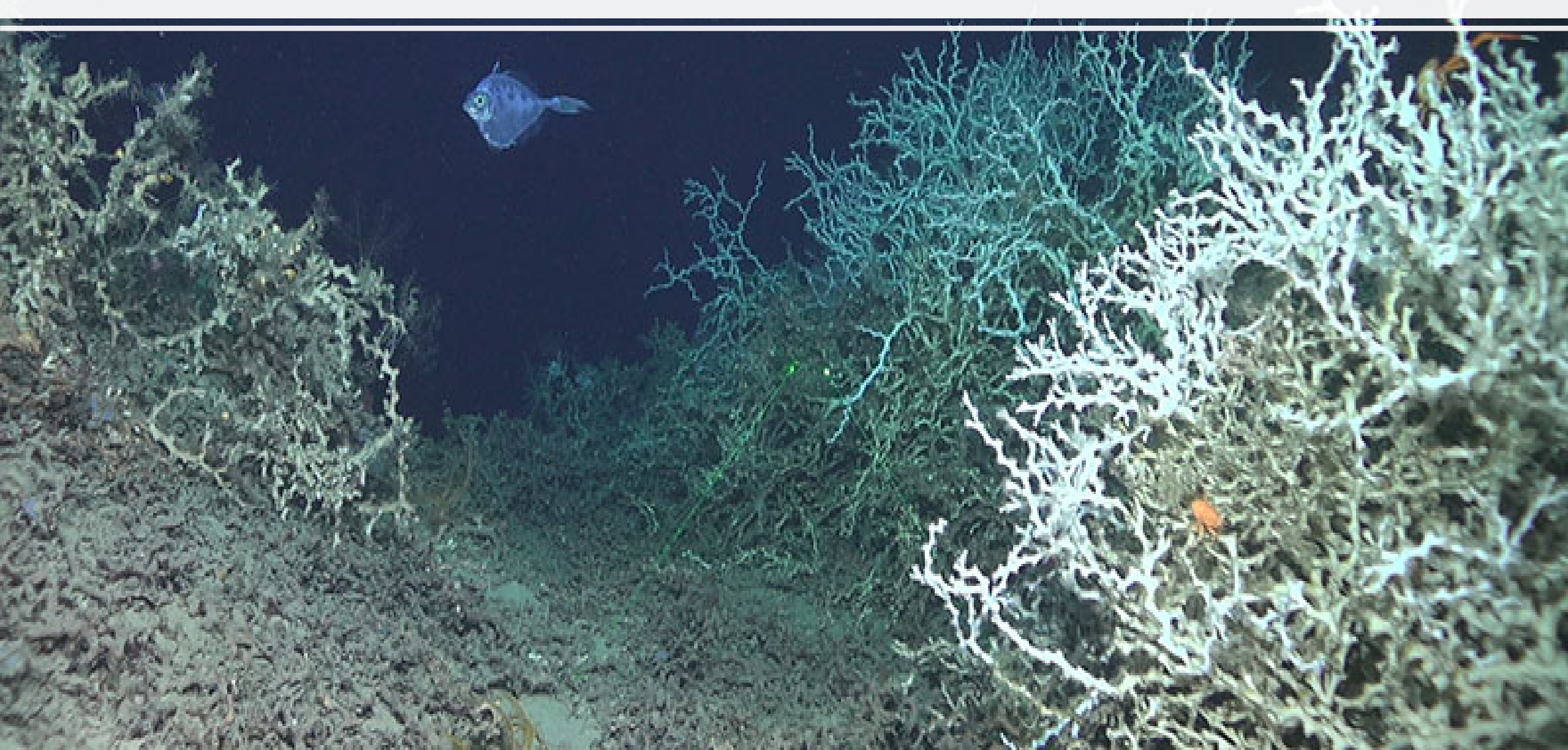
COMPREHENSIVE LITERATURE REVIEW



All search results were reviewed by the CSA Team and the documents of interest were identified and returned to the librarian for acquisition. PDFs of all requests were acquired online, via interlibrary loan request, personal request to authors or other marine librarians, or downloaded from the existing CSA library collection.

From the search and review tasks, an Endnote™ X9 library was created for all documents used in the project. The library includes full citations with a PDF of the document attached. The citations can be exported as simple document files or may be converted for use in other bibliographic management software such as Mendeley, Zotero and Refworks.

TASK 3 – ECOLOGICAL ASSESSMENT OF SELECTED CORAL AREAS





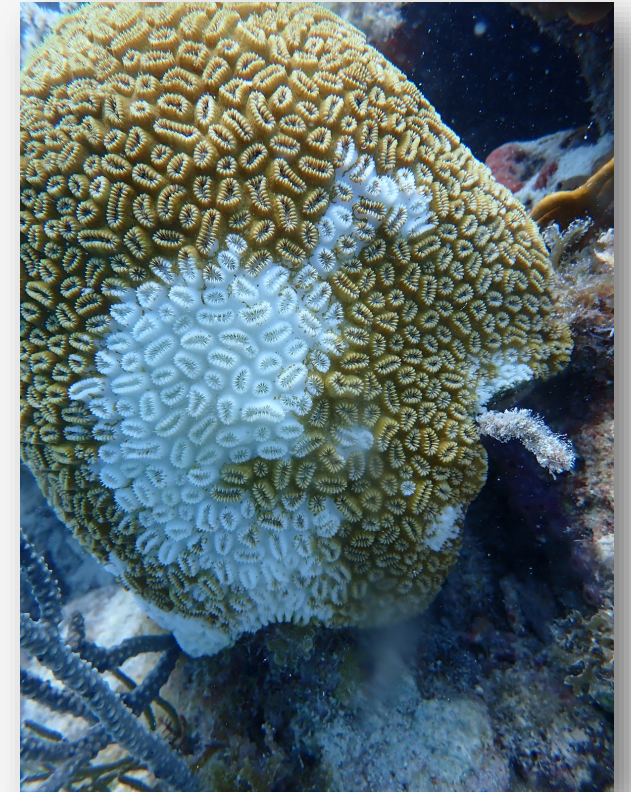
ECOLOGICAL ASSESSMENT OF SELECTED CORAL AREAS



“Design and produce a general ecological assessment of those areas where corals are identified as a conspicuous element of the bottom, and potential risks to corals in those areas and the services that they provide.”

Subtasks

- Identify, to the extent practical, a consistent level of detail for comparison across and among areas
- Provide an assessment of vulnerability of corals to disease (e.g., Stony Coral Tissue Loss Disease spread).
- Provide an assessment of potential impacts of environmental changes (e.g., changes in ocean circulation patterns, temperature, and pH).
- If available, include economically important fishery species and their association with the benthic habitat.
- Rank the areas identified above based on ecological function to provide a recommendation on which the Council could use to prioritize the development of management measures.





ECOLOGICAL ASSESSMENT OF SELECTED CORAL AREAS



The matrix was organized as follows:

- Each selected project site was entered on a separate row of the table and constituted the left column. The project sites were organized regionally to facilitate comparisons. Primary regions included the Southeastern, Northeastern, Southwestern, and Northwestern GoM.
- A list of physical and environmental factors were developed and entered as separate columns on the horizontal axis (top row) of the matrix. All included factors have known, accepted, and defensible ecological relevance.



ENVIRONMENTAL FACTORS (1)



- Area
- Relief
- Depth
- Base Substratum
- Temperature Regime
- Salinity Regime
- Proximity to:
 - Shore, Major River(s), Active Offshore Oil and Gas Activities; Wind Fields; Offshore Mining Operations; Shipping Lane(s); Other Protected Areas; Consistent Military Operations; Dumping Areas; and Benthic Methane Seeps.

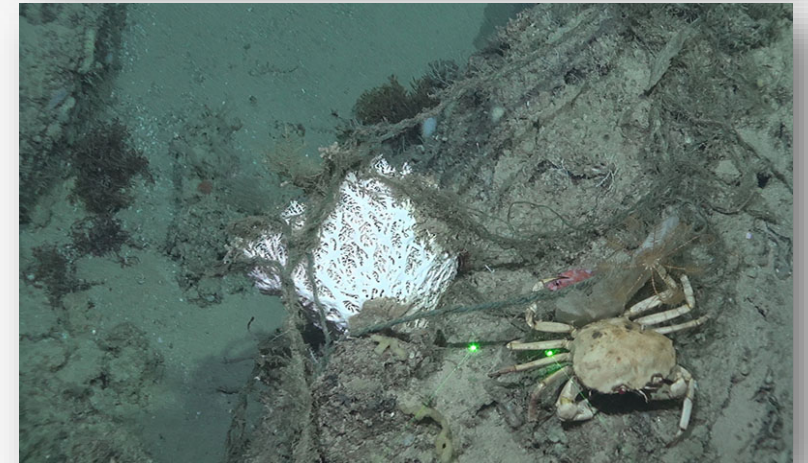




ENVIRONMENTAL FACTORS (2)



- Scleractinian Coral Species Richness
- Octocoral Species Richness
- Hydrozoan (Orders Milleporina and Stylasterina) Species Richness
- Antipatharian Species Richness
- Fish Species Richness
- Benthic Fishing Activity/Intensity – Bottom Long Line (BLL)
- Benthic Fishing Activity/Intensity – Bottom Trawl
- Benthic Fishery Types and Gears at Site
- Invasive Species
- Disease Incidence
- Research History
- Current Protections
- Vulnerability to Climate Change





DATA COMPILATION



- From the beginning of the project contract period, the CSA Team worked closely with the Council to refine the structure and content of the data review and compilation task.
- Information collected for each project site during the data search and review was examined, and information pertaining to the selected environmental factors was entered into corresponding matrix cells for each project site.
- Sources of data used to populate each cell were embedded in the cell as a note. In cases where information (or reliable information) was not located, the cell was left blank. In cases where the cell was not applicable to the site, “n/a” was entered in the cell.
- The distance/proximity analysis was conducted in ArcPro version 2.8.3. Coral site centroids were created from a coral site polygon feature using a “Feature to Point” tool. The coral site centroids are representative of center points for each coral site. A “Near” analysis was then performed between the coral site centroids and each proximity feature. All ‘Proximity’ data sources are listed in a separate matrix spreadsheet.
- This process resulted in a synoptic presentation of area-specific information that was used for site comparisons and rankings as part of the ecological assessment. Endpoints at the proximity features and lines connecting the coral site centroids to the endpoints were created using the “XY to line” tool. Geodetic distances were then calculated for each line using the “calculate geometry attributes” tool. Where information was not applicable, ‘n/a’ was entered in the cell.



DATA COMPILATION



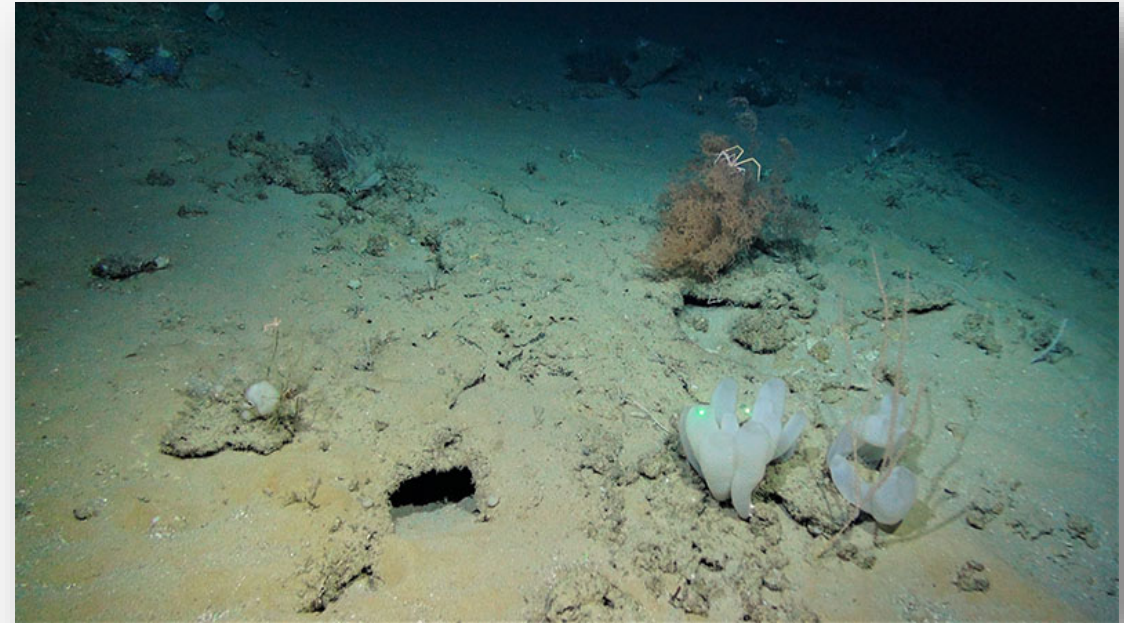
- Overall, this matrix process resulted in a synoptic presentation of area-specific information that was used for site comparisons and rankings as part of the ecological assessment.
- As designed, the assessment matrix allows for an objective approach to site comparisons across the GoM.
- As per study design, the assessment was limited to currently available data for the selected project sites; however, the assessment was designed to be modified and improved as needed and as new, authoritative data become available.
- Additional data needs (data gaps) were identified, leading to recommendations for new studies.



RANKING OF ENVIRONMENTAL FACTORS AND FINAL SCORING METHODS



- Distribution graphs of data were generated for 18 factors with sufficient quantitative data, and patterns examined
- Points were assigned to groups of data to separate sites across a spectrum of relative “quality” and/or “vulnerability.” This also allowed groupings of similar sites.
- Point assignments were weighted for two factors: Area and Research
- For one factor that was not quantitative (e.g., Substrate), points were assigned based on research or management criteria
- Note, the actual point values assigned were designed to give separation to the sites to easily visualize relative positions and data sufficiency



*Note: Working with a small subset of the whole range of GoM deep reef sites impacted (hindered) relative comparisons.

An underwater photograph of a large, mottled brown and yellow fish, possibly a grouper, resting on a vibrant coral reef. The reef is covered in various colorful corals and seaweeds. A white line, likely a diver's rope, is visible in the upper right corner. A semi-transparent white box with a thin black border is centered over the image, containing the title text.

RESULTS OF SITE PRIORITIZATION FOR MANAGEMENT PURPOSES: ECOLOGICAL AND VULNERABILITY ANALYSIS



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Thank you!

