

Coral Reef Conservation Program Grant Update

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Coral SSC, AP Joint Meeting

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What does the most recent grant include?

- A three year project (2017-2020) addressing threats to **Endangered Corals** from **Climate Change** and **Fishing** to Coral Reef Ecosystems and Associated Fisheries in the Gulf of Mexico using:
 - Spatial Decision-Support Tools
 - Broad Stakeholder Engagement
 - Comprehensive Scientific Review

Focus on ESA Coral Species

- In September 2014, NOAA Fisheries published a federal register notice that listed seven coral species as threatened under the Endangered Species Act
- Several learning modules and tools were developed as outreach materials in this grant to increase awareness about them

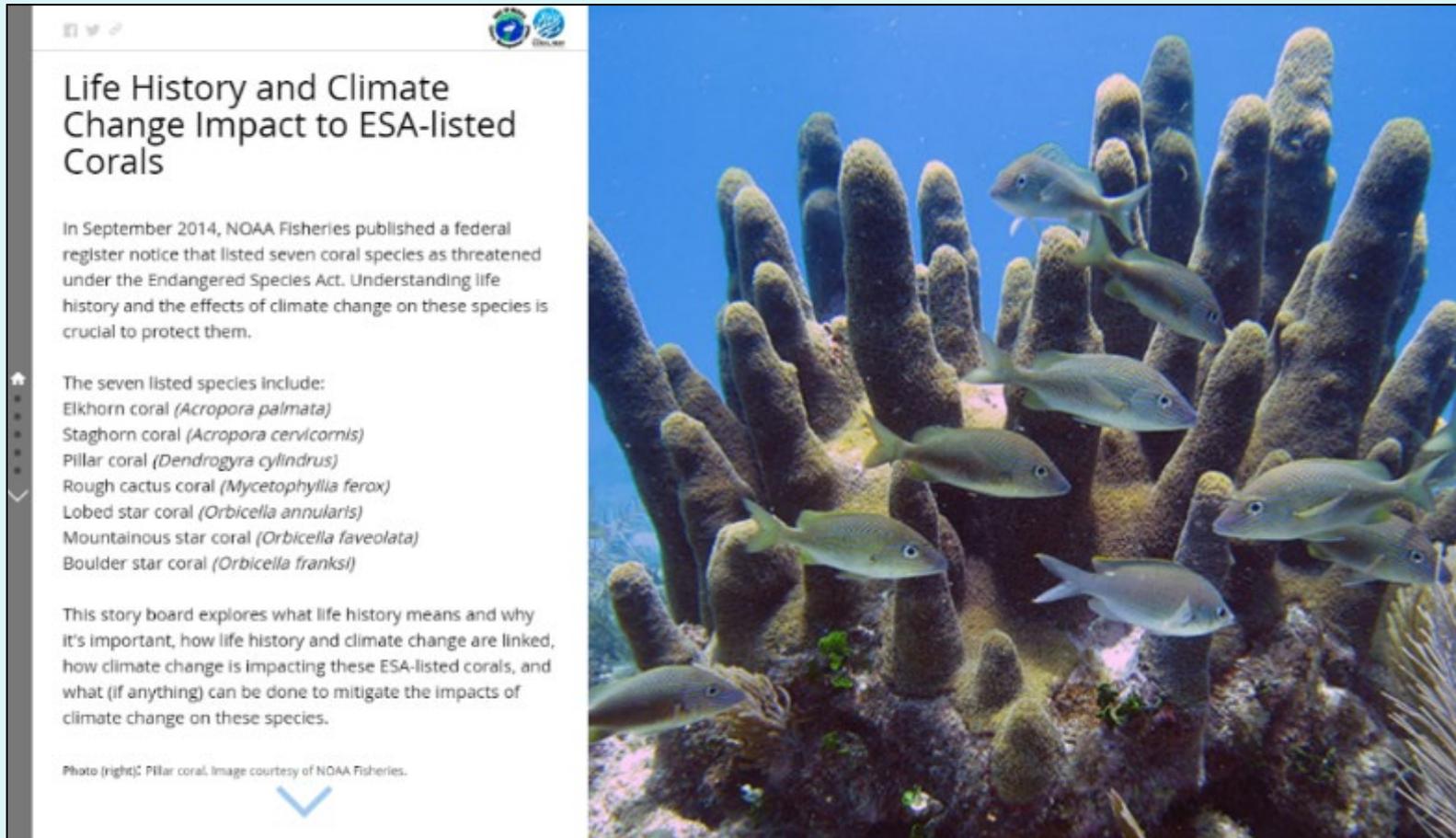
Task 1: ESA Corals

Assessing our understanding and importance of the 2014 listing of threatened coral, their abundance, and distribution in the Gulf of Mexico.

- Identify baseline abundance and distribution of ESA coral species in the gulf region.
- Generate learning modules from extensive literature search to highlight current distribution, life history information, and potential threats to coral distributions in the Gulf.
- Create metadata and maintain Coral Portal (Portal) with up to date information.

Outreach Materials

Learning module on life history and Climate Change Impacts to ESA-listed corals. This module can be accessed online at <https://portal.gulfcouncil.org/esagmxcoralhi/>



Life History and Climate Change Impact to ESA-listed Corals

In September 2014, NOAA Fisheries published a federal register notice that listed seven coral species as threatened under the Endangered Species Act. Understanding life history and the effects of climate change on these species is crucial to protect them.

The seven listed species include:

- Elkhorn coral (*Acropora palmata*)
- Staghorn coral (*Acropora cervicornis*)
- Pillar coral (*Dendrogyra cylindrus*)
- Rough cactus coral (*Mycetophyllia ferox*)
- Lobed star coral (*Orbicella annularis*)
- Mountainous star coral (*Orbicella faveolata*)
- Boulder star coral (*Orbicella franksi*)

This story board explores what life history means and why it's important, how life history and climate change are linked, how climate change is impacting these ESA-listed corals, and what (if anything) can be done to mitigate the impacts of climate change on these species.

Photo (right): Pillar coral. Image courtesy of NOAA Fisheries.



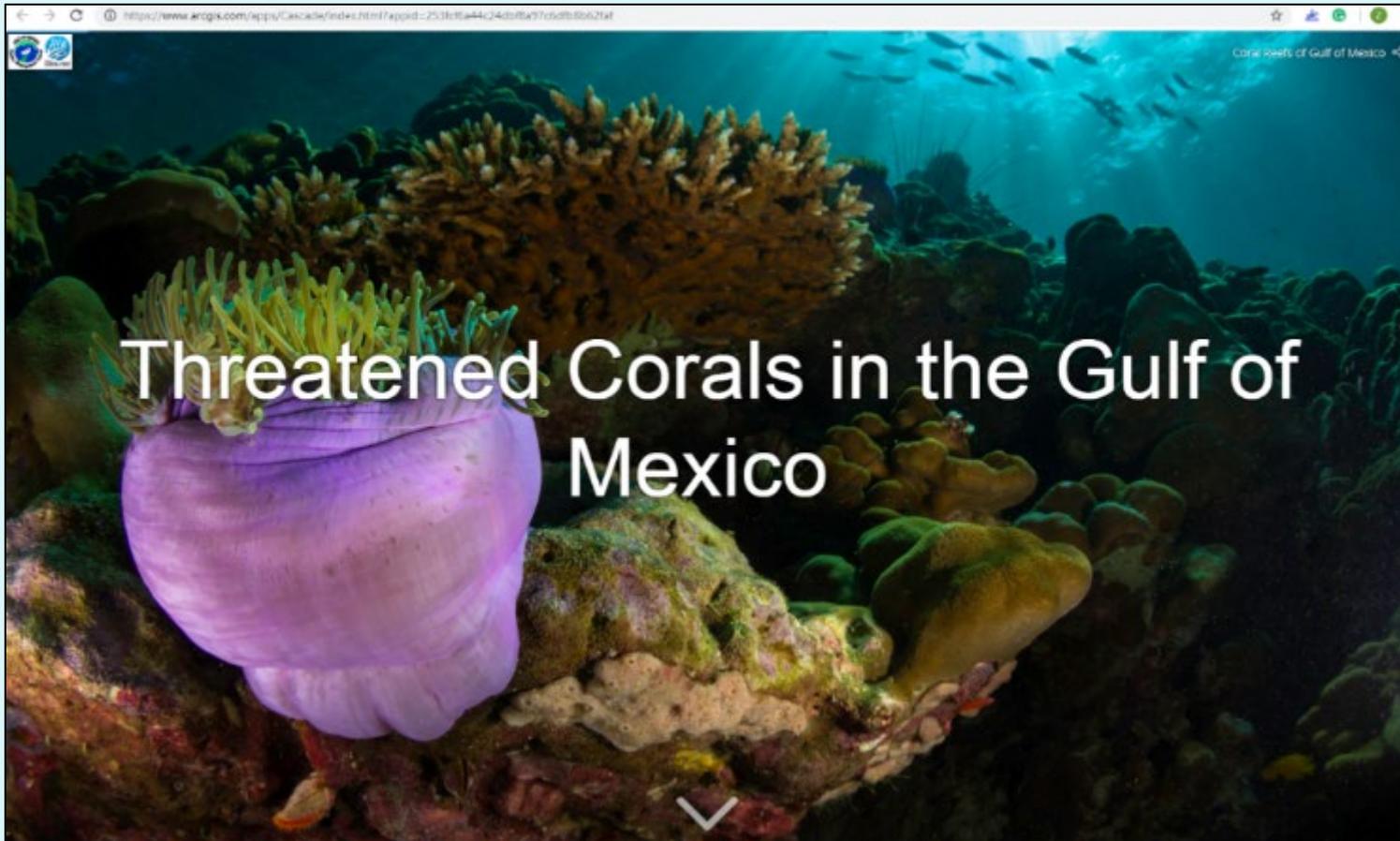
Outreach Materials

Learning module on causes and consequence of coral reef decline. The module can be accessed online at <https://portal.gulfcouncil.org/CoralDecline.html>



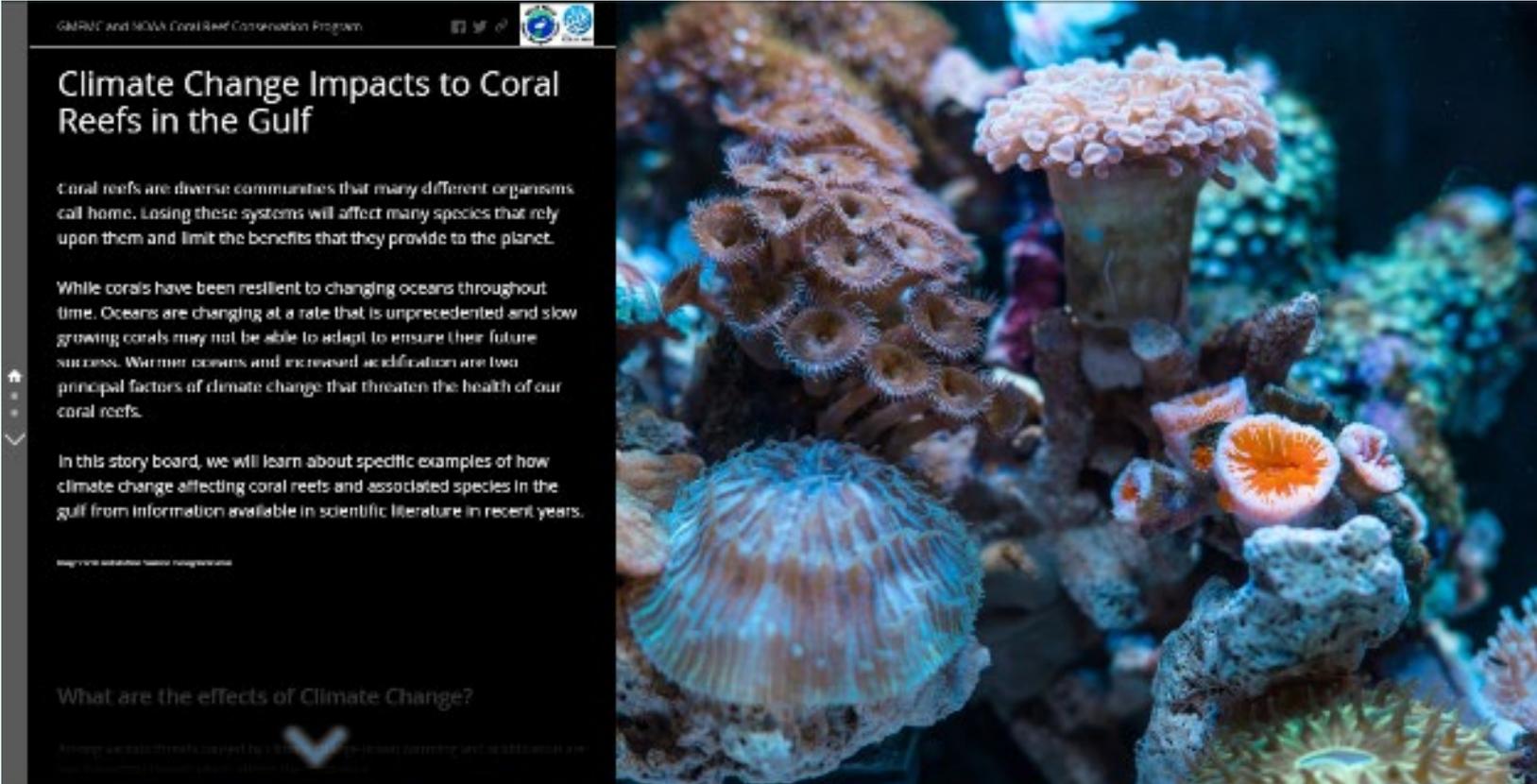
Outreach Materials

Learning module highlighting the life history and threats specific to endangered species act (ESA) listed individual shallow-water coral species in the Gulf of Mexico. It can be accessed online at <https://portal.gulfcouncil.org/esagmxcoralth/>



Outreach Materials

Learning modules highlighting the climate change impacts on the Gulf of Mexico corals and effects on coral reef associated species were also developed. Both of them can be accessed at <https://portal.gulfcouncil.org/coralccthreats/> and <https://portal.gulfcouncil.org/ccaspecies/>



The image shows a digital story board interface. On the left, there is a dark sidebar with white text. At the top of the sidebar, it reads "GMRIC and NOAA Coral Reef Conservation Program" followed by three circular logos. Below this is the title "Climate Change Impacts to Coral Reefs in the Gulf". The main text in the sidebar is as follows:

Coral reefs are diverse communities that many different organisms call home. Losing these systems will affect many species that rely upon them and limit the benefits that they provide to the planet.

While corals have been resilient to changing oceans throughout time, oceans are changing at a rate that is unprecedented and slow growing corals may not be able to adapt to ensure their future success. Warmer oceans and increased acidification are two principal factors of climate change that threaten the health of our coral reefs.

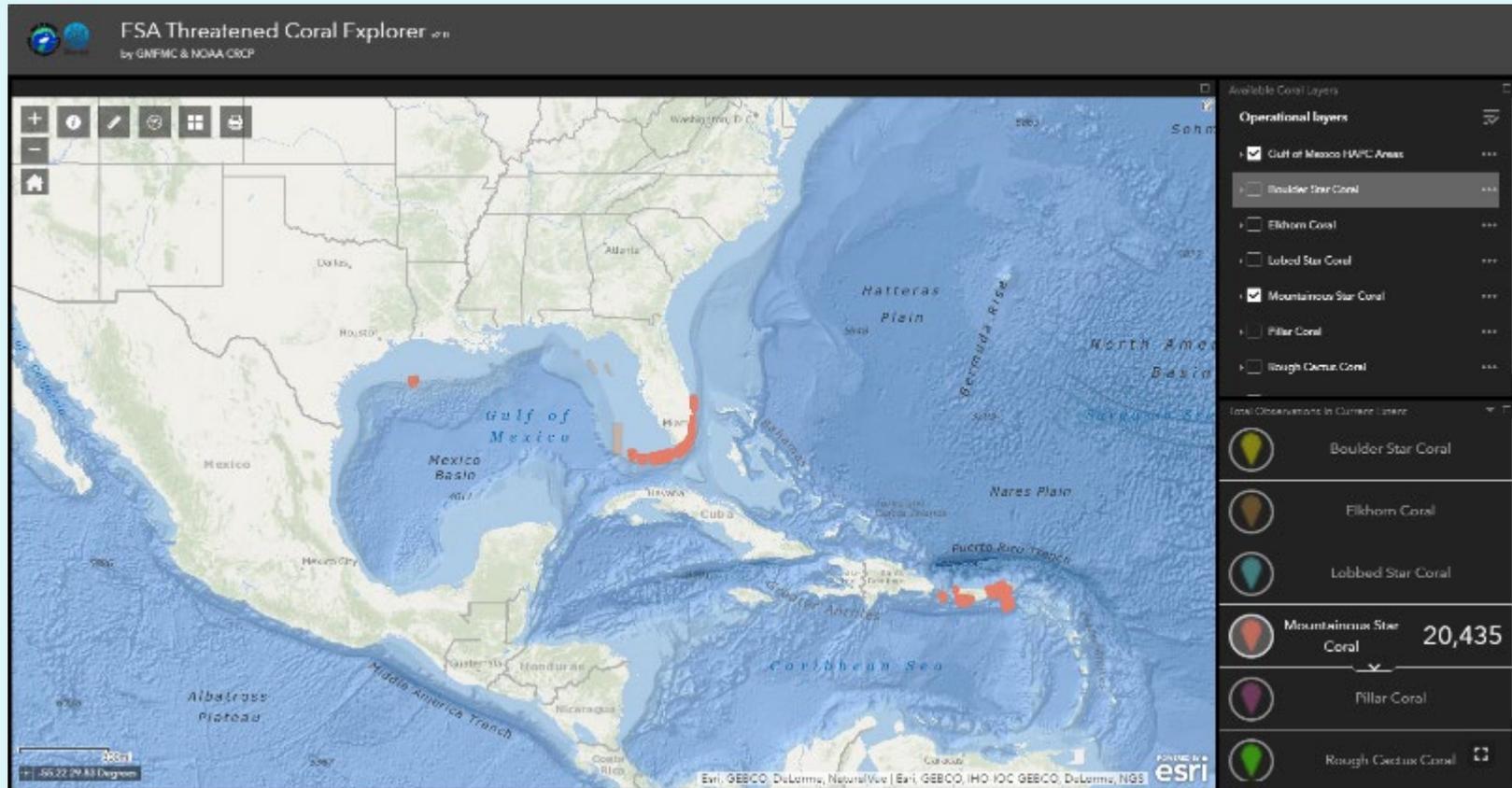
In this story board, we will learn about specific examples of how climate change affecting coral reefs and associated species in the gulf from information available in scientific literature in recent years.

At the bottom of the sidebar, there is a question "What are the effects of Climate Change?" and a downward-pointing arrow.

On the right side of the story board, there is a large, vibrant photograph of a coral reef. The coral is diverse, with various colors including shades of orange, pink, purple, and blue. The background is dark, making the colorful coral stand out.

Outreach Materials

We coordinate with federal, state agencies and partners to host ESA coral observation data in the Coral Portal. A new ESA Coral Explorer web application has been developed and can be accessed online at <https://portal.gulfcouncil.org/ESACoralDB.html>



Focus on Spatial Management

Documenting climate change in the EEZ that may affect the health of corals and translating that information to the public

- Compile climate, biological and environmental data into a platform that is user friendly for managers and the public.
- Develop spatially explicit model incorporating climate change and its potential effects on coral reefs.
- Develop a white paper and learning module describing climate change, storm activity and other habitats linked to coral reef health.

Task 2: Spatial Management

Coral Amendment 9 (approved in November 2020) establishes 13 new HAPC with fishing regulations, designates 8 new areas without fishing regulations, and modifies the regulations in 3 existing areas.

Revised 11/16/2018

Coral Habitat Areas Considered for Habitat Area of Particular Concern Designation in the Gulf of Mexico



Final Amendment 9 to the Fishery Management Plan for the Coral and Coral Reefs of the Gulf of Mexico, U.S. Waters

Including Final Environmental Impact Statement

November 2018

Outreach Materials

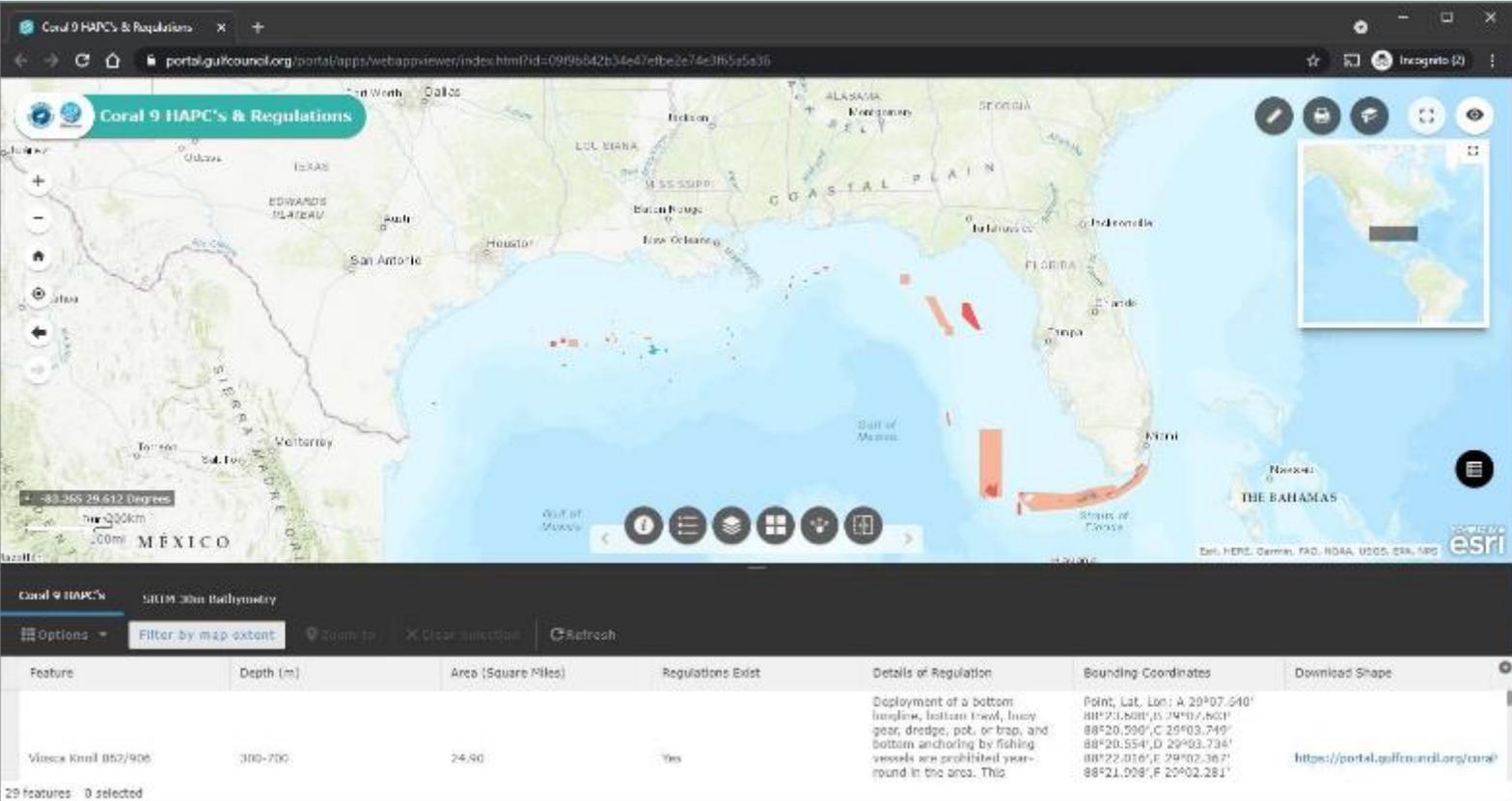
New Gulf HAPC explorer application showcased existing regulated areas and new Coral 9 designated HAPC areas online and could be used as REST API service. The application can be accessed from <https://portal.gulfcouncil.org/coral9.html>

The screenshot displays the Coral 9 HAPC & Regulations web application. The map shows the Gulf of Mexico with several red-shaded regulated areas. The interface includes a search bar, map controls, and a data table at the bottom.

Feature	Depth (m)	Area (Square Miles)	Regulations Exist	Details of Regulation	Bounding Coordinates	Download Shape
Vivian Knoll 057/906	300-700	24.90	Yes	Deployment of a bottom trawl, bottom trawl, buoy gear, dredge, pot, or trap, and bottom anchoring by fishing vessels are prohibited year-round in the area. This	Point, Lat, Lon: A 29°07.540' 88°21.508', S 29°07.501' 88°20.590', C 29°03.749' 88°20.554', D 29°03.734' 88°22.016', E 29°02.367' 88°21.098', F 29°02.281'	https://portal.gulfcouncil.org/coral9

29 features 0 selected

Gulf HAPC Explorer Live Demo



The screenshot displays the Coral 9 HAPC Explorer web application. The map shows the Gulf of Mexico with several red-shaded areas representing HAPCs. The interface includes a search bar, a map navigation toolbar, and a table of HAPC details.

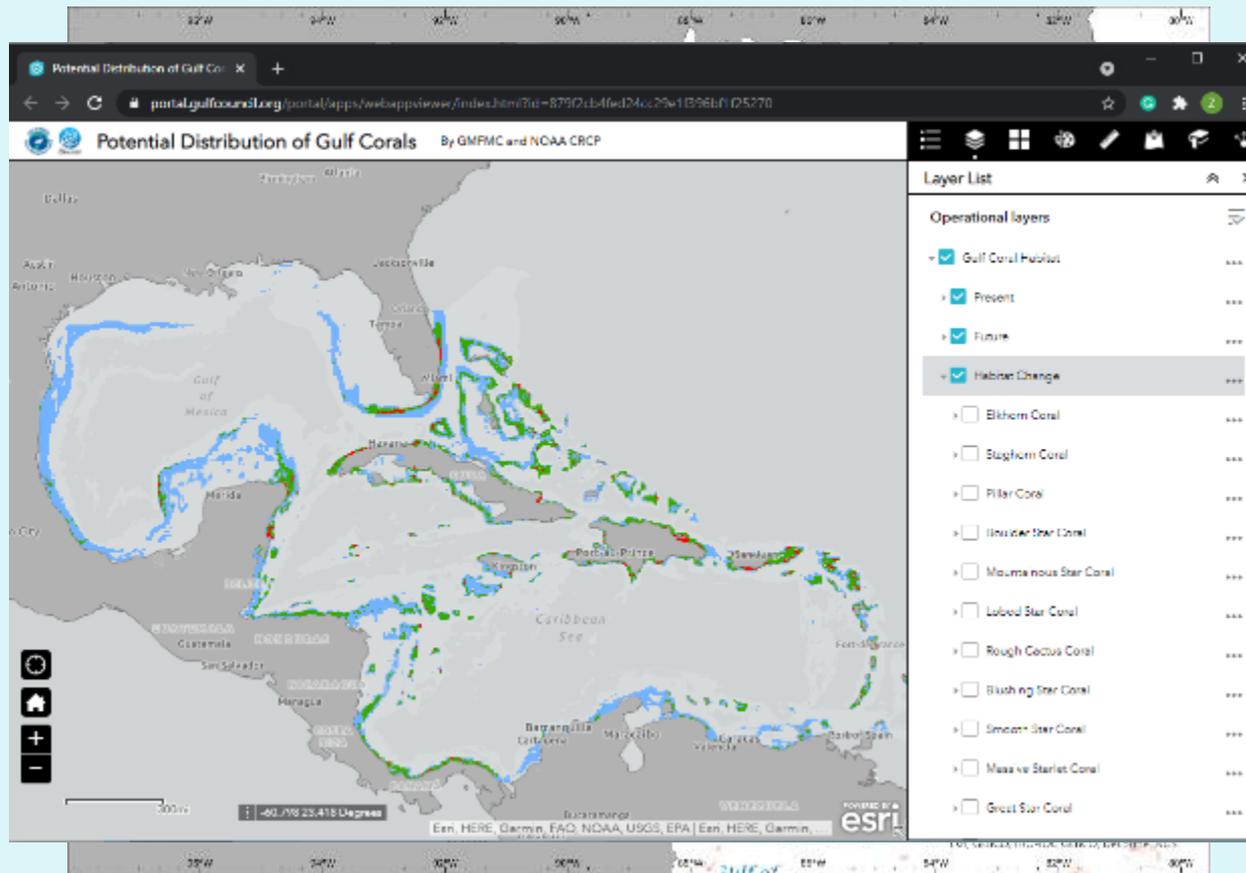
Feature	Depth (m)	Area (Square Miles)	Regulations Exist	Details of Regulation	Bounding Coordinates	Download Shape
Vincec Kmsl 052/906	300-700	24.90	Yes	Deployment of a bottom trawl, bottom trawl, buoy gear, dredge, pot, or trap, and bottom anchoring by fishing vessels are prohibited year-round in the area. This	Point, Lat, Lon: A 29°07.640' 88°21.600', B 29°07.600' 88°20.590', C 29°03.749' 88°20.554', D 29°03.734' 88°22.016', E 29°02.367' 88°21.508', F 29°02.281'	https://portal.gulfcouncil.org/coral9

29 Features 0 selected

<https://portal.gulfcouncil.org/coral9.html>

Predictive Models for Gulf Corals

Developed spatially explicit models for common coral species in the Gulf including the projection for future change in habitat due to the effect of climate change. Results from the models could be explored using interactive application from <https://bit.ly/3sFf9s3> and detailed analysis and results are available from the [whitepaper](#).



Task 3: Updating Baseline

Assessing effectiveness of spatial management areas and coral reef associated species diversity between selected sites across the Gulf of Mexico

- Conducting a Gulf-wide review of existing literature in collaboration with federal and academic partners to evaluate the effectiveness of MPAs in the Gulf by developing hotspot maps of selected sites and comparing them to appropriate control sites.
- Provide a Gulf-wide hotspot map of coral and fish species richness and analysis to evaluate the effectiveness of spatial management areas with current form of fishing gear regulation in conserving corals and reef fishes.
- Learning module to raise awareness on deep sea coral species in the gulf.

Assessing The Role of Spatial Management

Effectiveness of selected spatial management areas were evaluated and at the same time analyzed species (coral, fish, and invertebrate) diversity of these sites. Outputs from the analysis is available in the [whitepaper](#) and results could be explored using interactive application available from <https://portal.gulfcouncil.org/spdiv20/>

The screenshot displays a web browser window with the URL portal.gulfcouncil.org/spdiv20/. The page title is "Role of Spatial Management Areas on Maintaining Reef Species Diversity in the Gulf of Mexico". The navigation menu includes: Introduction, Methods, Density Maps, Species Richness, Species Diversity, Species Hotspots, SMA Effectiveness, and Conclusion.

Study Sites

- South Texas Bank sites
- Stetson Bank HAPC
- Lower Garden Banks HAPC
- Edgco
- Mechan and Stetson sites
- Seaboard Lumps

Text Panel:

Spatial management areas (SMA's) have been used in the form of Marine Protected Areas (MPAs) or Habitat Areas of Particular Concern (HAPCs) as a strategy to reduce fisheries stress on the ecosystem, conserve biodiversity in areas vulnerable to climate and anthropogenic stress.

The Gulf of Mexico accounts for 6% of the total area of MPAs in U.S. waters including at least 290 MPAs. However, the vast majority of MPAs are multiple use and allow at least some extractive use (i.e., fishing activities).

Stand-alone MPAs can be useful for conservation but often fail to achieve intended objectives when they are not planned as a network of sites (Moleod et al. 2009). MPA networks have been used for marine species conservation and established in many countries to reduce the adverse effect of the expanding human footprint on biodiversity (Gladstone et al. 2007). An approach that narrows the focus and scale of conservation and protects those species at greatest risk of extinction is the classic hotspot analysis (Possingham et al. 2005). Hotspots are those areas with the greatest numbers species including threatened and endemic species.

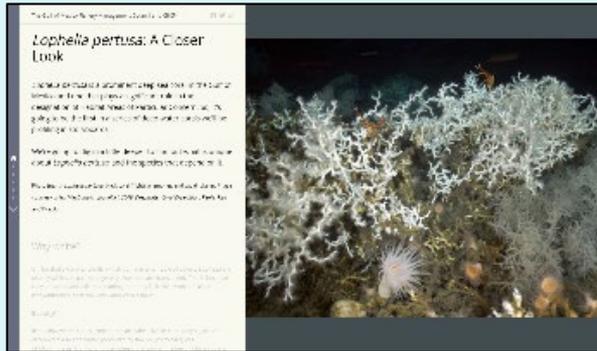
This study assessed the effectiveness of spatial management areas by identifying the species hotspots, coral reef-associated species diversity between selected sites across the Gulf of Mexico.

The objective is to evaluate existing management practices and prioritize potential locations that might need additional spatial management.

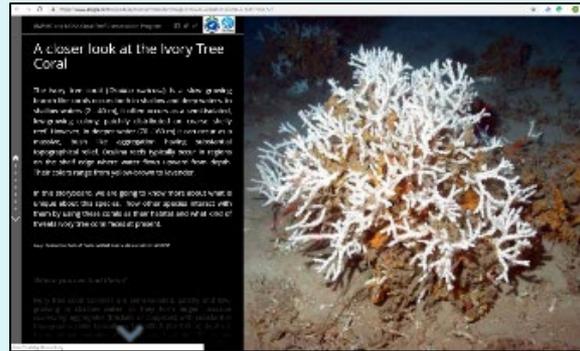
The background image of the text panel shows a vibrant underwater reef scene with various colorful fish swimming over coral.

Outreach Materials

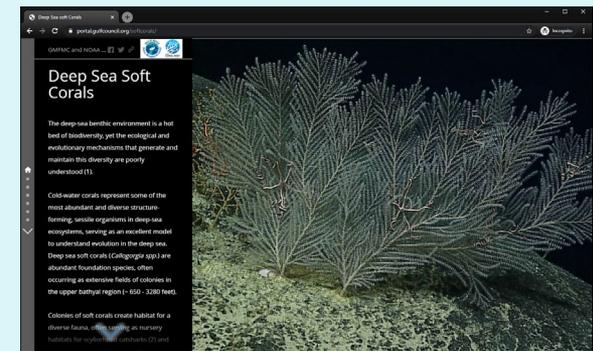
Learning modules on the deep sea coral species in the Gulf.



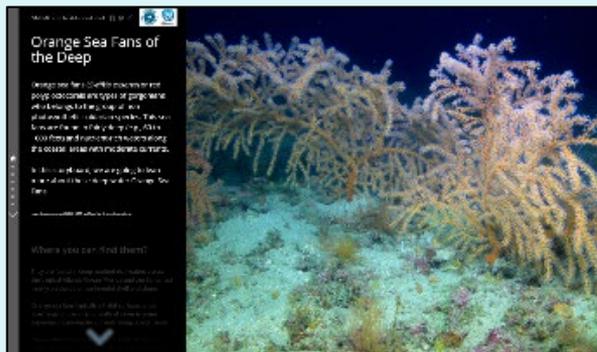
Lophelia (*Lophelia pertusa*)



Ivory Tree Coral (*Oculina varicosa*)



Soft Corals (*Callogorgia* spp.)



Orange Sea Fans (*Swiftia exserta*)



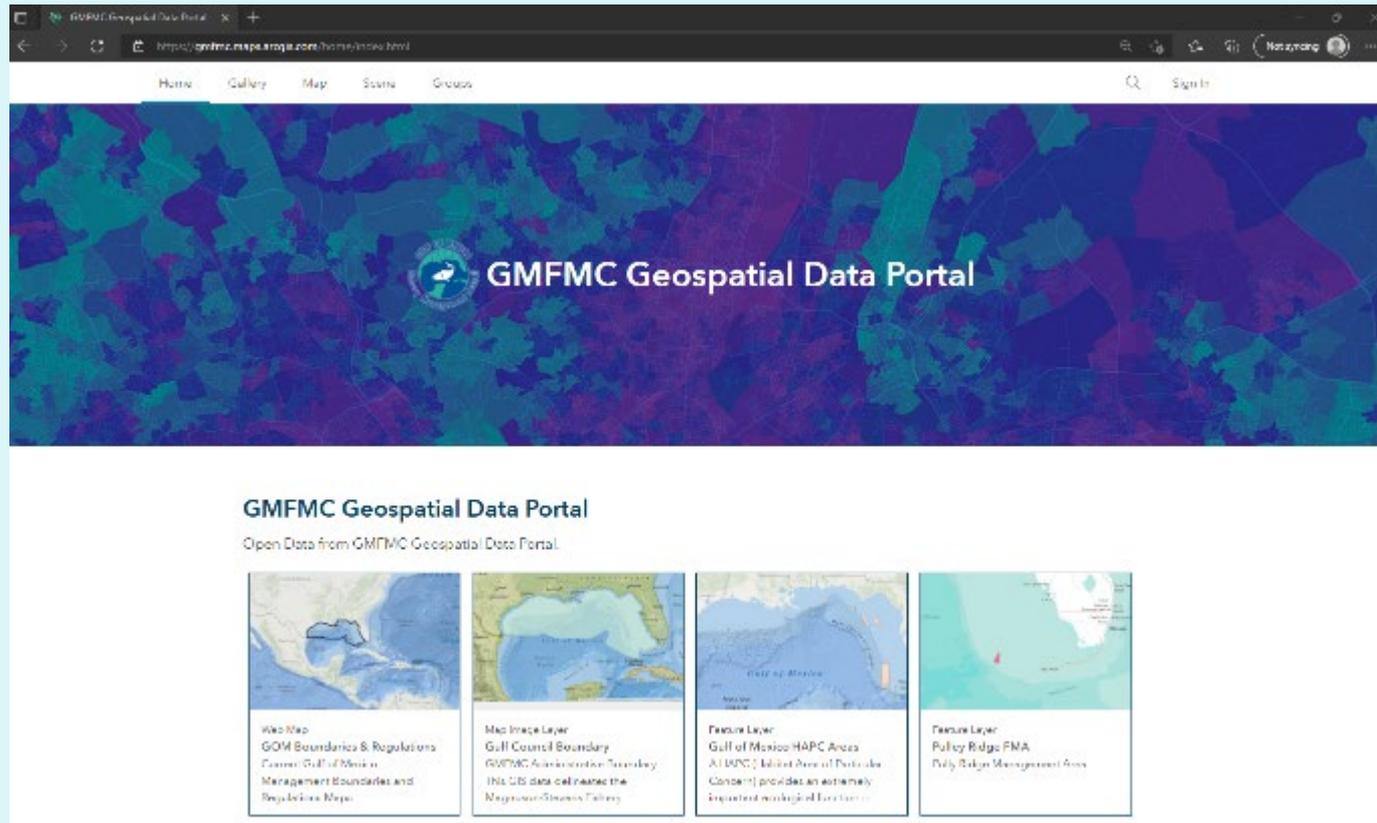
Black Corals (*Antipathes* sp.)



Ancient Corals (*Leiopathes* spp.)

Improvements in Web Services

Geospatial Open Data Portal for Public at
<https://gmfmc.maps.arcgis.com/home/index.html>



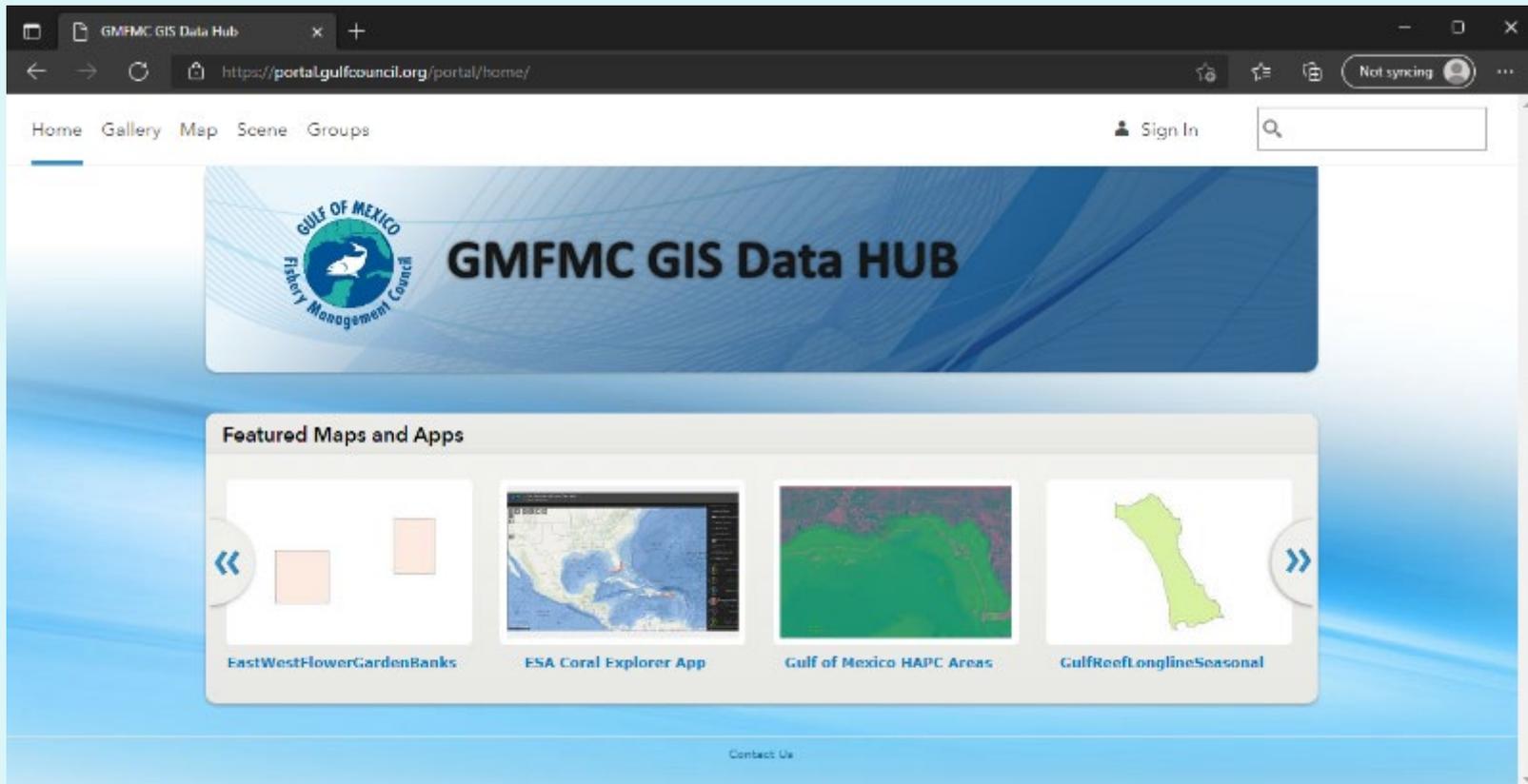
GMFMC Geospatial Data Portal

Open Data from GMFMC Geospatial Data Portal.

 <p>Web Map GOM Boundaries & Regulations Current Gulf of Mexico Management Boundaries and Regulatory Maps</p>	 <p>Map Image Layer Gulf Council Boundary GMFMC Association Territory This CBS data call names the Neagrosco Steamers Facility</p>	 <p>Feature Layer Gulf of Mexico HAPC Areas All BUNC (United Area of Particular Concern) provides an extremely important ecological function</p>	 <p>Feature Layer Policy Ridge FMA Policy Ridge Management Area</p>
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Improvements in Web Services

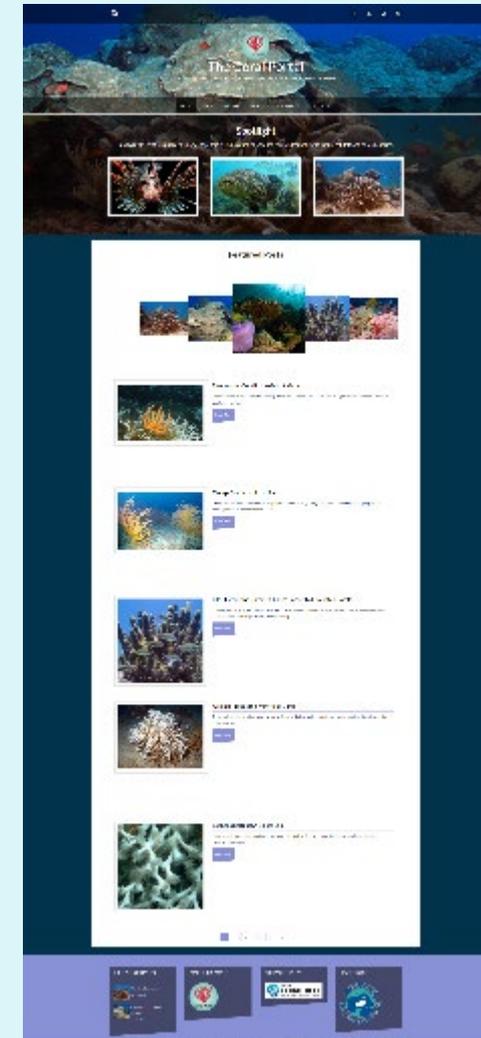
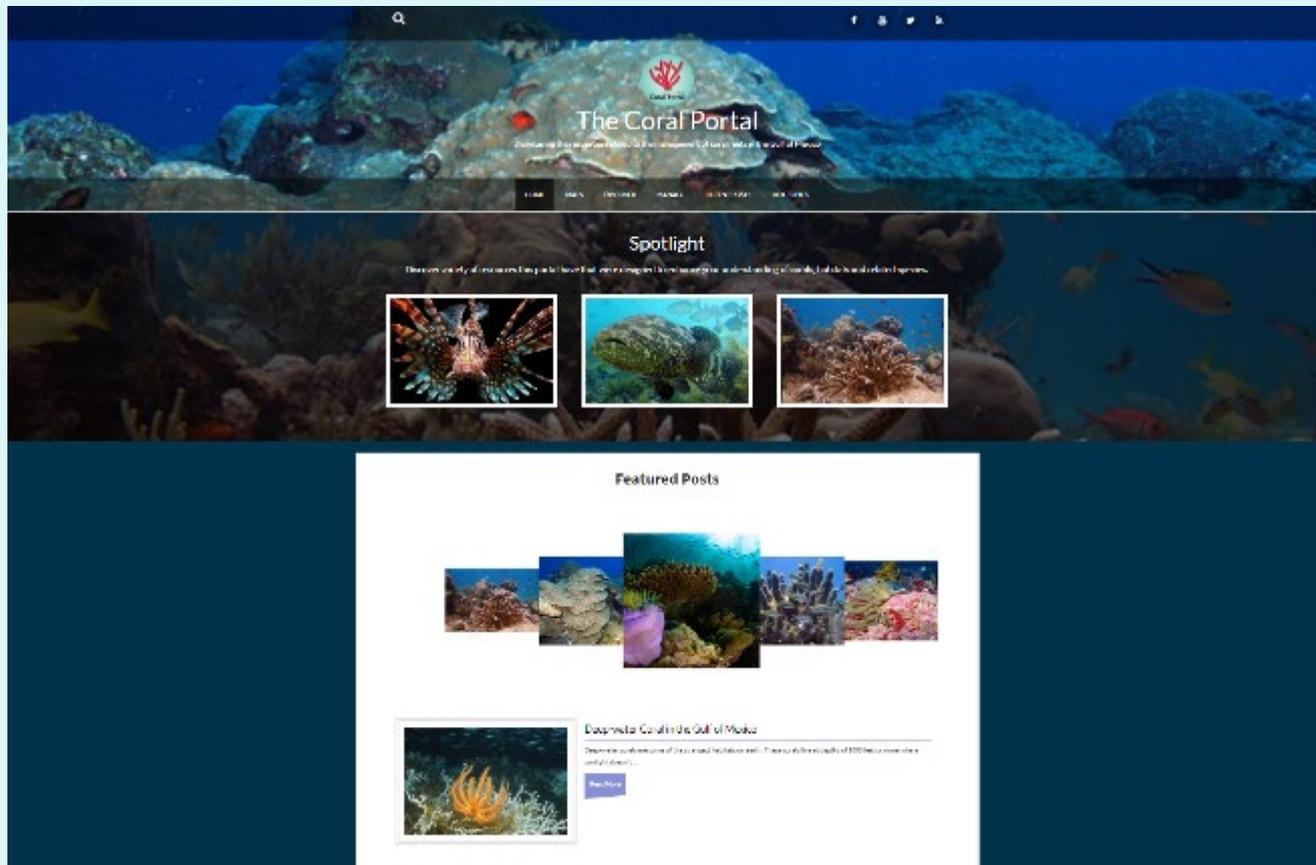
Upgraded new GIS server to host Council produced Geospatial Data for both internal and external use via REST services available from <https://portal.gulfcouncil.org/portal>



The screenshot displays the GMFMC GIS Data Hub website. The browser address bar shows the URL <https://portal.gulfcouncil.org/portal/home/>. The navigation menu includes Home, Gallery, Map, Scene, and Groups. A search bar and a Sign In button are located in the top right corner. The main header features the GMFMC logo and the text "GMFMC GIS Data HUB". Below the header is a "Featured Maps and Apps" section with four items: "EastWestFlowerGardenBanks", "ESA Coral Explorer App", "Gulf of Mexico HAPC Areas", and "GulfReefLonglineSeasonal". A "Contact Us" link is visible at the bottom of the page.

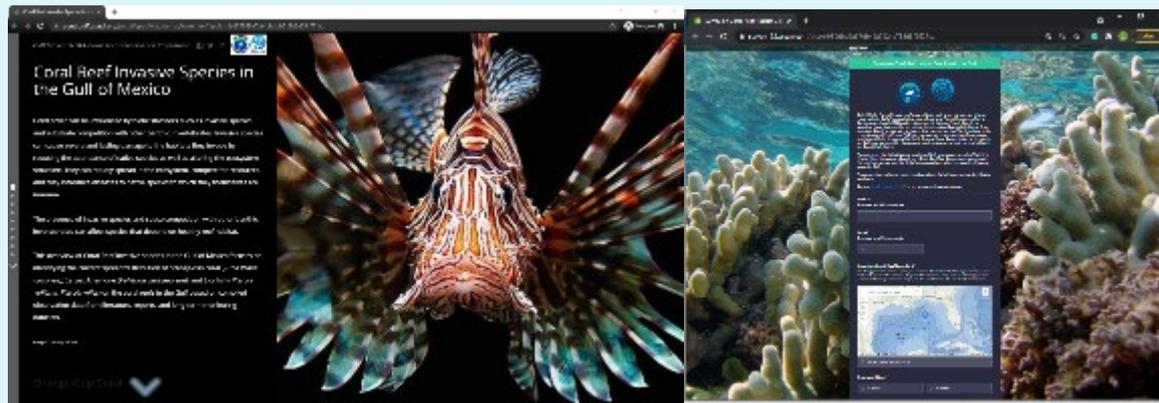
Improvements in Web Services

New Coral Portal with news, products and apps



Future Tasks

- Continue work on the new CRCP project which has focus on fishery connectivity, invasive species and environmental stressors role in coral reef habitat in the Gulf.
- Producing new learning modules, web applications and white papers from ongoing analysis.



Questions & Discussion

