

FECM/NETL Carbon Management Research Project Review Meeting

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CELEBRATING

100 YEARS

The Energy Port of the Americas

By the Numbers

#1



U.S. Port by Annual Revenue Tonnage

#1



U.S. Crude Oil Gateway

7,736

Vessels moved in 2022



187.9M Tons

of goods moved in 2022 | New annual record

\$400M

Per day goods value movement

\$65B

In private investment over the last 8 years

95,448 FTE



Direct, indirect, and related positions | Over 40% of regional workforce

\$5M



In direct community investment in 2022

#2



U.S. Port in LNG Exports
Estimated 808 Bcf in 2022

Commercial Partnerships

ExxonMobil



SIEMENS Gamesa
RENEWABLE ENERGY



KOCH



Vestas



Mexichem.



سابك
sabic



lyondellbasell



subsea 7



Six Environmental Precepts

Environmental Planning and Compliance



Air Quality

Reduce emissions by 15% in PM, VOCs, NOx, SOx every 3 years



Climate Action

Reduce GHG emissions per cargo ton by 7.5% annually



Water Quality

Reduce AL, Fe, Zn, Pb, TSS by 10% annually



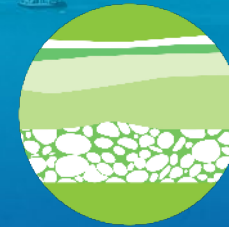
Climate Adaptation

Implement Life Cycle Assessment tool on Port capital projects



Habitat Restoration

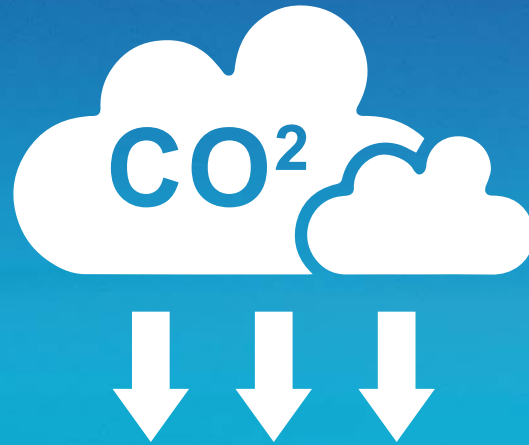
Create/restore 50 acres of habitat every 3 years



Soils & Sediments

Remediate spills to residential standard

The Port of Corpus Christi's Role in CCUS



Send clear signal to marketplace that centralized CCUS solution IS coming

Cultivate CCU opportunities (new projects/Port customers)

Identify/vet/permit route alternatives for CO2 delivery infrastructure

Lease Port-owned pore space for CO2 injection and storage

Facilitate logistical/commercial connections between emitters & CCS service providers

Deploy Port capital to fund key infrastructure elements

Pursue/leverage federal capital

Advocate for appropriate state and federal policy

Two Discrete Projects

OFFshore:

US DOE awards Port of Corpus Christi with \$16.4M in CarbonSAFE grants

BUSINESS DEVELOPMENTS & PROJECTS

February 2, 2023, by Aida Čučuk

The Port of Corpus Christi has been allocated \$16.4 million through the US Department of Energy's (DOE) Carbon Storage Assurance Facility Enterprise (CarbonSAFE) initiative to evaluate the technical and economic feasibility of permanently storing captured carbon dioxide (CO₂) from industrial operations.



Partners/Sub-Recipients

- University of Texas Bureau of Economic Geology Gulf Coast Carbon Center
- Strategic Sequestration Development, SSD
- Trimeric Corporation
- Geostock Sandia
- Geosurveys
- MRSW

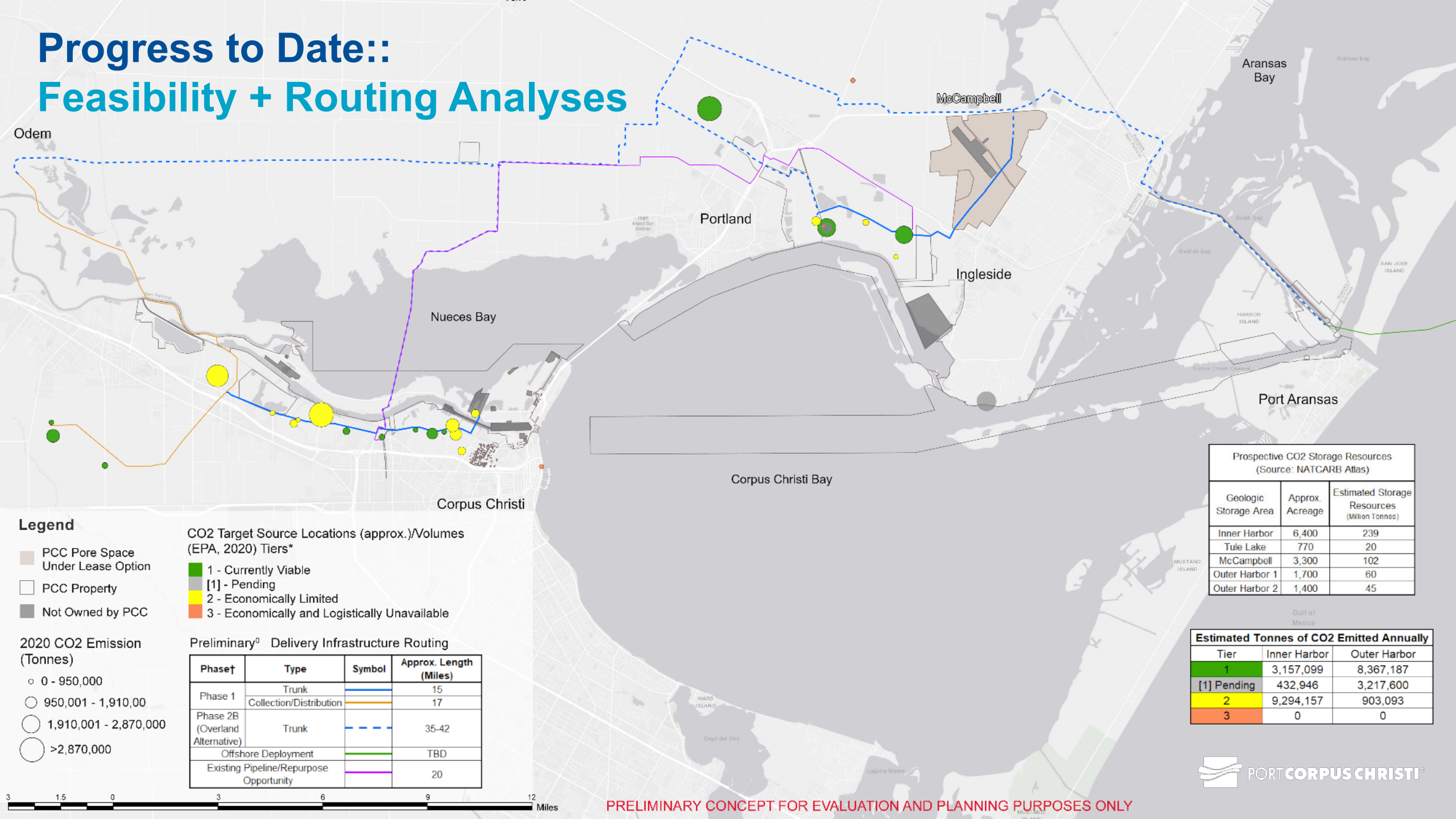
Total Project Cost \$9,169,659

- DOE Award \$7,357,327
- PCCA & Partner Match \$1,839,332

Objectives

- Address, meet, and/or exceed criteria for CarbonSAFE Phase III eligibility
- Contribute to development of scalable carbon management solution in Coastal Bend, via offshore storage resources
- Enable access to large volume storage in deep saline stratigraphy in western Gulf of Mexico
- Reduce risks/costs for future projects by bringing new storage resources into commercial classifications to foster an innovative, diverse, and inclusive geological storage industry

Progress to Date:: Feasibility + Routing Analyses



Prospective CO2 Storage Resources
(Source: NATCARB Atlas)

Geologic Storage Area	Approx. Acreage	Estimated Storage Resources (Million Tonnes)
Inner Harbor	6,400	239
Tule Lake	770	20
McCampbell	3,300	102
Outer Harbor 1	1,700	60
Outer Harbor 2	1,400	45

Estimated Tonnes of CO2 Emitted Annually

Tier	Inner Harbor	Outer Harbor
1	3,157,099	8,367,187
[1] Pending	432,946	3,217,600
2	9,294,157	903,093
3	0	0

- Legend**
- PCC Pore Space Under Lease Option
 - PCC Property
 - Not Owned by PCC

- CO2 Target Source Locations (approx.)/Volumes (EPA, 2020) Tiers***
- 1 - Currently Viable
 - [1] - Pending
 - 2 - Economically Limited
 - 3 - Economically and Logistically Unavailable

- 2020 CO2 Emission (Tonnes)**
- 0 - 950,000
 - 950,001 - 1,910,00
 - 1,910,001 - 2,870,000
 - >2,870,000

Preliminary^o Delivery Infrastructure Routing

Phase†	Type	Symbol	Approx. Length (Miles)
Phase 1	Trunk		15
	Collection/Distribution		17
Phase 2B (Overland Alternative)	Trunk		35-42
Offshore Deployment			TBD
Existing Pipeline/Repurpose Opportunity			20

PRELIMINARY CONCEPT FOR EVALUATION AND PLANNING PURPOSES ONLY



Progress to Date::

Feasibility + Routing Analyses

01

Review of
existing
infrastructure

02

Probabilistic analysis
of known emitters
(volumes and
likelihood/timing of
participating in
centralized CO2
mgmt. system)

Scope:

- Identification of additional “in-scope” emitters
- Data gathering for all “in-scope” emitters:
 - Likely volumes of CO2
 - Type & concentration (power gen, cement, etc)
 - Distance emitter’s CO2 / environmental commitments
 - Established relationship / discussions underway
 - CO2 sequestration incentives (45Q or other relevant carbon taxation)
 - For new sources, does timeline meet 45Q
 - Data review and probability weighting

Progress to Date::

Feasibility + Routing Analyses

01

Review of
existing
infrastructure

02

Probabilistic analysis
of known emitters
(volumes and
likelihood/timing of
participating in
centralized CO2
mgmt. system)

03

Economic assessment
of infrastructure costs
that can be supported
by available storage
resources under
current 45Q
regulations

Progress to Date:: State-level Activities

Port of Corpus Christi and Texas General Land Office to Collaborate in Development of Large-Scale Carbon Storage

Sep 01, 2021



Corpus Christi, TX, USA – The Port of Corpus Christi Authority (Port of Corpus Christi) and the Texas General Land Office (GLO) have executed a Memorandum of

Understanding (MOU) stating their intention to co-develop a carbon dioxide (CO₂) storage solution in the Coastal Bend in support of national decarbonization targets. Such a solution would involve infrastructure to transport and permanently store CO₂ captured by various industrial target sources in the greater Port of Corpus Christi area.

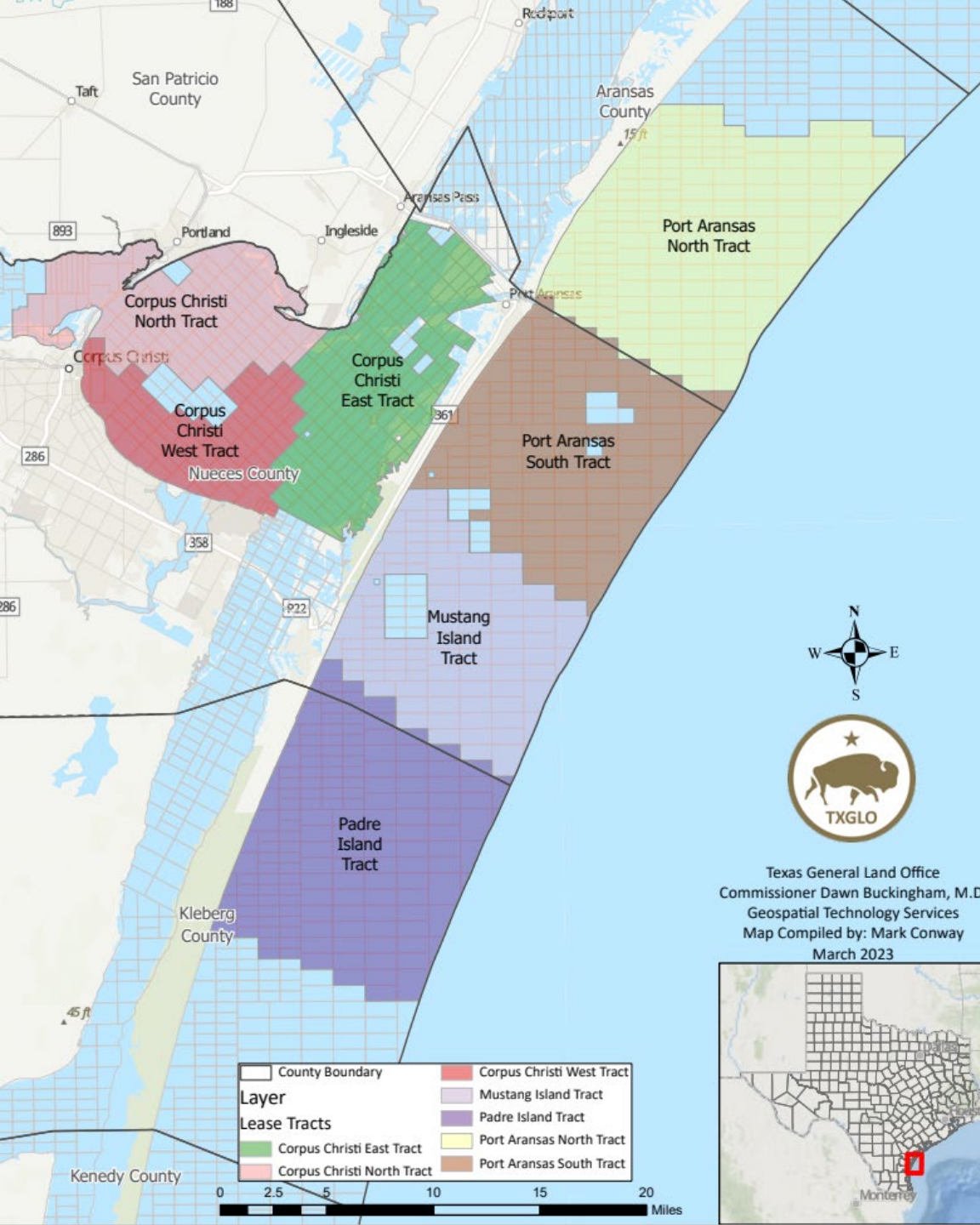
Industry leaders recognize the detrimental impacts of excessive CO₂ emissions. Partnering to capture and sequester these emissions has unmatched environmental benefits. A [recent report](#) from the American Petroleum Institute and the International Petroleum Industry Environmental Conservation Association and the International Association of Oil and Gas Producers calls on energy developers to adopt unified actions

Memorandum of Understanding between Port + State of Texas :: Co-development of Geological Carbon Dioxide Storage Solution in the Coastal Bend of TX

Executed 8.25.21

Coastal Bend region prioritized by Texas General Land Office

Port to leverage geographic (ROWs) + market position



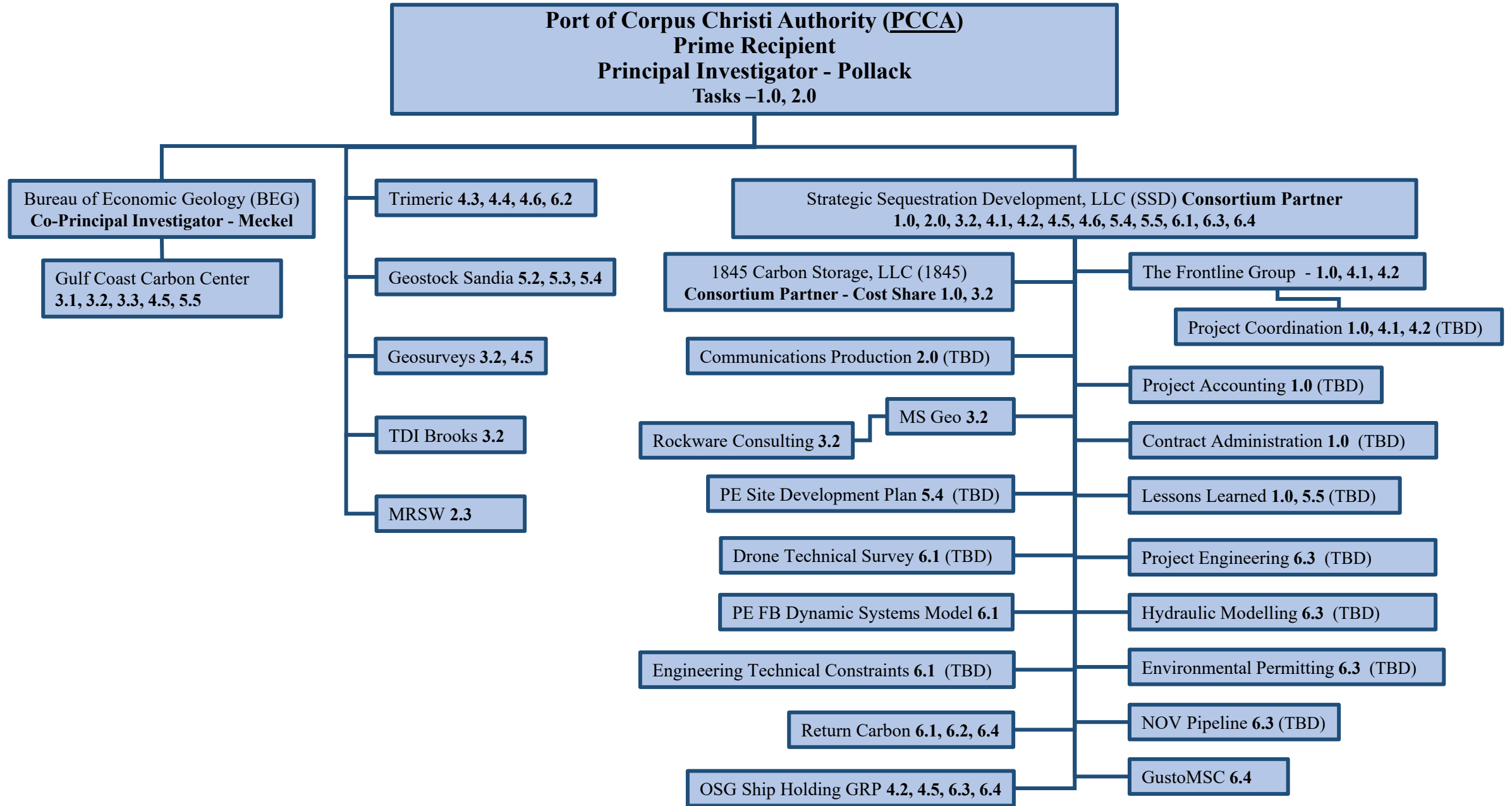
Progress to Date:: State-level Activities

Lease of State Submerged Tracts in Nueces, Aransas, & Kleberg Counties

Published 03.09.23
Closed 06.12.23

7 defined lease tracts for creation/operation of geologic CO2 storage repositories

Inshore (bay system) and offshore submerged tracts



Task 3.0: Site Specific Characterization & Assessment of the CO₂ Storage Complex

- **Subtask 3.1: Geologic Characterization**
- **Subtask 3.2: Geophysical Characterization**
- **Subtask 3.3: Model Data and Reservoir Simulation**

Task 4.0: Preliminary Project Risk Assessment with Mitigation & Management Plans

- **Subtask 4.1: Non-technical challenges**
- **Subtask 4.2: Options**
- **Subtask 4.3: Existing Wells**
- **Subtask 4.4: Mitigation Plans**
- **Subtask 4.5: Monitoring**
- **Subtask 4.6: CO₂ Management Plan**

Task 5.0: Plan for Subsequent Detailed Site Characterization & UIC Class VI Permitting

- **Subtask 5.1: Storage Complex Geologic and Geophysical Characterization**
- **Subtask 5.2: Well Plans**
- **Subtask 5.3: UIC Class VI Permit Planning**
- **Subtask 5.4: Draft Site Development Plan**
- **Subtask 5.5: Onshore-Offshore Integration**

Task 6.0: Project Technical & Economic Feasibility Assessment

- **Subtask 6.1: Technical Feasibility**
- **Subtask 6.2: Economic Feasibility**
- **Subtask 6.3: Conceptual-Level Design Study for CO₂ Transport**
- **Subtask 6.4: Evaluate Options for Ship Transport of CO₂**

Cross-section for the study area

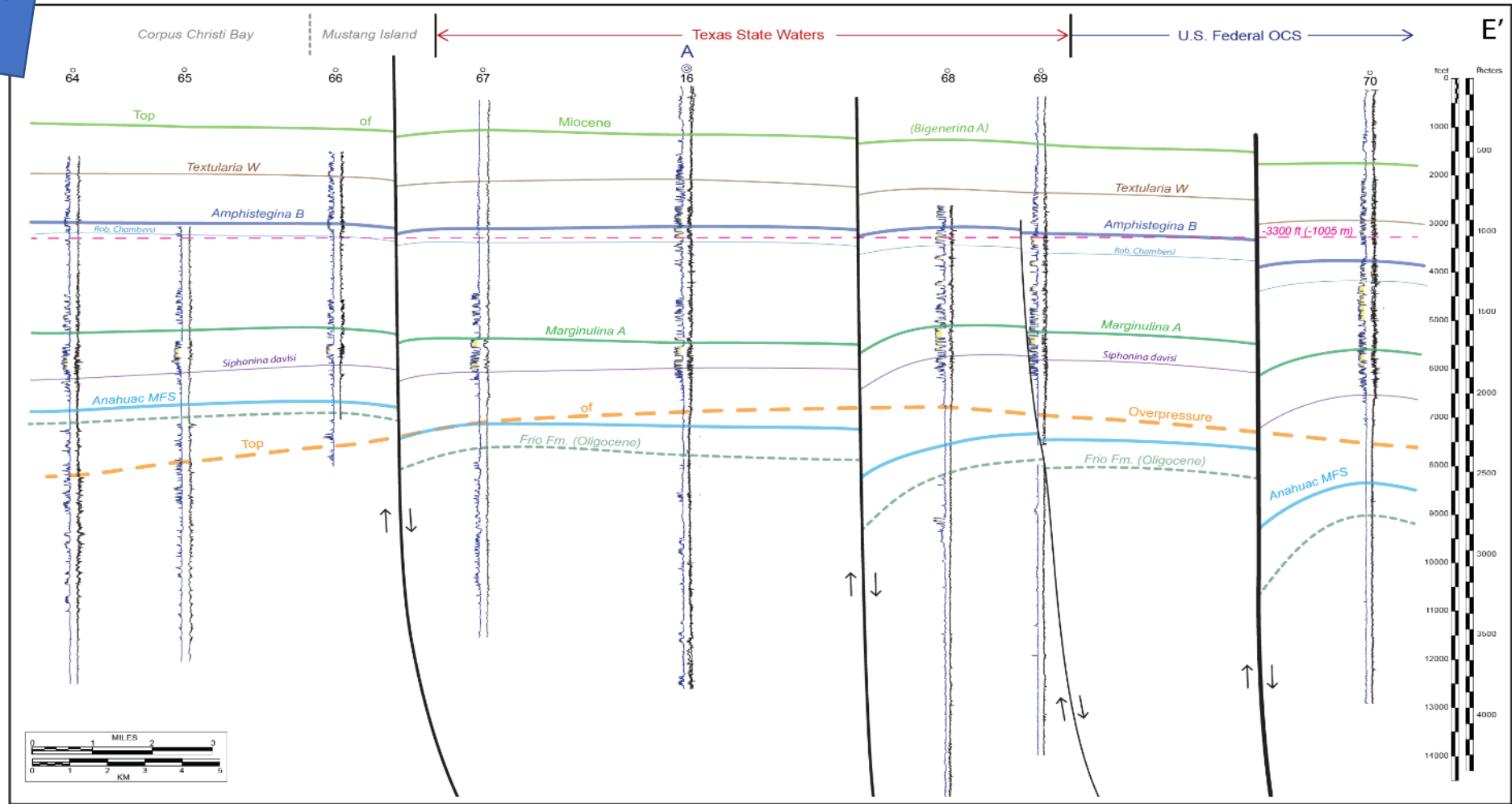
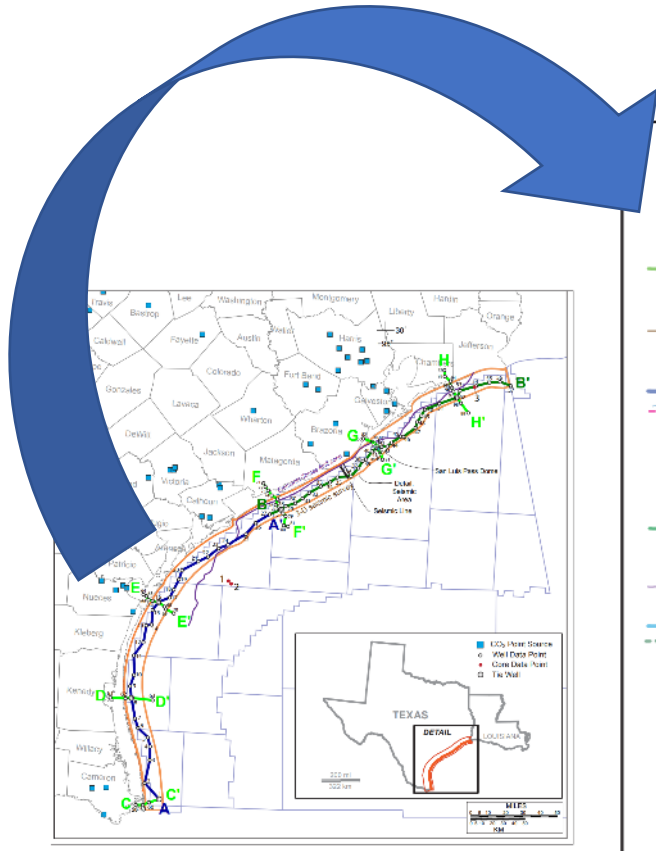
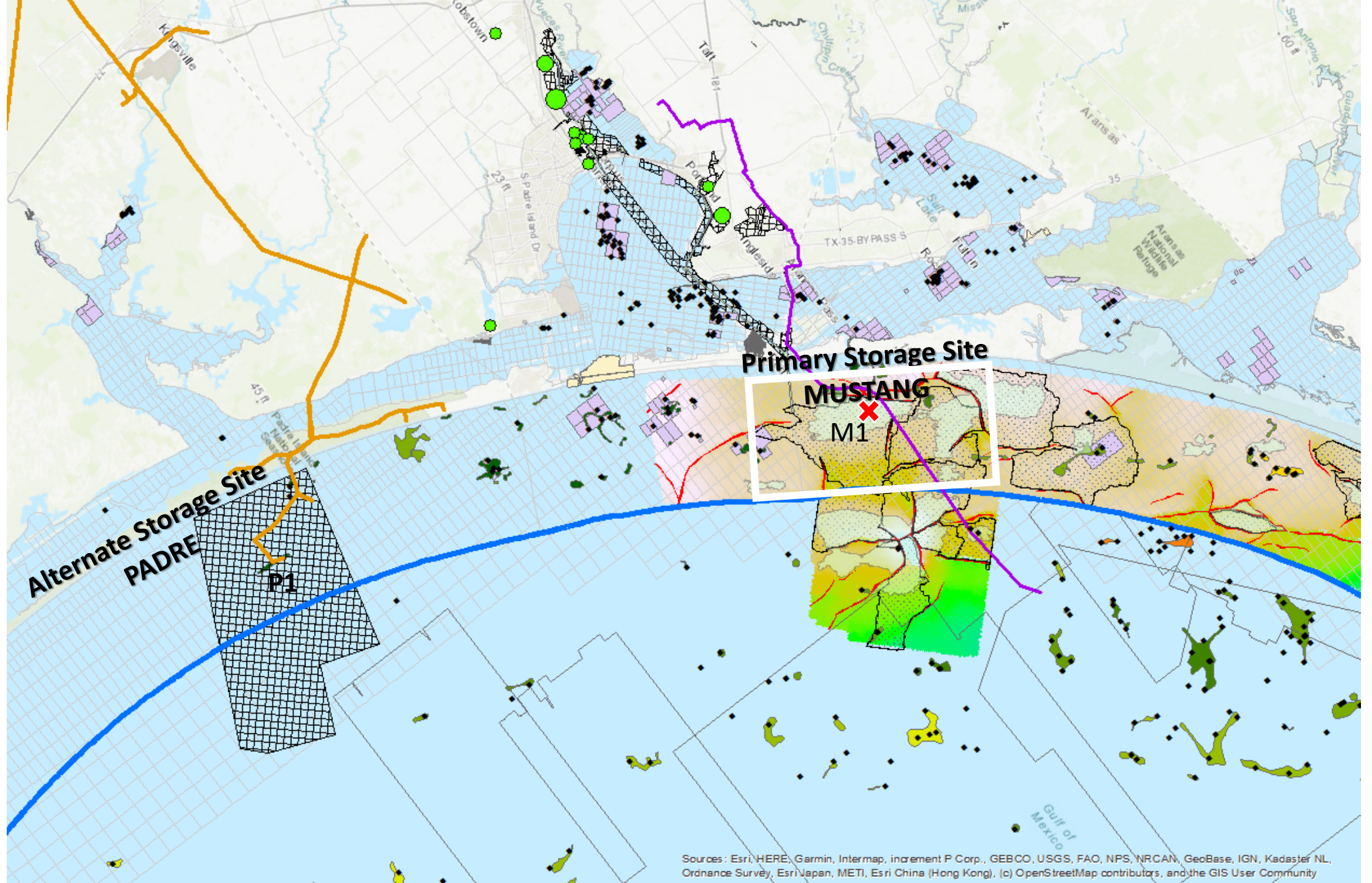


Figure A-6. Dip cross section E-E'.



Primary storage site MUSTANG

- Selected as a result of pre-feasibility regional geologic characterization work completed under the previous DOE-funded offshore CCS projects.
- Preliminary subsurface structure maps on the regional marine seal (Amph. B.) were evaluated for large fetch-closure pairs that could provide more than 50 Mt of storage.
- The co-location of this storage site with nearby onshore CO₂ emitters and existing pipeline ROW (Fig. 1) made this site selection process quite straight-forward, although more than 6 structures with mapped fetch-closures were considered.
- An alternate storage site has also been identified (PADRE) with similar geologic storage characteristics.

The storage complex consists of:

1. Multiple Oligocene and Miocene storage sandstone reservoirs
 - 5,000-8,000 feet depth; permeability 100^+ mD; porosity 20%
2. Injection at rates up to 1 Mta (Ni et al., 2021); and
3. A regional low-permeability seal (Amph. B. interval-100's of feet thick), which serve as barrier to upward migration of CO₂, as demonstrated by retention of natural methane accumulations (hundreds of BCF) over geologic time.

Regional geologic model of the storage complex

- Area: 811 sq. mi.
- Wells:
 - Wells with facies logs 213
 - Wells with porosity log 26
 - Wells with sonic logs 26
 - Wells with density 11

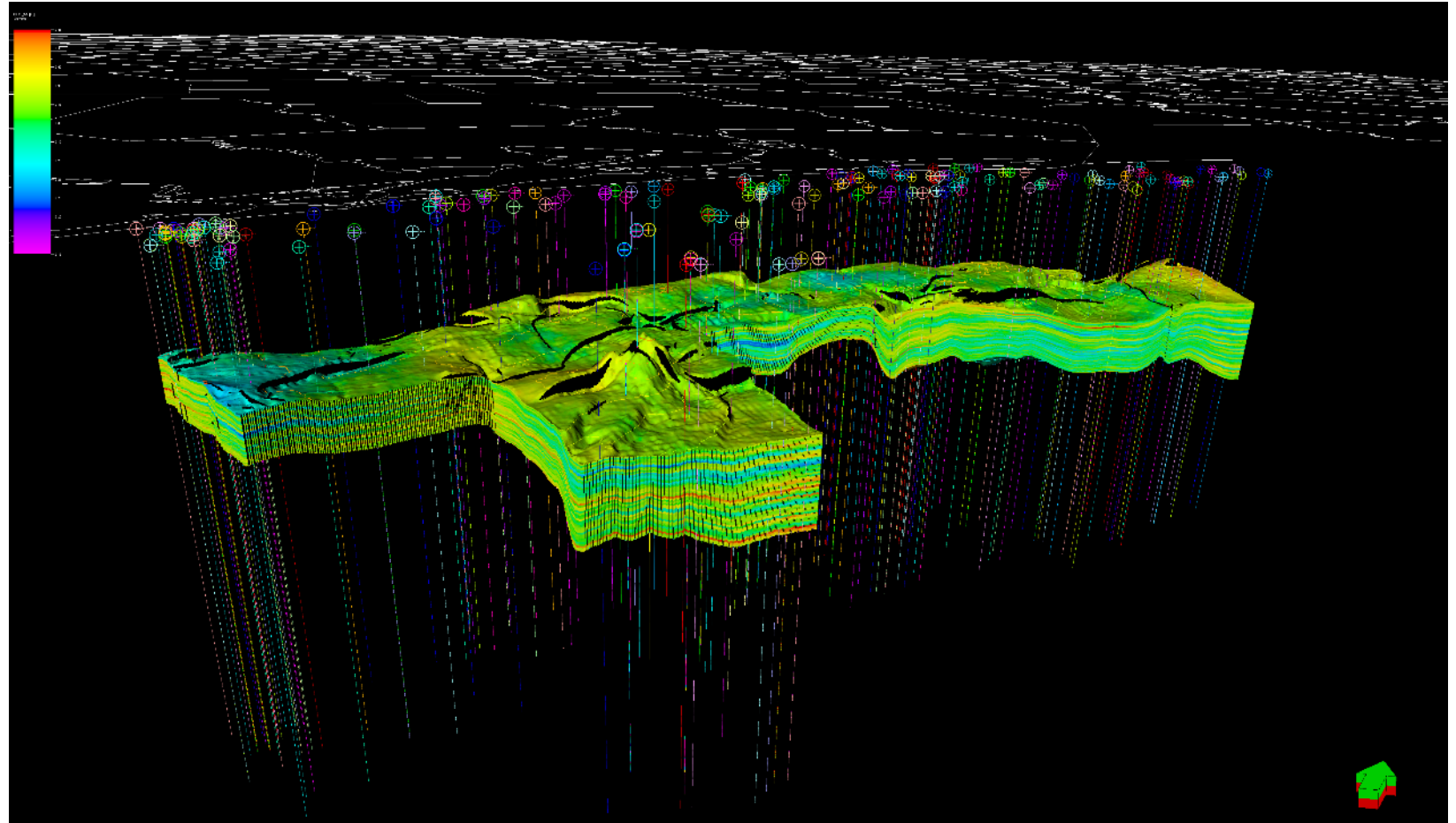
Surfaces:

MFS 9

MFS 10

MFS 12

Number of faults: 171



Thank You



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