

# San Diego Bay EELGRASS BLUE CARBON STUDY 2021-2022



U.S. Department  
of Transportation  
**Maritime  
Administration**



**PORT of  
SAN DIEGO**  
Environment

## What Is Blue Carbon?

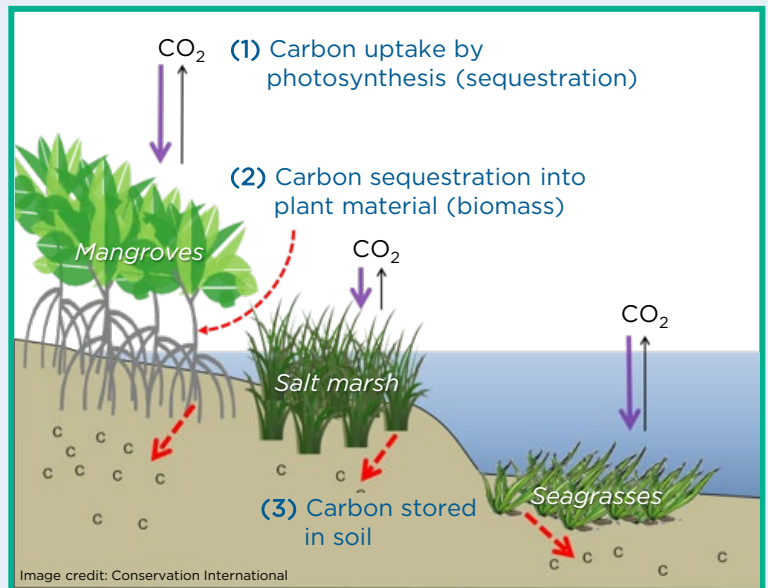
**Blue carbon** refers to carbon captured by the world's oceans and coastal ecosystems. All blue carbon ecosystems, such as seagrass beds, tidal salt marshes, and mangroves, are **carbon sinks**, meaning they can **sequester** and **store** large amounts of carbon in their plants and soils. Seagrasses, like the native eelgrass beds found in San Diego Bay, can store twice as much carbon as forests on land.



## How the Blue Carbon Cycle Works: Step by Step

Like plants on land, plants in coastal ecosystems breathe in carbon dioxide ( $\text{CO}_2$ ) (1), and through photosynthesis use that carbon to grow leaves, stems, and roots (2). When land plants die, **aerobic** bacteria take oxygen from the air and turn the dead plant's carbon back into  $\text{CO}_2$ .

Unlike land plants, coastal ecosystems are often submerged in water. Water contains much less oxygen than air, which prevents aerobic bacteria from performing the  $\text{CO}_2$  conversion process. Instead, other bacteria (**anaerobic**) and processes break down the plant material into carbon-rich organic matter, which is then trapped and buried below ground (3). As this carbon builds up over time, it can remain sequestered for hundreds to millions of years.



## Why Blue Carbon Ecosystems Are Important

In addition to storing carbon, blue carbon ecosystems provide multiple **co-benefits**. These ecosystems provide food and nesting areas for birds, nursery habitat for juvenile fish, and improve water quality. They also create a buffer against storm surge and sea level rise, helping protect shorelines from erosion and flooding. (Photo credit: Port of San Diego)



## San Diego Bay Eelgrass Blue Carbon Study

In 2021, the Port partnered with the U.S. Maritime Administration and their Maritime Environmental & Technical Assistance Program on the first-ever assessment of carbon storage in San Diego Bay's eelgrass beds. This work built a baseline for understanding carbon storage in the bay and will inform potential opportunities to mitigate greenhouse gas emissions. (Photo credit: Merkel & Associates, Inc.)



## Key Findings: Carbon Storage in the Bay

### San Diego Bay has lots of eelgrass

- The bay has nearly 2,600 acres of eelgrass. That's 50% of all the eelgrass in Southern California and about 17% of all eelgrass in the state.

### Eelgrass beds store tons of carbon (literally!)

- The bay's eelgrass beds currently store **1.7 million metric tons of CO<sub>2</sub> equivalent** (Mt CO<sub>2</sub>e). That's the same amount of CO<sub>2</sub> that **370,784 cars** emit annually.

### South Bay is a carbon storage hot spot

- Most of the bay's carbon, as much as 73%, is stored in the calm, muddy sea floor sediments of South Bay.

### Older eelgrass beds store more carbon than new beds

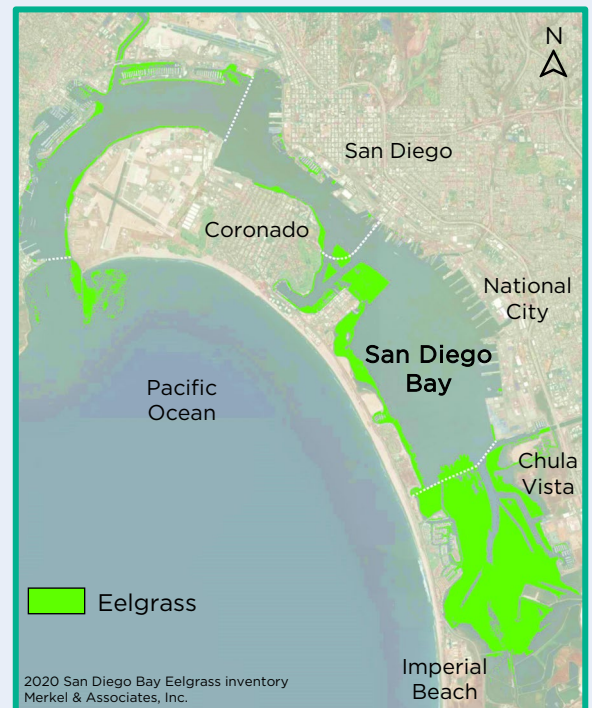
- There's a strong link between eelgrass bed age and how much carbon it stores. Older eelgrass beds (decades old) store roughly 9x more carbon than new beds (less than 10 years old).

### Restoring eelgrass could aid in more carbon storage

- Planting more eelgrass could store lots more carbon, especially in the first few decades of restoration.

### Sea level rise may affect where eelgrass grows

- Based on future sea level rise scenarios, 10% to 30% of the bay's eelgrass could be impacted by 2100 by rising seas. Even with this potential loss, the bay's remaining eelgrass is still expected to remove between 50,800 and 209,600 Mt CO<sub>2</sub> from the atmosphere by 2100. Future restoration and mitigation efforts could help alleviate potential losses posed by sea level rise.



## Next Steps

It's important to ensure San Diego Bay's eelgrass beds and other coastal habitats are protected so they continue to sequester carbon into the future. The Port and the Maritime Administration, along with the U.S. Navy, are continuing blue carbon research to better understand how ports, the maritime sector, and the Navy can offset greenhouse gas emissions through appropriate management of eelgrass. Look for our next report in late 2023.