SBMM's Whale Exhibit: Climate Change
4 panels

Introduction:

- According to the World Economic Forum, the failure to mitigate and adapt to climate change is among the biggest global risks for our planet with significant environmental, economic and health impacts.
- Our burning of fossil fuels, a non-renewable energy source, has caused a massive increase in carbon dioxide and other greenhouse gases in our atmosphere, trapping more heat and ultimately warming our planet.
- While international agreements, including both the 1997 Kyoto Protocol2 and the 2015 Paris Agreement3 address global reductions in CO_2 emissions, no global efforts have yet considered the importance of the oceans as a carbon sink and the significant ecological role whales play in mitigating climate change. (From Whale and Dolphin Conservation: "Whales- Their Future is Our Future"

1. **Whale Diversity in the Santa Barbara Channel:**
    - Almost 30% of the world's 93 whale and dolphin species have been documented in the Santa Barbara Channel, making our local waters one of the best places in the world to go whale watching.
    - Baleen and sperm whales, known collectively as the "great whales," include the largest animals to have ever lived on Earth.
    - Whales are playful, social, curious and share in cultural traditions…just like us.
    - Witnessing the sights of migrating gray whales in the winter and springs months or seeing feeding blue and humpback whales in the spring, summer and fall months, means we have whales in the SB Channel just about every month of the year.
      (this is from the condor express' website: we can use more updated sightings from both Condor Express and Island Packers and fill this in with more details…just to show the diversity of whales.)

Whale Watching Seasons:	Winter		Spring			Summer						
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
Gray Whales Southern Migration	X	X	O X	O								O
Gray Whales Northern Migration			O X	X	X	X O						
Gray Whales Females With Calves			O	O X	X	X O	O					
Humpback Whales					O X	X	X	X	X	X	X O	O
Blue Whales						O X	X	X	X	X	X O	O
Finback Whales						O	X	X	X	X		
Orcas (Killer Whales)	O	X	O	O	X	X	O	O	O	O	O	O
Minke Whales	O	O	O	O	O	O	X	X	X	X	O	O
Sperm Whales	O	O	O								O	O

2. **Climate Connection: Ecosystem Engineers**
    - Whales have a powerful and positive influence on the function of oceans, global carbon storage, and the health of commercial fisheries.
    - Whale serves as nutrient pumps: Feasting on fish and invertebrates at depths, many whales release their fecal matter at the surface, fertilizing the surface of the sea. Their poop packs a powerful energetic punch, providing critical nutrients like nitrogen and iron to stimulate the growth of microscopic plant plankton (phytoplankton) in the photic zone, the uppermost layer of the world's oceans bathed in sunlight. This fertilizer enhances ecosystem productivity.
    - And it is the phytoplankton that is the base of all life in our world's oceans. Not only providing life sustaining oxygen through photosynthesis, phytoplankton consumes carbon dioxide on a scale equivalent to forests and other land plants.
    - The turbulence of whales diving, surfacing and exhaling stirs the water column, mixing vital nutrients thus increasing the biodiversity of the ocean. More biodiversity, more carbon stored.
    - Increase in abundance of phytoplankton, more CO_2 being removed from the atmosphere thus mitigating the impacts of climate change.

3. **Climate Connection: Carbon store; whale fall**
    - Healthy populations of whales will enhance the levels of carbon transfer to the deep ocean through 'whale falls'
    - Whales are not just engineers of ecosystems, they help create them. When a whale dies, its carcass sometimes descends all the way to the deep ocean floor. Within days of it's arrival, scavengers will have converged from far and wide for a feast,
    - The carcass of a single large whale transports 190,000 tons of carbon, which is the equivalent of the carbon produced by 80,000 cars per year.
    - These deep oceans are what we call "carbon sinks," because they trap and hold excess carbon from the atmosphere, and therefore help to counteract global warming.

4. **Conservation**
    - Whale populations have suffered greatly in recent centuries, largely thanks to the advent of whaling.
    - Many of these whale populations were on the brink of extinction just 50 to 100 years ago when over 3 million whales were killed in just the 1900s alone.
    - By conservative estimates, the historical global population was 6 times greater than it is today (Roman and Palumbi 2003).
    - With their unique ecological contributions taken into consideration, this dramatic decline is likely to have had profound effects throughout the oceans.
    - Now that we know whales play a critical role in enhancing the productivity of marine ecosystems, we need to do everything we can to continue to save whales for their sakes and for ours.