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San Francisco, CA



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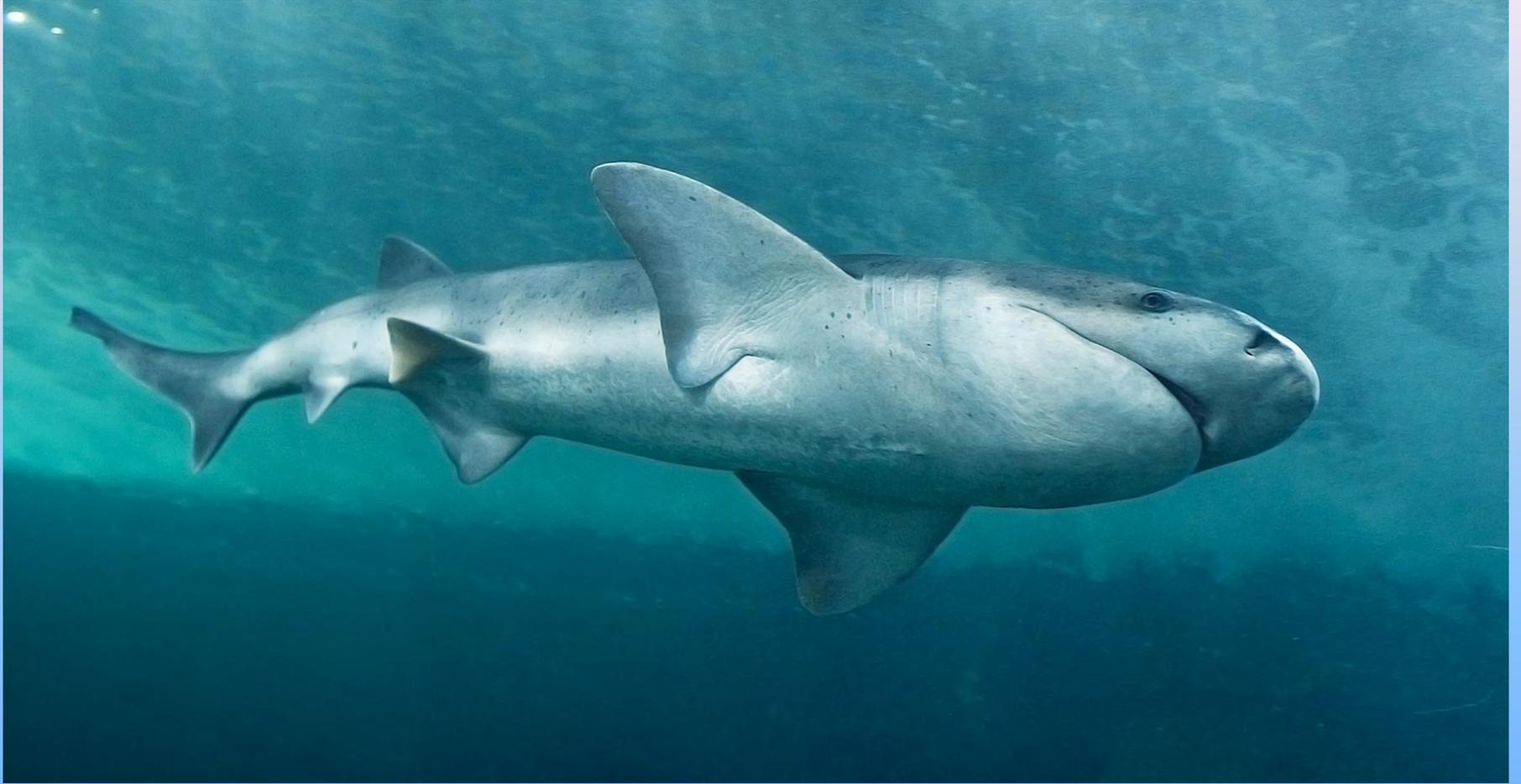
S.F. GOURMET DOGS



**Sevengills on display at  
Aquarium of the Bay**



- The Aquarium of the Bay strongly supports the expansion of the Gulf of the Farallones Marine Sanctuary.
- Our three-year research study, using active and passive tagging of sevengill sharks, indicates that sevengills show a high degree of residency in the San Francisco Bay area. And, the Golden Gate Bridge area is a preferred habitat for both adult and juvenile sevengill sharks.



**Sevengill Shark,**  
*Notorynchus cepedianus*

## **San Francisco Bay sevengills have not been comprehensively studied, but we know...**

- Females are larger than males
- Shallow bays are important for reproduction
- Highly abundant within or adjacent to shallow bays in California
- Seasonal abundance in San Francisco Bay is related to their reproductive cycle
- The Bay is considered a nursery for the species and possibly the only one in the American Pacific coast
- Apex predator in the Bay. Diet composed of bony fish, sharks, and marine mammals
- Population status in the wild is unknown.

**In conjunction with the Biotelemetry Lab at UC-Davis, ABay developed a sevengill research project. The primary goal: to describe the behavior and ecology of sevengill sharks in the San Francisco estuary. Specifically...**

- Are individual sevengill sharks resident to San Francisco Bay?
- Do they show site fidelity to specific locations? Are there shark “hot spots” in the Bay?
- What are their diel and seasonal movement patterns in the Bay?
- Are there specific arrival times at sites within the Bay?
- Are there particular periodicities in their hourly and daily movements?
- What are their environmental preferences?

## **During the course of the project, from 2008-2010**

- Twenty-one sharks (15 male, 6 female) tagged internally during summer and fall 2008 with coded beacons
- One shark (“Shirley”) tagged with a coded transmitter with pressure sensor
- Sharks released at Alcatraz
- Six adult sharks tagged with continuous transmitters and tracked in the bay
- Collected monitor downloads
- Statistical analyses



**Transmitter**



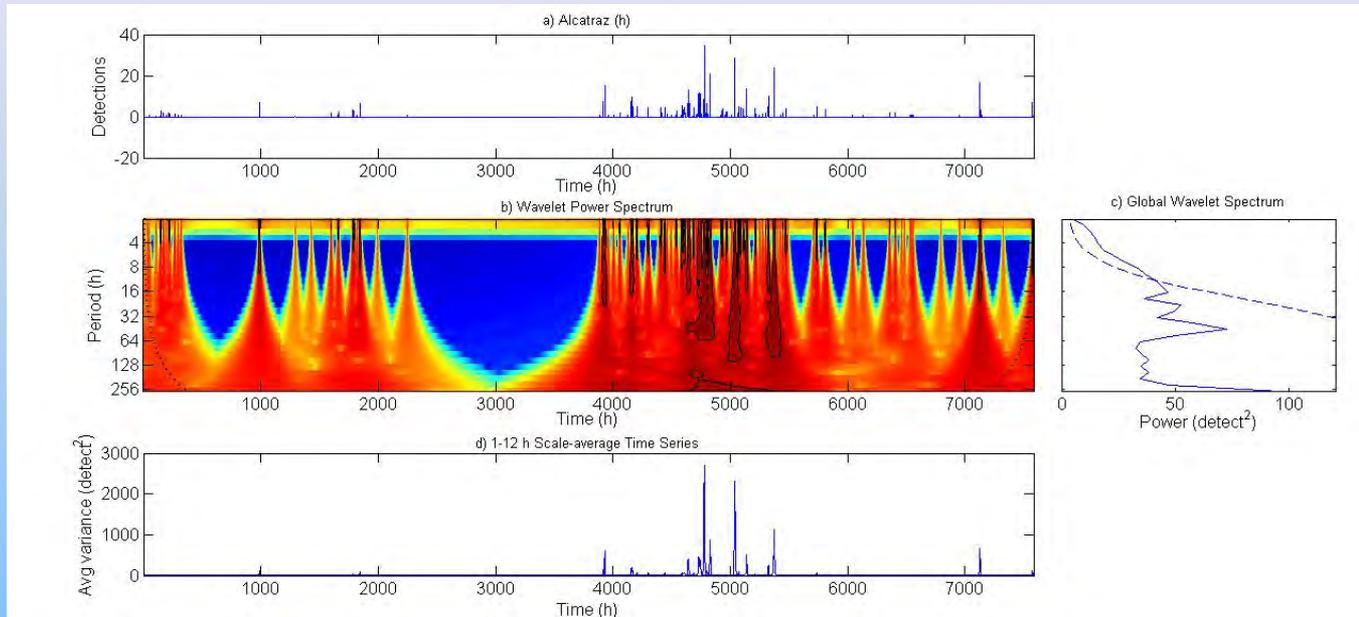
Lea Suzuki / The Chronicle





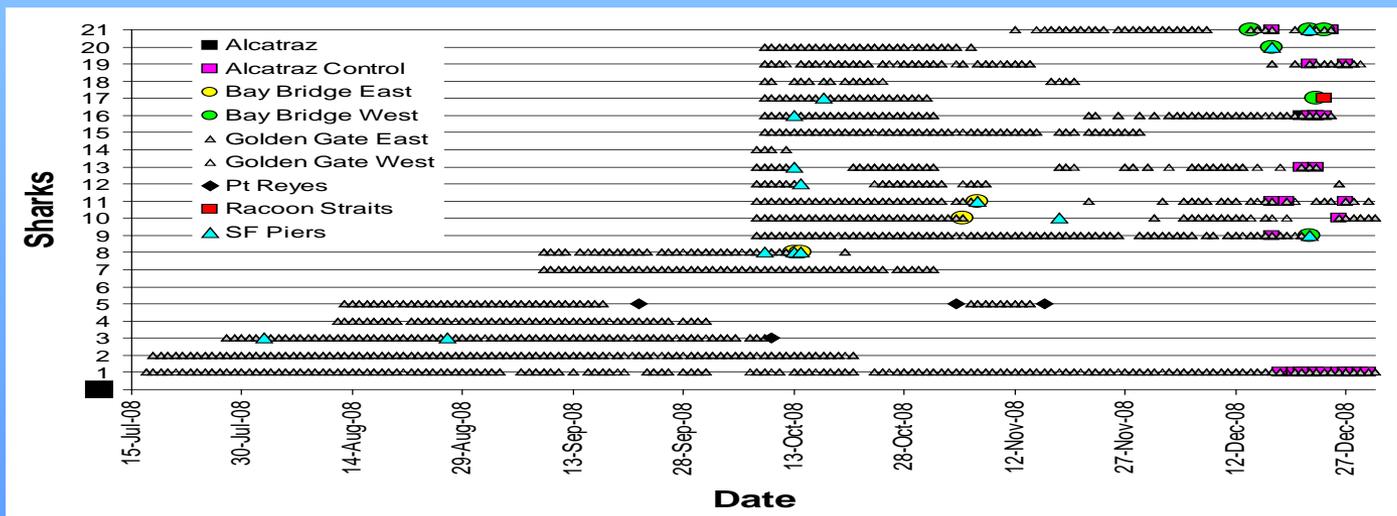
**Monitor detections of study sharks throughout the Bay; most frequently under the Golden Gate Bridge and around Alcatraz Island**

# Obligatory unreadable data slide



Hourly movement patterns (time)

Site visitation pattern



# SOME CONCLUSIONS

- Sevengill sharks show a high degree of residency in San Francisco Bay
- Sevengill sharks were tagged at Alcatraz, but show strong site fidelity to the Golden Gate Bridge area (70%-90% visits)
- Juvenile sharks also have strong site fidelity to Golden Gate area, but tend to wander more into the inner and northern parts of the Bay
- There is apparently no difference between males and females in regards to site preference
- The hourly periodicity of movements has a significant signal of 8 hrs at Bay Bridge, 12 hrs at Golden Gate Bridge, 6 hrs at Pt. Reyes, 8 hrs at Richmond Bridge

- Sharks move with the current in or out of the bay depending on the direction of the current and time of the year
- Sevengills move more with the Ebb current (out of the Bay) in the winter months
- Sevengills move more with the Flood current (into the Bay) in the spring, summer and fall
- More than 50% of the study sharks were detected throughout most of the year
- Sevengill sharks have a preference for the Golden Gate and Alcatraz areas

- Sevensgills move through the Golden Gate during ebb and flood phases
- Number of detections were considerably higher (or exclusively) at night at most locations except Golden Gate Bridge
- Number of detections at Golden Gate Bridge were moderately higher during the day



**MANUSCRIPT IN PREP**

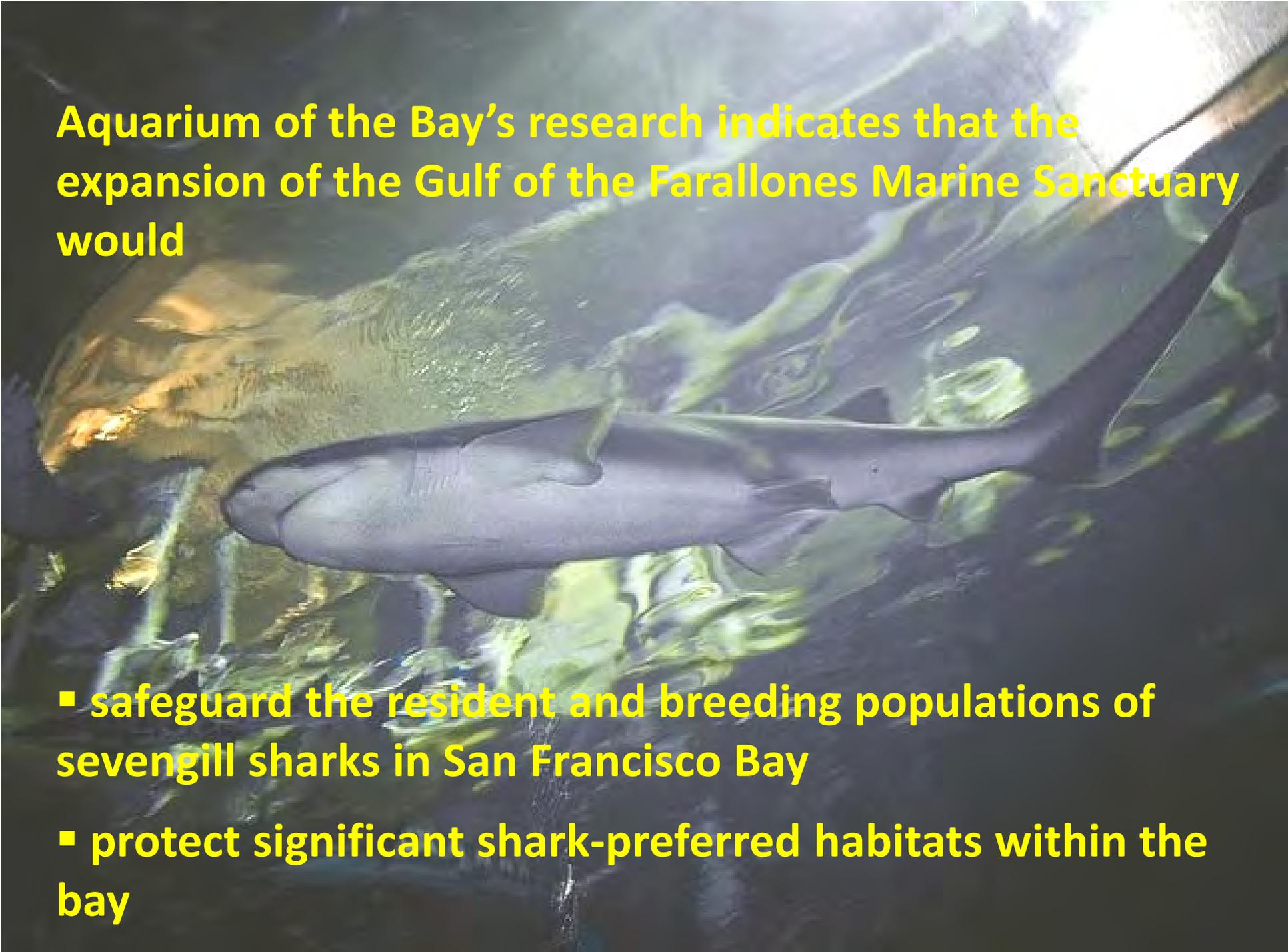
**of Sevengill Sharks,  
*Notorynchus cephalopus* in San Francisco Bay  
James Ketchum<sup>1</sup>, Christina J. <sup>2</sup>, A. Peter Klimley<sup>1</sup>**

<sup>1</sup>Biotelemetry Lab, University of California, Davis

<sup>2</sup>Aquarium of the Bay

# Significantly, for the “donut hole” consideration...

- Detections at Golden Gate Bridge occurred day and night indicating site fidelity
- Synchronicity of arrivals and departures of sharks may indicate a similar pattern of daily movements among individuals in the Golden Gate area
- The Golden Gate Bridge and Alcatraz areas are sevengill “hot spots”

A large shark, likely a sevengill shark, is swimming in an aquarium tank. The shark is dark grey and is seen from a side profile, moving towards the left. The water is clear, and the background shows the structure of the tank and some greenish-brown algae or plants. The lighting is bright, creating reflections on the water's surface.

**Aquarium of the Bay's research indicates that the expansion of the Gulf of the Farallones Marine Sanctuary would**

- **safeguard the resident and breeding populations of sevengill sharks in San Francisco Bay**
- **protect significant shark-preferred habitats within the bay**



Questions?