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San Francisco, CA



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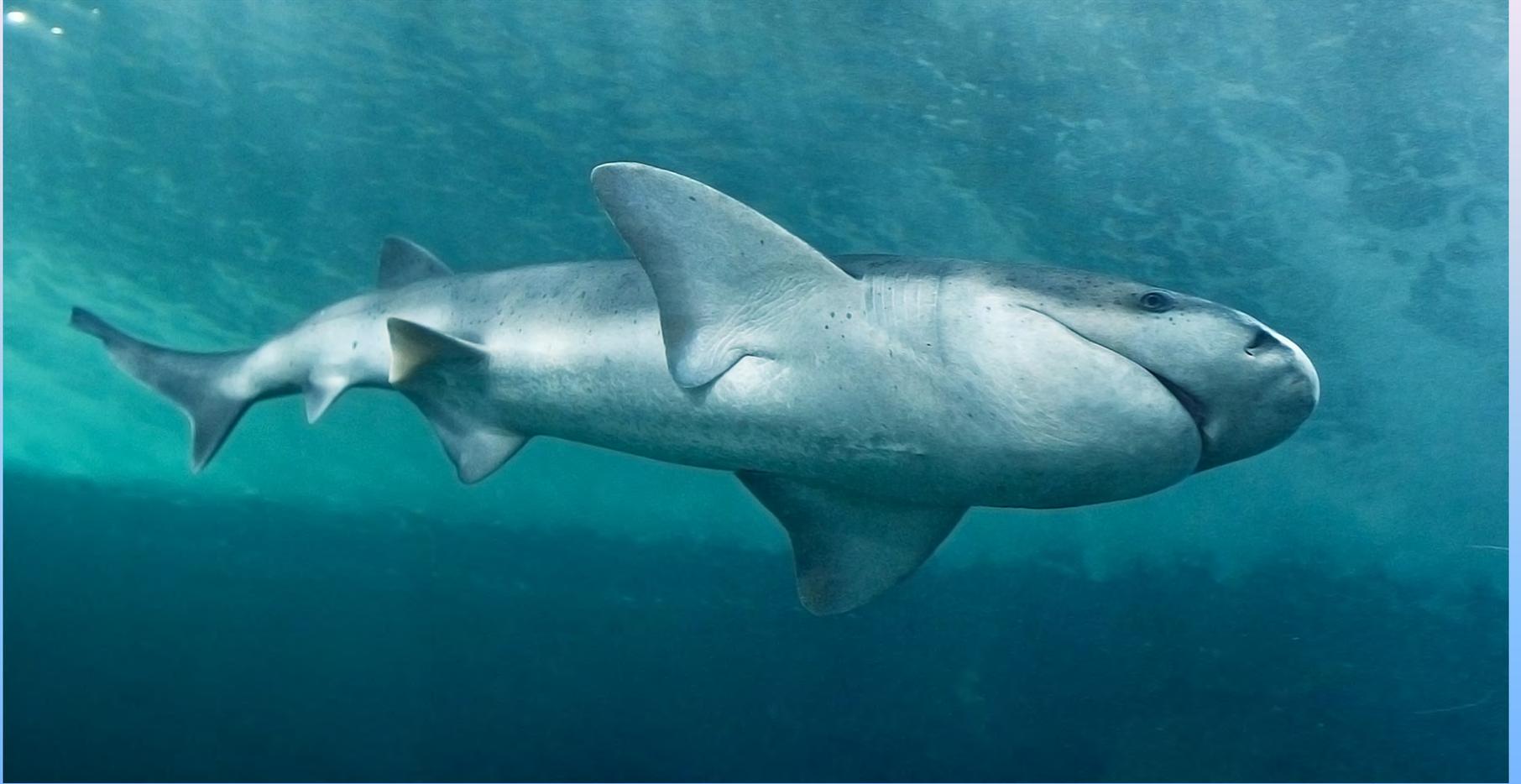
S.F. GOURMET DOGS



**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 Locations

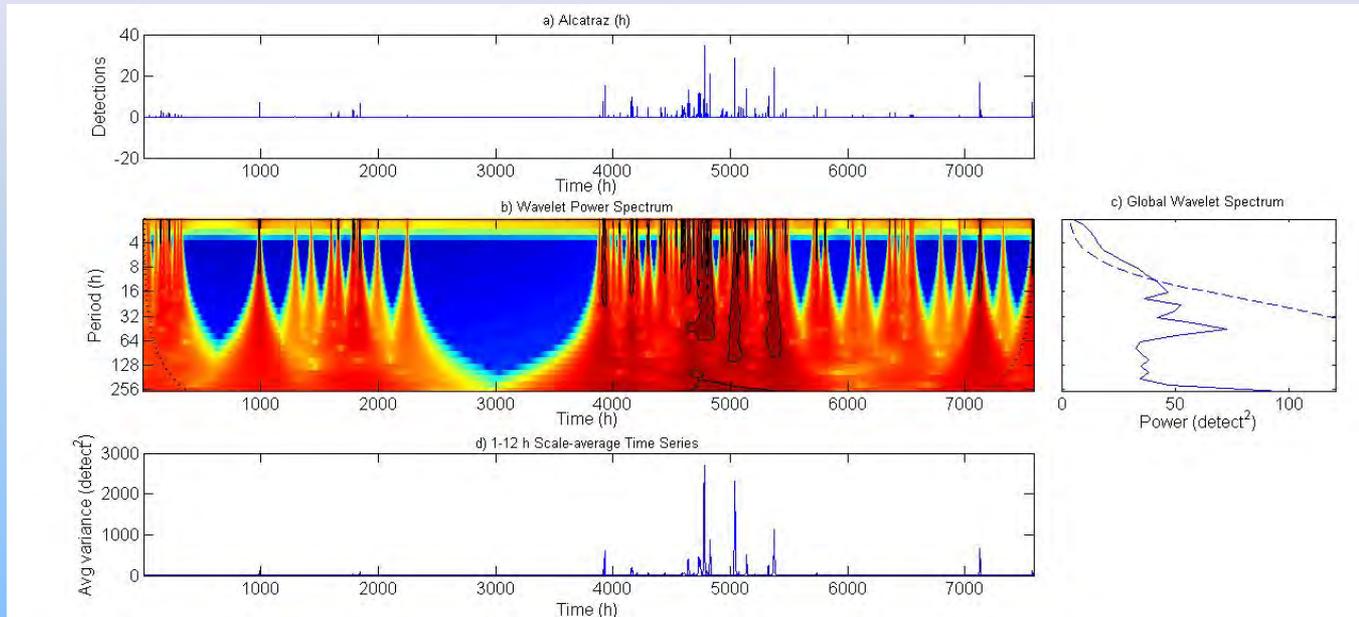
~100 monitors (VR2W)
located in San Francisco
and San Pablo bays





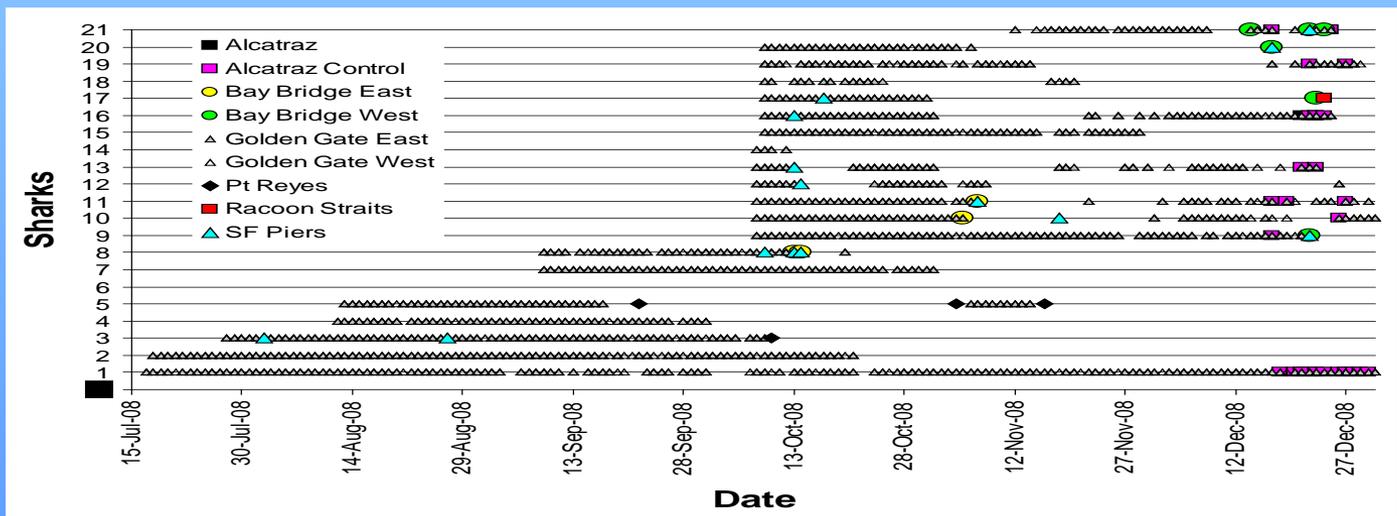
Monitor detections of study sharks throughout the Bay; most frequently under the Golden Gate Bridge and around Alcatraz Island

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



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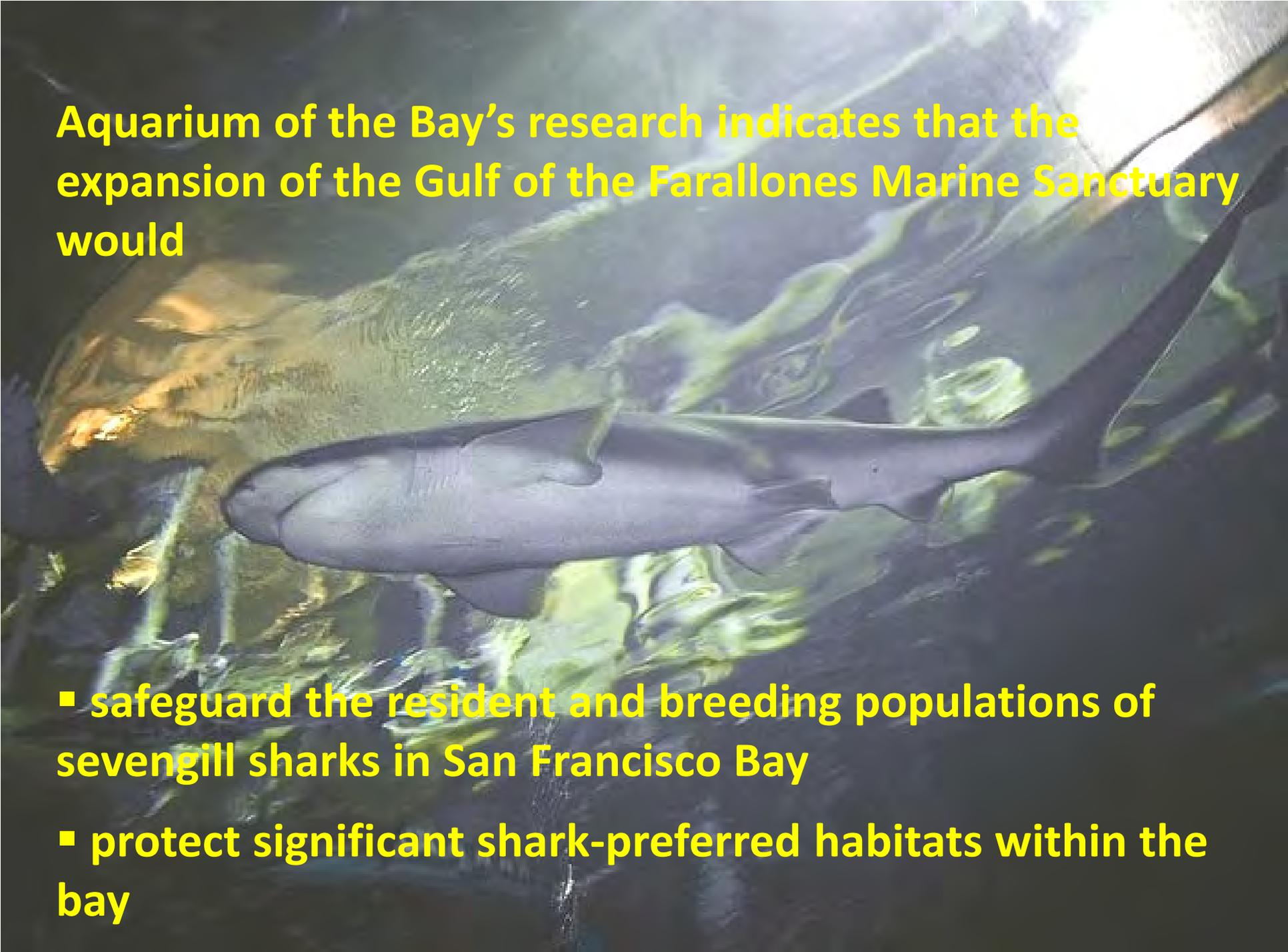
**of Sevengill Sharks,
Notorynchus cephalopus in San Francisco Bay
James Ketchum¹, Christina J. ², A. Peter Klimley¹**

¹Biotelemetry Lab, University of California, Davis

²Aquarium 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?