



## NOAA FISHERIES SERVICE

### Southwest Fisheries Science Center

Figure 1. Common thresher shark. Photo by Ann Coleman.



### Fisheries Resources Division

The Fisheries Resources Division develops the scientific foundation for the conservation and management of marine resources in the California Current and Pan-Pacific Pelagic Ecosystems. We serve the public and contribute information to management organizations and the scientific community.

## Common Thresher Shark (*Alopias vulpinus*) Fact Sheet

### Fishery Information

- The common thresher shark is the most important commercial shark species in U.S. west coast highly migratory species fisheries. Threshers are caught primarily in the California-based drift gillnet (DGN) fishery that was first established west coast-wide to target thresher sharks in the late 1970s. By the mid 1980s the fishery had shifted its focus to more lucrative swordfish. The shift was the result of both economics and regulations to protect pupping female thresher sharks (PFMC 2003). Since that time, threshers have only occasionally been targeted secondarily or caught incidentally in the DGN fishery. West coast commercial landings are down from 1800 metric tons (mt) in the early 1980s to below 200 mt in 2008 and 2009 (PFMC 2010).
- Common thresher sharks are also targeted by recreational anglers (Heberer et al. 2010). The number of threshers caught annually by recreational anglers, including those released, is estimated from angler surveys and dockside interceptions. Recreational catch varies widely from year to year but has averaged roughly 20 mt annually in recent years ([www.pcouncil.org/bb/2008/1108/E3b\\_SUP\\_CDFG\\_1108.pdf](http://www.pcouncil.org/bb/2008/1108/E3b_SUP_CDFG_1108.pdf)). The estimated level of catch in this fishery may be imprecise because the fishery is patchy and sporadic.
- The Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species includes an annual harvest guideline of 340 mt for thresher shark. This level of commercial catch is estimated to be 75% of the regional sustainable yield.

### Research and Research Findings

The SWFSC is conducting research to support stock assessment and management of thresher sharks including fishery-independent surveys, conventional and electronic tagging, tissue analysis, foraging ecology, and age and growth studies.

- A preliminary examination of trends in the catch-per-unit-effort and total catch are consistent with earlier conclusions that the population is increasing from low levels in the late 1980s and early 1990s (see PFMC 2003 and figure on page 4 of [www.pcouncil.org/wp-content/uploads/E2b\\_SUP\\_HMSMT\\_JUNE2010BB.pdf](http://www.pcouncil.org/wp-content/uploads/E2b_SUP_HMSMT_JUNE2010BB.pdf)). Efforts to conduct a full stock assessment have been initiated.
- Analysis of mercury in the muscle (Suk et al. 2009) reveals levels substantially lower (mean  $0.13 \pm 0.15$   $\mu\text{g/g}$ ) than the FDA recommendations of  $1.0$   $\mu\text{g/g}$ . Mercury concentration increased with shark size to a maximum of  $0.7$   $\mu\text{g/g}$  for a 241 cm fork length (~ 425 lb) individual, still below the FDA recommendations.
- Electronic and conventional tagging studies reveal regular movements between U.S. and Mexico waters highlighting the need for bilateral coordination (Baquero 2006, Cartamil 2009, Cartamil et al. 2010, SWFSC unpublished data).
- Regardless of their location, common thresher sharks typically exhibit a diel pattern of remaining deeper during the day than at night. (Baquero 2006, Cartamil et al. 2010, SWFSC unpublished data).

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Figure 2. Common thresher shark carrying a satellite tag. Photo by Scott Aalbers.



### Science and Management

The focus of research conducted at the SWFSC is to improve life history information, document migrations and essential habitat including the impacts of climate change, and to better characterize the role of thresher sharks in the ecosystem. This information is provided to the Pacific Fishery Management Council which manages the common thresher shark as a part of the HMS Fishery Management Plan (FMP). Common thresher sharks are a transboundary species and so to ensure the resource is well managed, the United States and Mexico are collaborating on life history research and a stock assessment.

### Research and Research Findings, Cont.

- Stomach content analyses reveal a relatively narrow diet in comparison to other local pelagic shark species with a focus on small schooling pelagic fish (Preti et al. 2001, 2004, *in review*).

### Fun Species Facts

- Common thresher sharks use their long tails to stun prey (Aalbers et al. 2010). As a result, they are often caught by the tail on recreational and longline fishing gear.
- They have small mouths to match the size of their prey and are no threat to humans.

### Sustainability Status

**Fishing Mortality** – Based on analyses of productivity, CPUE, and catch data, fishing mortality is estimated to be below the rate that would produce maximum sustainable yield; thus, overfishing is not occurring (PFMC 2010).

**Biomass** – Biomass is estimated to be above that required for maximum sustainable yield and the stock is reportedly not overfished (PFMC 2010).

**Bycatch** – Thresher sharks are taken incidentally in the swordfish DGN fishery. Historically, there have been concerns about the level of bycatch of marine mammals and turtles in this fishery; however, after changes in fishing practices to minimize interactions with protected species, NMFS believes there is currently only a remote likelihood of incidental mortality or serious injury to marine mammals based upon the most recent information ([www.nmfs.noaa.gov/pr/interactions/lof/](http://www.nmfs.noaa.gov/pr/interactions/lof/)).

### Conservation and Management Measures

U.S. West Coast fisheries that capture common thresher sharks operate under a suite of state and federal conservation and management measures including but not limited to:

- An annual commercial harvest guideline for thresher sharks
- Extensive time and area/closures to minimize impacts to target and non-target species
- An incidental take authorization at conservative levels to prevent jeopardy for protected species
- Required training on safe handling and release of protected species
- A bag limit of two thresher sharks per day for recreational harvest
- Mandatory placement of at-sea federal observers on commercial drift gillnet vessels

Compliance and enforcement are handled by both state and federal agencies. Efforts ensure that U.S. west coast fisheries are effectively and sustainably managed to provide long-term economic and social benefits and safe, locally-produced seafood. Over 80% of U.S. seafood is currently supplied by foreign sources. Foreign fleets may operate with fewer conservation measures and less enforcement oversight and thus have higher bycatch rates.

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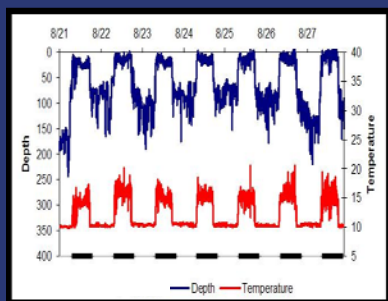


Figure 3. One week in the life of a common thresher shark. Night is indicated by the black bars. The blue line shows the depth (meters) of the shark and the red line shows temperature (°C). Note the diel pattern with daytime depths deeper and temperatures colder than at night when the shark remained close to the surface.

#### Life History and Habitat (see PFMC 2003 and Smith *et al.* 2008)

**Geographic range** – The geographic range of common thresher sharks in the Northeast Pacific is from Goose Bay, British Columbia, Canada to the Baja Peninsula, Mexico and out to about 200 miles from the coast.

**Habitat** – The SWFSC annual survey and electronic tagging studies show habitat separation between juveniles and adults. Juveniles tend to remain over the continental shelf in shallow water while adults are most common in deeper water but rarely range beyond 200 miles from the coast. Both juveniles and adults are often associated with highly productive or “green” water in regions of upwelling or intense mixing.

**Life span** – Estimated range from 19 to 50 years; additional research is necessary.

**Growth rate** – Approximately 30 cm per year over the first 5 years.

**Maximum size** – 550 cm total length for U.S. West Coast.

**Maturity** – Approximately 5 years old and around 166 cm fork length for both sexes.

**Reproduction** – Aplacental ovoviviparity and oophagous: Eggs are deposited into one of two uterine horns and developing embryos are nourished by feeding on other eggs. The typical litter size is 2-4 pups and gestation is thought to be around 9 months.

**Pupping season** – Pupping is thought to occur in the spring off southern California. Mating is thought to occur in the summer.

**Nursery ground** – The nursery grounds for pups is over the continental shelf in waters 90 m or less, primarily from Point Conception, California to San Vizcaino Bay, Baja California, Mexico.

**Stock Structure** – Genetics, catch, and tagging data suggest a single homogenous west coast population of common thresher sharks.

**Migration** – Seasonal migrations are thought to be linked to temperature with north-south movements between Oregon/ Washington and Southern California/ Baja Peninsula, Mexico.

#### Ecology

**Prey** – Based on studies at the SWFSC, the top six prey species, in order, are northern anchovy, Pacific sardine, Pacific hake, Pacific mackerel, jack mackerel, and market squid (Preti *et al.* 2001, 2004, *in review*).

**Predators** – Other upper level predators, like killer whales and larger sharks, may occasionally prey on small threshers.

**Ecosystem Role** – Common thresher sharks feed at mid-trophic levels on small pelagic fish and squid. Given their more specialized diet in comparison to other local pelagic sharks, they are more likely to exert top-down effects on their prey, although this remains to be demonstrated.

**Climate effects** – While climate effects remain to be determined, based on seasonal movements, it is hypothesized that a northward shift in their distribution could occur if

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Figure 4. Juvenile common thresher shark on the cradle of the *F.V. Outer Banks* during the juvenile thresher shark survey. All sharks are tagged and measured prior to being released.

### Ecology, Cont.

regional temperatures increase. A switch to a more diverse diet during an El Niño year relative to a La Niña year (Preti et al. 2004) suggests a more adaptable strategy that may help threshers withstand gradual climate effects.

### Notes and Links

**NOAA Fisheries SWFSC Highly Migratory Species Division:**  
[swfsc.noaa.gov/textblock.aspx?Division=FRD&id=940](http://swfsc.noaa.gov/textblock.aspx?Division=FRD&id=940)

**NOAA Fisheries Southwest Regional Office:** [swr.nmfs.noaa.gov/](http://swr.nmfs.noaa.gov/)

### Research partners

**Dr. Jeffrey Graham.** Scripps Institution of Oceanography, UCSD, La Jolla CA.  
[www.sio.ucsd.edu/Profile/jgraham](http://www.sio.ucsd.edu/Profile/jgraham)

**Dr. Oscar Sosa-Nishizaki.** Departamento de Oceanografía Biológica, Centro de Investigación Científica y de Educación, Ensenada, Mexico. [usuario.cicese.mx/~ososa/](http://usuario.cicese.mx/~ososa/)

**Dr. Chugey Sepulveda.** Pflieger Institute of Environmental Research, Oceanside, CA.  
[www.pier.org/](http://www.pier.org/)

### Stock Status Reports and Life History Information

[www.pcouncil.org/wpcontent/uploads/E2b\\_SUP\\_HMSMT\\_JUNE2010BB.pdf](http://www.pcouncil.org/wpcontent/uploads/E2b_SUP_HMSMT_JUNE2010BB.pdf)

[www.pcouncil.org/wp-content/uploads/10\\_HMS\\_SAFE\\_FINAL\\_100831.pdf](http://www.pcouncil.org/wp-content/uploads/10_HMS_SAFE_FINAL_100831.pdf)

[www.pcouncil.org/highly-migratory-species/fishery-management-plan-and-amendments/](http://www.pcouncil.org/highly-migratory-species/fishery-management-plan-and-amendments/)

### NOAA Fish Watch Webpage

[www.nmfs.noaa.gov/fishwatch/species/pac\\_common\\_thresher.htm](http://www.nmfs.noaa.gov/fishwatch/species/pac_common_thresher.htm)

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- Suk SH, Smith SE, and Ramon DA (2009) Bioaccumulation of mercury in pelagic sharks from the northeast Pacific Ocean. *Calif Coop Ocean Fish Invest Rep*, 50:172-177.