SWFSC Literature Review to Suggest Potential Changes to the Highly Migratory Species Essential Fish Habitat Descriptions

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APPENDIX F

U.S. WEST COAST HIGHLY MIGRATORY SPECIES: LIFE HISTORY ACCOUNTS AND ESSENTIAL FISH HABITAT DESCRIPTIONS

(Originally Appendix A to the FMP)

U.S. West Coast Highly Migratory Species Plan Development Team
Pacific Fishery Management Council

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January 16, 2003
Potential changes: Species list

- Removal of EFH descriptions for 2 species: pelagic thresher shark & bigeye thresher shark
  - These species were removed from the HMS FMP and thus no longer need EFH described for them.

- Species reviewed were Common Thresher Shark, Shortfin Mako shark, Blue Shark, Albacore Tuna, Northern Bluefin Tuna, Skipjack Tuna, Yellowfin Tuna, Striped Marlin, Broadbill Swordfish and Dorado.

Potential changes: Updated Maps

- New and/or better maps of EFH within the EEZ
Potential changes: Common Thresher Shark (*Alopias vulpinus*)

- Updated references on general distribution in the California current (Smith et al. 2008)
- New electronic tagging data that better identify the inshore distribution and habitat utilization in southern California (Cartamil, 2009; Cartamil et al., 2010; Cartamil et al., 2011; Sepulveda et al., 2014).
- New data on feeding habits including comparing prey species in warm water and cool water periods, showing a higher number of prey items in warm water periods than cold water, another study that looked at stomach contents of 225 common thresher sharks between 2002 and 2008, and also a comparison of diet between size classes. (Preti et al 2004, Aalbers et al., 2010, Preti et al. 2012, Preti 2020)
- Preti A (2020) Trophic ecology of nine top predators in the California Current. PhD dissertation, University of Aberdeen, Scotland, UK
**Potential changes**: Shortfin Mako Shark (*Isurus oxyrhinchus*)

- Much of the currently listed information comes from fisheries data, but new electronic tagging data are available for juvenile through adult mako sharks that better identify the coastal range within the California Current providing details on preferred depth, temperature and variations in movement patterns by season, sex and size (Nasby-Lucas et al. 2019, Nosel et al. 2019).

- A recent analysis of observer data from the California drift gillnet fishery from 1990-2017 showing that YOY and age-1 mako sharks were captured almost exclusively south of Point Conception in the SCB. It also shows that makos appear to expand their northward range as they grow, with catch rates north of Point Conception increasing with size (Nosal et al. 2019).

- New data on feeding habits from a study that sampled 330 mako sharks between 2002 and 2008, and also did a comparison of diet between subregion and size classes. (Preti et al. 2012, Preti 2020)


- Preti A (2020) Trophic ecology of nine top predators in the California Current. PhD dissertation, University of Aberdeen, Scotland, UK
Potential changes: Blue Shark (*Prionace glauca*)

- Much of the currently listed information comes from fisheries data, but new electronic tagging data are available for juvenile through adult blue sharks that better identify the coastal range within the California Current providing details on preferred depth, temperature and variations in movement patterns by season, sex and size (Nosel et al. 2019, Nasby-Lucas et al. in prep).

- A recent analysis of observer data from the California drift gillnet fishery from 1990-2017 show that YOY- juvenile blue sharks are commonly encountered north of Point Conception, well into waters off Oregon and Washington (Nosal et al. 2019).

- New data on feeding habits from a study that sampled 158 blue sharks between 2002 and 2008, and also did a comparison of diet between subregion and size classes. (Preti et al. 2012, Preti 2020)


- Preti A (2020) Trophic ecology of nine top predators in the California Current. PhD dissertation, University of Aberdeen, Scotland, UK
Potential changes: Albacore Tuna (*Thunnus alalunga*)

- A recent study examined how juvenile albacore in the California Current use their oceanographic environment, and how their distributions overlap with the habitats of four key forage species (Muhling et al. 2019).
- New electronic tagging data shows seasonal movements, migration patterns and vertical distribution of juvenile albacore tuna off Southern California and Washington and Oregon (Childers et al 2011).
- Recent analysis of stomach samples taken in the SCB indicates important prey species (Madigan et al 2015).

Potential changes: Bigeye Tuna (*Thunnus obesus*)

- A recent study found that median phytoplankton size (MD50) is an informative environmental predictor of bigeye tuna recruitment in the Hawaii longline fishery (Woodworth-Jefcoats and Wren 2020).
- Additional information on prey species is available (Moteki et al 2001).
Potential changes: Northern Bluefin Tuna (*Thunnus orientalis*)

- A recent study examined local oceanic conditions (sea surface temperature, surface chlorophyll, sea surface height, eddy kinetic energy), as well as large-scale oceanographic phenomena, such as El Niño, on Pacific bluefin tuna availability to commercial and recreational fishing fleets. Results from generalized additive models showed that warmer temperatures of around 17–21°C with low surface chlorophyll concentrations (<0.5 mg/m3) increased probability of occurrence in the Commercial Passenger Fishing Vessel and purse seine fisheries (Runcie et al. 2018).

- New electronic tagging data show repeatable seasonal movements along the west coast of North America. Fish showed latitudinal movement patterns that were correlated with peaks in coastal upwelling-induced primary productivity. (Boustany et al., 2010; Domeier et al., 2003).

- Recent analysis of stomach samples taken in the SCB updates information on important prey species (Madigan et al 2015).

Potential changes: Yellowfin Tuna (*Thunnus albacares*)


Potential changes: Striped Marlin (*Tetrapturus audax*)

- Despite advancements to date from genomic and electronic tagging studies (Domeier 2006; Domeier et al., 2018), annual migration patterns remain poorly understood.
- Additional information on diet (Moteki et al 2001).
- Spawning occurs in coastal waters of the mouth of the Gulf of California (Armas et al. 1999)
Potential changes: Broadbill Swordfish (Xiphias gladius)

- New data available on optimal sea surface temperature for swordfish (Dewar et al., 2011; Sepulveda et al., 2020)

- Recent electronic tagging research has shown that despite large-scale seasonal migrations, individuals may return to the same location year after year (Sepulveda et al., 2020; Griffiths et al., 2020; Sepulveda et al., in preparation). Both juvenile and adult swordfish occur off southern California to forage during the summer and fall, with some individuals (mainly juveniles) possibly remaining in the SCB throughout the entire year.

- Electronic tag data showing diurnal depth distribution of swordfish off Southern and Central California reveal that daytime depths typically range from the surface down to depths in excess of 400m. As swordfish move offshore towards tropical spawning grounds the average daytime depth distribution increases to depths closer to 600m (Dewar et al., 2011).

- Additional information on diet (Moteki et al 2001, Markaida and Hochberg, 2005).

  
  
  
Potential changes: Dorado (Mahimahi, *Coryphaena hippurus*)

- New data on feeding habits for dorado (Olson and Galván-Magaña 2002, Torres-Rojas et al. 2014, Tripp-Valdez et al. 2015)

Summary

• New information is available for HMS EFH descriptions due to advancements in electronic tagging data over the last 17 years, providing important data on migration patterns, preferred depth and temperature data, and additional environmental preferences through remote sensing data. Also show variations in movement patterns by season, sex and size
• New studies also available on feeding ecology
• New mapping technology available to update EFH maps by species

Conclusions

• New information generally supports the original descriptions of general distribution and trophic interactions
• There is some updated information on prey items
• New information from electronic tagging studies indicate that several HMS species are present farther inshore than currently indicated in the HMS EFH descriptions
• Tagging data also provide new details of habitat utilization linked with environmental data (i.e. SST and Chlorophyll a)