Report of the Pre-Assessment Workshop for the 2021 Stock Assessment of Spiny Dogfish

Pacific Fishery Management Council

Via Webinar

March 9, 2021

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The pre-assessment workshop for Spiny Dogfish (*Squalus suckleyi*) was convened via webinar on March 9th, 2021. Mr. John Holloway of the Groundfish Advisory Subpanel chaired the workshop. Drs. Vlada Gertseva and Ian Taylor (STAT) of the Northwest Fisheries Science Center presented an overview of plans for the 2021 stock assessment.

The Spiny Dogfish stock was last assessed in 2011 and was estimated to be at 63% of unfished biomass at that time. The main sources of uncertainty identified by the 2011 STAR panel included the lack of reliable age data, discard estimates, and the use of a new pre-recruit survival based stock-recruitment relationship. Also, the overall retrospective pattern in the 2011 base model indicted further source of uncertainty not captured in the 95% confidence intervals of the final base model.

The 2021 assessment will keep the same stock structure (single coast-wide) and fleet structure as in the 2011 assessment. There is no new information available on historical landings since 2011. The STAT focused their efforts in improving discard estimates, age determination, and stock recruitment relationship.

Discard estimates and assumption for discard mortality

Dogfish stock experienced an intense fishing pressure in the 1940s for vitamin A market. This fishery ended in 1950 with the advent of synthetic vitamins. In the mid-1970s, an overseas food fish market for dogfish was developed. Harvest of this species was exported to other counties, primarily Great Britain. Dogfish landings have declined since mid-1980's with a slight increase in recent years. It is unclear if development of a new market caused the increase in landings. Most of the commercial catch (more than 90%) has been landed in Washington. A small portion of the catch is taken recreationally, mostly in California.

Historical discard studies

Despite the historical fisheries, dogfish is not highly prized in general and is mostly taken as bycatch and discarded at sea in other commercially important fisheries. Discard information is lacking historically. The three commonly used discard studies are limited in scope for dogfish.

• Pikitch study – Between 1985 and 1987, primarily for Columbia INPFC area, by species estimates
• EDCP conducted by ODFW – From late 1995 to early 1999, Oregon waters only, focus on deeper waters, all sharks combined
• WCGOP – 2002 forward, coastwide, discard estimates by species

Bottom trawl discard

For dogfish discarded by bottom trawl, the STAT proposed using the same approach as used for longnose skate (Gertseva and Matson, 2021). In this approach, the annual total catch of dogfish is estimated based on the annual total catch of sablefish, a targeted species co-occurring with dogfish in the catch. The annual discarded dogfish is the difference between the estimated annual total catch and reported annual landing. The resulted discard estimates agree with the observations in the Pikitch study and the EDCP study.

Discard mortality for trawl gear is assumed to be 100%. There was some question as to whether assuming 100% discard mortality was representative given the resilience of this species. Individuals encountered toward the end of a tow, in short tows or in lighter tows subject to less pressure in the cod end may be more likely to survive. It was suggested that the STAT examine

discard mortality estimates for other robust species like lingcod for which sufficient data was available to provide a proxy.

Non-trawl discard

The approach used above did not work for non-trawl discard. There was no relationship found between catches of dogfish and other targeted species. The STAT applied the average bottom trawl discard rate to average landings for three time periods: 1969-1980, 1981-1990, and 1991-2001. This is the same approach used for big skate discard in the 2019 big skate assessment. A linear interpolation was used between 1954 and 1968.

Discard mortality for non-trawl gears is assumed to be 50%. It is believed that the survival rate can be higher than 50%, unless crucifiers, which can severely injure the jaw in pulling out the hook, are used. It was noted that after the sablefish size limit was put in place in the early 1980s, and the increase in live fish markets, that crucifiers became less common. For the reasons noted, it was suggested that the STAT use species like lingcod as a proxy species for survival rate for release in the absence of crucifiers.

Mid-water trawl discard

There are two sectors in the mid-water trawl hake fishery – at sea and shoreside. Total dogfish catch data are available for at-sea hake fishery. For discard from the shoreside hake fishery, WCGOP data are available from 2002. For pre-2002 discard, the average discard rate (90%) of WCGOP 2002-2004 data was applied to landing data. Other assumptions are also being explored.

Abundance indices

There are five surveys included in the model. The Delta-GLM approach was used in 2011. The STAT proposed to use the VAST model, currently used in groundfish assessments for constructing abundance indices of the bottom trawl surveys.

Age determination

The second dorsal fin spine is the structure used in determining the age of spiny dogfish. Due to the wearing of the tip of the spine as dogfish gets older, it is challenging to determine the age. There were two age determination methods considered in the 2011 assessment. The STAT conducted additional studies on this topic and concluded the Ketchen method is more reliable than the Cheng method. Therefore, the Ketchen's age will be used in 2021 assessment, to inform growth.

Stock-recruitment relationship

The pre-recruit survival-based stock-recruitment relationship used in 2011, will be used in 2021 assessment. The STAT published a paper in the journal Fisheries Research (Taylor et al. 2013), explaining the details of this relationship and describing how it compares with Beverton-Holt model. STAT also plans to conduct sensitivity analysis on stock recruit parameters.

References

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