HIGHLY MIGRATORY SPECIES MANAGEMENT TEAM REPORT ON
PERFORMANCE METRICS FOR THE 2017/2018 CALIFORNIA/OREGON LARGE-MESH
DRIFT GILLNET FISHERY

## DGN Fishery Performance in the 2017/2018 Fishing Season

In 2015, the Pacific Fishery Management Council (Council) established annual fishery performance objectives for the California/Oregon large-mesh drift gillnet (DGN) fishery. These provide a way for the Council to monitor bycatch, non-target catch, and interactions with protected species in the fishery during each season in comparison to historical levels. The Council set numeric metrics for specified marine mammals that are not listed under the Endangered Species Act (ESA), but have been observed entangled in the DGN fishery. The Council also set numerical metrics for non-swordfish billfish, prohibited sharks, hammerhead sharks, and manta rays. For all finfish, the Council set a performance metric for the bycatch rate based on the overall retention rate (total number of fish that are landed, divided by all landed catch and fish thrown overboard dead). The Council chose a retention rate of 70%, which is based on recent historical performance in the fishery.

Table 1 includes the results for the 2017/2018 fishing season, based on a simple ratio estimator, which expands bycatch counts from 114 observed sets (18.4% observer coverage) to a bycatch estimate for 618 total sets. Performance metrics were exceeded for Northern elephant seals, gray whales, and hammerhead sharks (shaded cells).

**Table 1. DGN Performance Metrics and Fishery Performance During the 2017/2018 Fishing Season.**

|  | Performance Metric | 2017/2018 Fishing Season Results |
|---|---|---|
| Finfish Retention Rate | 70% | 82% |
|  |  |  |
| Minke whale | 5 | 0 |
| Short-beaked common dolphin | 66 | 54.3 |
| Long-beaked common dolphin | 24 | 0 |
| Risso's dolphin | 7 | 0 |
| California sea lion | 97 | 5.4 |
| Northern elephant seal | 6 | 16.3 |
| Northern right whale dolphin | 11 | 5.4 |
| Gray whale | 5 | 5.4 |
| Pacific white-sided dolphin | 22 | 0 |
|  |  |  |
| Billfish (other than swordfish) | 26 | 16.3 |
| Prohibited sharks (megamouth, basking, white) | 2 | 0 |
| Hammerhead sharks | 4 | 21.7 |
| Manta ray | 2 | 0 |

At its June 2017 meeting, the Council requested that the Highly Migratory Species Management Team (HMSMT) begin reporting on species for which hard caps on observed mortality and serious injury (M/SI) were proposed for the DGN fishery. Table 2 includes the proposed hard cap value and observed M/SI for each species during the two most recent DGN fishing seasons.

**Table 2. Proposed Hard Cap Values and Observed M/SI in the DGN Fishery During the 2016/2017 and 2017/2018 Fishing Seasons.**

|  | Proposed 2-year hard cap on observed M/SI | Observed M/SI 2016/2017 Fishing Season | Observed M/SI 2017/2018 Fishing Season |
|---|---|---|---|
| Sperm whale | 2 | 0 | 0 |
| Humpback whale | 2 | 0 | 0 |
| Fin whale | 2 | 0 | 0 |
| Short-finned pilot whale | 4 | 0 | 0 |
| Bottlenose dolphin | 4 | 0 | 0 |
| Leatherback sea turtle | 2 | 0 | 0 |
| Loggerhead sea turtle | 2 | 0 | 0 |
| Olive ridley sea turtle | 2 | 0 | 0 |
| Green sea turtle | 2 | 0 | 0 |

## HMSMT Recommendations for Updating Performance Metrics

Finfish Performance Metrics

The HMSMT suggests that the Council reconsider the performance metric for hammerhead sharks, and reclassify it as scalloped hammerhead sharks (*Sphyrna lewini*). The Eastern Pacific distinct population segment of scalloped hammerhead shark is listed as endangered under the ESA and poses a bycatch concern, while smooth hammerhead sharks (*Sphyrna zygaena*) are legal catch in California (one of the four observed hammerheads was sold). All hammerhead sharks observed caught during the 2017/2018 DGN fishing season were smooth hammerhead sharks.

More generally, the HMSMT plans to review the basis of the performance metric levels for non-swordfish billfish, prohibited and hammerhead sharks, and manta rays and will report any recommendations in a supplemental report.

Alternative Methods for Establishing and Reporting of DGN Performance Metrics

The 2017/2018 fishing season results were calculated using the simple ratio estimator, which was the method used to estimate bycatch and protected species interactions at the time the performance metrics were adopted. The ratio estimator uses the observer sample from a single year and assumes exactly the same bycatch rate in the unobserved portion of fishing effort as in the observer sample. Inaccuracies created when estimating rare event bycatch from a single year of observer data are documented in a recent NOAA Technical Memorandum[1] and a recent Ecological Applications paper[2]. The result is an upward-biased estimation of rare-event bycatch in years when at least one bycatch event is observed and a downward-biased estimate when no bycatch is observed.

In its June 2017 report on DGN performance metrics (Agenda Item H.1.c, Supplemental HMSMT Report), the HMSMT suggested that an alternative method for calculating performance metrics and reporting DGN performance to those metrics is more appropriate than the ratio estimator. The HMSMT will submit a supplemental report for the June 2018 Council meeting showing selected performance metrics based on a random forest regression tree method[3] and DGN performance during the 2016/2017 fishing season, along with recommendations about how performance metrics using this method could be implemented.

Alternative methods for determining performance metrics and reporting DGN performance for the proposed hard cap species could also be considered. In this report, the HMSMT has compared interactions to the proposed hard cap values as originally defined, based on observed interactions. For consistency with the existing performance metrics, the HMSMT could develop performance metrics for these species based on total estimated interactions as opposed to simply using the values originally chosen for hard caps.

<u>References</u>

[1] Carretta, J.V. and J.E. Moore. 2014. Recommendations for pooling annual bycatch estimates when events are rare. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-528. 11 p.

[2] Martin, S.L., Stohs, S.M., and Moore, J.E. 2015. Bayesian inference and assessment for rare-event bycatch in marine fisheries: a drift gillnet fishery case study. Ecological Applications, 25(2), pp. 416–429.

[3] Carretta, J.V., J.E. Moore, and K.A. Forney. 2017. Regression tree and ratio estimates of marine mammal, sea turtle, and seabird bycatch in the California drift gillnet fishery: 1990-2015. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-568. 83 p. doi:10.7289/V5/TM-SWFSC-568.