# 7 Norton Sound red king crab

## *Fishery information relative to OFL setting*

During the 2026 fishery, 5,756 crab (7.6 t; 16,794 lb) were harvested in the winter commercial fishery and 80,726 crab (134.4 t; 296,238 lb) were harvested in the summer commercial fishery. In the winter subsistence fishery, 6,767 male crab were caught, while 5,025 male crab (6.7 t; 14,662 lb) were retained. The summer subsistence fishery caught 113 male crab and retained 95 (0.16 t; 349 lb). The model-estimated (26.0) discard mortality was 4.8 t (10,585 lb). The ABC of 135 t (298,000 lb) was exceeded but overfishing did not occur in 2026 because the total catch mortality for this stock (153.6 t; 338,628 lb) was below the 2026 OFL of 193 t (426,000 lb).

## *Data and assessment methodology*

During the last three decades, information from summer trawl, summer pot, winter pot, and preseason summer pot surveys have been periodically collected for Norton Sound red king crab (NSRKC). The summer trawl surveys provide data on annual abundance and size compositions, while the other surveys have contributed to life history knowledge. Time series of standardized CPUE from the summer commercial fishery provide additional indices of abundance. Tag return data provide information on growth. Retained catch data are available from fish tickets for the winter and summer commercial fisheries, as well as from subsistence catch reports. Retained catch size-composition data are generally available for the summer commercial fishery, but only limited data are available for the winter commercial fishery. Limited data on discards are available from summer commercial fishery observer data and subsistence catch reports.

The assessment has been updated to include the following new data for 2026: retained catch for the winter and summer commercial fisheries, size compositions for the summer commercial fishery, total and retained catch for the winter subsistence fishery, and standardized CPUE for 2026. Survey abundance and shell condition/size composition data for 2026 were not available because the National Atmospheric and Ocean Administration (NOAA) Northern Bering Sea (NBS) summer trawl survey and the Alaska Department of Fish and Game (ADF&G) trawl survey were not conducted during 2026. Historical datasets used in the assessment include growth information from tagging data as well as abundance and size composition data from NOAA's Norton Sound (NS) trawl survey (1976-1991).

The assessment is based on a length-based model of male crab abundance implemented in the GMACS modeling framework. It combines multiple sources of data. Logistic functions are used to describe commercial fishery and trawl survey selectivities, and a dome-shaped function is used for the winter pot survey. Selectivities for the winter commercial fishery and the subsistence fishery are mirrored to the summer commercial fishery. Molting and growth are combined into a size-transition matrix. The model allows for length-dependent natural mortality. In the 2025 accepted model, 25.0a2, the ADF&G trawl survey was assigned a catchability of 1.0, with catchabilities estimated for other surveys and the standardized CPUE indices.

The assessment author presented results from five models for consideration by the CSPT for status determination and OFL/ABC calculation. The base model 26.0 was the 2025 accepted model (25.02a) with GMACS updated to version 2.20.44 and updated data. Models 26.1.d and 26.2.d were fit to a spatiotemporal model-based index of abundance that incorporated a smooth on depth by survey while Models 26.1.nd and 26.2.nd were fit to a spatiotemporal model-based index of abundance that did not include depth. The 26.1 models fixed catchability at 1.0 for the model-based indices but estimated it for the historical survey while the 26.2 models estimated catchability for both the model-based indices and the historical survey. The model-based indices used the results from spatiotemporal generalized additive models fit simultaneously to the NOAA NBS and ADF&G survey data. The authors recommended against selecting the base model

(26.0, which fits design-based indices from the NOAA NBS and ADF&G trawl surveys) for harvest specifications because using a model-based index represents a more rigorous way to estimate abundance for this stock given the variation in survey station sampling over time. They also recommended against selecting either of the 26.2 models until the consequences of estimating catchability for the model-based indices could be more fully explored. Between models 26.1.nd and 26.1.d, they recommended Model 26.1.d for harvest specifications because the spatiotemporal model that included a smooth on depth by survey had improved diagnostics compared with the model that did not include it. The CSPT concurred with the authors' recommendation to use Model 26.1.d for 2027 harvest specifications.

### *Stock biomass and recruitment trends*

Estimated mature male biomass (MMB) reached a low point (1.68 kt) in 1982 following a sharp decline from the peak biomass (9.29 kt) in 1977. It recovered slightly to reach a smaller peak in 1987 (3.26 kt) but then declined again to a time series low in 1996 (1.58 kt). Subsequently, MMB has undergone fluctuations about the $B_{MSY\ \text{proxy}}$.(currently estimated to be 2.58 kt) on a 3-4-year time scale. In 2022, MMB reached the highest value since the late 1970's (4.07 kt) but has since declined and was 1.97 kt in 2026.

Estimated recruitment has generally been variable across the time series, fluctuating on a 5-6 year time frame about a mean of 0.57 kt. Estimated recruitment for 2020 (1.31 kt) was the highest since the late 1970s, but recruitment has since decreased to 0.29 kt in 2026.

ADF&G trawl survey estimates of male abundance indicated a fairly substantial decline in recent abundance from 3.5 million males in 2023 to 1.4 million males in 2024 (maximum abundance, 5.9 million males, occurred in 2014) while estimated abundance from the NMFS Northern Bering Sea trawl survey did not change substantially from 2023 (1.7 million males) to 2025 (1.6 million). CPUE from the summer commercial fishery in the post-superexclusive time period (1994-present) reached a maximum in 2024 at 38.7 crab/pot and was above the 1994-2026 time series average (14.2 crab/pot) during 2026 (15.9 crab/pot).

### *Tier determination/Plan Team discussion and resulting OFL and ABC determination*

Using model 26.1.d, the Tier 4 $B_{MSY}$ proxy was calculated as the average MMB on February 1 from 1980 to 2026, which was 2,600 t. The estimated 2027 MMB on February 1 was 1,590 t, which is below the $B_{MSY}$ proxy, placing NSRKC in Tier 4b. The corresponding $F_{\text{MSY}}$ proxy for NSRKC was $M$ =0.23 $yr^{-1}$ (using the default $\gamma = 1.0$). Because the stock is in Tier 4b, the associated $F_{OFL}$ falls on the slope of the $F_{OFL}$ control rule and was computed as 0.13 $yr^{-1}$. In 2023, the CPT recommended adopting a retained catch OFL due to the lack of new information on discard mortality; the SSC rejected this recommendation and based the OFL on total catch mortality as in 2022. To maintain consistency with recent practice, the CSPT recommends a total catch OFL for 2027. Consequently, the 2027 Tier 4b total catch OFL is 143 t (0.315 m lbs).

The CSPT recommends that the ABC for 2027 be set below the maximum permissible ABC, using a 30% buffer. The SSC endorsed using a buffer of 30% for the 2026 ABC given concerns regarding the assessment. The sources of uncertainty identified when setting the 2026 ABC are still relevant, as was noted in the discussion of the Risk Table for this stock (see Appendix A of the SAFE Chapter).

The resulting ABC is 100 t (0.22 million lb). Stock status is 61% of the $B_{MSY}$ proxy and therefore this stock is not overfished.

*Status and catch specifications (1,000 t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.*

| Year | MSST | Biomass (MMB) | GHL | Retained Catch Mortality | Total Catch Mortality | OFL[1] | ABC[1] |
|---|---|---|---|---|---|---|---|
| 2023 | 1.20 | 2.40 | 0.178 | 0.192 | 0.201 | 0.310 | 0.220 |
| 2024 | 1.00 | 2.50 | 0.219 | 0.209 | 0.215 | 0.332 | 0.233 |
| 2025 | 0.98 | 2.15 | 0.186 | 0.164 | 0.168 | 0.284 | 0.199 |
| 2026 | 1.00 | 1.56 | 0.130 | 0.149 | 0.154 | 0.193 | 0.135 |
| 2027 | 1.30 | 1.59 | | | | 0.143 | 0.100 |

*Status and catch specifications (million lb.)*

| Year | MSST | Biomass (MMB) | GHL | Retained Catch Mortality | Total Catch Mortality | OFL[1] | ABC[1] |
|---|---|---|---|---|---|---|---|
| 2023 | 2.65 | 5.29 | 0.392 | 0.425 | 0.444 | 0.680 | 0.480 |
| 2024 | 2.20 | 5.52 | 0.483 | 0.460 | 0.474 | 0.733 | 0.513 |
| 2025 | 2.16 | 4.72 | 0.410 | 0.361 | 0.369 | 0.628 | 0.440 |
| 2026 | 2.21 | 3.43 | 0.268 | 0.328 | 0.339 | 0.426 | 0.298 |
| 2026 | 2.86 | 3.50 | | | | 0.315 | 0.221 |

Notes:
[1]OFL/ABC are total catch values in 2023-2027