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# Observed and Estimated Bycatch of Salmon in U.S. West Coast Fisheries, 2002–18

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U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
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## NOAA Data Report Series NMFS-NWFSC-DR

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## Recommended citation:

(Richerson et al. 2019)[1]

[1] Richerson, K., K. A. Somers, J. E. Jannot, V. Tuttle, N. B. Riley, and J. McVeigh. 2019. Observed and Estimated Bycatch of Salmon in U.S. West Coast Fisheries, 2002–18. U.S. Department of Commerce, NOAA Data Report NMFS-NWFSC-DR-2019-02.

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NOAA FISHERIES

# Observed and Estimated Bycatch of Salmon in U.S. West Coast Fisheries, 2002–18

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# Report description

This data report summarizes the observed and estimated bycatch of all salmon species observed in fisheries monitored by the West Coast Groundfish Observer Program (WCGOP), the At-Sea Hake Observer Program (A-SHOP), the Electronic Monitoring (EM) Program, and the Catch Monitor (CM) Program. The WCGOP and A-SHOP are part of NOAA Fisheries' Northwest Fisheries Science Center, and the EM and CM Programs are run by the Pacific States Marine Fisheries Commission. We present bycatch in terms of both weight and numbers of individuals. Methods used in this report follow the methods presented in the previous salmon report (Somers et al. 2015) and the most recent groundfish mortality report (Somers et al. 2019).

The Fisheries Observation Science (FOS) Program consists of two programs, A-SHOP and WCGOP. A-SHOP observes the hake fleet that processes catch at sea, while WCGOP observes a number of fleets that deliver catch shoreside for processing, including sectors that target and incidentally impact groundfish. Both programs place trained scientists on board commercial fishing vessels to observe and sample catch; WCGOP specifically focuses on sampling at-sea discards. Once landed shoreside, catch is sampled by the CM program; for vessels fishing under maximized or optimized retention, this sampling quantifies the majority of their bycatch. All salmon encountered by EM fisheries are either observed at sea or retained and sampled dockside. This report also includes fish ticket landings data from the Pacific Fishery Information Network (PacFIN). Every year this report is updated to include the newest year of data, the most current data from FOS and PacFIN for previous years, and the most recent data processing procedures. Data processing updates are described in the annual groundfish mortality report, which is available in draft form annually in the Pacific Fishery Management Council September Briefing Book and later in the year in final form via a NOAA Technical Memorandum.

In this report, for each sector in which salmon bycatch was recorded, we provide two data files, one showing observer or sampling coverage for all strata with observed or electronically-monitored effort and a second showing bycatch data for only those strata with salmon bycatch. Some tables include seasonal, latitudinal, and/or depth strata as possible while preserving confidentiality. For the shoreside-processed fisheries, seasons are defined as winter (Jan–Apr and Nov–Dec) or summer (May–Oct); for the at-sea processed fisheries, seasons are defined as spring (15 May, when the season opens, to 30 June) or fall (1 July to 31 December). Latitudinal divisions are defined as Cape Falcon (45.77°N), Cape Blanco (42.83°N), and Cape Mendocino (40.50°N). For the catch share bottom trawl fishery, depth strata have been updated since the previous report to reflect depth bins (in fathoms) more relevant to salmon management (0–100 fth, 100–150 fth, 150–250 fth, and 250+ fth). This may result in slightly different estimates of total bycatch relative to the previous report. In addition, we now include an estimate of bycatch rates for A-SHOP and catch share fisheries (total observed/monitored salmon bycatch divided by total observed/monitored landed target weight in a stratum). All weight units are in metric tons (mt), except for individual fish in biological data tables, which are in kilograms (kg). All count values were rounded to an integer value using standard rounding rules in each table for presentation purposes; for that reason, a sum of the rounded values over rows within sector-level tables may not be equivalent to the value in the final summary tables. Similarly, zero values represent cases

where catch or salmon was present, but the rounded numeric value was less than the digits shown. In cases where fewer than three vessels were active, data cannot be shown in order to maintain confidentiality; these strata are reported as asterisks (*). Additionally, the at symbol (@) represents strata for which the potential bootstrapping pool had less than three vessels and so could not be estimated. This represented less than 0.25 percent of fishing effort in regards to yearly landings. Finally, the hash symbol (#) represents cases where only a single haul with salmon was observed, so the standard error calculation is not informative.

In addition to sector-specific coverage and bycatch information, we also include a bycatch summary table as well as summaries of the biological data collected by the WCGOP, A-SHOP, and CM programs. We do not present tribal fishery data in this year's report.

## Trends, 2002–18

We present trends in Chinook and coho salmon bycatch because they are the most likely to be impacted by observed fisheries, and because ocean troll fisheries target both species. In addition, both species include multiple populations that are listed under the Endangered Species Act. Salmon bycatch in groundfish fisheries has the potential to cause friction between the groundfish and salmon sectors. This has been the case for Chinook salmon, and high levels of bycatch in some years have created an on-going fisheries management challenge. We present data beginning in 2002, when WCGOP began observing these fisheries. Chinook bycatch in the hake fishery as a whole has been volatile, with a high in 2014. In 2017 and 2018, bycatch was higher than the preceding two years, but similar to 2011–12. Non-catch share (NCS) bycatch has been minimal across all years. After extremely high bycatch in 2002 and 2003, mostly in the limited entry bottom trawl fishery, Chinook bycatch has remained relatively low in the shoreside non-hake fishery. In 2014, Chinook bycatch by the shoreside non-hake fishery was the highest since 2005 (mostly attributed to the catch share bottom trawl fishery), but bycatch was relatively low from 2016–18.

Over the time period examined, coho bycatch was generally an order of magnitude lower than Chinook bycatch, with considerable amounts of interannual variability. Bycatch in the hake fishery was elevated in 2002, 2005, 2007, 2011, and 2014, compared to other years when bycatch was lower. Bycatch in the NCS and shoreside non-hake fisheries has remained at moderate levels across all years, though NCS coho bycatch in 2018 was higher than all other years except 2014. The increased bycatch in 2018 is partially due to the first observed salmon bycatch in the OA Hook-and-Line fishery. In low encounter rate situations like this, ratio estimators can result in estimates with greater uncertainty. In this case, we estimated that one observed coho represented approximately nine total coho salmon in the fleet, or about 13% of the bycatch in the NCS fleet for the year.

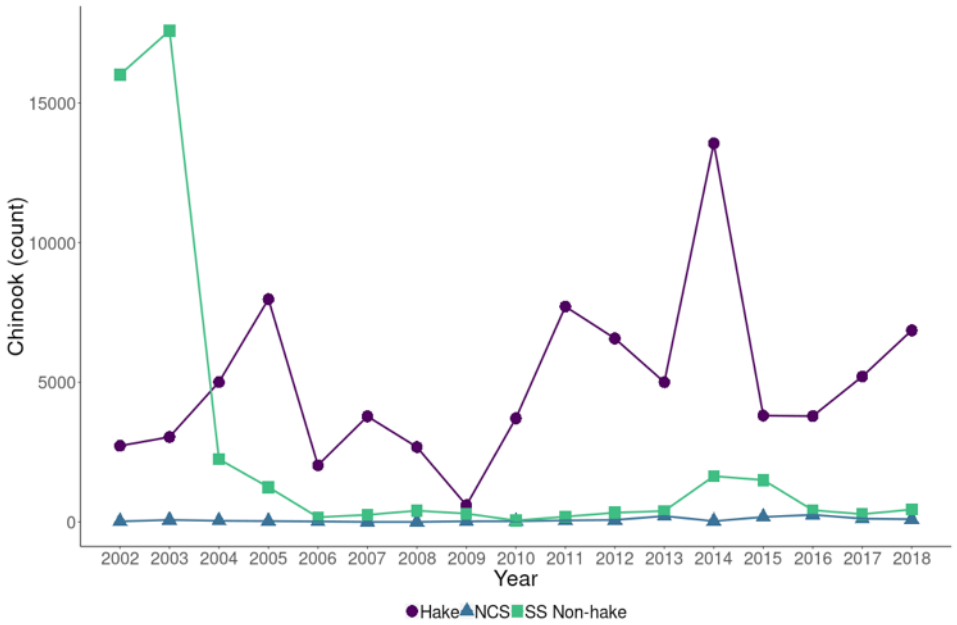


Figure 1. Chinook salmon bycatch in fisheries monitored by A-SHOP, CM, EM, and WCGOP, 2002–18. *Hake* includes at-sea catcher processors, at-sea mothership catcher vessels, and shoreside processors. *NCS* includes non-catch share (CS) exempted fishing permits, sablefish primary, nearshore, open access (OA) California halibut, pink shrimp, and OA hook-and-line. *SS Non-hake* includes shoreside limited entry (LE) and CS bottom trawl, CS fixed gear, CS midwater rockfish, and LE California halibut.

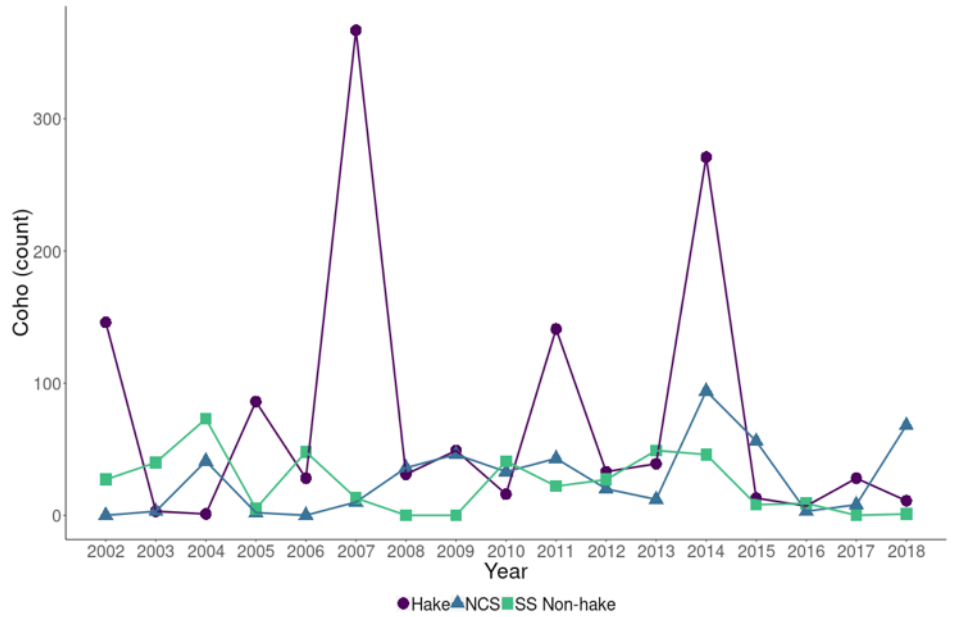


Figure 2. Coho salmon bycatch in fisheries monitored by A-SHOP, CM, EM, and WCGOP, 2002–18. *Hake* includes at-sea catcher processors, at-sea mothership catcher vessels, and shoreside processors. *NCS* includes non-catch share (CS) exempted fishing permits, sablefish primary, nearshore, open access (OA) California halibut, pink shrimp, and OA hook-and-line. *SS Non-hake* includes shoreside limited entry (LE) and CS bottom trawl, CS fixed gear, CS midwater rockfish, and LE California halibut.

# Tables

The tables in this data report (filename: `DR-2019-02.xlsx`), described below, can be downloaded from the report's NOAA Institutional Repository[1] record by clicking on the "Supporting Files" tab.

Table 1. Observed vessels, trips, hauls, catch, and salmon interactions, as well as total fleet landings, stratified by year, season, salmon management area, and depth interval for the LE trawl fishery.

Table 2. Observed and expanded salmon bycatch in the LE trawl fishery.

Table 3. Observed vessels, trips, hauls, catch, and salmon interactions, as well as total fleet landings, stratified by year and season for the LE California halibut (CHLB) fishery.

Table 4. Observed and expanded Chinook salmon bycatch in the LE CHLB fishery.

Table 5. Observed vessels, trips, hauls, catch, and salmon interactions, as well as fleet landings, stratified by year for the OA CA halibut fishery.

Table 6. Observed and expanded Chinook salmon bycatch in the OA CHLB fishery.

Table 7. Observed vessels, trips, hauls, catch, and salmon interactions, as well as fleet landings for the combined LE & OA CHLB fishery.

Table 8. Observed and expanded salmon bycatch in the combined LE & OA CHLB fishery.

Table 9. Observed vessels, trips, hauls, catch, and salmon interactions, as well as fleet landings, stratified by year and area for the LE sablefish primary fishery, using hook-and-line gear.

Table 10. Observed and expanded salmon bycatch in the LE sablefish primary fishery (hook-and-line).

Table 11. Observed vessels, trips, hauls, catch, and salmon interactions, as well as fleet landings, stratified by state, year, and area for the pink shrimp fishery.

Table 12. Observed and expanded salmon bycatch in the pink shrimp fishery.

Table 13. Observed vessels, trips, hauls, catch, and salmon interactions, as well as fleet landings, stratified by state, year, and area for the nearshore fishery. Only effort north of lat 40°10'N is shown, as no salmon interactions occurred south of that line.

Table 14. Observed and expanded salmon bycatch in the nearshore fishery.

Table 15. Observed vessels, trips, hauls, catch, and salmon, as well as fleet landings, stratified by year, season, depth bin, and salmon management area for 100% observed catch shares bottom trawl.

Table 16. Observed at-sea, estimated unknown, landed, and total salmon bycatch in the 100% observed catch shares bottom trawl fishery.

Table 17. Observed vessels, trips, hauls, catch, and salmon, as well as fleet landings, stratified by year, target strategy, season, and salmon management area for 100% observed shoreside catch shares midwater trawl fishery (hake and rockfish).

Table 18. Observed at-sea, estimated unknown, landed, and total salmon bycatch in the 100% observed catch shares midwater trawl fishery (hake and rockfish).

[1] https://repository.library.noaa.gov/

# References

Somers, K. A., M. A. Bellman, J. E. Jannot, Y.-W. Lee, J. McVeigh, and V. Tuttle. 2015. Observed and estimated total bycatch of salmon in the 2002-2013 U.S. west coast fisheries. West Coast Groundfish Observer Program. National Marine Fisheries Service, NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112.

Somers, K. A., J. Jannot, K. Richerson, N. B. Riley, V. Tuttle, and J. McVeigh. 2019. Estimated discard and catch of groundfish species in the 2018 U.S. west coast fisheries. NOAA Fisheries, NWFSC Observer Program, 2725 Montlake Blvd E., Seattle, WA 98112.


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