Summary of the NWFSC West Coast Groundfish Bottom Trawl Survey Data for Select Species from 2003-2019

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Contents

1 Preface

This document is an update the initial summary provided for the March 2020 Pacific Fishery Management Council meeting. The changes between this document an the one provided in March are as follows:

1. The NWFSC West Coast Groundfish Bottom Trawl Survey (WCGBTS) data from 2019 are now available and have been added to the summaries;
2. Summaries for the following species have been added: petrale sole, sablefish, big skate, longnose skate, widow rockfish, and Pacific ocean perch;
3. The index of abundance for select species was calculated splitting area-based estimates by South and North of the N. 40° 10' latitude (splitnose rockfish and yellowtail rockfish);
4. The index of abundance for sablefish was calculated splitting are based estimates by Sount and North of the N. 36° latitude; and,
5. The March version had incorrect labeling of the estimated indices of abundance for the following species: yellowtail rockfish, splitnose rockfish, and shortspine thornyhead. This has been corrected.

2 Introduction

A brief summary of the NWFSC West Coast Groundfish Bottom Trawl Survey (WCGBTS) is presented here for data available from 2003 - 2019. These analyses are meant to provide additional information and guidance for the 2020 assessment prioritization process. The selection of the species was based on having an average of 20 or more positive tows by the survey per year.

The indices were calculated using VAST and the biomass estimates were aggregated by a generalized approach using state boundaries based on the areas where observations were present. Future species specific assessments may select a more tailored approach for summarizing the NWFSC WCGBTS data by area.

The length data also were expanded using a generalized stratification. The composition data were expanded using a design-based approach with stratas based on state latitudes with two depth stratas: 55 - 183 m and 183 - 549 m, for all species except for three. The three exceptions were species with considerable biomass at depths greater than 549 m: Dover sole, longspine thornyhead, and shortspine thornyhead. These three species had an additional depth strata that included deeper waters, 549 - 1280 m, for each state area. The expanded length composition data were summarized using either a 2 or 4 cm bin structure depending

upon the range between maximum and minimum lengths observed within the survey data. Species where the range between the maximum and minimum lengths observed by the survey were less than 60 cm, 2 cm data bins were used, and for species where the range was 60 cm or greater the data bins were set at 4 cm. The generalized stratification and bin structure selected here provides a simple summary of the data that can be useful for decision making, but will likely differ from a species specific approach that would be selected in a future assessment.

3 Arrowtooth flounder

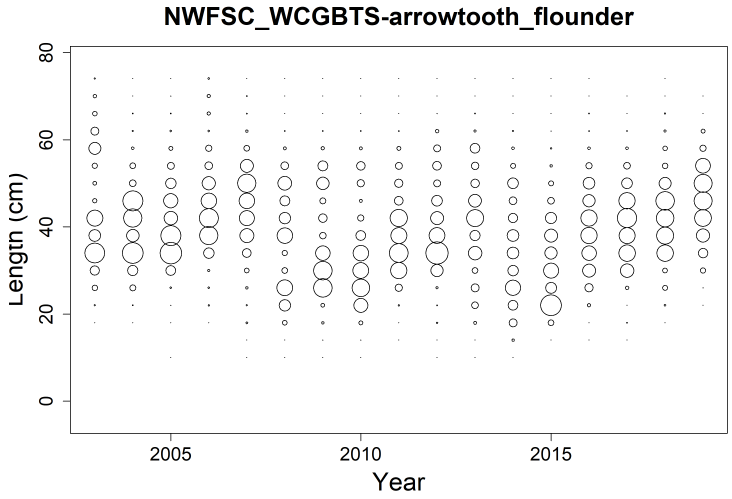

Figure 1: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

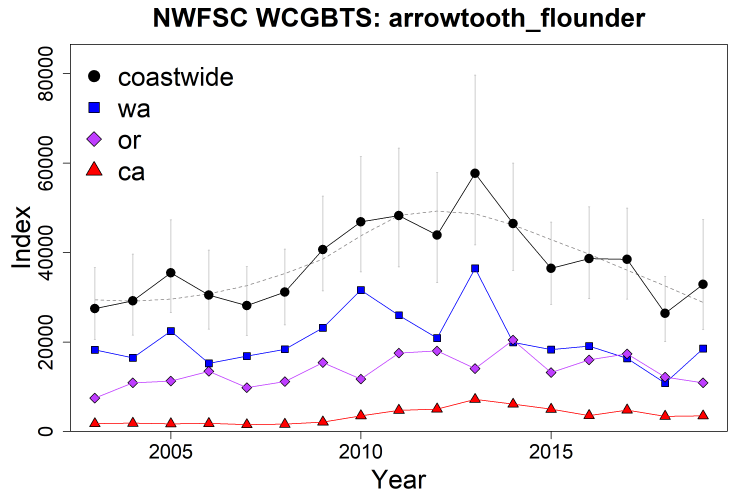

Figure 2: Index of abundance for arrowtooth flounder from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

4 Aurora rockfish

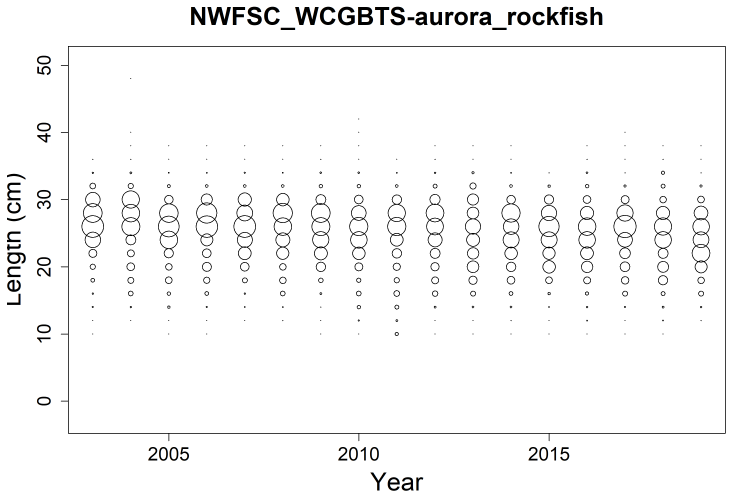

Figure 3: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

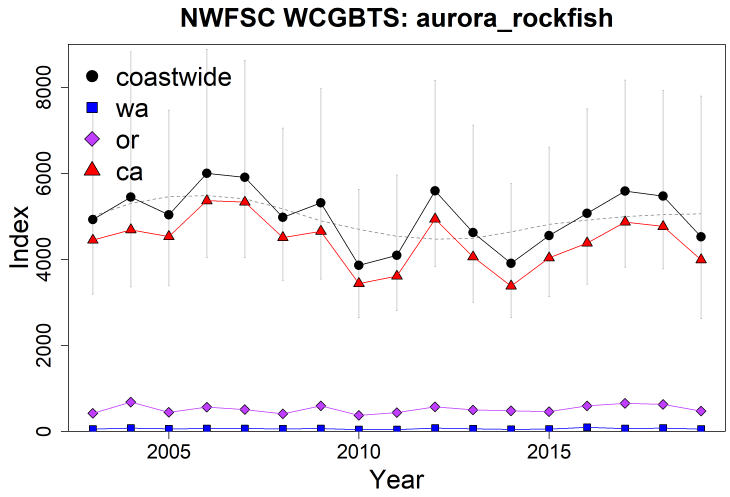

Figure 4: Index of abundance for aurora rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

5 Bank rockfish

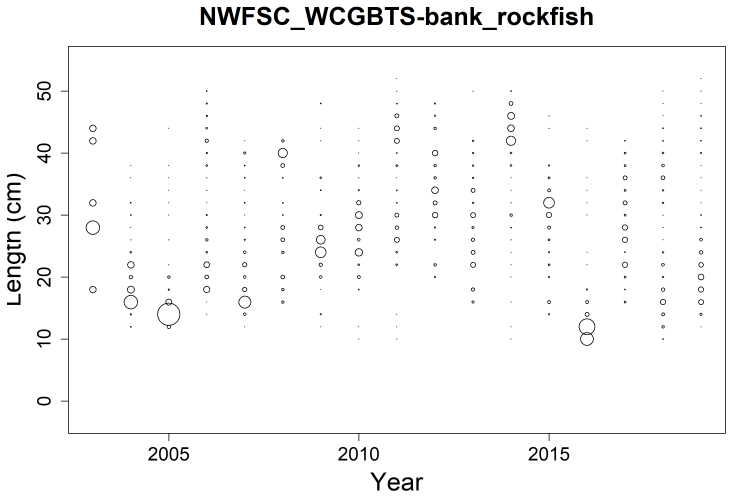

Figure 5: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

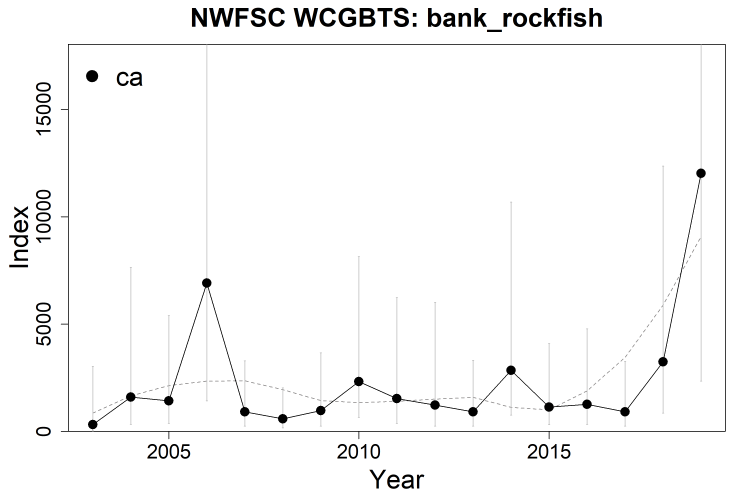

Figure 6: Index of abundance for bank rockfish from the NWFSC WCGBTS from 2003-2019. Observations for index calculation were only available in California waters. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

6 Big skate

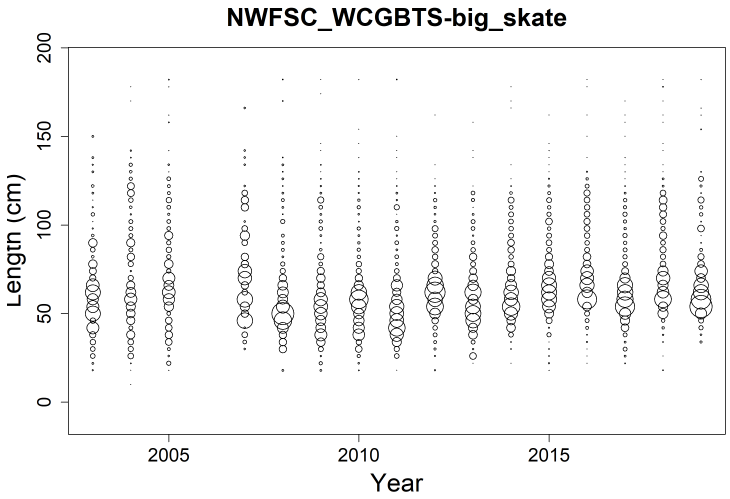

Figure 7: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

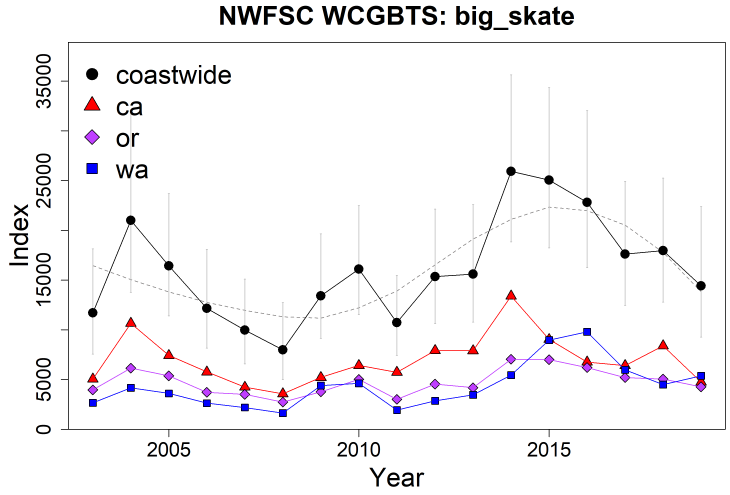

Figure 8: Index of abundance for big skate from the NWFSC WCGBTS from 2003-2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

7 Blackgill rockfish

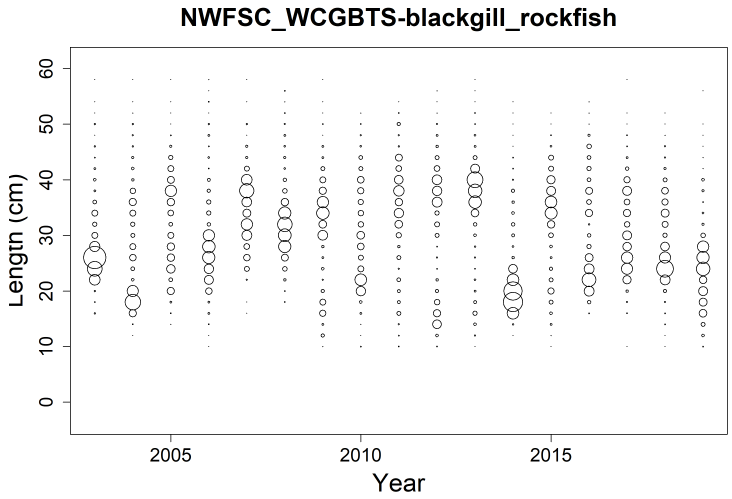

Figure 9: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

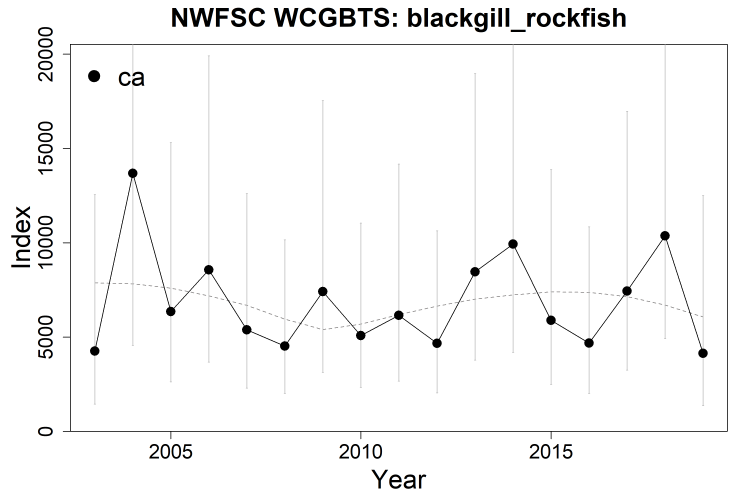

Figure 10: Index of abundance for blackgill rockfish from the NWFSC WCGBTS from 2003-2019. Observations for index calculation were only available in California waters. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

8 Bocaccio

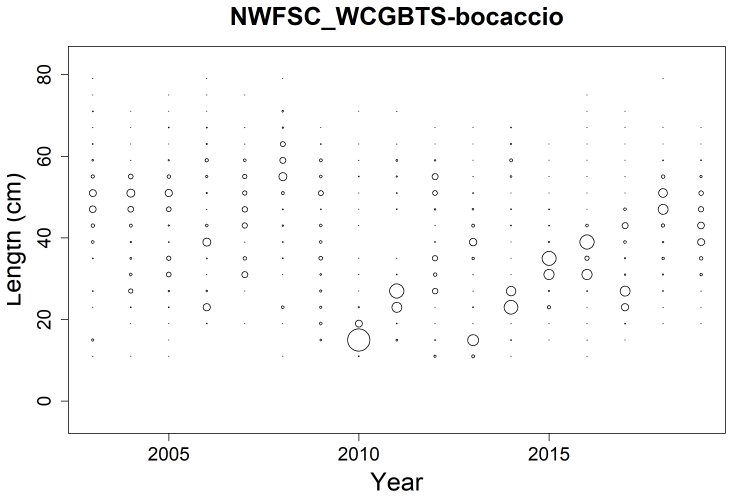

Figure 11: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

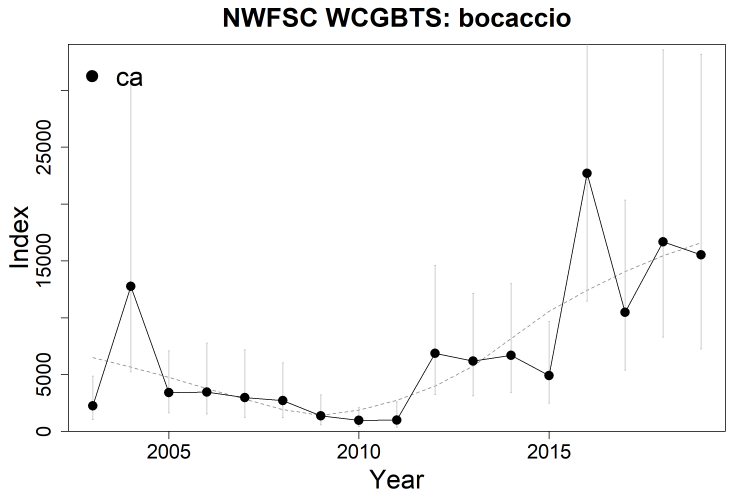

Figure 12: Index of abundance for bocaccio from the NWFSC WCGBTS from 2003-2019. Observations for index calculation were only available in California waters. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

9 Brown rockfish

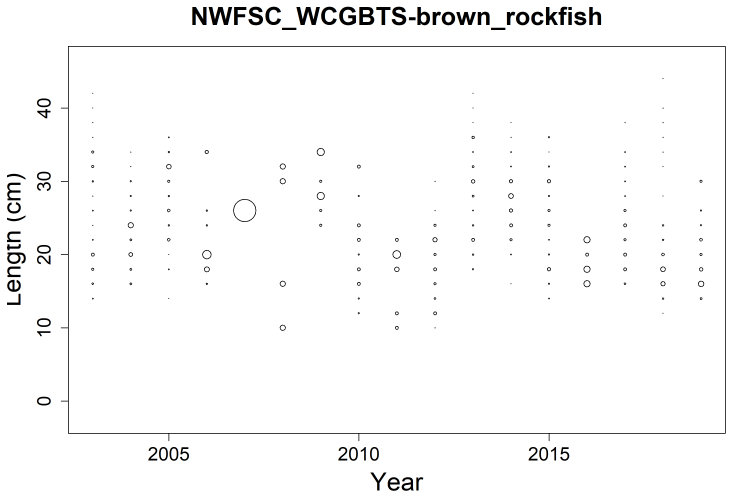

Figure 13: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

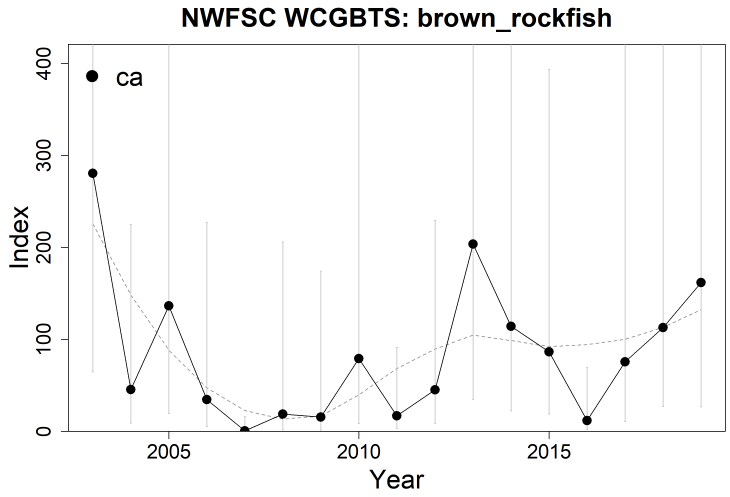

Figure 14: Index of abundance for brown rockfish from the NWFSC WCGBTS from 2003-2019. Observations for index calculation were only available in California waters, with high sample variation by year. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

10 Canary rockfish

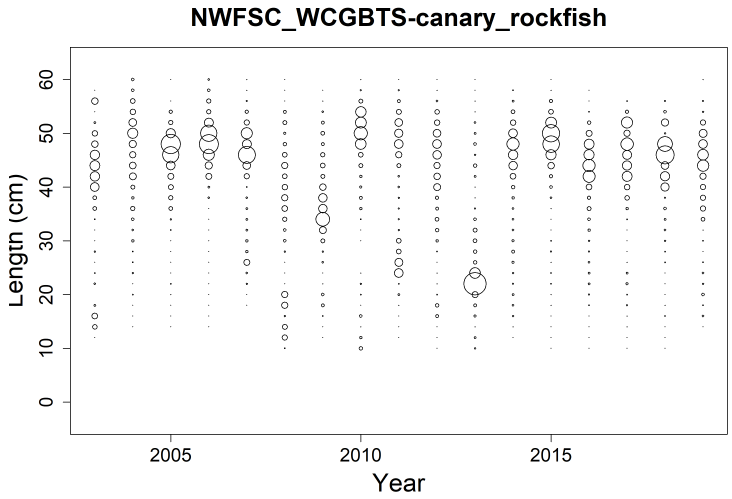

Figure 15: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

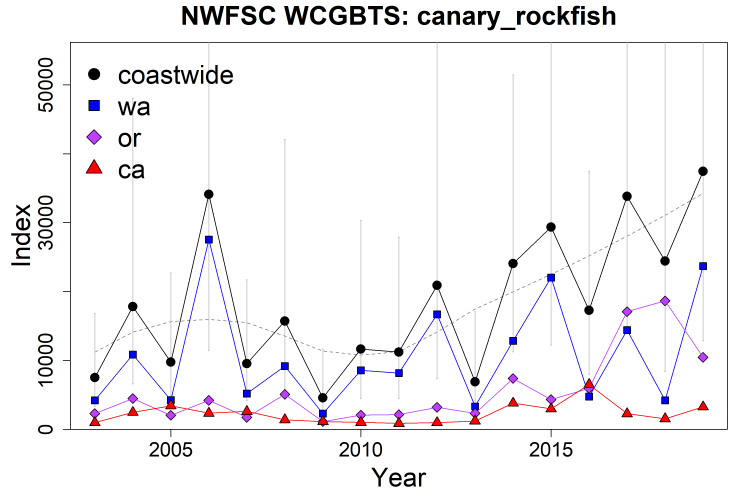

Figure 16: Index of abundance for canary rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

11 Chilipepper

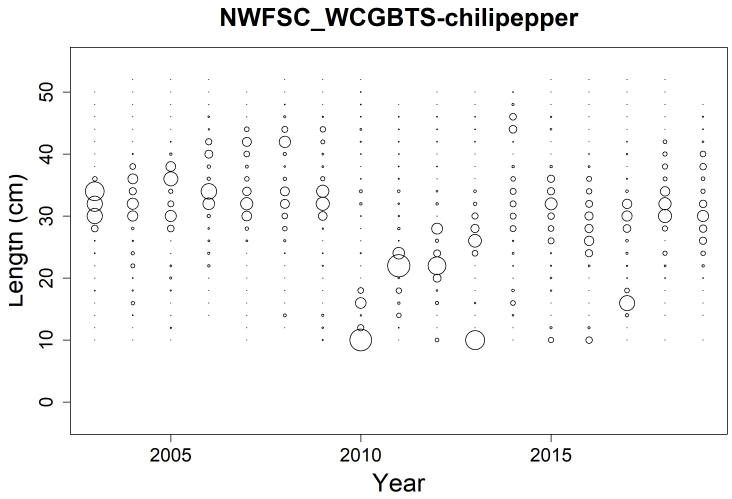

Figure 17: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

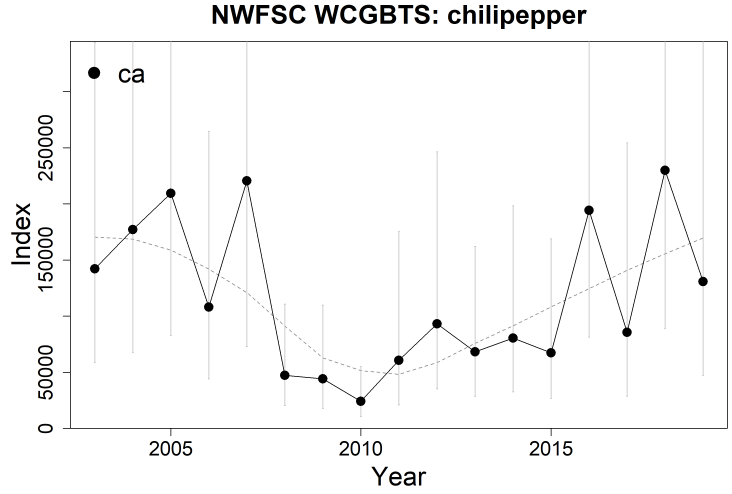

Figure 18: Index of abundance for chilipepper from the NWFSC WCGBTS from 2003-2019. Observations for index calculation were only available in California waters, with high sample variation by year. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

12 Copper rockfish

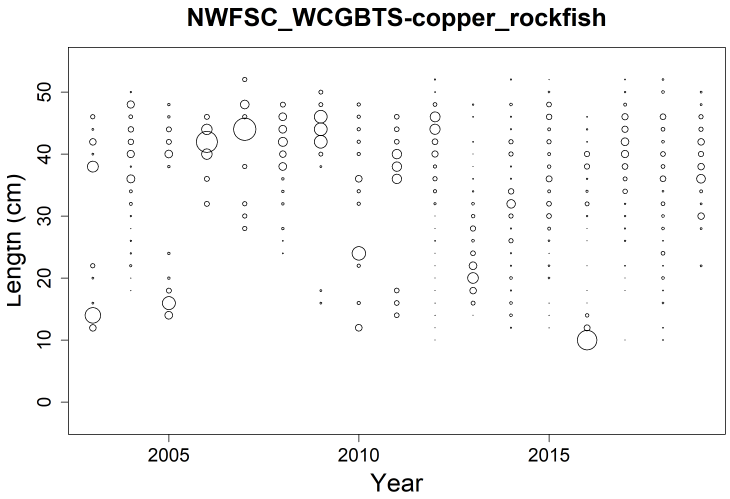

Figure 19: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

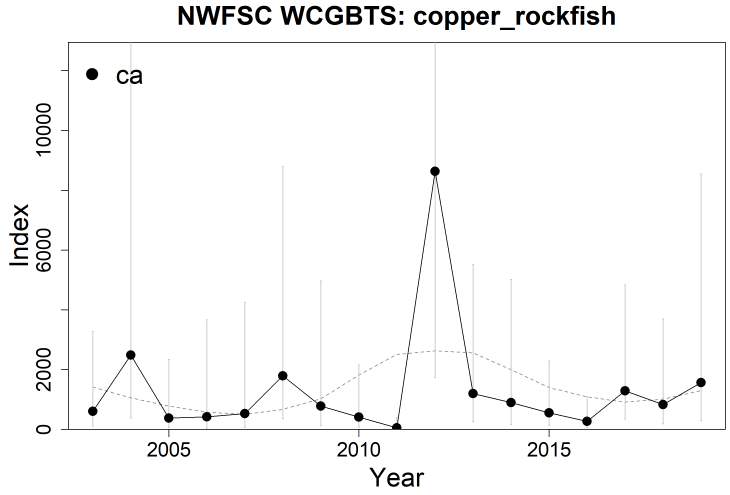

Figure 20: Index of abundance for copper rockfish from the NWFSC WCGBTS from 2003-2019. Observations for index calculation were only available in California waters, with high sample variation by year. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

13 Darkblotched rockfish

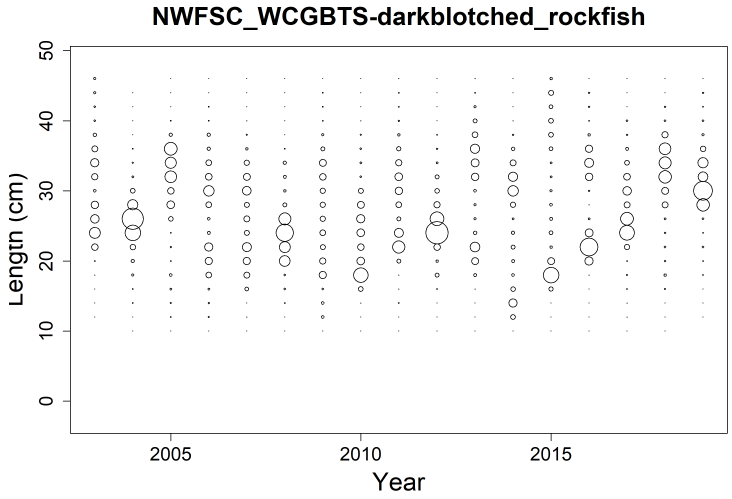

Figure 21: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

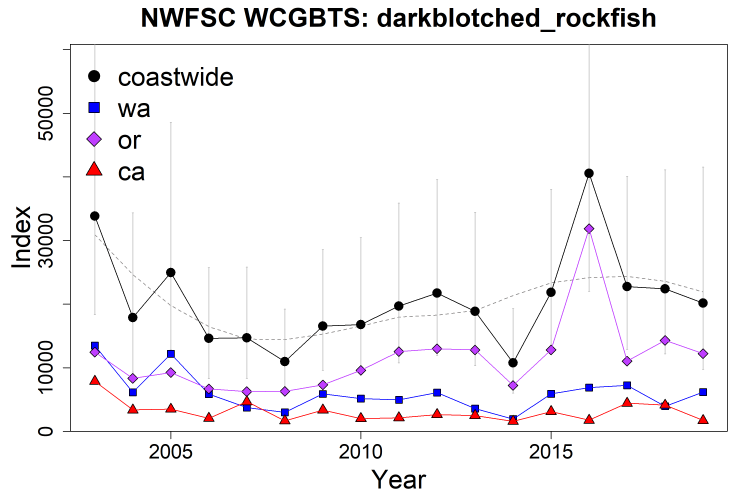

Figure 22: Index of abundance for darkblotched rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

14 Dover sole

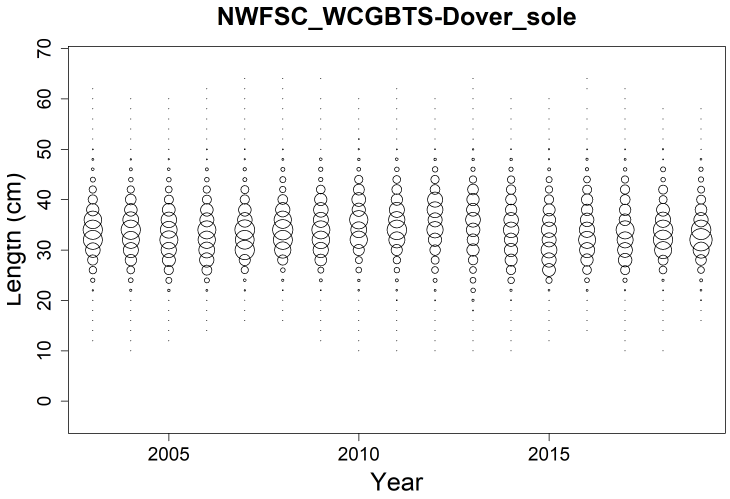

Figure 23: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

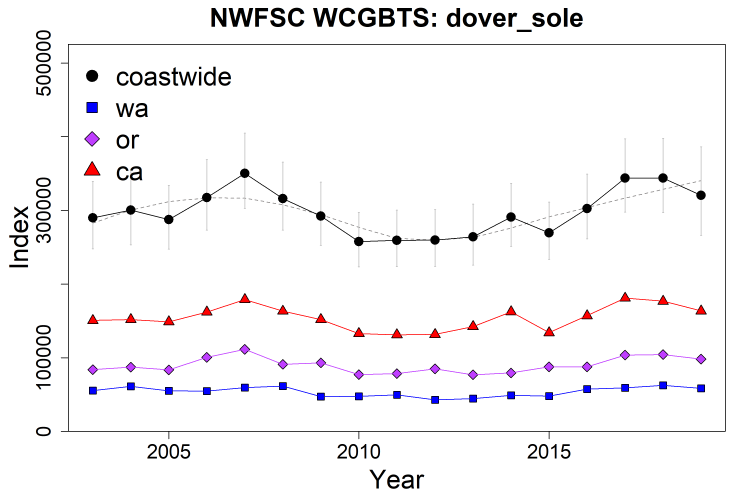

Figure 24: Index of abundance for Dover sole from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

15 English sole

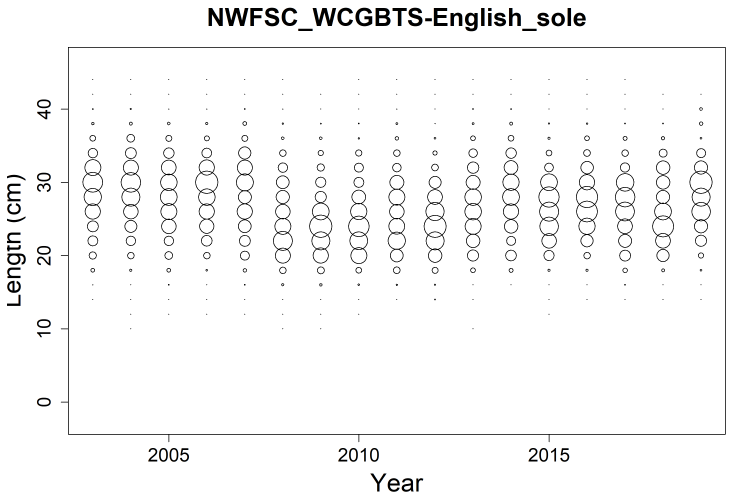

Figure 25: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

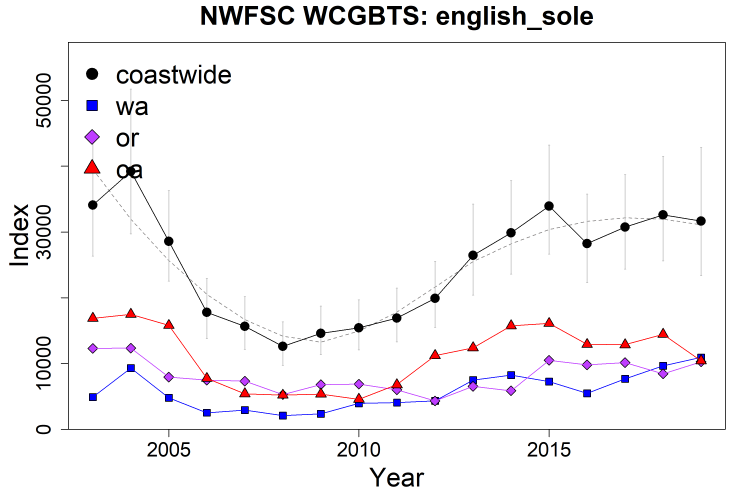

Figure 26: Index of abundance for English sole from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

16 Flathead sole

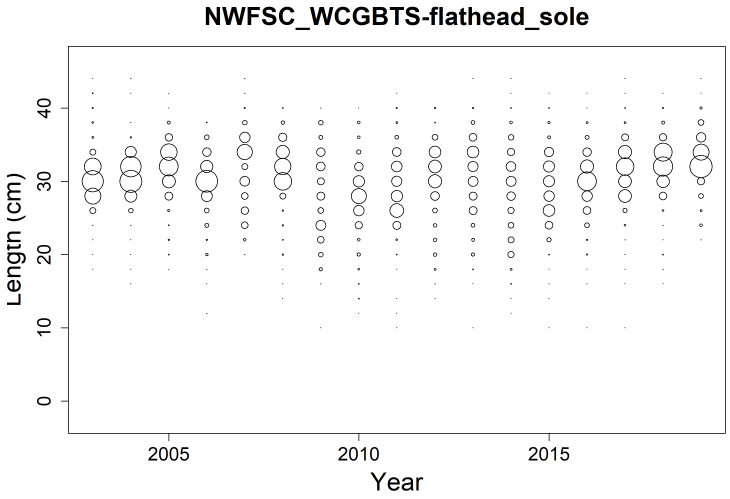

Figure 27: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

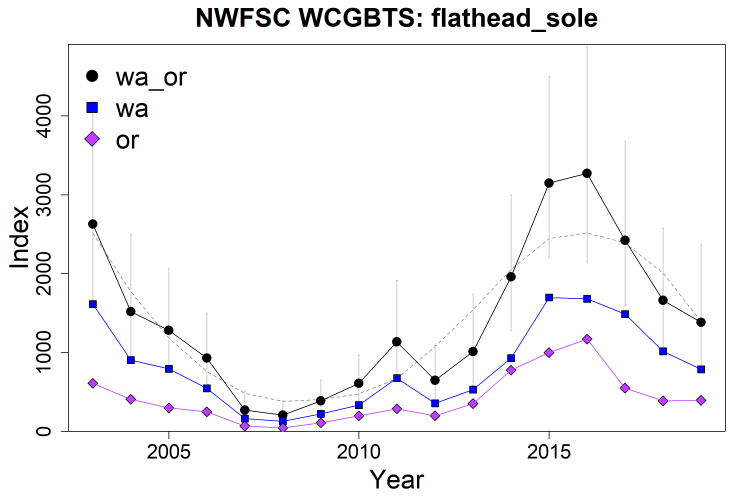

Figure 28: Index of abundance for flathead sole from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

17 Greenspotted rockfish

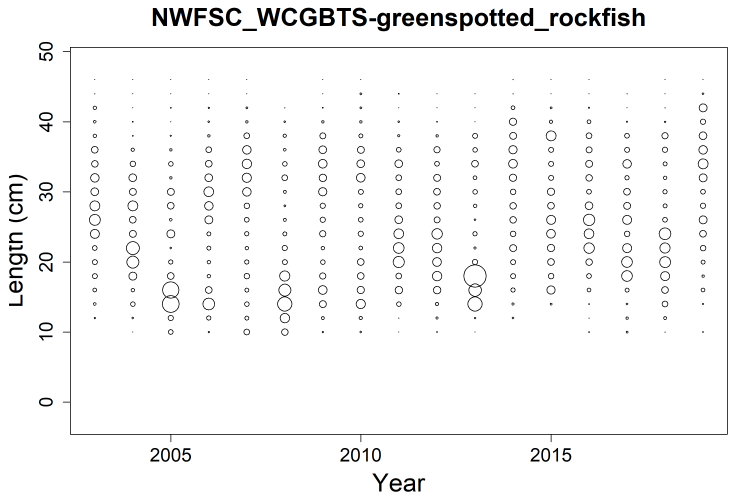

Figure 29: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

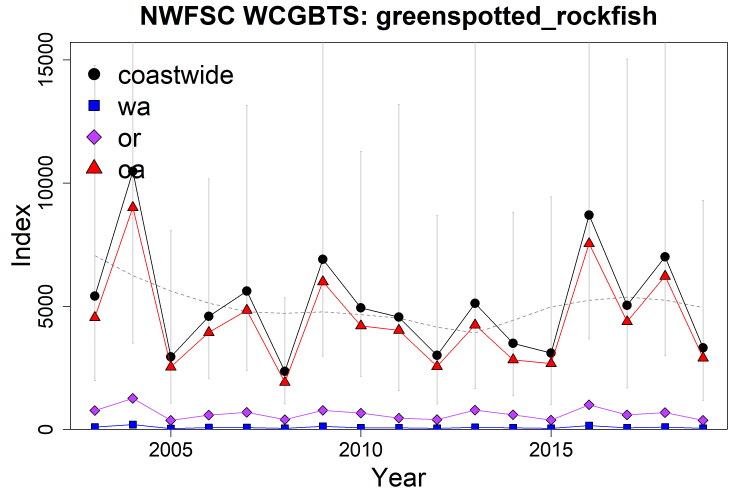

Figure 30: Index of abundance for greenspotted rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

18 Greenstriped rockfish

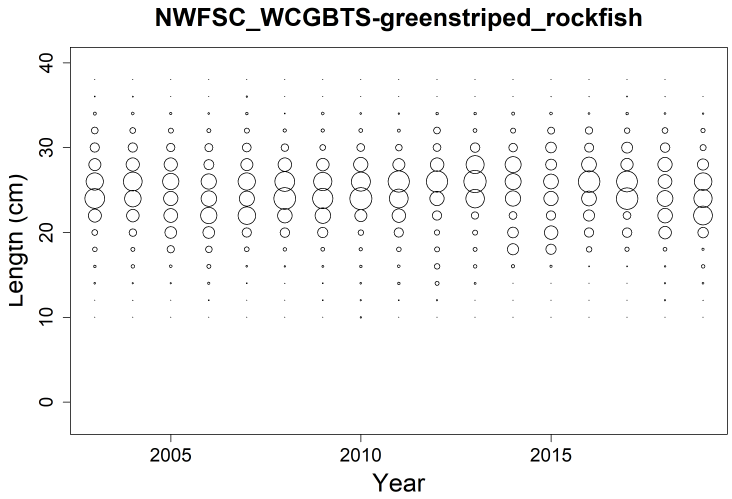

Figure 31: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

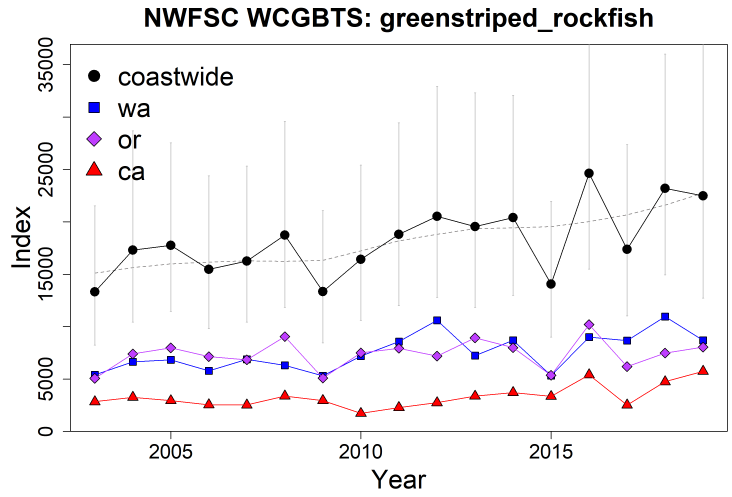

Figure 32: Index of abundance for greenstriped rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

19 Lingcod

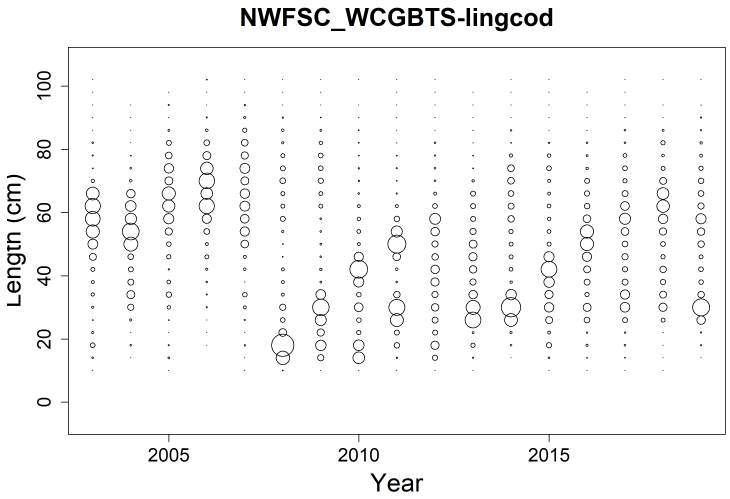

Figure 33: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

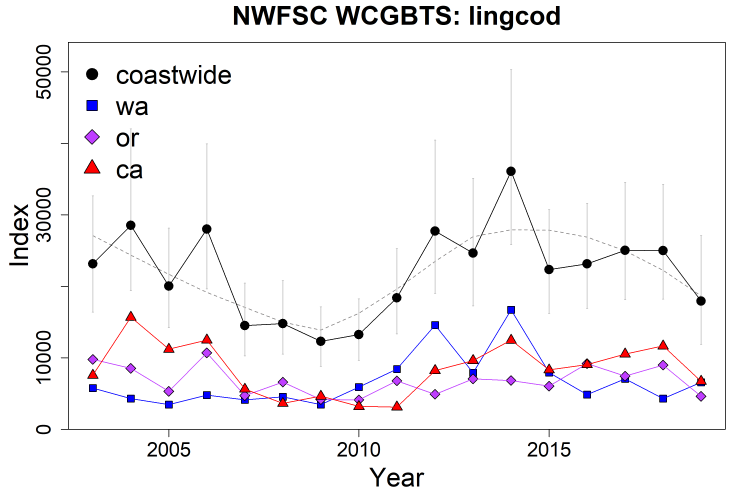

Figure 34: Index of abundance for lingcod from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

20 Longnose skate

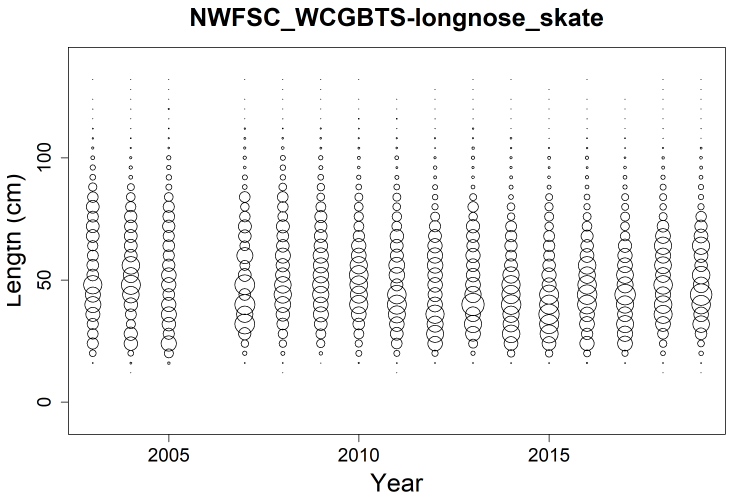

Figure 35: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

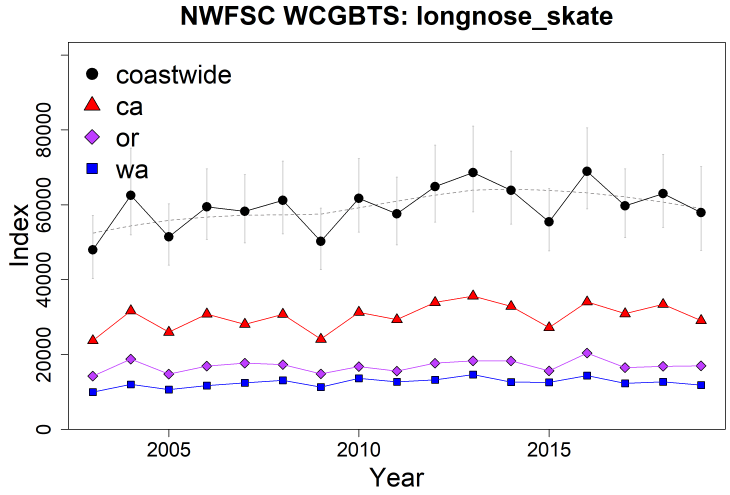

Figure 36: Index of abundance for longnose skate from the NWFSC WCGBTS from 2003-2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

21 Longspine thornyhead

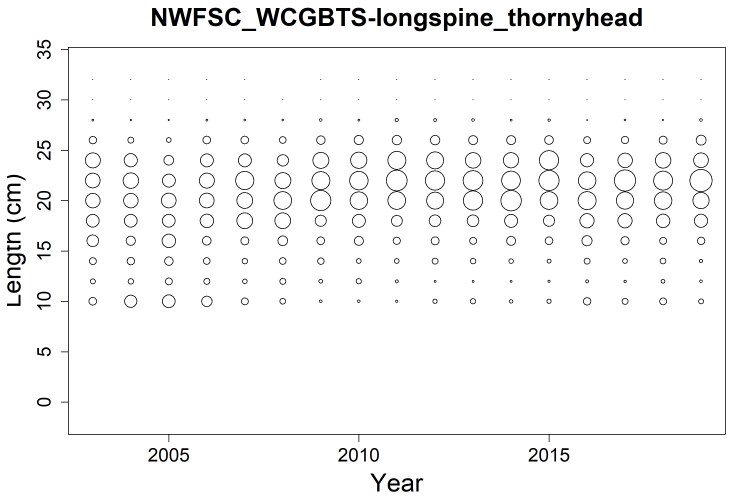

Figure 37: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

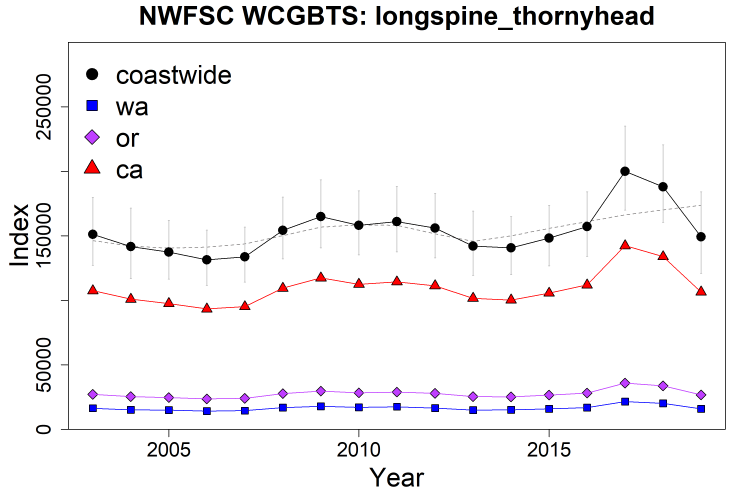

Figure 38: Index of abundance for longspine thornyhead from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

22 Pacific cod

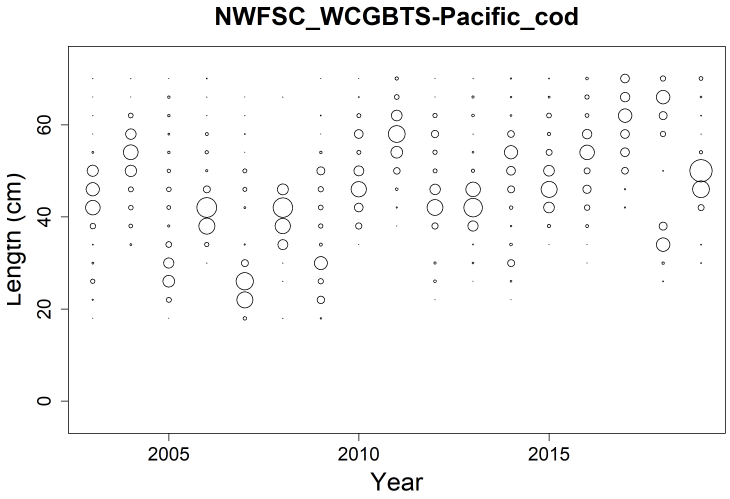

Figure 39: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

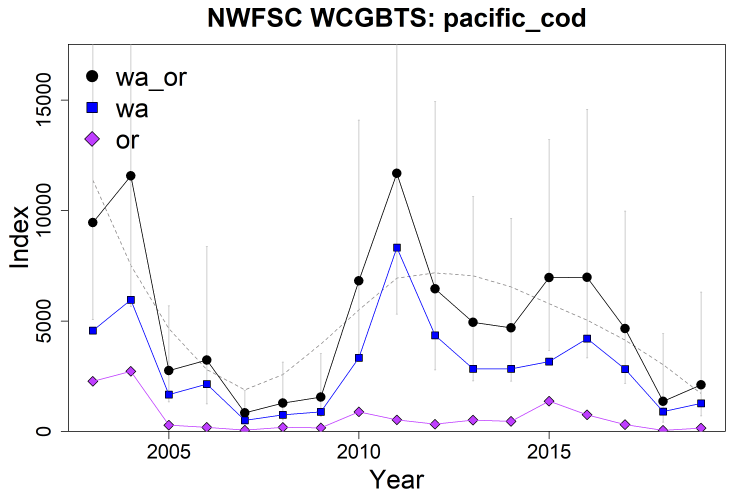

Figure 40: Index of abundance for Pacific cod from the NWFSC WCGBTS from 2003 - 2019. The index for Washington and Oregon combined (black line with circles) is highly variable across the time series. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds).

23 Pacific ocean perch

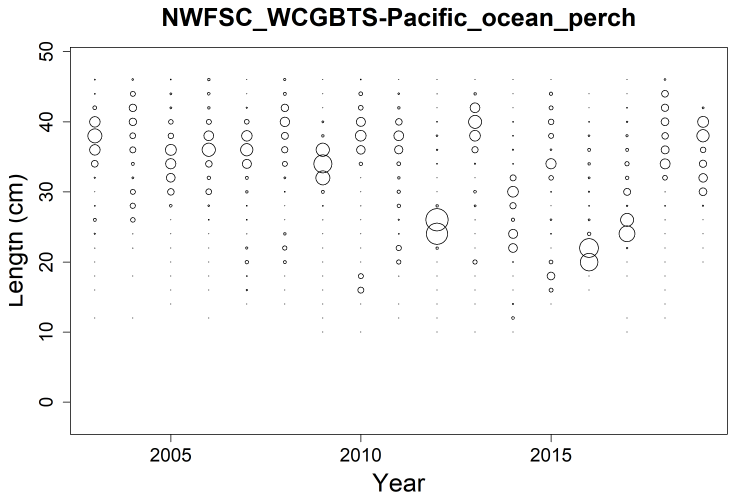

Figure 41: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

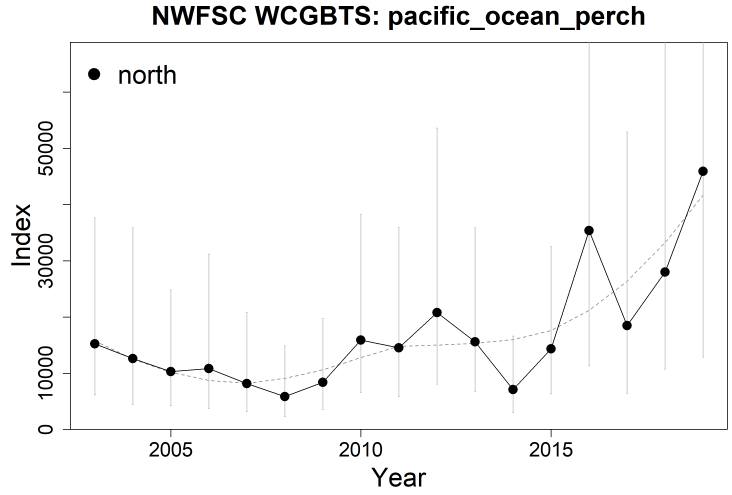

Figure 42: Index of abundance for Pacific ocean perch from the NWFSC WCGBTS from 2003 - 2019 (North of N. 40 degrees 10' lat.- black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line.

24 Pacific sanddab

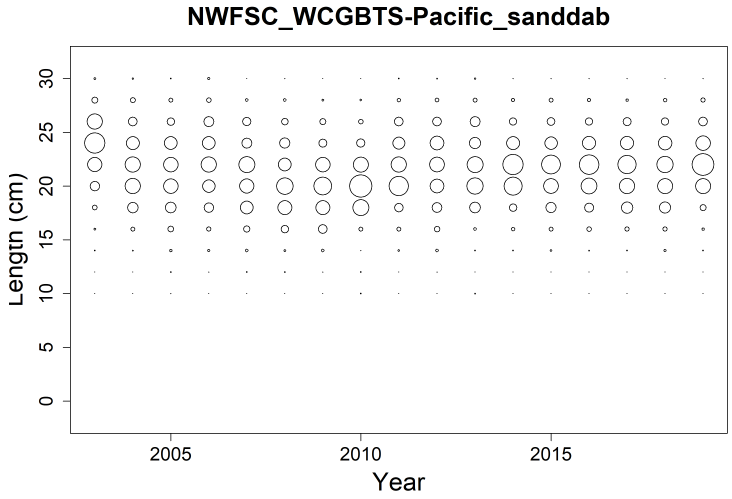

Figure 43: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

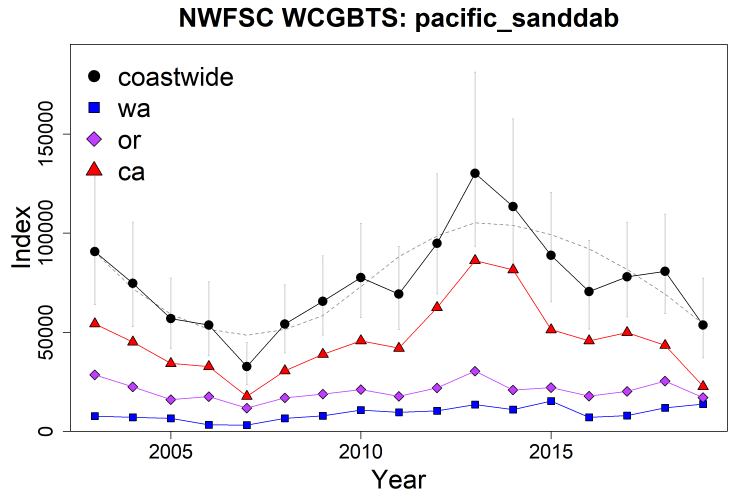

Figure 44: Index of abundance for Pacific sanddab from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

25 Pacific spiny dogfish

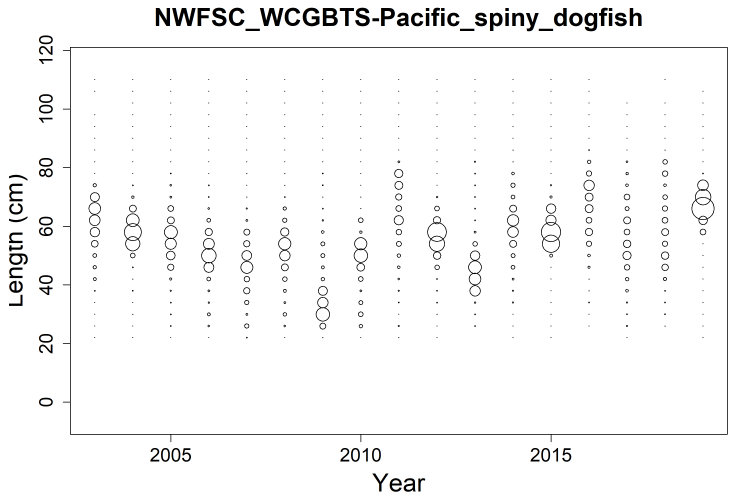

Figure 45: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

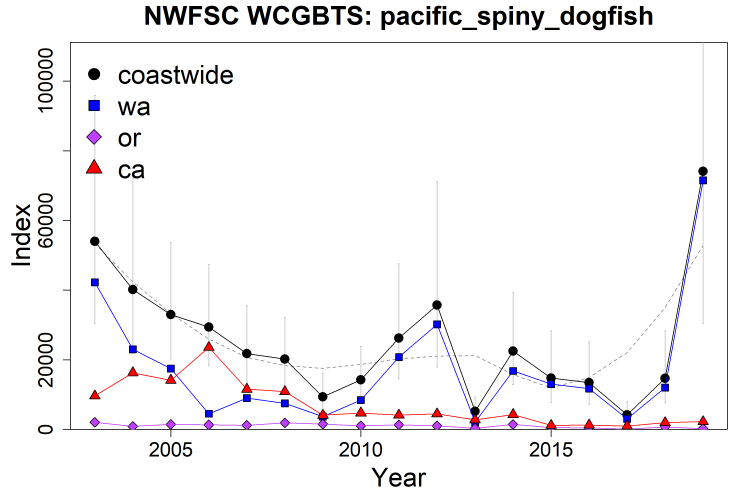

Figure 46: Index of abundance for Pacific spiny dogfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

26 Petrale sole

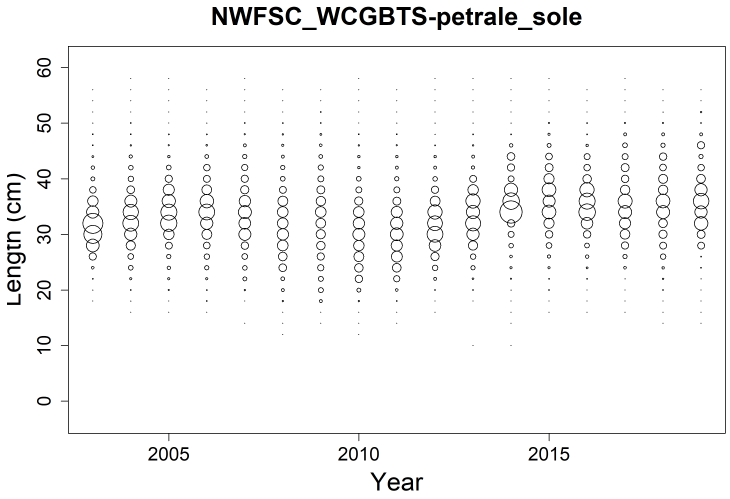

Figure 47: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

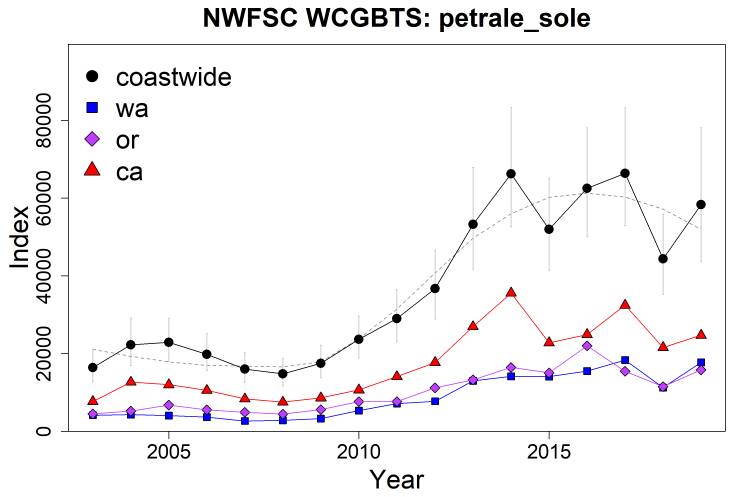

Figure 48: Index of abundance for petrale sole from the NWFSC WCGBTS from 2003-2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

27 Redbanded rockfish

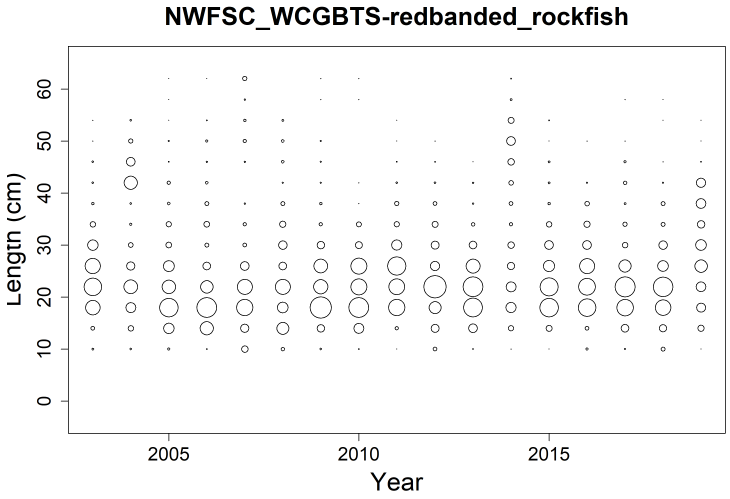

Figure 49: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

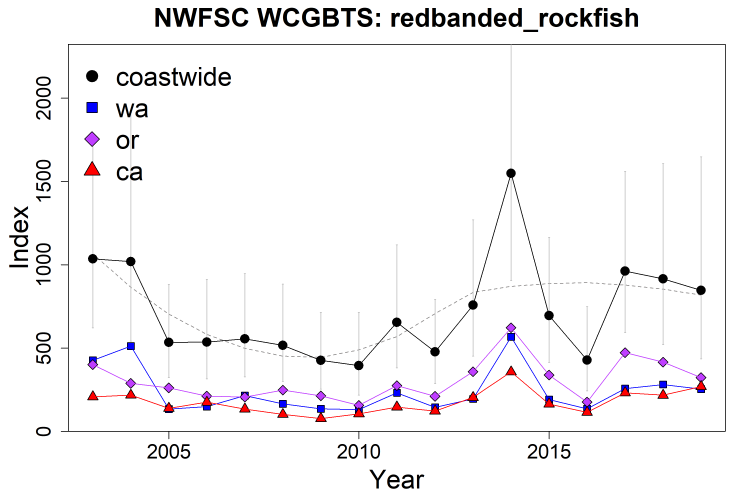

Figure 50: Index of abundance for redbanded rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

28 Rex sole

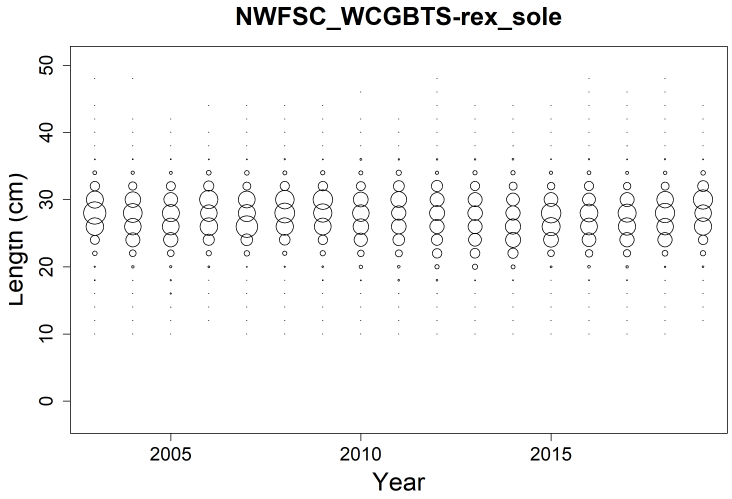

Figure 51: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

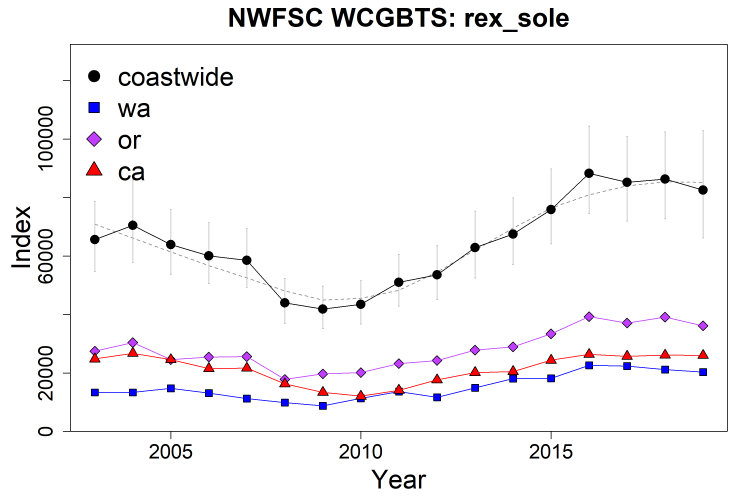

Figure 52: Index of abundance for rex sole from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

29 Rougheye and blackspotted rockfish

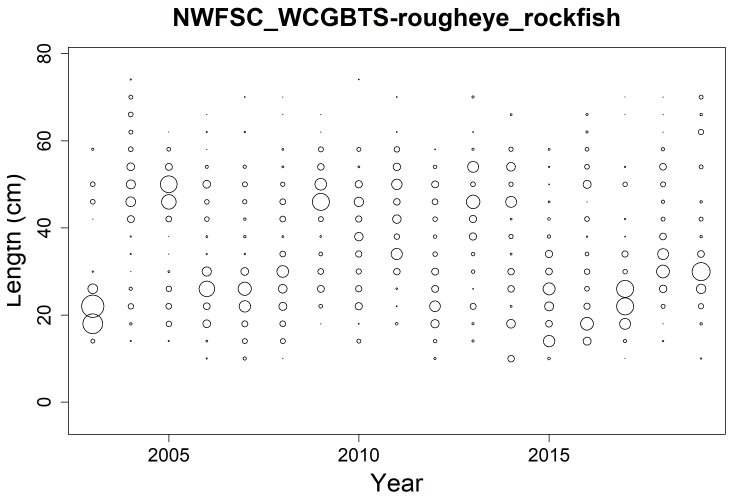

Figure 53: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

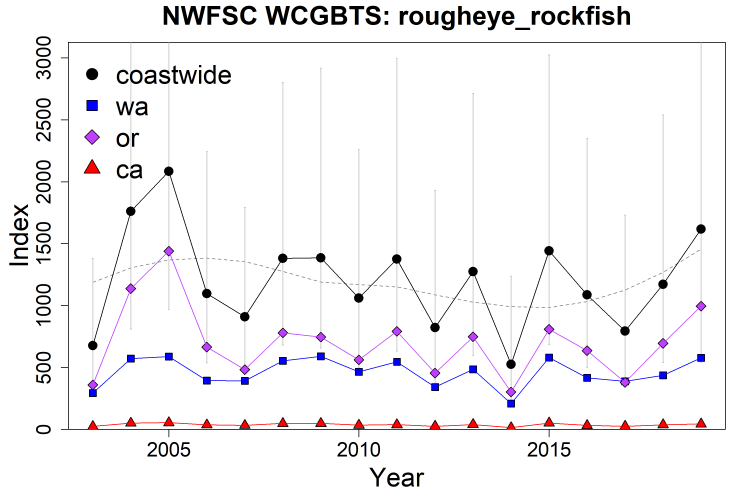

Figure 54: Index of abundance for rougheye and blackspotted rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

30 Sablefish

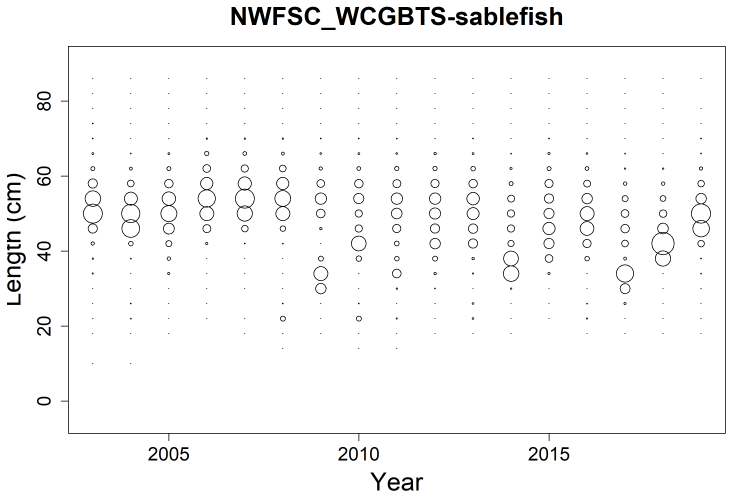

Figure 55: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

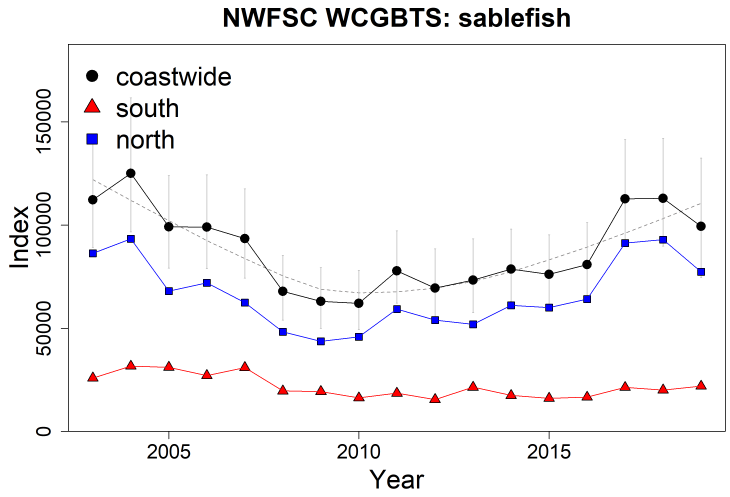

Figure 56: Index of abundance for sablefish from the NWFSC WCGBTS from 2003-2019 (coastwide - black line with circles). A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by areas are shown across the time series (North of N. 36 degrees lat. - blue squares, South of N. 36 degrees - red triangles).

31 Sharpchin rockfish

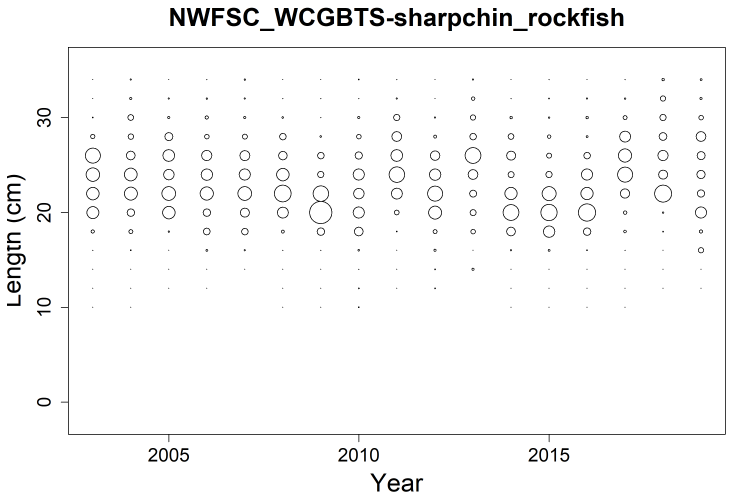

Figure 57: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

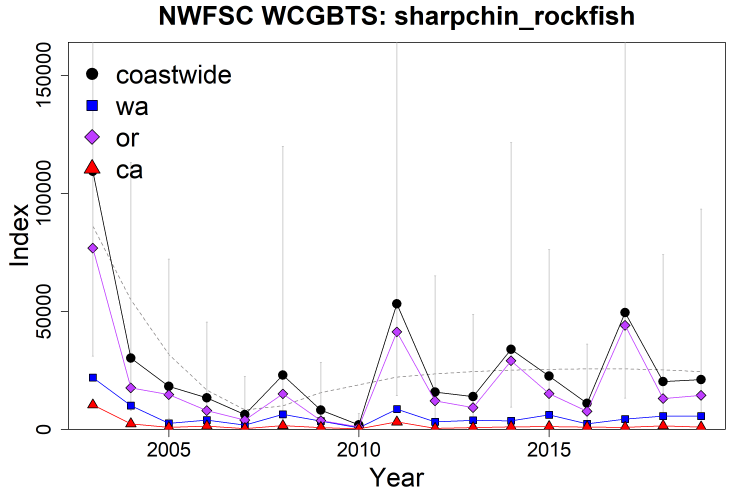

Figure 58: Index of abundance for sharpchin rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

32 Shortspine thornyhead

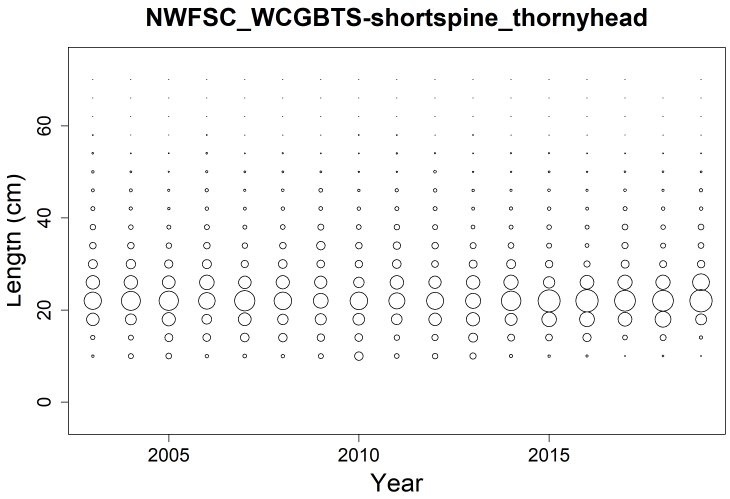

Figure 59: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

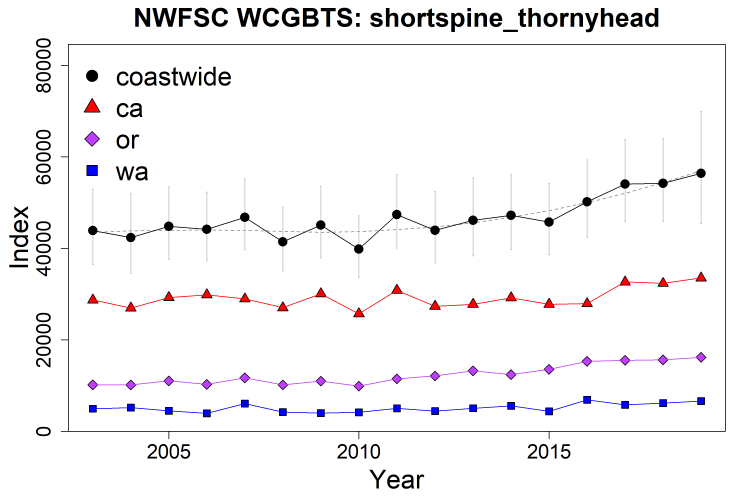

Figure 60: Index of abundance for shortspine thornyhead from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

33 Splitnose rockfish

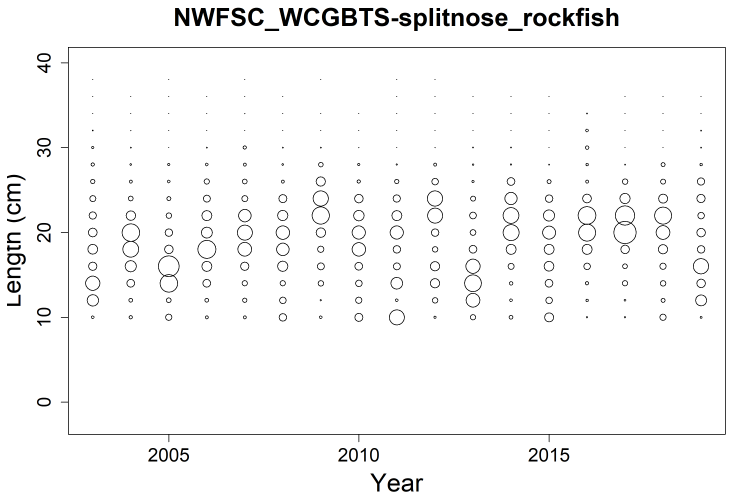

Figure 61: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

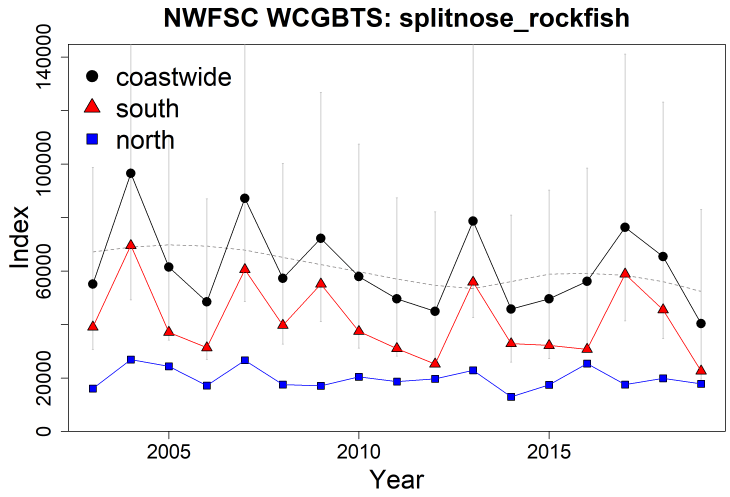

Figure 62: Index of abundance for splitnose rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by area are shown across the time series (North of N. 40 degrees 10' lat. - blue squares, South of N. 40 degrees 10' lat. - red squares).

34 Widow rockfish

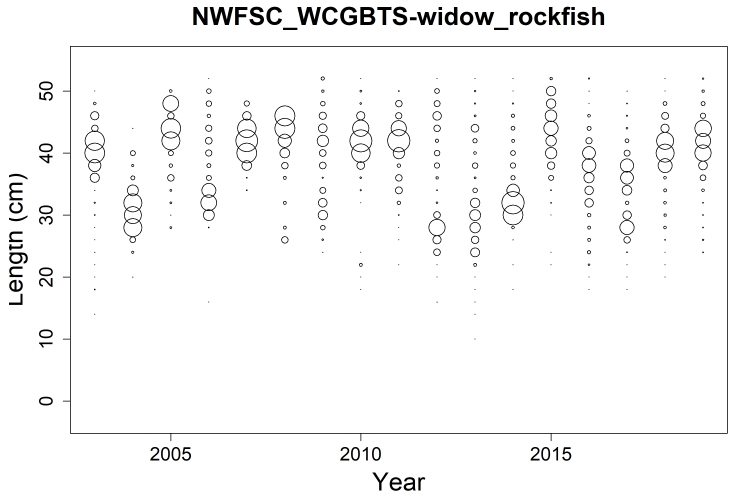

Figure 63: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

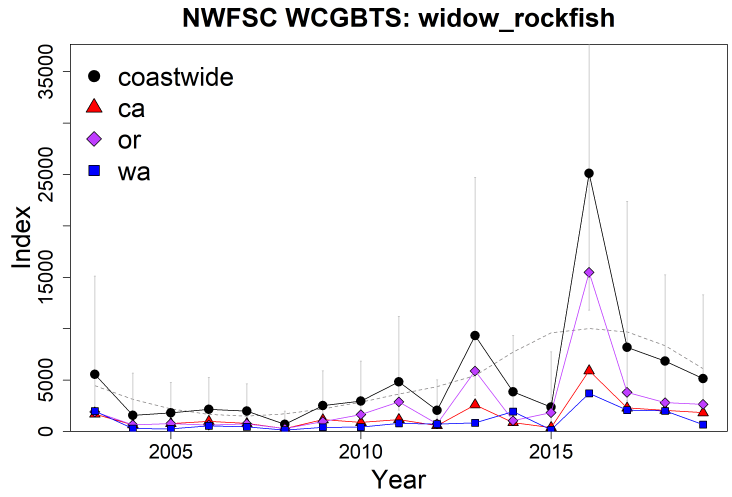

Figure 64: Index of abundance for widow rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

35 Yellowtail rockfish

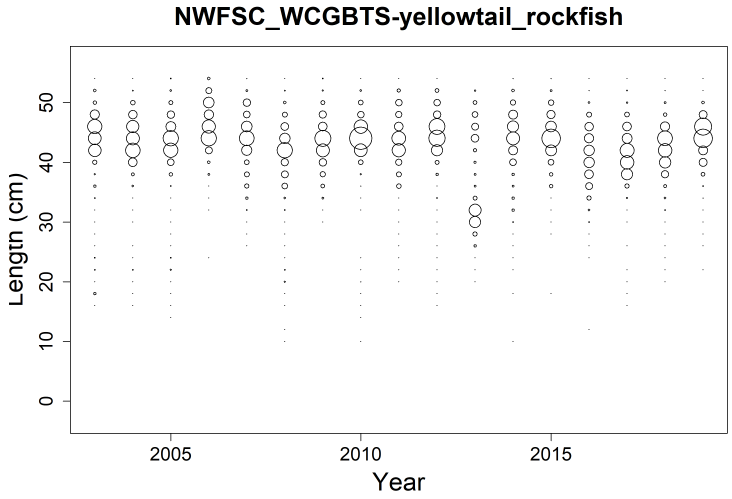

Figure 65: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

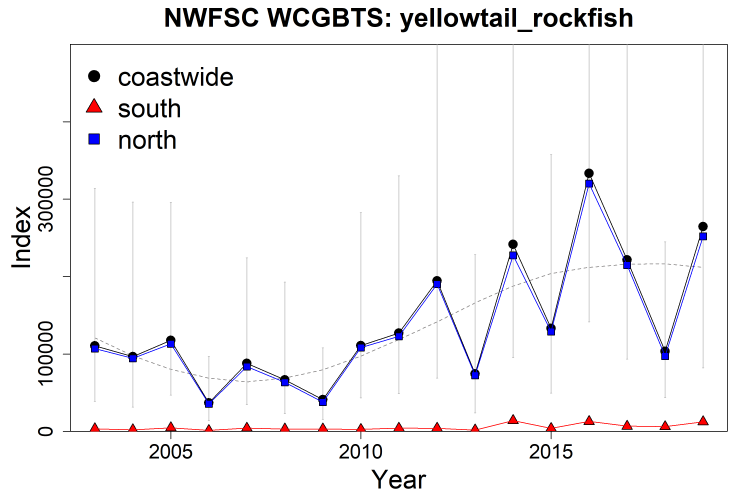

Figure 66: Index of abundance for yellowtail rockfish from the NWFSC WCGBTS from 2003 - 2019 (coastwide - black line with circles). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by areas are shown across the time series (North of N. 40 degrees 10' lat. - blue squares, South of N. 40 degrees 10' lat. - purple diamonds).