Summary of the NWFSC West Coast Groundfish Bottom Trawl Survey data for select species from 2003-2019

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February 2020

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1 Introduction

A brief summary of the NWFSC West Coast Groundfish Bottom Trawl Survey (WCGBTS) is presented here for data available from 2003 - 2018. 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. Species that were assessed in 2019 were omitted from analysis here since the data available since the 2019 assessment season have not changed (e.g., the 2019 survey data are not currently available).

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.

2 Arrowtooth flounder

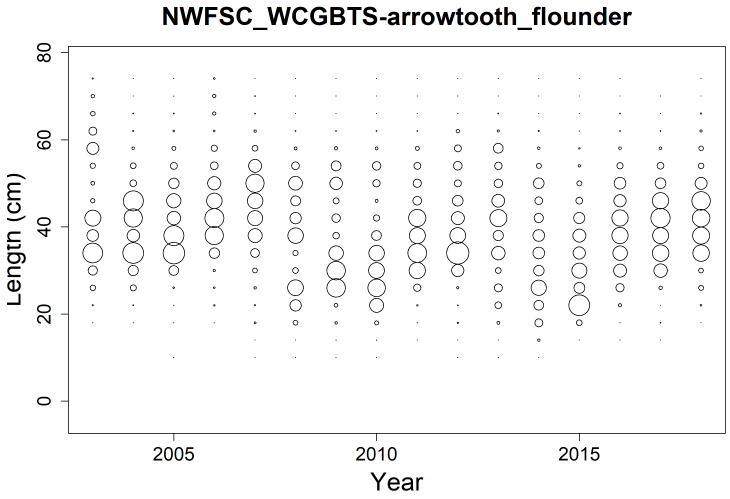

Figure 1: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

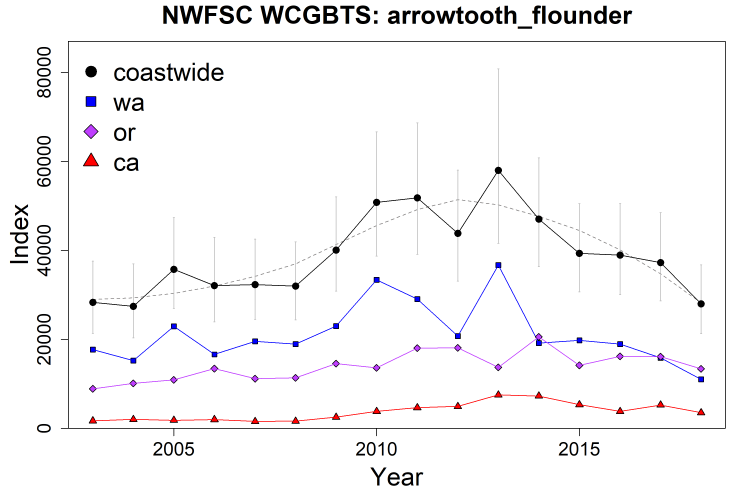

Figure 2: Index of abundance for arrowtooth flounder from the NWFSC WCGBTS from 2003 - 2018. Coastwide index (black line with circles) shows an increasing trend in the relative index, from 2003, peaking in 2013, and declining in recent years. A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

3 Aurora rockfish

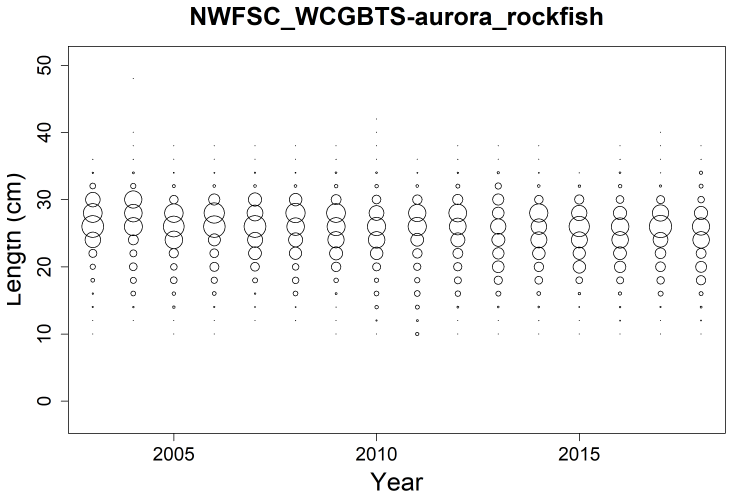

Figure 3: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

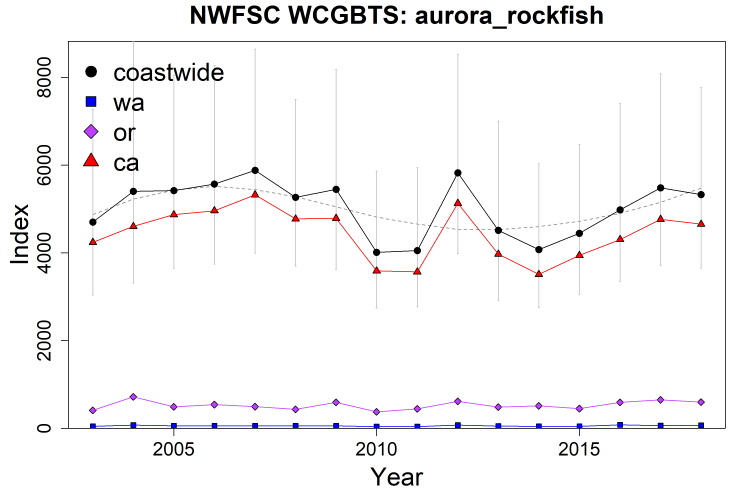

Figure 4: Index of abundance for aurora rockfish from the NWFSC WCGBTS from 2003 - 2018. Coastwide index (black line with circles) shows an increasing trend in the relative index, from 2003 - 2007, declining from 2008 - 2011, a spike in 2012, and a decrease in 2013 with increase to 2018. A loess smoother 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 Bank rockfish

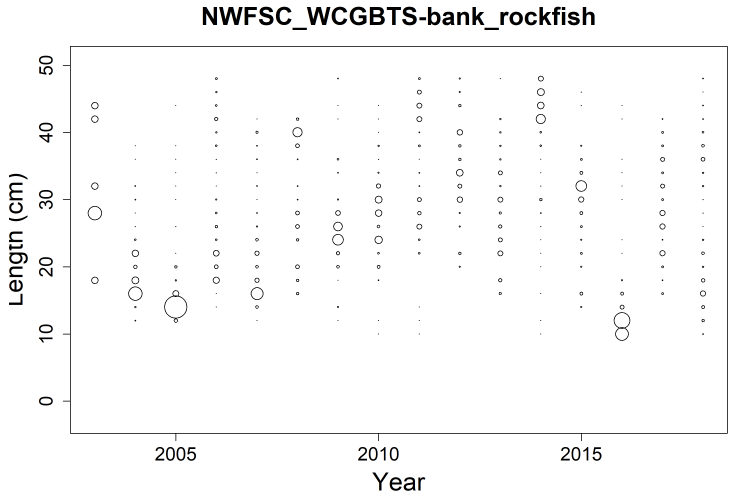

Figure 5: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

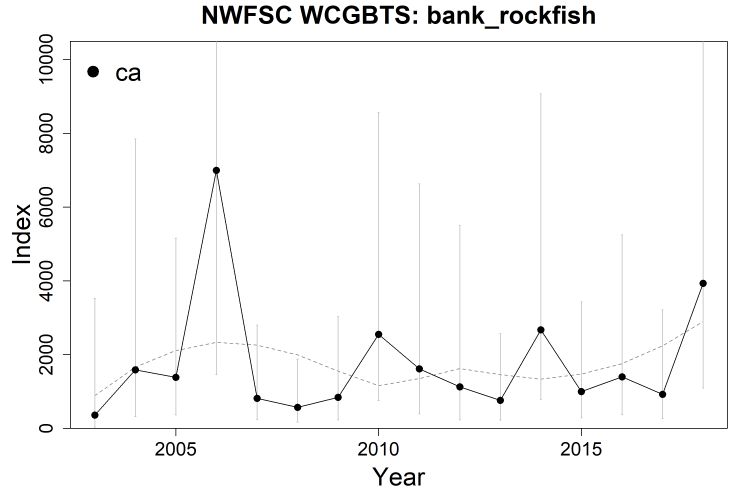

Figure 6: Index of abundance for bank rockfish from the NWFSC WCGBTS from 2003-2018. Observations for index calculation were only available in California waters. The index is highly variable from year to year, likely due to sampling variance, resulting in an relatively flat index over the time series. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

5 Blackgill rockfish

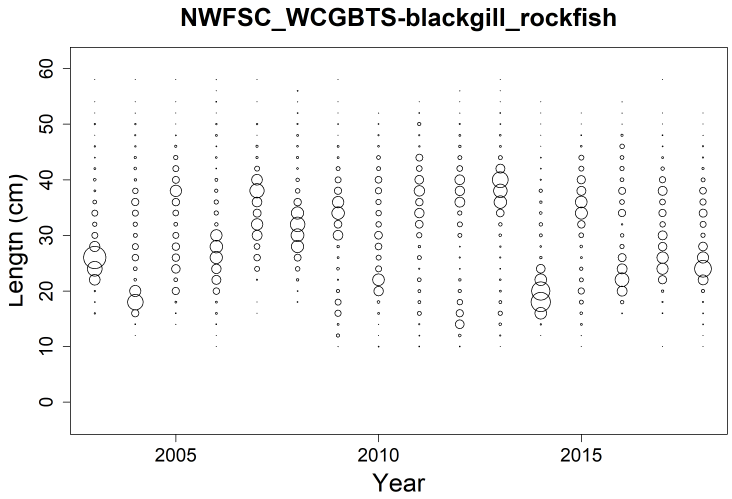

Figure 7: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

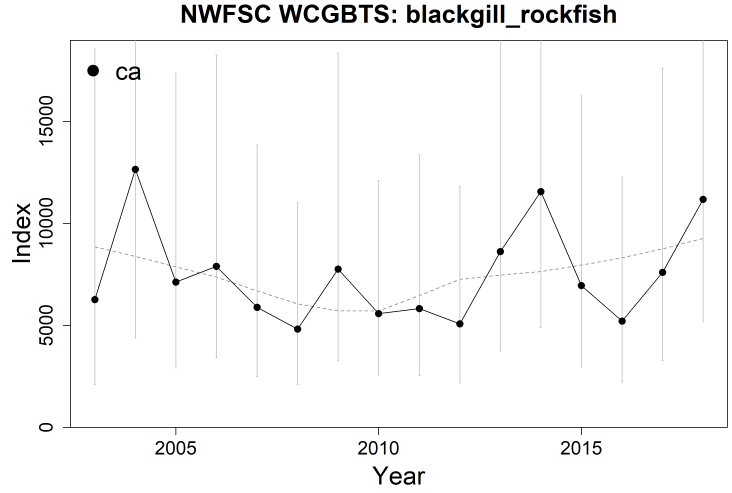

Figure 8: Index of abundance for blackgill rockfish from the NWFSC WCGBTS from 2003-2018. Observations for index calculation were only available in California waters. The index is highly variable from year to year, likely due to sampling variance. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

6 Bocaccio

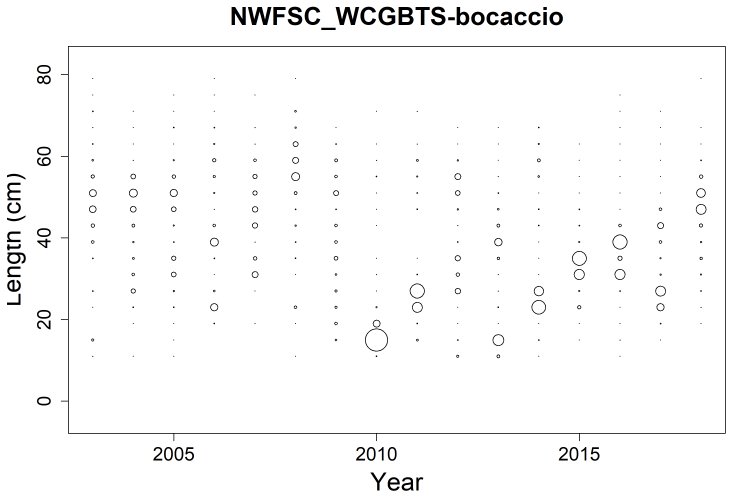

Figure 9: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

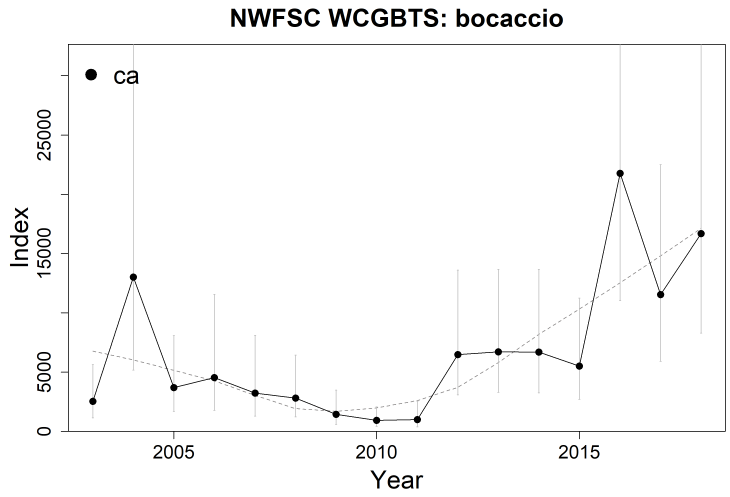

Figure 10: Index of abundance for bocaccio from the NWFSC WCGBTS from 2003-2018. Observations for index calculation were only available in California waters. The index generally declines from 2003 - 2011 and increases from 2012 - 2018. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

7 Brown rockfish

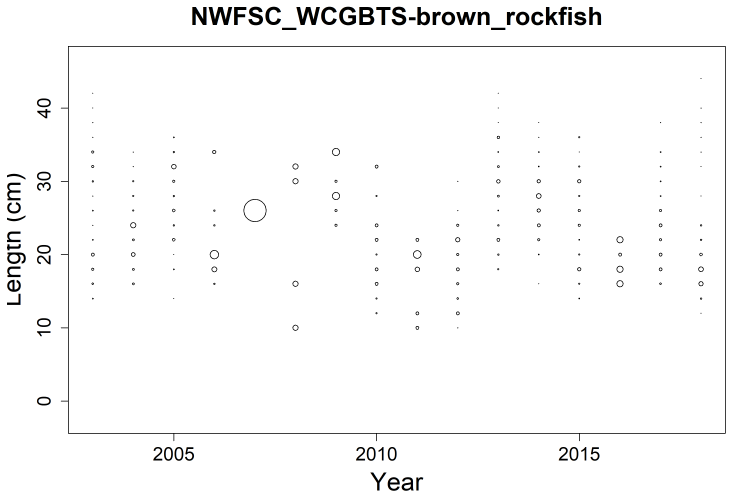

Figure 11: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

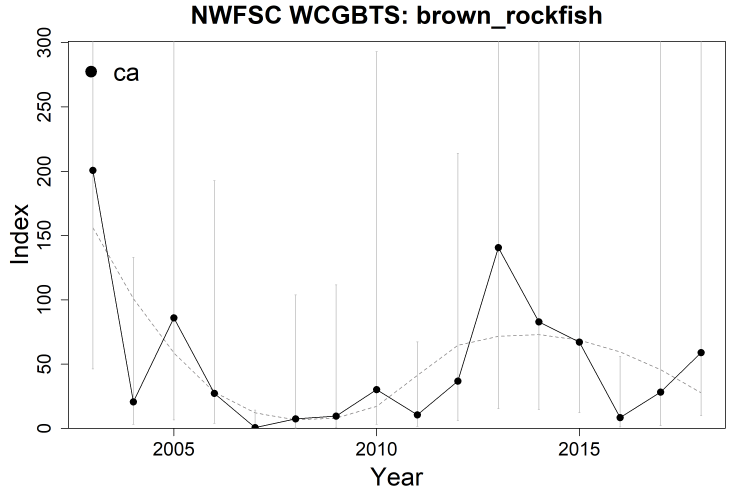

Figure 12: Index of abundance for brown rockfish from the NWFSC WCGBTS from 2003-2018. Observations for index calculation were only available in California waters, with high sample variation by year. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

8 Canary rockfish

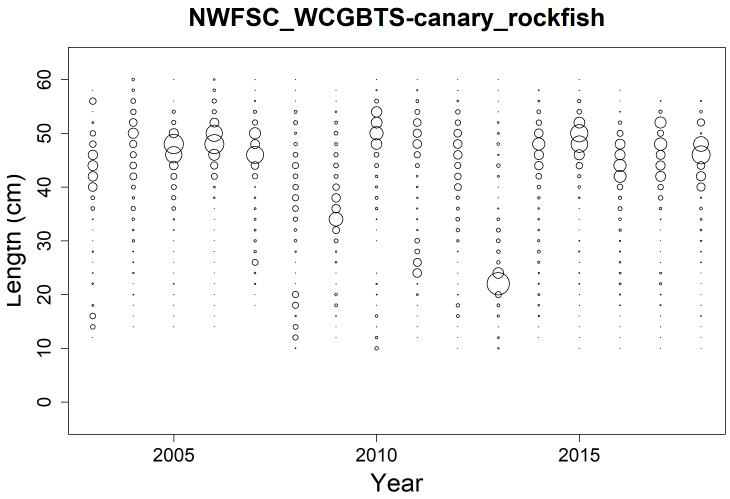

Figure 13: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

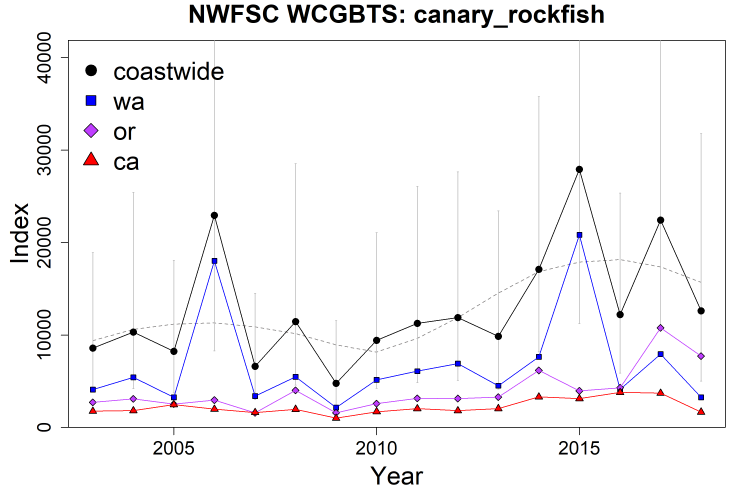

Figure 14: Index of abundance for canary rockfish from the NWFSC WCGBTS from 2003 - 2018. Coastwide index (black line with circles) shows an increasing trend in the relative index, from 2003, peaking in 2015, with variable but minimal declines in recent years. A loess smoother line was fit to the data 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).

9 Chilipepper

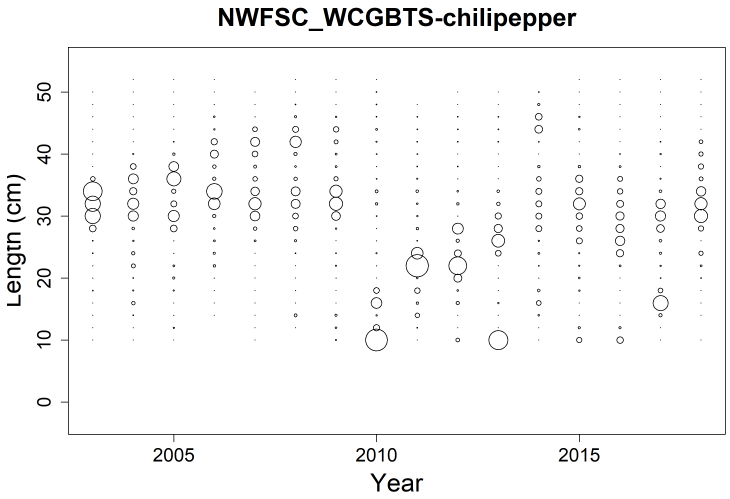

Figure 15: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

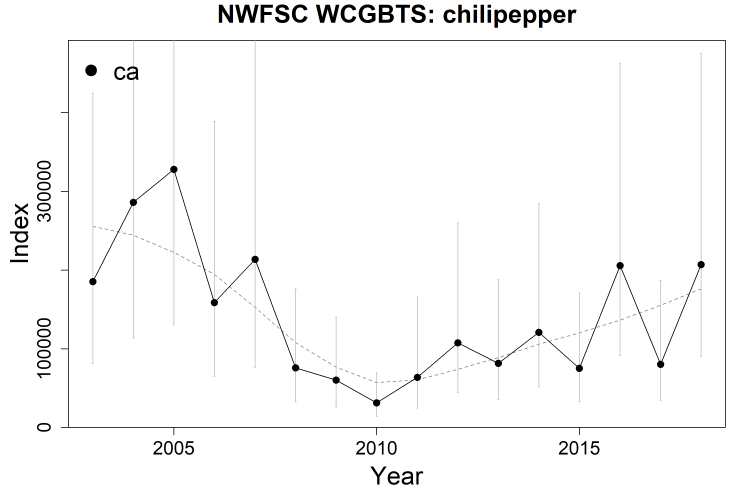

Figure 16: Index of abundance for chilipepper from the NWFSC WCGBTS from 2003-2018. Observations for index calculation were only available in California waters, with high sample variation by year. The index has a declining trend, but variable, from 2003 - 2010 and an increasing trend from 2011 -2018. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

10 Copper rockfish

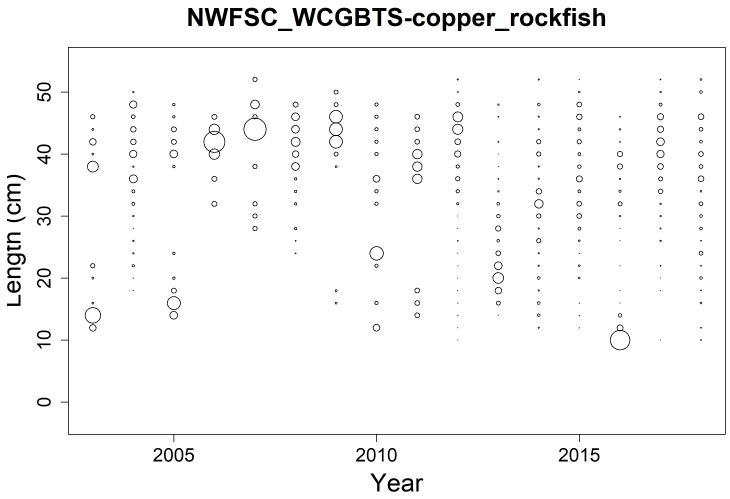

Figure 17: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

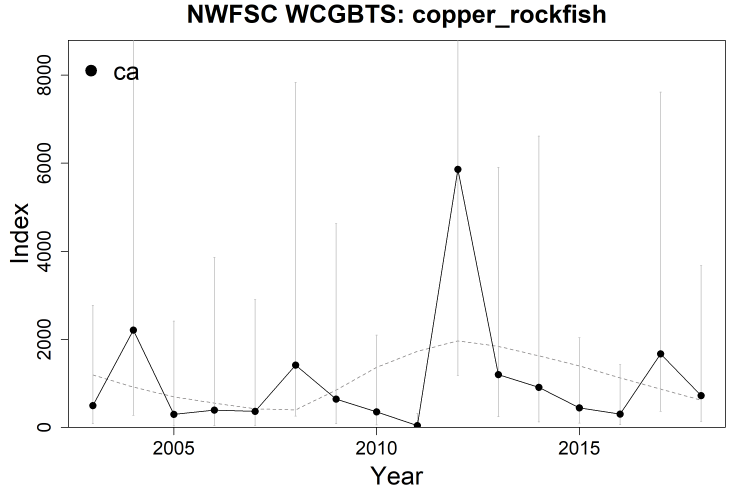

Figure 18: Index of abundance for copper rockfish from the NWFSC WCGBTS from 2003-2018. Observations for index calculation were only available in California waters, with high sample variation by year. A loess smoother line was fit to the data series and is denoted by the grey dashed line.

11 Darkblotched rockfish

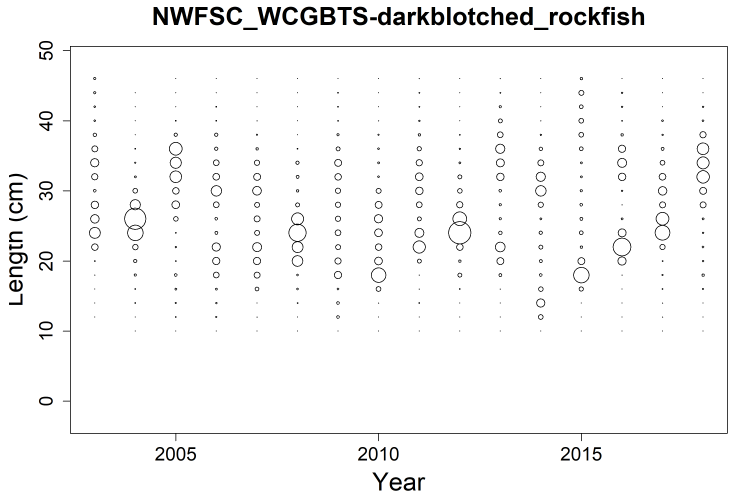

Figure 19: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

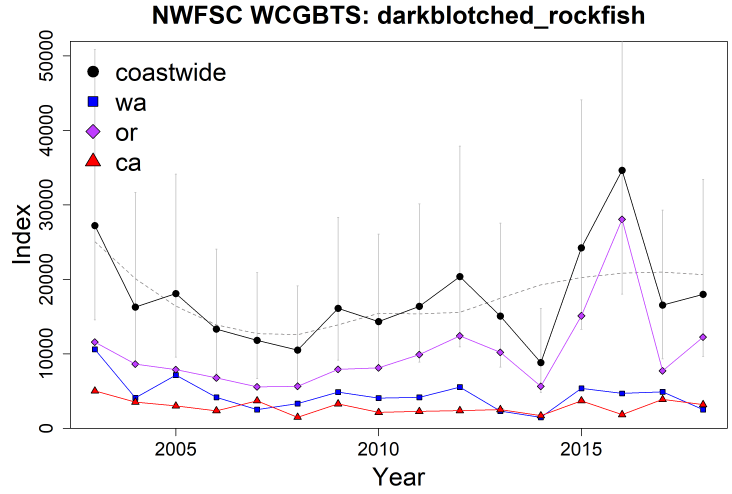

Figure 20: Index of abundance for darkblotched rockfish from the NWFSC WCGBTS from 2003 - 2018. Coastwide index (black line with circles) shows an declining trend in the relative index, from 2003 - 2008, high variability from 2009 - 2018, but generally increasing trend in recent years. A loess smoother 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).

12 Dover sole

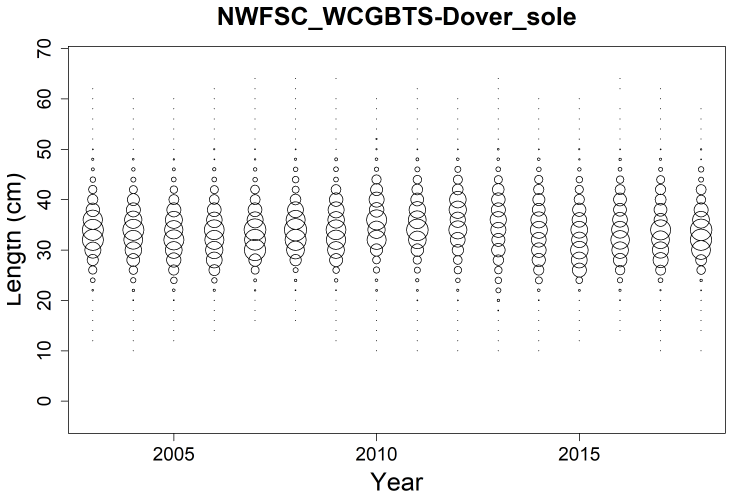

Figure 21: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

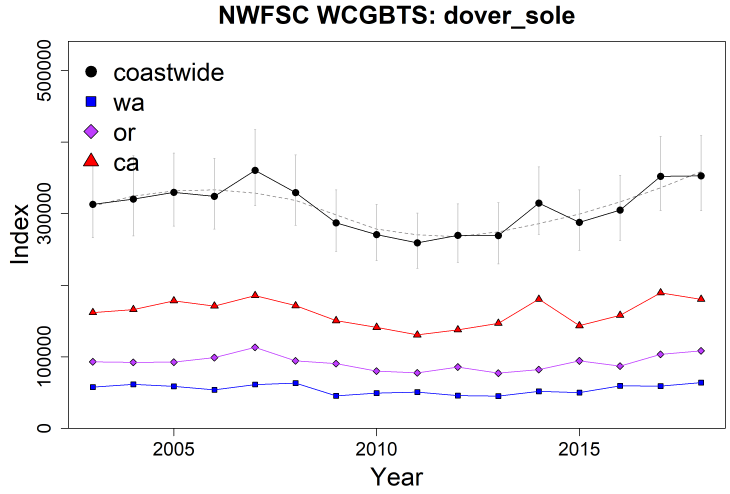

Figure 22: Index of abundance for Dover sole from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) shows a relatively flat trend from 2003 - 2008, decline from 2009 - 2011, and an increasing trend from 2012 - 2018. A loess smoother line was fit to the data series and is 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).

13 English sole

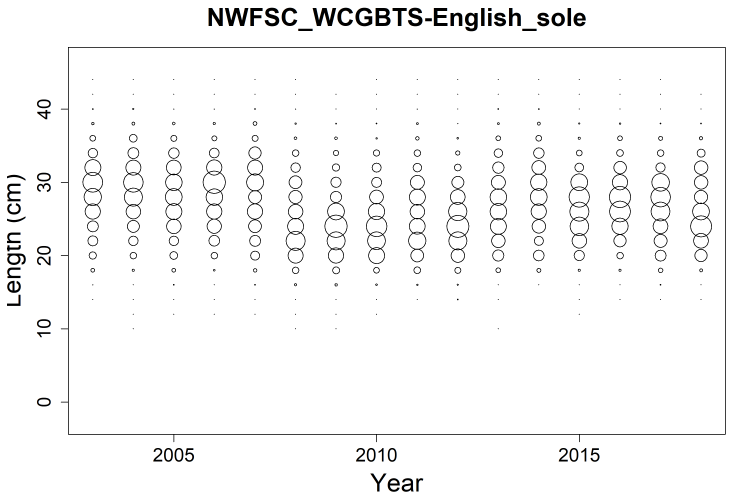

Figure 23: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

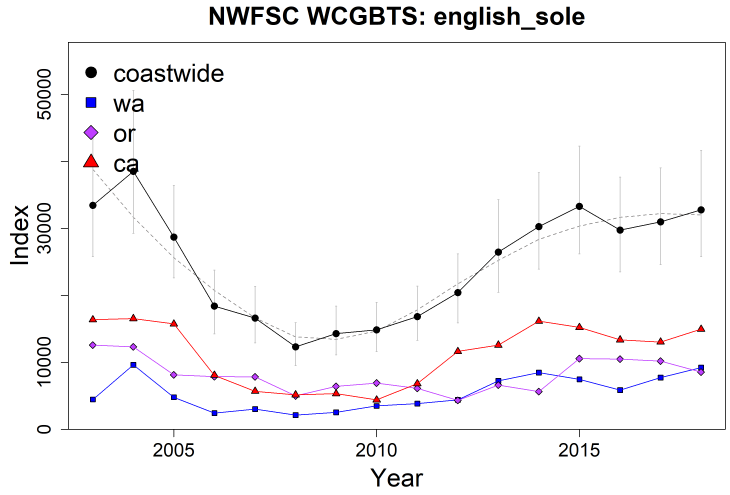

Figure 24: Index of abundance for English sole from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) shows a declining trend from 2003 - 2008 and an increasing trend from 2009 - 2018. A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

14 Flathead sole

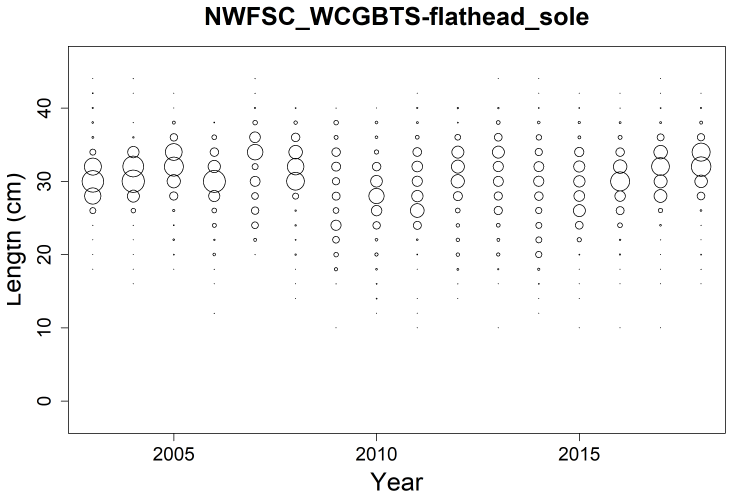

Figure 25: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

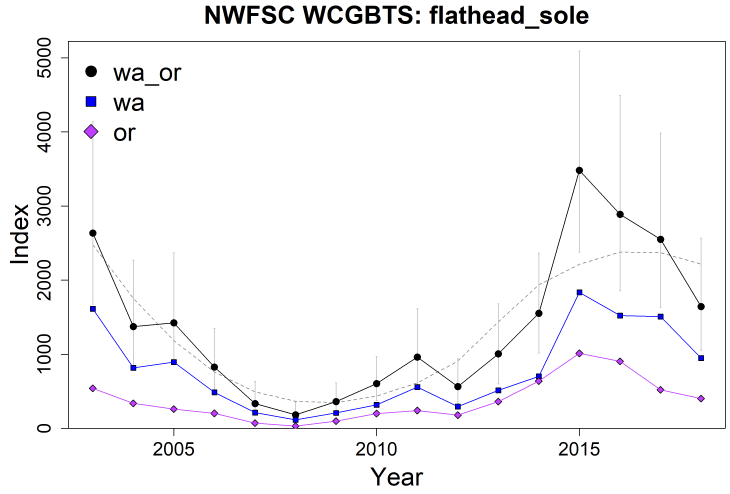

Figure 26: Index of abundance for flathead sole from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) shows a declining trend from 2003 - 2008, an increasing trend from 2009 - 2015,and a decline from 2016 - 2018. A loess smoother line was fit to the data series and is 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 Greenspotted rockfish

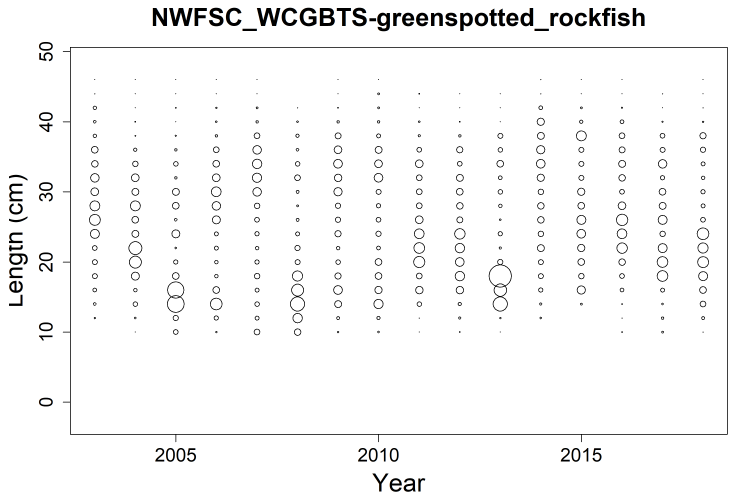

Figure 27: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

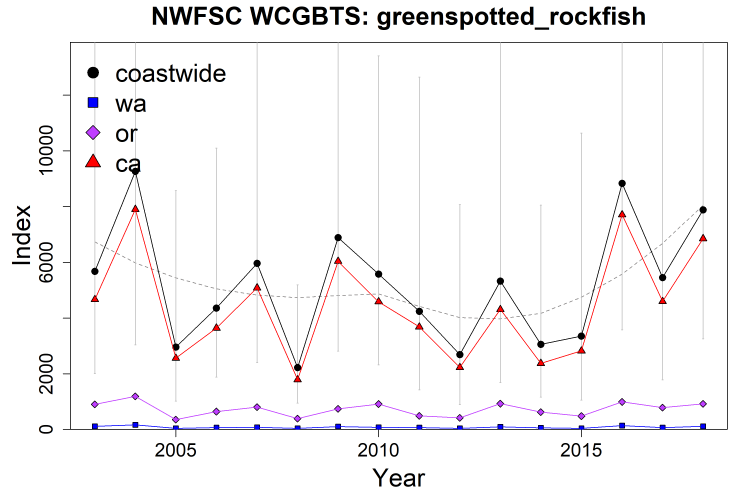

Figure 28: Index of abundance for greenspotted rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) in highly variable from years to years, likely due to sampling variance, with relatively flat trend across the time series. A loess smoother line was fit to the 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 Greenstriped rockfish

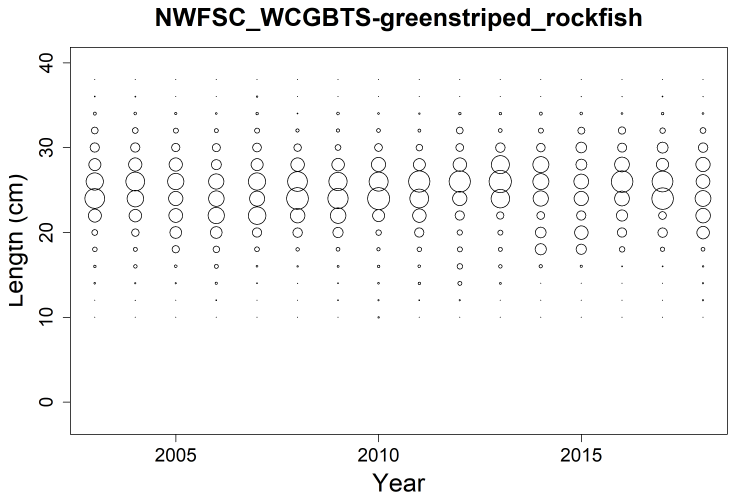

Figure 29: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

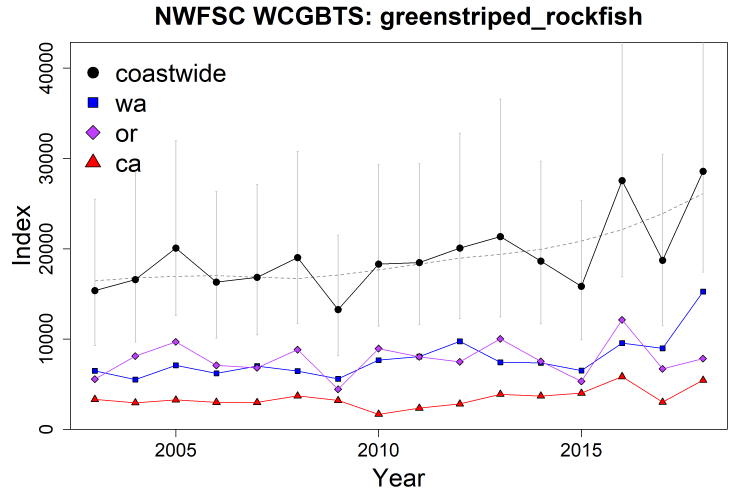

Figure 30: Index of abundance for greenstriped rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is relatively flat trend with a slight increase in recent years. A loess smoother line was fit to the data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

17 Lingcod

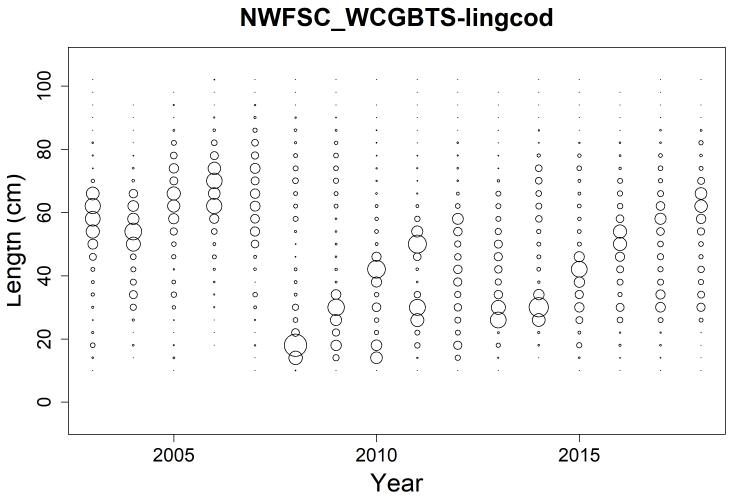

Figure 31: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

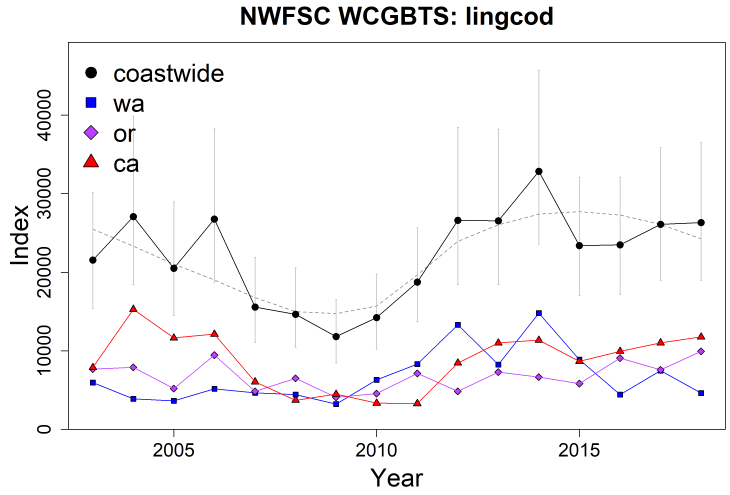

Figure 32: Index of abundance for lingcod from the NWFSC WCGBTS from 2003 - 2018. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles). The trend in the indices by state are highly variable across the time series. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line.

18 Longspine thornyhead

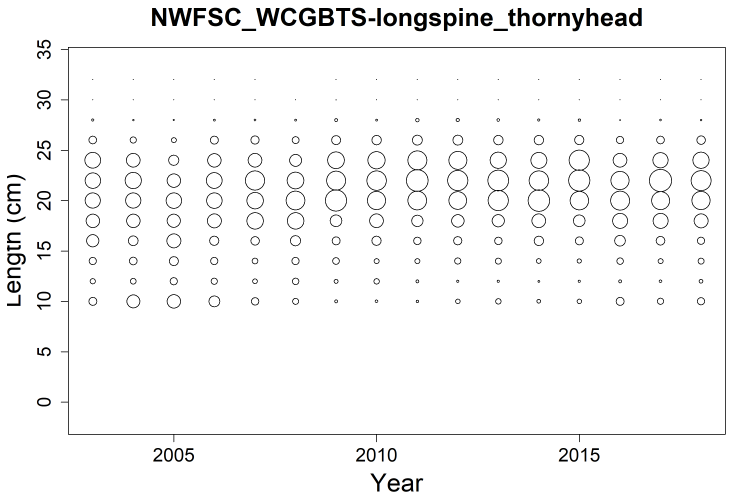

Figure 33: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

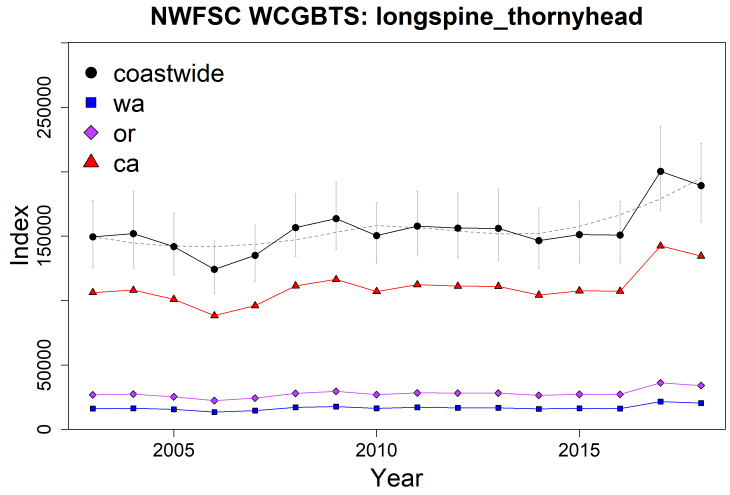

Figure 34: Index of abundance for longspine thornyhead from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is relatively flat trend with a slight increase in recent years (2017 and 2018). A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

19 Pacific cod

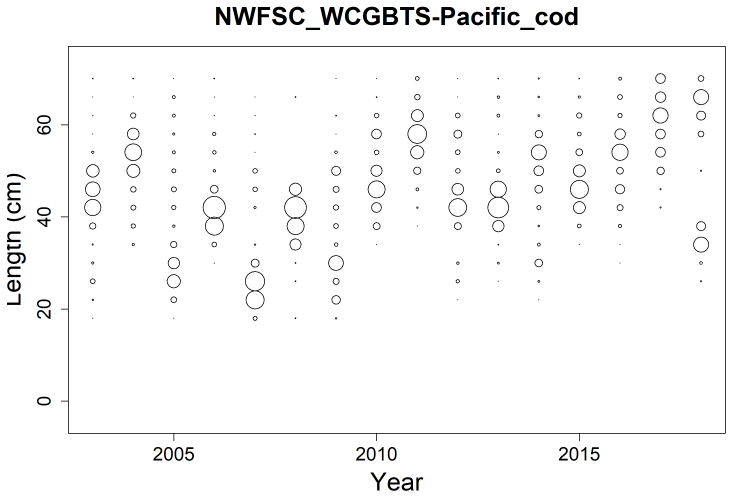

Figure 35: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

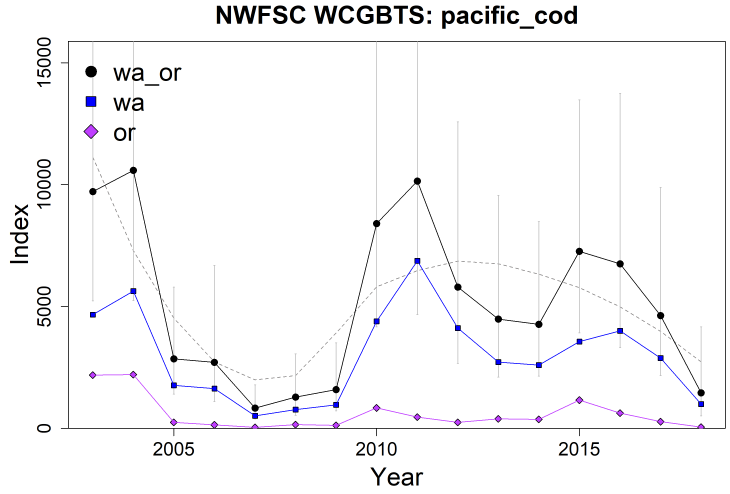

Figure 36: Index of abundance for Pacific cod from the NWFSC WCGBTS from 2003 - 2018. The index for Washington and Oregon combined (black line with circles) is highly variable across the time series. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds).

20 Pacific sanddab

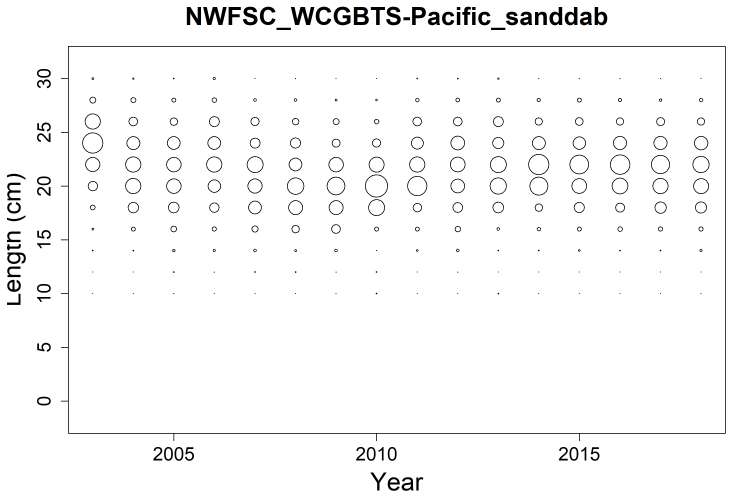

Figure 37: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

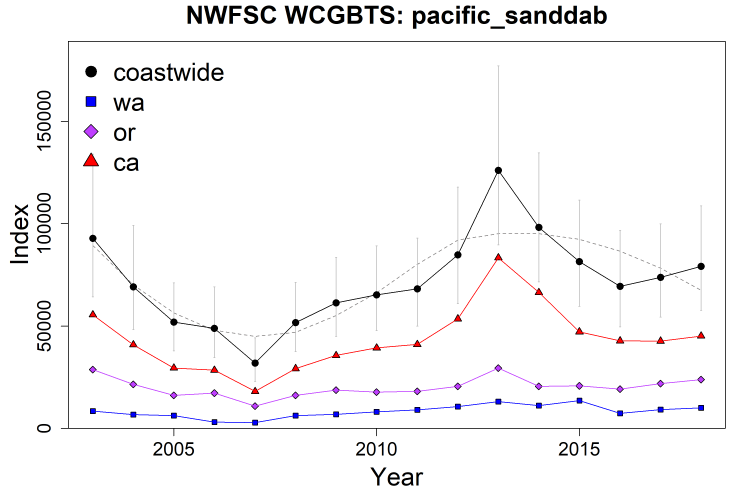

Figure 38: Index of abundance for Pacific sanddab from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) declines from 2003 - 2007, increases from 2008 - 2013, decline from 2014 -2016, and a slight increase from 2017 - 2018. A loess smoother line was fit to the coastwide 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).

21 Pacific spiny dogfish

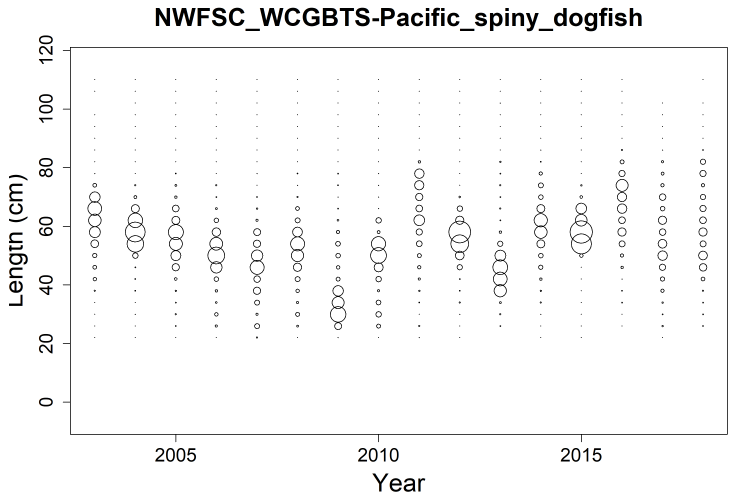

Figure 39: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

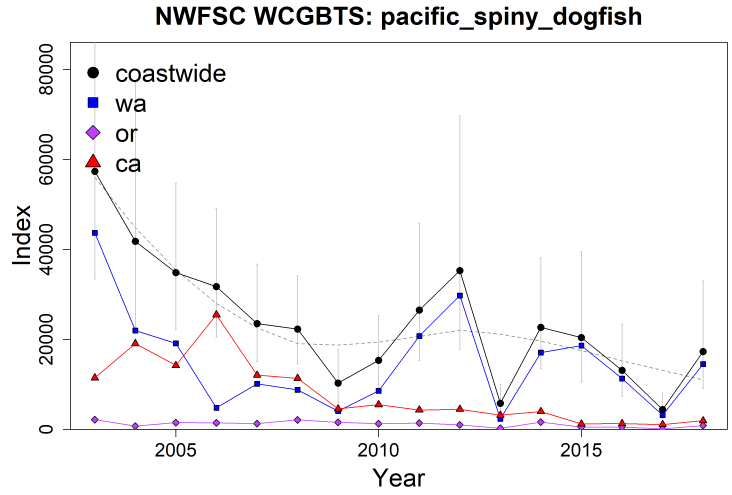

Figure 40: Index of abundance for Pacific spiny dogfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) declines from 2003 - 2009, increases from 2010 - 2012, and is highly variable at lower levels from 20113 -2018. A loess smoother line was fit to the coastwide 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 Redbanded rockfish

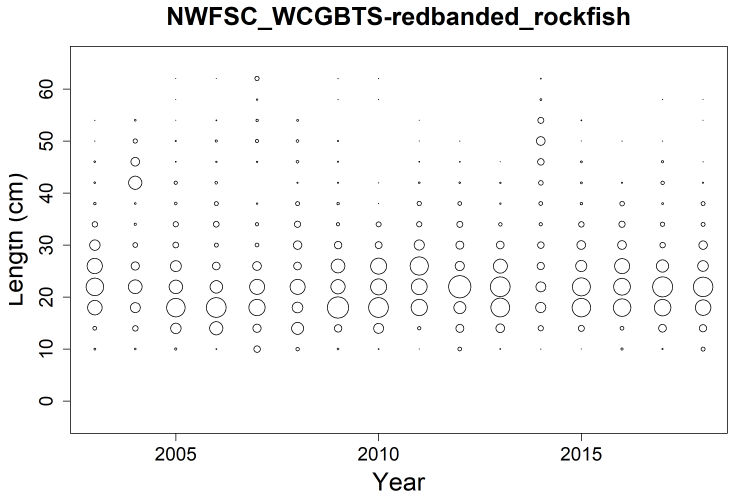

Figure 41: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

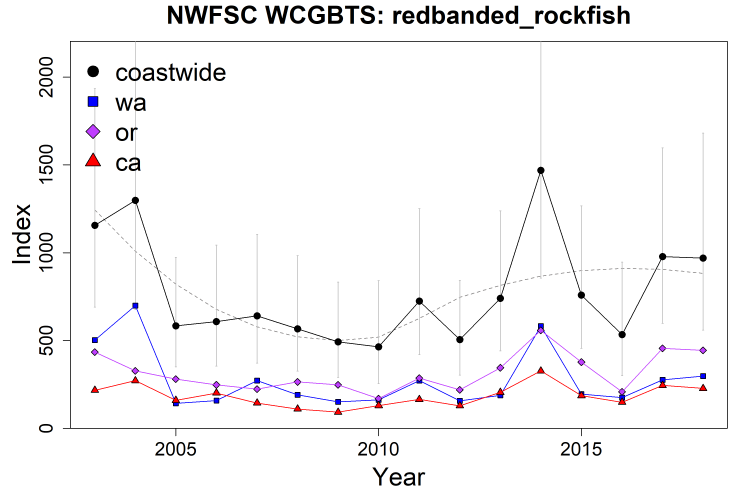

Figure 42: Index of abundance for redbanded rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is variable across the time series with potential increases in recent years. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

23 Rex sole

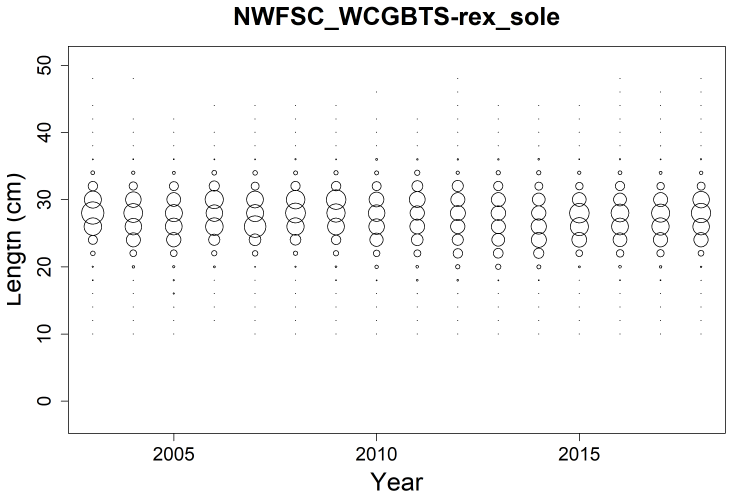

Figure 43: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

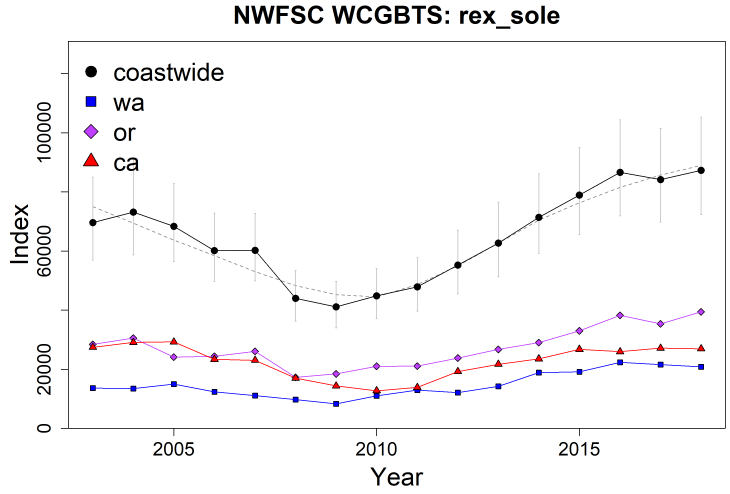

Figure 44: Index of abundance for rex sole from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) declines from 2003 - 2009 and increases from 2010 - 2018. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

24 Rougheye and blackspotted rockfish

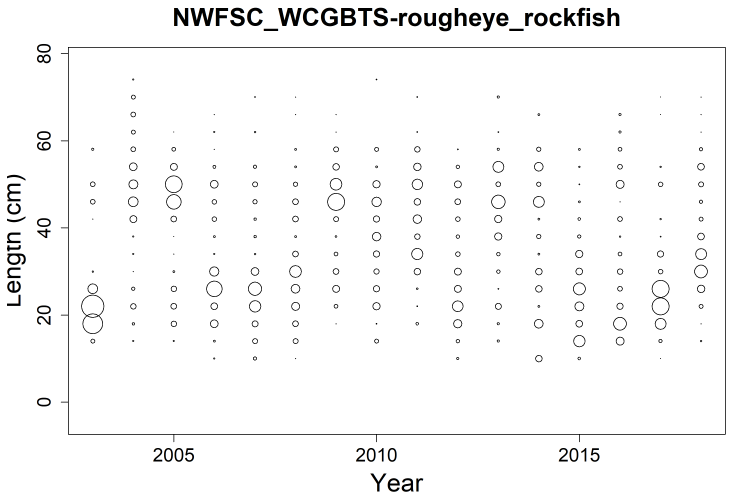

Figure 45: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

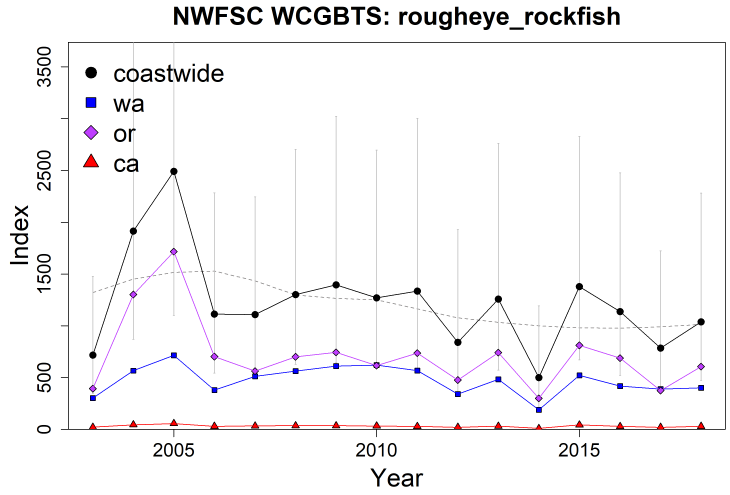

Figure 46: Index of abundance for rougheye and blackspotted rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is generally flat with a slight decrease in recent years. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

25 Sharpchin rockfish

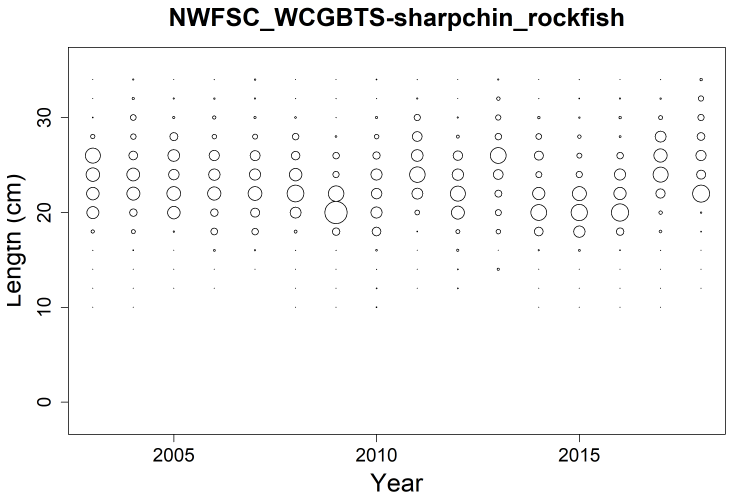

Figure 47: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

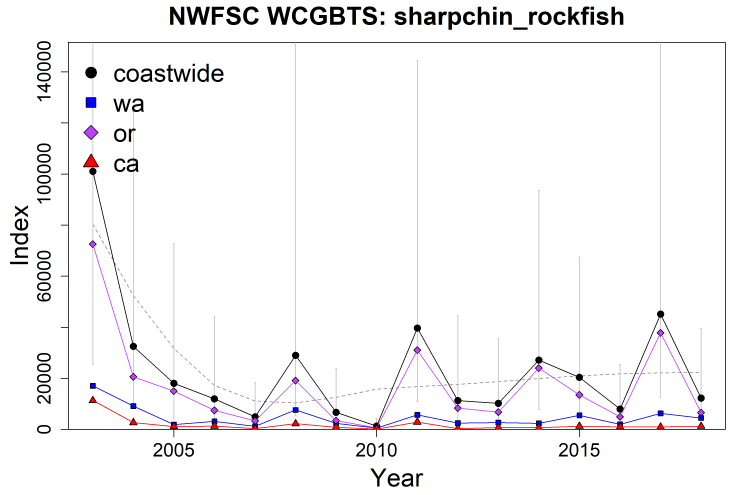

Figure 48: Index of abundance for sharpchin rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is highly variable across the time series and generally flat with a slight potential increase in recent years. A loess smoother line was fit to the coastwide data 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 Shortspine thornyhead

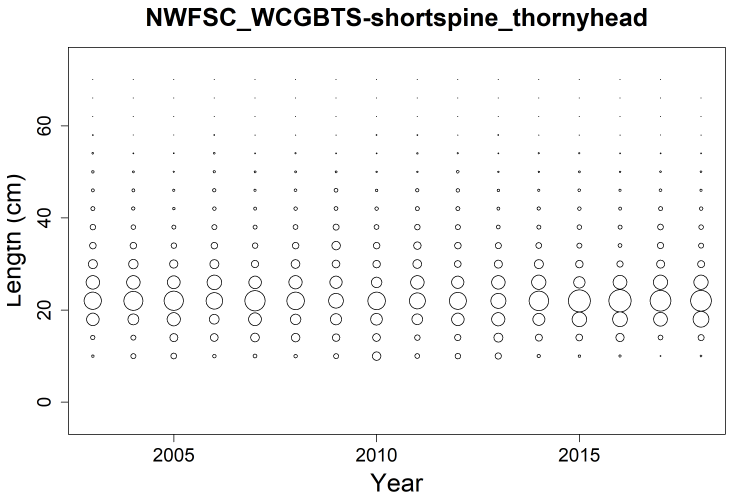

Figure 49: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

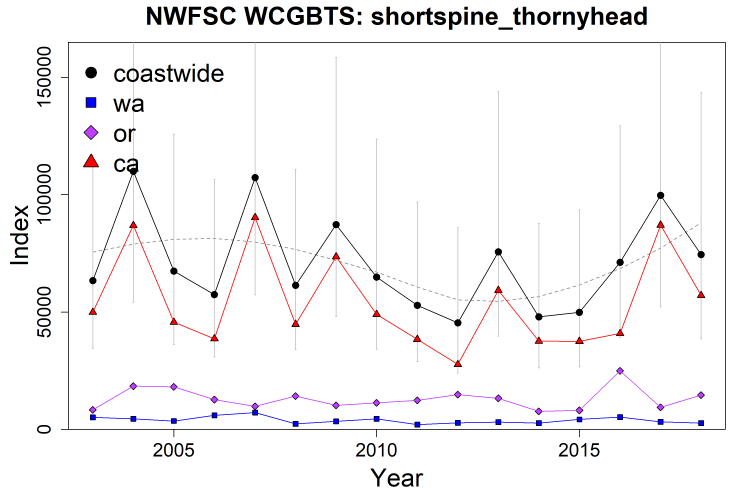

Figure 50: Index of abundance for shortspine thornyhead from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is highly variable across the time series, with a slight decrease from 2003 - 2012 and a slight increase from 2013 - 2018. A loess smoother line was fit to the 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).

27 Splitnose rockfish

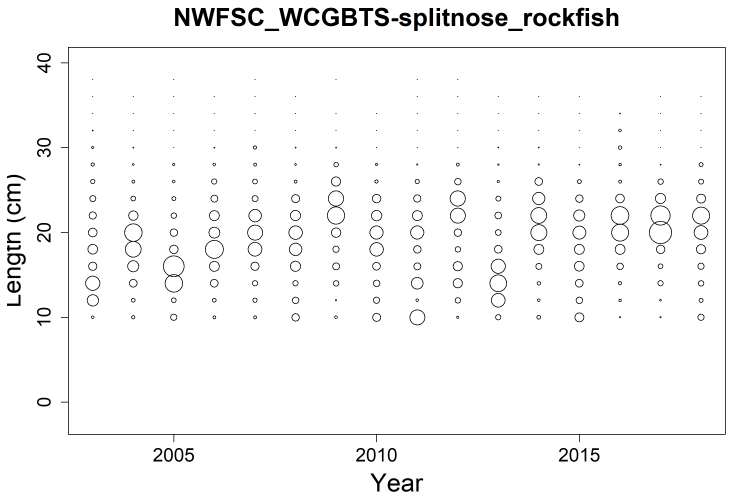

Figure 51: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

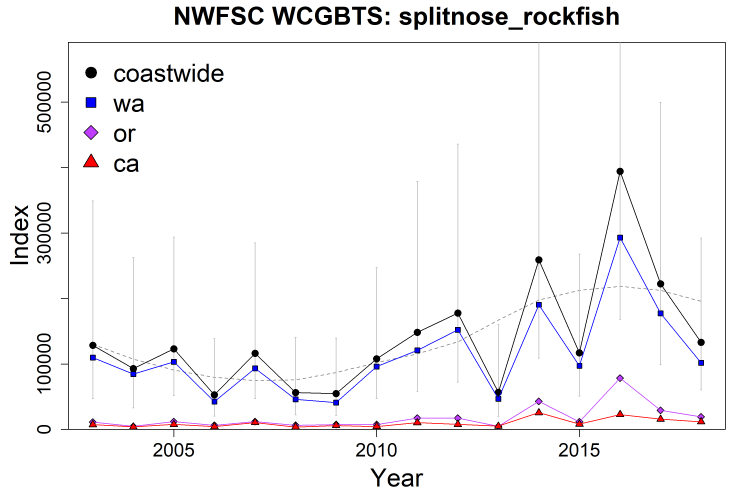

Figure 52: Index of abundance for splitnose rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is highly variable across the time series, with a slight increasing trend since 2009. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).

28 Yellowtail rockfish

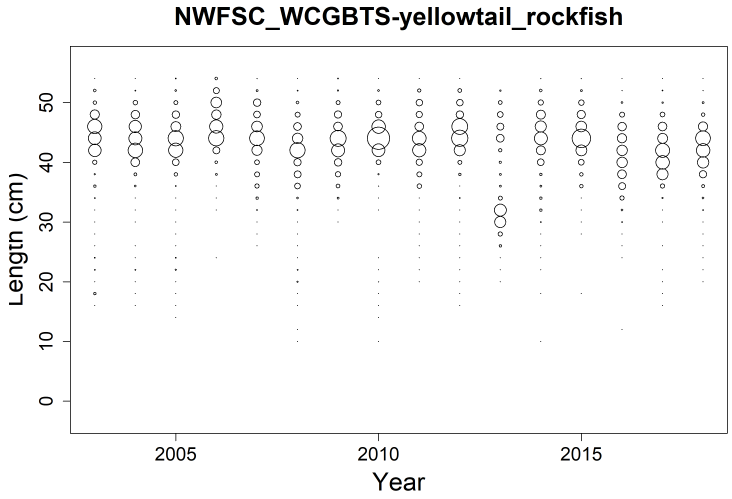

Figure 53: Length (cm) composition data sample data from the NWFSC WCBTS data. Large circles at smaller lengths may indicate above average incoming recruitment.

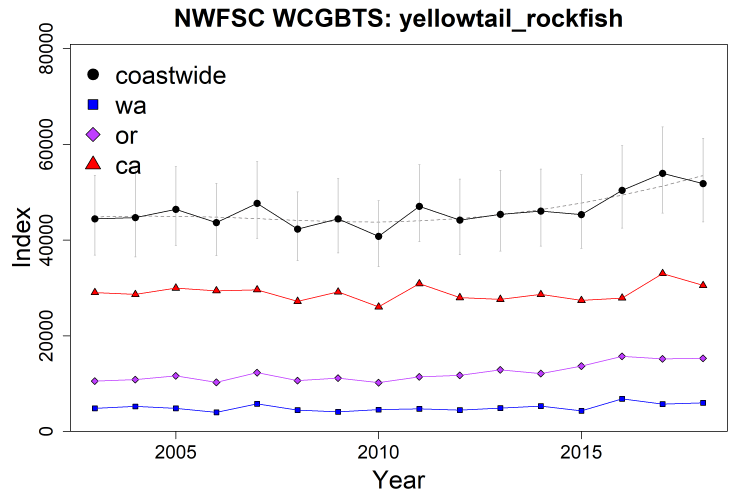

Figure 54: Index of abundance for yellowtail rockfish from the NWFSC WCGBTS from 2003 - 2018. The coastwide index (black line with circles) is generally flat with a slight increase since 2015. A loess smoother line was fit to the coastwide data series and is denoted by the grey dashed line. The trends by states are shown across the time series (Washington - blue squares, Oregon - purple diamonds, California - red triangles).