

Eastern Bering Sea 2015 Report Card

- The **eastern Bering Sea in 2015 was characterized by warm conditions** that were first seen in 2014, and continued through the winter, during which the **PDO reached the highest winter value seen** in the record extending back to 1900.
- The extent of **sea ice during winter was reduced, as was as the size of the cold pool of bottom water** relative to the long term mean during the summer.
- While there was no acoustic survey of euphausiids during summer, rough counts of zooplankton during spring indicated that **small copepods were more prevalent than either lipid-rich large copepods or euphausiids**.
- **Jellyfish remained abundant** during summer, following a new peak fall biomass recorded in 2014.
- **Survey biomass of motile epifauna has been above its long-term mean** since 2010, with no trend in the past 5 years. There has been a unimodal increase in brittle stars since 1989 and for sea urchins, sea cucumbers and sand dollars since 2004-2005.
- **Survey biomass of benthic foragers decreased substantially in 2015, which contributed to the change in their previously stable recent trend to negative**. Recent declines could possibly be related to the consecutive years of springtime drift patterns that have been linked with poor recruitment of flatfish.
- **Survey biomass of pelagic foragers has increased steadily** since 2009 and is currently above its 30-year mean. While this is primarily driven by the **increase in walleye pollock** from its historical low in the survey in 2009, it is also a result of **increases in capelin during the cold years**, which have remained high during the past two warm years.
- **Fish apex predator survey biomass is currently above its 30-year mean**, although the increasing trend seen in recent years has leveled off. **The increase from below average values in 2009** back towards the long term mean is driven primarily by increases in Pacific cod from low levels in the early 2000s.
- **The multivariate seabird breeding index is below the long term mean**, indicating that seabirds bred later and less successfully in 2015. This suggests that **foraging conditions were not favorable for piscivorous seabirds**, a hypothesis further supported by large numbers of dead, emaciated birds observed at sea.
- **Northern fur seal pup production for St. Paul Island remained low** in 2014, indicating that fewer pups were produced in 2014 than during the year of the last survey in 2012.
- The maximum potential **area of seafloor habitat disturbed by trawl gear has remained stable since 2011**.

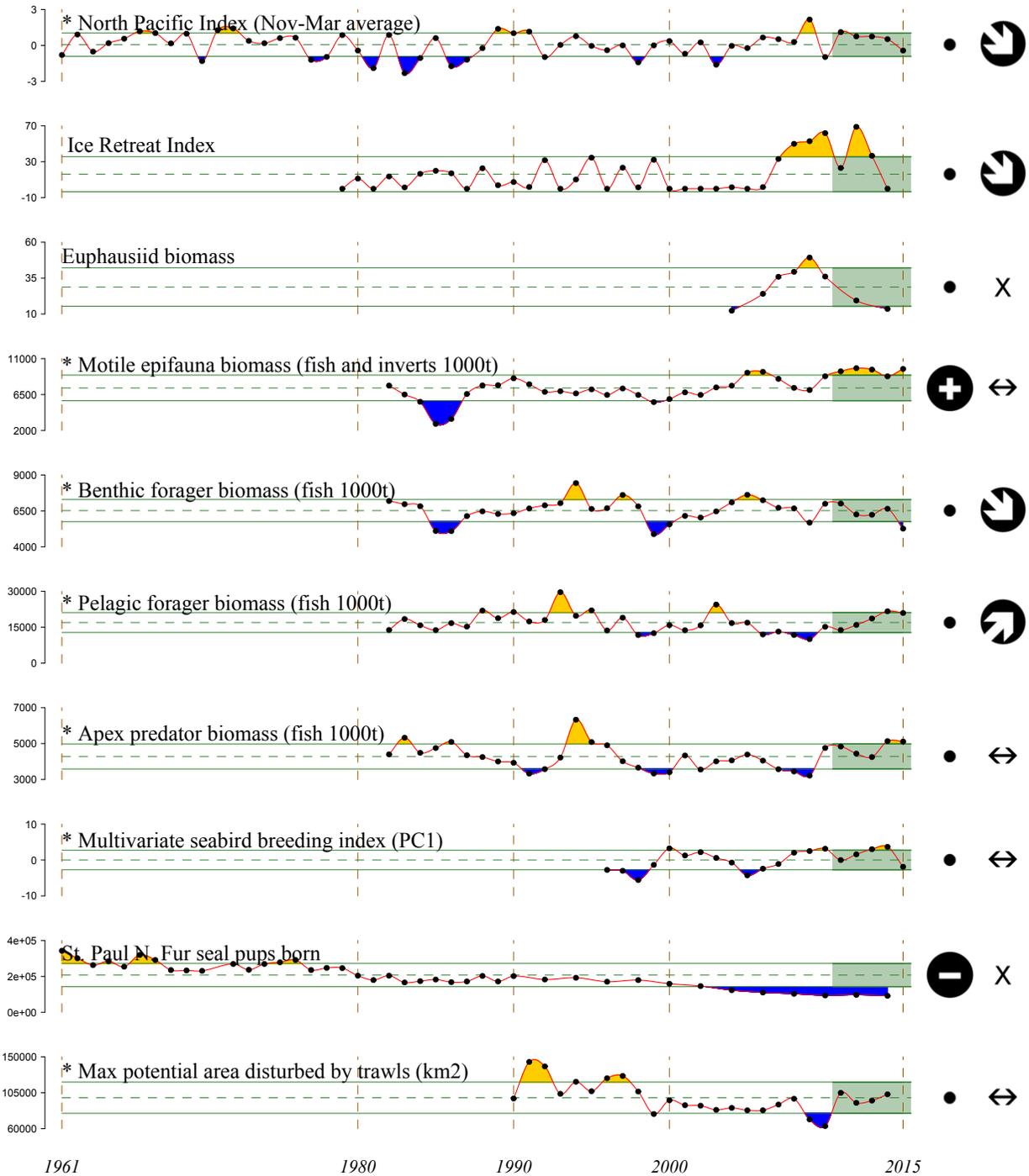


Figure 1: Eastern Bering Sea ecosystem assessment indicators; see text for descriptions. * indicates time series updated in 2015.

Aleutian Islands 2015 Report Card

Region-wide

- The state of the North Pacific atmosphere-ocean system during 2014-2015 featured the **continuance of strongly positive SST anomalies** that began in 2013-2014.
- The NPI was negative during the fall and early winter, implying a strong and often displaced Aleutian Low. The generally **negative values of the NPI are consistent with the positive trend in the PDO**.
- Some of the **abnormally warm water that developed in the NE Pacific during early 2014 appears to have made it to the Aleutians and through the eastern Aleutian passes** into the Bering Sea, presumably during the winter when the local winds were favorable for northward transports.
- During the period from fall 2014 to summer 2015, **upper ocean temperature anomalies** in the western Aleutians **cooled from above normal to near normal**. These anomalies remained generally above normal along the arc of the eastern Aleutian Islands
- In general, **schools in the Aleutian Islands have shown no recent trends in enrollment**, possibly indicating that communities with year-round residents that experience direct interactions with the ecosystem through residential and subsistence activities are stable.

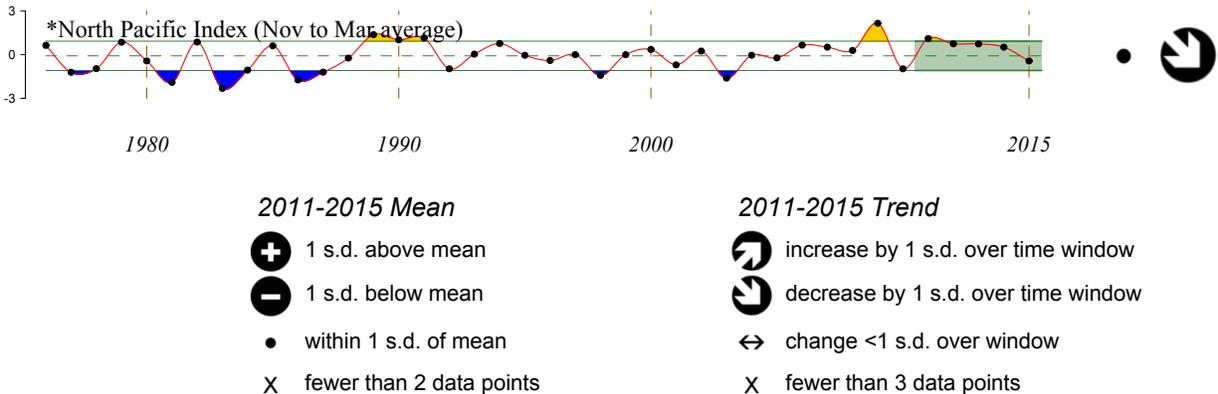
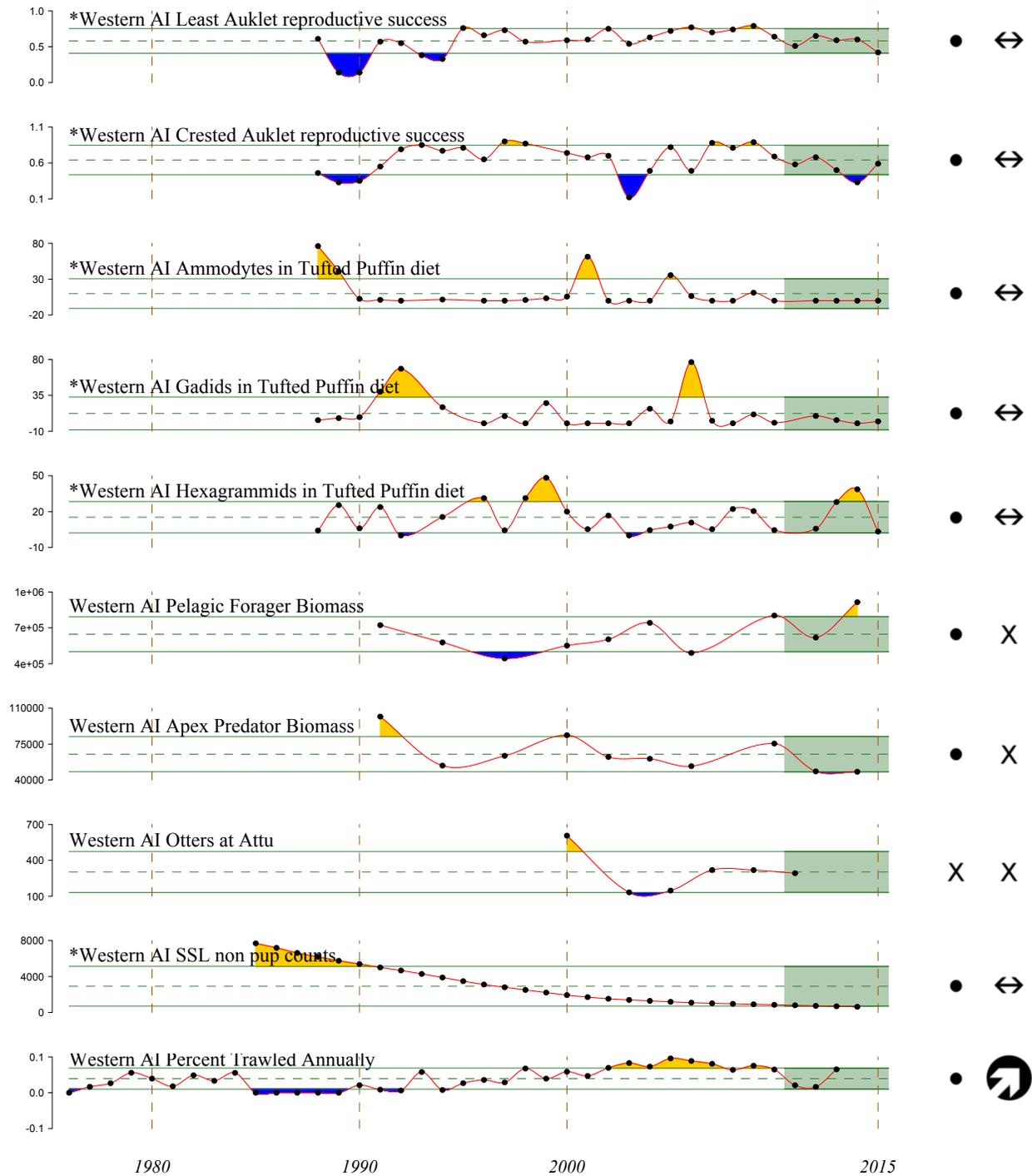


Figure 2: The winter North Pacific Index time series. * indicates time series updated in 2015.

Western Aleutian Islands Ecoregion

- While the reproductive success of planktivorous least auklets declined in 2015, that of crested auklets increased from the low level seen in 2014. Crested auklets rely more on euphausiids than the copepod-specialist least auklets, thus **we can speculate that copepod availability was poor in 2015**.
- Forage fish trends as indicated in tufted puffin chick meals have varied over the long term. In general, sand lance have been absent since 2010, and age-0 gadids uncommon. The **number of hexagrammids (likely age-0 Atka mackerel) declined relative to the past two years, possibly indicating poor recruitment**.
- Steller **sea lions remain below their long-term mean** in this ecoregion, although there has been no significant trend in the past 5 years. The 2014 counts were the lowest in the time series.



2011-2015 Mean

- ⊕ 1 s.d. above mean
- ⊖ 1 s.d. below mean
- within 1 s.d. of mean
- X fewer than 2 data points

2011-2015 Trend

- ↻ increase by 1 s.d. over time window
- ↺ decrease by 1 s.d. over time window
- ↔ change < 1 s.d. over window
- X fewer than 3 data points

Figure 3: Western Aleutian Islands ecoregion indicators. * indicates time series updated in 2015. See Figure 2 for legend.

Central Aleutian Islands Ecoregion

- **Counts of non-pup Steller sea lions remain below the long term mean** although there is no significant trend in the past 5 years.
- **School enrollment has shown no trend** in recent years, following a decline since peak enrollment in 2000, and potentially indicating stability in the residential communities.

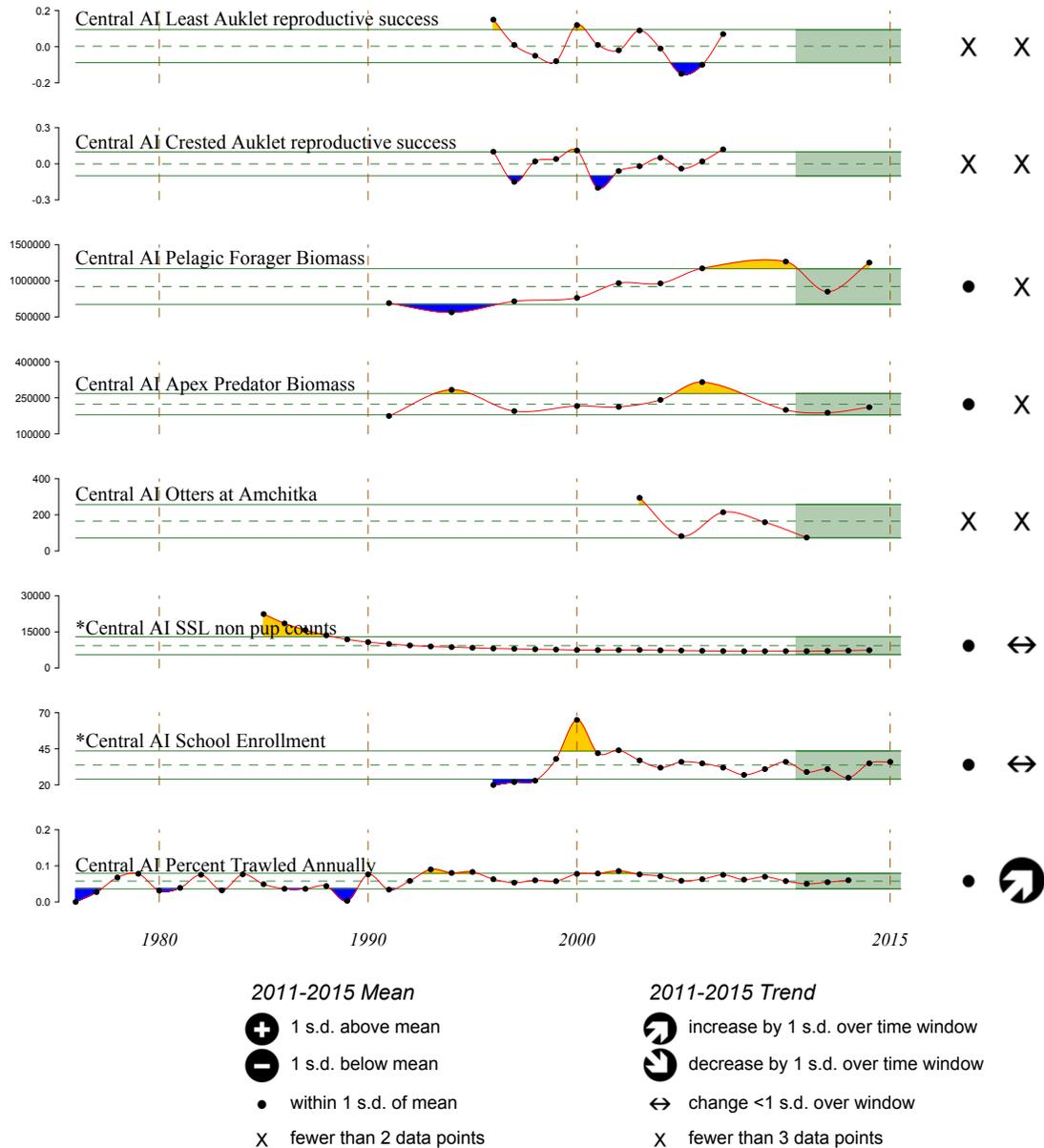
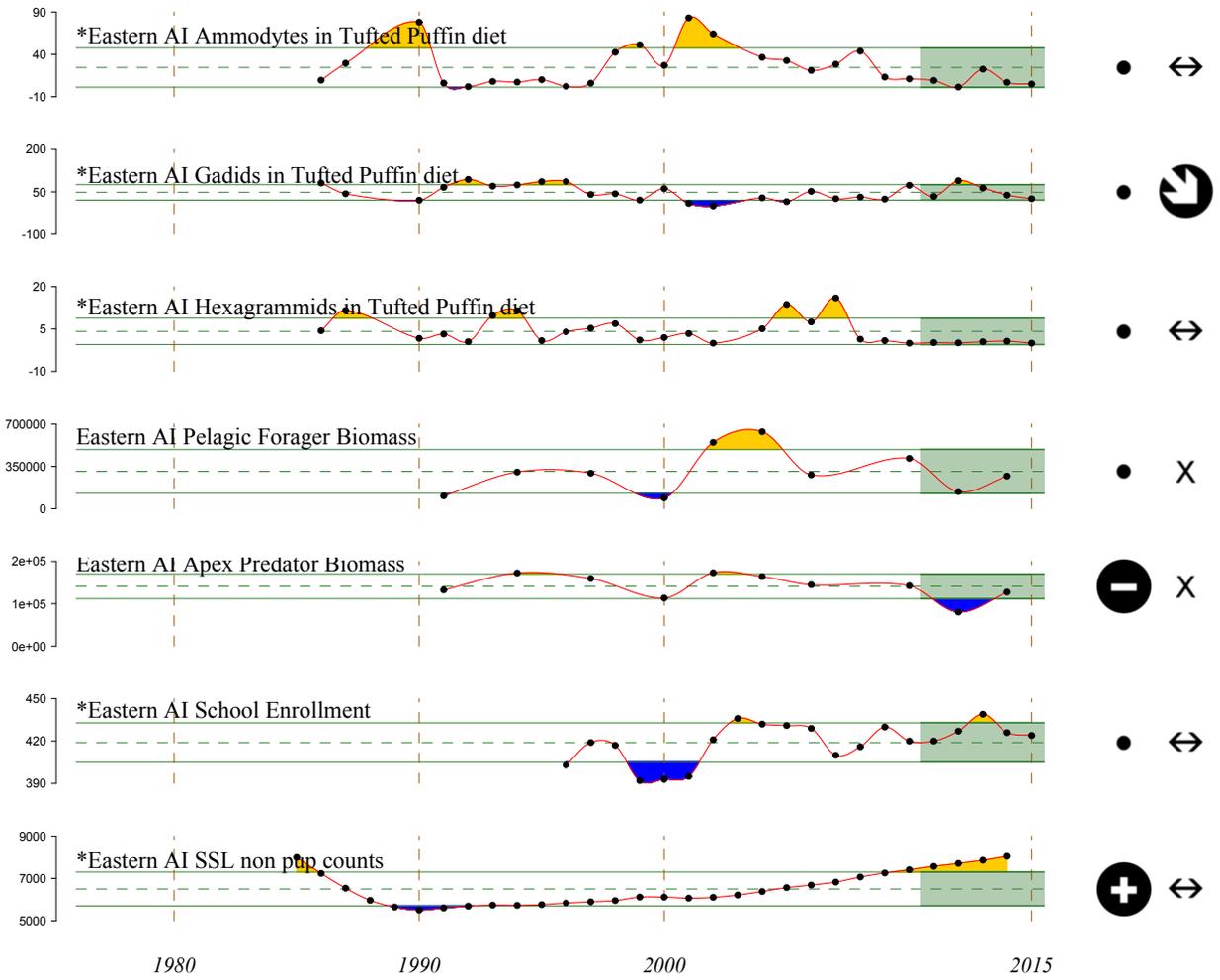


Figure 4: Central Aleutian Islands ecoregion indicators. * indicates time series updated in 2015. See Figure 2 for legend.

Eastern Aleutian Islands Ecoregion

- Relative abundances of **gadids and *Ammodytes*** in prey brought back to feed puffin chicks **have shown opposite trends, although both declined in recent years. Age-0 gadids were uncommon in 2015** Chick-provisioning patterns suggest puffins are responding to changes in forage fish availability.
- In contrast to the other ecoregions, **non-pup counts of Steller sea lions remained high** during the last count in 2014. Counts were largely stable through the 1990s, but increased at a rate of 3% per year between 2000 and 2008.
- **School enrollment has shown no trend in the past five years**, despite peak enrollment in 2014. These numbers suggest communities are stable in the eastern ecoregion communities.



2011-2015 Mean

-  1 s.d. above mean
-  1 s.d. below mean
-  within 1 s.d. of mean
-  fewer than 2 data points

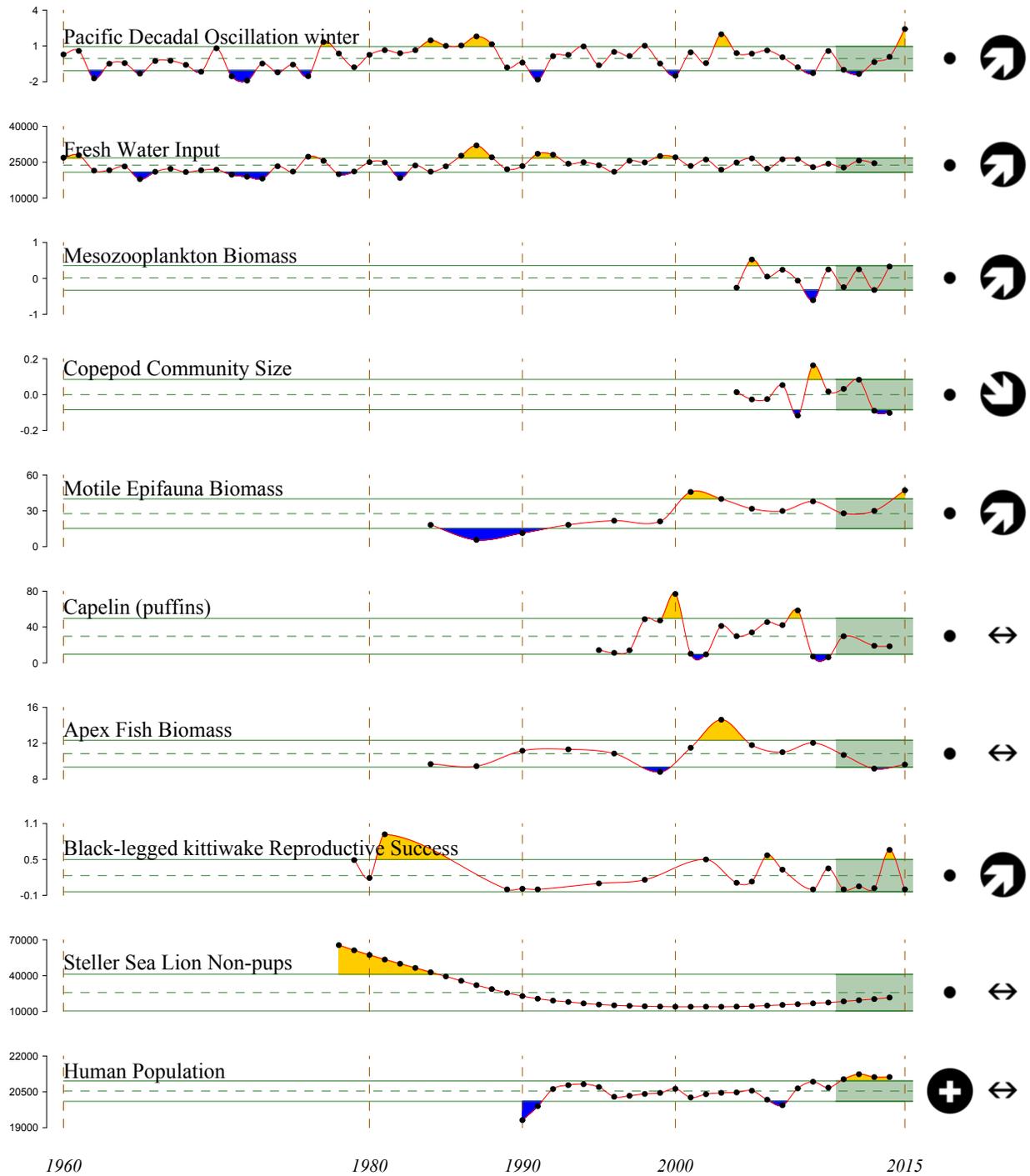
2011-2015 Trend

-  increase by 1 s.d. over time window
-  decrease by 1 s.d. over time window
-  change <1 s.d. over window
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Figure 5: Eastern Aleutian Islands ecoregion indicators. * indicates time series updated in 2015. See Figure 2 for legend.

Gulf of Alaska 2015 Report Card

- The Gulf of Alaska in 2015 was **characterized by warm conditions** that were first seen in 2014, and continued through the winter, during which **the PDO reached the highest winter value seen** in the record extending back to 1900.
- **Fresh water input as estimated at the GAK1 station has been variable** over the long time series. The most recent data indicate an increasing trend.
- **Mesozooplankton biomass measured by the continuous plankton recorder has shown a biennial trend since 2009**, with higher biomass recorded during even-number years. Biomass trends can be influenced by ecosystem conditions and mean size of the community. This suggests that prey availability for planktivorous fish, seabirds, and mammals has been variable recently. The biennial patterns suggests a **possible link with biennially varying planktivorous pink salmon abundance**.
- **Copepod community size has been declining in recent years**. The prevalence of small copepods during 2014 fits predictions of warm conditions favoring small copepods. This suggests that **less lipid-rich prey were available to planktivorous predators**.
- **Survey biomass of motile epifauna** has been **above its long-term mean** since 2001. The increase from 1987 to 2001 was driven by hermit crabs and brittle stars, which dominate the biomass. Since 2001 their biomass has been stable. Record catches of octopus influenced the increased estimate in 2015.
- **Trends in capelin captured by tufted puffins at the Barren Islands have been variable** in the 20 year time series. **Capelin comprised the majority of chick diets in 2000 and were generally abundant from 2003 - 2008, but have been at or below the mean since that time**. It is unknown whether these trends reflect capelin abundance or prey preferences of the puffins.
- **Fish apex predator survey biomass is currently below its 30-year mean**, although the declining trend seen in recent years has leveled off. **The trend is driven primarily by arrowtooth flounder** which, along with halibut, had been declining since 2005. Both increased slightly in 2015. It is unknown whether these increases were due to distributional shifts in the warm water. **Pacific cod has declined from a peak survey biomass in 2009**.
- With the exception of 2014, **black-legged kittiwake reproductive success has been poor** in the Semedi Islands, indicating that conditions were not favorable for these surface-foraging piscivorous seabirds. This may reflect poor conditions prior to the breeding season, during, or both.
- Modelled estimates of total Gulf of Alaska **Steller sea lion non-pups counts are approaching the long term mean**. This slowly increasing pattern since 2000 reflects the combination of increasing trends in the eastern population with declining trends in the western population.
- Human populations in the Gulf of Alaska coastal towns of **Homer, Kodiak, Sitka, and Yakutat are above their 25 year mean**. Homer is the sole town with a steadily increasing trend. Kodiak saw declines until 2006 and has recovered slightly since then.



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Figure 6: Eastern Bering Sea ecosystem assessment indicators; see text for descriptions. * indicates time series updated in 2015.