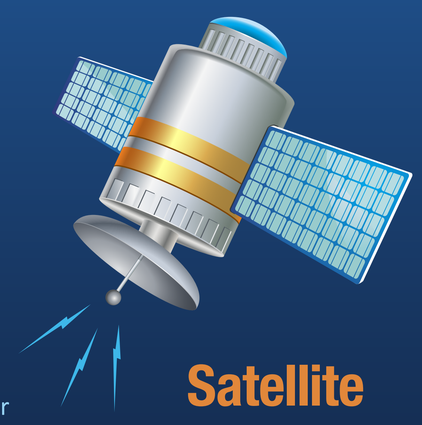
NOAA FISHERIES

In an effort to better understand the physics of the eastern Bering Sea shelf current as it relates to flatfish advection to favorable near-shore areas, multiple satellite-tracked oceanic drifters were released in 2010, 2012 and 2013. The release sites and dates were chosen to coincide with known spawning locations for northern rock sole and known time of larval emergence. The drifters were drogued 5-each at 20 and 40 meters in 2010 and 2012 and deployed in a pattern where the five drifters at the same depth could be grouped into six triads (drifters 1, 2 and 3, or 1, 2 and 4, etc.). The drifter triads are used to make calculations of area (triangles) and divergence over a 90-day period that correspond to the larval duration of Bering Sea shelf flatfish. Results from the 2012 drifter deployments indicate that over the 90-day observation period there are alternating periods of positive and negative divergence with an overall trend toward drifter separation after 90 days. Examination of the drifter behavior at the hourly scale indicates that semidaily tidal forcing is the primary mechanism of drifter divergence and convergence. Field observations by the Alaska Fisheries Science Center EcoFOCI program indicate flatfish larval behavior that includes diel vertical distributions that may interact with tidal cycles. It is hypothesized that larval use of diverging tidal cycles could be a mechanism in larval advection to favorable nursery grounds.



Ocean drifters reveal differential patterns of divergence forced by tidal periodicity: implications for larval flatfish advection and recruitment

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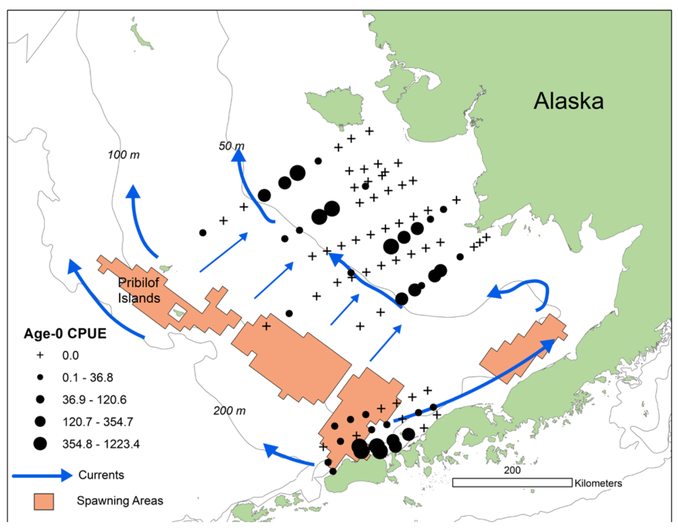
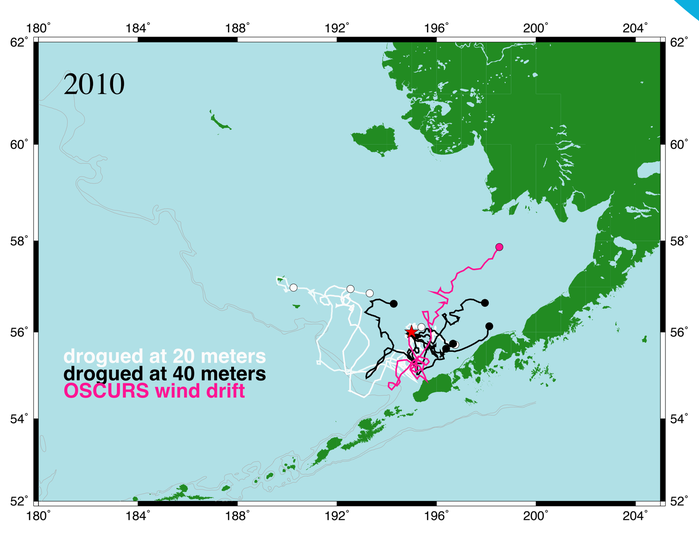
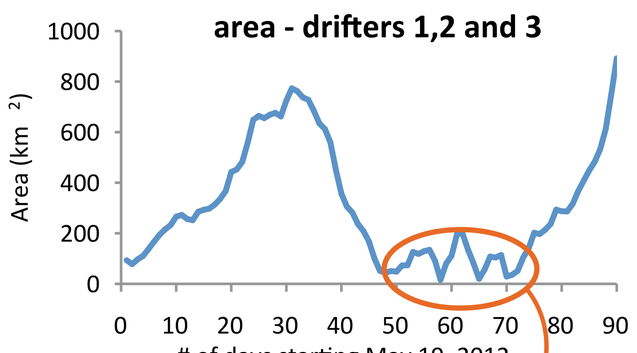
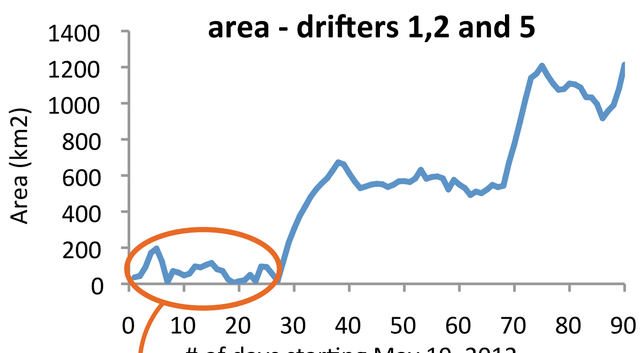


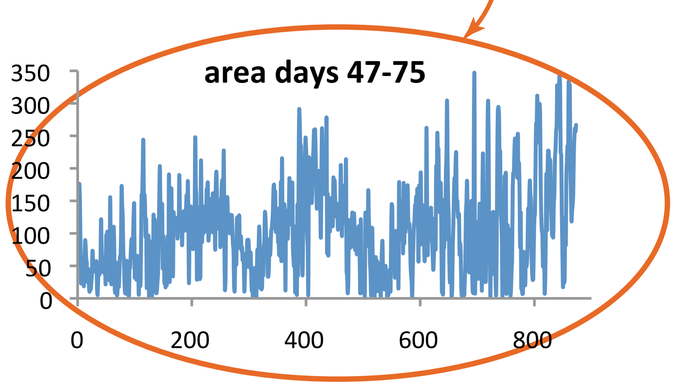


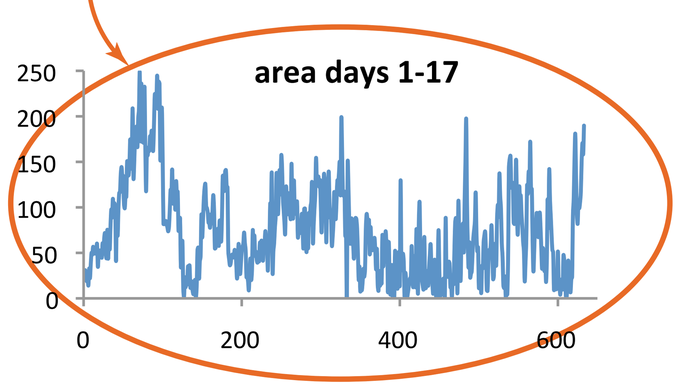
Northern Rock Sole (*Lepidopsetta polyxystra*)

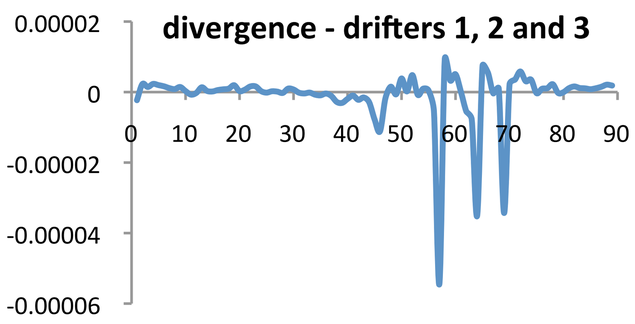
lowpass filtered

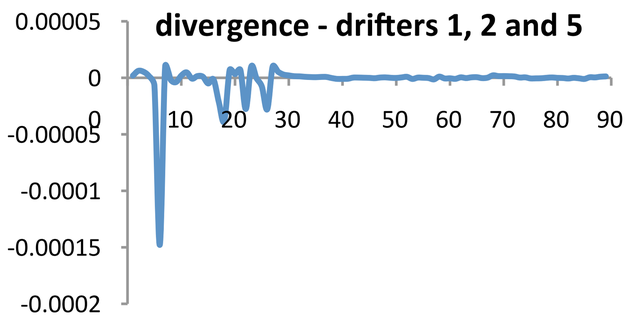


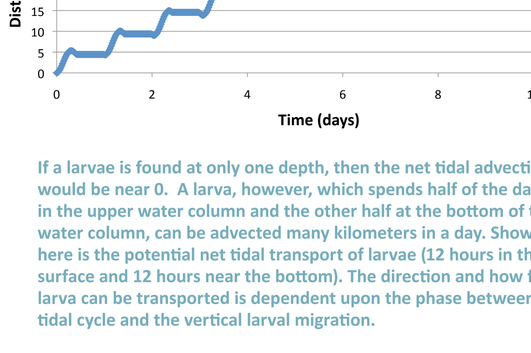




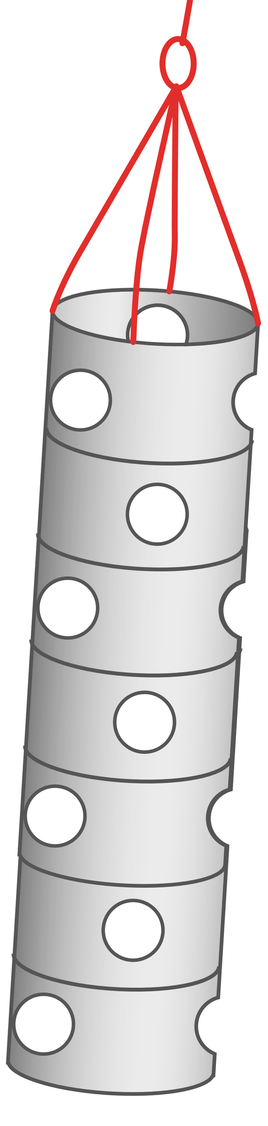






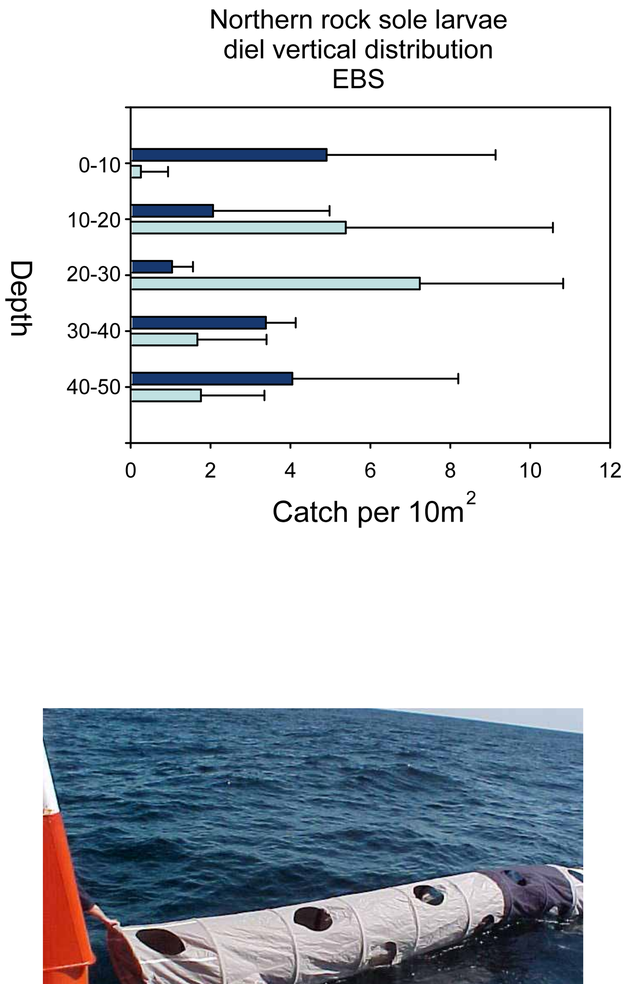


If a larvae is found at only one depth, then the net tidal advection would be near 0. A larva, however, which spends half of the day in the upper water column and the other half at the bottom of the water column, can be advected many kilometers in a day. Shown here is the potential net tidal transport of larvae (12 hours in the surface and 12 hours near the bottom). The direction and how far a larva can be transported is dependent upon the phase between the tidal cycle and the vertical larval migration.

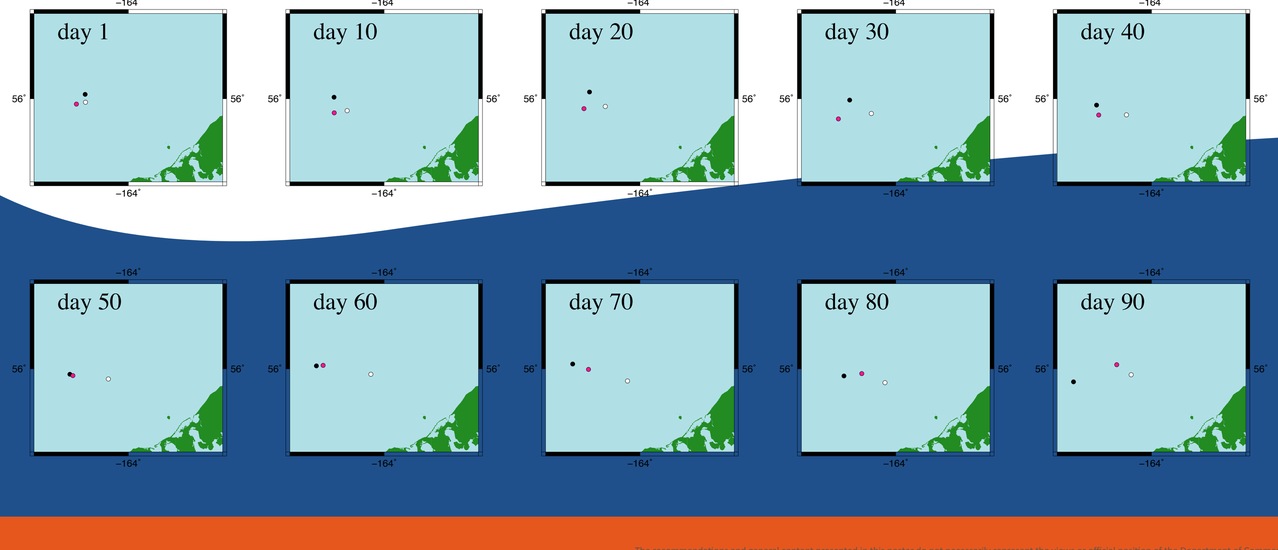


Transmitter

Drogue



tides are important for diffusion



"Holey Sock" satellite-tracked drifter