

Spawning Habitat and Early-Life Linkages to Fisheries (SHELF), Chris Stallings (USF)

Long-term time series can be critically valuable resources for fisheries science and management. They establish baselines, provide context for environmental change, and enable evaluation of population responses to natural and human-driven disturbances. Despite their importance, relatively few programs maintain consistent biological observations over decadal scales.

The Spawning Habitat and Early-Life Linkages to Fisheries (SHELF) program was established in 2017 to develop a long-term record of fish reproductive activity on the West Florida Shelf through DNA barcoding of individual fish eggs. By leveraging archived egg collections from the SEAMAP Fall Plankton Survey, SHELF extended the resulting time series back to 2013 while continuing annual sampling. More recently, SHELF developed an independent Continuous Underway Fish Egg Sampler (CUFES) to augment SEAMAP sampling. Together, these efforts have produced a species-level record of spawning activity for managed and non-managed fishes in the eastern Gulf.

Development of this long-term spawning time series has remained the central objective of SHELF since its inception. Studies of biodiversity and spawning ecology both rely upon and contribute to this broader time series. As SHELF concludes its third phase and over ten years of observations, the data are beginning to support fisheries applications and other management-relevant products.

A recent analysis conducted for SEDAR 99 (Gulf king mackerel) illustrates this capability. Using DNA-barcoded king mackerel eggs collected during SEAMAP surveys between 2013 and 2025, SHELF developed standardized indices of relative abundance analogous to larval abundance indices commonly considered during stock assessments. Multiple analytical approaches indicated reduced relative abundance in recent years, consistent with other evidence of stock declines over the past decade. Spatial analyses also revealed contraction of spawning activity on the West Florida Shelf and concentration of egg production within the northwestern portion of the sampling domain.

Because SHELF currently samples only the eastern Gulf, it may not be suitable as a direct tuning index for Gulf-wide assessments. However, it provides an independent source of information that can strengthen confidence in assessment outcomes and reveal patterns not detected by other monitoring programs. More broadly, the king mackerel analysis demonstrates how a sustained time series can generate fishery-independent indicators of reproductive activity while providing new insight into changes in spawning distribution.

As SHELF enters its second decade, opportunities continue to expand. The program is positioned to develop indices for additional managed species, evaluate responses to disturbances, identify shifts in spawning distribution and phenology, and contribute to ecosystem-based fisheries science. At the midpoint of its planned duration, SHELF is demonstrating how long-term observations of fish reproductive activity can support both fundamental ecological research and the needs of fisheries management in the Gulf.