History, Status and Challenges for Oyster Industry Expansion in Virginia

In Partial Fulfillment of the Project Entitled: Expanding Virginia's Oyster Industry While Minimizing User Conflict

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For additional information go to: https://cmap22.vims.edu/OysterInfoToolVa/

History

Historically, commercial fishing, especially the oyster fishery, dominated coastal activity throughout the tidal areas of the Virginia Chesapeake Bay. For decades, communities developed along shorelines to take advantage of productive public and private (leased) oyster grounds, and to harvest other economically important species. With the expansion of oyster diseases in the late 1950s, oyster harvests began to collapse and continued to decline through several consecutive decades.

Efforts to increase oyster populations and oyster production on both public and private grounds has remained a bay-wide focus of federal, state and local entities. Revitalization of the public fishery through shell replenishment programs, that is the addition of oyster shell to a region to serve as a substrate for oyster recruitment from the larval to the attached benthic form, have attempted to restore both oyster populations and underlying reef shell structure on public Baylor grounds to a level that can sustain recruitment and thus the fishery. Over evolutionary time reef shell is supplied by natural oyster mortality; however, where recent increases in natural mortality and intensive fishing reduces the number and size of oysters present, the subsequent mortality related addition of shell is also reduced. Over the past decade there has been a substantial improvement in oyster production on both public and private grounds. This can primarily be attributed to increased gear efficiency among the dredge fishery on both public and private grounds as well as the expansion of intensive aquaculture practices (intensive aquaculture involves the use of containers, such as cages, floats etc. for grow-out). Figure 1 illustrates the rise in oyster harvest on both public and private grounds in Virginia since 2000. About 70% of the harvest occurring on private grounds is attributed to opportunistic fishing practices and the rise beginning around 2009 is primarily associated with more efficient dredges used on both public and private grounds. On private grounds, aquaculture accounts for just under 30% of the harvest.

This study seeks to assess the sustainability of the public oyster fishery and the expansion of hatchery dependent oyster aquaculture in the Virginia portion of the Chesapeake Bay. Previous analyses have suggested that limitations in available shell resources will ultimately drive the future of the public fishery. The expansion of intensive aquaculture, already apparent in the Bay, suggests sustainability will be contingent upon the availability of bottom space and/or a shift in practices that minimize user conflict in leased areas.
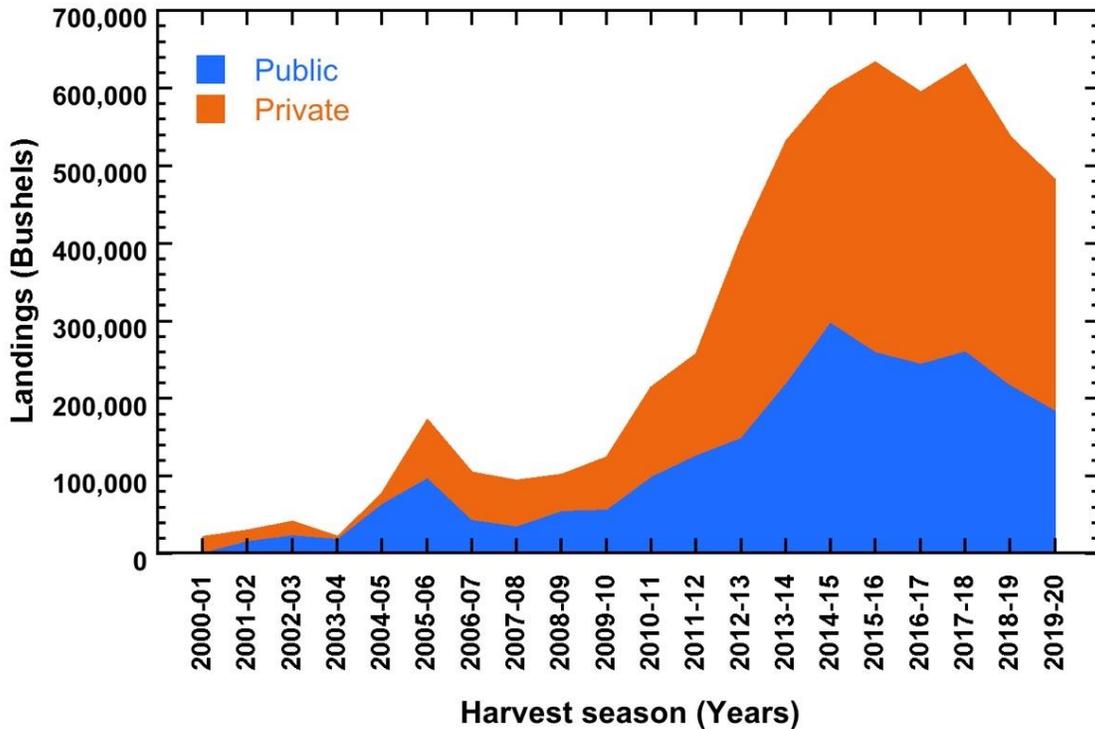
Figure 1. Harvest trends in public and private oyster fishery (2000-2019)

Status

Status of the shell resources on the public reefs can be summarized as follows:

- Within pubic Baylor grounds, intensive and ongoing monitoring of the shell quantity and condition on oyster reefs indicates that replenishment efforts provide short term increases in the shell structure.
- Monitoring data indicate that reef systems slowly revert to pre-replenishment conditions since the oyster growth, associated shell production rate and eventual addition of shell to the reef structure through oyster mortality cannot keep pace with breakdown and/or burial of the shell material (Mann and Powell 2007, Mann et al. 2009a, 2009b).
- Predictions for the future based on this evidence suggests that despite replenishment efforts on public Baylor ground, available shell to sustain the wild oyster fishery will be an ever-declining resource.

With support from the Chesapeake Bay Trust, investigators Mann, Southworth and Wesson completed a census of shell abundance and productivity on currently exploited Baylor grounds in the Virginia Bay and sub-estuaries. For reporting in this report, the study area has been generally divided into 6 areas: Tangier and Pocomoke Sounds as a single unit, Rappahannock River harvest areas 1-5 as a single unit, Great Wicomico River natural (VMRC monitored reefs), Piankatank River, York River and Mobjack Bay as a single unit, and the James River as a single unit. For convenience, shell abundance data in absolute numbers of bushels (one VA bushel ~ 50L) present in the entire sampling area is summarized for all areas in Figure 2 for the 2006-

2016 period. Note the vertical axes are not to the same scale. The total is subdivided into live and brown shell that is present above the sediment water interface. Note the general stability of abundance values in most of the regions. Notable increases in shell abundance are associated with single replenishment events (e.g., York River and Mobjack Bay 2008-2011). Also notable are general modest declines some 2-3 years later as the year class resulting from replenishment, grows and is subsequently harvested. Figure 2 provides data in absolute volumes, but a cautionary note on shell abundance, that is as bushels per unit area or density, is pertinent. Consider that 10 Lm^{-2} is essentially a one shell thick layer when spread uniformly on the bottom. Most of the regions in Figure 2 have standing stocks of shell at or below this critical density value, the most stable systems NOT requiring regular replenishment (James River) notably have the highest shell per unit area density. Thus, while absolute numbers of bushels present show constancy, mostly due to feedback processes that reduce shell loss rates when density is low, a desired end point would be gradual increase in recruitment to sustained higher levels that will, in turn, sustain higher oyster and shell densities. This gradual increment is not observed in any of the described areas. Thus this deficit is backfilled by replenishment.
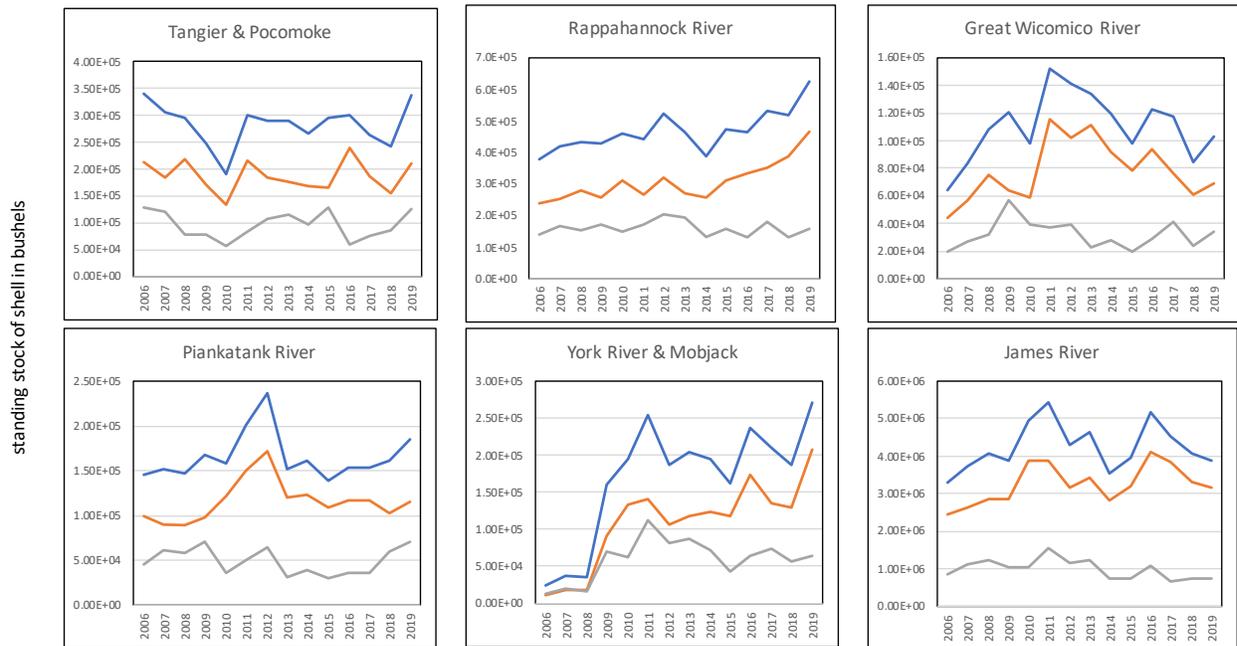

Figure 2. Standing stocks of shell (bushels; blue line = total shell, orange line = brown shell, gray line = live shell) in selected regions of Baylor ground: 2006-2019

A general summary of the status of the wild oyster resource on Baylor grounds in the Virginia bay can be found at the Virginia Oyster Stock Assessment and Replenishment Archive website at: https://cmap22.vims.edu/VOSARA/

Challenges

Best practices for replenishment in support of the wild fishery should be to geographically target selected areas within Baylor bottom with the highest opportunity for success. This study developed a protocol to identify where subaqueous bottom within Baylor has the potential to support future oyster populations, and where replenishment efforts in the future should be directed.

A decline in the public fishery stimulates a likely shift in oyster production to aquaculture. Such a shift has already been documented through the expansion of the aquaculture industry in Virginia on private grounds observed over the past decade (Figure 3). This study reviews and identifies opportunities and conflicts for the growing contribution aquaculture has had on oyster production on private grounds; with the most rapid expansion being hatchery-based production of cage-cultured oysters (intensive aquaculture practices) on private grounds in shallow water. A review of current regulations within public and private subaqueous bottom use reveals that existing policy confines the expansion of this well supported industry into the future. This study quantifies the impact that broadening the use of the public resource for aquaculture could have, at stimulating the industry and its growth without adversely affecting the public fishery.
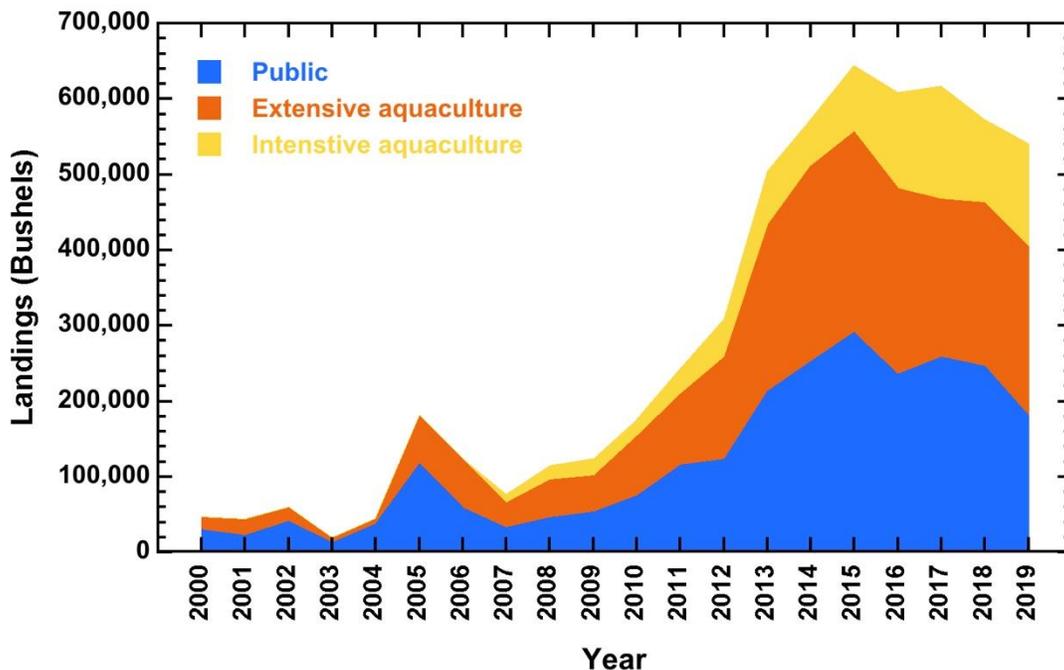

Figure 3. Harvest trends in public and private (extensive and intensive aquaculture) oyster fishery (2000-2019)

Expansion of intensive aquaculture, as it is typically practiced in Virginia, is expected to be limited primarily by available space in the shallow water nearshore, where most of the production occurs today. Along with this increase is an expanding list of conflicts in this zone.

Most notable are ecological conflicts associated with submerged aquatic vegetation and user conflicts associated with multiple uses by constituents with widely varying commercial, recreational and cultural interests. Nearshore properties, historically associated with commercial fishing long ago, have transitioned to a user group made up largely of single family, residential home owners. Conflicts ranging from view scape disputes to navigation impingement have ensued in the past decade.

References

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