

THE U.S. OYSTER AQUACULTURE INDUSTRY IS EXPECTED TO GROW IN THE NEXT DECADE

ABSTRACT

- This presentation shows the overall trends in U.S. oyster aquaculture production and farmgate values.
- U.S. aquaculture data are available from 1984 to 2019.
- Values beyond 2019 are predicted using econometric models developed by Dr. Posadas.
- The U.S. oyster aquaculture production index was constructed to show future growth trends in the industry.
- A scatter diagram shows the relationship between U.S. oyster aquaculture production and deflated imputed farmgate prices.

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LET US START OUR MODELING EFFORT!

- The NOAA Fisheries data on national aquaculture production are reported in **pounds per year**.
- The NOAA Fisheries data on national aquaculture farmgate values are reported in **dollars per year**.
- The national farmgate prices are imputed from the farmgate values and pounds of meat.
- U.S. aquaculture data are available from **1984 to 2019**.
- Values beyond 2019 are predicted using econometric models developed by Dr. Posadas.

U.S. AQUACULTURE PRODUCTION INDEX

- The aquaculture production index (API) equals current year production divided by base year production.
- The base year was the most recent annual production data in 2019.
- The API was computed for the U.S. oyster aquaculture production.

U.S. AQUACULTURE ECONOMIC MODELS

- The Ordinary Least Squares (OLS) models of U.S. aquaculture consisted of the following dependent variables:
 - Aquaculture production (lb/yr)
 - Deflated farmgate value (\$/yr)
- The OLS models of U.S. aquaculture were estimated using the robust variance procedure of STATA-16.
- The variation inflation factor was calculated to detect the possible presence of multicollinearity.
- The marginal impacts of disaster events were computed using the margins procedure.

U.S AQUACULTURE PRODUCTION ECONOMIC MODEL

- The OLS model of U.S aquaculture production (lb/yr) assumed that annual production could be explained by the following:
 - year and year-squared
 - recession (1 or 0) and a trade war (1 or 0)
 - growth in per capita disposable income (%)

- other variables

U.S. AQUACULTURE FARMGATE VALUE ECONOMIC MODEL

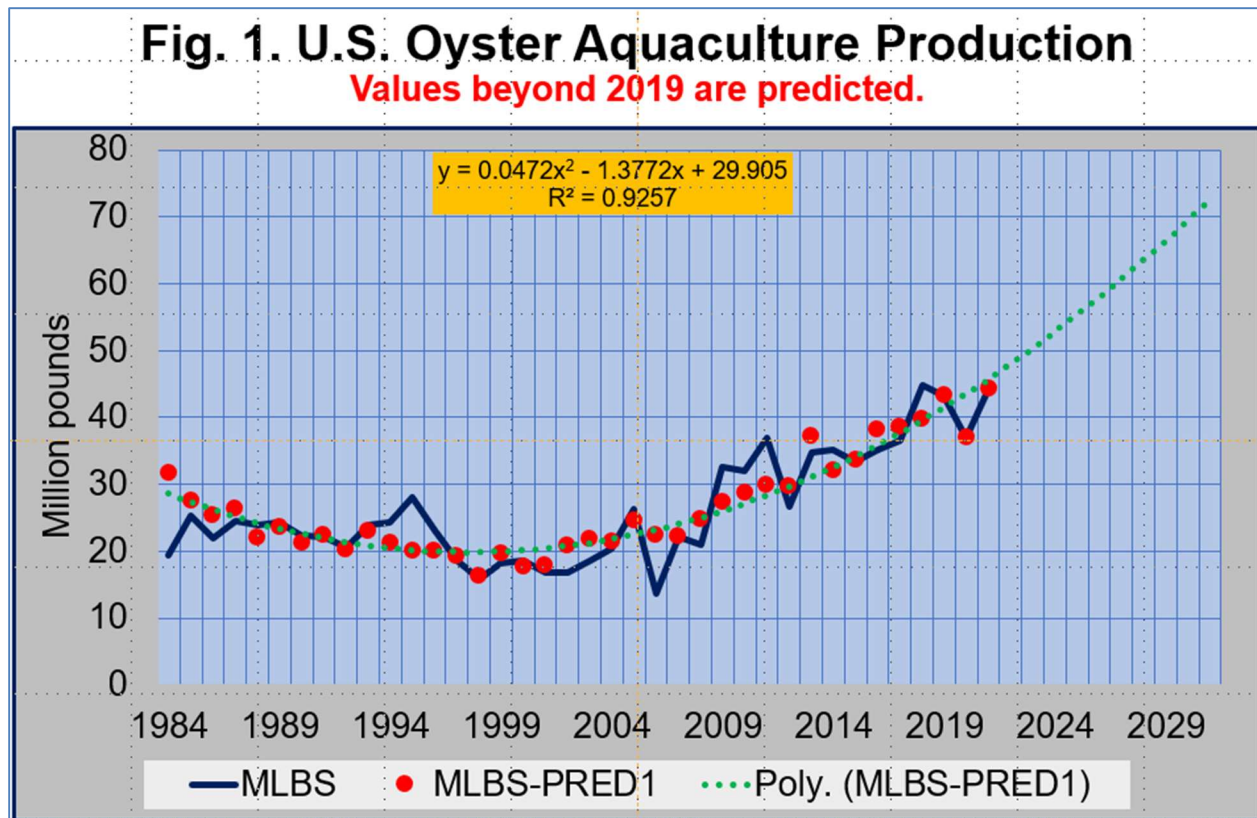
- The OLS model of U.S. aquaculture farmgate value (\$/yr) assumed that annual production could be explained by the following:
 - year and year-squared
 - recession (1 or 0) and a trade war (1 or 0)
 - aquaculture production (lb/yr)
 - deflated farmgate price (\$/lb)
 - other variables

U.S. OYSTER AQUACULTURE PRODUCERS

- The U.S. Aquaculture Census estimated that total oyster farms numbered 483 in 2013 and 701 in 2018.
- Total oyster aquaculture sales reached \$180 M in 2013 and \$285 M in 2018.
- In the number of farms, the top five oyster farming states in 2018 are Massachusetts (151 farms), Virginia (134 farms), Washington (86 farms), Maine (42 farms), and North Carolina (33 farms).
- In annual gross sales, the top five oyster-producing states in 2018 are Virginia (\$62 M), Washington (\$56 M), Louisiana (\$29 M), California (\$29 M), and Massachusetts (\$22 M).

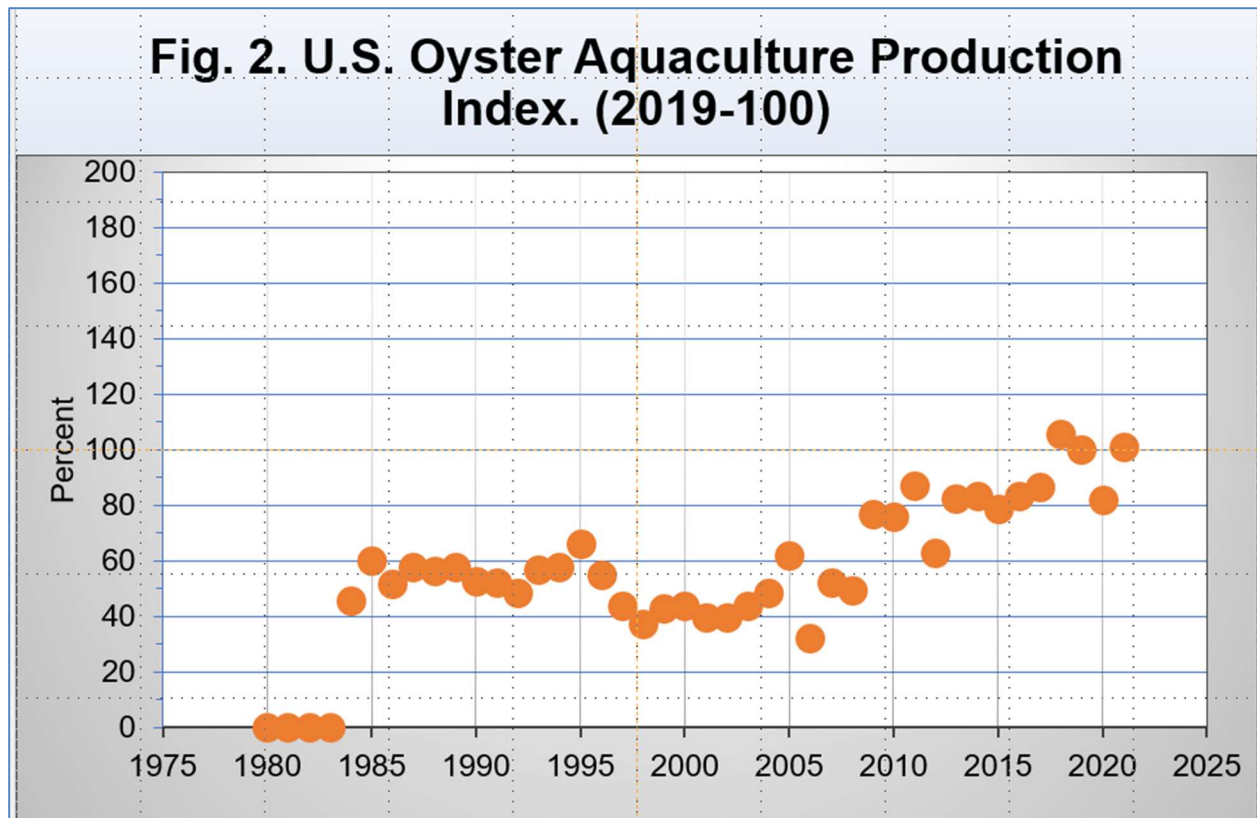
U.S. OYSTER AQUACULTURE PRODUCTION

- Annual U.S. oyster aquaculture production since 1984 is shown in Fig. 1.
- The blue curve (MLBS) shows annual oyster aquaculture production reported by NOAA Fisheries from 1984 to 2019.
- The red dots (MLBS-PRED1) are predicted annual oyster aquaculture production using an econometric model estimated by Dr. Posadas for 1984 to 2021 with R-squared = 0.81.
- The green dotted curve (Poly...MLBS-PRED1) is the Excel-generated polynomial equation of predicted annual oyster aquaculture production up to 2030.



U.S. OYSTER AQUACULTURE PRODUCTION INDEX

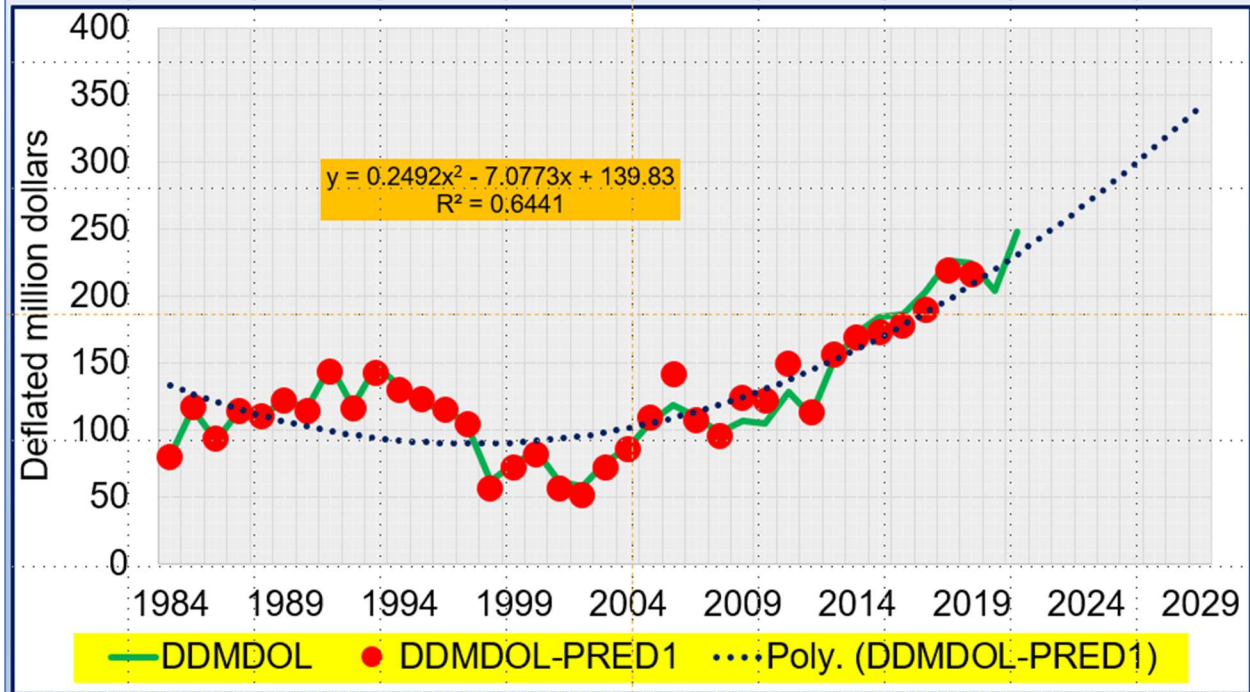
- Annual U.S. oyster aquaculture production peaked in 2018 at 44.7 million pounds of meat.
- The oyster aquaculture production index averaged around 50 percent from 1984 to 2008.
- The oyster aquaculture production index improved to about 84 percent from 2009 to 2019.
- The U.S. oyster aquaculture industry has grown during the past decade and is expected to grow further in the coming decade (Fig. 2).



U.S. OYSTER AQUACULTURE FARMGATE VALUES

- Annual U.S. oyster aquaculture farmgate values since 1984 are shown in Fig. 3.
- The green curve (DDMDOL) shows annual oyster farmgate values reported by NOAA Fisheries from 1984 to 2019. However, the 2013 and 2017 values are lower than what the Aquaculture Census reported.
- The red dots (DDMDOL-PRED1) are predicted annual oyster farmgate values using an econometric model estimated by Dr. Posadas for 1984 to 2021 with R-squared = 0.71.
- The blue dotted curve (Poly...DDMDOL-PRED1) is the Excel-generated polynomial equation of predicted annual oyster farmgate values up to 2030.

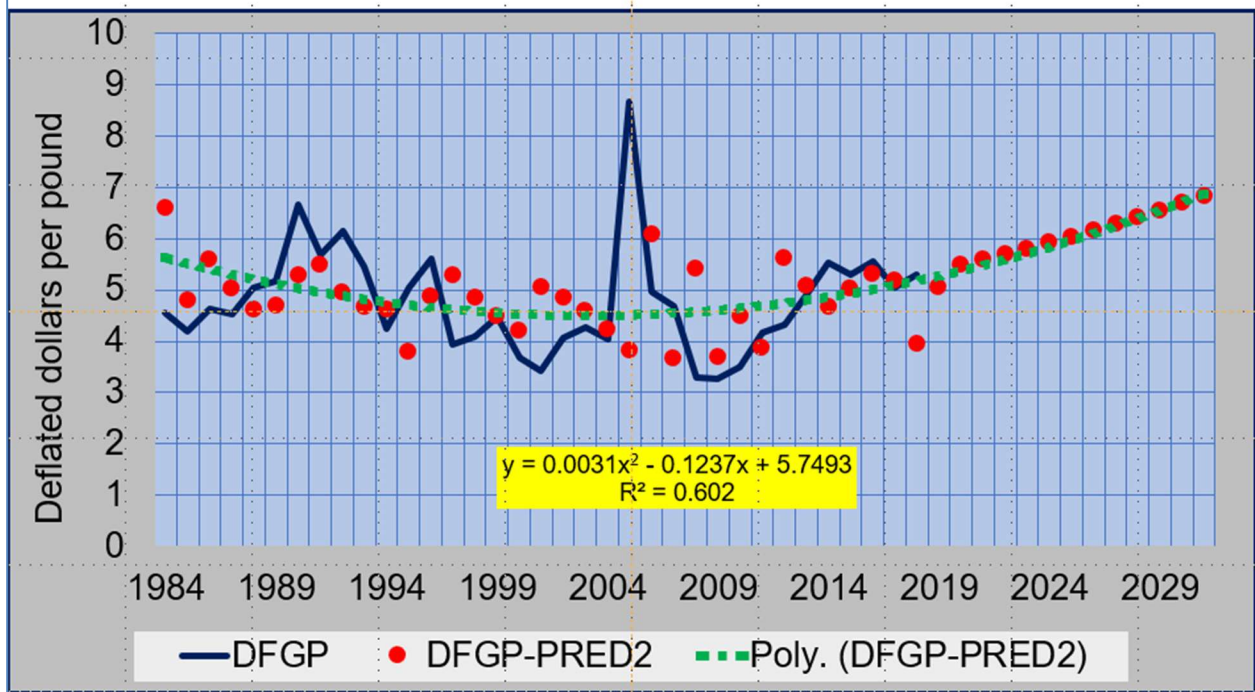
Fig. 3. U.S. Oyster Aquaculture Farmgate Values
Values beyond 2019 are predicted.



U.S. OYSTER AQUACULTURE FARMGATE PRICES

- Annual U.S. oyster farmgate prices imputed from production and farmgate values reported by NOAA Fisheries since 1984 are shown in Fig. 3.
- The blue curve (DFGP) shows the deflated annual oyster farmgate prices from 1984 to 2019.
- The red dots (DFGP-PRED2) are predicted annual oyster farmgate prices using an econometric model estimated by Dr. Posadas for 1984 to 2021.
- The green dotted curve (Poly...DFGP-PRED2) is the Excel-generated polynomial equation of predicted annual oyster farmgate prices up to 2030.

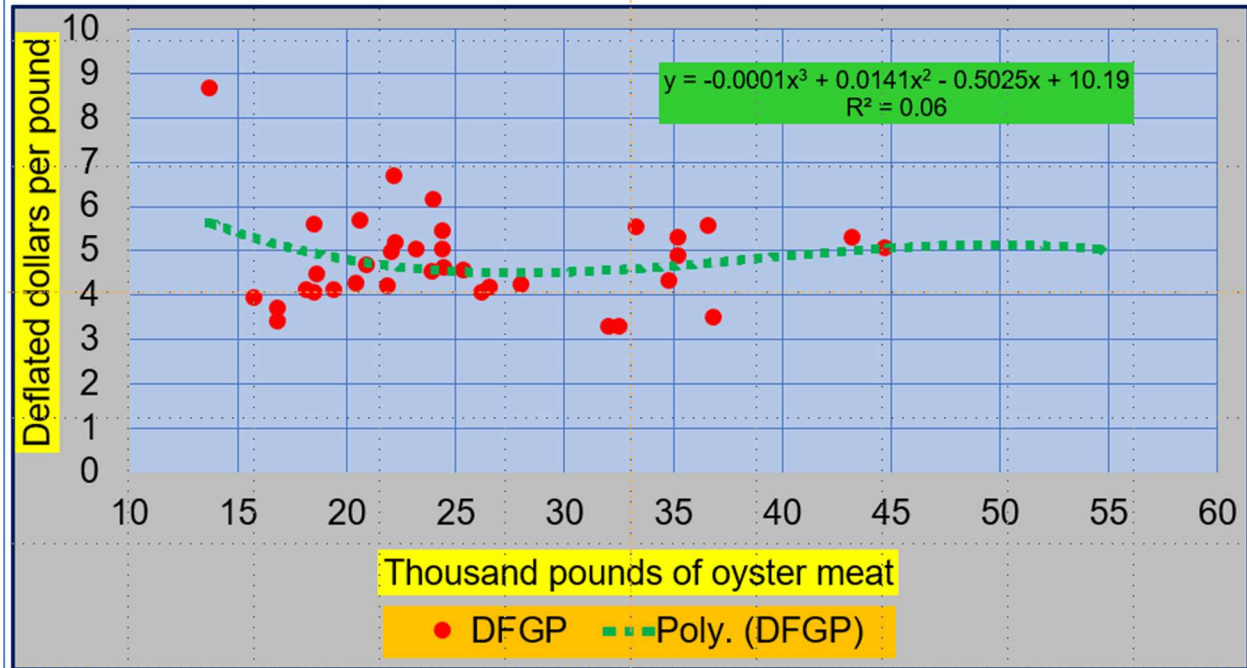
Fig. 4. Imputed U.S. Oyster Farmgate Prices.
 Values beyond 2019 are predicted)



U.S. OYSTER AQUACULTURE PRODUCTION AND FARMGATE PRICES

- The scatter diagram between the U.S. oyster aquaculture production and imputed oyster farmgate prices since 1984 is shown in Fig. 5.
- The red dots (DFGP) are the imputed oyster farmgate prices at various levels of oyster production reported by NOAA Fisheries from 1984 to 2019.
- The green dotted curve (Poly...DFGP) is the Excel-generated polynomial equation of predicted oyster farmgate prices at various levels of oyster production.

Fig. 5. U.S. Oyster Aquaculture Production and Imputed Farmgate Prices



SUMMARY AND IMPLICATIONS

- Annual production and farmgate values are predicted to be lower in 2020 and 2021.
- In 2020, the global pandemic created disruptions in the marketplace and the production space.
- Recessions caused oyster aquaculture production to fall by an average of -2.99 million pounds per year.
- Overall, annual production has been growing during the past decade and is expected to expand further in the coming decade.

MY ECONOMIC OUTREACH ON OYSTERS

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9. Posadas, B.C., and B.K.A. Posadas, Jr. 2017a. [Economic Impacts of the Opening of the Bonnet Carre Spillway to the Mississippi Oyster Fishery](#). J. Food Distr. Soc., 48(1). 42-45.

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