Mississippi MarketMaker Newsletter

THE U.S. TILAPIA AQUACULTURE INDUSTRY HAS BEEN SLOWING DOWN

ABSTRACT

- This newsletter shows the overall trends in U.S. tilapia aquaculture production, landings, and imports.
- Annual aquaculture, commercial landings, and import data are compiled from the NOAA Fisheries and Urner Barry Comtell websites.
- Econometric models are estimated to measure the impacts of disasters and economic events on aquaculture production, commercial landings, and imports.

ACKNOWLEDGEMENT

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KEYWORDS

- Tilapia aquaculture production
- Tilapia commercial landings
- Tilapia imports

LET US START OUR MODELING EFFORT!

- The NOAA Fisheries data on U.S. tilapia aquaculture production (lb/yr) and farmgate values ($/yr) are available from 1991 to 2019.
- Farmgate prices ($/lb) are imputed from farmgate values and annual production.
- The NOAA Fisheries data on U.S. tilapia commercial landings (lb/yr) and dockside values ($/yr) are available from 1973 to 2021.
- Dockside prices ($/lb) are imputed from dockside values and commercial landings.
- The Urner Barry Comtell data on the U.S. volume of tilapia imports (lb/yr) and import values ($/yr) are available from 1992 to 2022.
- Import prices ($/lb) are imputed from import values and volume of imports.
- Econometric models are estimated to determine significant production, landings, and import determinants.

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)
    - Commercial landings (lb/yr)
    - The volume of imports (lb/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
    - deflated farmgate, dockside, and import prices ($/lb)
    - recession, trade war, pandemic, and Gulf natural disasters (1 or 0)
    - unemployment rate (%)
    - other variables

TOTAL U.S. TILAPIA SUPPLY

- The total U.S. tilapia supply is shown in Fig. 1. It includes:
    - commercial tilapia landings,
    - tilapia aquaculture production, and
    - tilapia imports.
- Annual tilapia supply was highest in 2012-14 at over 500 million pounds.
- The apparent per capita tilapia consumption peaked at 1.66-1.68 pounds per person. After that, it had been a downhill up to the present.

TOTAL U.S. TILAPIA EXPENDITURES

- The total U.S. tilapia expenditure is shown in Fig. 2. It includes the following:
    - farmgate values of tilapia aquaculture production
    - dockside values of commercial tilapia landings and
    - values of all tilapia imports
- Annual tilapia expenditures peaked in the mid-2010s, valued at $1.1 billion.
- The apparent per capita tilapia expenditure peaked in 2012-14 at $3.30-3.64 per person.

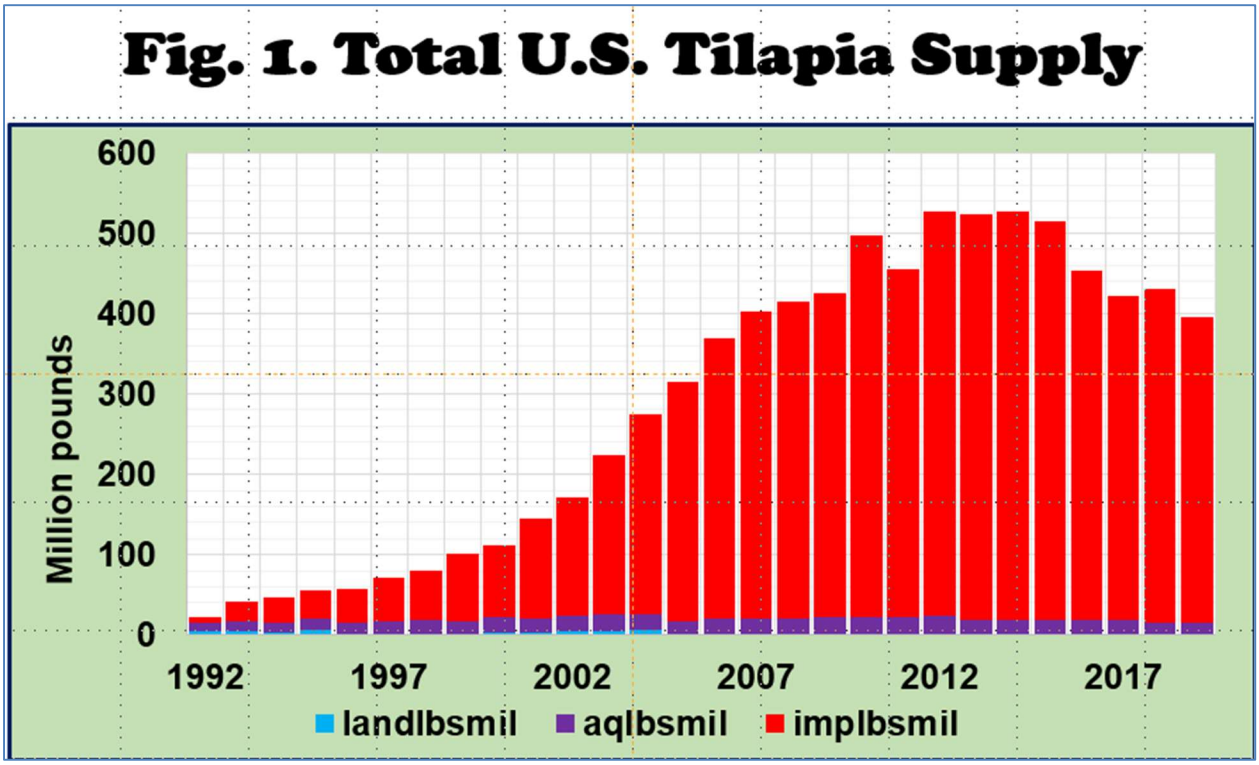


Fig. 1. Total U.S. Tilapia Supply
Million pounds
600
500
400
300
200
100
0
1992
1997
2002
2007
2012
2017
landlbsmil
aqlbsmil
implbsmil

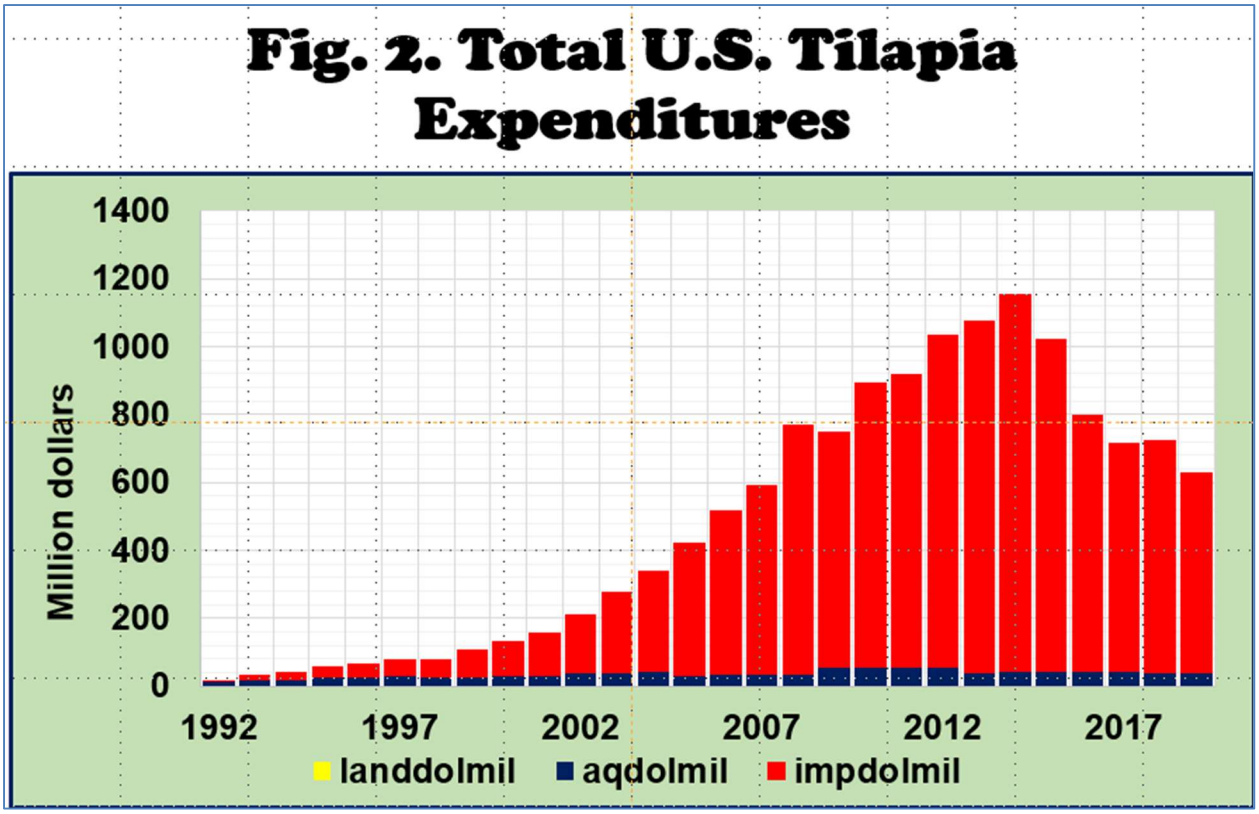
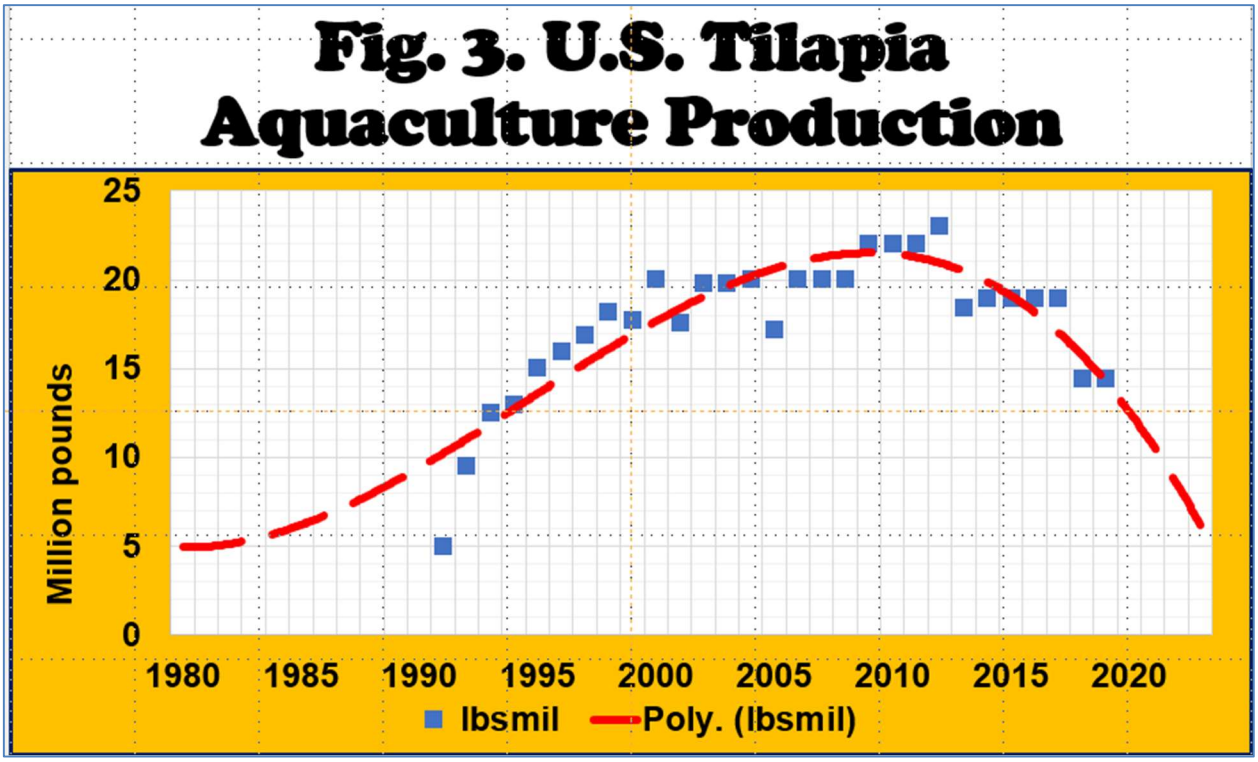


Fig. 2. Total U.S. Tilapia Expenditures
Million dollars
1400
1200
1000
800
600
400
200
0
1992
1997
2002
2007
2012
2017
landdolmil
aqdolmil
impdolmil

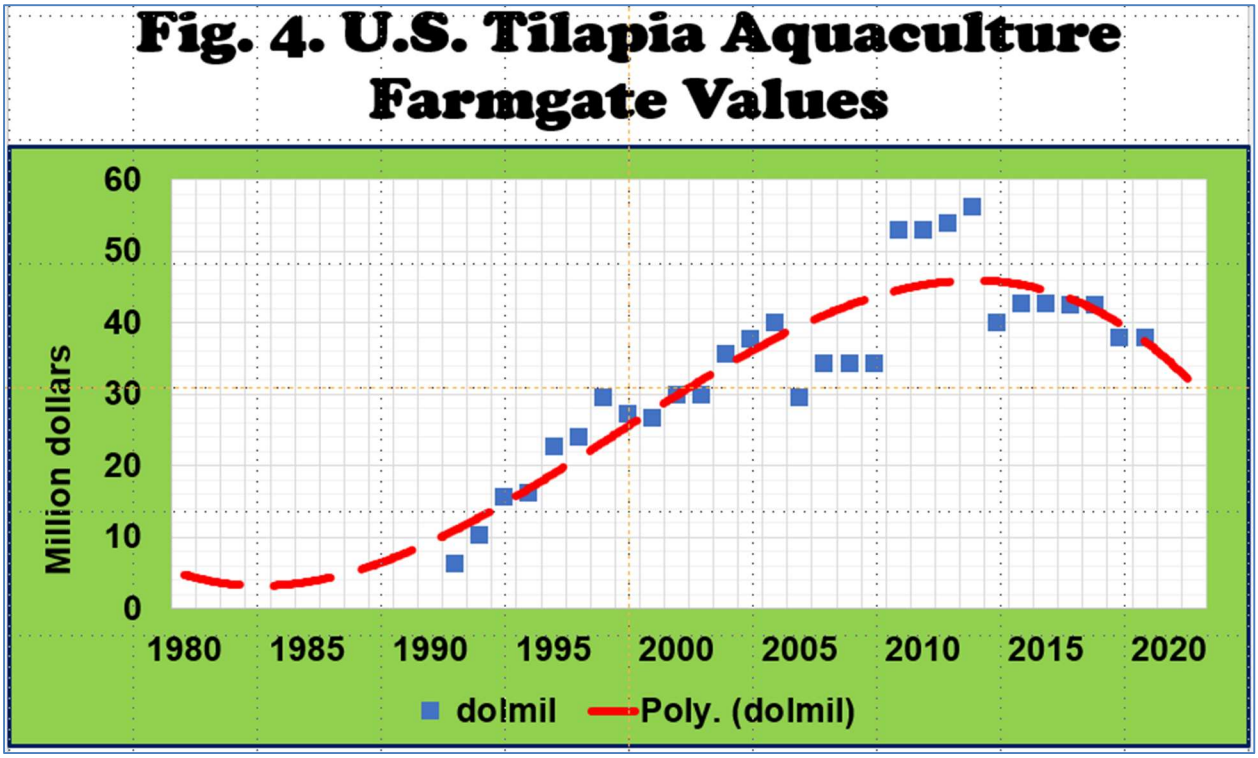
U.S. TILAPIA AQUACULTURE PRODUCTION

- Tilapia aquaculture production (lb/yr)
- Data from 1991 to 2019 were compiled from the NOAA Fisheries website.
- Tilapia's annual aquaculture production peaked in the early 2010s.
- Since then, it has declined to about 15 million pounds per year.



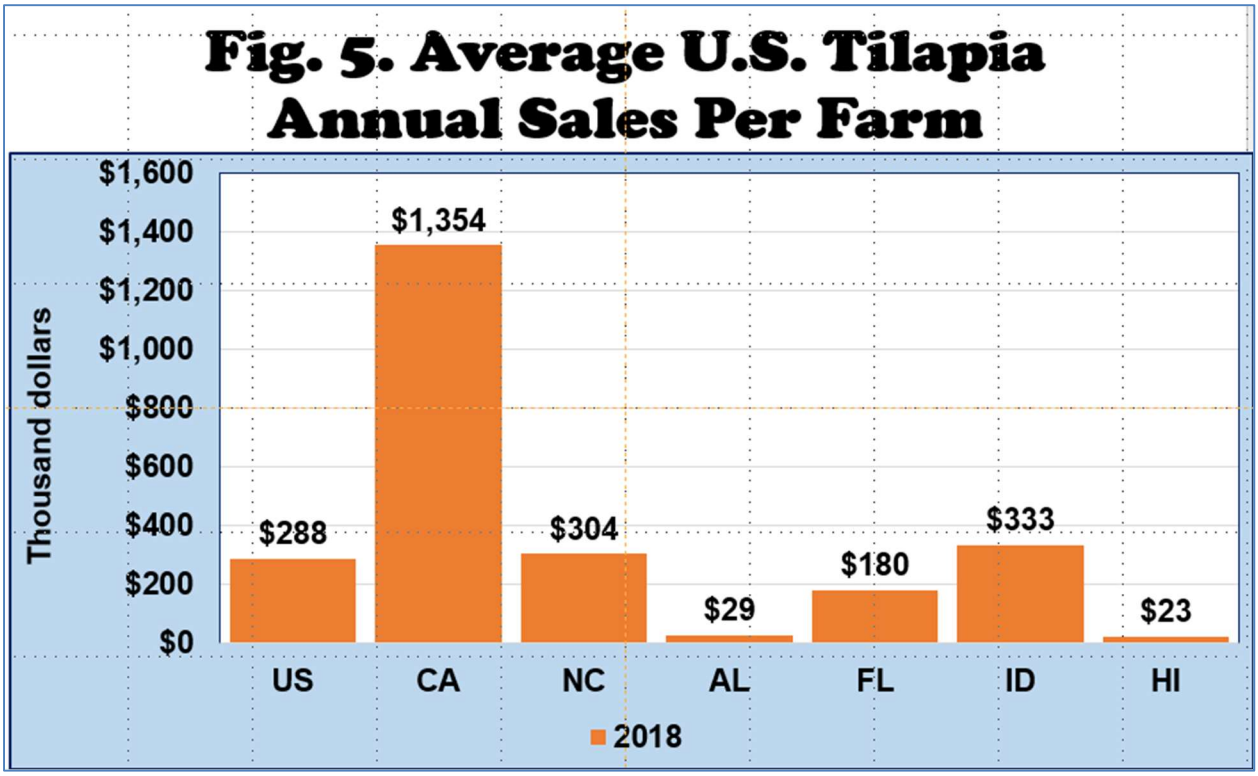
U.S. TILAPIA AQUACULTURE FARMGATE VALUES

- Tilapia farm-gate values ($/yr)
- Data from 1991 to 2019 were compiled from the NOAA Fisheries website.
- Annual tilapia aquaculture farmgate values peaked in the early 2010s.
- Since then, it decreased to less than $40 million per year.



U.S. TILAPIA AQUACULTURE PRODUCERS

- In 2013, there were 181 tilapia farms in the U.S., as compiled from the U.S. Agriculture Census website. The average annual tilapia sales per farm was $235,000 per farm.
- The number of tilapia farms fell to 137 in 2018, with a higher average annual sale of $288,000 per tilapia farm.
- In 2018, tilapia farms with reported total annual sales were in the following states:
    - California ($12.2 million),
    - Florida ($3.1 million),
    - North Carolina ($2.4 million),
    - Idaho ($2.0 million),
    - Hawaii ($280,000), and
    - Alabama ($172,000).



U.S. TILAPIA COMMERCIAL LANDINGS

- Annual tilapia commercial landings (lb/yr)
- Data from 1980 to 2021 were compiled from the NOAA Fisheries website.
- Tilapia annual commercial landings peaked in the early 1990s and 2000s (Fig. 6).
- Since then, it has declined to less than 100,000 pounds per year.

U.S. TILAPIA COMMERCIAL LANDING VALUES

- Tilapia dockside values ($/yr)
- Data from 1980 to 2021 were compiled from the NOAA Fisheries website.
- The tilapia's annual commercial landing values peaked in the early 1990s and 2000s (Fig. 7).
- Since then, it continued to decline to about $70,000 per year.

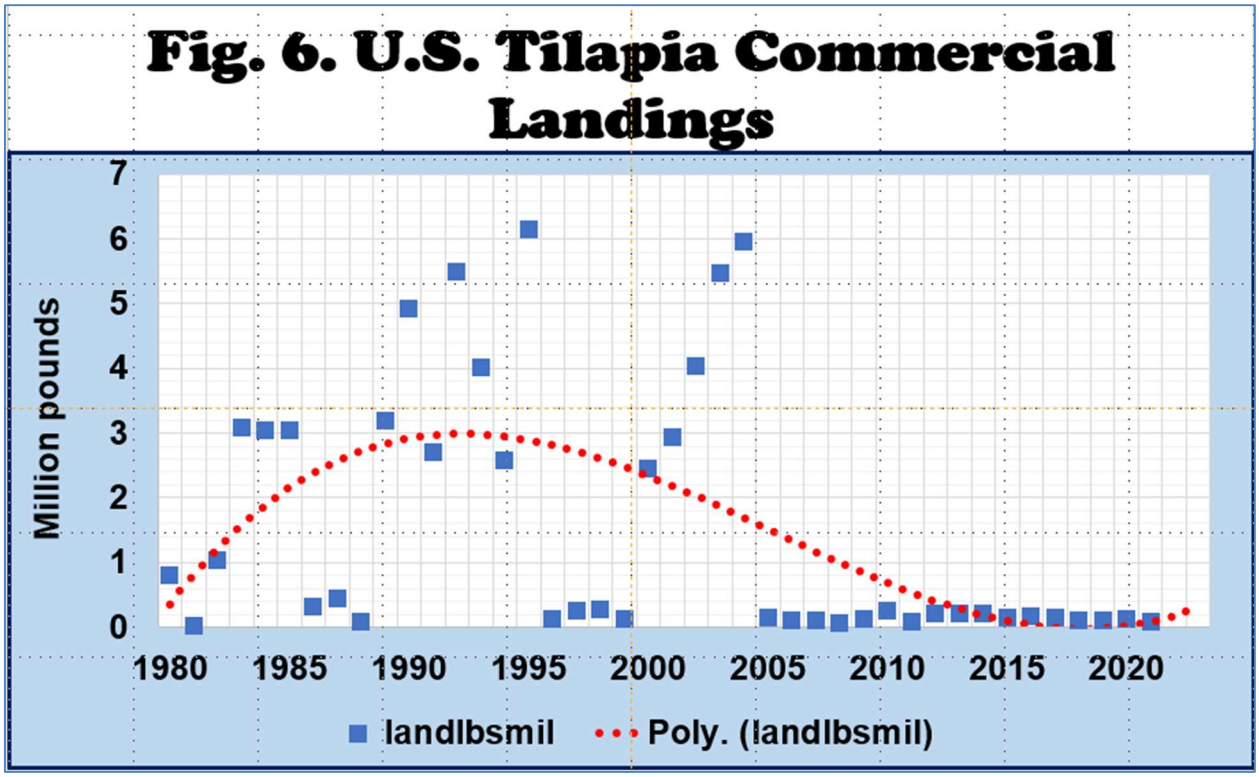


Fig. 6. U.S. Tilapia Commercial Landings
Million pounds
7
6
5
4
3
2
1
0
1980
1985
1990
1995
2000
2005
2010
2015
2020
landlbsmil
Poly. (landlbsmil)

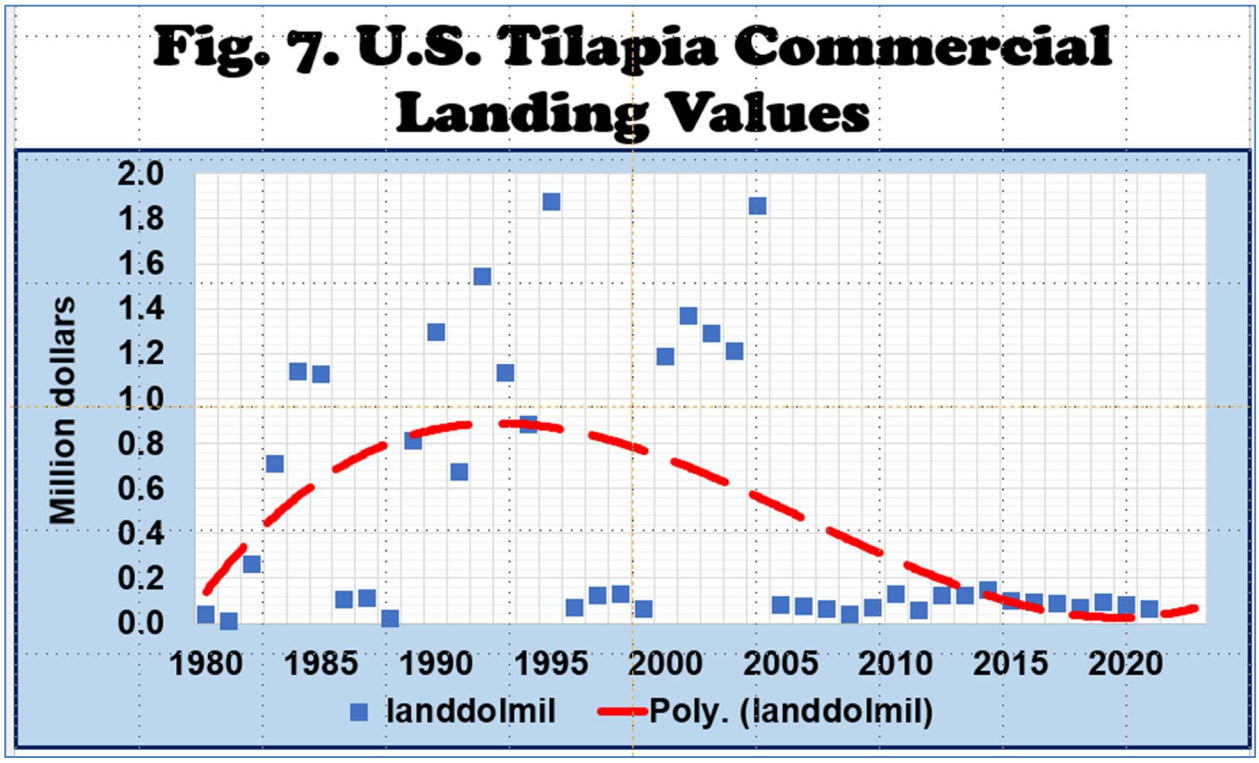
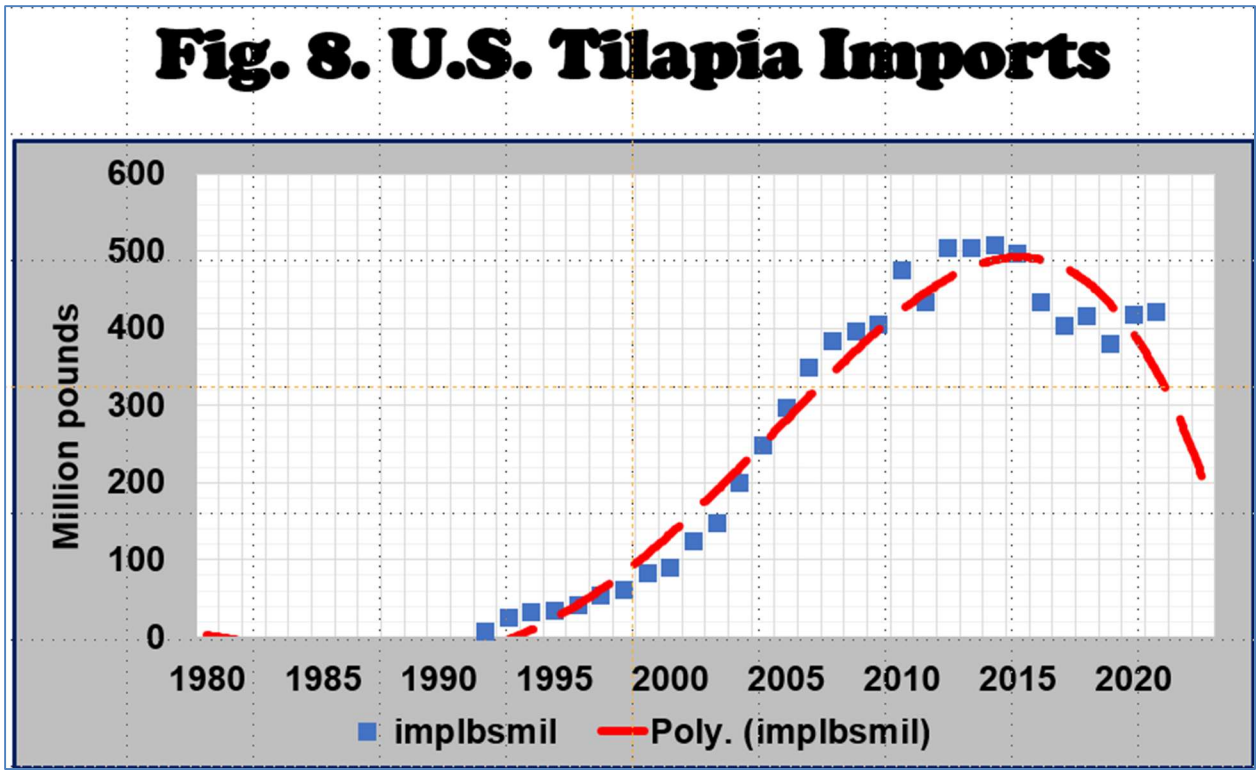


Fig. 7. U.S. Tilapia Commercial Landing Values
Million dollars
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1980
1985
1990
1995
2000
2005
2010
2015
2020
landdolmil
Poly. (landdolmil)

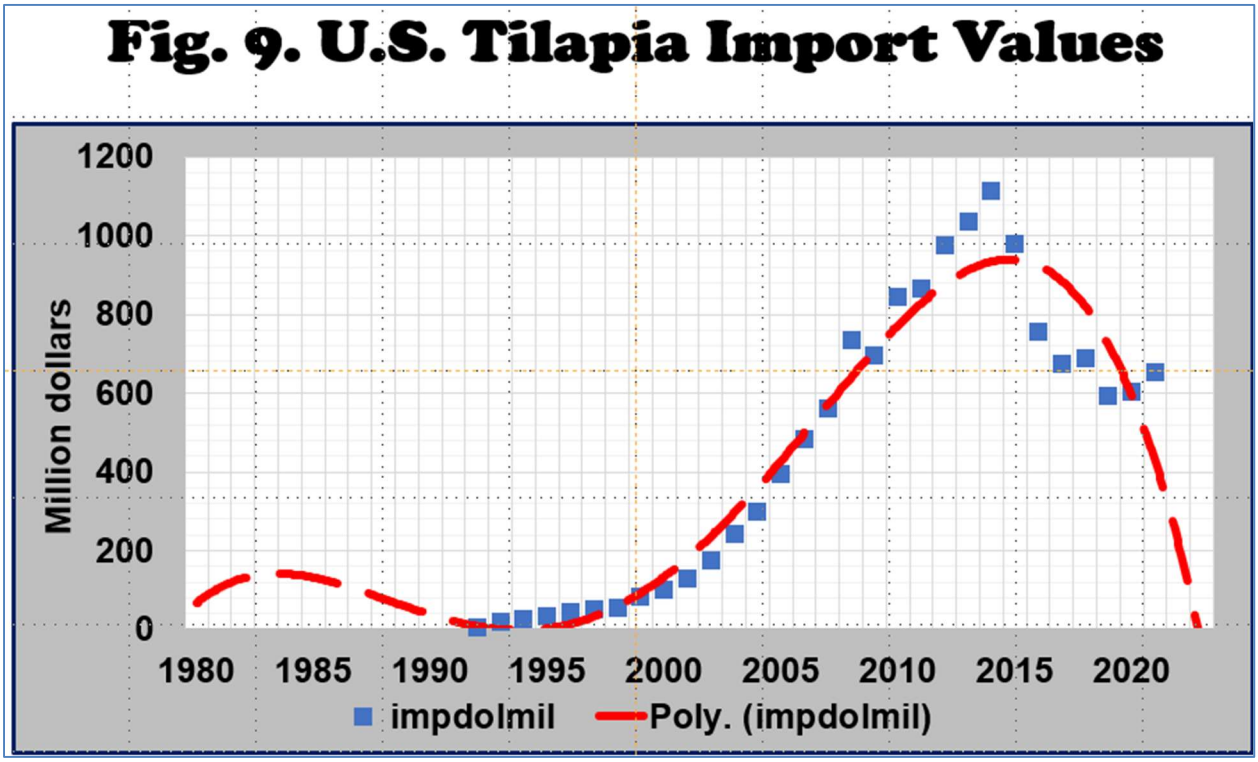
VOLUME OF U.S. TILAPIA IMPORTS

- The volume of tilapia imports (lb/yr)
- Data from 1992 to 2022 were compiled from the Urner Barry Comtell website.
- Tilapia annual imports peaked in the mid-2010s (Fig. 8).
- Since then, it has declined to less than 400 million pounds annually.



VALUE OF U.S. TILAPIA IMPORTS

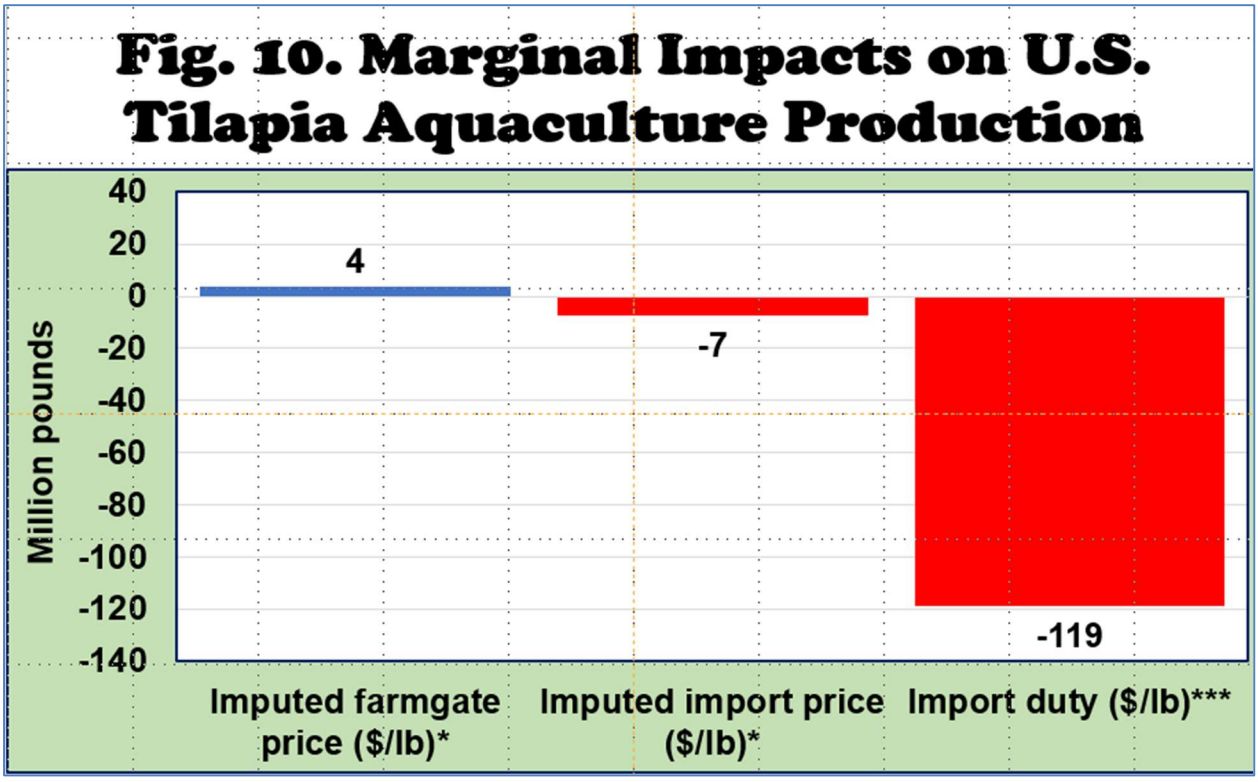
- Value of tilapia imports ($/yr)
- Data from 1992 to 2022 were compiled from the Urner Barry Comtell website.
- The tilapia annual import values peaked in the mid-2000s at over $1.1 billion (Fig. 9).
- Since then, it has declined to less than $600 million annually.



MARGINAL IMPACTS ON U.S. TILAPIA AQUACULTURE PRODUCTION

Significant variables affecting tilapia production (Fig 10):

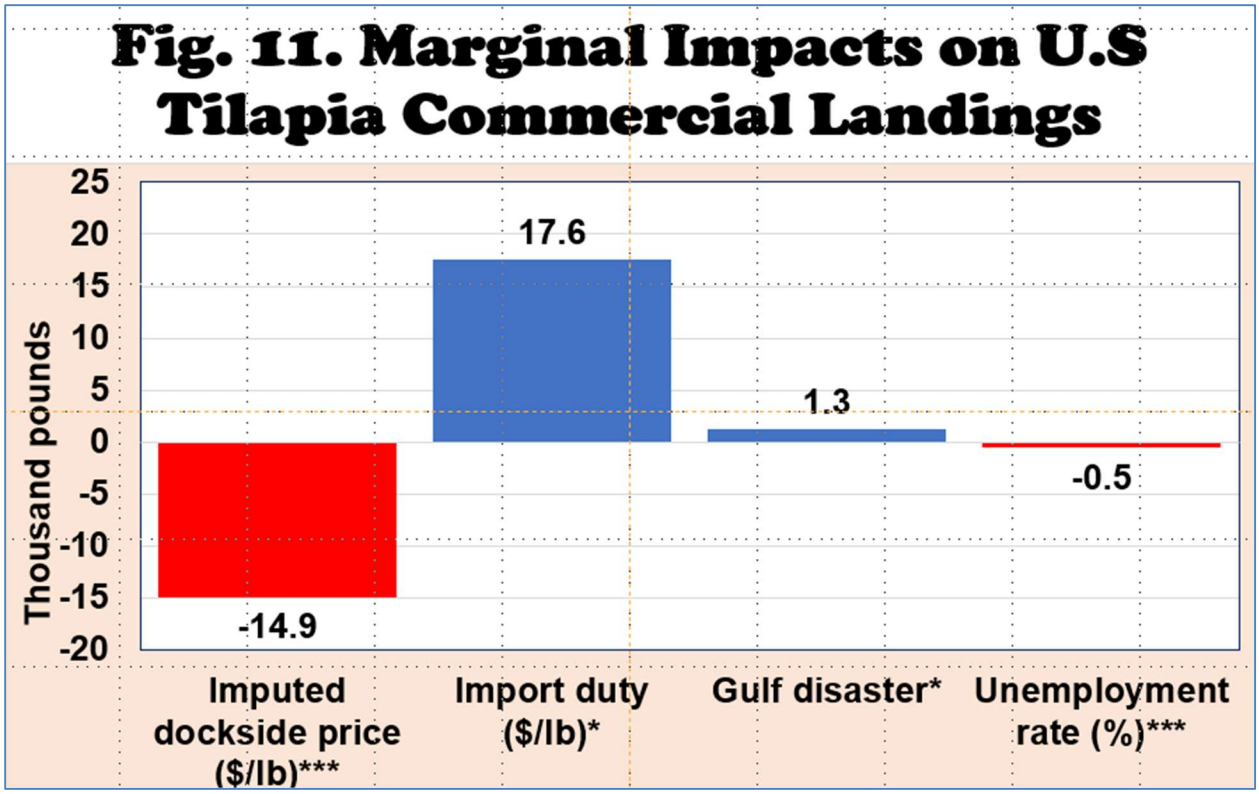
- A dollar increase in imputed deflated tilapia farmgate price led to a 4-million-pound rise in tilapia aquaculture production.
- A dollar increase in imputed deflated tilapia import price led to a 7-million-pound fall in tilapia aquaculture production.
- A dollar increase in deflated tilapia import duty led to a 119-million-pound fall in tilapia aquaculture production.



MARGINAL IMPACTS ON U.S. TILAPIA COMMERCIAL LANDINGS

Significant variables affecting tilapia commercial landings (Fig 11):

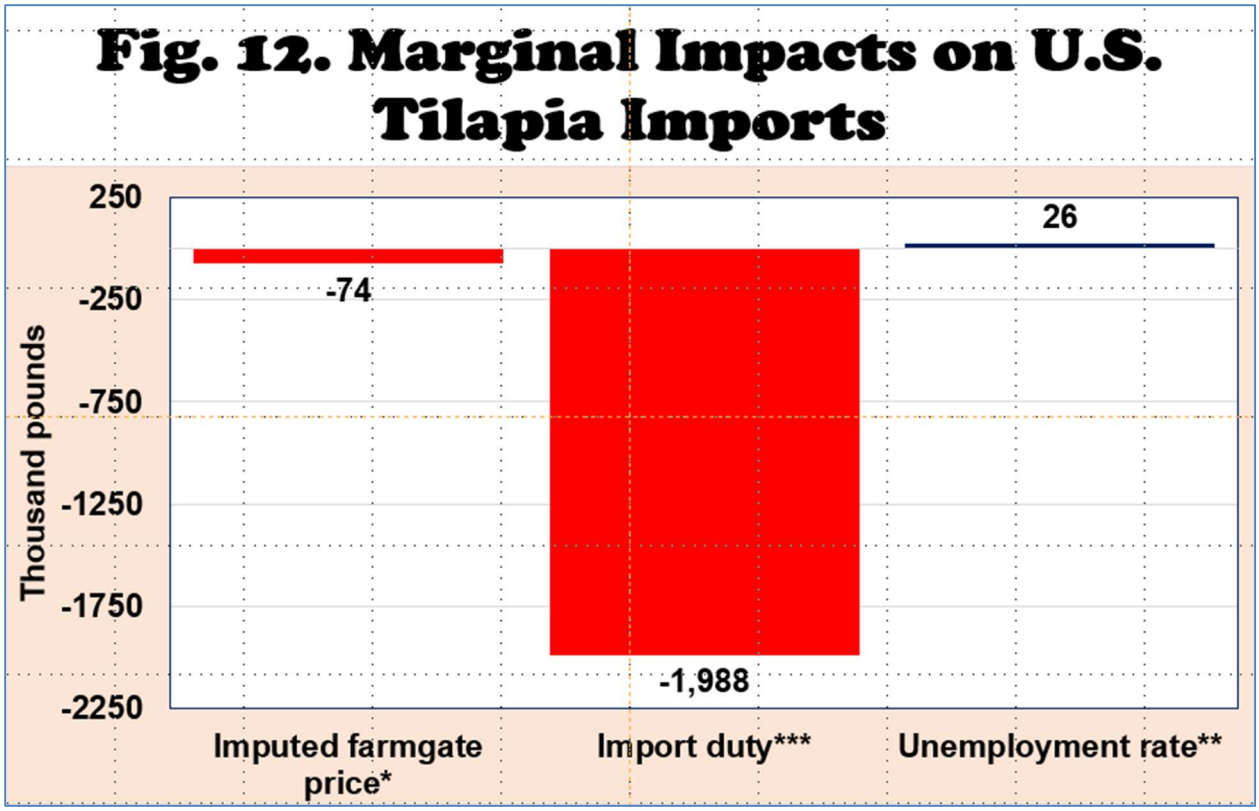
- A dollar increase in imputed deflated tilapia dockside price led to a 14.9-million-pound fall in tilapia commercial landings.
- A dollar increase in deflated tilapia import duty led to a 17.6-million-pound rise in tilapia commercial landings.
- A Gulf disaster event could increase tilapia commercial landings by 1.3 million pounds (???).
- A 1% unemployment rise led to an almost 0.5-million-pound fall in commercial tilapia landings.



MARGINAL IMPACTS ON U.S. TILAPIA IMPORTS

Significant variables affecting tilapia imports (Fig 12):

- A dollar increase in imputed deflated tilapia farmgate price led to a 74-million-pound fall in tilapia imports.
- A dollar increase in deflated tilapia import duty per pound led to an almost 2-million-pound reduction in tilapia imports.
- A 1% unemployment rise led to a 26-million-pound commercial tilapia import increase.



SUMMARY AND IMPLICATIONS

These variables have been shown to exert significant impacts on tilapia aquaculture production, tilapia commercial landings, and tilapia imports:

- Changes in tilapia farmgate prices,
- Changes in tilapia dockside prices,
- Changes in tilapia import prices,
- Changes in tilapia import duties,
- Occurrence of Gulf disaster event,
- Changes in the unemployment rate.

However, the magnitude and direction of impacts are still subject to further model development and testing.

MY ECONOMIC OUTREACH ON TILAPIA

- Posadas, B.C. The U.S. Tilapia Aquaculture Industry. Horticulture and Marine Economics Outreach. MSU-CREC, Biloxi, MS. Virtual presentation. May 10, 2023. https://youtu.be/m59bI42mTYc.
- Posadas, B.C. U.S. Tilapia Consumption, Production, Imports, and Prices. Mississippi MarketMaker Newsletter, Vol. 10, No. 9. September 30, 2020. https://tinyurl.com/4utrhd9c.
- Posadas, B.C. Tilapia Farming and Related Businesses! Mississippi MarketMaker Newsletter, Vol. 5, No. 4. April 7, 2015. https://tinyurl.com/2af5rdd4.

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