

# Economic Losses from Pollution Closure of Clam Harvesting Areas in Machias Bay

Kevin Athearn, Ph.D.  
University of Maine at Machias

June 8, 2012

Tora Johnson (UMM) and Brian Beal (UMM) assisted with this study.

# Sh\*t Happens:

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# Value of Conservation

Physical health

Mental health

Quality of life

Water supply

Recreation

Food supply

Water purification

Clean air

Income

Wildlife

Jobs

Assimilation of wastes

Pollination of Crops

Medicines and pharmaceuticals

Energy

Mitigation of floods and droughts

Soil formation

Erosion Control

# Value of Conservation

## ➤ Value for a community or region

### ➤ Economic indicators

- GDP, income, jobs

### ➤ Community/sustainability indicators

- Sustainable Seattle Happiness Initiative
- Gross National Happiness Index
- Happy Planet Index
- Regional sustainability indicators



# Economic Perspective

- Environment as an asset
- Forms of capital:
  1. **Natural capital**
  2. Human capital
  3. Social capital
  4. Manufactured capital
  5. Financial capital
- Improvements in quality and quantity of **natural capital** enhance the potential flow of benefits.

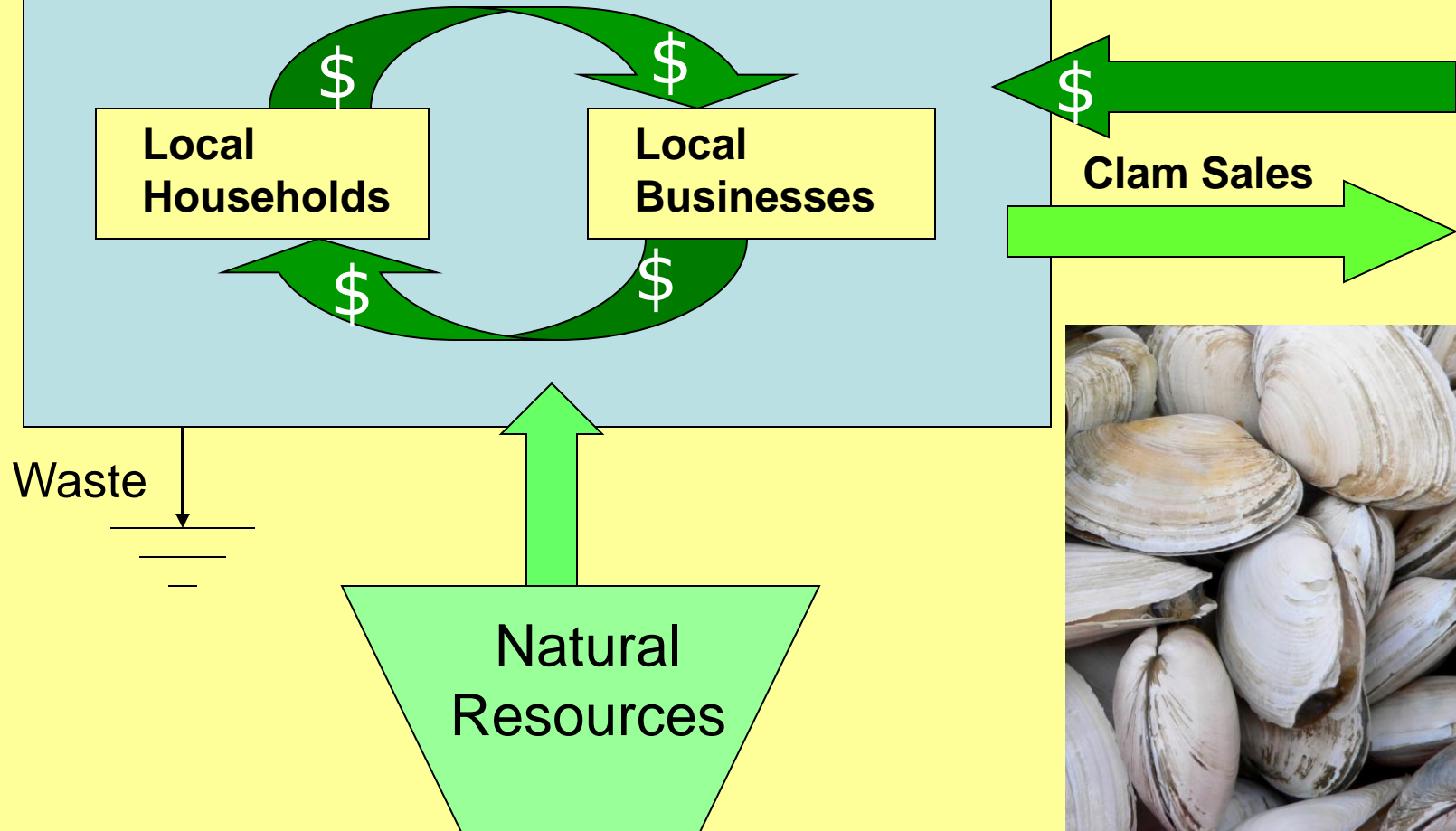








# DOWN EAST ECONOMY



# DOWN EAST ENVIRONMENT

TOWN OF MACHIAS  
WASTEWATER TREATMENT FACILITY





0 500 1,000 Feet

**TOWN OF  
MACHIAS  
WET WEATHER  
SEWAGE  
DISCHARGE  
OUTFALL #1**





D

THIS AREA  
**CLOSED**

TO ALL DIGGING  
OF

CLAMS, MUSSELS, QUAHOGS,  
OYSTERS, CARNIVOROUS WHELKS  
OR SNAILS

BECAUSE OF POLLUTION

OR

PARALYTIC SHELL FISH POISON



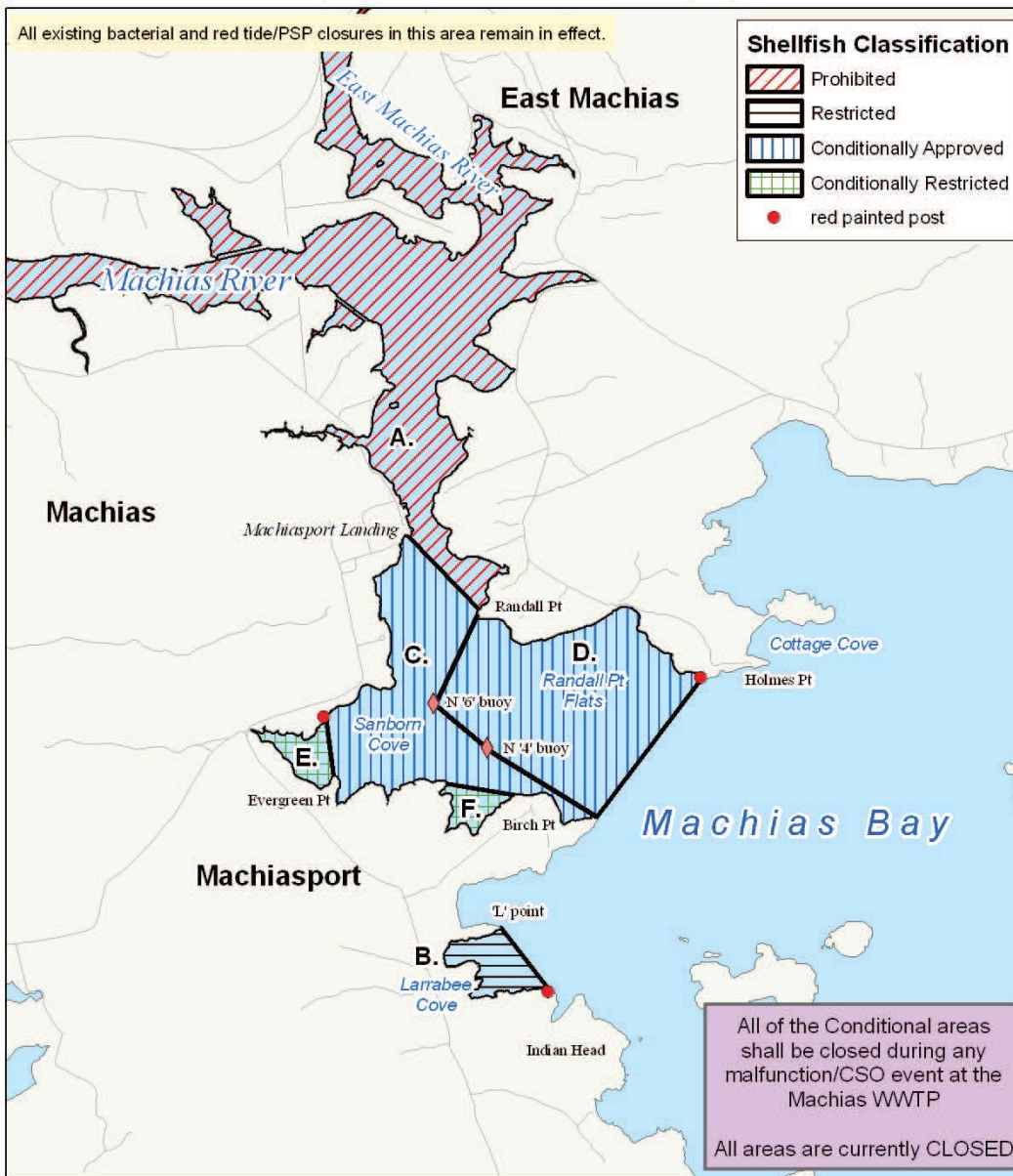
# Maine Department of Marine Resources

Pollution Area No. 55

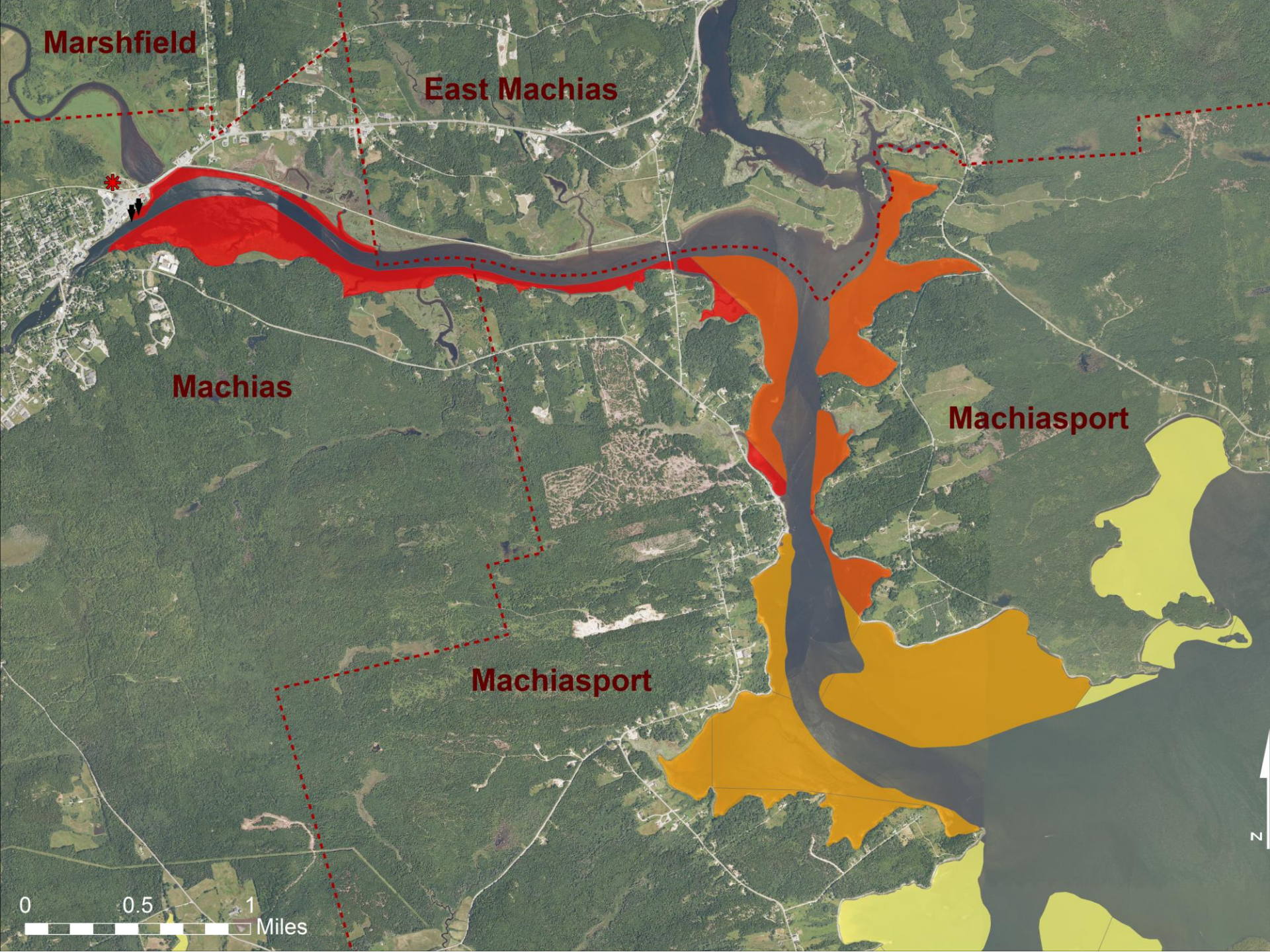
Machias and East Machias Rivers, Machias Bay and vicinity  
(Machias, East Machias, Machiasport)



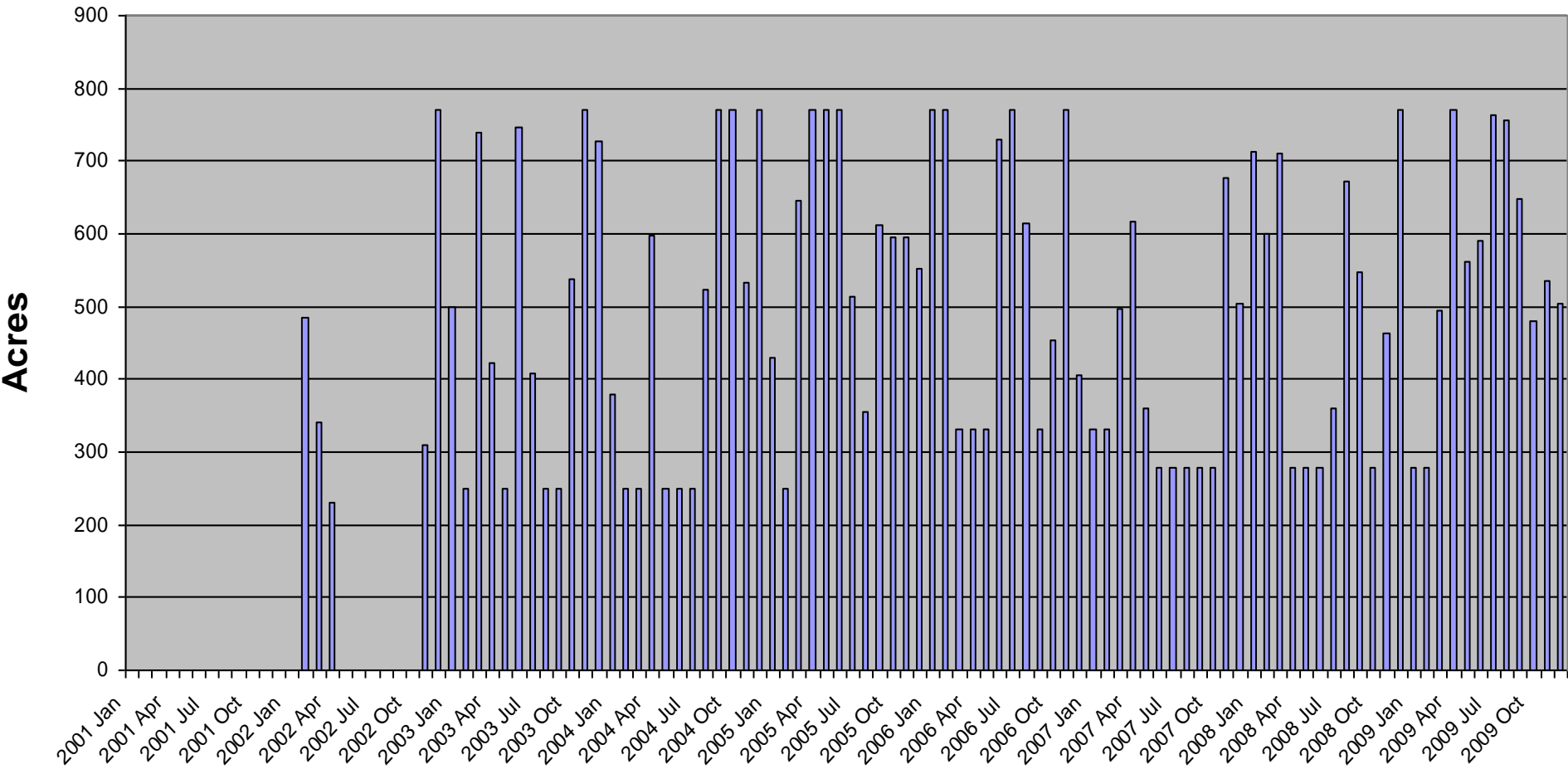
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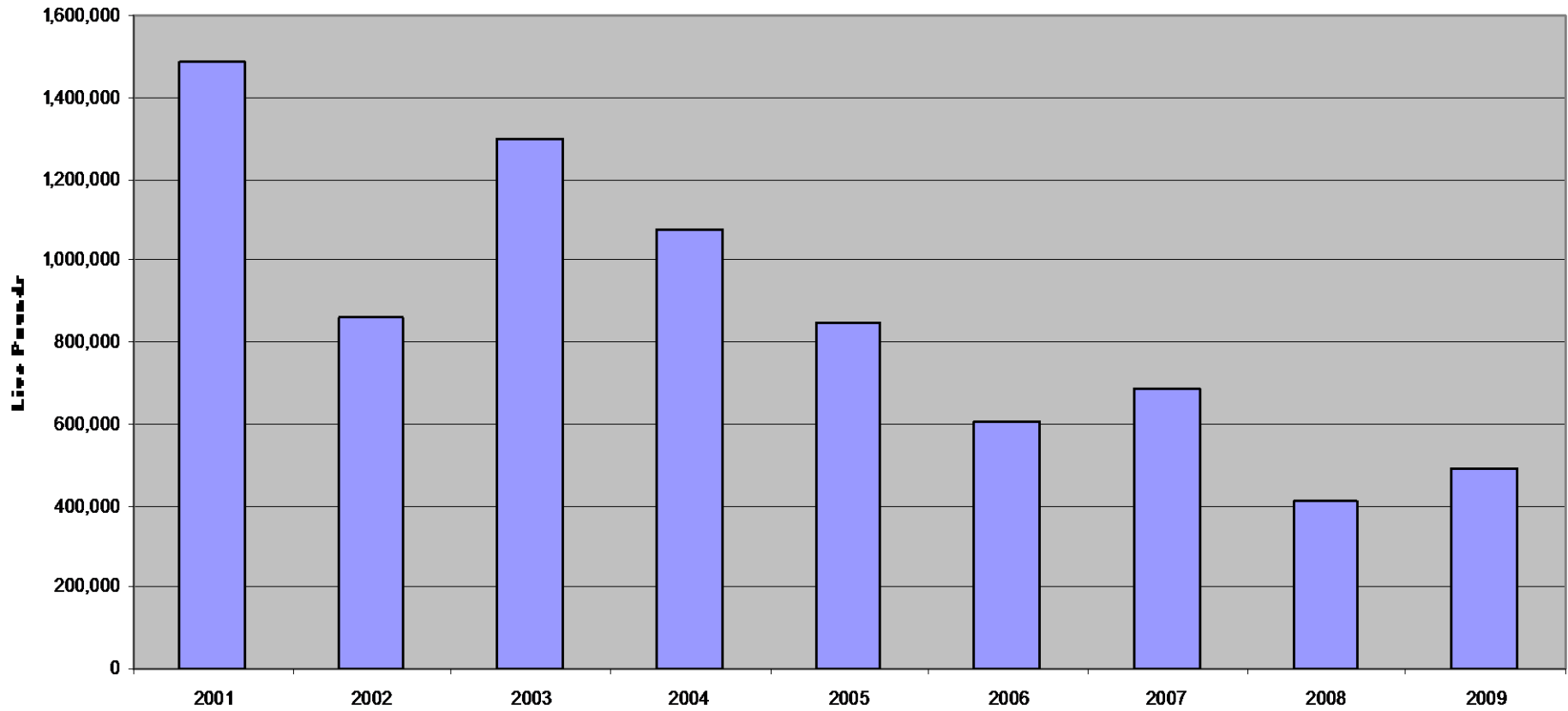




# Monthly Average Closed Acres Per Tide, Linked to Machias WWTP

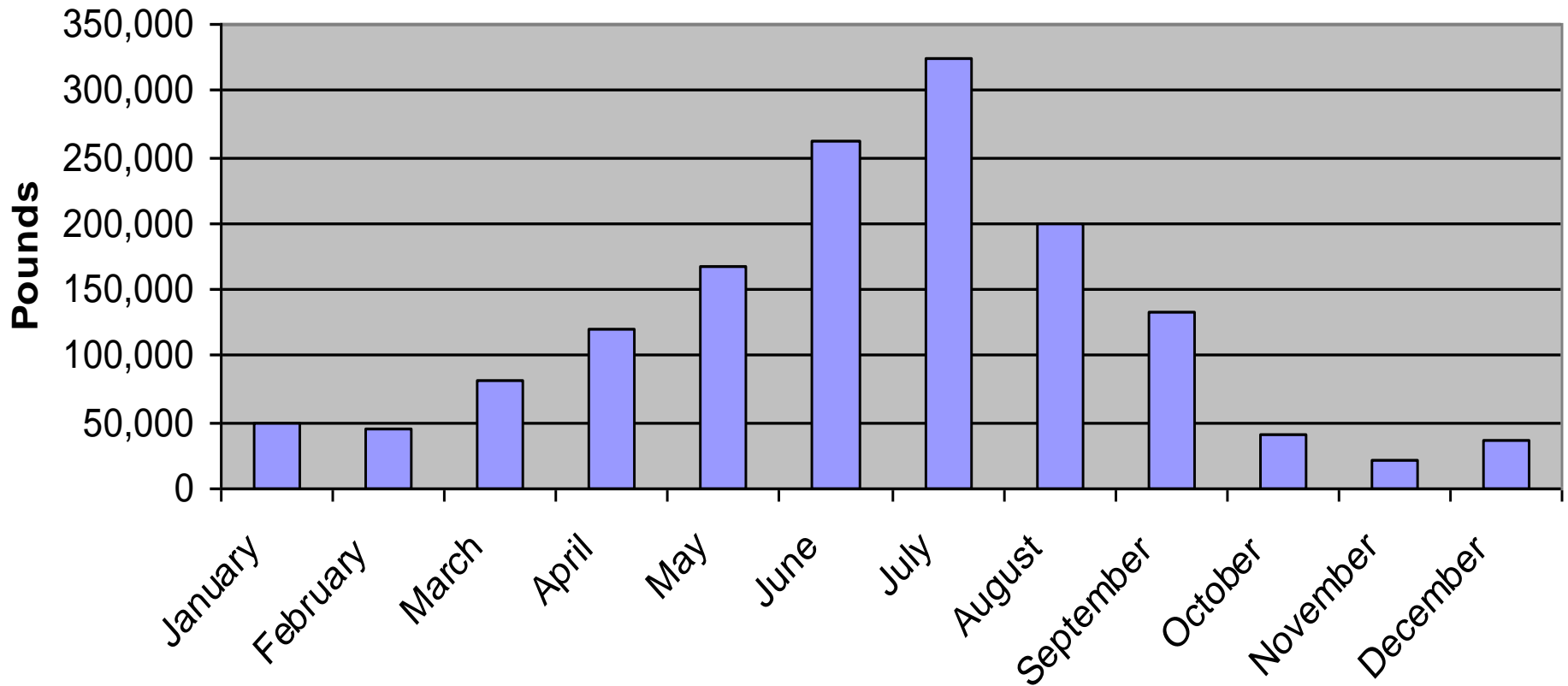


**Pounds Harvested by Year**  
**Machias & Machiasport**




## Pounds Harvested by Month, 2001

### Machias & Machiasport



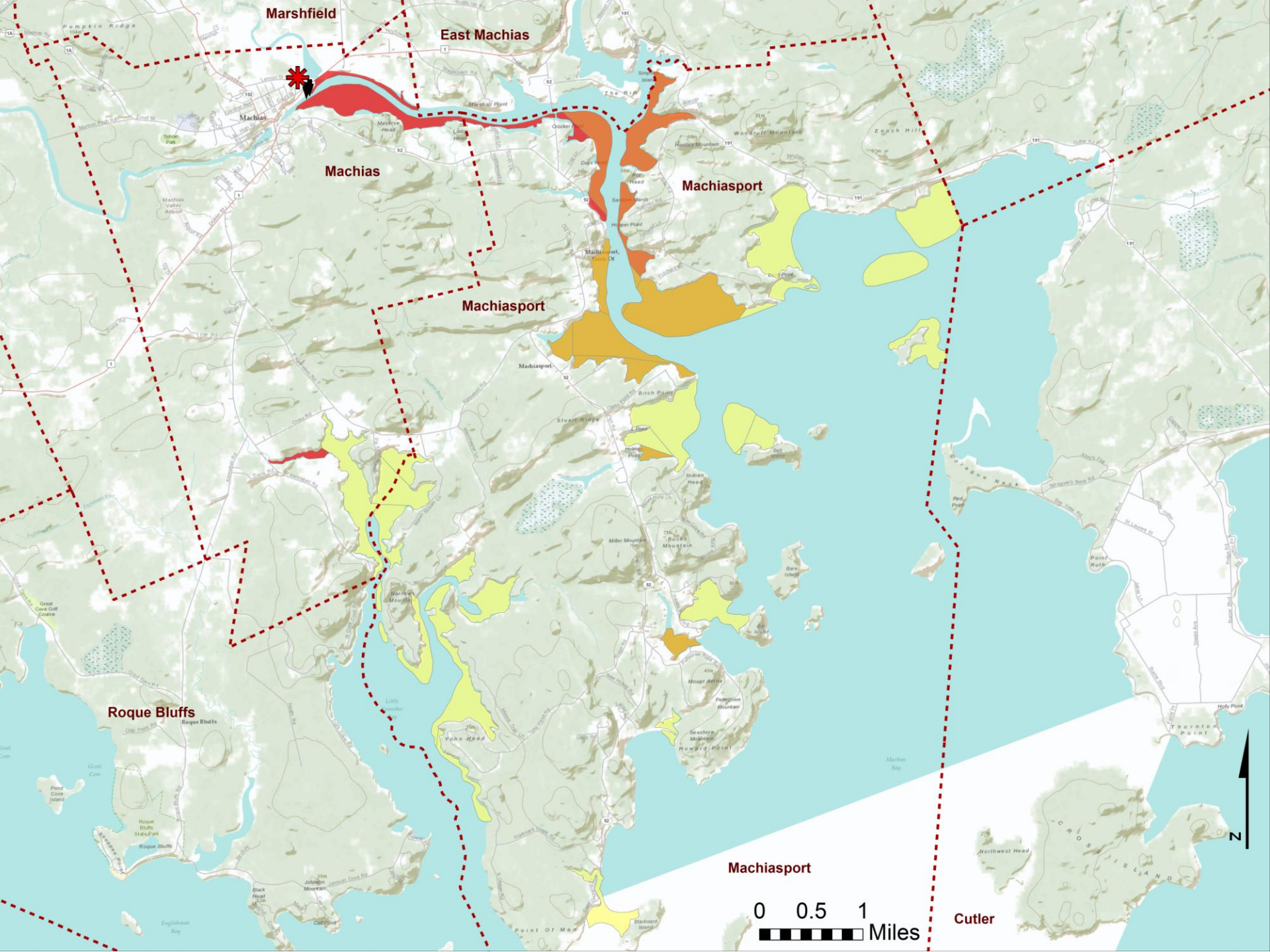
# Analysis 2001-2009

1. Test for relationship between pollution closures and monthly clam sales
  2. Estimate magnitude of lost clam sales attributed to pollution closures
  3. Estimate local economic impact (loss) from pollution closures
- 
- The background of the slide features a blue gradient with several concentric white circles at the bottom, resembling ripples in water.

# GIS


- Mapped intertidal areas of Machias Bay and Little Kennebec Bay
- Divided intertidal areas into 22 distinct polygons to show daily closure status, 2001-2009
- Calculated acreage of each polygon to obtain daily closed (& open) acreage

GIS work completed with a lot of help from Tora Johnson, Director of GIS Service Center, University of Maine at Machias.



# Interviews

Interviewed 11 clam diggers to learn about...

1. Factors affecting harvesting effort
  2. Factors believed to affect landings
  3. Expenditure related to clamming
  4. Where local clams are sold
  5. How pollution closures affect clam diggers
- 
- The bottom of the slide features several faint, concentric circular ripples in a lighter blue shade, resembling water droplets or waves, which add a decorative touch to the presentation.

# Interviews

Interviewed 2 clam dealers to learn about...

1. Factors perceived to affect clam landings
2. Market channels for local clams
3. How closures affect seafood dealers



# Statistical Model

Dependent Variable: Monthly Clam Landings (lbs)

Independent Variable	Coefficient Estimate	t Statistic	P Value	R <sup>2</sup>
Price of Clams, Infl.Adj.	85122.1	6.0878	<0.0001	0.71
Average Open Acres	51.8357	5.3163	<0.0001	
2002 Truck Buyer Dummy	-65122.6	-3.6758	0.0004	
WC Other Seafood Landings \$	-0.00846	-3.446	0.0008	
Number of Daylight Tides	3908.505	3.1125	0.0024	
Avg Daily Mean Temperature	1631.315	2.4957	0.0142	

# Lost Clam Sales from WWTP Closures, 2001-2009

- Lost Clam Landings:\* **2.3 million lbs**
- Lost Value to Diggers:\* **\$3.2 million**  
(2010 dollars, inflation adjusted)

\*Preliminary results, pending further analysis

# Washington County Economic Impact

Direct Impact	<b>\$3.42 million</b>
Indirect Impact	<b>\$1.71 million</b>
Total Lost Output	<b>\$5.13 million</b>
Total Lost Income	<b>\$3.44 million</b>

\*Preliminary results, pending further analysis

# Value of WWTP Upgrades

1. Increase supply of clams to Northeast U.S. consumers
2. Increase income for local clam diggers and seafood dealers
3. Increase income for local businesses

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