



# Linking Local Economic Indicators to Environmental Change and Regulation: First Steps

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with research assistance from Allison Chan, Scott  
Norris, and Calvin Kwan

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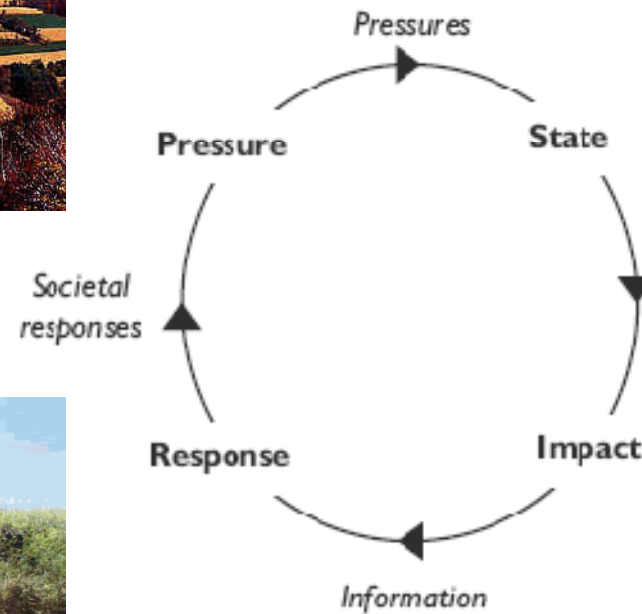
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# Pressure-State-Impact-Response



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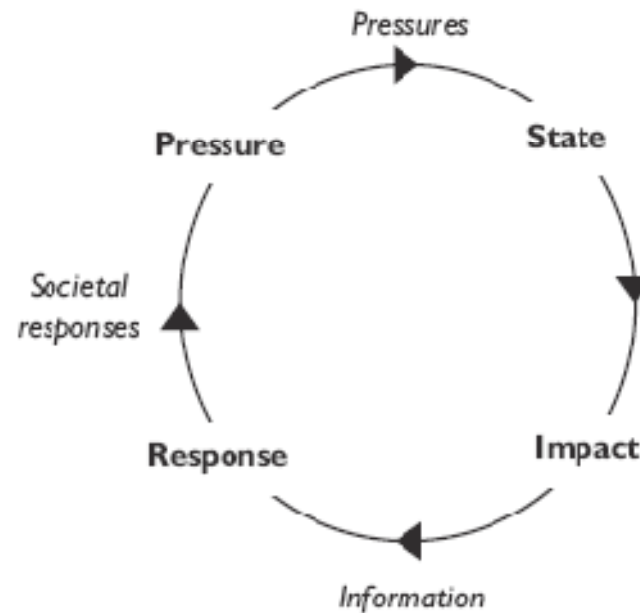


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# Pressure-State-Impact-Response

**Measures of STATE -**  
Environmental Indicators



**Measures of IMPACT -**

Economic and Social Indicators  
(outcomes vs. outputs)  
(start with focus on coastal use)

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# What To Do With Indicator Data?

Collect coastal use data and plot it!

- Establish baseline (relative values)
- Identify changes in activities
- Historical narrative - examine conventional (anecdotal) wisdom about impacts of
  - Environmental quality
  - Regulation
  - Climate change/weather, etc.

# Beach Use in Santa Monica Bay

What's the baseline?



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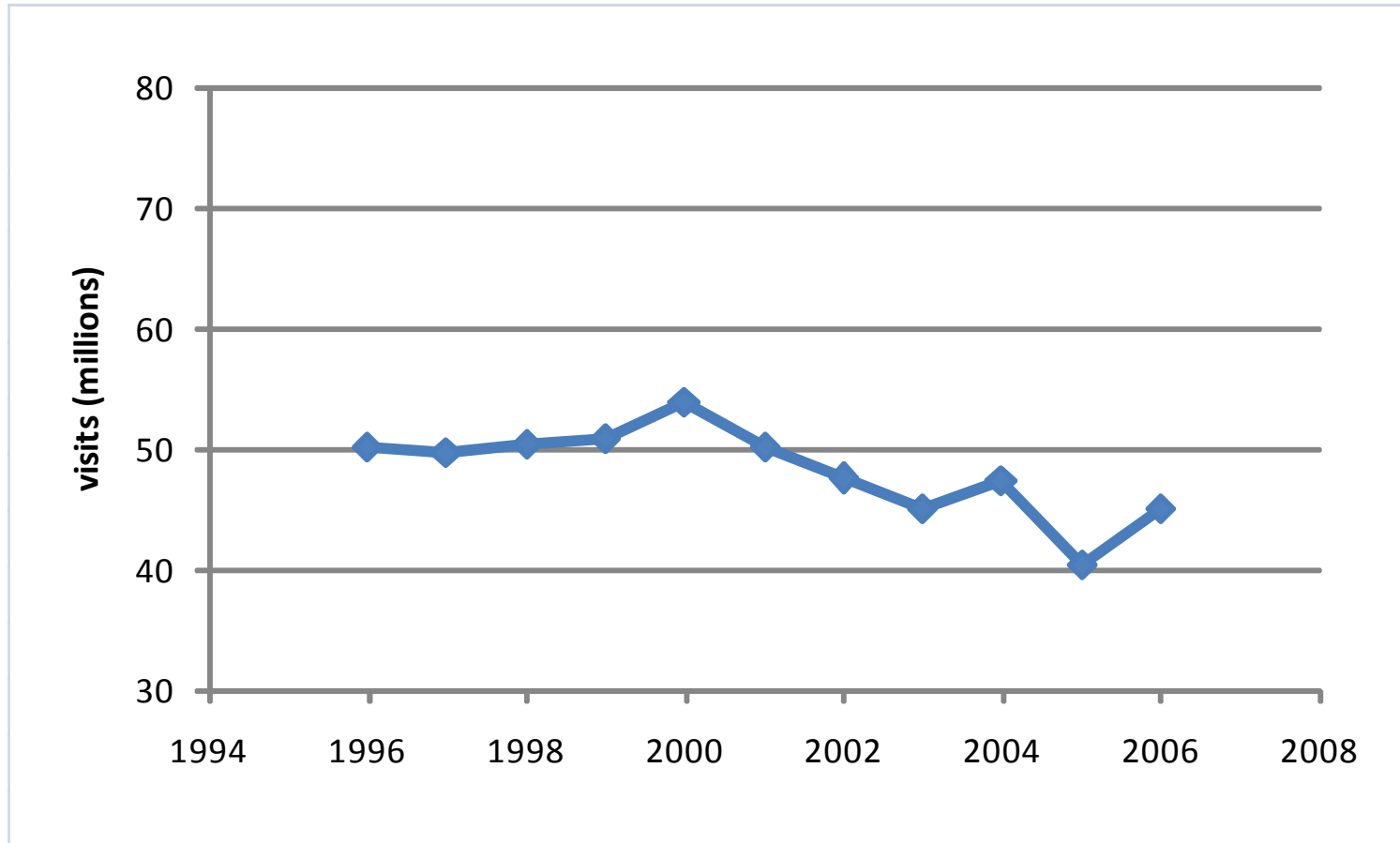
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# Total SM Bay Beach Attendance



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# Economics of SM Bay Beach Visits

Baseline of expenditures by beach goers.



Baseline of non-market values of beach visits.

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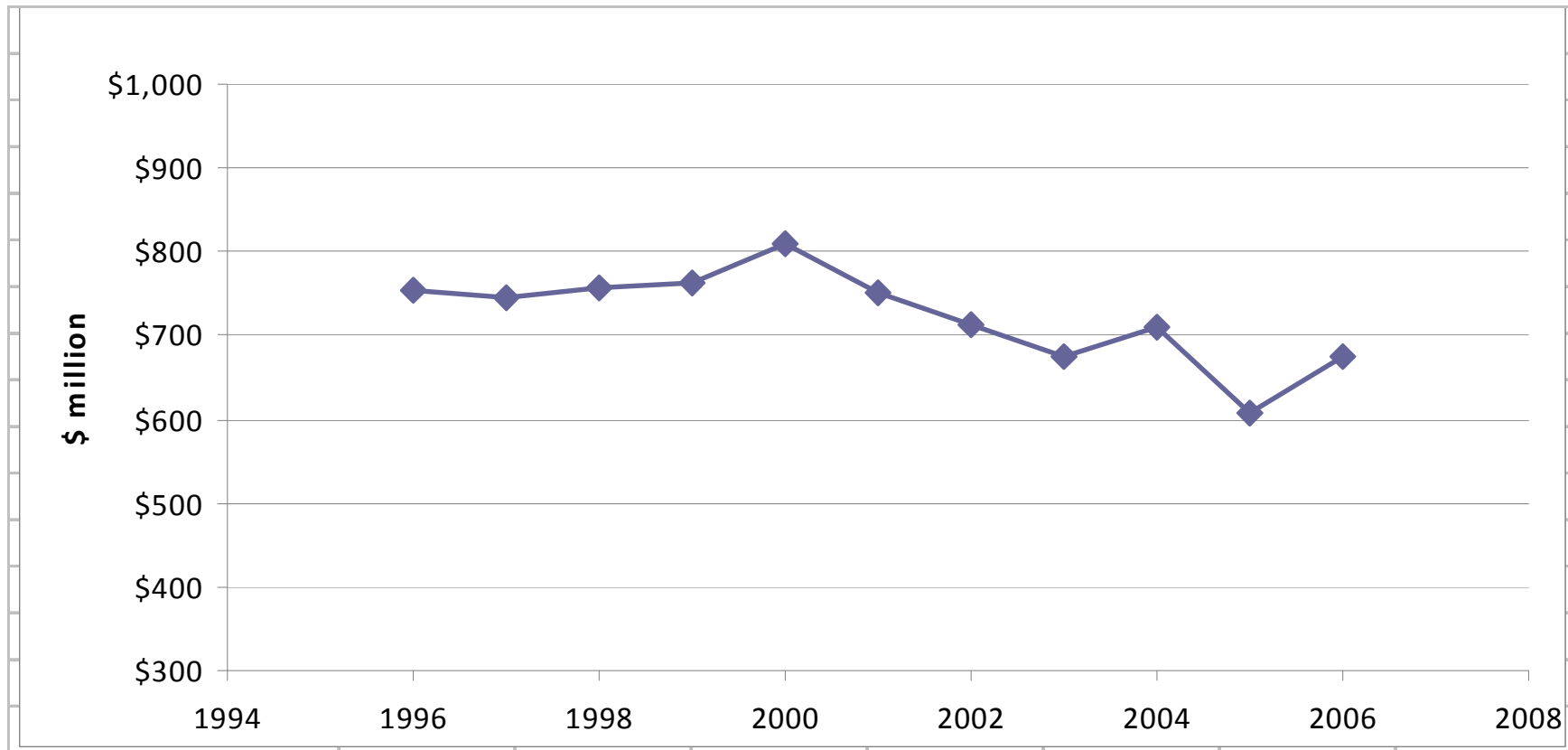


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# Non-market Value SM Bay Beach Visits

Value ~ \$600+ million/year



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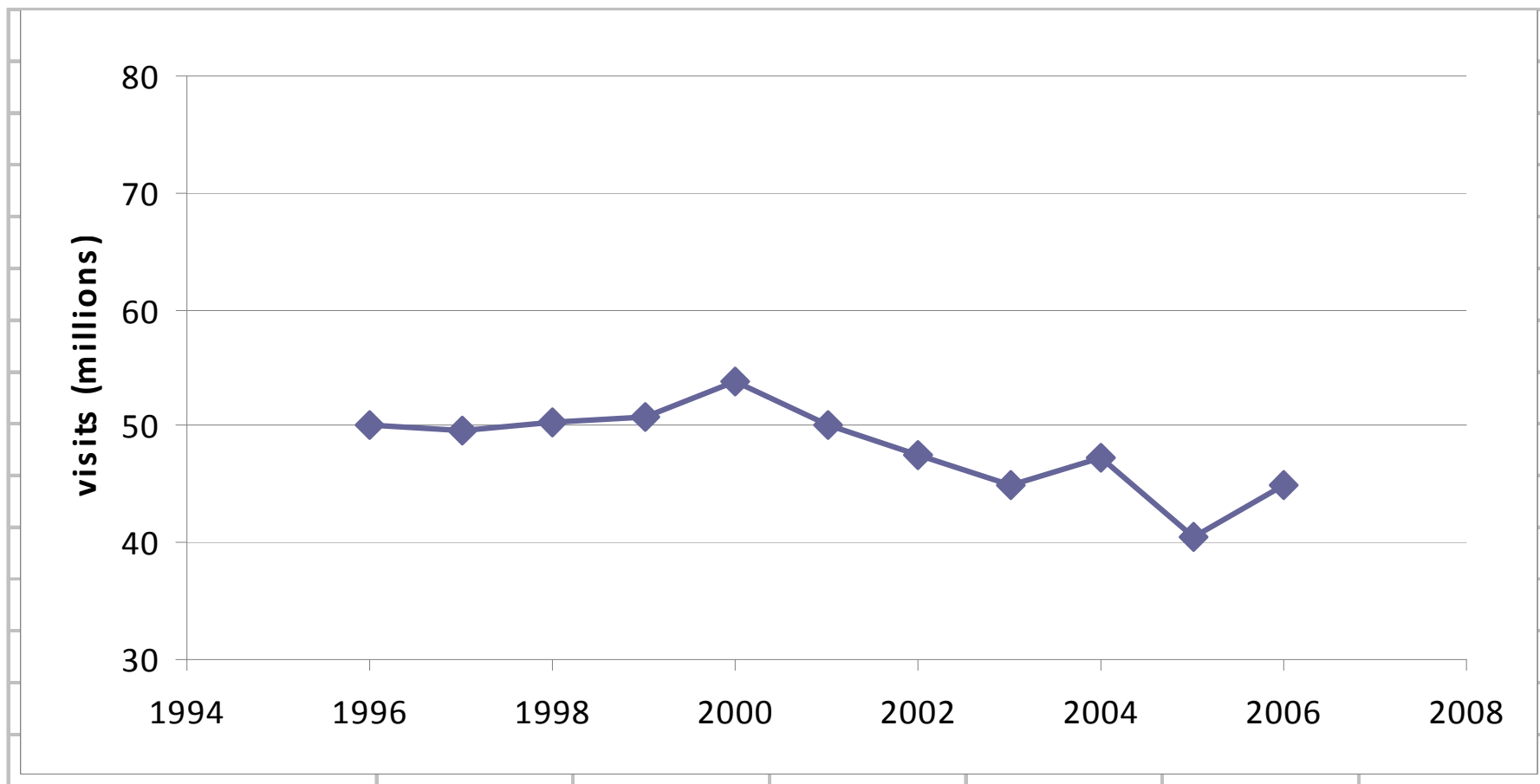
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Ave. Annual Change = -818,600 visits !



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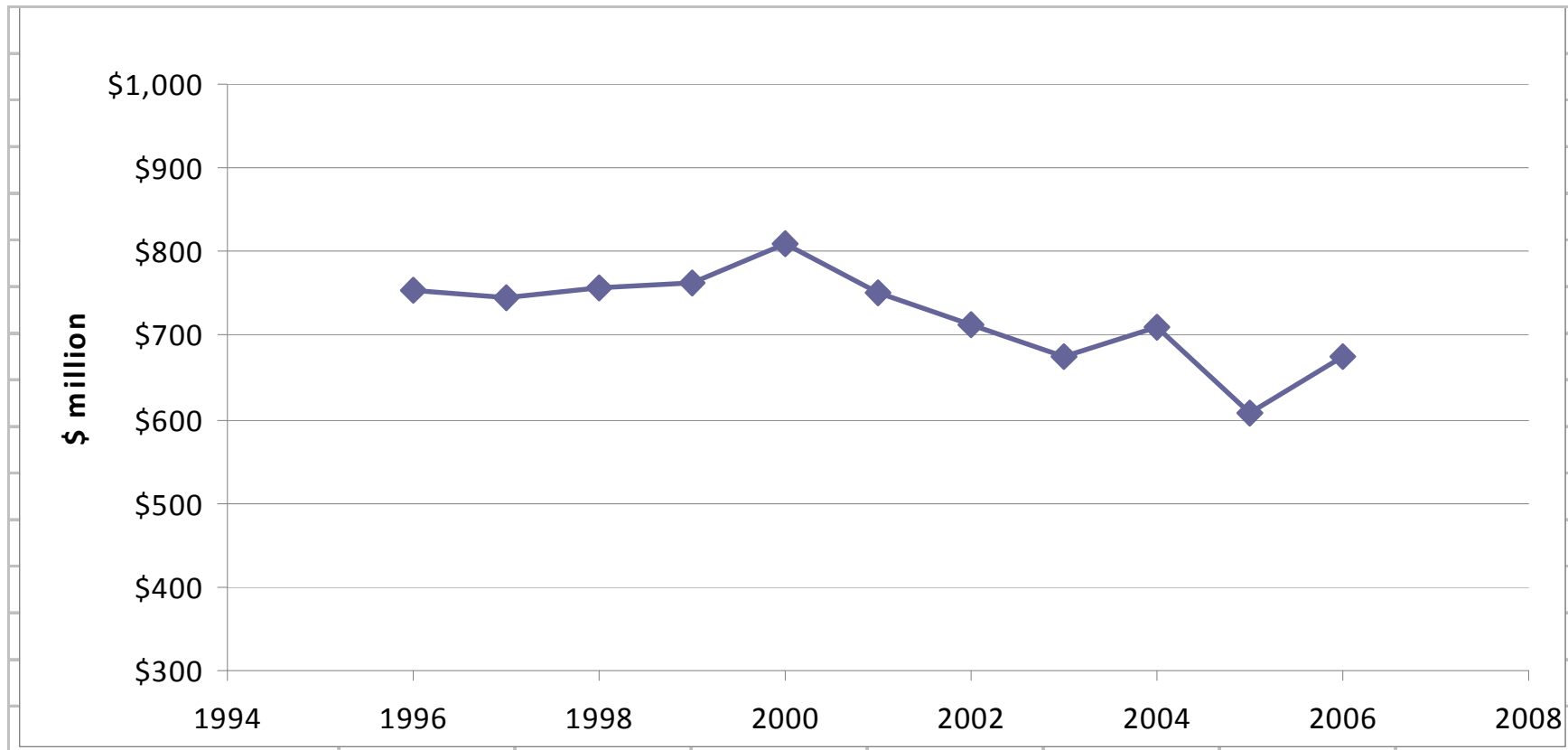


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# Non-market Value SM Bay Beach Visits

Ave. annual loss in non-market value~ \$12.3 million



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# Why the decline?

- 1) Terrorism ?
  - 2) Price of gas
  - 3) Water quality?
- Do all beaches  
experience  
declines?



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## Average Annual Attendance Change & Water Quality

Beach	Change in Attendance	Beach Grade 96-99 (4.0=A)	Beach Grade 00-06 (4.0=A)
<b>Santa Monica N</b>	<b>-430,000</b>	3.9	<b>2.9</b>
<b>Santa Monica S</b>	<b>-166,000</b>	2.7	<b>2.8</b>
<b>Will Rogers S</b>	<b>-123,000</b>	2.9	<b>2.4</b>
<b>Ave C</b>	<b>-68,000</b>	3.6	<b>3.5</b>
<b>Redondo</b>	<b>-56,000</b>	3.3	<b>2.6</b>
<b>Topanga</b>	<b>-51,000</b>	3.0	<b>1.8</b>
<b>Marina del Rey</b>	<b>-24,000</b>	1.9	<b>2.8</b>
<b>Nicholas Canyon</b>	<b>15,000</b>	2.4	<b>4.1</b>
<b>Scattergood</b>	<b>16,000</b>	3.8	<b>3.8</b>
<b>Leo Carrillo</b>	<b>51,000</b>	4.2	<b>3.5</b>

# ESTUARIES AND LOCAL COMMERCIAL FISHERIES

The literature indicates that hypoxia may affect flatfish and anchovies.

Is there a link between hypoxia in Elkhorn Slough and fish catch at Moss Landing?



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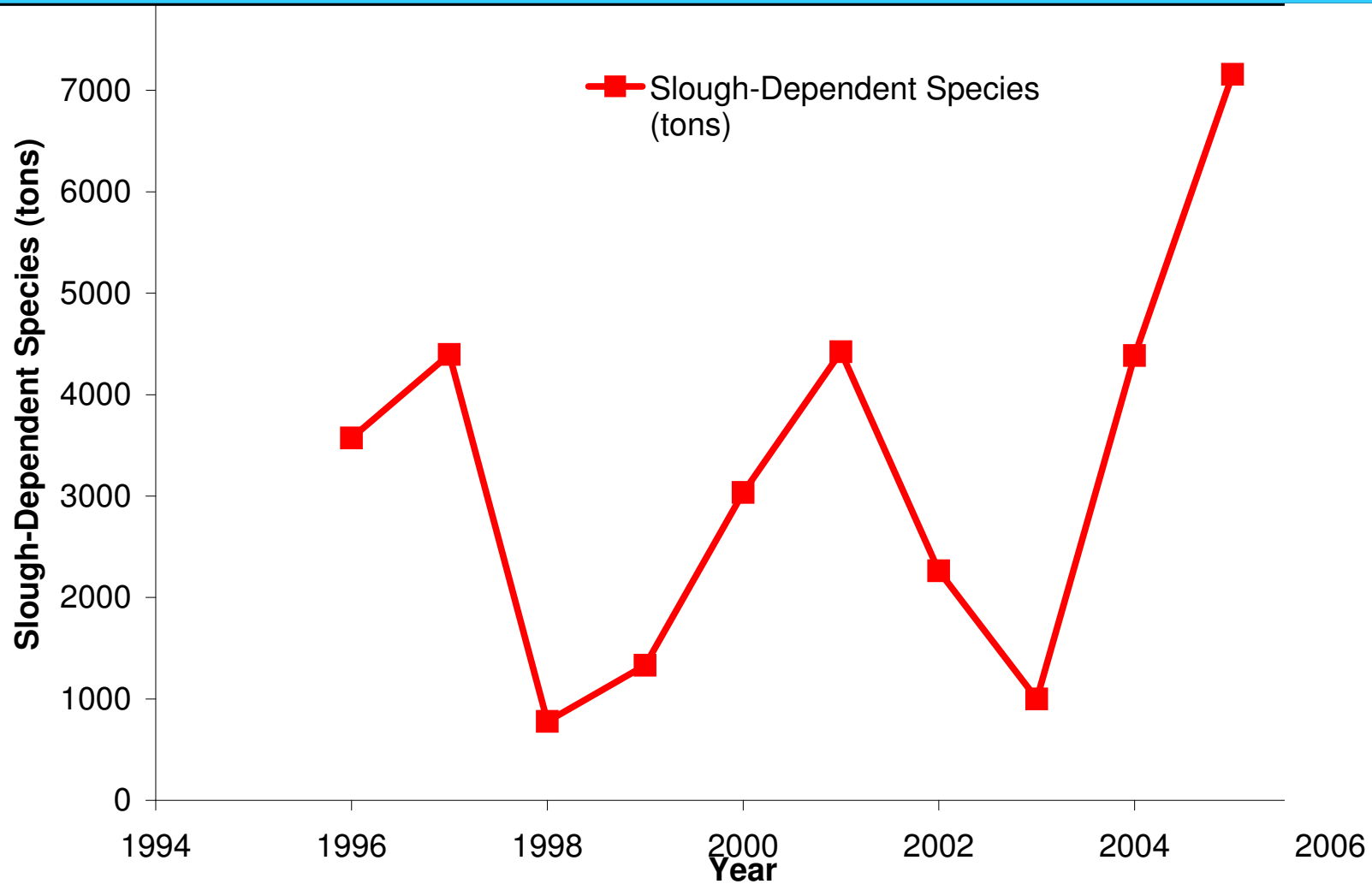
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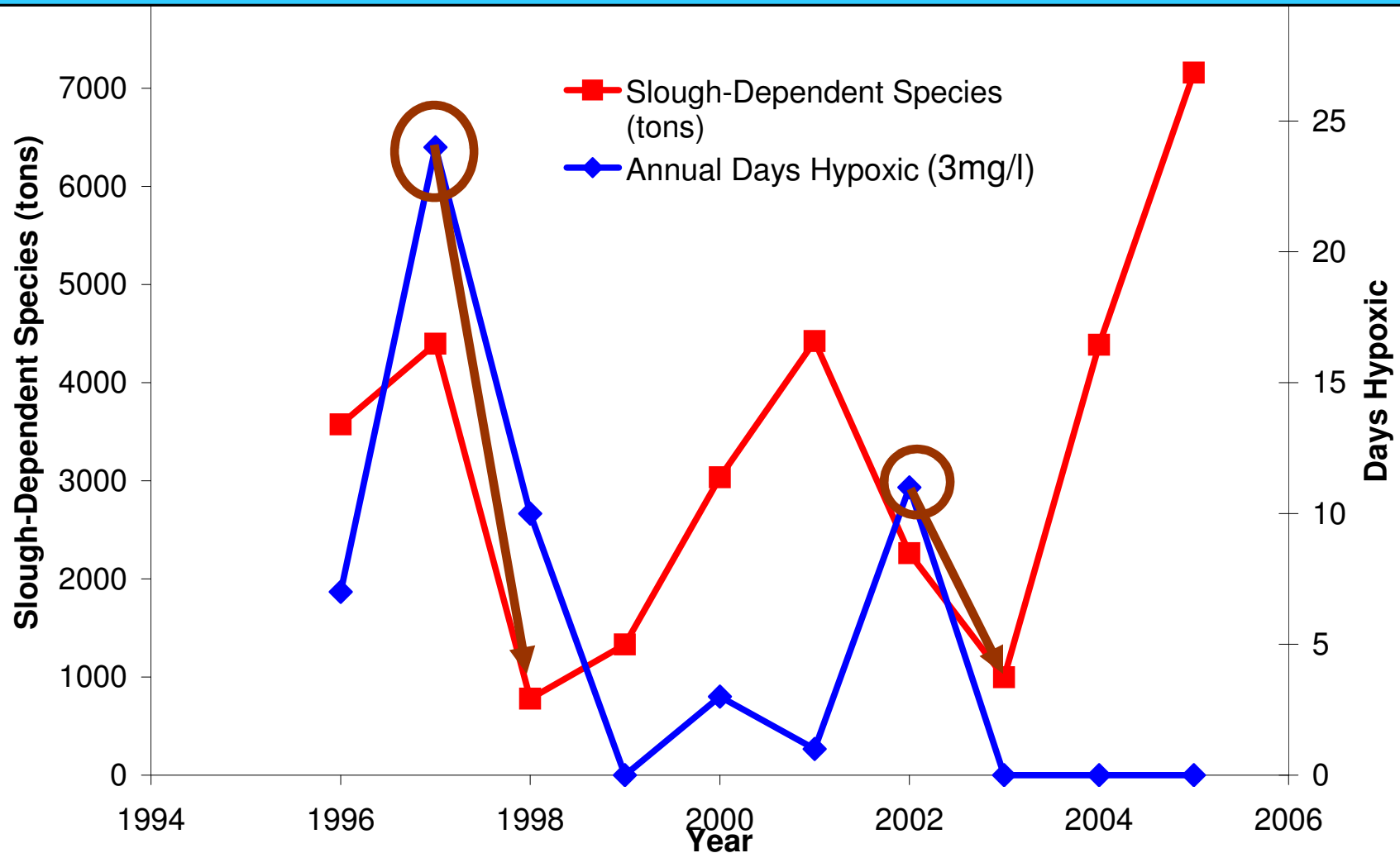
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# Commercial Catch of Slough-Dependent Fish - Moss Landing, CA



# Affects of Hypoxia on Slough-Dependent Fisheries



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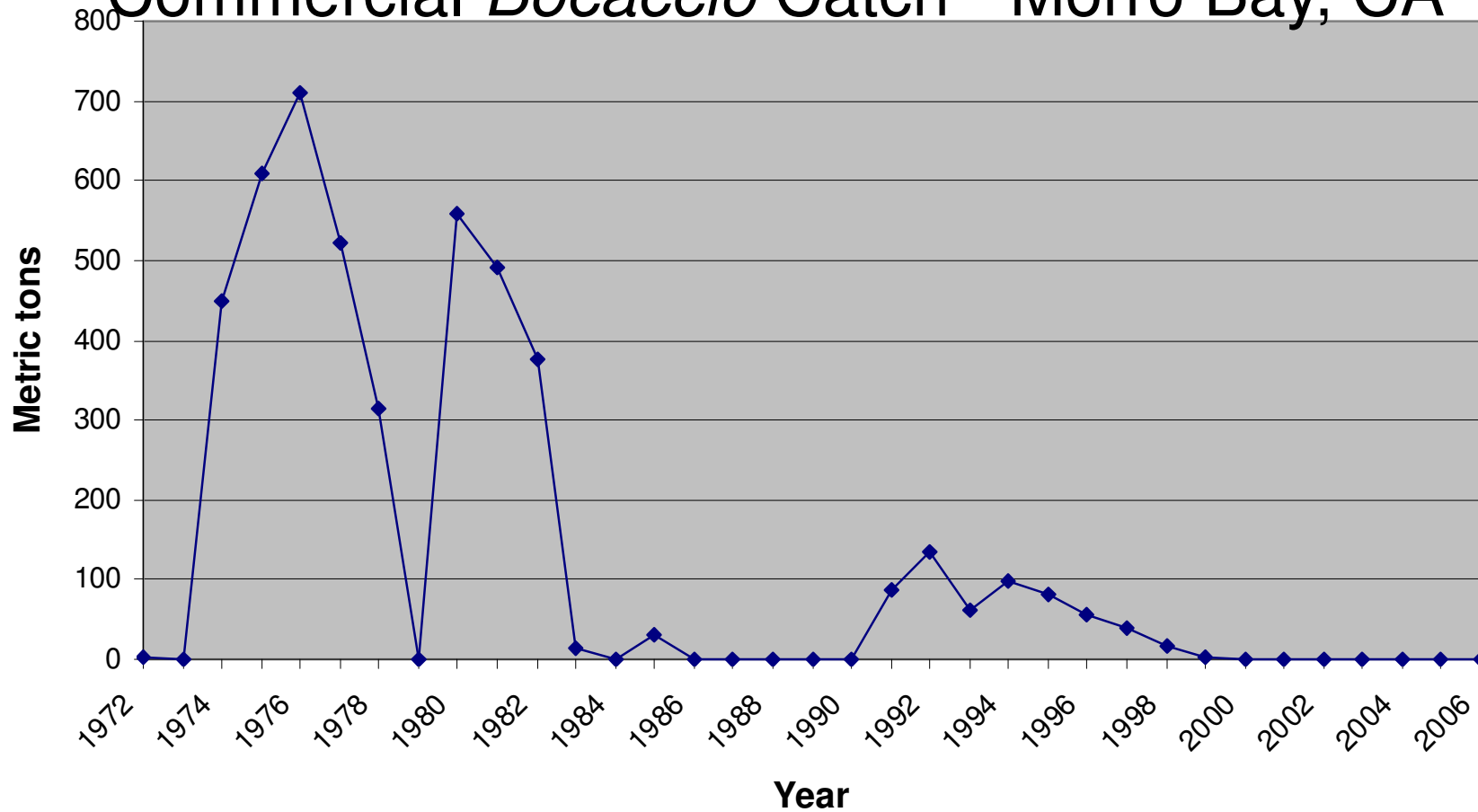


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# Did Fishing Regulations Kill the Fishery?

## Commercial *Bocaccio* Catch - Morro Bay, CA



Source: CA DFG

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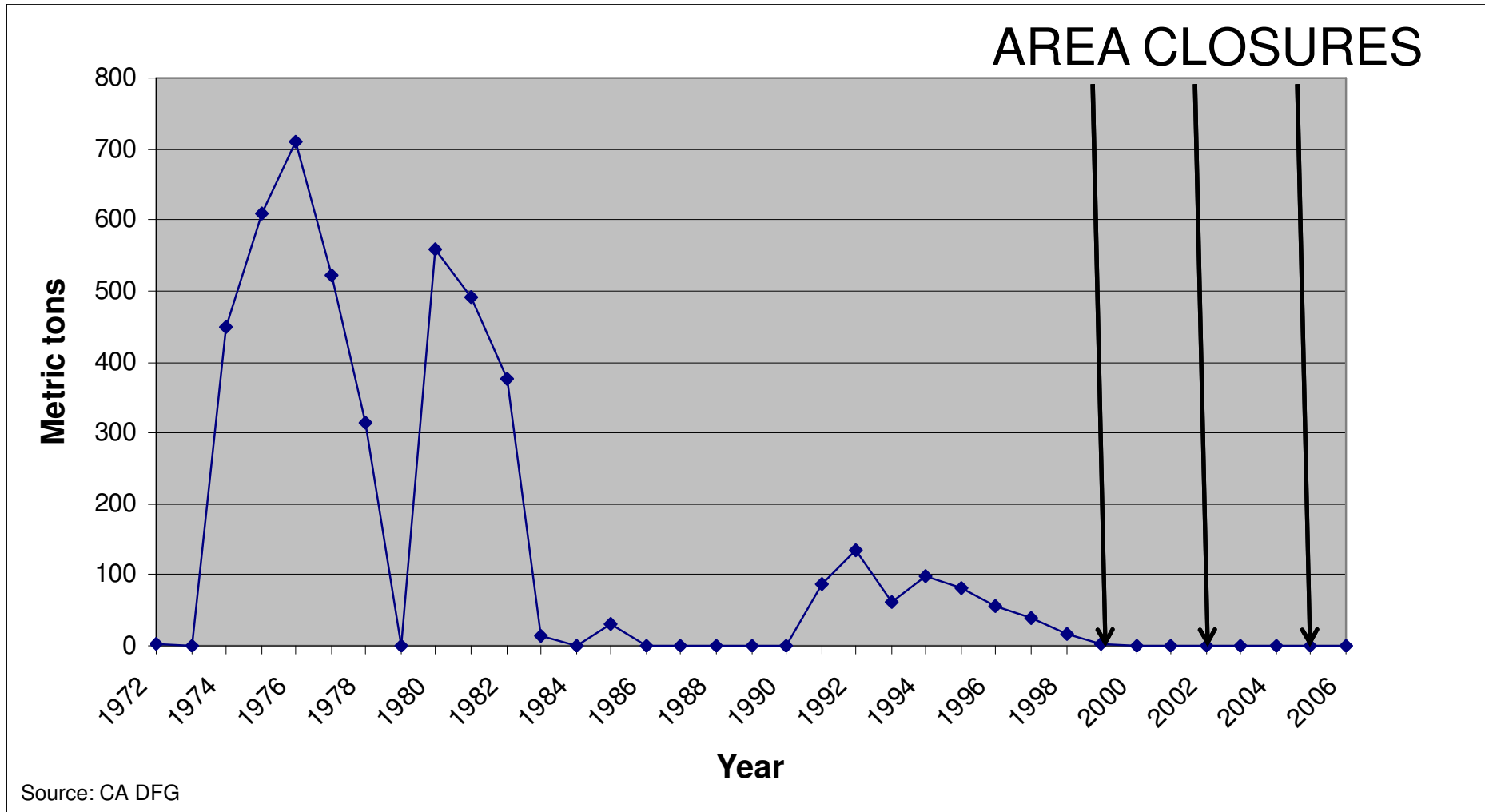
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# The Impacts of Regulation? Area Closures



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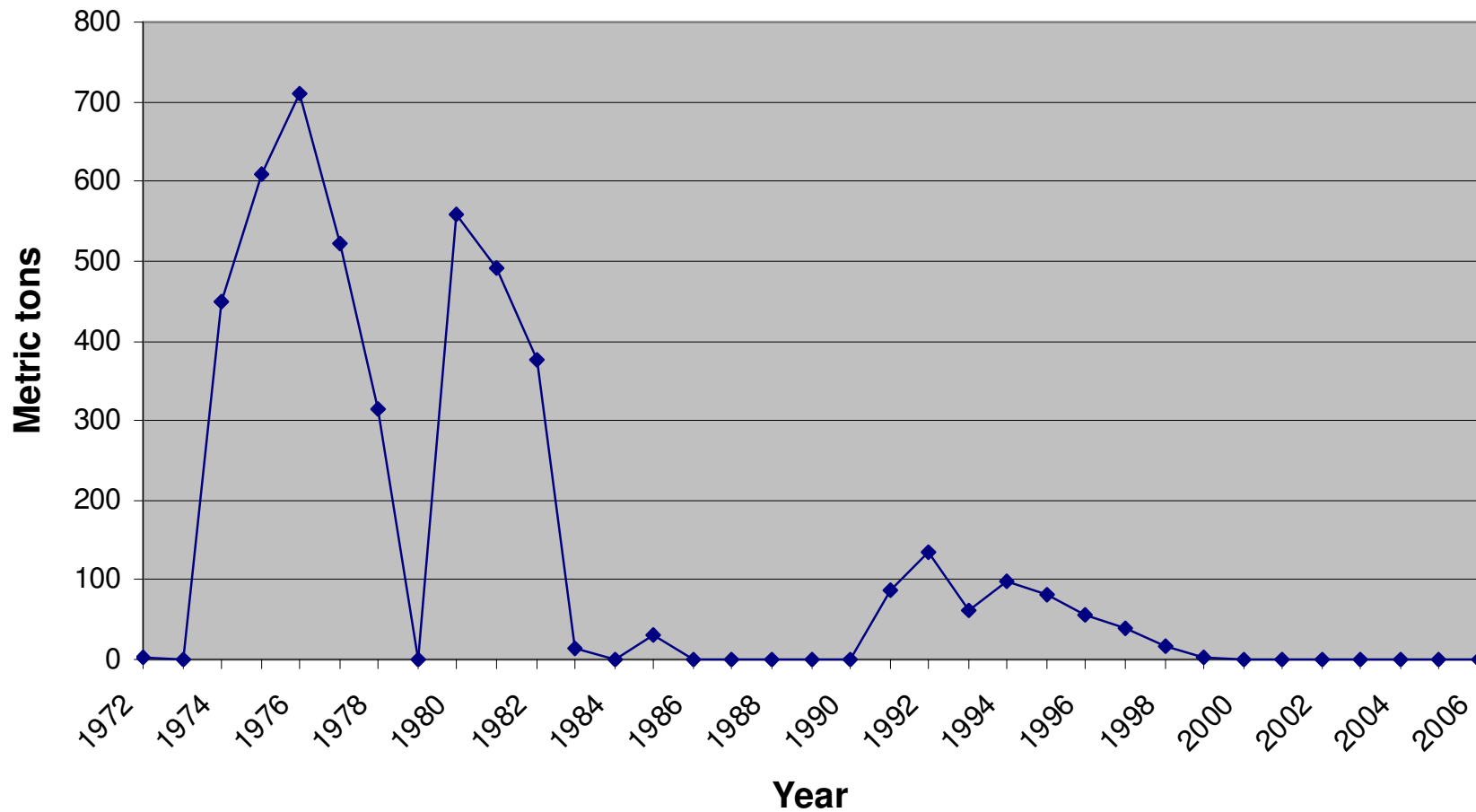
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# The Impacts of Regulation? Quotas



Source: CA DFG

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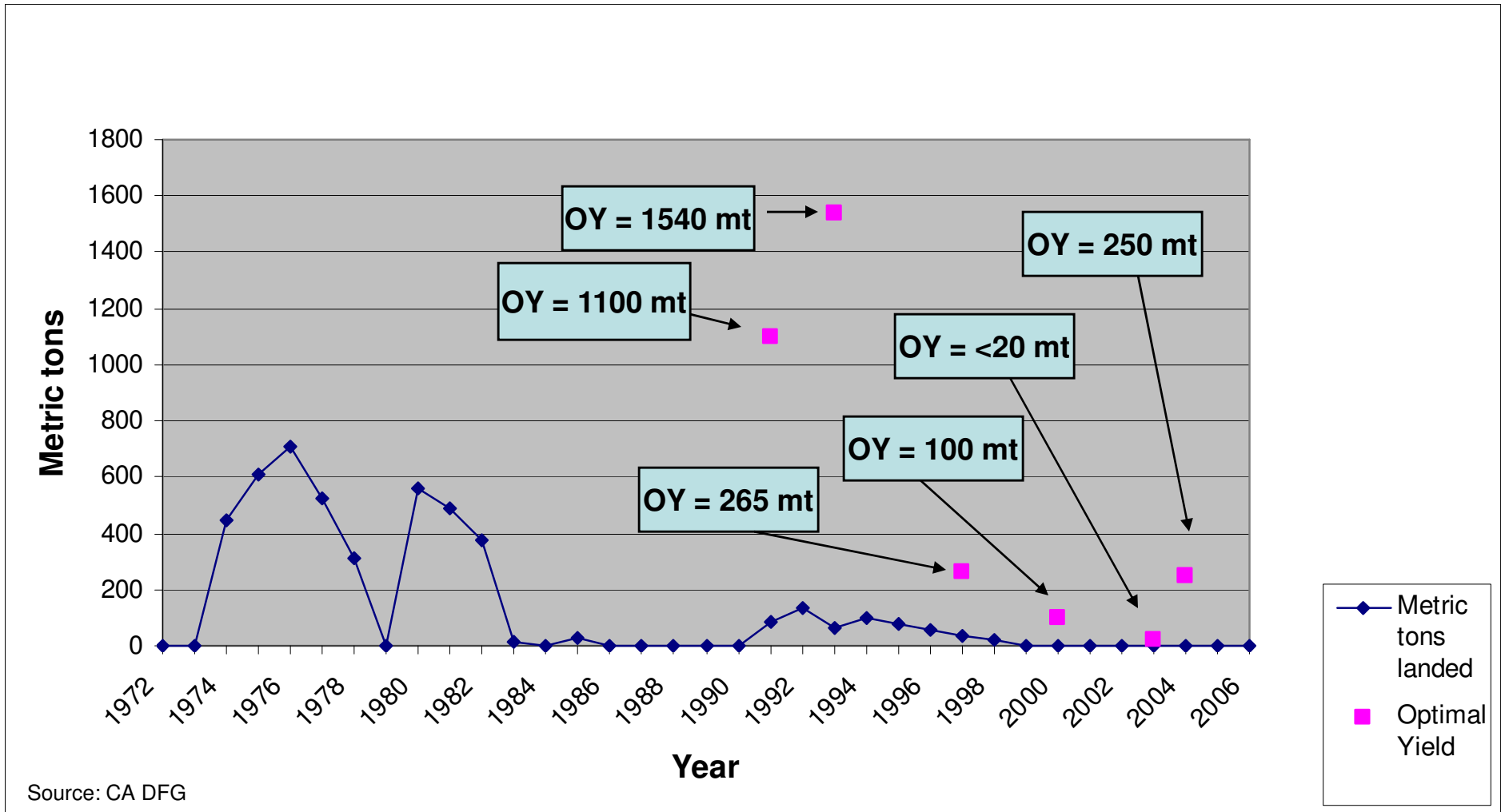
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# The Impacts of Regulation? Quotas



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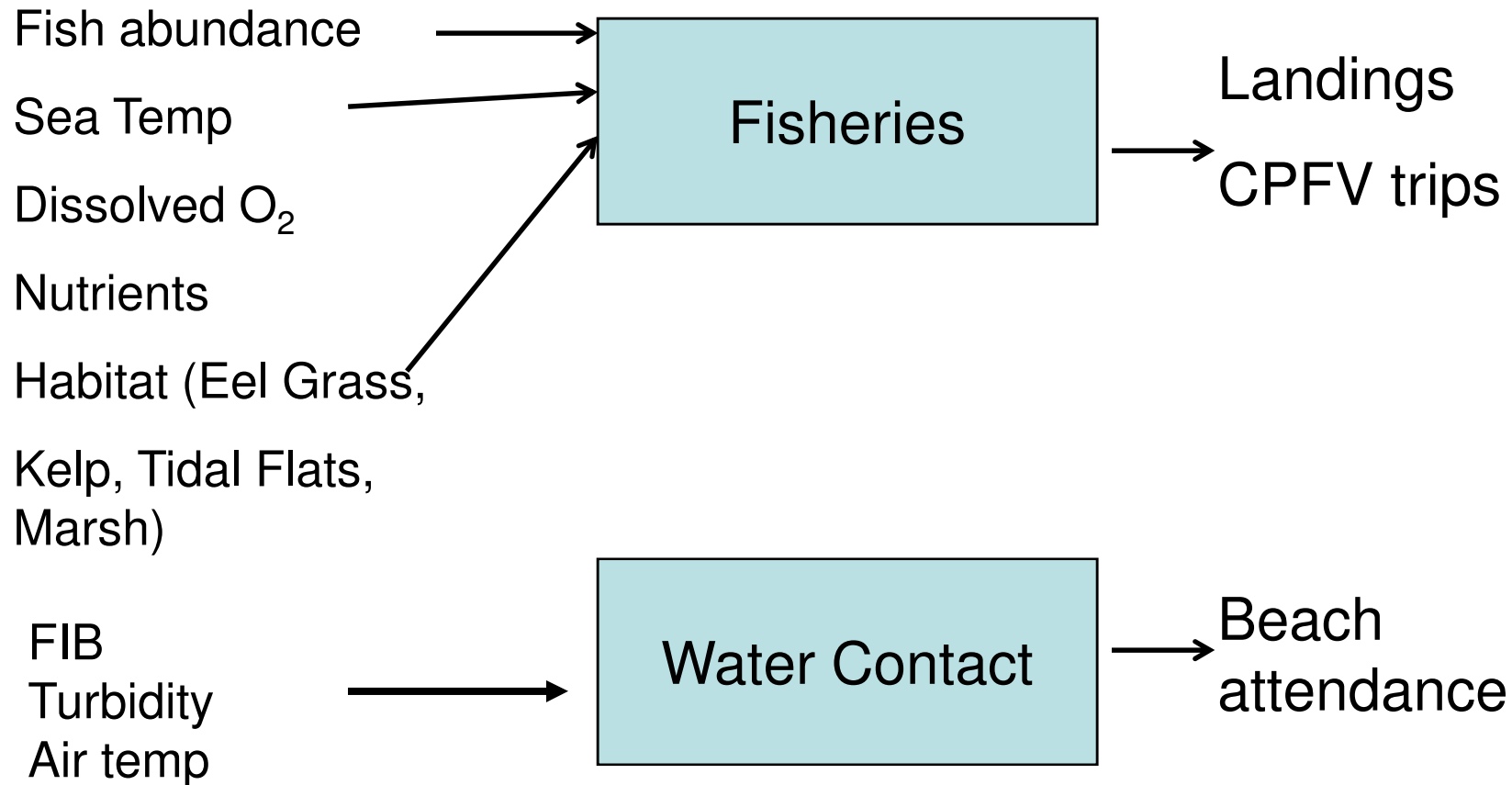
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# More Formal Analysis of Data

- Currently
  - One shot valuation studies
  - Cross-sectional relationship between environmental and economic variables
- Need a more fully “specified” model
  - Built on science
  - Reduced form helps test for relationship
    - (not the same as a predictive model)

# Linking Environmental Change to Coastal Uses



# Linking Environmental Change to Coastal Uses

Need to model/understand role of many factors on indicator change.

Collecting data across many sites for many years

→ better statistical power!

# The Model

$\Delta$  Economic Indicator = fn( $\Delta$  environmental,  
 $\Delta$  regulatory, other factors)

$\Delta$  Economic Indicator

fn (factors)

$\Delta$  environmental

$\Delta$  demographic

$\Delta$  economic

$\Delta$  regulation

# The Model

$\Delta$  Economic Indicator = fn( $\Delta$  environmental,  
 $\Delta$  regulatory, other factors)

$\Delta$  Economic Indicator      (*beach going*)

fn (factors)

$\Delta$  environmental      (water quality, beach access)

$\Delta$  demographic      (population, income)

$\Delta$  economic      (price of gas)

$\Delta$  regulation      (beach advisories, TMDLs)

# National Database of Economic Indicators of Coastal Health

## 1) Indicator Studies

- 3 in California
- Working with Restore America's Estuaries to choose 3 new sites
  - a) Pacific
  - b) Gulf of Mexico
  - c) Atlantic
- FES Interns (2/site)

## 2) Coastal Ocean Values Expedition

- 20 ports of call
- 10 month-long stays

# Collect Social and Economic Indicator Data

- Process brings stakeholders into dialogue
- Time series are revealing
  - What happened?
  - Why?
- Indicators linked to literature
  - Estimates of impacts and value
- Econ Indicators linked to Environ. Indicators
- Only way to get better data is to start with what we've got!