

Using Harvest Data to Monitor the Asian Carp Invasion in the Illinois and Mississippi Rivers

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Analyzing Harvest Data

- Introduce a long term data set on commercial harvest in Illinois
- Overview of the fishery
- Analysis of how Asian carp have affected the fishery
- What type of research questions could be addressed with such data

Illinois Commercial Catch Statistics

- Illinois Department of Natural Resources has kept commercial catch statistics for river fisheries in Illinois since 1950
- Mostly paper copies – we are beginning to digitize the data for analysis

Illinois Commercial Catch Statistics

Records contain harvest information on:

- Species
- Location – river and navigation pool
- Effort – number of fishermen, amount of gear
- Wholesale fish prices

Illinois Commercial Catch Statistics

- Long time series of data
- Fishermen fish in more places than biologists do
 - more locations (pools)
- Harvest is a potential control strategy
- Consider – commercial harvest is dependent on non-biological factors

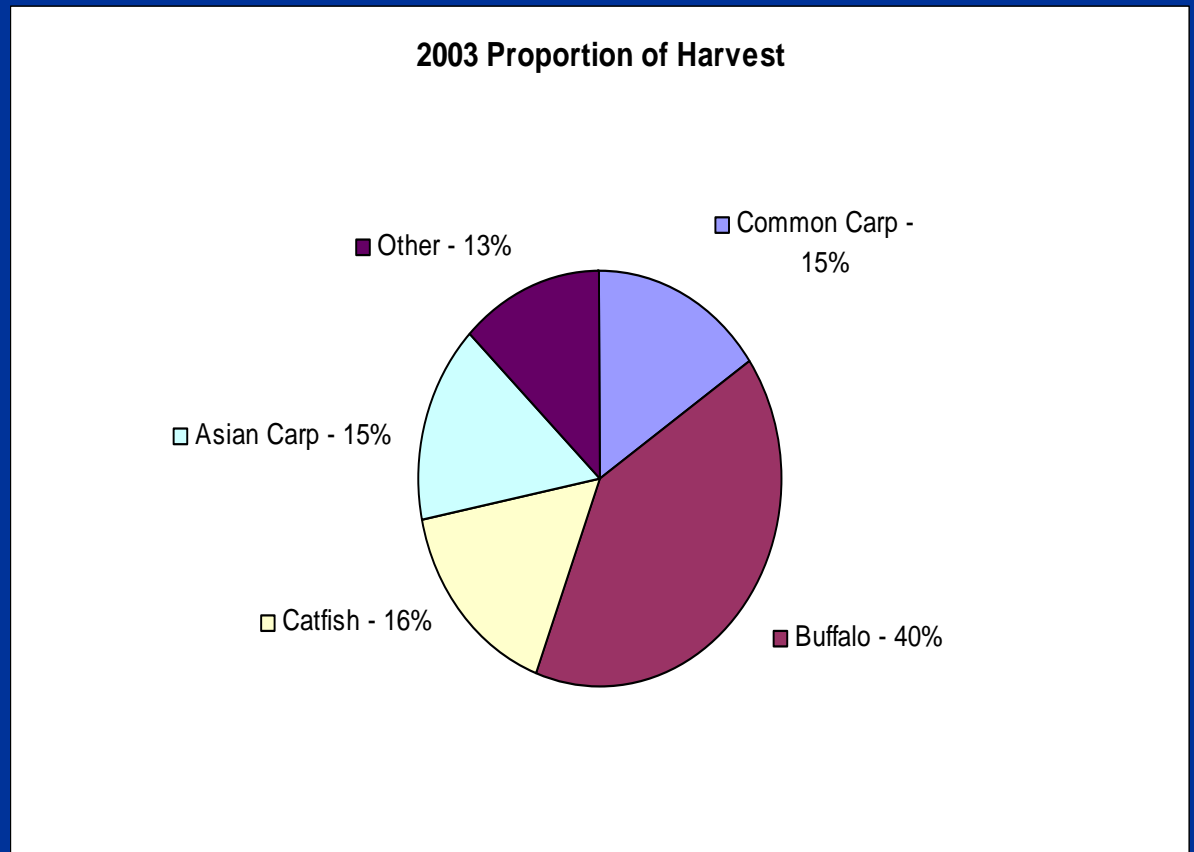
Commercial River Fishery in Illinois

2003 harvest

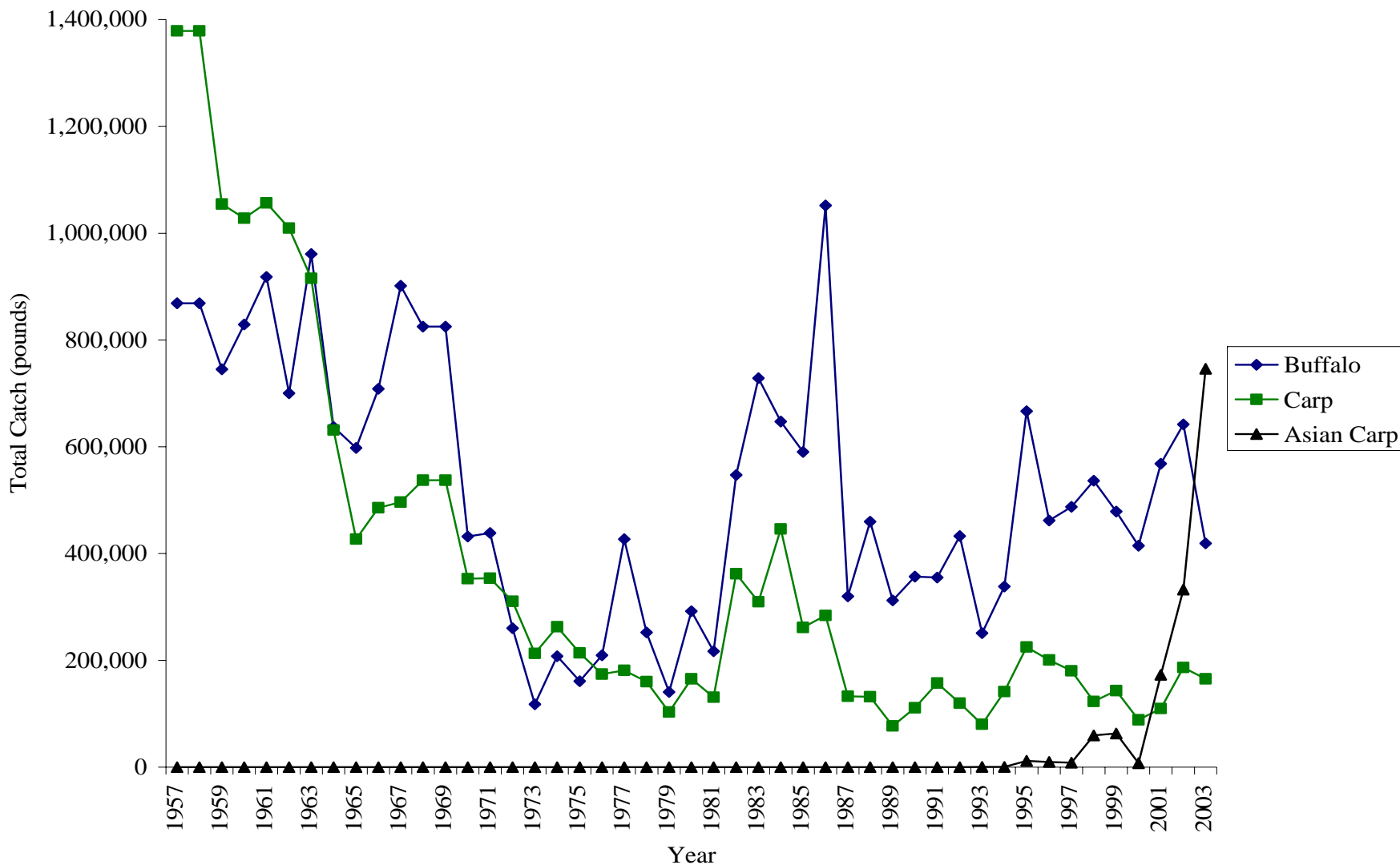
- 6.3 million pounds
- \$1.33 million

2003 prices

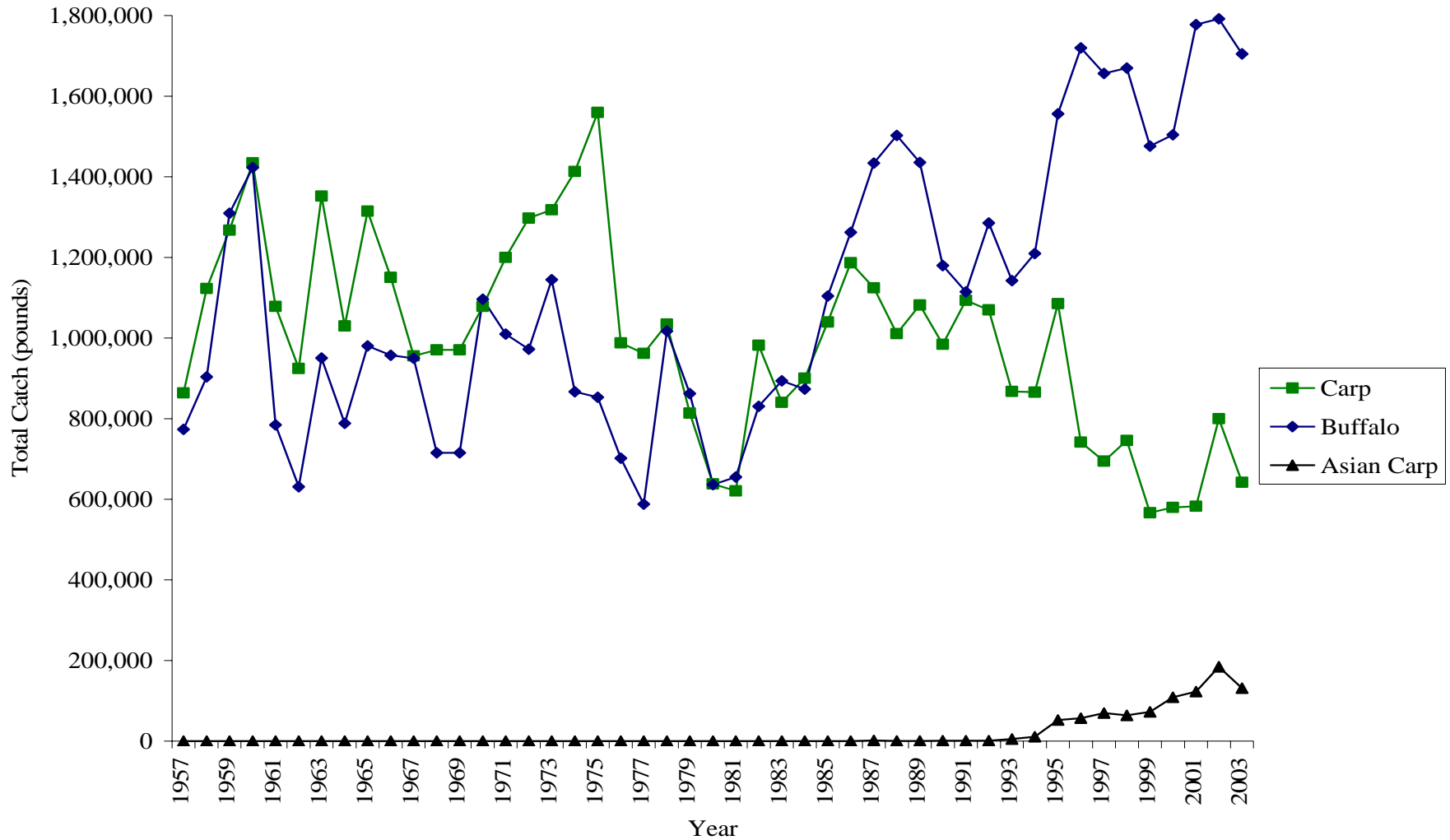
- Buffalo \$0.22
- Catfish \$0.43
- Asian carp \$0.11



Commercial Harvest – Illinois River



Commercial Harvest – Mississippi River



Have Asian carp affected the harvest of native species?

- Regression analysis – estimate buffalo harvest as a function of Asian carp harvest using 45 years of data
- Pool level analysis – fixed effects regression

Navigation Pools



source: USGS

Regression Analysis – pool level

$$B_{t,i} = B_{t-1,i} + AC_{t,i} + CC_{t,i} + P_t + D1 + D2 + D3 + T + \varepsilon$$

+ Illinois River interaction terms

- $B_{t,i}$ = buffalo harvest in year t, pool i
- $AC_{t,i}$ = Asian carp harvest in year t, pool i
- $CC_{t,i}$ = common carp harvest in year t, pool i
- P_t = average statewide buffalo price in year t
- D = dummy variables for reporting requirements
- T = time trend
- ε = error term

Regression Analysis – pool level

	Estimated coefficient	Significance (p-value)
<i>Asian carp</i>	3.15	0.000
<i>Asian carp * IL river term</i>	-3.16	0.026
<i>Buffalo_{t-1}</i>	0.51	0.000
<i>Buffalo price</i>	-1390.26	0.974
<i>Common carp</i>	0.22	0.000

Discussion

- Increased buffalo harvest is correlated with increased Asian carp harvest in the Mississippi River
- No such correlation exists in the Illinois River
- Why?
 - biological explanation
 - economic/technological/behavioral explanations
 - missing variables

Discussion and Future Direction

Additional Data

- Weather and river data –National Weather Service, Corps of Engineers
- Independent stock assessment - INHS, LTRMP

Discussion and Future Direction

Research Questions

- Do Asian carp affect the harvest of native species?
- If so, do Asian carp affect native species harvest via an ecological effect or some production relationship?
- Is commercial harvest an effective control strategy?
- What policies might induce greater commercial harvest?