How’s the buffet? Nutrition and Striped Bass (continued)

Jim Uphoff

MD DNR, Fisheries Service

June 18, 2013

Examination of Chesapeake Bay Ecological Foundation Striped Bass Health and Diet Data

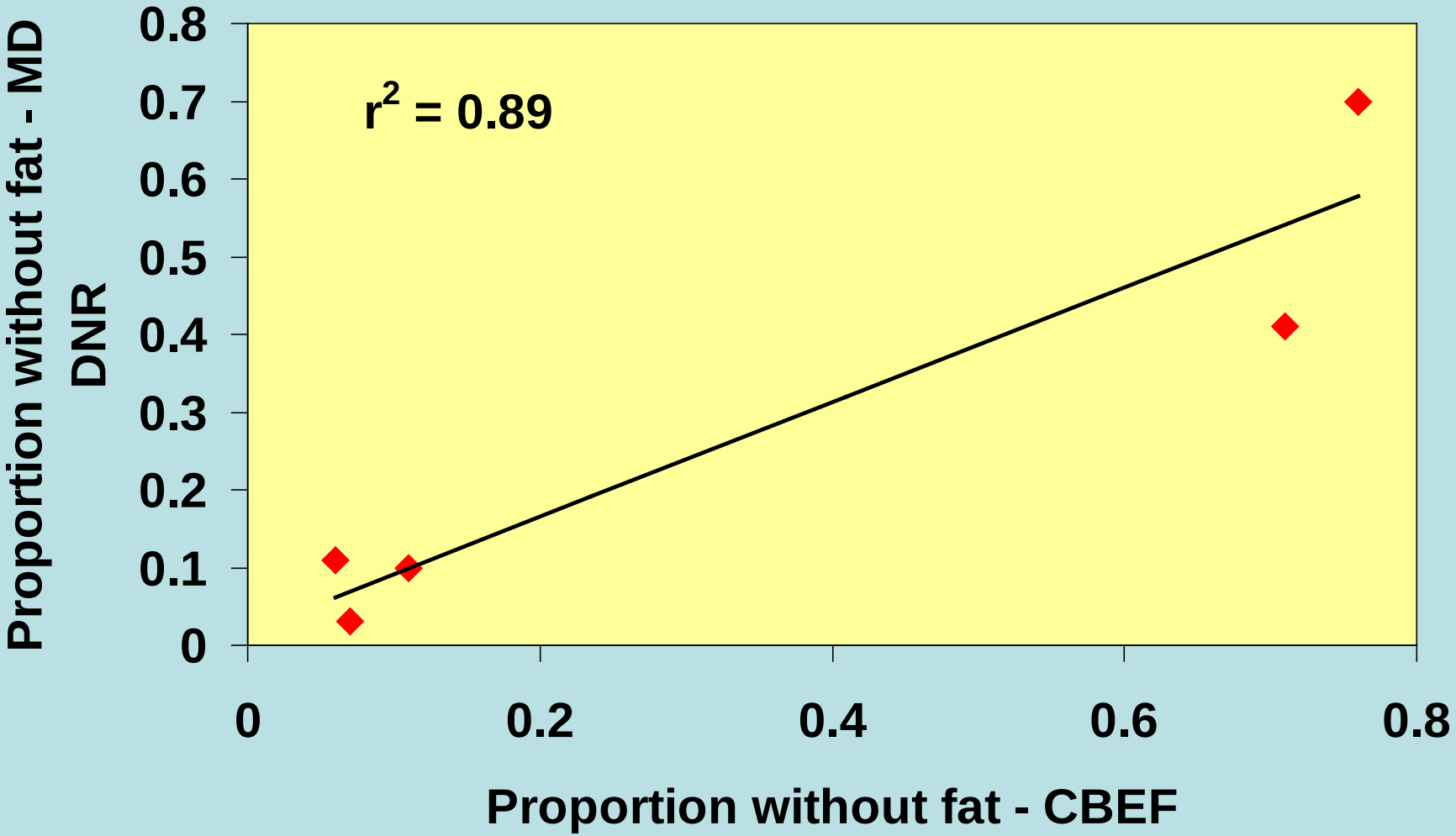
Preliminary analysis

- Is nutritional state associated with diet information?
- Judge whether to investigate further
- Percent frequency of major diet items
- Body fat = 0 was nutrition indicator
- Correlation analysis
- Anchovy, spot, menhaden, blue crab > 87% of items

Summary of collections by Jim Price

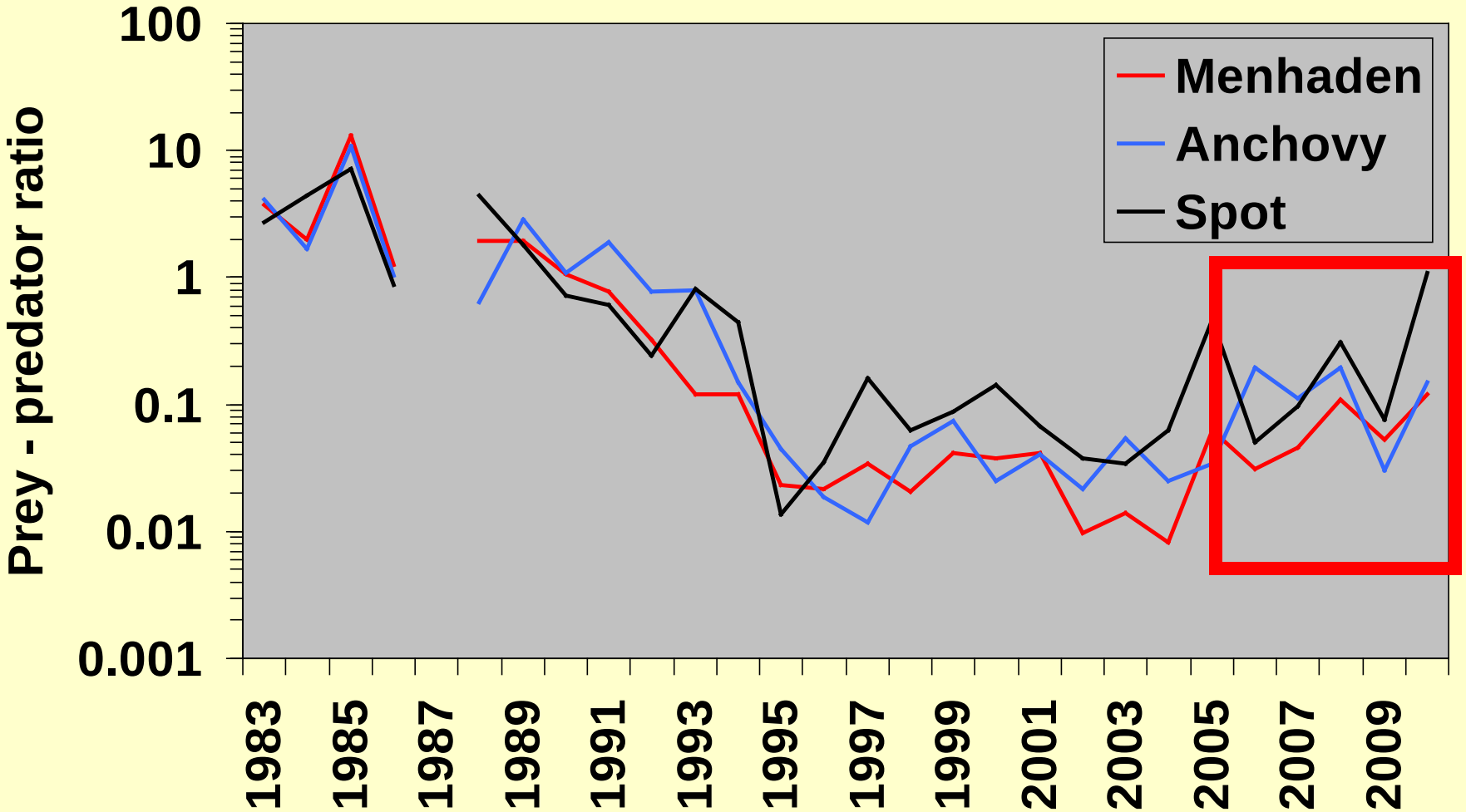
- Collections year-round, 2006-2013
- Analysis: October – November, 2006-2010
  - Nutrition Ref Pt recommendation in Jacobs et al.
- 2 Regions: Choptank River and mid-Bay (Bay Bridge – Solomons)
- Hook and line catches: mid-Bay cleaning station & collections under permit in Choptank (sublegal & legal)
- N = 3,921

CBEF and DNR Fish Health Program estimates of proportion without body fat. Slope not different from 1 and intercept not different from 0, i.e. they match.

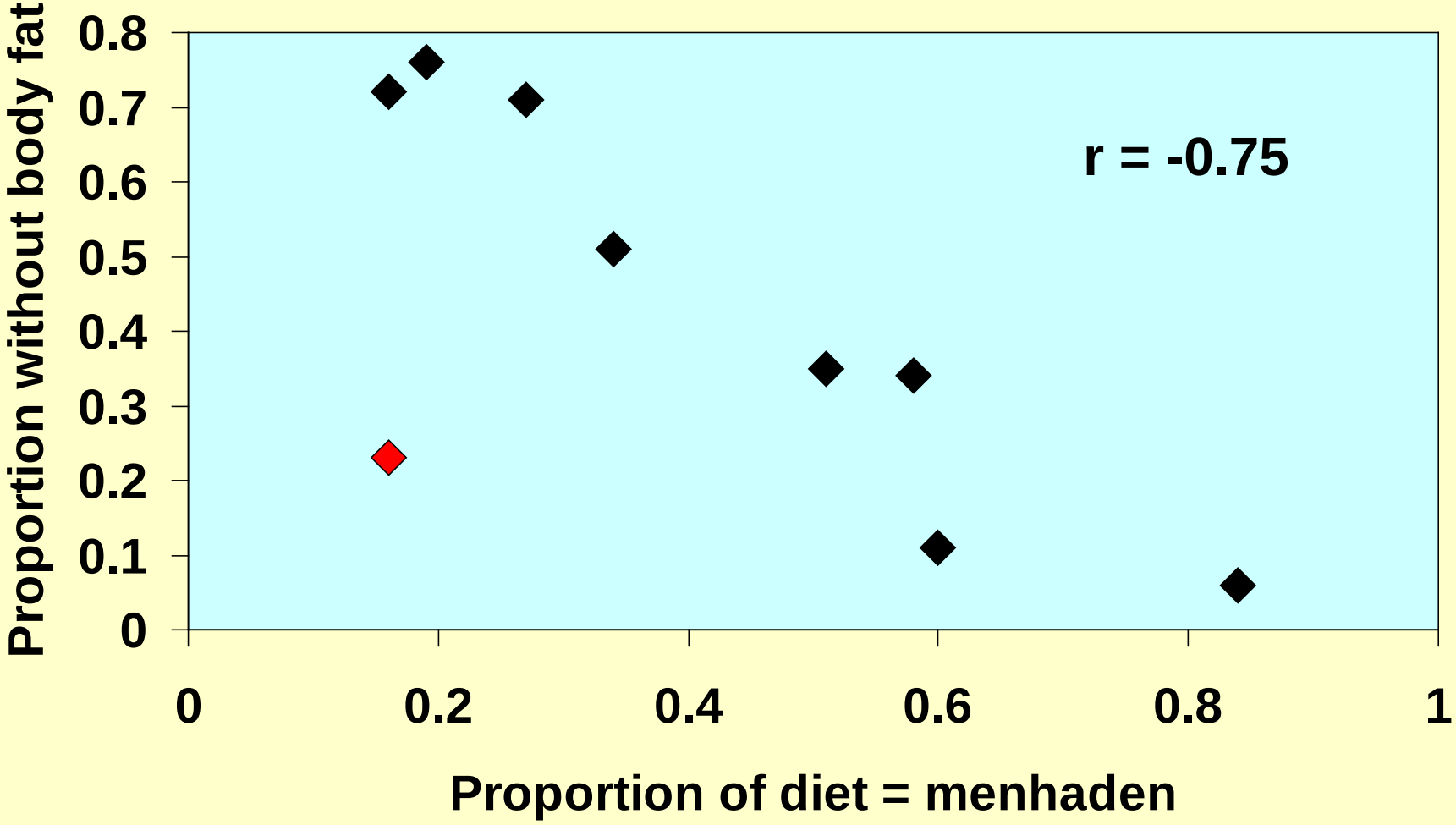


Standardized ratios of indices of prey and striped bass in MD's Chesapeake Bay (attack success).

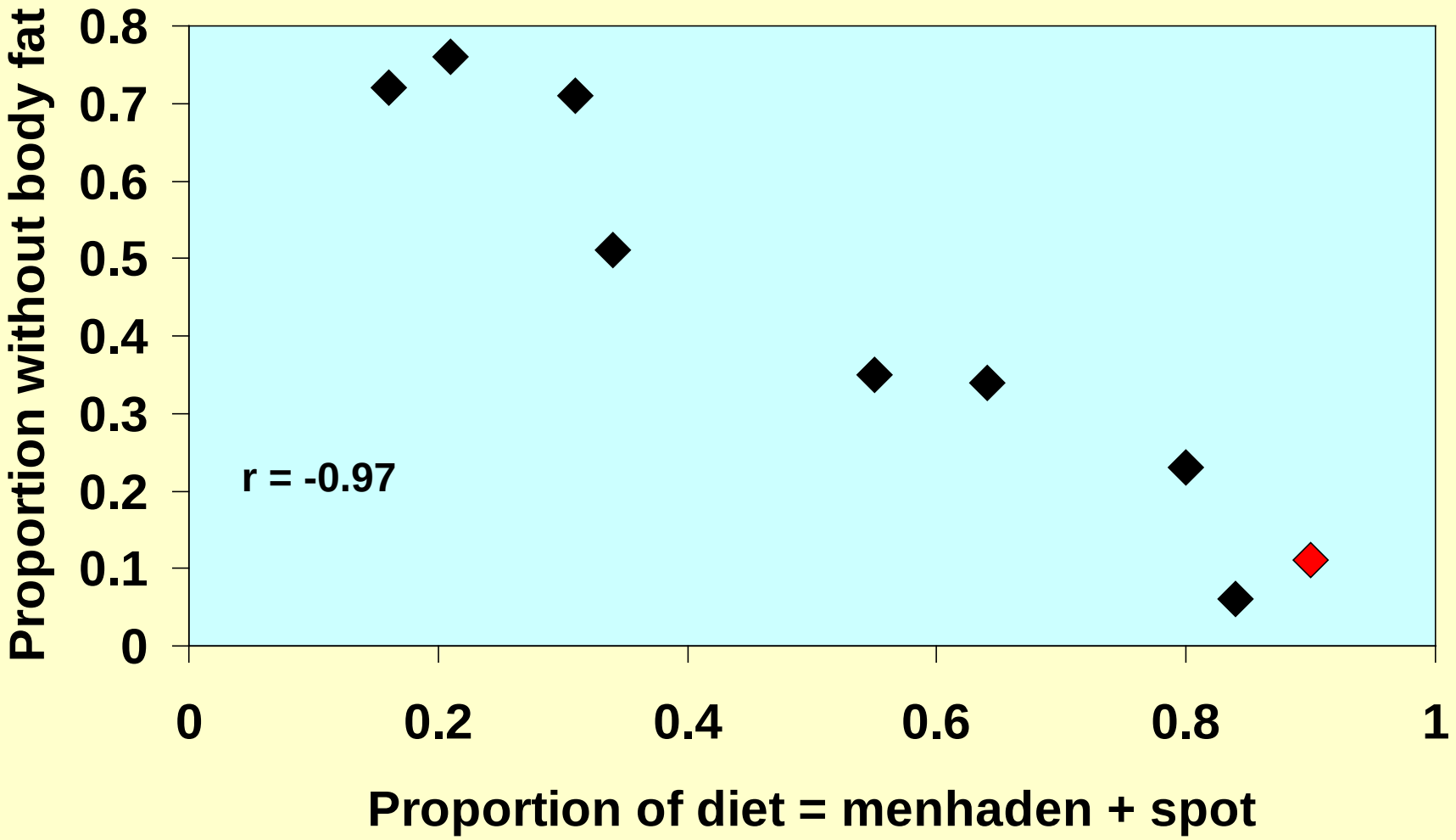
Note log10 scale.



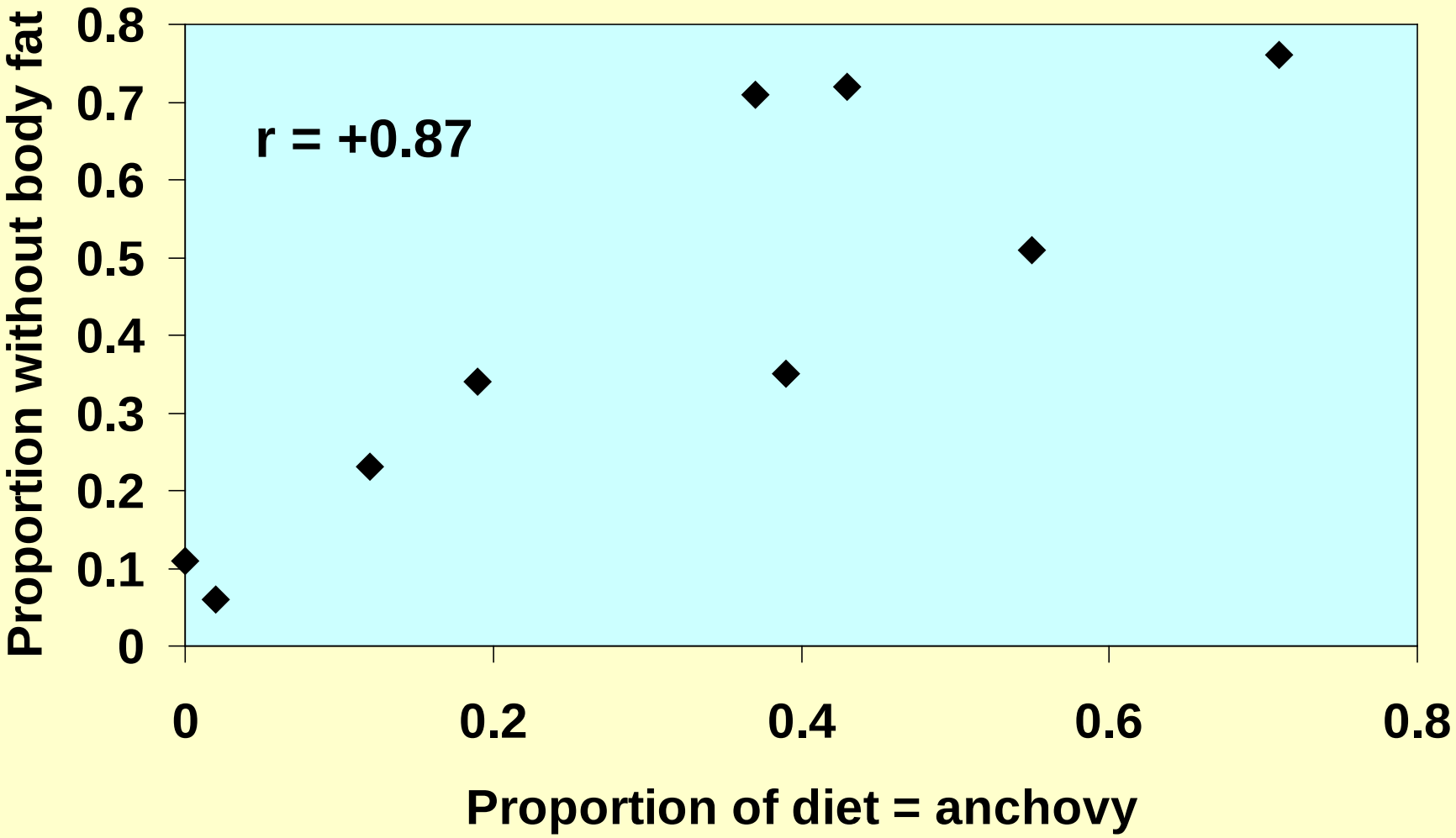
Proportion of diet (frequency) comprised of menhaden versus proportion without body fat



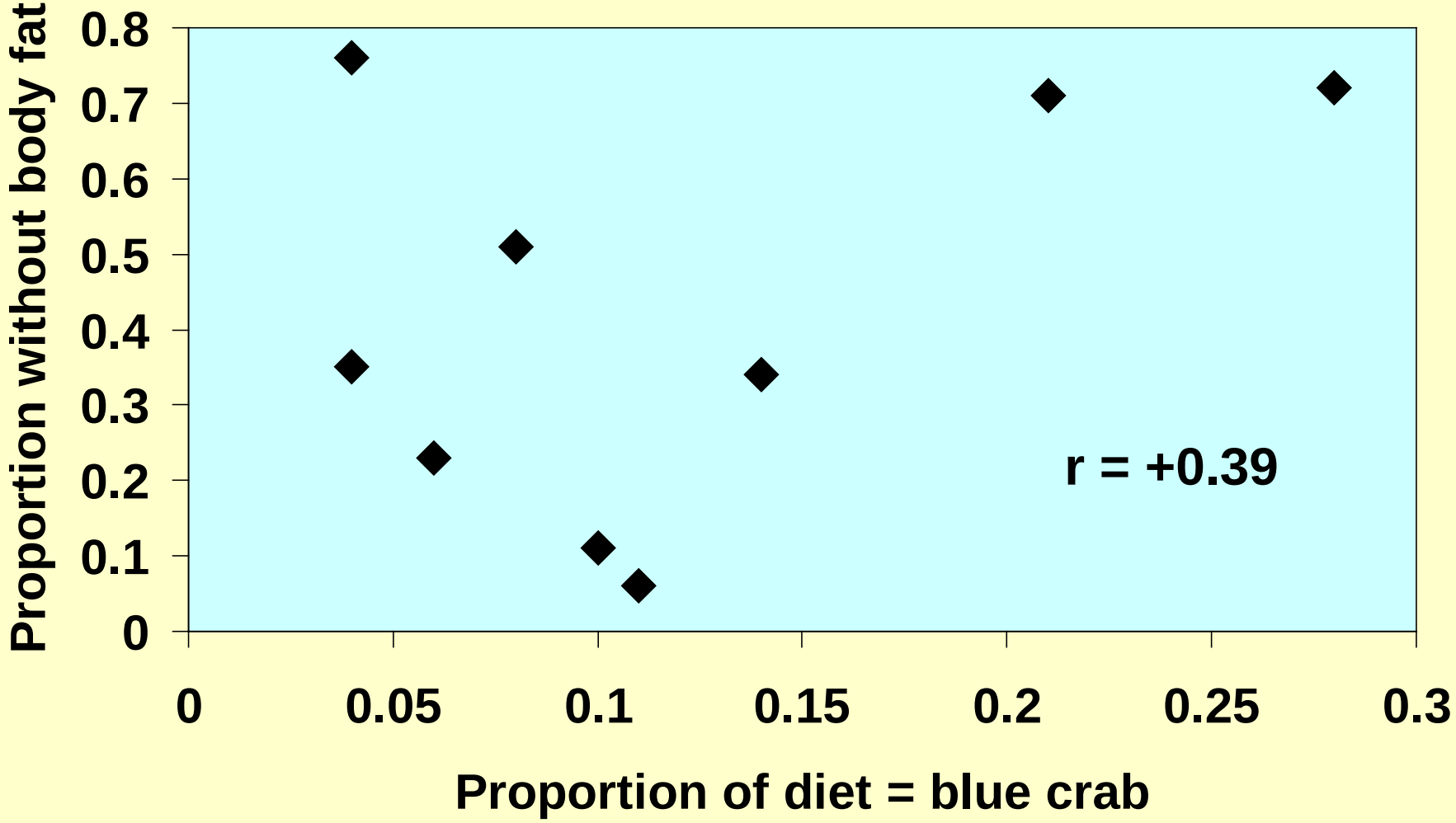
Proportion of diet (frequency) comprised of menhaden + spot vs proportion without body fat



Proportion of diet (frequency) comprised of anchovy versus proportion without body fat



Proportion of diet (frequency) comprised of blue crab versus proportion without body fat



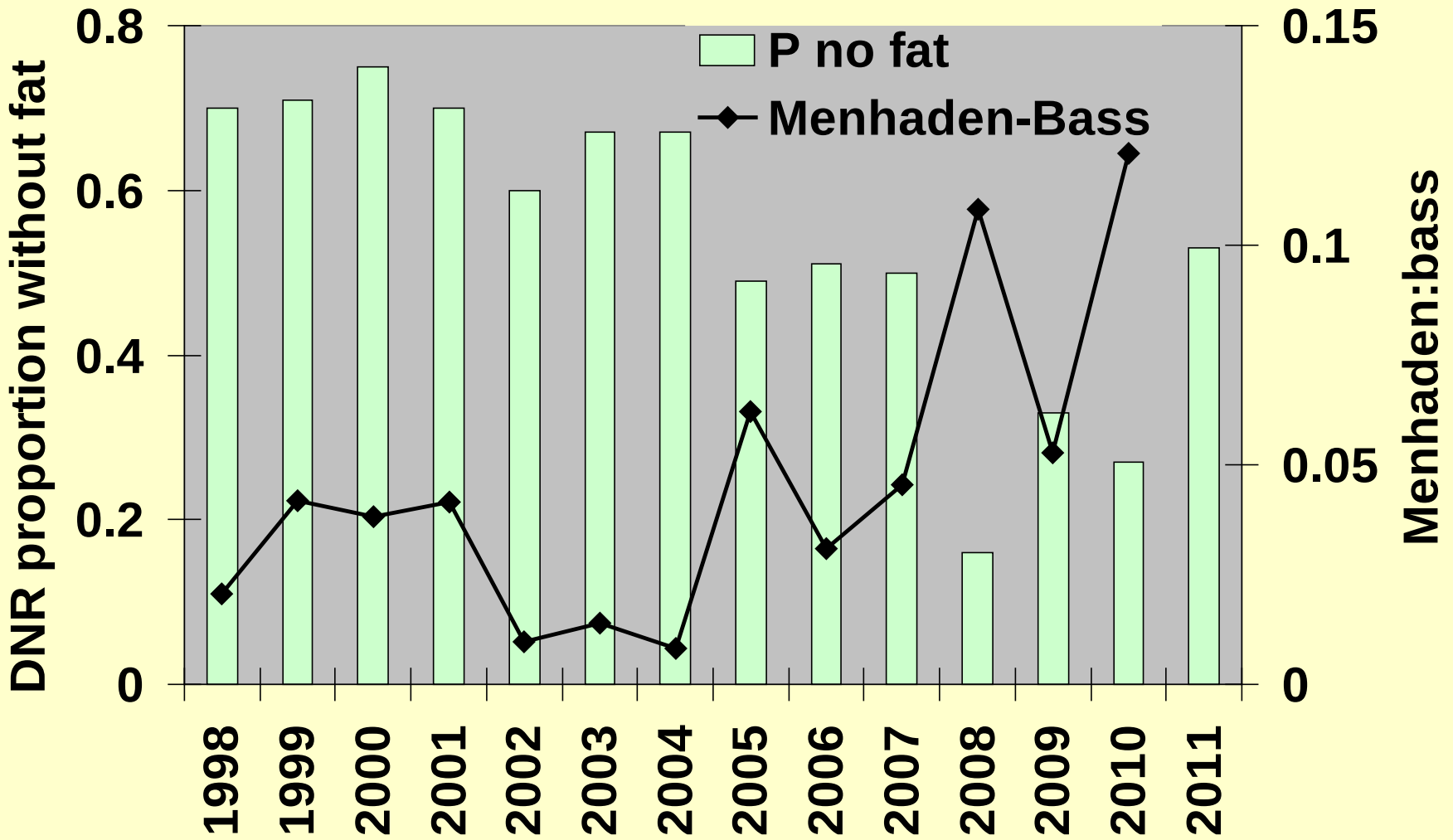
Future direction

- Added to Federal Aid to Sportfish project
- Estimate consumption on weight and energy (lipid) basis
- Split sublegal and legal
- Evaluate prey abundance indicators vs diet
- Eventually, look at year-round
- Fish Health Program collecting diet information on fall survey

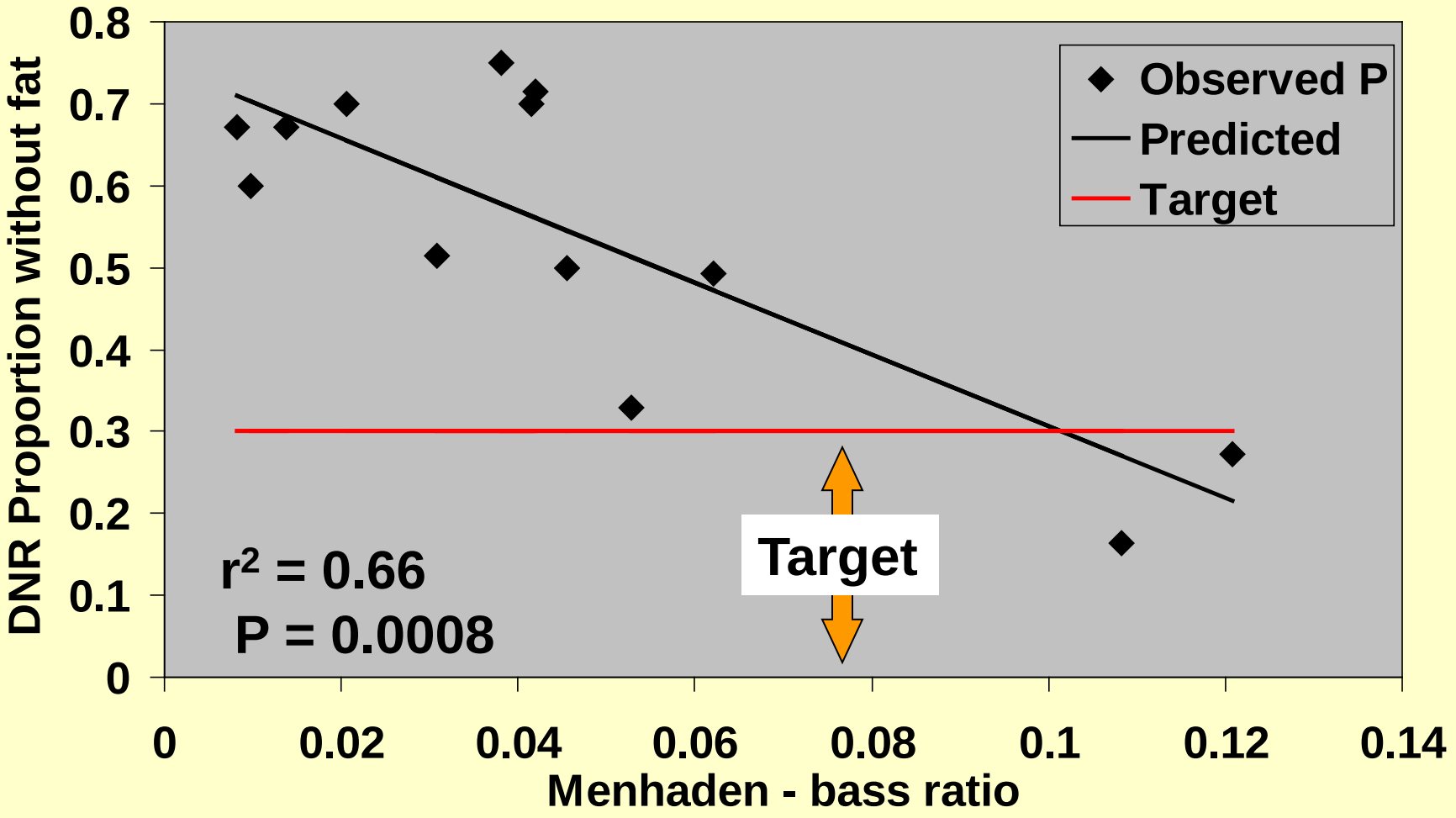
Application of condition / nutrition indicator

Or what do you look at when M (natural mortality) before late 1990s becomes…

Application example: DNR 0 body fat and ratio of MD indices of menhaden to striped bass (relative)



Body fat in target region when menhaden – bass ratio (relative measures) is more than 0.10. Target reached due to decrease in striped bass.



Freshwater striped bass management

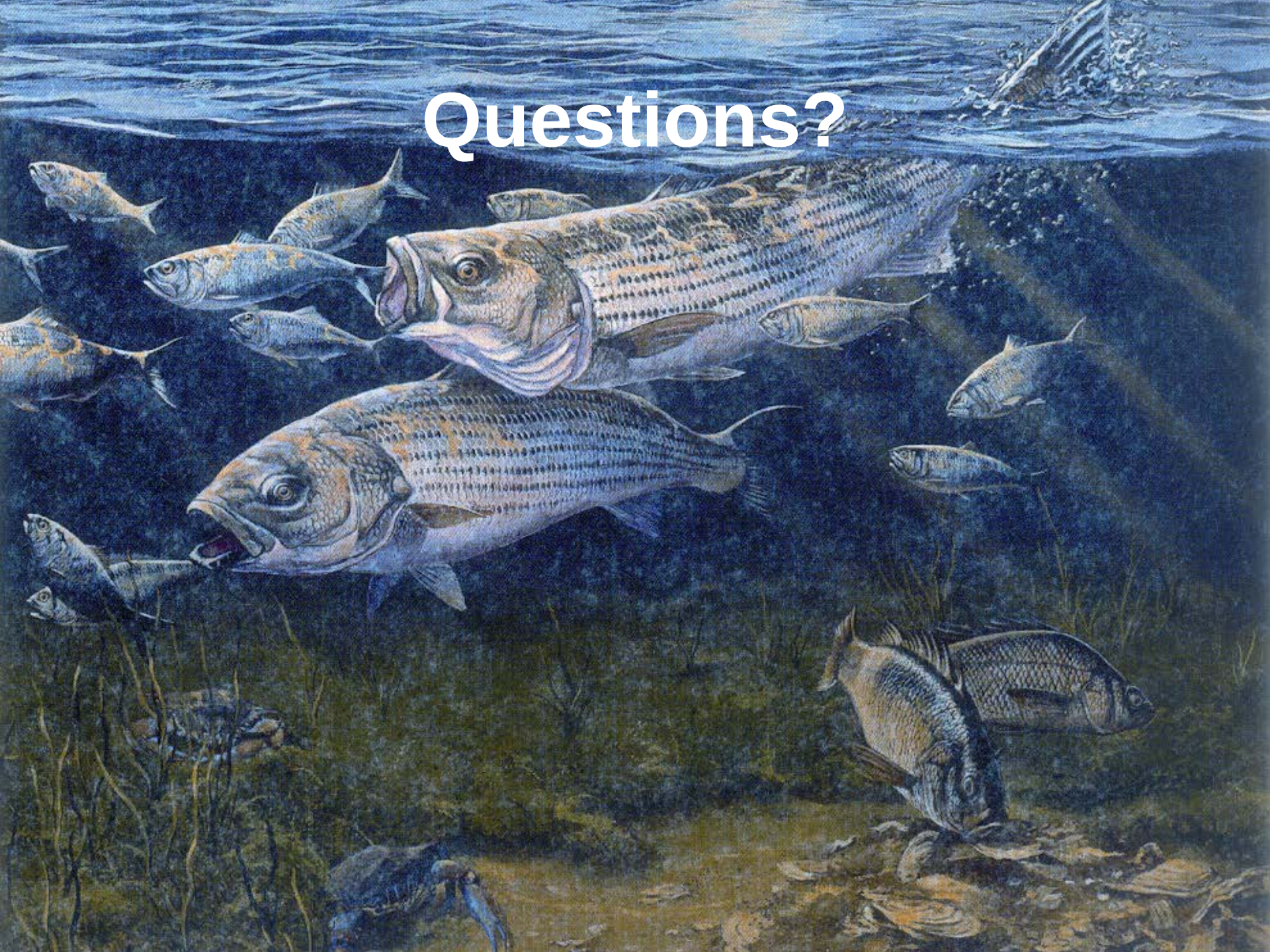
- Inadequate prey a common problem
- Condition indices are part of suite of indicators used to infer prey-bass imbalances in lakes
- Manipulate prey by introductions
- Reduce demand - reduce striped bass stocking and increase harvest

Lake Michigan indicator approach for Chinook salmon stocking to manage alewife

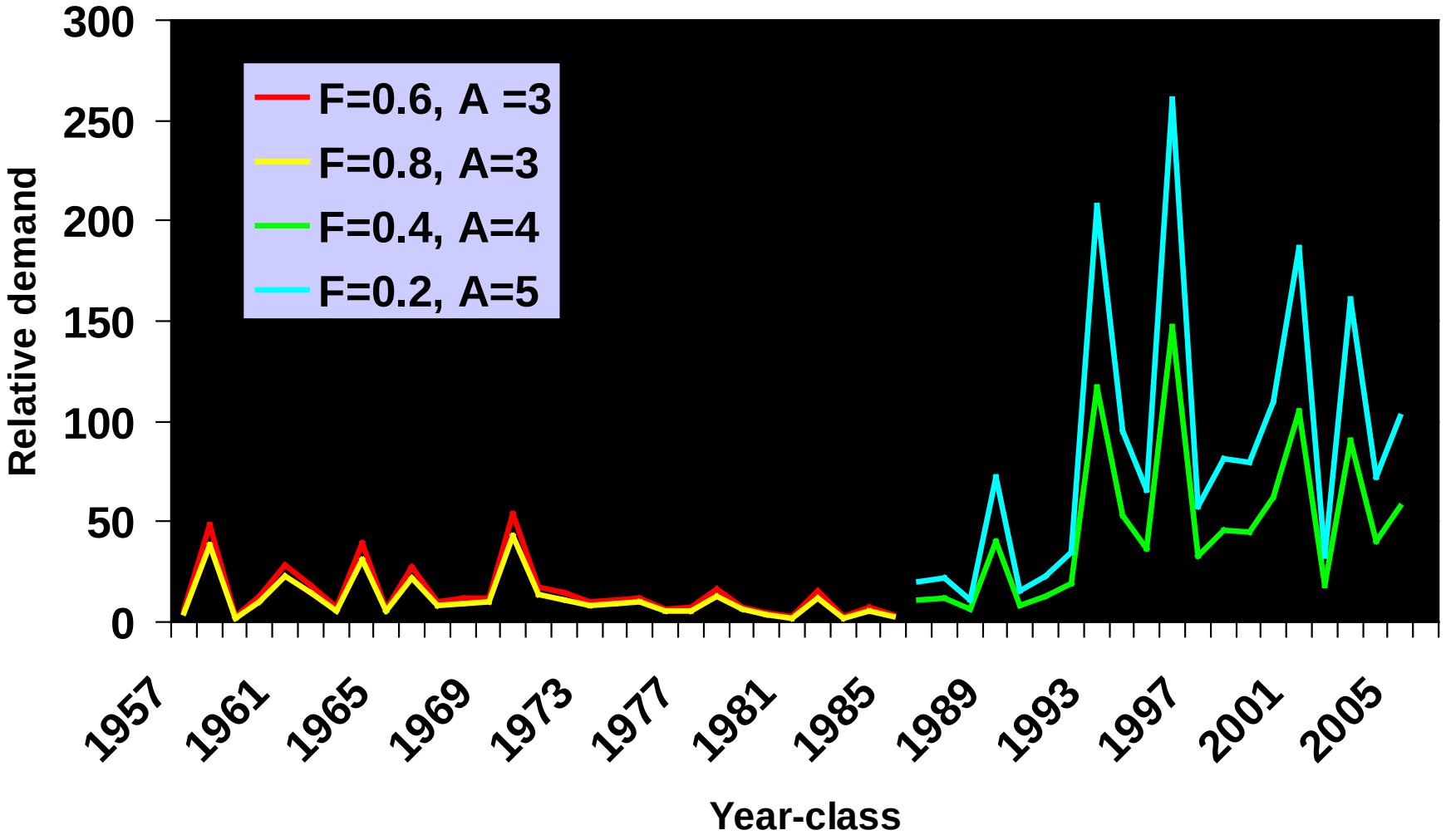
- Lake shifts to benthic production
- Alewife crash – low recruitment & high Chinook population & predation
- Indicators: Chinook abundance (4), natural reproduction (1), growth and condition (4), prey fish biomass (4, includes salmon diet), & ecosystem health (3; disease & energy density).
- Decision - greatly reduce stocking

Why don’t some cod stocks recover?

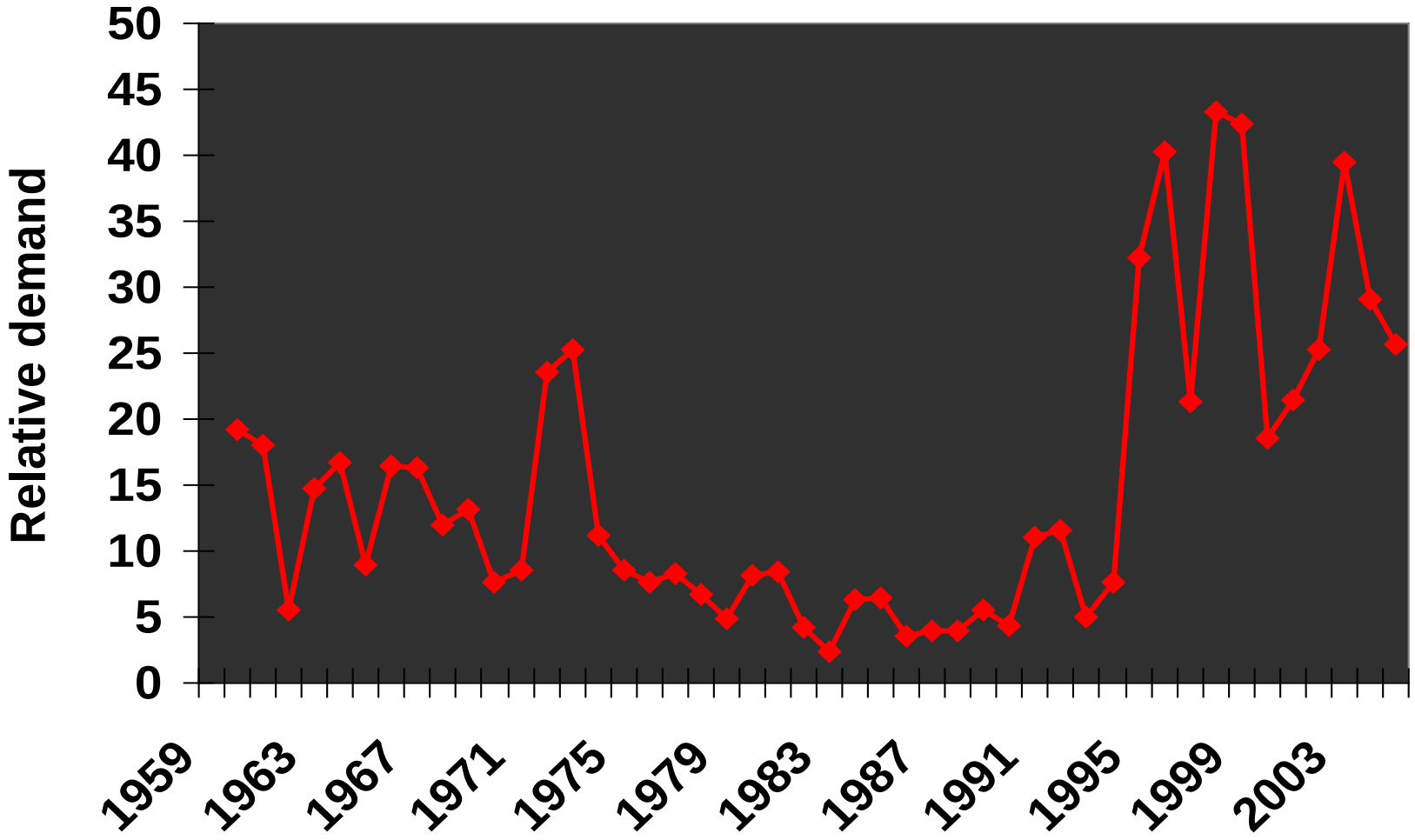
- Some stocks do not recover with F reductions
- Northern cod: lack of lipid in diet from lack of capelin = poor condition & low reproductive potential
- Gulf of St. Lawrence: poor condition contributes to increased natural mortality.
- Barents Sea: Egg production ≠ spawner biomass. Total Lipid Energy = egg production and is function of food abundance.


Questions?

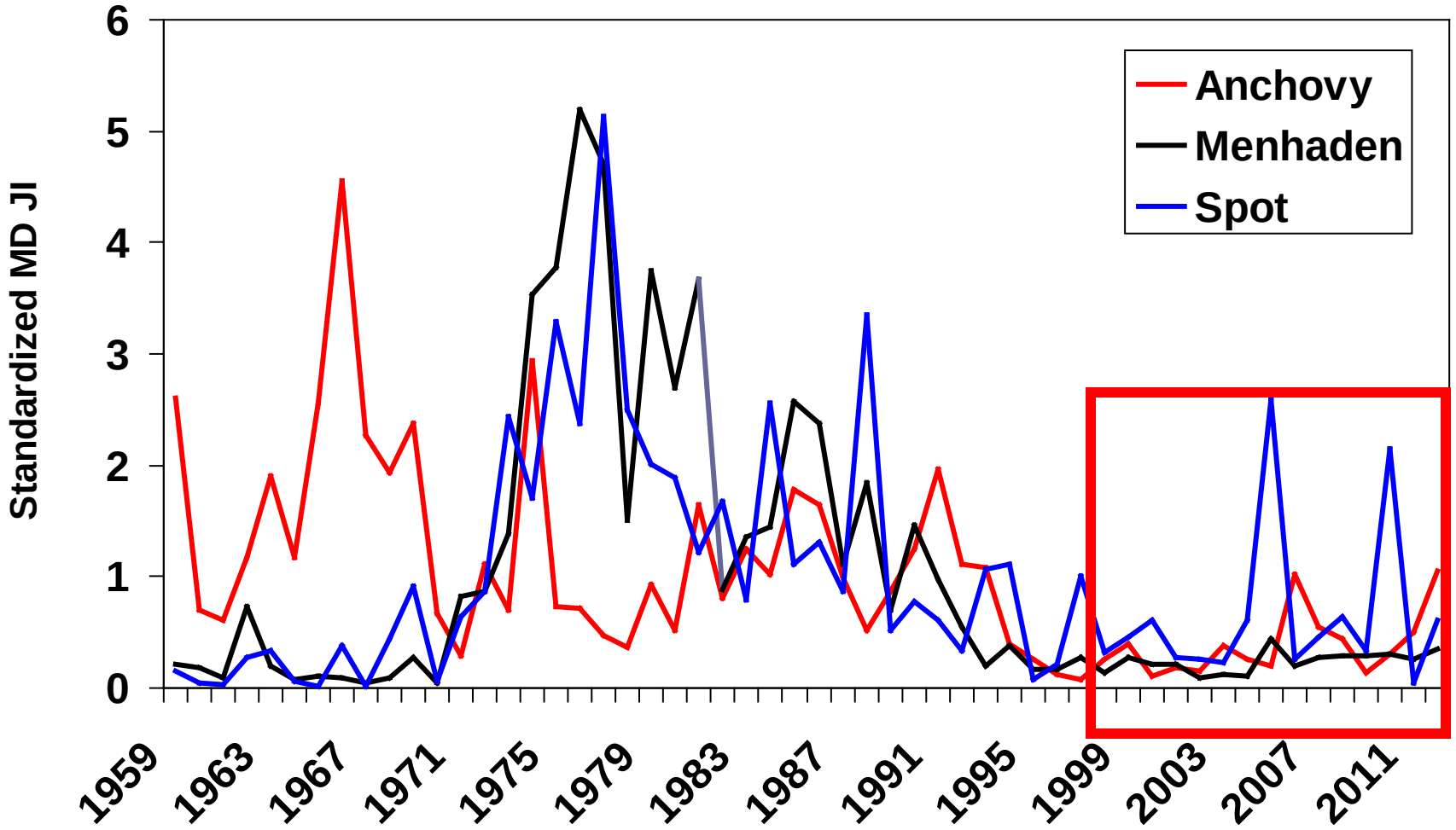
Relative lifetime demand for menhaden by striped bass year-classes. Age-at-entry and F approximate historic and current conditions. Natural mortality and growth constant



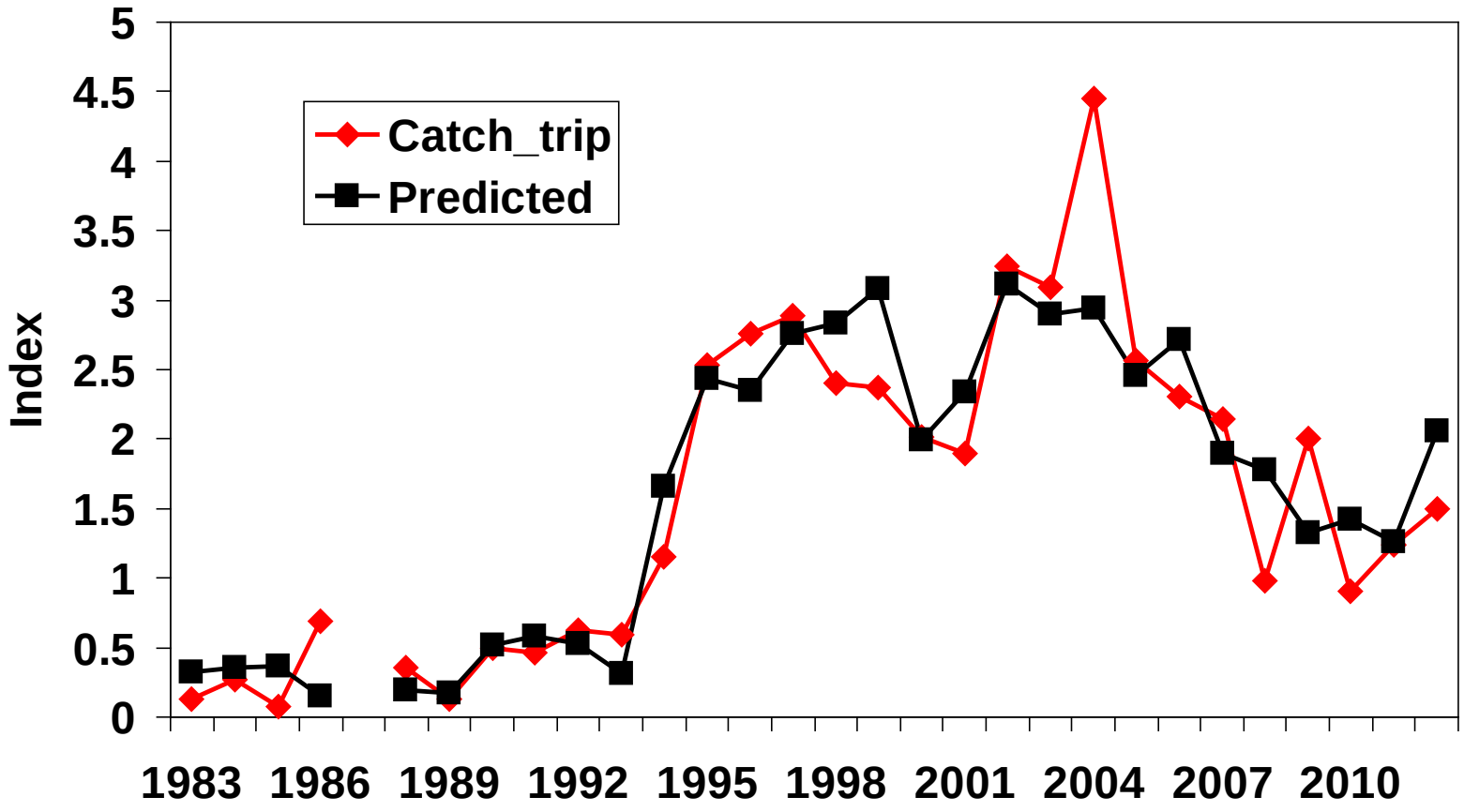
Striped bass relative demand for bay anchovy



Long-term trend in MD seine indices for forage (standardized to mean). We are managing during a low forage regime.



Wave 5 catch per private boat trip as index of resident striped bass and prediction from juvenile index with categorical mortality term (1999+)



Proportion without body fat, by area (CBEF)