

# Benthic Invertebrate Community Composition and Sediment Properties in Barnegat Bay, 1965 to 2014

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**RUTGERS**  
UNIVERSITY



## Take-home summary

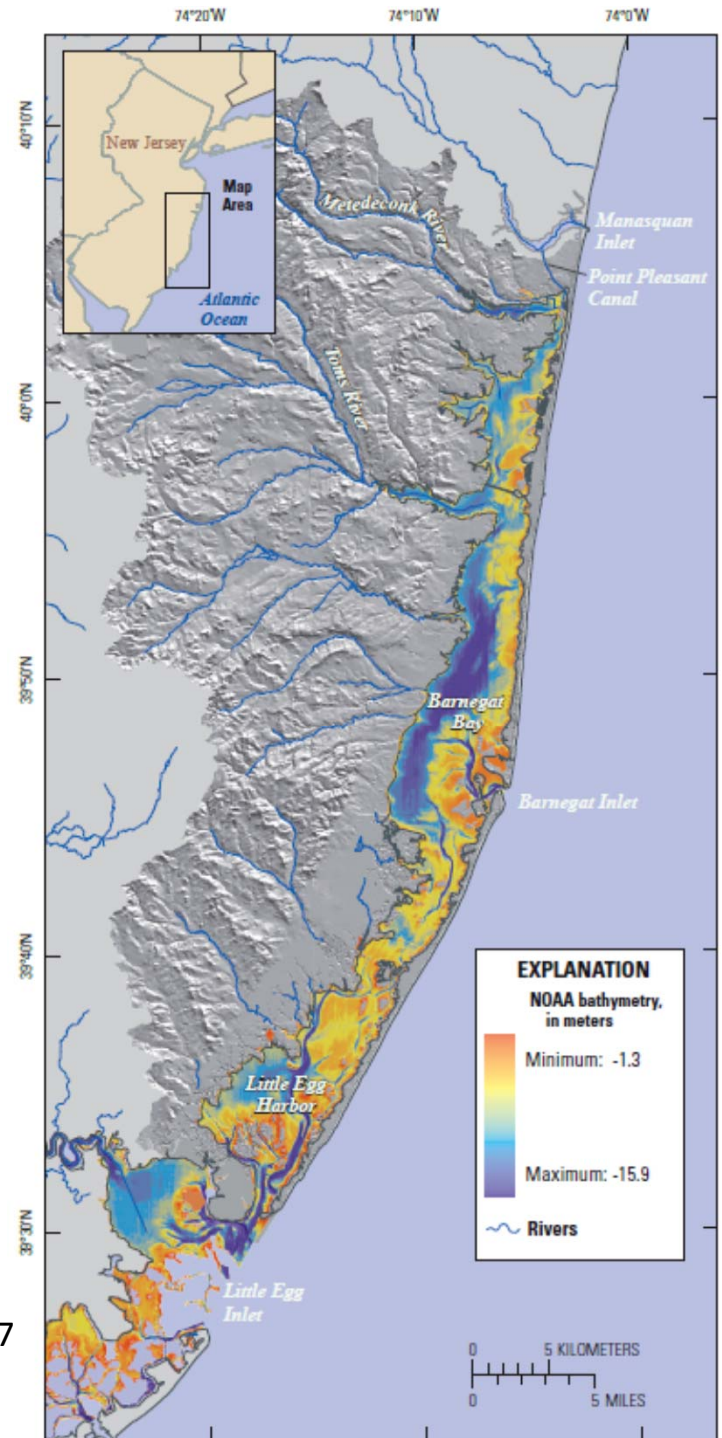
Compared with (limited) historical data from 49 years ago, the benthic invertebrate community today is nearly unchanged

Compared with (limited) historical data, sediment physical and chemical properties today are improved or similar

Based on the kinds and abundances of bottom-dwelling animals, habitat quality in Barnegat Bay-Little Egg Harbor is good to high

Shallow, back-barrier estuary  
North-to-south salinity gradient  
North-to-south human population gradient  
East-to-west sediment particle size gradient  
East-to-west sediment organic matter  
content gradient

Andrews et al. (2015) doi: 10.3133/ds937



# Governor Christie's Comprehensive Action Plan to Address the Ecological Decline of Barnegat Bay

## Six Month Update

presented by  
NJDEP Commissioner Bob Martin

Toms River Municipal Building  
L.M. Hirshblond Room, 2nd Floor  
33 Washington Street  
Toms River, NJ 08753  
June 27, 2011

State of New Jersey  
Department of Environmental Protection

## BARNEGAT BAY ACTION ITEM #9

# Produce More Comprehensive Research

*"The research projects being funded by the NJDEP should not only improve our understanding of the bay but also help inform management decisions to address the troubling conditions of the Bay."*

Stan Hales, Director  
Barnegat Bay Partnership

### COMPLETED MILESTONES

- Assessed research to identify data needs.
- Identified eight research projects that provide critical missing information on the health of Barnegat Bay.
- Posted online bibliography of Barnegat Bay Research.
- Developed a comprehensive plan for future research needs.
- Completed research, nutrient and ecological histories of Barnegat Bay.

### NEXT STEPS

- Award research contracts.
- Conduct research projects: establish baseline condition of bay and fill in critical data gaps.



Brigantine Salt Marsh

Over the years, extensive research has been conducted on Barnegat Bay but the work has not been fully coordinated - resulting in some key gaps in the data. Understanding the Bay's baseline condition will provide a solid basis for future comparisons to measure the effectiveness of the Comprehensive Plan of Action. The NJDEP Office of Science has been working with the Science Advisory Board, state universities, the U.S. Geological Survey, the U.S. Environmental Protection Agency, and the Barnegat Bay Partnership to develop and fund the additional research needed to fill in the data gaps. In conjunction with water quality analysis this research will assist in answering fundamental questions about the current status of the Bay ecosystem.



Benthic invertebrates are sediment-dwelling animals such as worms, clams, crustaceans, etc.



# Why care about benthic invertebrates?

Have important ecological roles

Species differ in tolerances to stress

Most species are relatively sedentary

The types of species and how abundant they are can be used as an “index” of habitat quality



# An analogy: rating restaurants



3-Star restaurants worldwide   					
COUNTRY			CITIES		
	Japan	28		Tokyo	13
	France	27		Paris	10
	Germany	11		New York	7
	US	10		Hong Kong	5
	Spain	8		San Francisco	2
	Italy	8		London	2
	China	7		Macau	2
	Spain	7		Chicago	1
 	The UK Ireland	4		Reims	1
	Switzerland	2		Shonan	1
	Belgium	3			
	Netherlands	2			

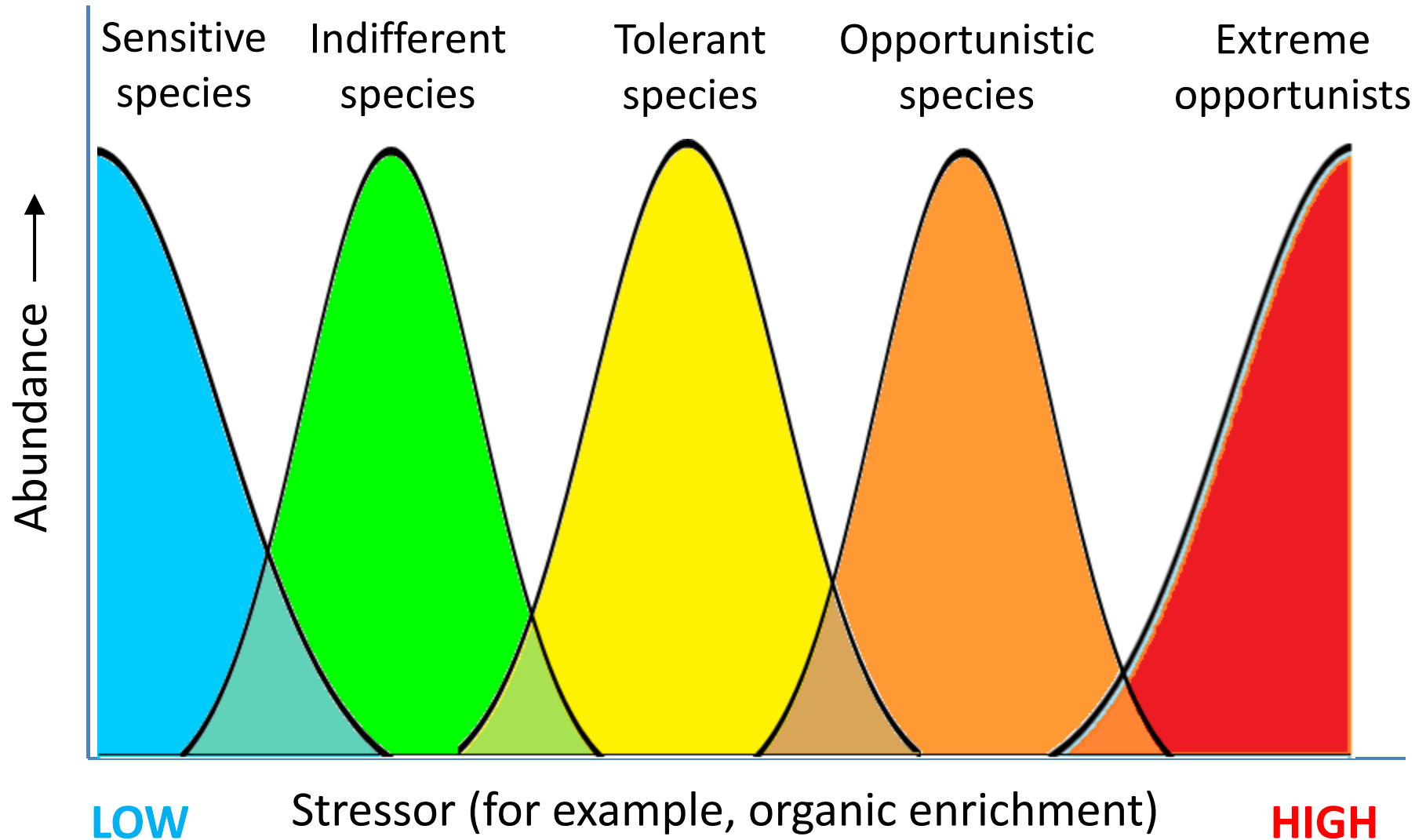
# An analogy: rating restaurants



CITIES		
Tokyo	13	
Paris	10	
New York	7	
Hong Kong	5	
San Francisco	2	
London	2	
Hanoi	2	
Chicago	1	
Helsinki	1	
Switzerland	2	
Belgium	3	
Netherlands	2	
Shonan	1	



A commonly observed response: Species differ in their sensitivity or tolerance to stress



## What we did

Sediment sampling at 100 locations in  
July 2012, 2013, 2014

Total of 156,578 individuals

Total of 191 species



# What went before – locations sampled in:



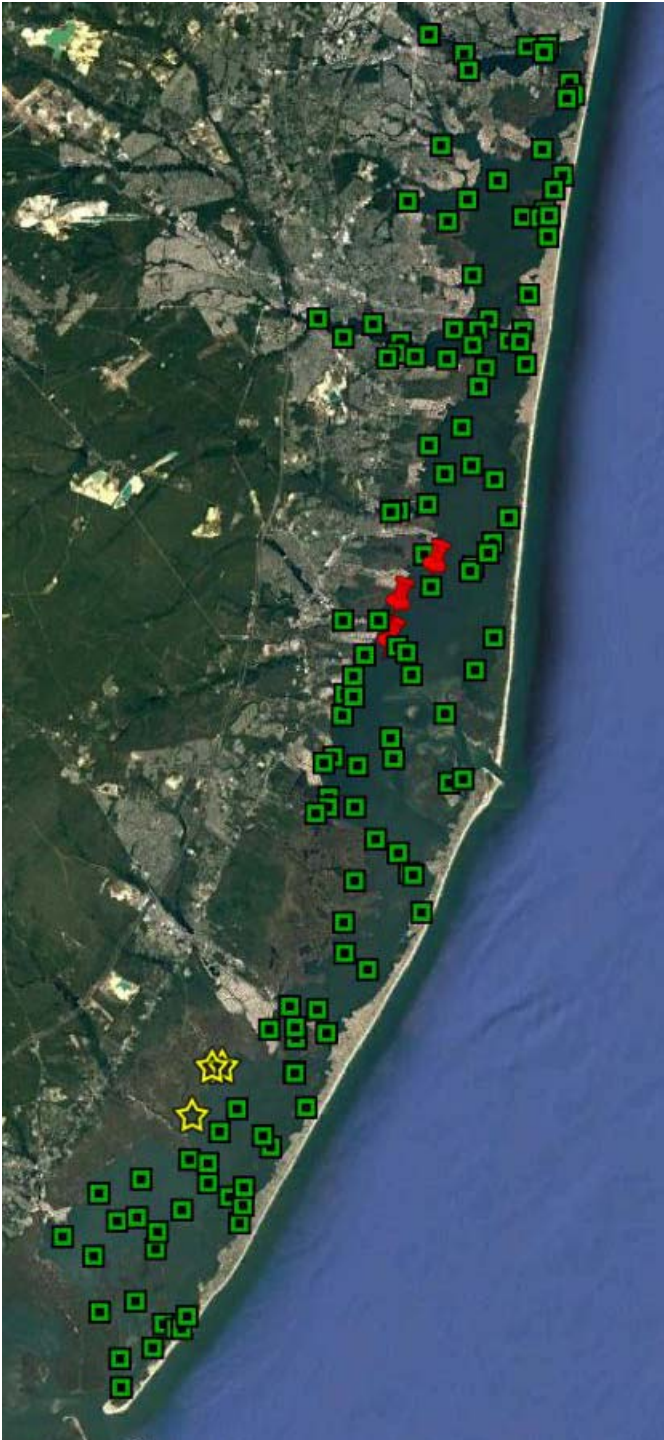
1965–1973 (Phillips, Loveland and Vouglitois)



1973–1974 (Haskin and Ray)



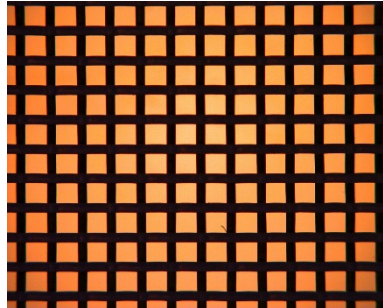
1990–2006 (US EPA)



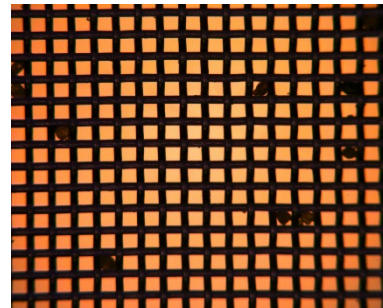
# What hinders comparing data sets?

Changes in sampling gear, sample processing

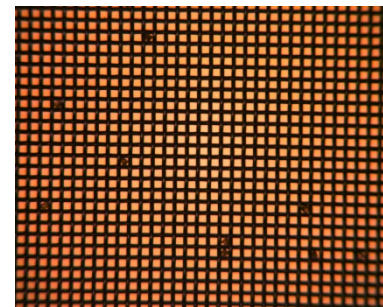
1965–1973



1973–1974



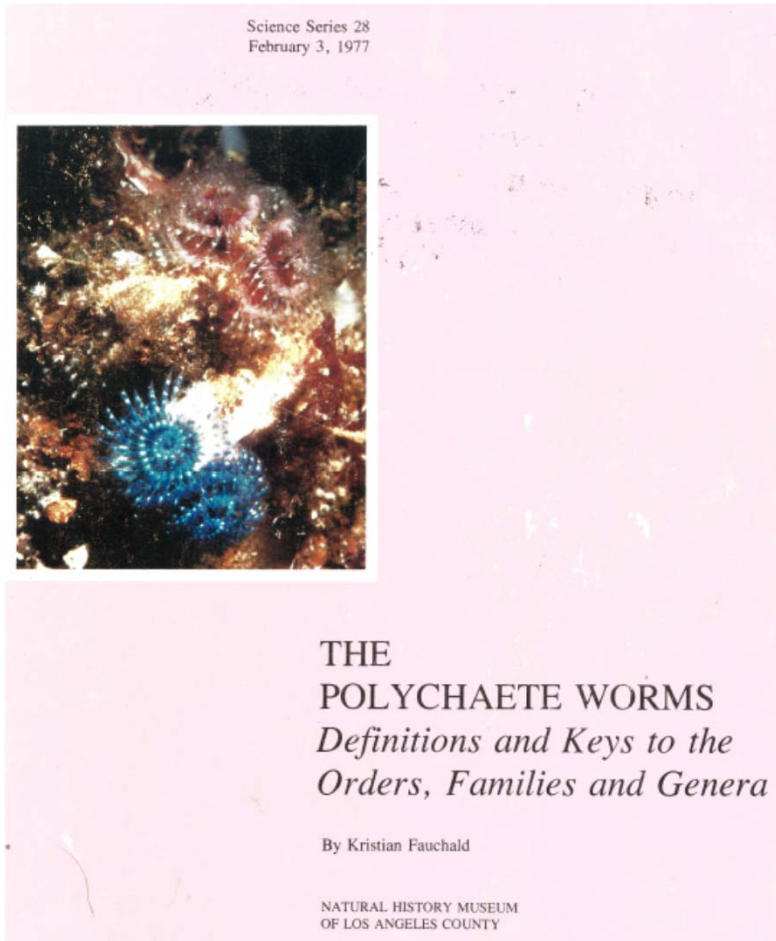
1990–2006,  
2012–2014





# What hinders comparing data sets?

## Changes in taxonomy



VS

**WoRMS**  
World Register of Marine Species

**Latest taxon additions**

Margarita (Unio) coccineus Lea, 1836	2016-11-15 16:28Z
Heterotestophyes jonesae Siyal, Das, Ghazi & ...	2016-11-15 13:13Z
Spiroloculina striata d'Orbigny, 1826	2016-11-15 10:26Z
Spiroloculina tricosta Cushman and Todd, 1944	2016-11-15 10:26Z
Aphrodita roulei Horst, 1917	2016-11-14 23:49Z

**Search WoRMS**

Home  
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contains [input] Search

Scientific name  
begins with [input] Search

[advanced search]

**Statistics**

242,464 accepted species of which 226,256 checked (93%)  
446,550 species names including synonyms  
553,667 taxon names (infraspecies to kingdoms)  
53,300 images of which 27,008 checked (51%)  
Last update: 28 minutes ago

**About WoRMS**

With WoRMS we aim to provide the most authoritative list of names of all marine species globally, ever published.

WoRMS is a contribution to Lifewatch, Catalogue of Life, Encyclopedia of Life, Global Biodiversity Information Facility and the Census of Marine Life.  
[Read more...](#)

**News**

**New Steering Committee, Chair and Vice-chair in place for WoRMS**  
Added on: 2016-10-17 12:30:46 by Vandepitte, Leen  
Following the nominations and elections earlier this year for a number of positions within the Steering Committee (SC), the new WoRMS SC, with a newly elected chair and vice-chair is in place. ...  
[Read more](#)

**World List of Tardigrada launched**  
Added on: 2016-10-17 11:40:24 by Vandepitte, Leen  
The World List of Tardigrada is now available! ...  
[Read more](#)

**LifeWatch support in 2015-2016 made it possible to make WoRMS more complete**

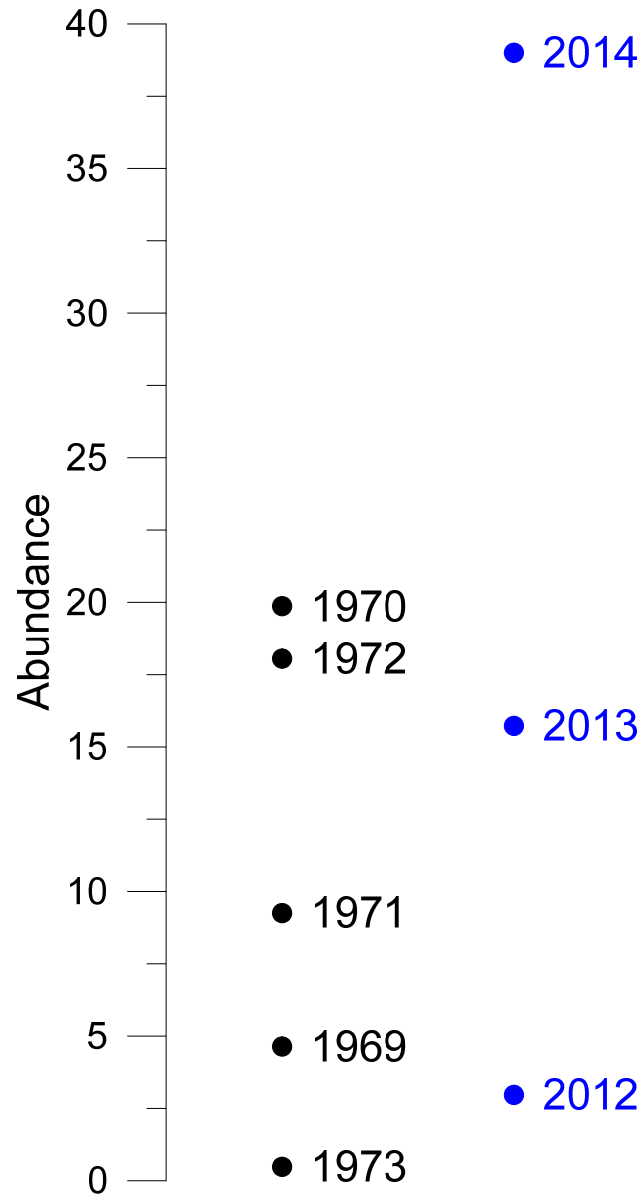
**Tweets by @WRMarineSpecies**

WoRMS Retweeted  
Oceanography Centre @NOCEnews  
Great to see #BoatyMcBoatface looking so lovely at today's #MATS16 showcase  
14 Nov

WoRMS @WRMarineSpecies  
Copyright & Use of Images as Biodiversity Data - copyright doesn't

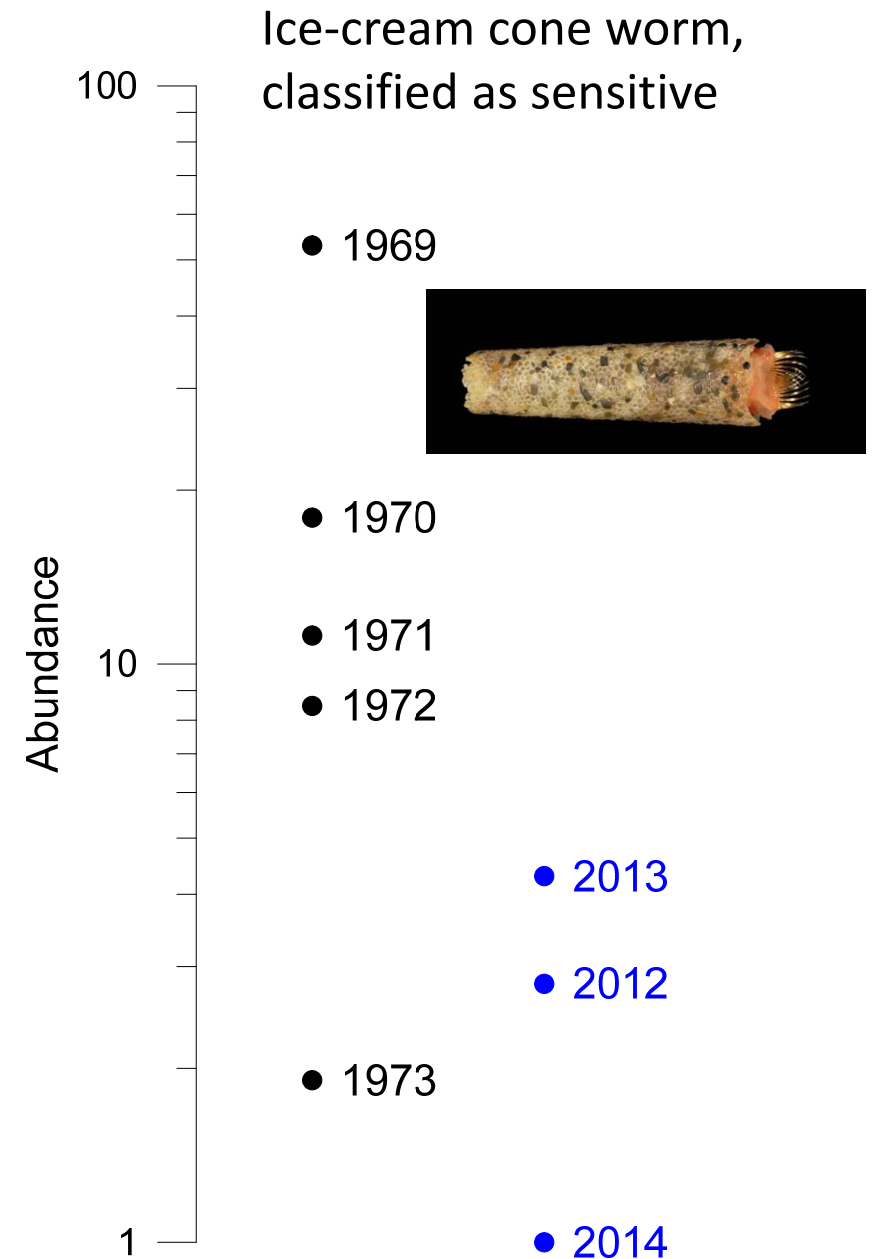
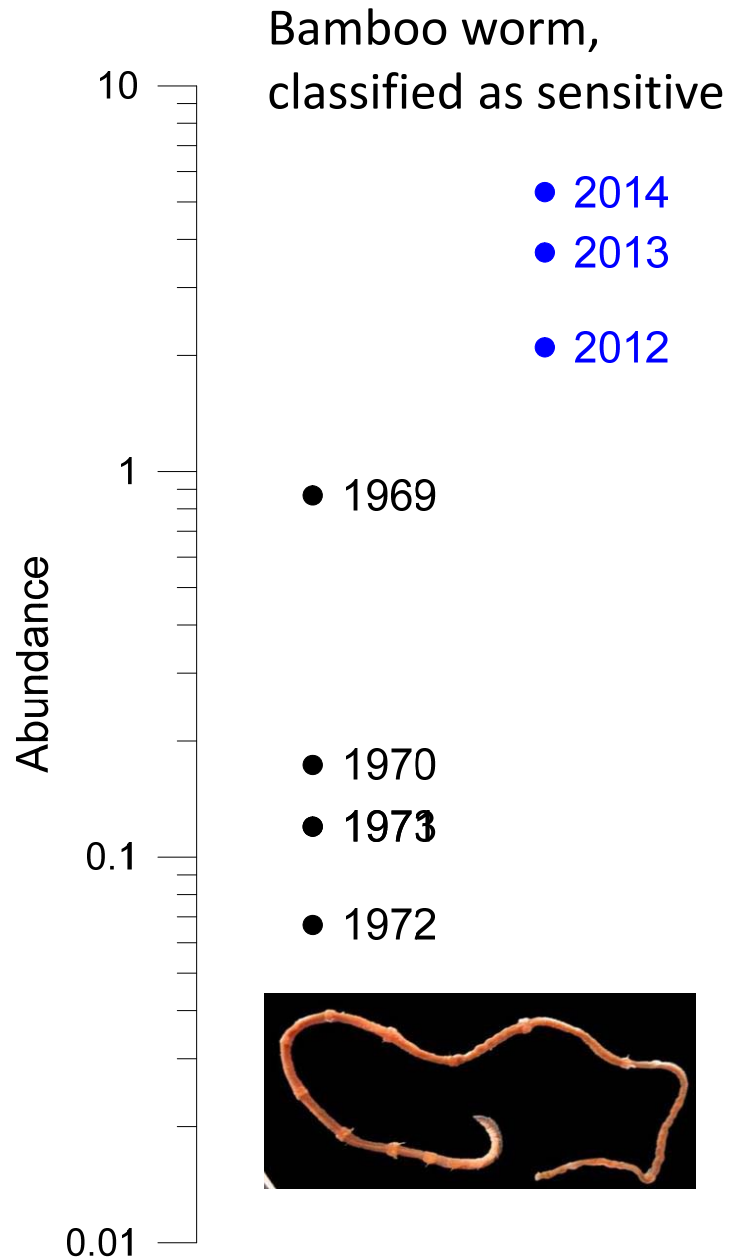


# How do abundances in the past compare with the present?

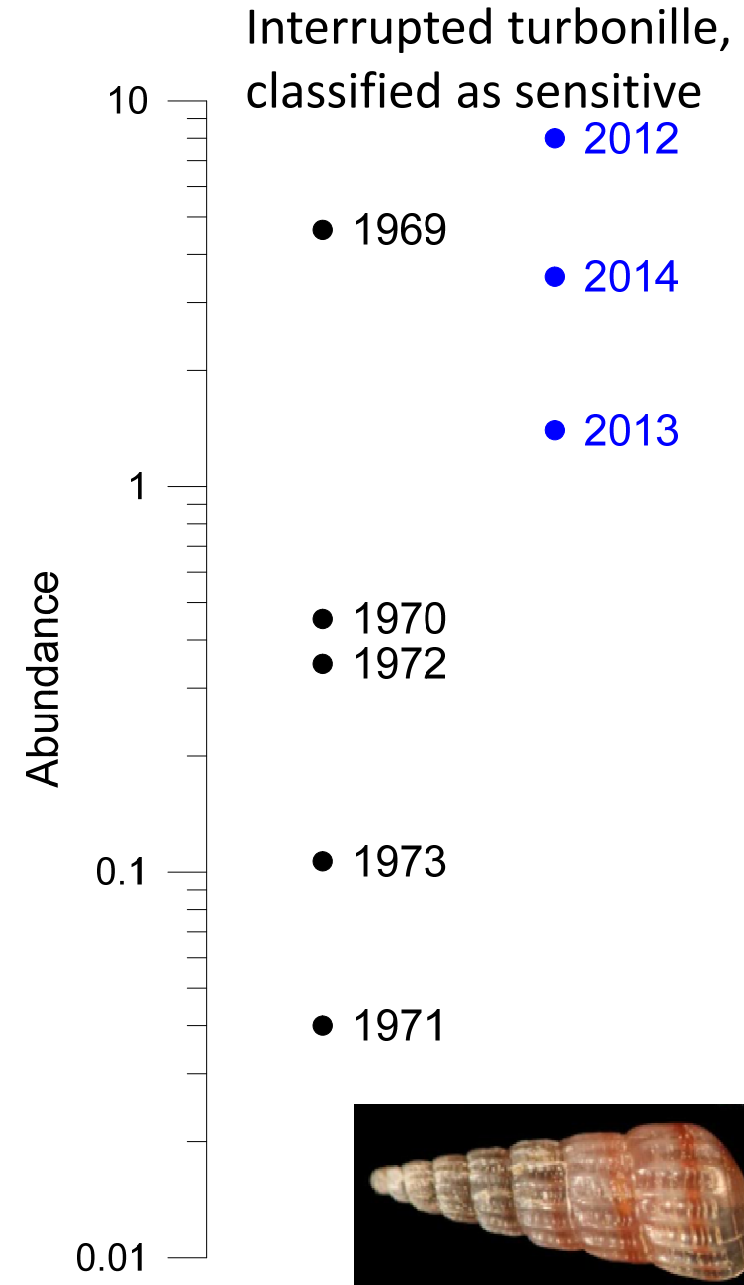
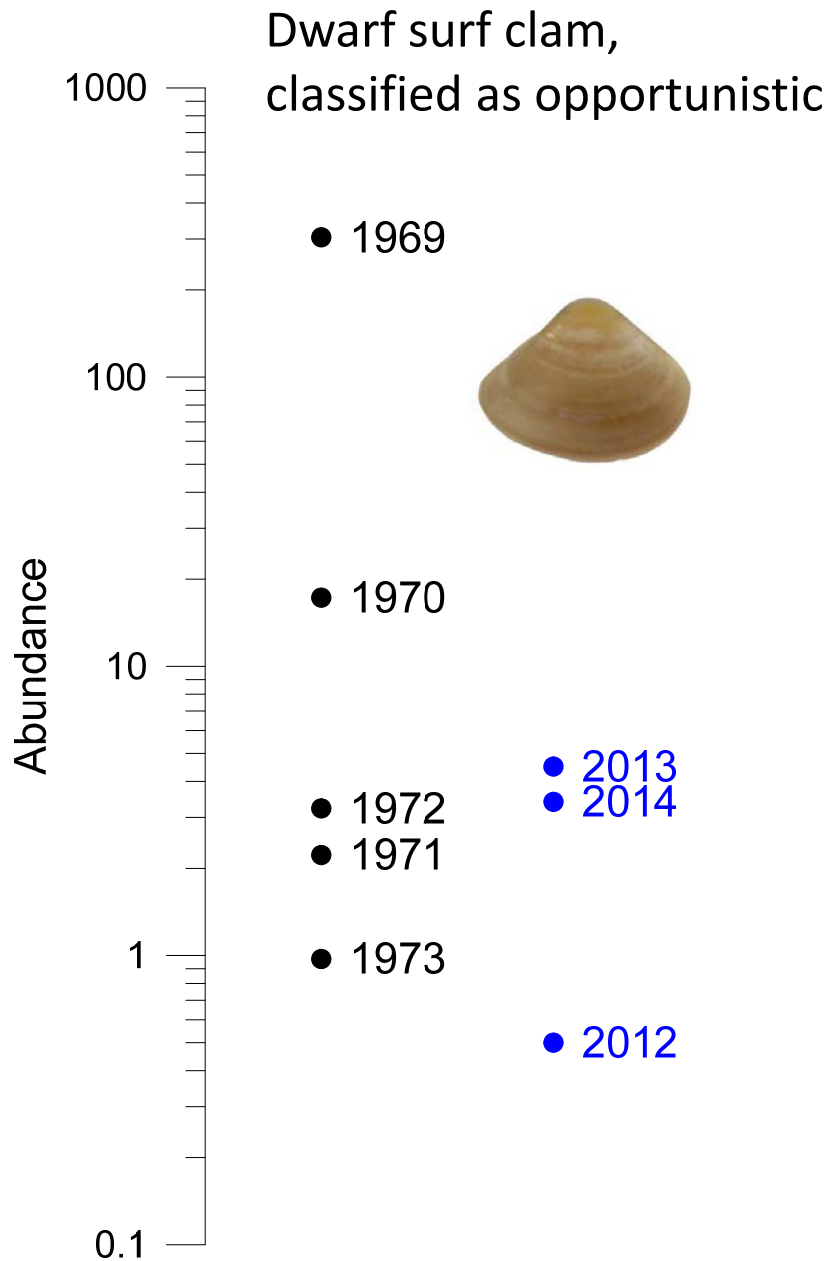


Four-eyed amphipod, classified as sensitive-to-tolerant

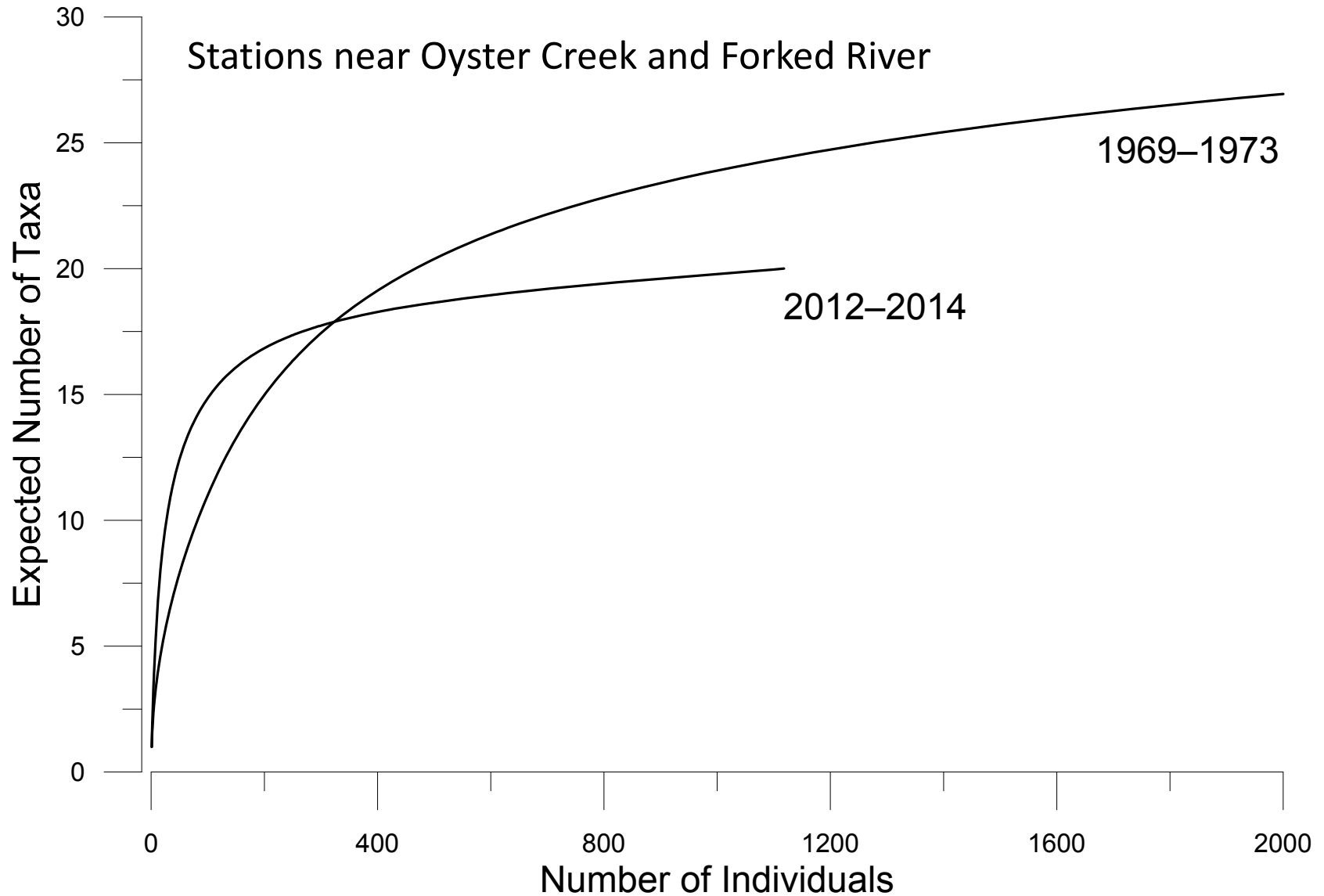
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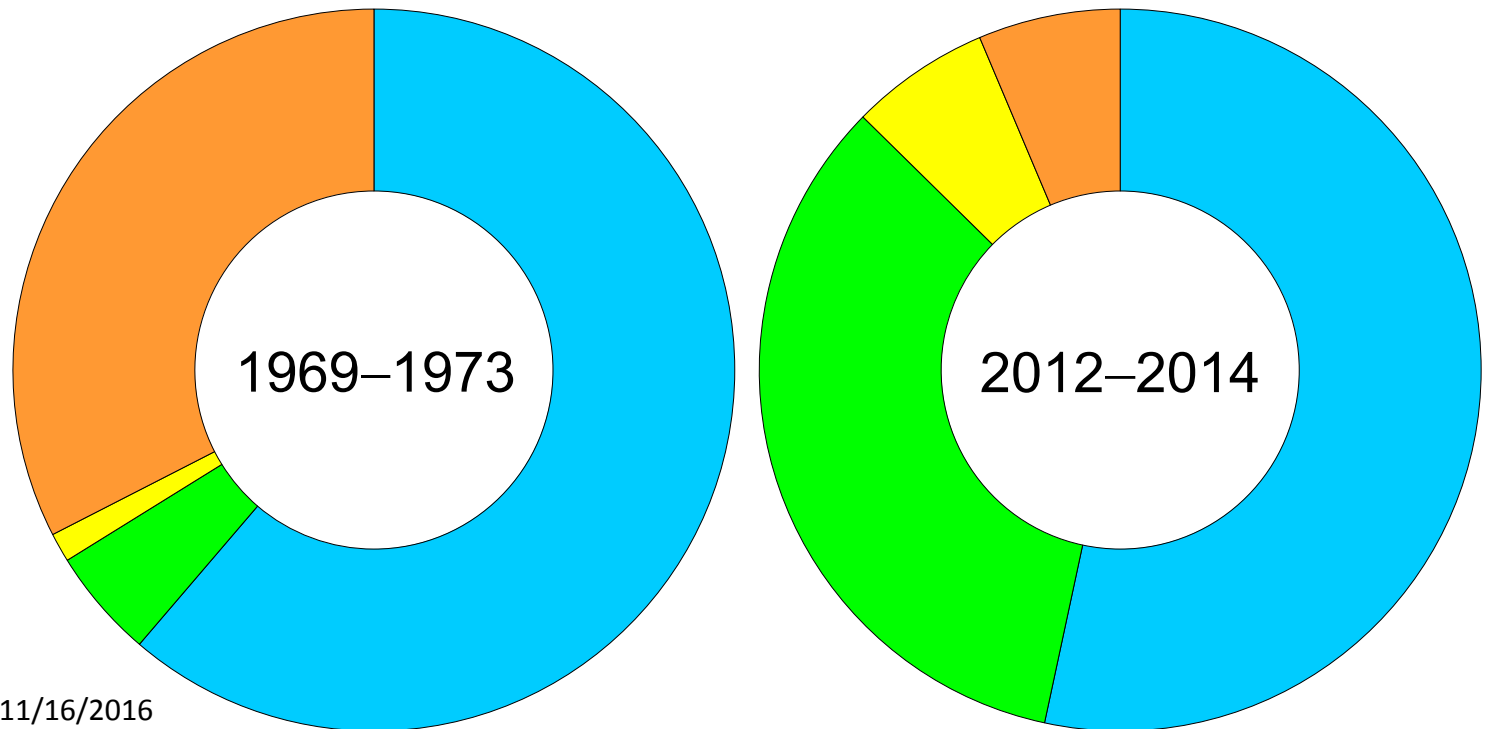
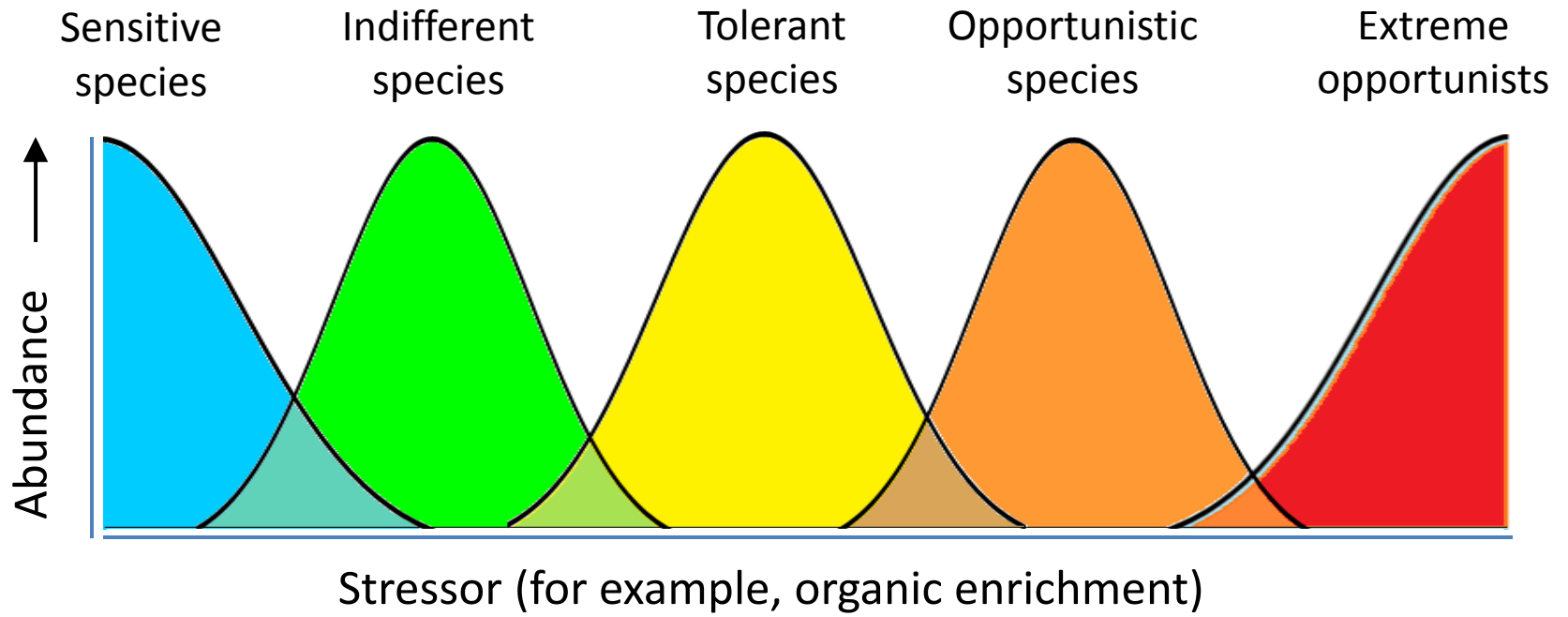


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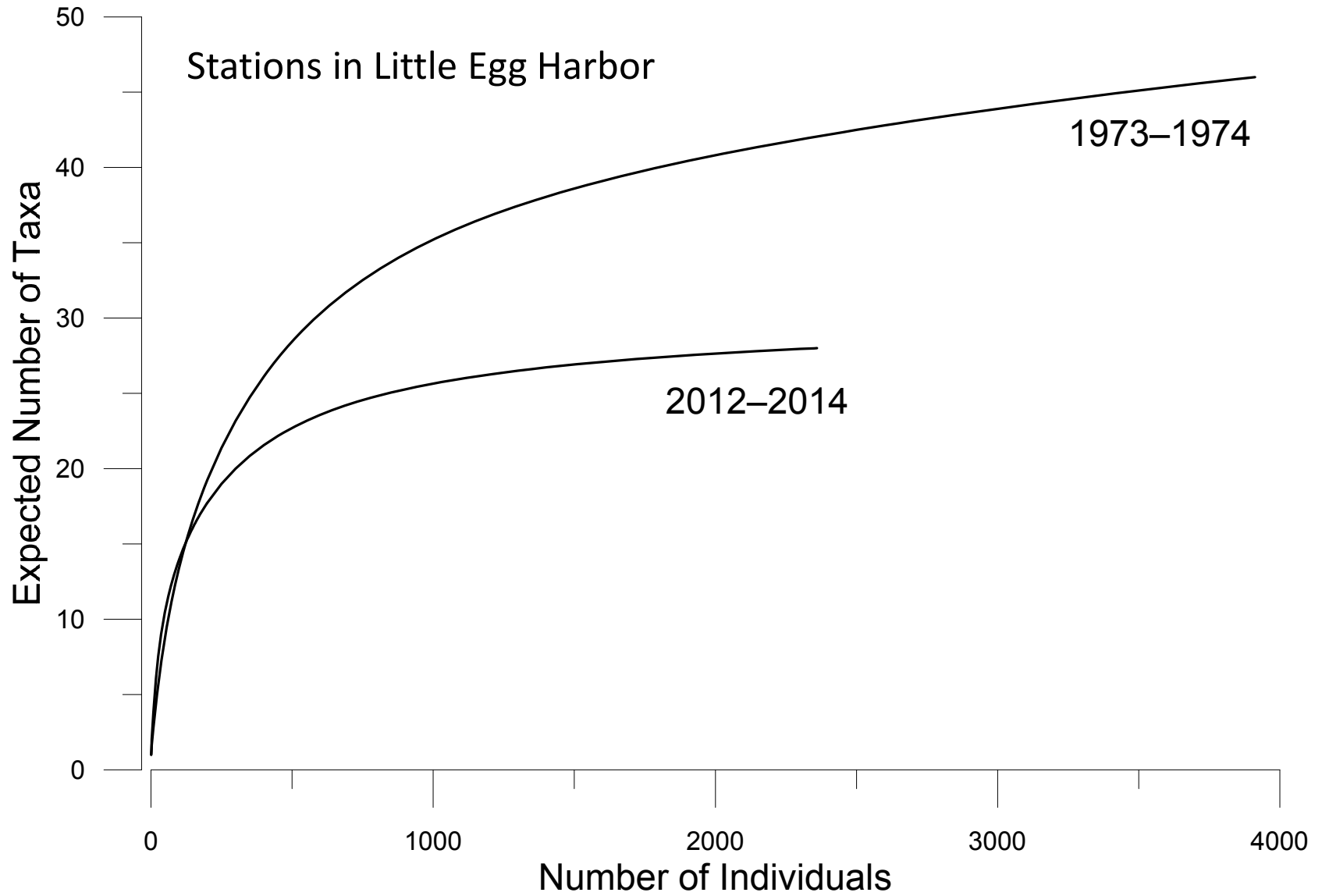


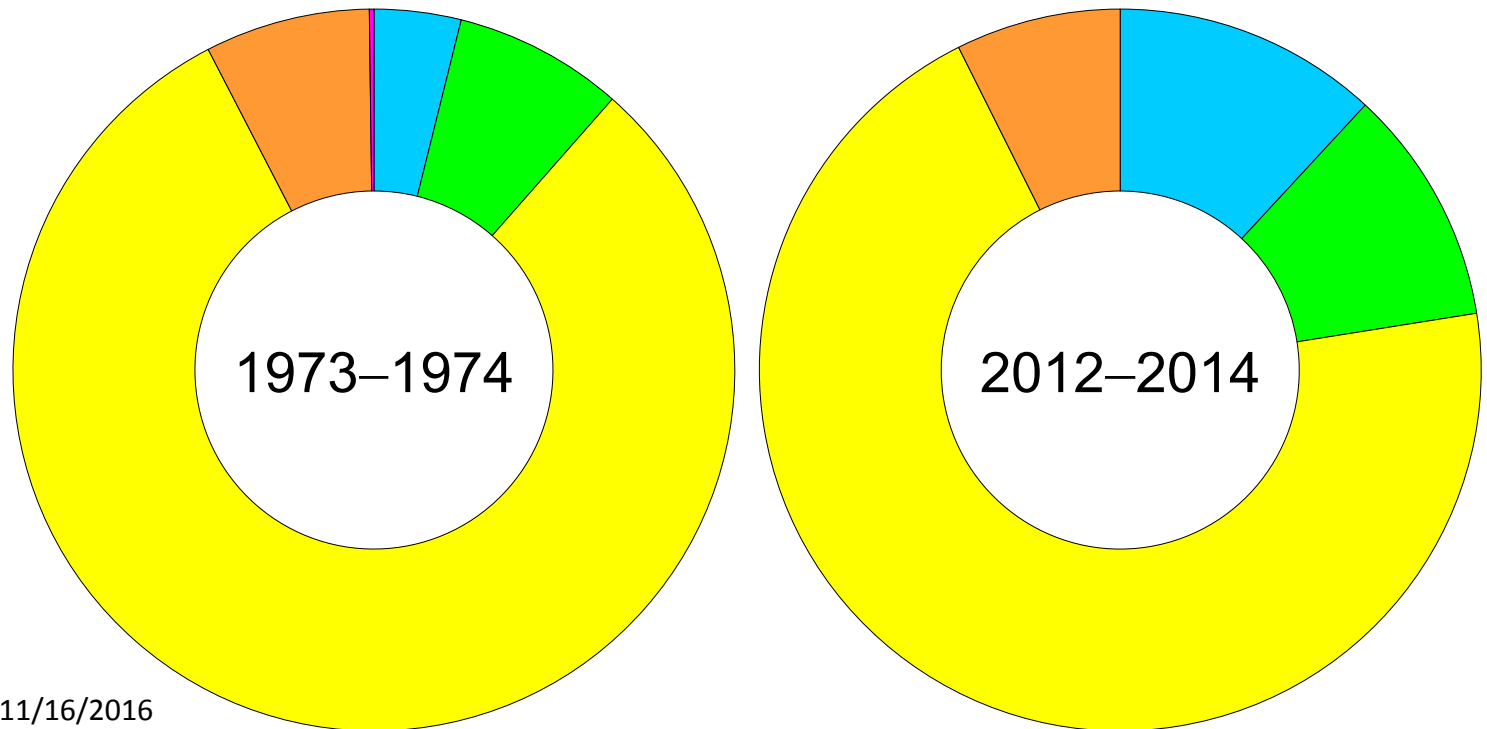
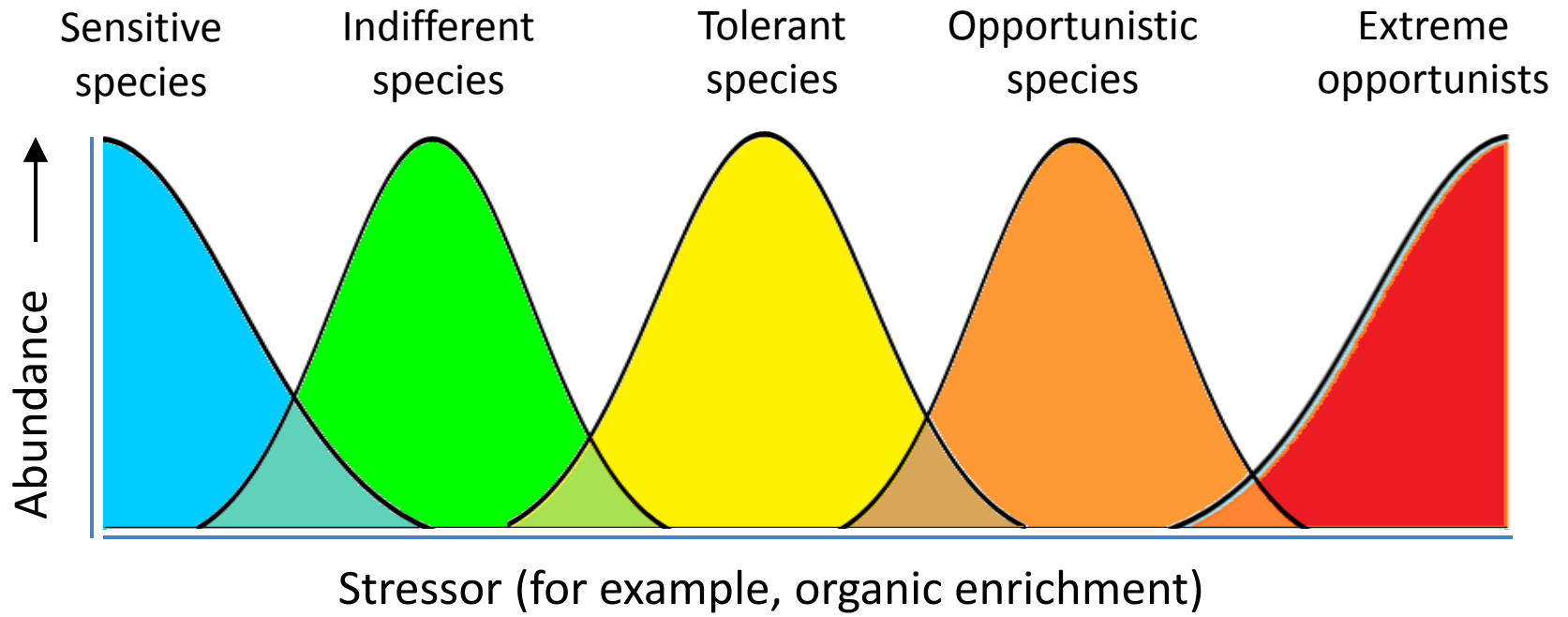
“Rarefaction curves” allow comparison of species diversity between locations, time, or both



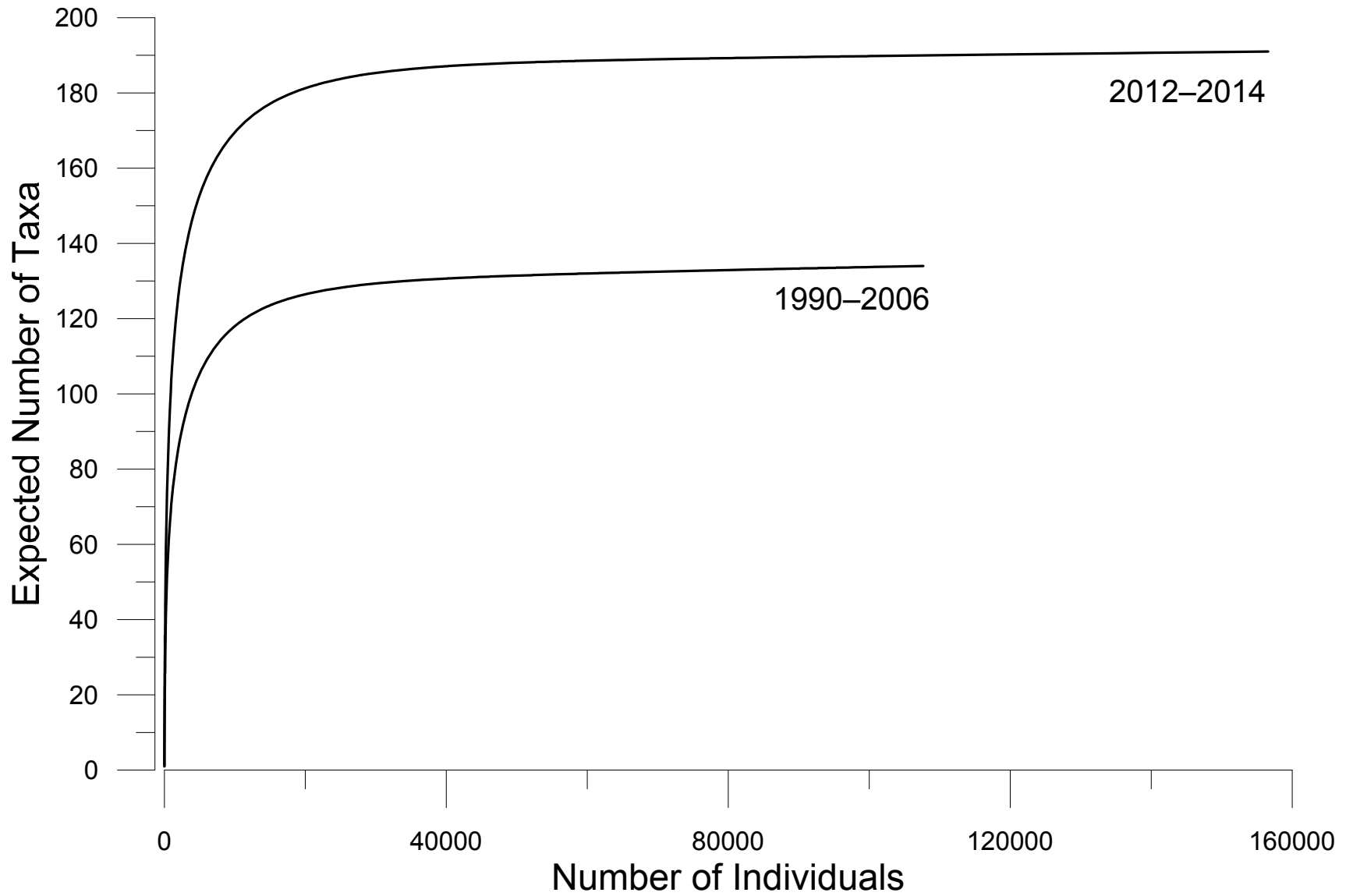


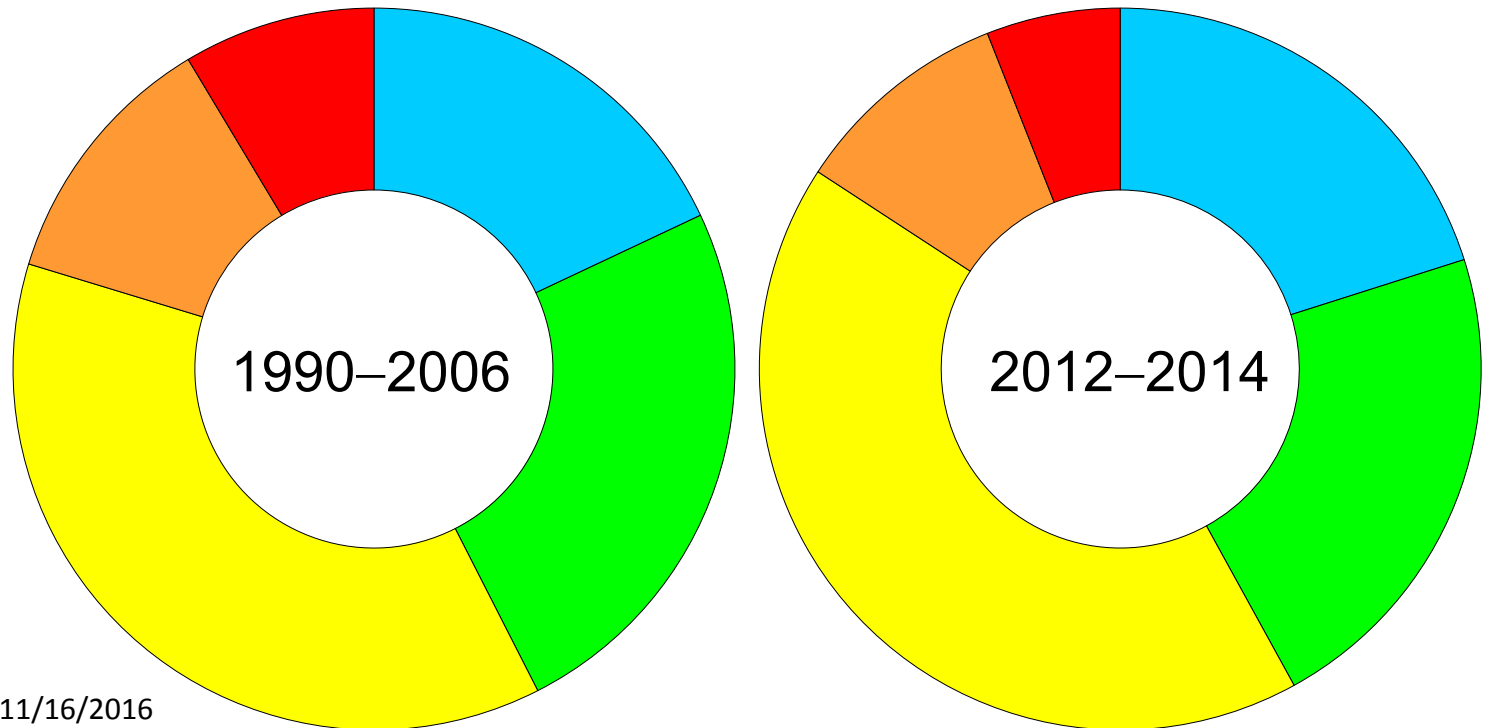
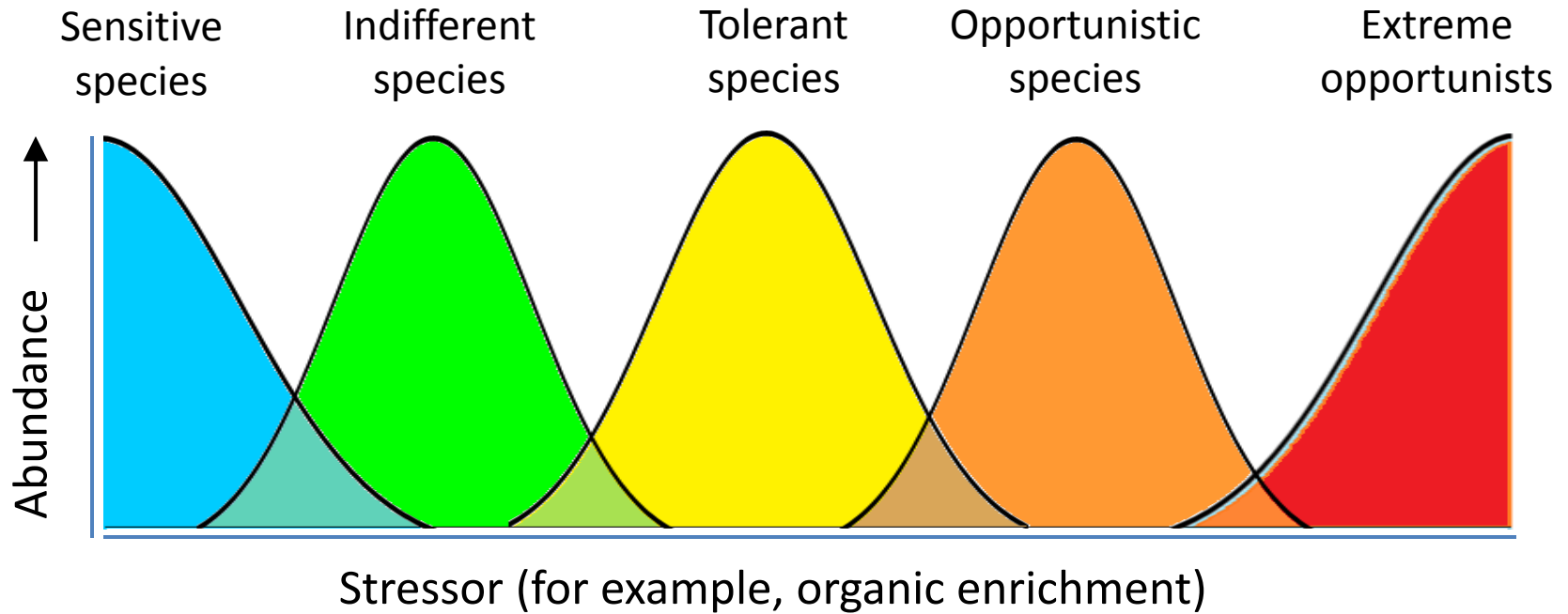




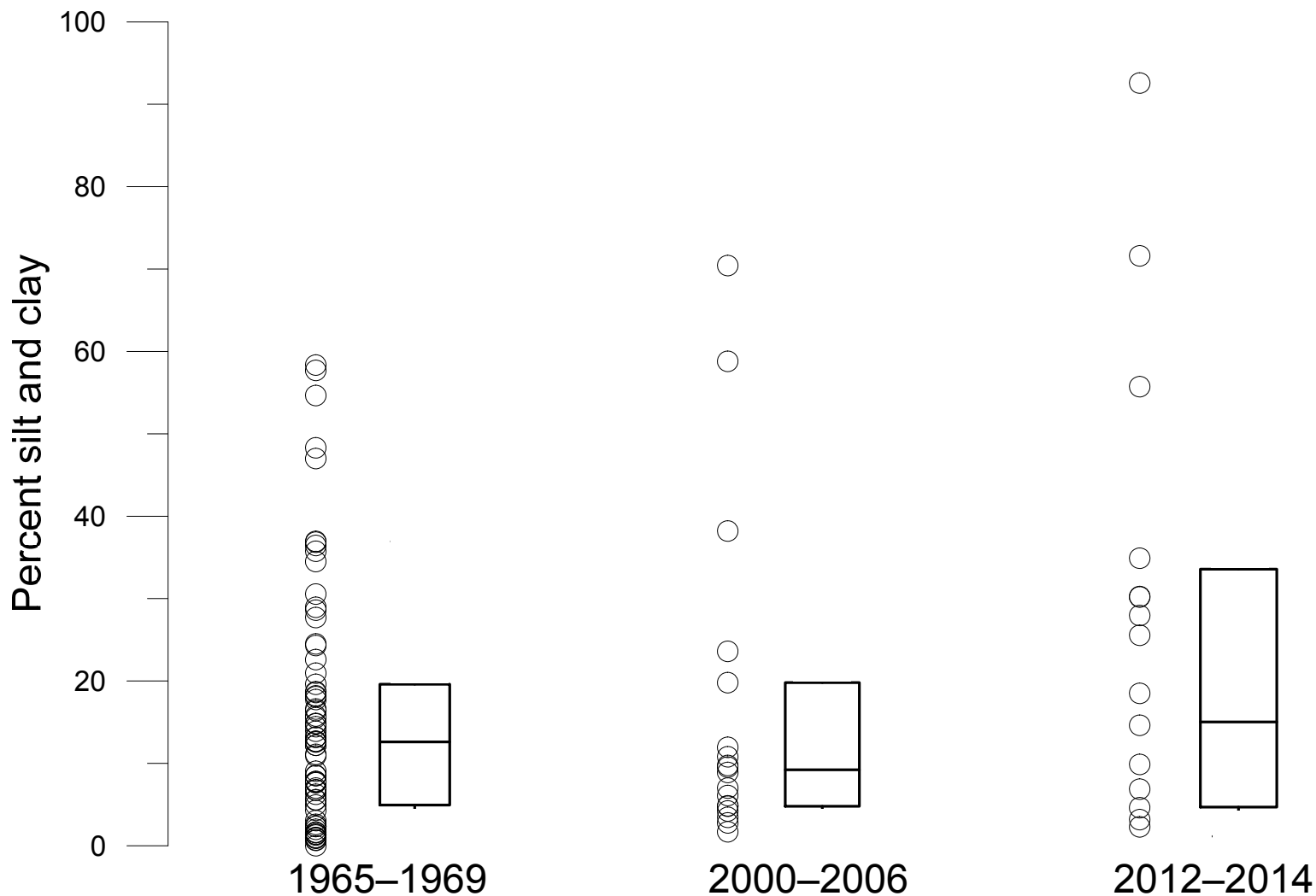


# Stations throughout Barnegat Bay and Little Egg Harbor



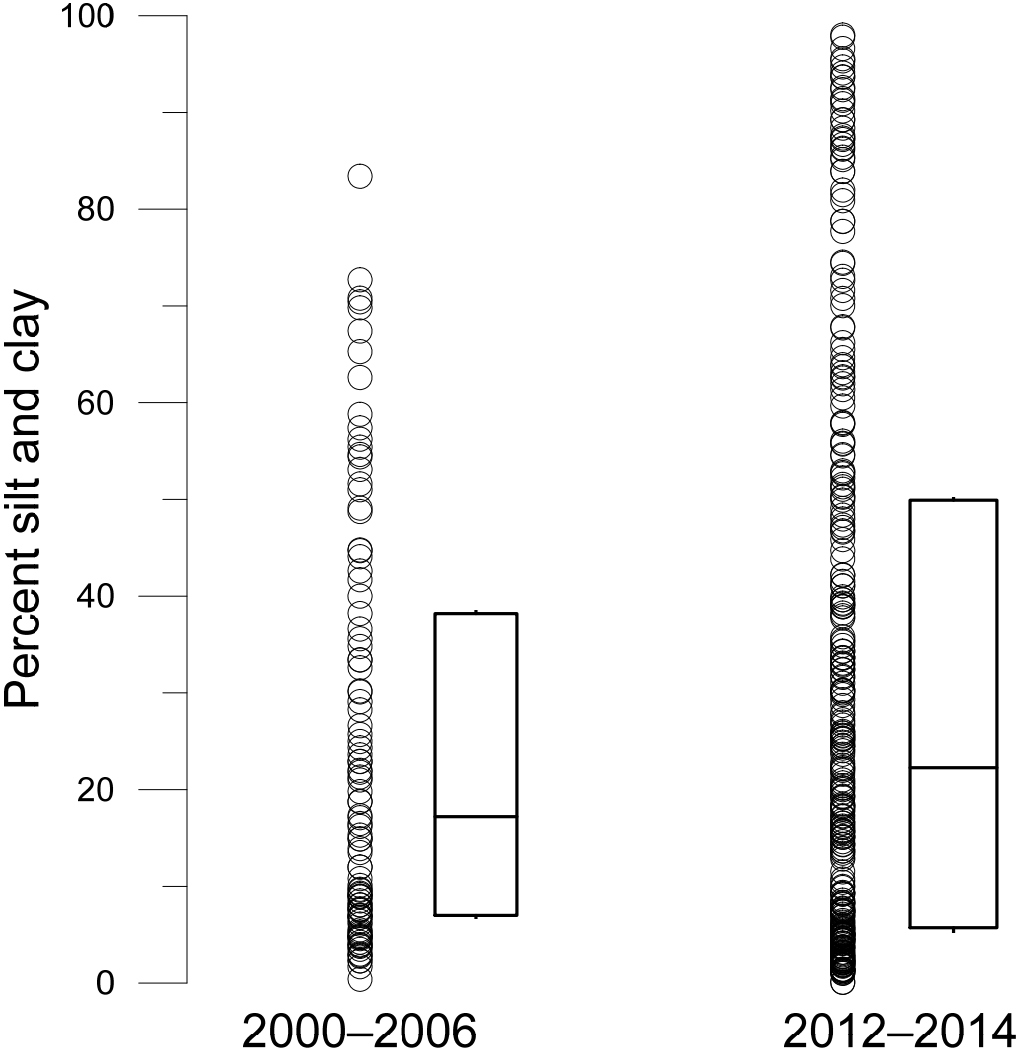


# Sediment particle size near Oyster Creek and Forked River has changed little if at all over past 49 years

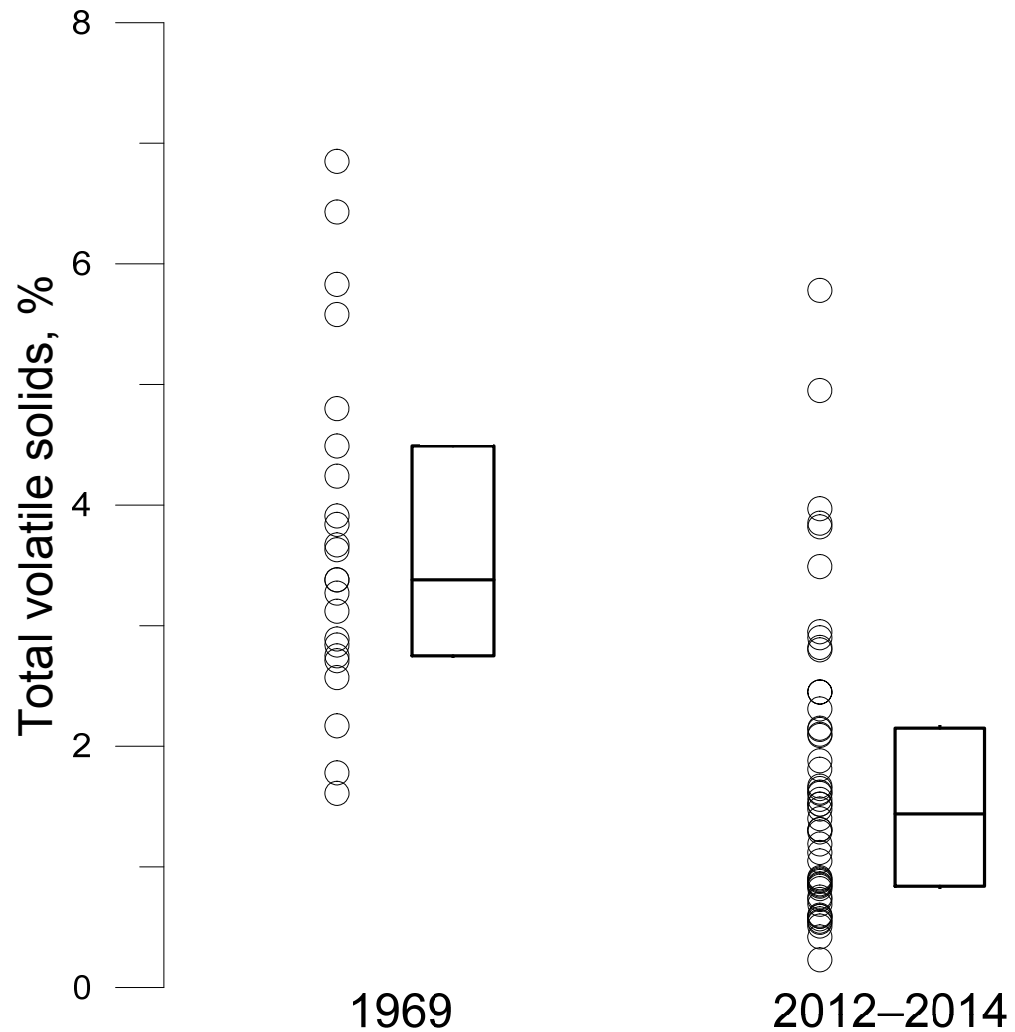




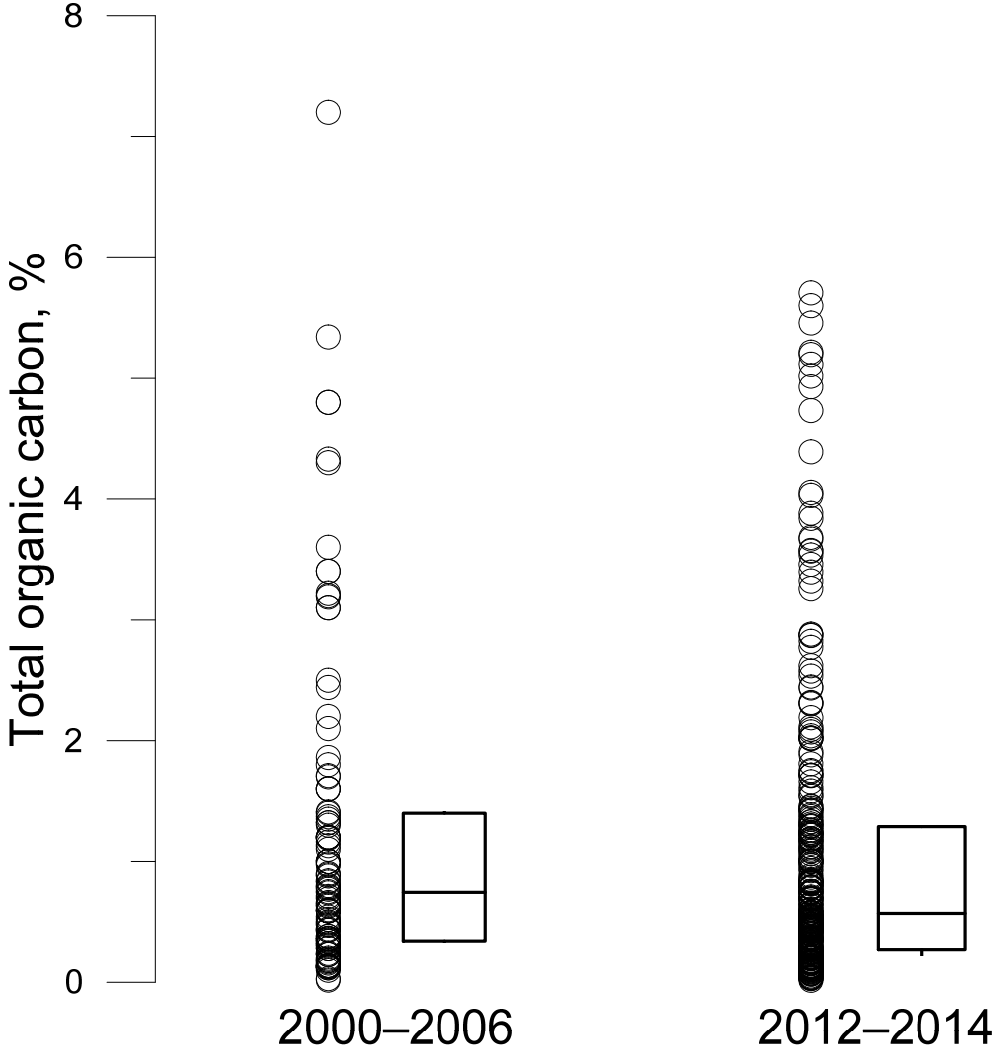
# Sediment particle size throughout Barnegat Bay – Little Egg Harbor has changed little if at all over past 14 years



# Sediment total organic content near Oyster Creek and Forked River has decreased over past 45 years



# Sediment total organic carbon throughout Barnegat Bay – Little Egg Harbor has not changed over past 14 years



## Conclusions

Compared with (limited) historical data from 49 years ago, the benthic invertebrate community today is nearly unchanged

Compared with (limited) historical data, sediment physical and chemical properties today are improved or similar

Based on the kinds and abundances of bottom-dwelling animals, habitat quality in Barnegat Bay-Little Egg Harbor is good to high