

History/Overview of the Florida Fish & Wildlife Conservation Commission's Work with Exotic Freshwater Fishes

**Paul Shafland, Director
FWC's Non-Native Freshwater
Fish Laboratory**

**Gulf & South Atlantic Regional Panel on
Aquatic Invasive Species
Miami**

30 Oct 07

A photograph capturing a massive school of silver carp jumping over a dam. The fish are silvery with a dark lateral stripe and are seen in various stages of their leap, creating a chaotic scene of splashing water. In the background, the dam's concrete structure and a small white control building are visible under a clear sky.

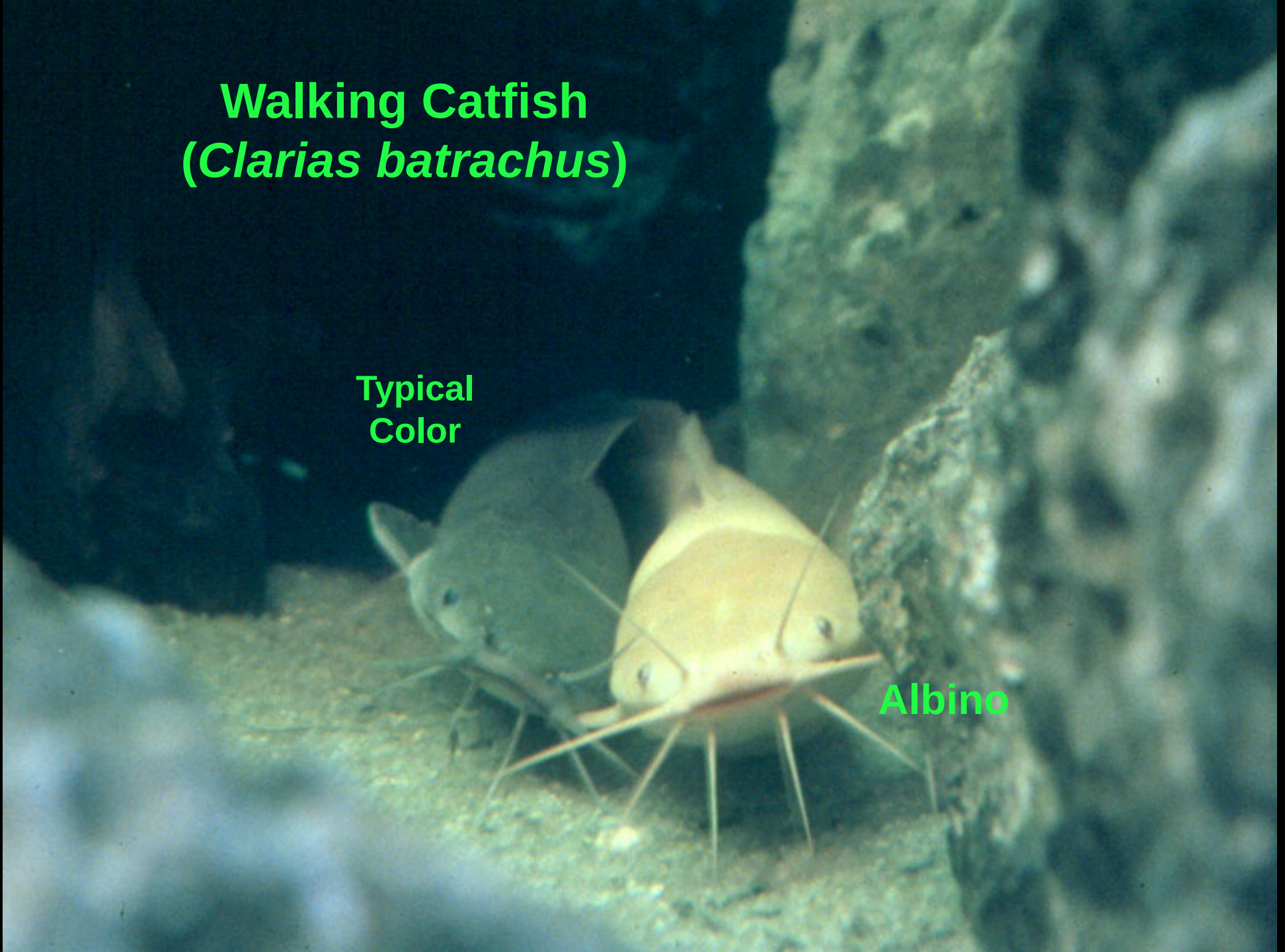
**Silver Carp
(Illinois River)**

10/04/2005

Walking Catfish (*Clarias batrachus*)

Typical
Color

Albino





Asian Swamp Eel
(*Monopterus albus*)



Red Lionfish
(*Pterois volitans*)

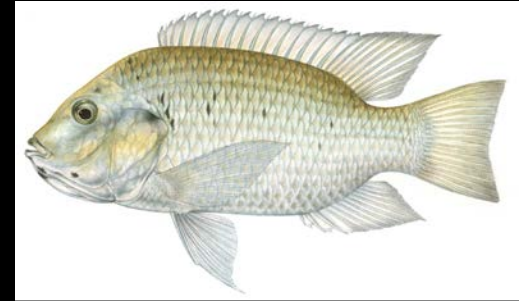
Photo by D. Snyder



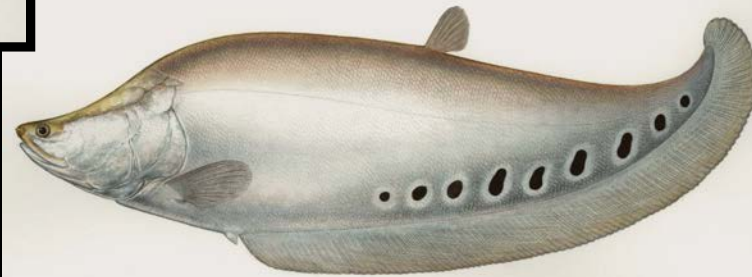
Bullseye Snakehead
(*Channa marulius*)



Some of Florida's Exotic Freshwater Fishes



34
Reproducing
Species



VALUES and BELIEFS

VERSUS

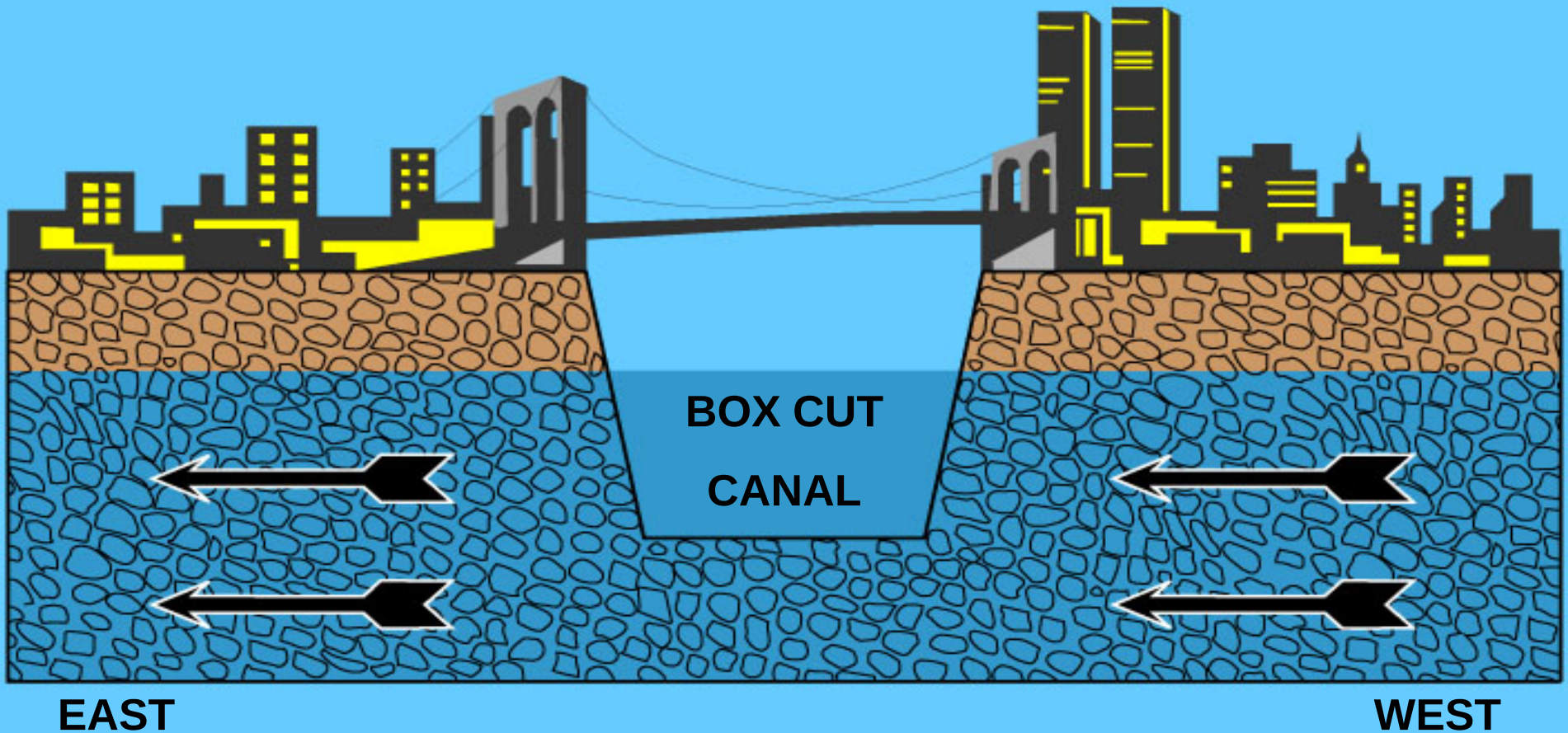
VALUE-NEUTRAL SCIENCE





BISCAYNE AQUIFER

CROSS SECTION



Thus, the success of some exotic species might better be viewed as a symptom of ecological disturbances preceding their introduction rather than a primary cause of biotic changes occurring after their introduction, although the possibility remains they could be both a symptom and later a primary cause.

Moreover, one might ask if exotic freshwater fishes are primary causes of biotic change, why are their effects generally so difficult to identify and independently verify?

Another question we have struggled with is: Should we attempt to identify beneficial uses for successful exotics even though this might result in their being spread to new places?

A Little History

FRESH WATER FISH COMMISSION
TALLAHASSEE

32304
16 August 1966

Dr. O. E. Frye, Jr., DIRECTOR
H. E. Wallace, ASSISTANT DIRECTOR

Legal

...s of the Exotic Fish Committee
...lines to Regulate the Importation of Undesirable Fish
...es and the Escapement of "tropical fishes" from
...cial Facilities
...mittee was held at the Vero Beach

ILLUSTRATED LIST OF FISHES
WHICH REQUIRE A SPECIAL PERMIT
TO IMPORT OR POSSESS IN THE
STATE OF FLORIDA

FEBRUARY

1972

Prepared by
Vernon E. Ogilvie
Biologist

MEMORANDUM

March 25, 1970

TO: John W. Woods, Chief, Fisheries Division
FROM: Vernon E. Ogilvie, Fishery Biologist
SUBJECT: Restricted Fishes
The following is a list of fishes which I feel
on our list of restricted fishes. A brief
tion is given for each.

1. Hoplias malabaricus and
Origin: South America
Common names
Family: Cichlidae



FWC PROGRAMS

PREVENTION

ASSESSMENT

MANAGEMENT

#1 PREVENTION



STATE CONSTITUTION
WILDLIFE CODE



RUSH
LIVE TROPICAL
MAINTAIN AT 70 TO
DON'T DELAY DON'T

QUARIUM TRADERS
GUYANA
BOX 10596, GEORGETOWN
GUYANA S.A.

An aerial photograph of a large aquaculture facility. The facility consists of numerous rectangular and oval-shaped ponds, some of which are filled with water and others with a light-colored substrate. Several white buildings, likely storage or processing units, are situated in the center of the facility. The surrounding area is a mix of green grass and bare earth. The text "ASSESSMENT" is overlaid in large, bold, brown letters with a white outline at the top of the image.

ASSESSMENT

**Non-Native Freshwater Fish
Project
at FAU in Boca Raton**

“The accidental release of walking catfish in southern Florida ... may be the most harmful introduction to any North American area so far witnessed.”

“Its invasion of the Everglades, northern Florida, and Georgia, and perhaps the Gulf Coast states westward to Texas is inevitable.”

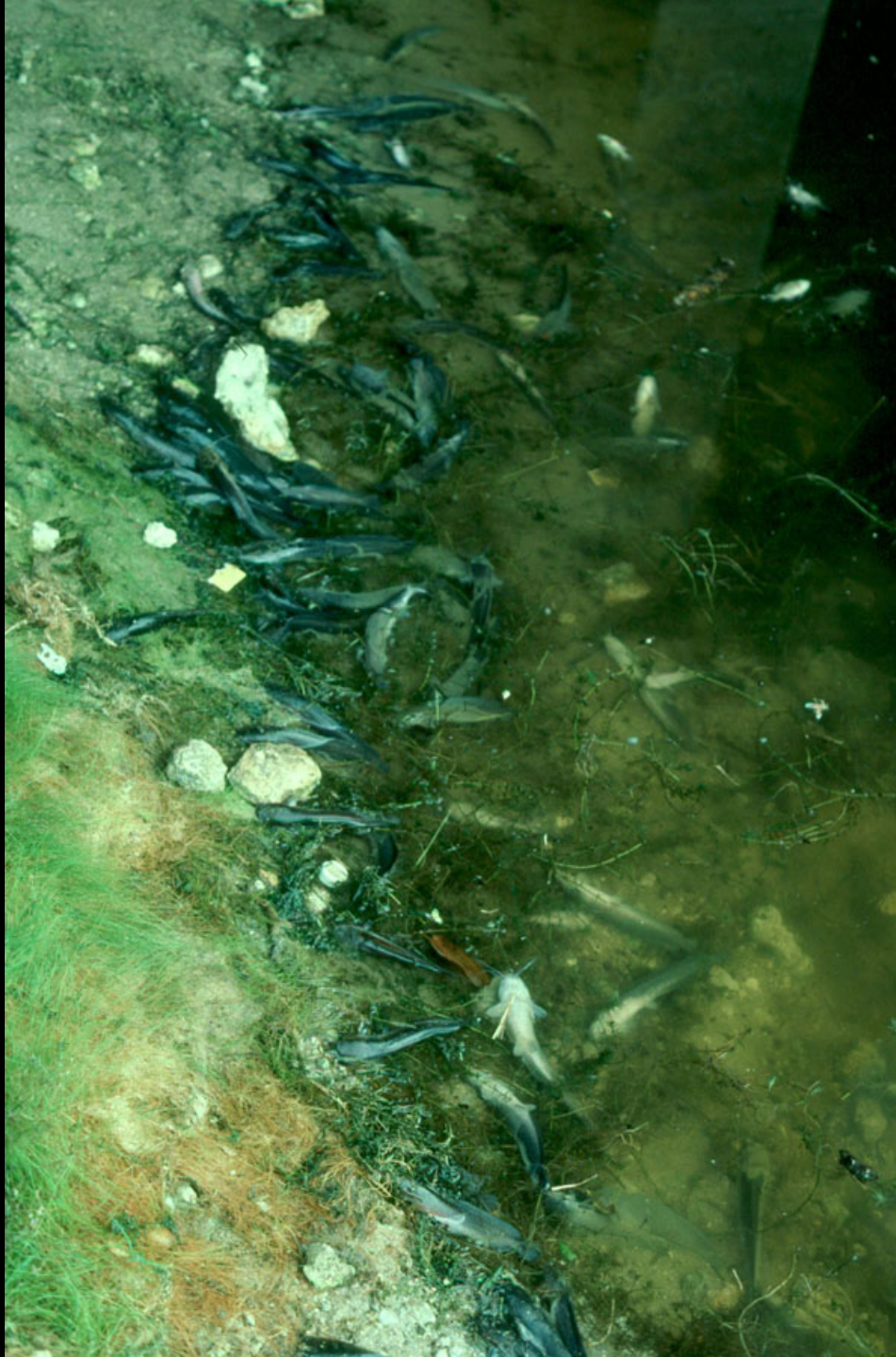
Lachner et al. (1970) Exotic fishes and other Aquatic organisms introduced into North America. Smithsonian Contributions to Zoology, No. 59.

“The species is a severely harmful competitor, for it apparently reduces the entire freshwater community that it invades to one common denominator, more walking catfish.”

Lachner et al. (1970) Exotic fishes and other
Aquatic organisms introduced into North America.
Smithsonian Contributions to Zoology, No. 59.



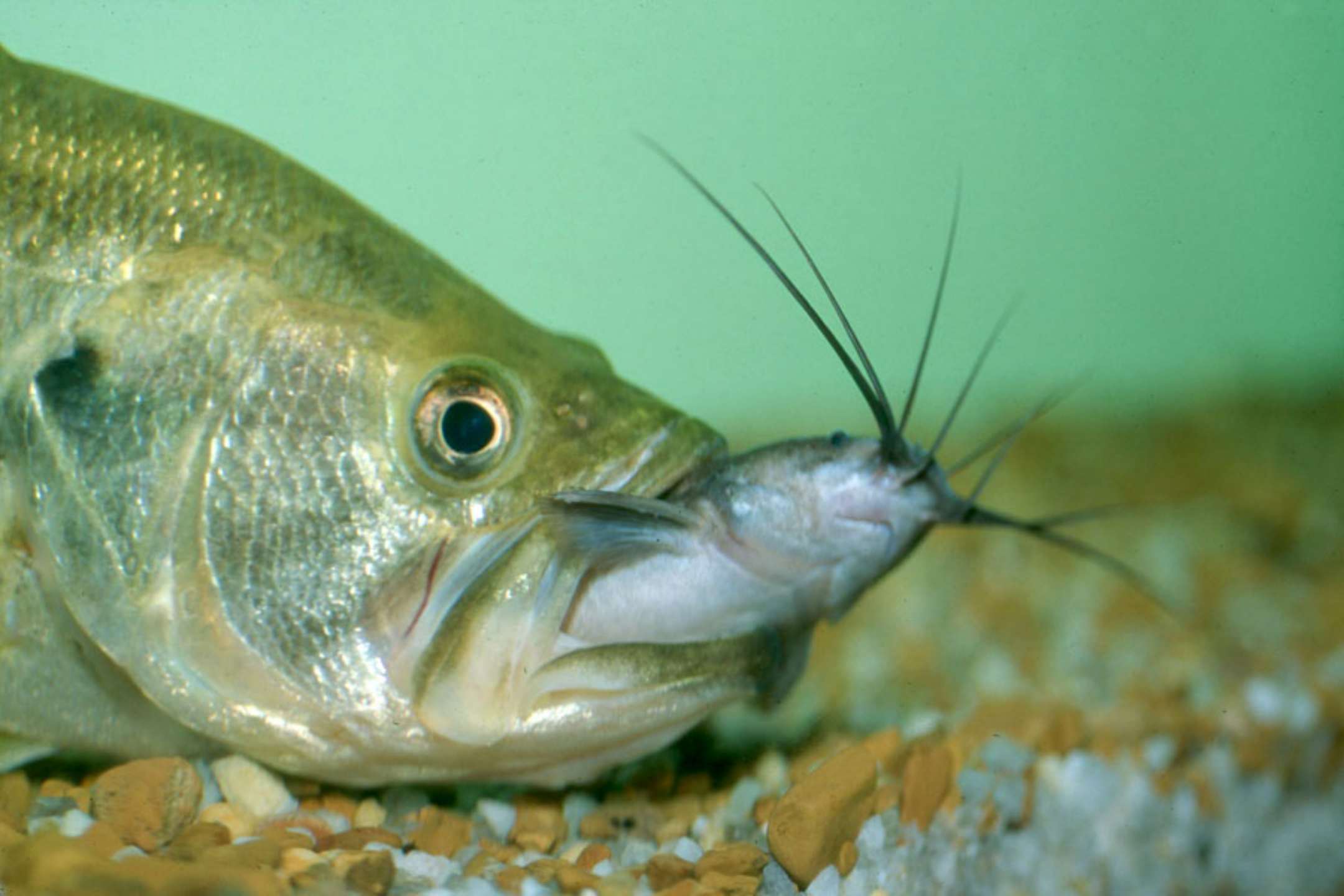
Walking Catfish
(*Clarias batrachus*)



MM 12.2
Walking Catfish
Renovation
1983



MM 12.2
Alligator Alley
1983







Bullseye Snakehead
(*Channa marulius*)



Asian Swamp Eel
(*Monopterus albus*)



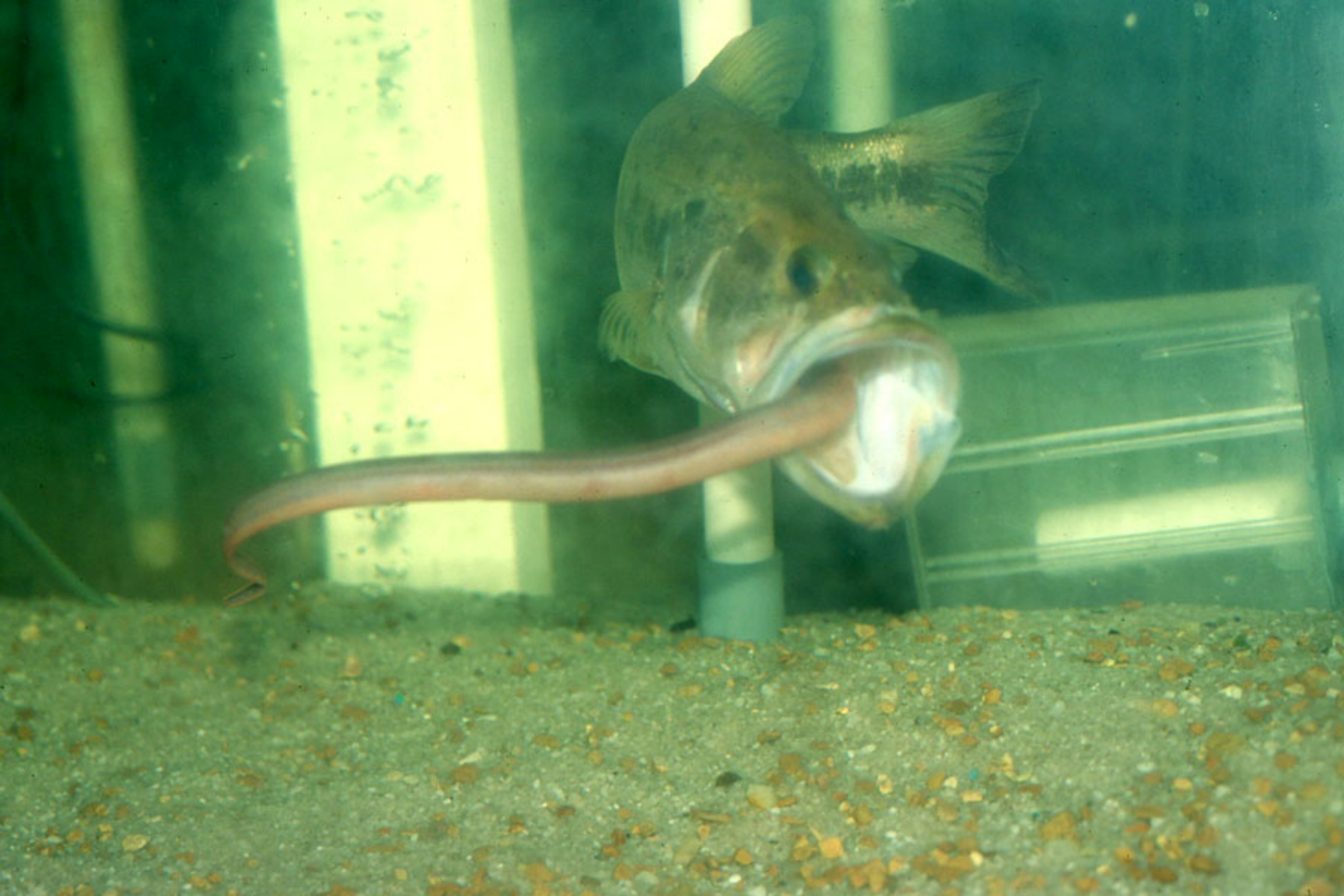
**Asian
Swamp Eel**













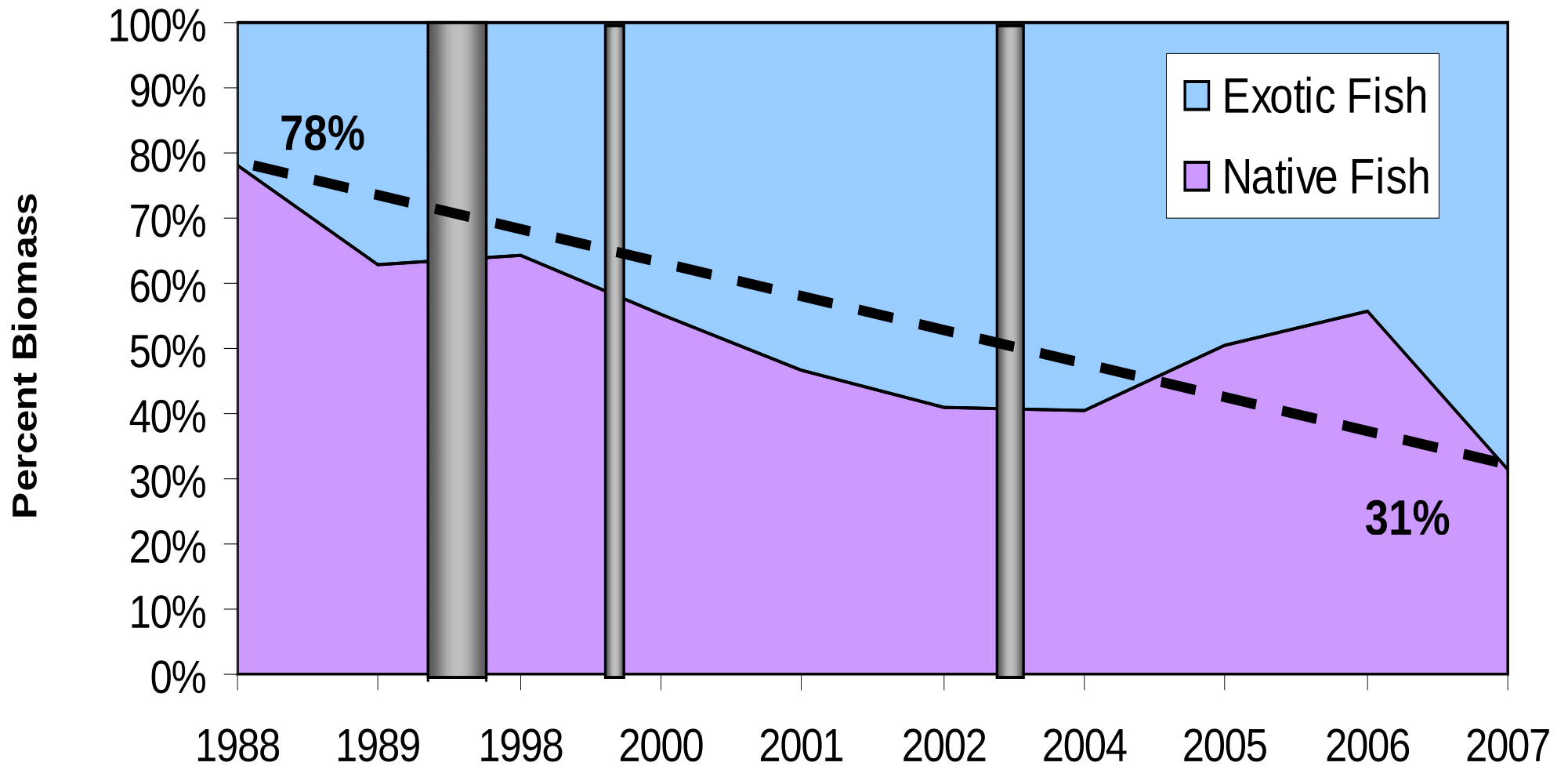
Fish Community Analyses





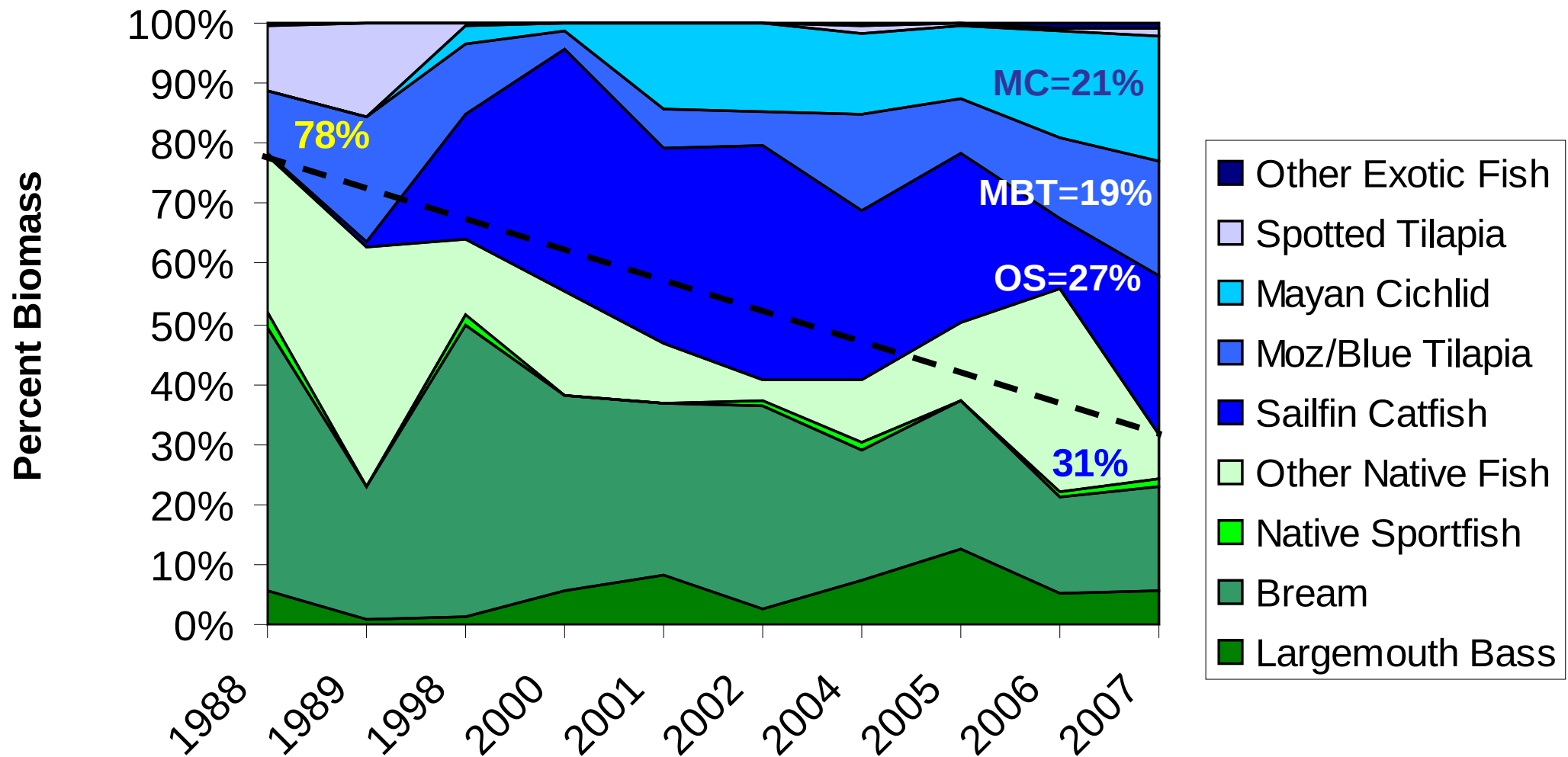
Boynton Canal (C-16) Fish Community Estimates

(one 0.185 ha blocknet sample per year)



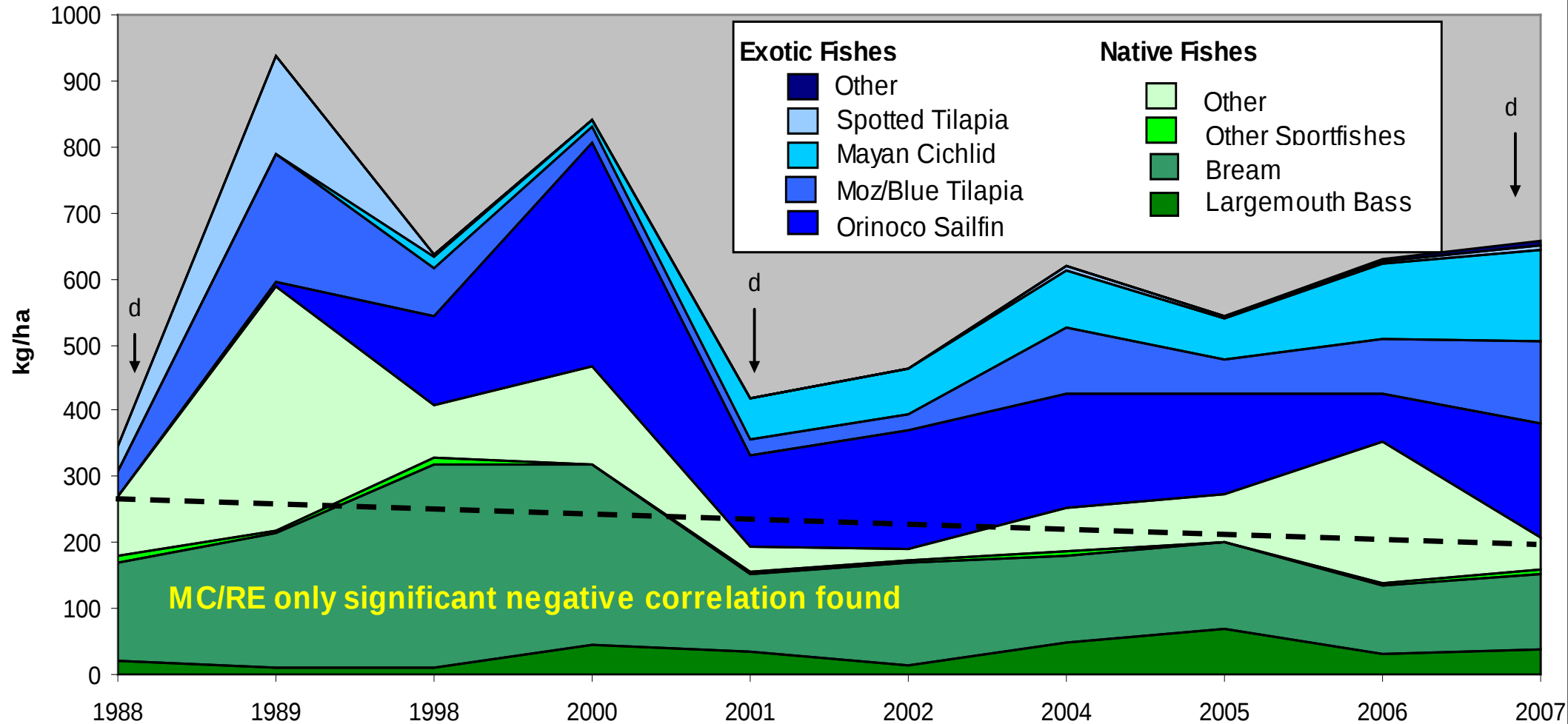
Boynton Canal (C-16) Fish Community Estimates

(one 0.185 ha blocknet per year)

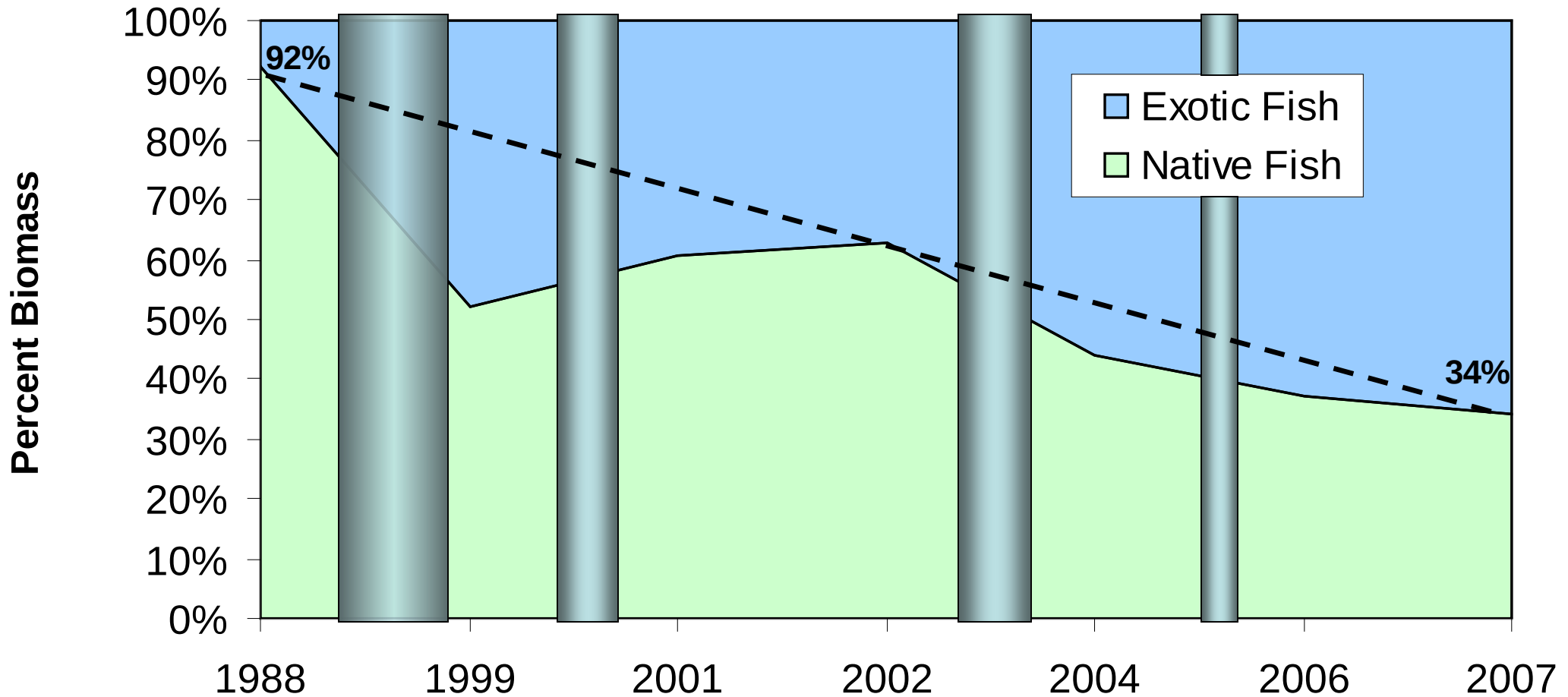


Boynton Canal (C-16) Fish Community Estimates

(one 0.185 ha blocknet per year)

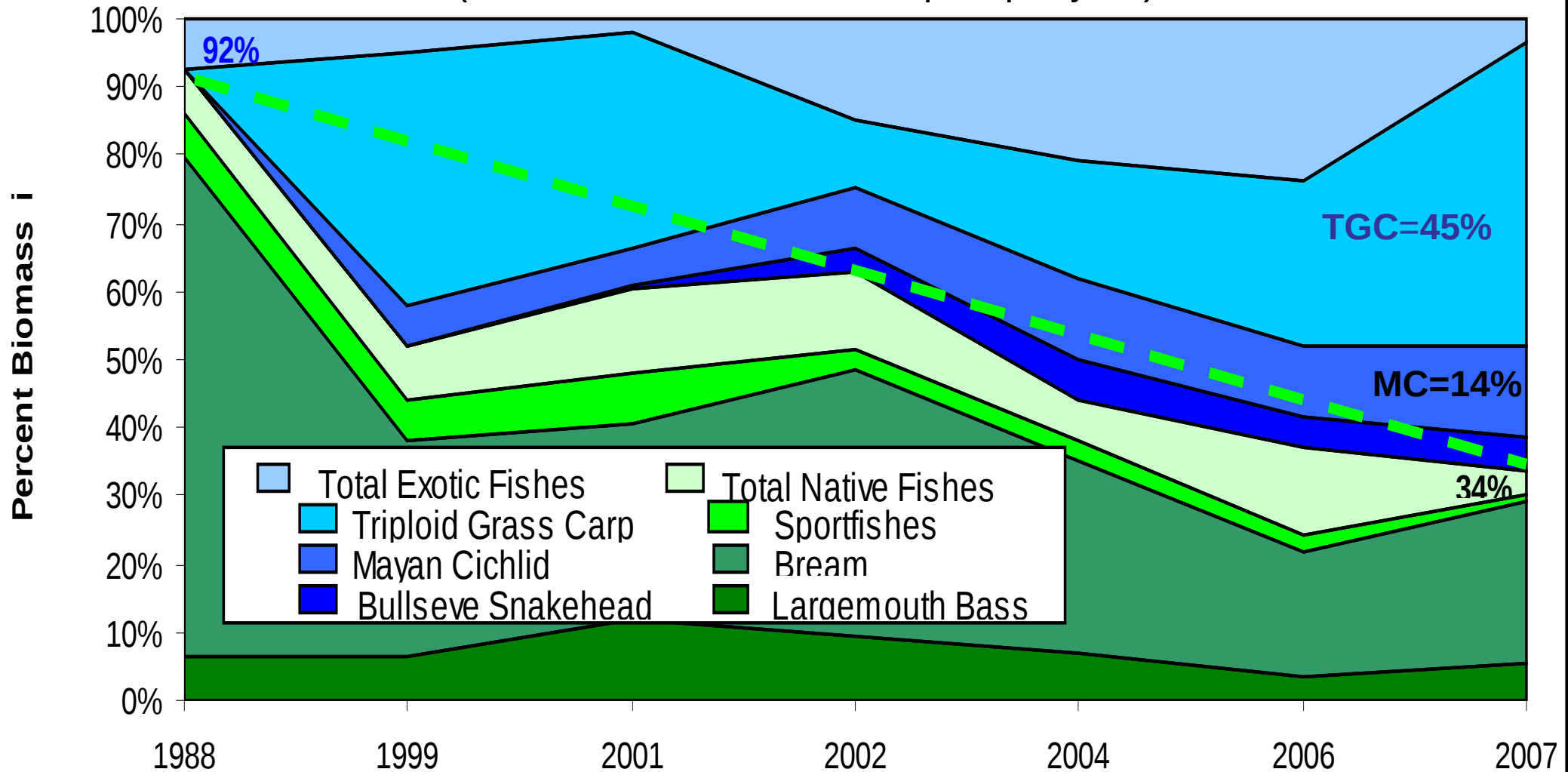


Cypress Creek Canal (C-14) Estimates (two 0.185 ha blocknet samples per year)

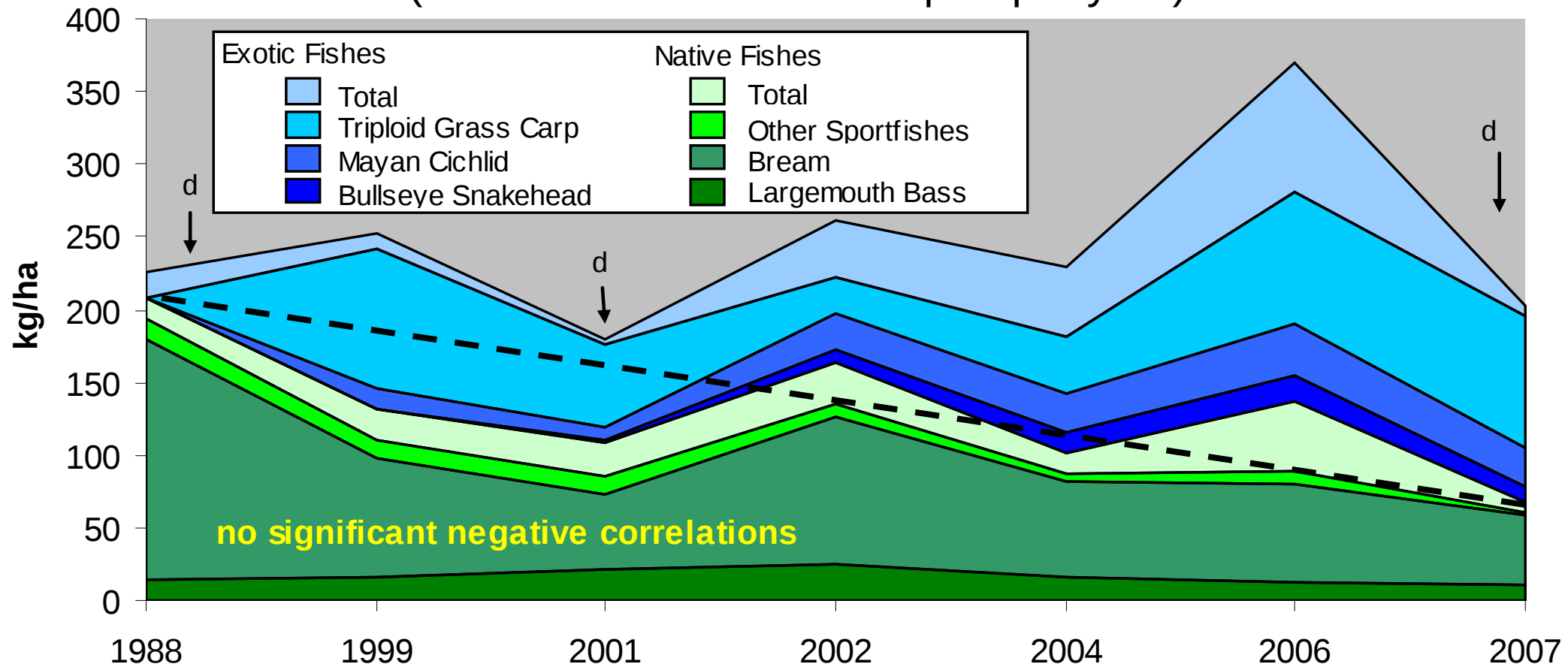


Cypress Creek Canal (C-14) Fish Community Estimates

(two 0.185 ha blocknet samples per year)



Cypress Creek Canal (C-14) Fish Community Estimates (two 0.185 ha blocknet samples per year)



Biomass (kg/ha)	1980- 1984	1998- 2007	Percent Change
Exotics	61	168	+175%

Biomass (kg/ha)	1980- 1984	1998- 2007	Percent Change
Exotics	61	168	+175%
Natives	140	140	0%

Biomass (kg/ha)	1980- 1984	1998- 2007	Percent Change
Exotics	61	168	+175%
Natives	140	140	0%
All Fish	201	308	+53%

TENTATIVE FINDINGS

Native fish communities appear far more resilient to external disturbances including those presented by exotic fishes than is generally presumed; however,

Loss of vegetation due to high Grass Carp stockings (>250 fish/ha; up to 45% of biomass) do appear to be having a direct effect on native fishes in some canals.

A blue tilapia fish is shown swimming in water. The fish has a deep, laterally compressed body with a prominent dorsal fin and a large eye. The text "MANAGEMENT OF EXOTIC FRESHWATER FISHES" is overlaid in blue capital letters with a white outline.

**MANAGEMENT
OF EXOTIC
FRESHWATER FISHES**



Oscar
(*Astronotus*
ocellatus)



Commercial Fishing for Blue Tilapia

Blue Tilapia

(*Oreochromis aureus*)





Triploid Grass Carp
(*Ctenopharyngodon idella*)

B
U
T
T
E
R
F
L
Y

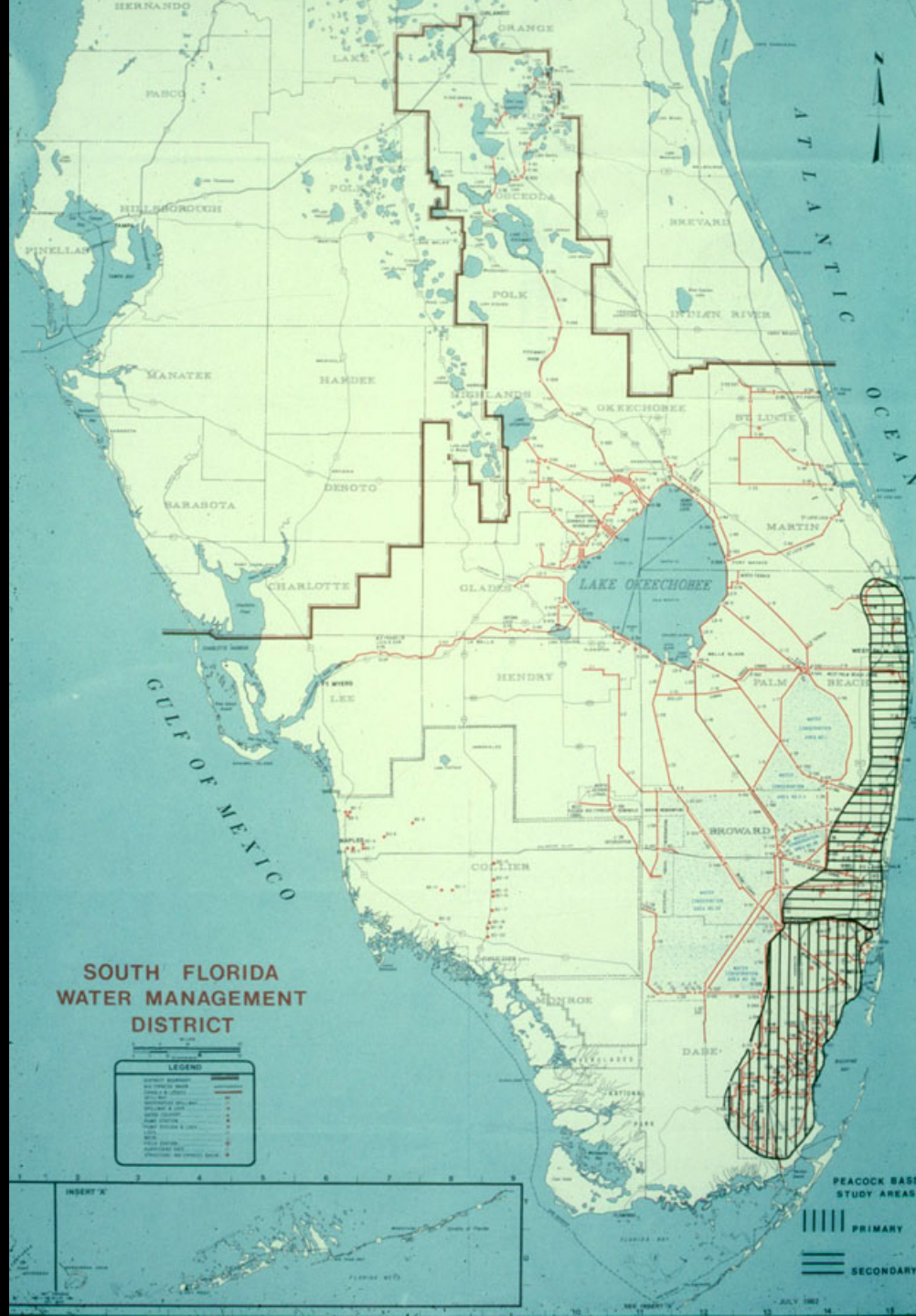
P
E
A
C
O
C
K



1984



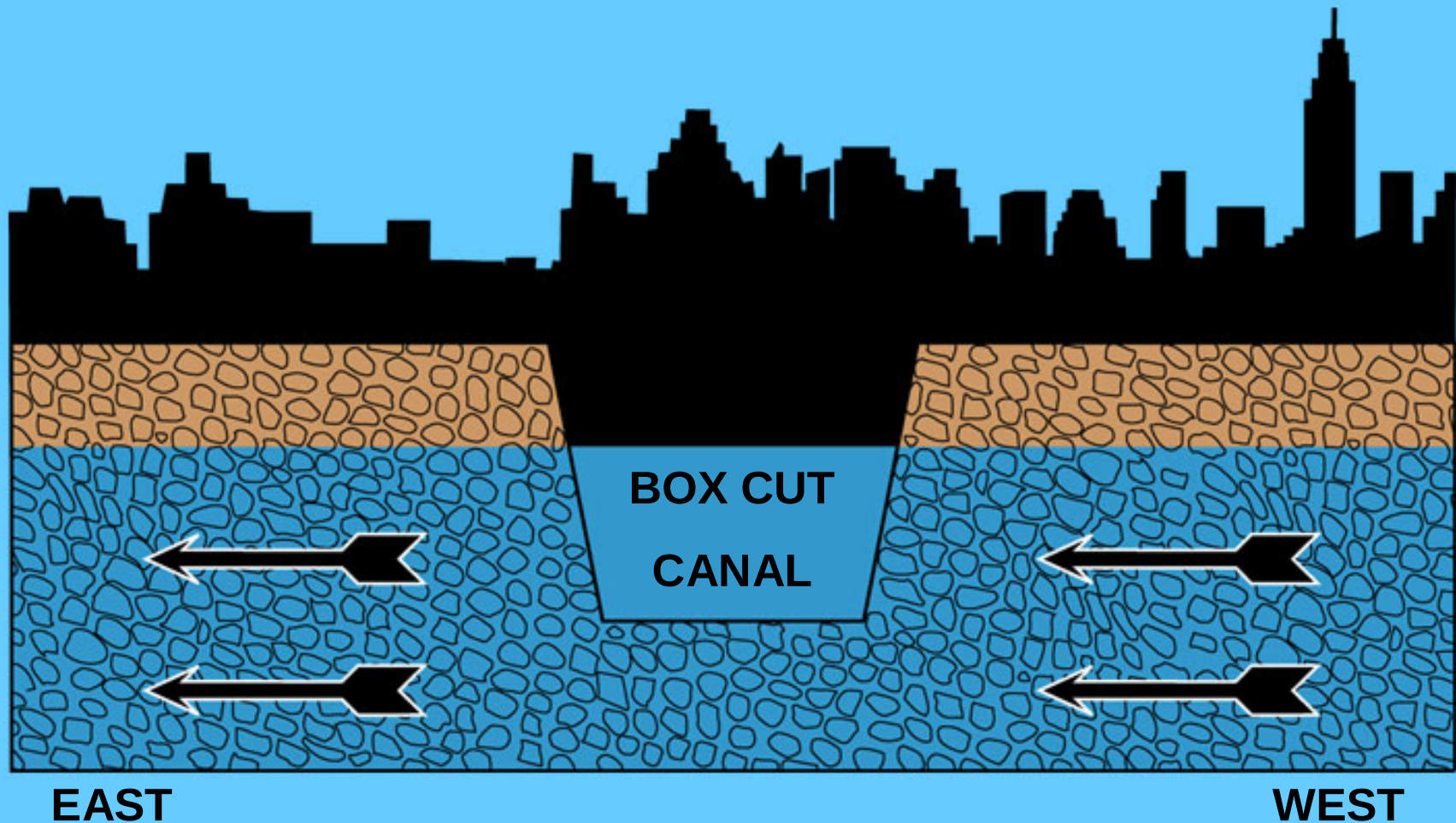
Butterfly Peacock
(*Cichla ocellaris*)



Predicted Pre-Introduction Butterfly Peacock Range

BISCAYNE AQUIFER

CROSS SECTION

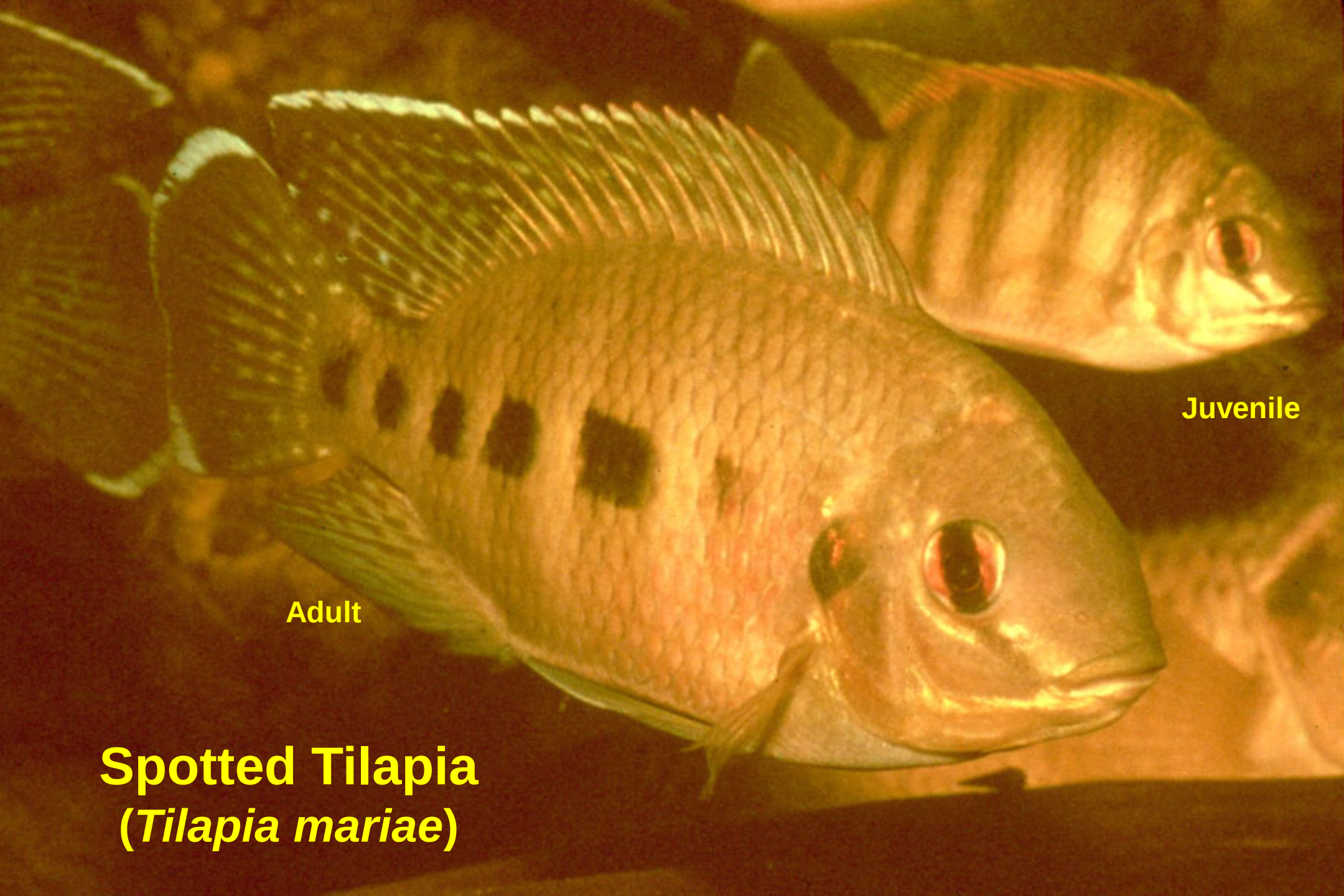




Tubing

Butterfly

Peacock



Juvenile

Adult

Spotted Tilapia
(Tilapia mariae)



**Butterfly Peacock
Stomach Contents**

Butterfly Peacock (*Cichla ocellaris*)



- Helps reduce exotic forage fishes
- No known detrimental effects
- Generates \$10 million annually

Conclusions

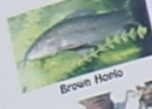


- 1. Exotic fishes are problematic.**
- 2. Everything practical needs to be done to prevent future illegal introductions.**



DON'T RELEASE EXOTIC FISHES!



FREE EXOTIC FISH POSTER AVAILABLE

Invest in the Future...
RETURN PEACOCK BASS

The Florida Game and Fresh Water Fish Commission has stocked the major Dade County peacock bass, two spectacular South American sport fish. Some of this project will bring new excitement to small fishing in the years to come, but the success depends on the survival and spawning of these first groups.

Small butterfly peacocks have three vertical bars and a horizontal bar through the tail that is replaced by an "eye spot" in fish longer than six inches.



Butterfly Peacock Bass are distinguished by the absence of black markings on the opercula (gills).

PROTECT Our Natural Resources

DON'T RELEASE EXOTICS

Foreign animals will compete with our native fish and wildlife for food and space. Some may present a threat to human safety, while others may become agricultural pests or public nuisances. **STATE LAW PROHIBITS THE RELEASE OF ANY NON-NATIVE WILDLIFE!**

FLORIDA GAME & FRESH WATER FISH COMMISSION




PROTECT Our Natural Resources



DON'T RELEASE EXOTICS

Foreign animals will compete with our native fish and wildlife for food and space. Some may present a threat to human safety, while others may become agricultural pests or public nuisances. State law prohibits the release of any non-native wildlife!

FLORIDA GAME AND FRESH WATER FISH COMMISSION

Printed on recycled paper. Please recycle. This poster is available for free. Please contact your local Game and Fresh Water Fish Commission office for more information.



END

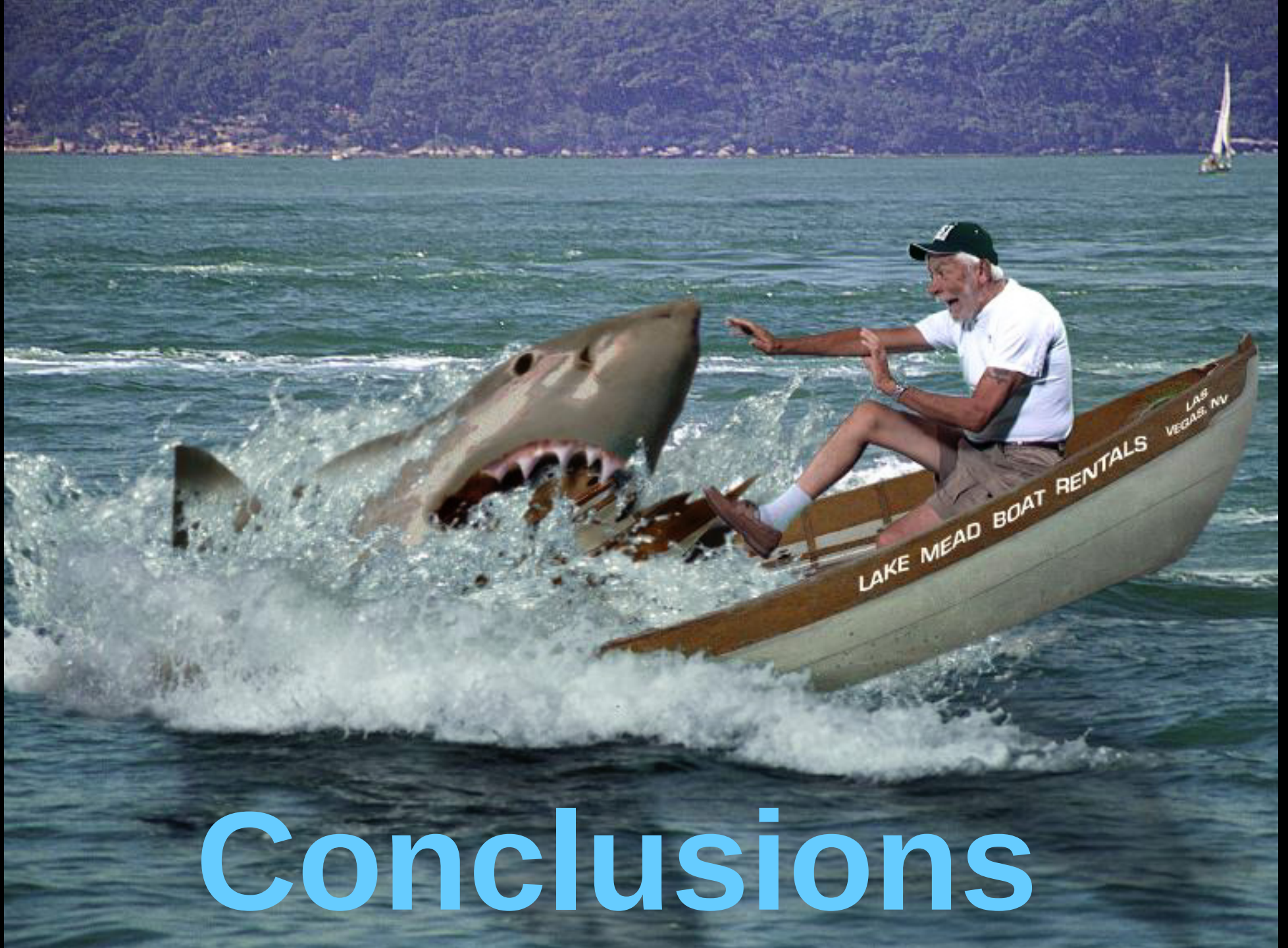


VALUES and BELIEFS

VERSUS

VALUE-NEUTRAL SCIENCE





Conclusions

EXOTIC FLORIDA



the end





Walking Catfish = Catastrophe Not!

Southeast Florida Canal Trifecta



Snook



Butterfly
Peacock

John Gore 6 Feb 06
(photos by Zaremba)



Largemouth
Bass



Blue Tilapia

A photograph of a sunset over a calm body of water. The sun is a small, bright orange-red sphere on the horizon, casting a long, shimmering reflection across the water's surface. The sky is a gradient of colors, from a pale yellow near the horizon to a soft blue at the top. The water is a deep blue-green with gentle ripples. The word "CONCLUSIONS" is written in a large, bold, blue, sans-serif font across the middle of the image.

CONCLUSIONS



Seeking value-neutral answers to such questions sometimes weaken arguments favoring more restrictive regulations, larger exotic species programs, and even more funding for scientific studies that are sorely needed, for us not to ask them can only be considered rationalized dishonesty.



Tubing

Butterfly

Peacock

Biomass (kg/ha)	1980- 1984	1998- 2006	Percent Change
All Fish	201	313	+56
All Natives	140	145	+4
All Exotics	61	168	+175
All Sportfish	81	135	+67
All Native Sportfish	81	102	+26
M/B Tilapia	8	69	+763
Bluegill	21	43	+105
Sailfin Catfish	<1	42	+420
Redear Sunfish	23	28	+22
Mayan Cichlid	--	26	cc
Largemouth Bass	20	22	+10
Grass Carp	--	18	cc
Jaguar Guapote	--	<1	cc
Butterfly Peacock	--	3	cc

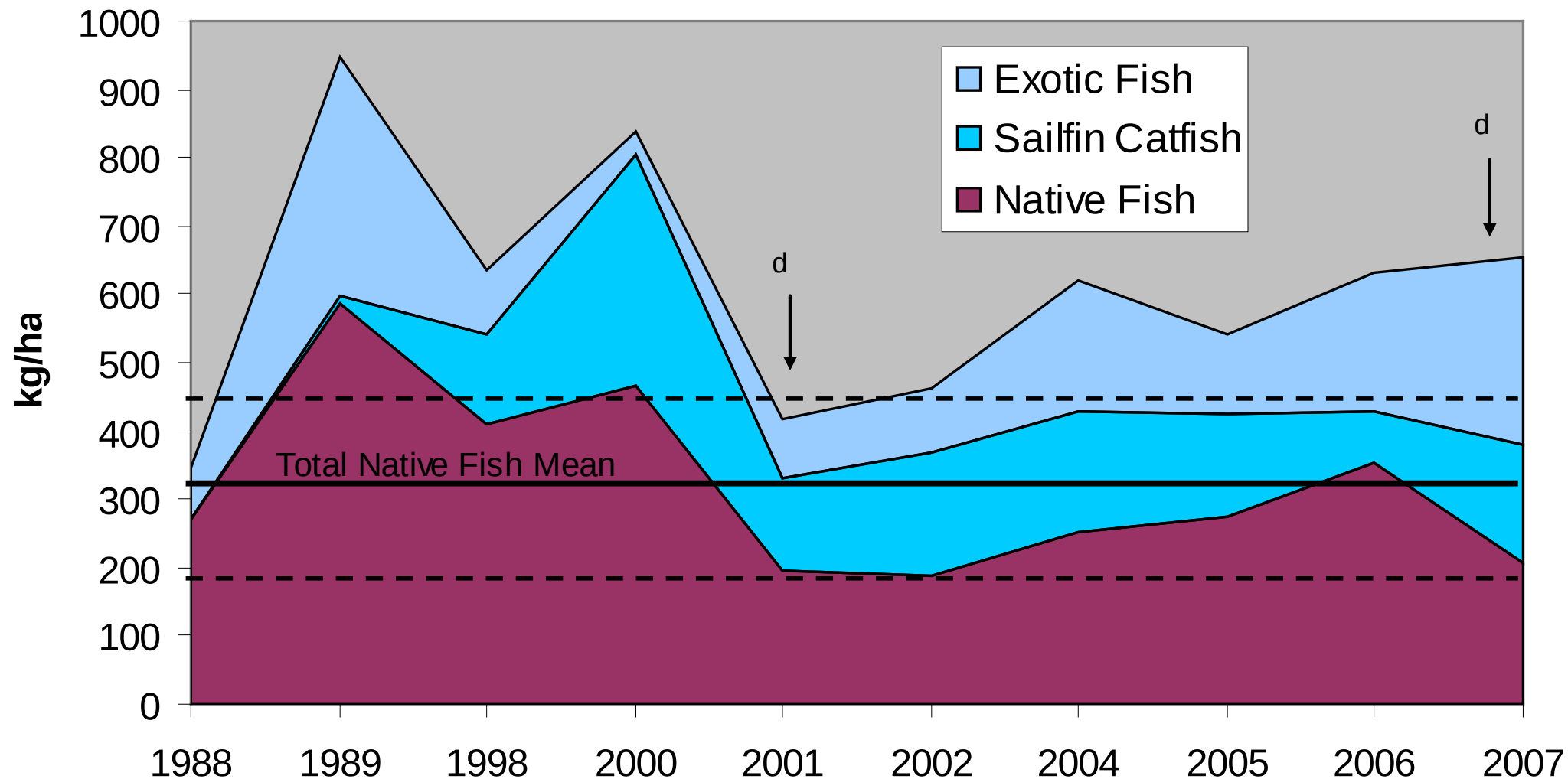
M/B Tilapia	8	69	+763
Bluegill	21	43	+105
Sailfin Catfish	<1	42	+420
Redear Sunfish	23	28	+22
Mayan Cichlid	--	26	cc
Largemouth Bass	20	22	+10
Grass Carp	--	18	cc
Jaguar Guapote	--	<1	cc
Butterfly Peacock	--	3	cc





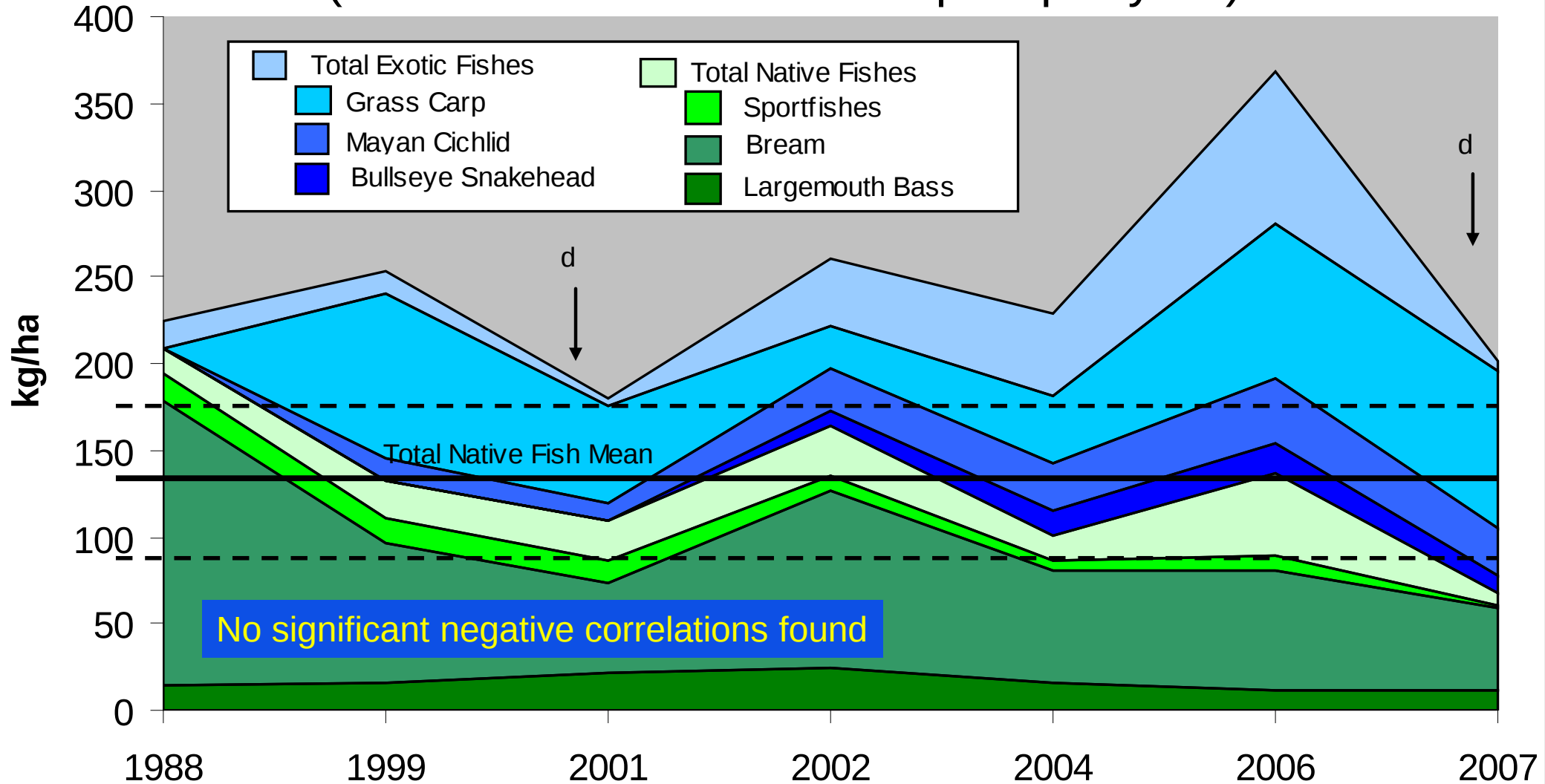
Boynton Canal (C-16) Fish Community Estimates

(one 0.185 ha blocknet sample per year)

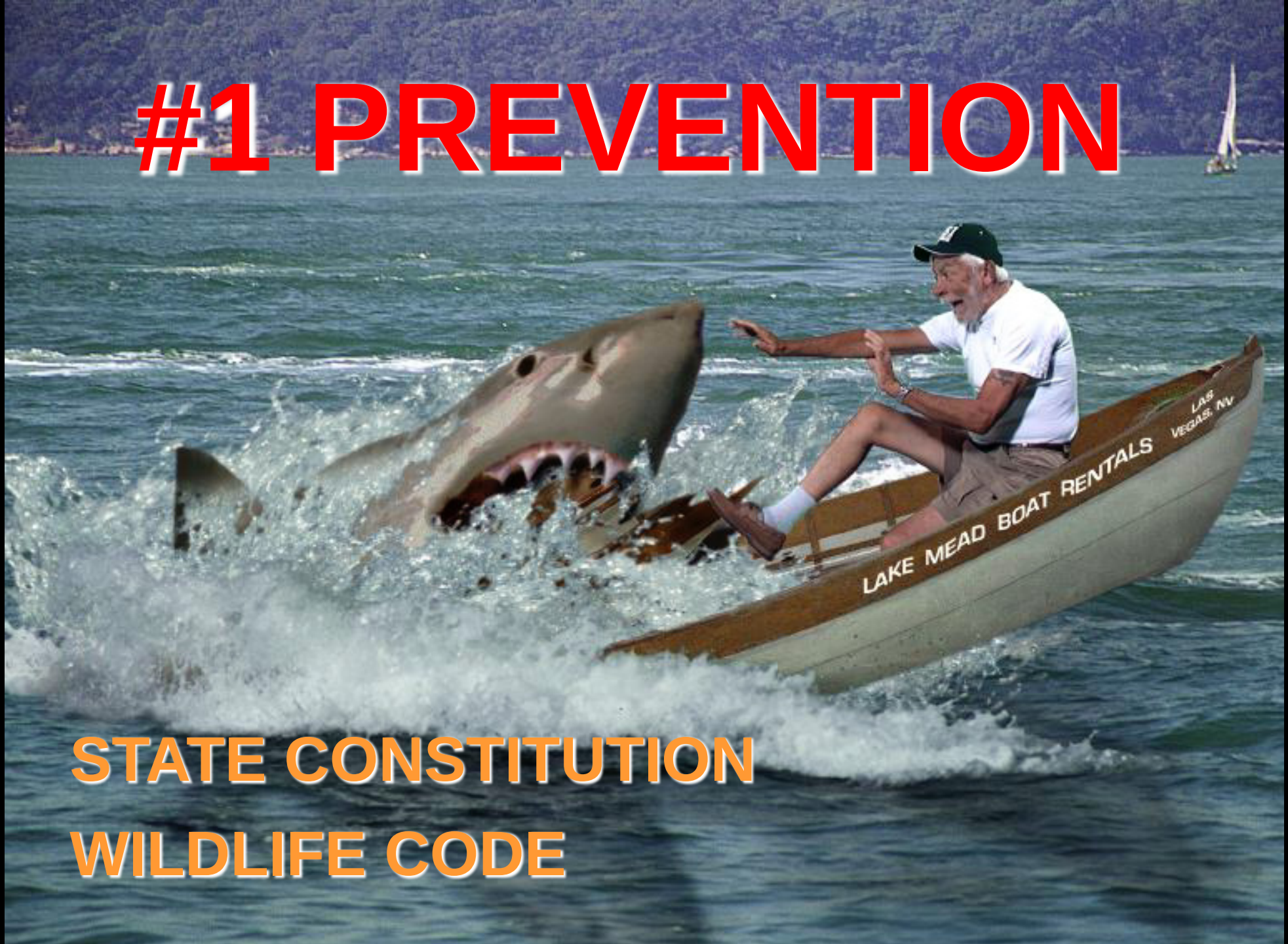


Cypress Creek Canal (C-14) Fish Community Estimates

(two 0.185 ha blocknet samples per year)



#1 PREVENTION



STATE CONSTITUTION
WILDLIFE CODE

#1 PREVENTION

STATE CONSTITUTION
WILDLIFE CODE

#1 PREVENTION

A large, flat, greyish-brown fish, likely a flatfish, is swimming in greenish water. The fish has a broad, flat body with a slightly rounded head and a small, pointed snout. Its eyes are visible on the top of its head. The background is a blurred green, suggesting an underwater environment.

STATE CONSTITUTION
WILDLIFE CODE

#1 PREVENTION



STATE CONSTITUTION
WILDLIFE CODE

Might the presence of exotic species be more symptomatic of ecological disturbances preceding their introduction than they are the primary cause of them?

An aerial photograph of a large facility, likely a fish assessment and management laboratory. The facility features several large, rectangular ponds arranged in a row on the right side. In the center, there are several white buildings, including a large warehouse-like structure and smaller houses or offices. To the left of the buildings, there are more ponds, some of which are smaller and more irregular in shape. The surrounding area is a mix of green grass, trees, and some bare ground. The overall scene suggests a well-maintained research or management facility.

ASSESSMENT

**Non-Native Freshwater Fish Assessment
and Management Laboratory
At FAU in Boca Raton**

***“A lie gets around the world
before the
truth can get its pants on!”***

(Winston Churchill ... a long time ago)

Lesson #1:

Learning to Unlearn



Walking Catfish = Catastrophe Not!

Tentative Conclusions

- **Something other than the presence of highly successful and illegally introduced exotic fishes is the primary driving force in these fish communities.**
- **We suspect the primary forces currently driving these canal communities are the legal high density Grass Carp stockings (>250/ha; 45% of total fish biomass) that have nearly eliminated beneficial aquatic vegetation in some canals and, not too surprisingly, the climate (e.g., drought).**

Biomass (kg/ha)	1980- 1984	1998- 2007	Percent Change
All Exotics	61	168	+175%
All Natives	140	140	0%
All Fish	201	308	+53%