Presented at

Great Rivers Reference Condition Workshop

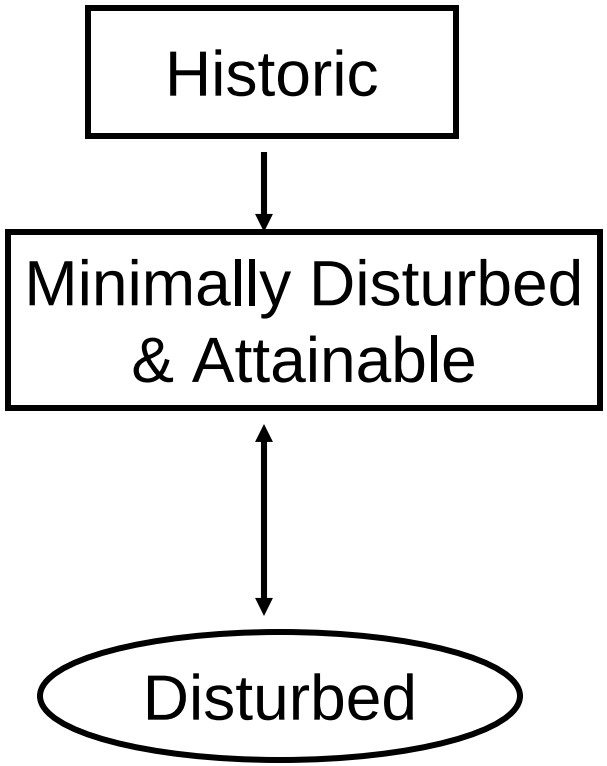
January 10-11, Cincinnati, OH

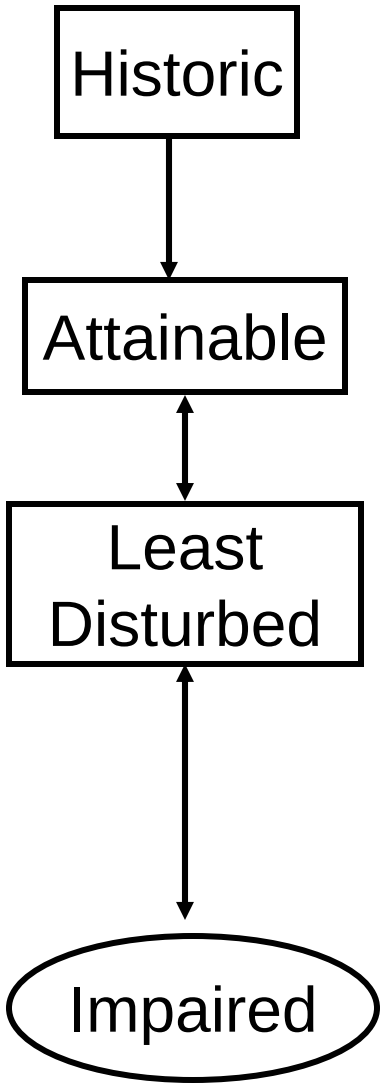
Sponsored by

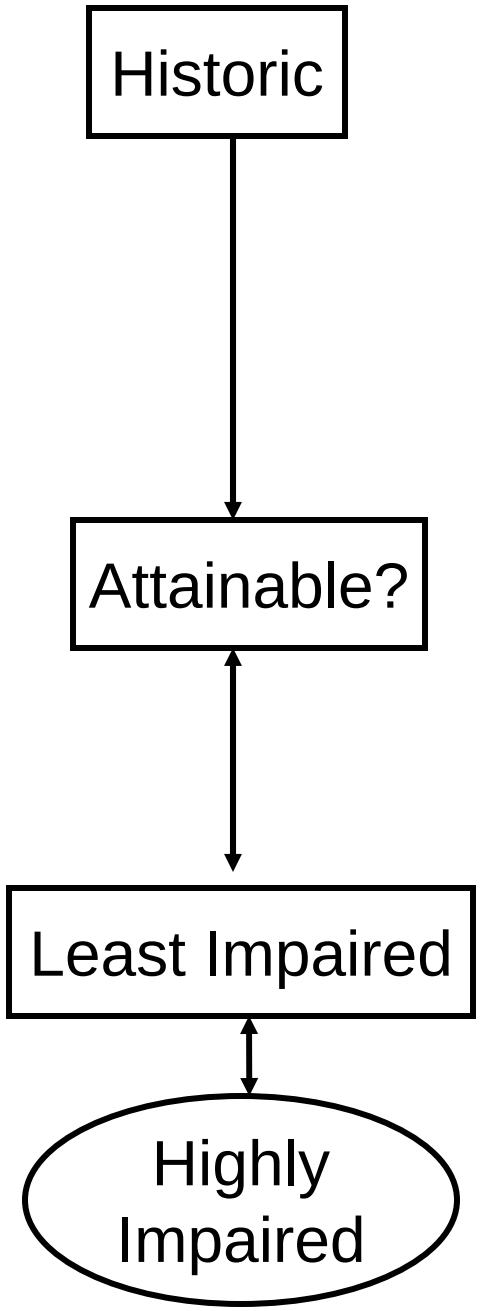
The U.S. Environmental Protection Agency and The Council of State Governments

Using Available Historical Data for Developing Reference Condition

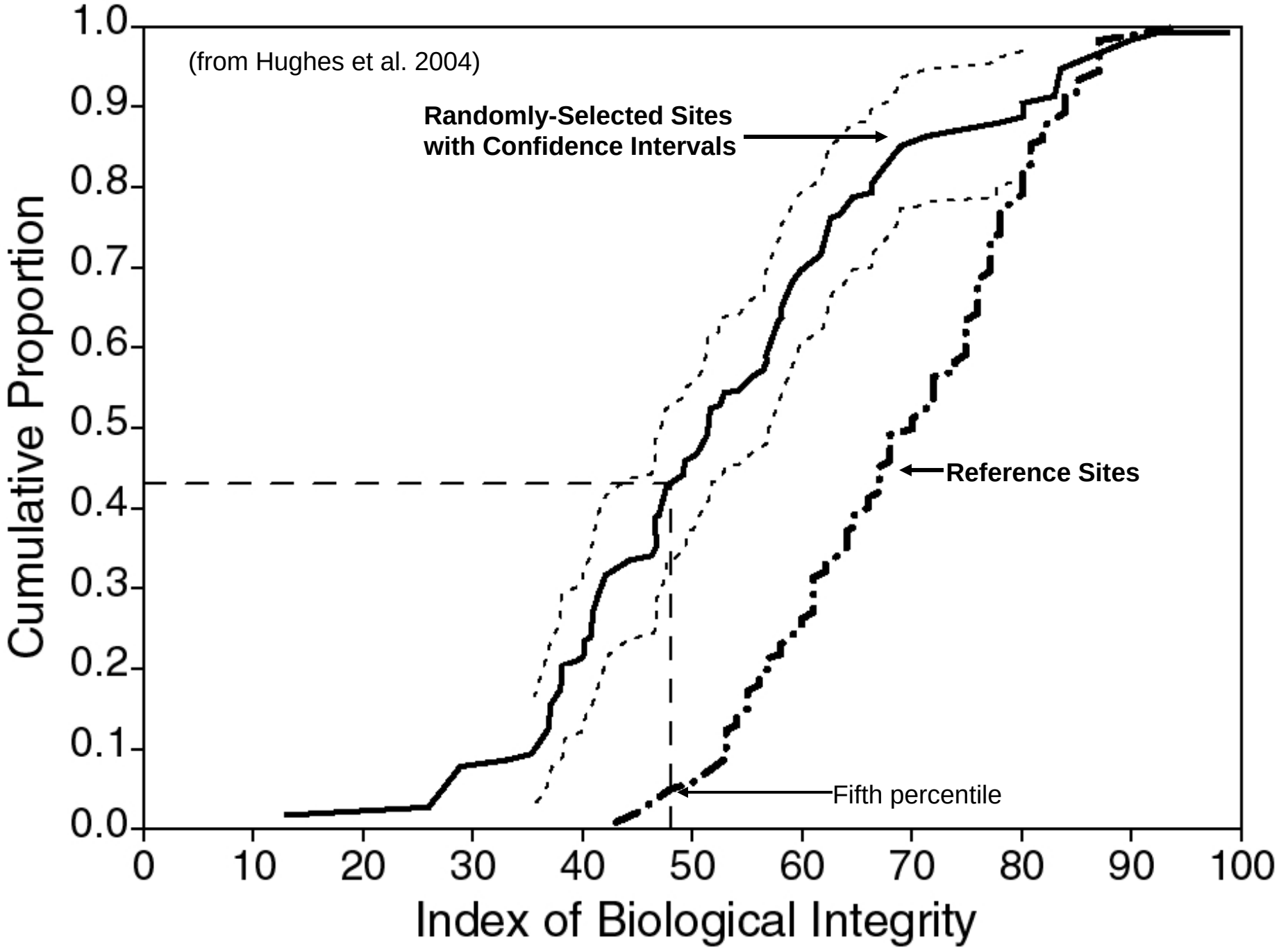
Robert M. Hughes
Department of Fisheries & Wildlife
Oregon State University
Corvallis, OR

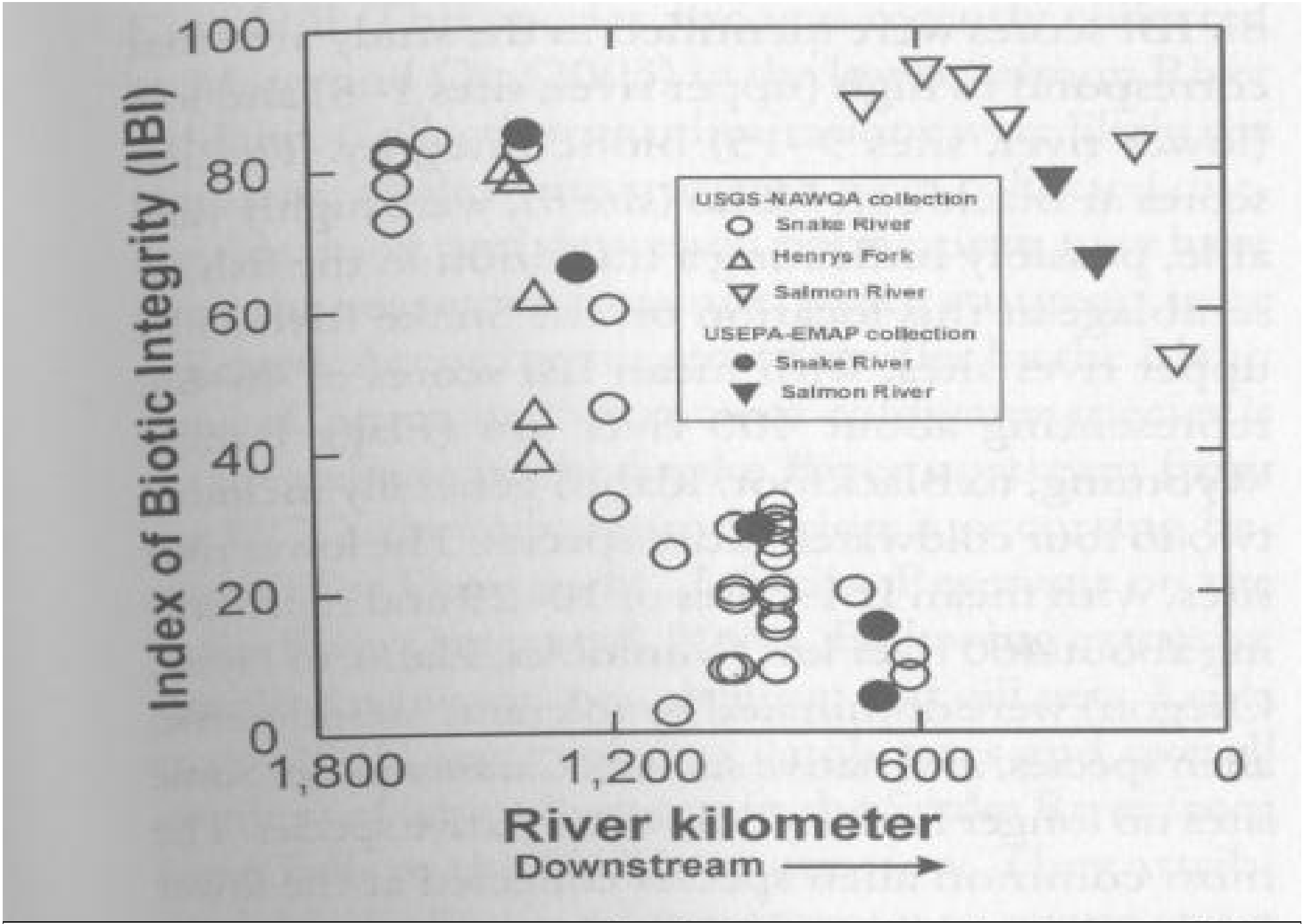




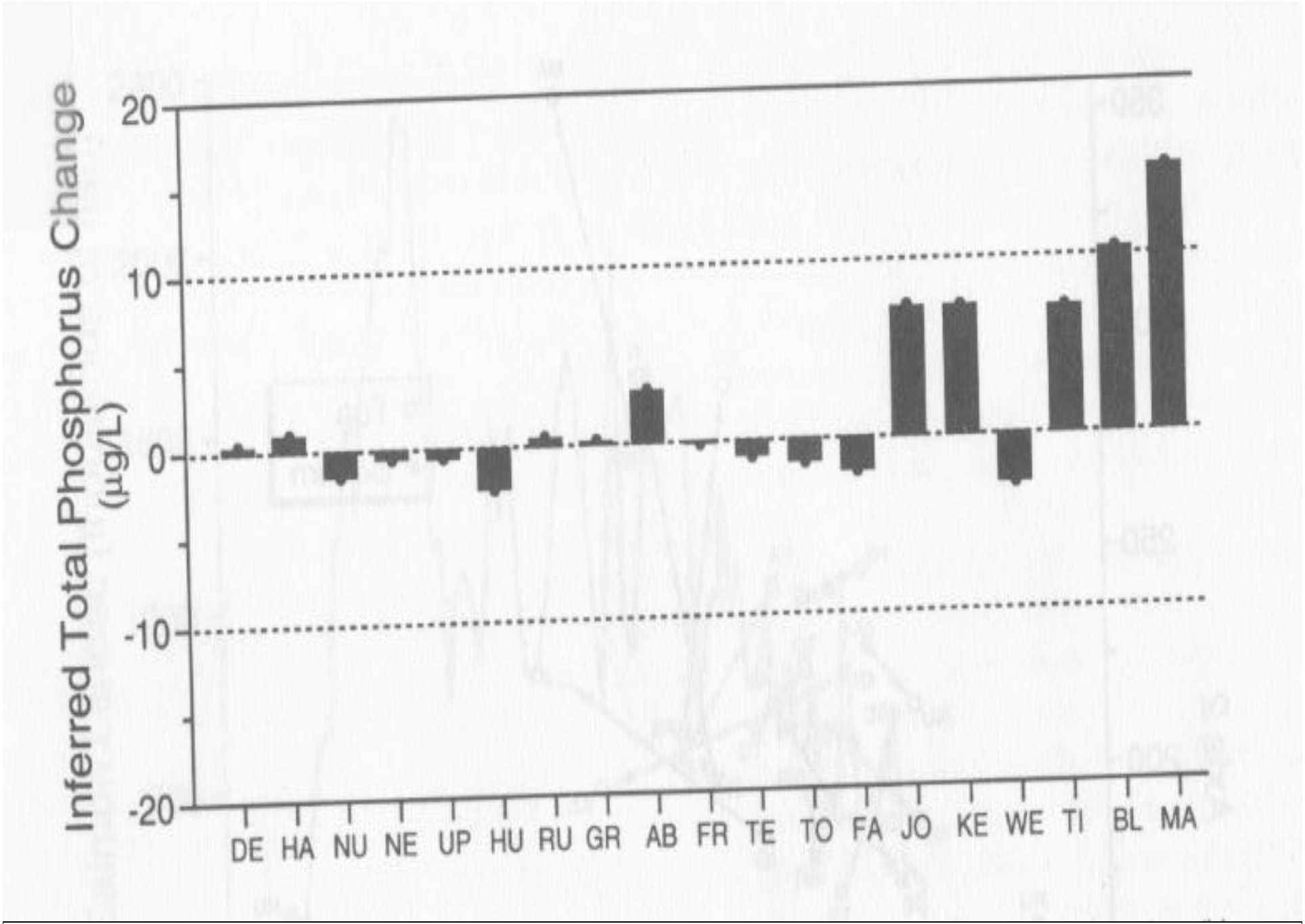


(from Bryce et al. 1999)

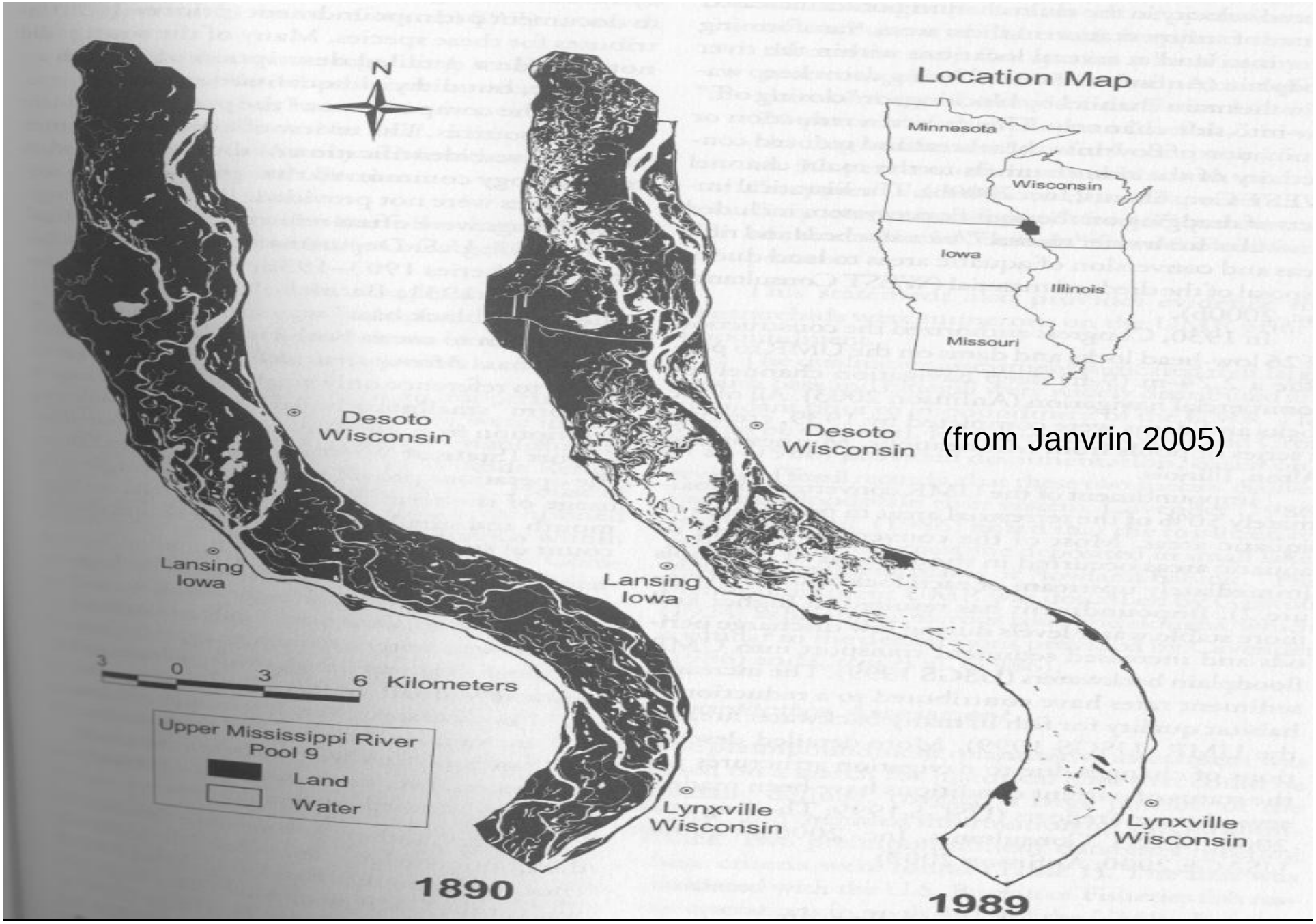




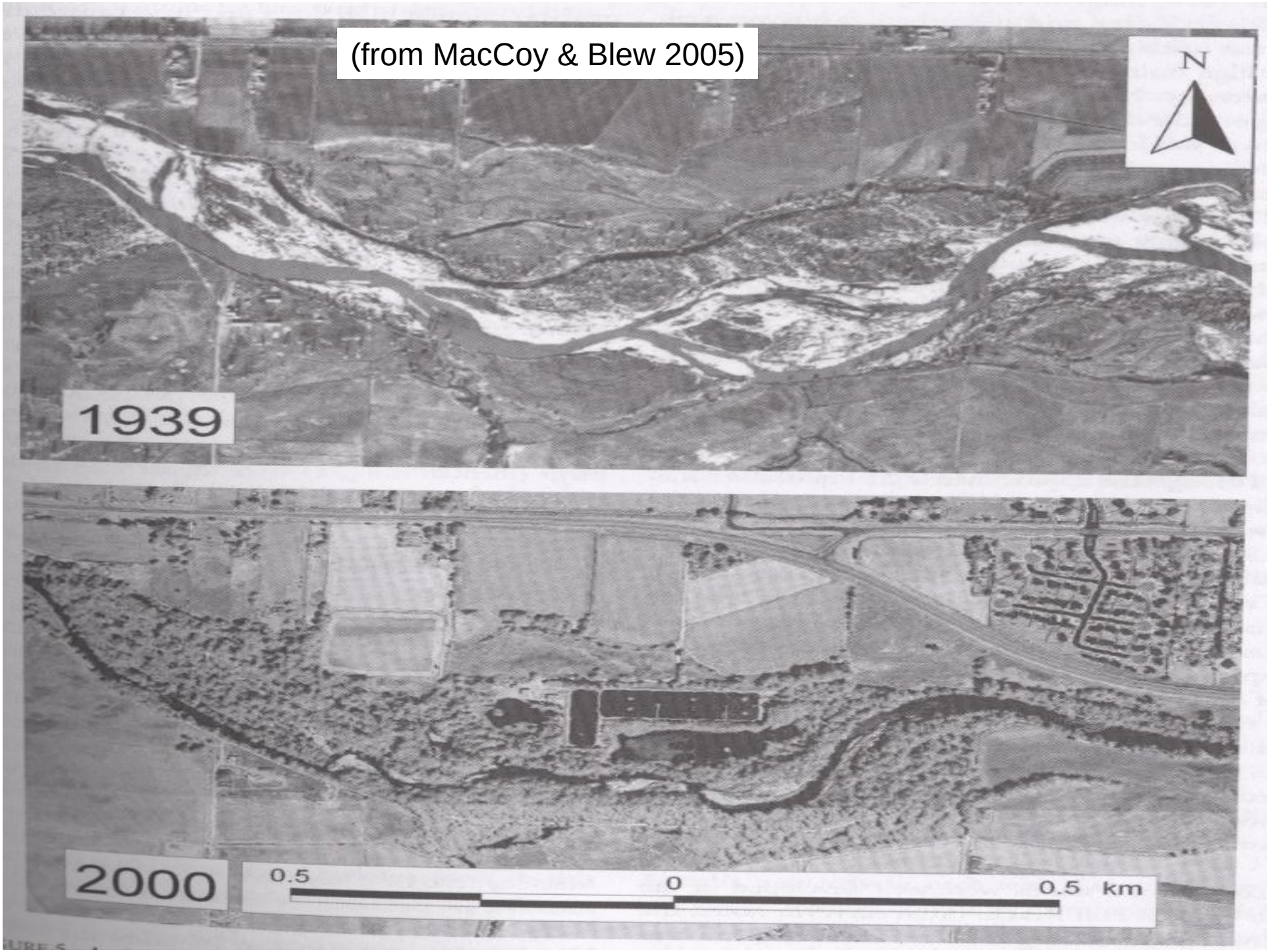
(from Maret & Mebane 2005)

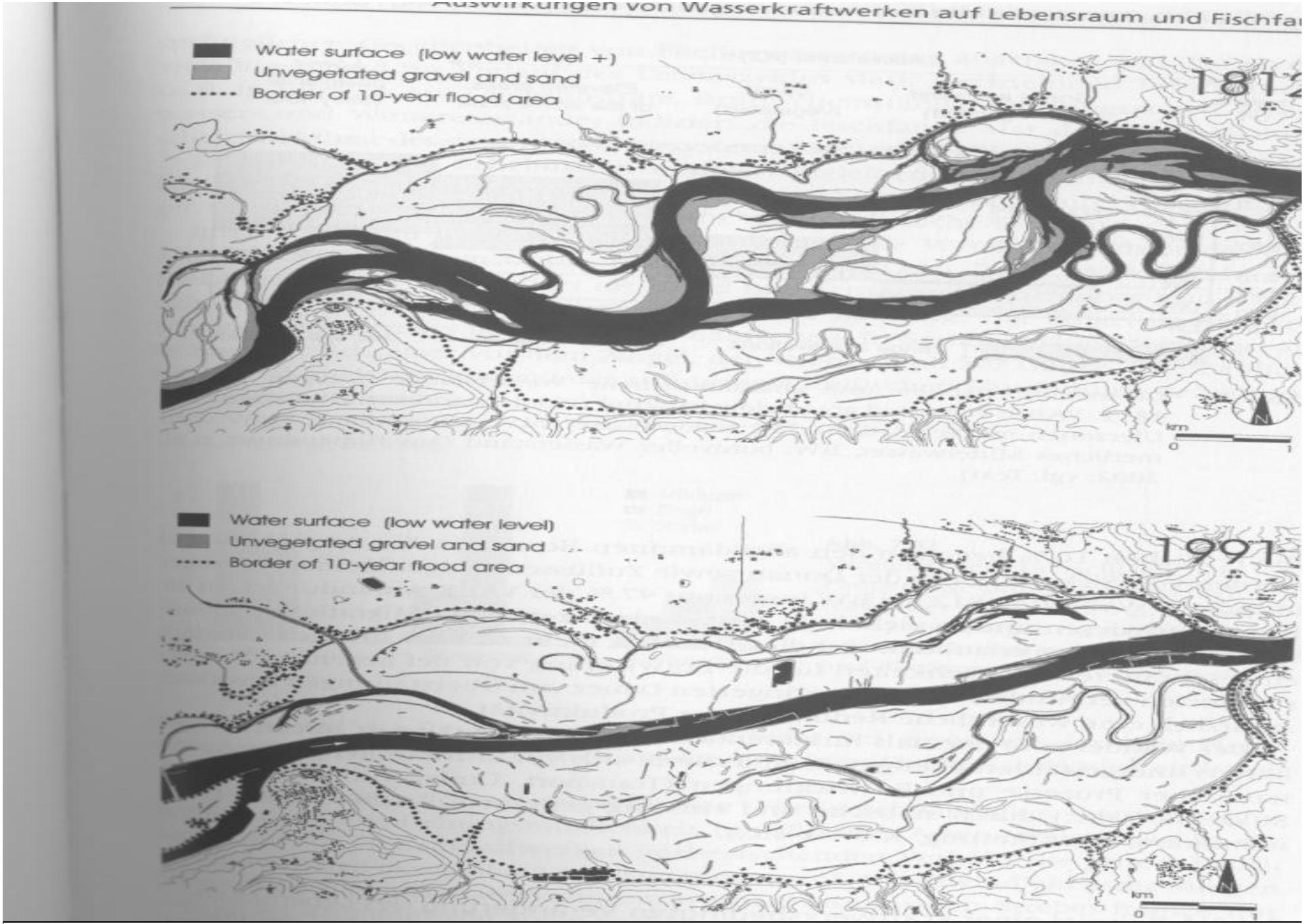


(from Hughes et al. 1993)



(from Janvrin 2005)



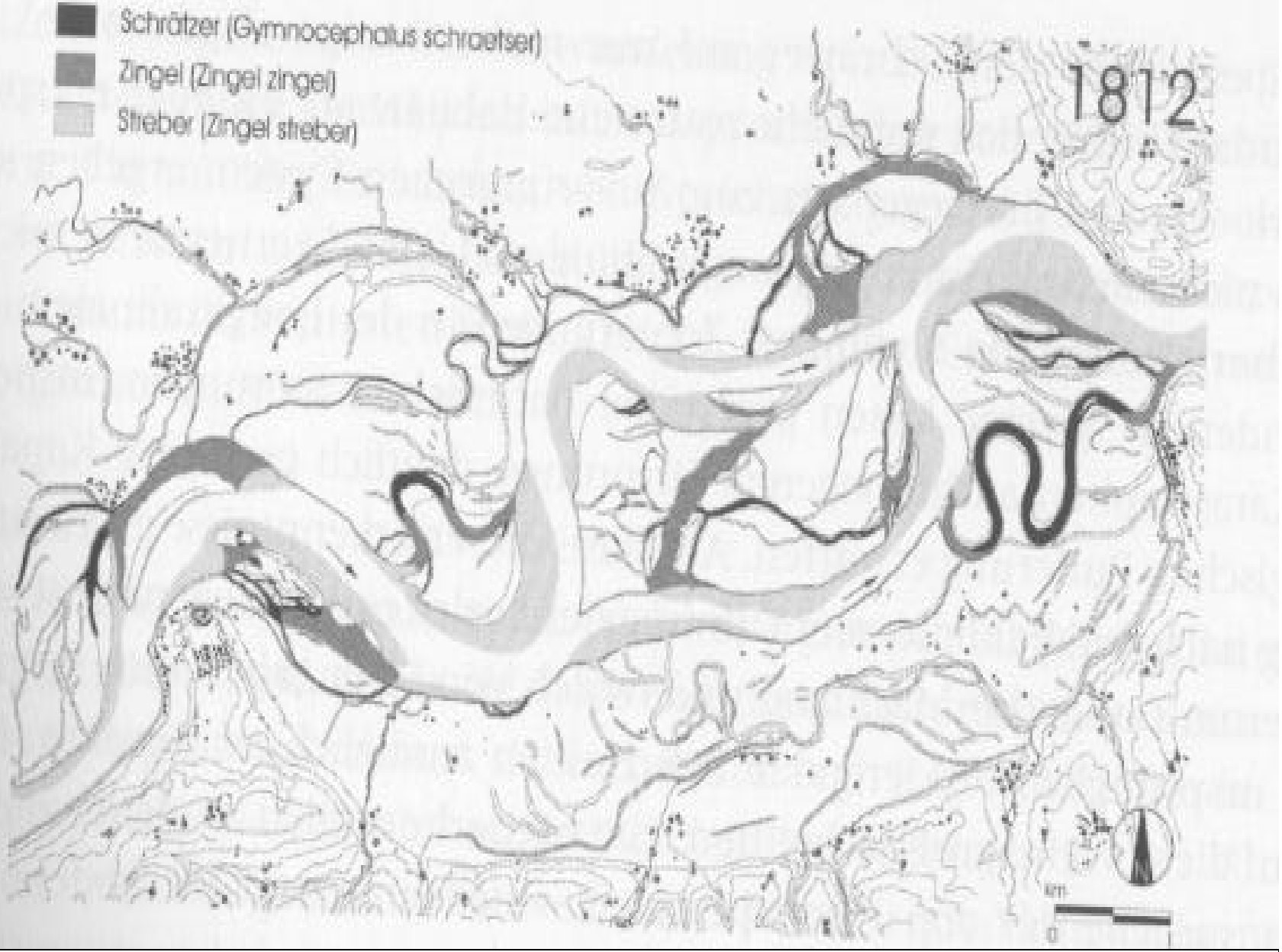


(from Jungwirth et al. 2003)

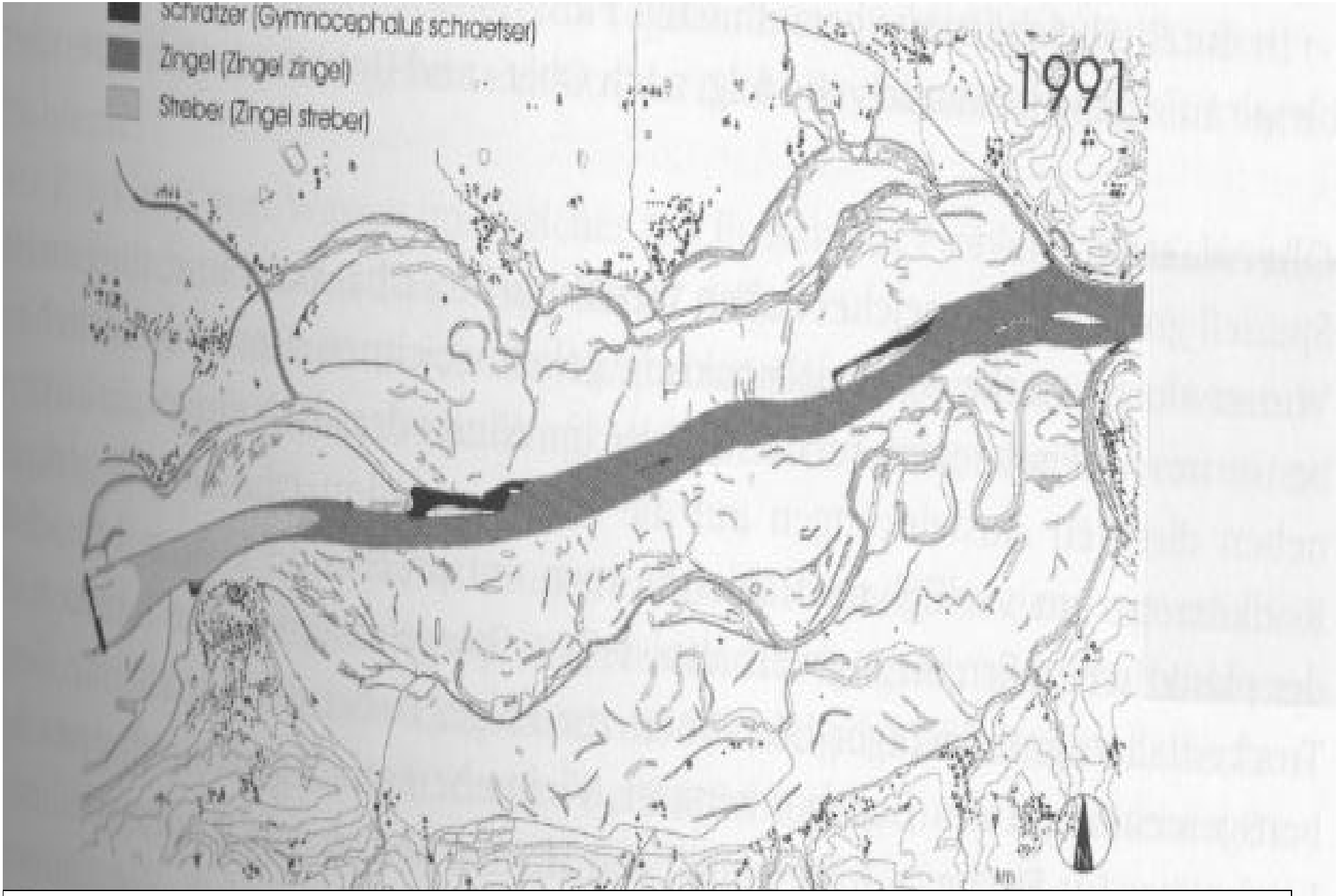
Historical Changes in Large River Fish Assemblages of the Americas

John N. Rinne, Robert M. Hughes, and Bob Calamusso, editors

American Fisheries Society Symposium 45



(from Jungwirth et al. 2003)

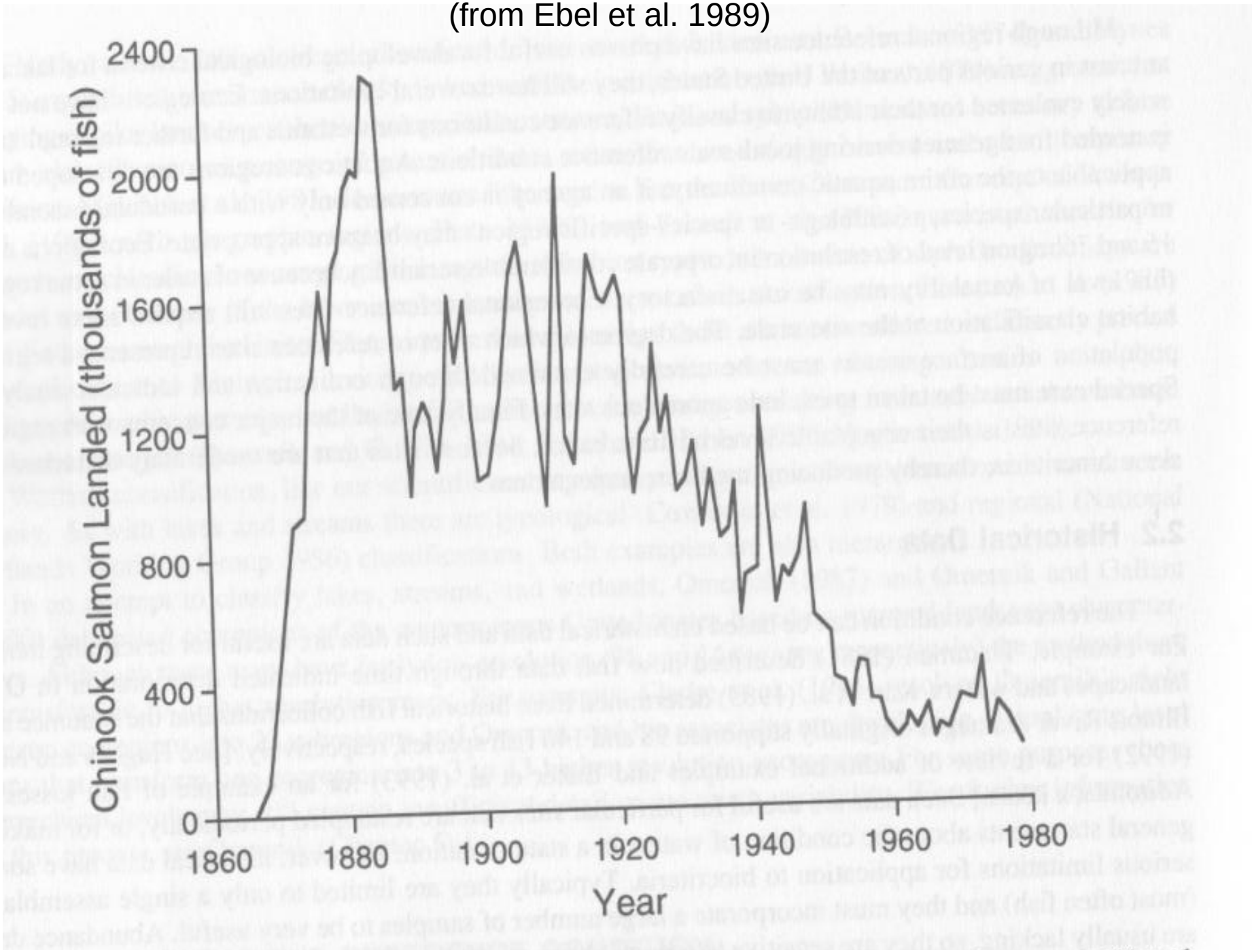


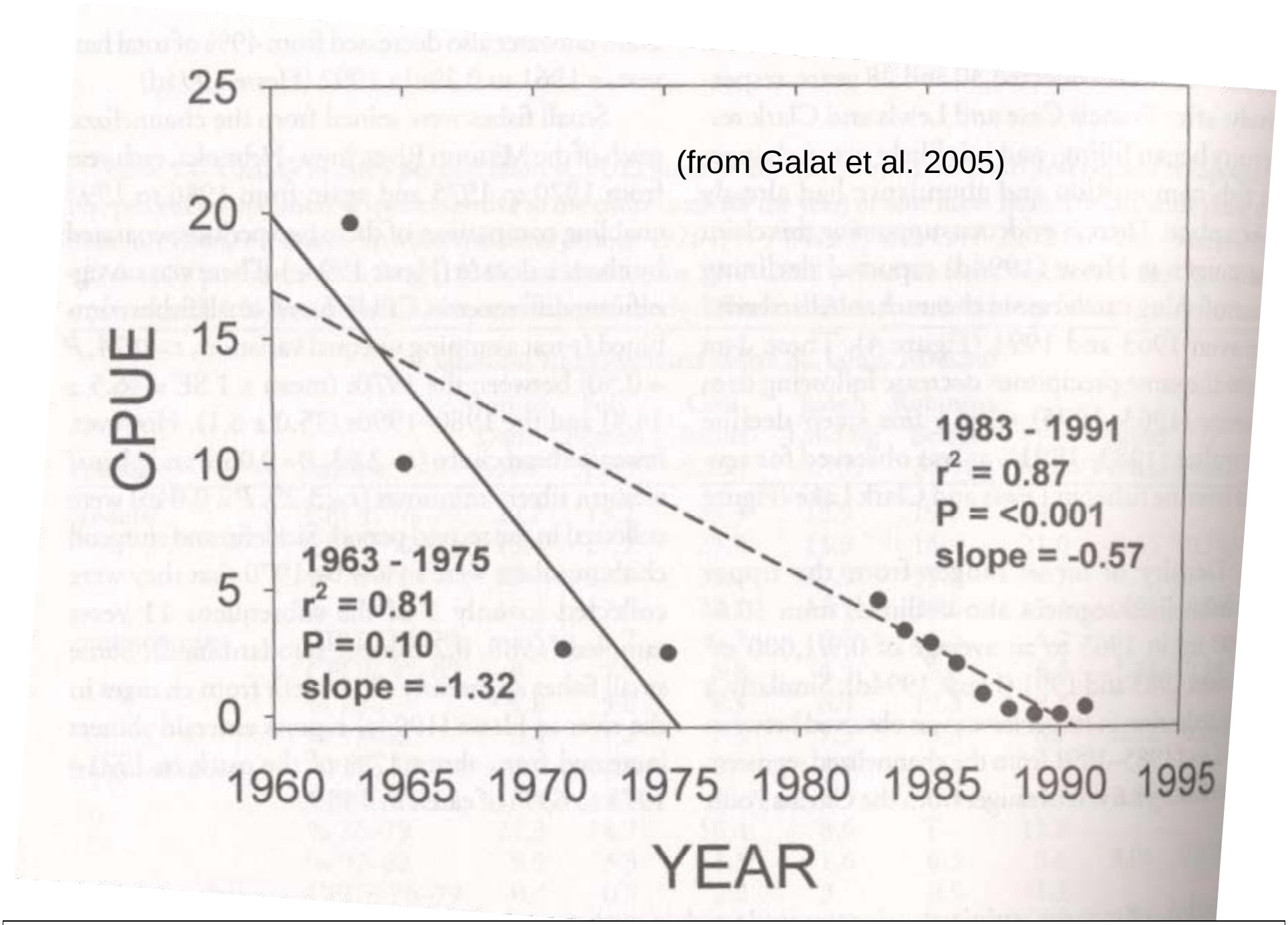
(from Jungwirth et al. 2003)

(from Aadland et al. 2005; 184 kg)

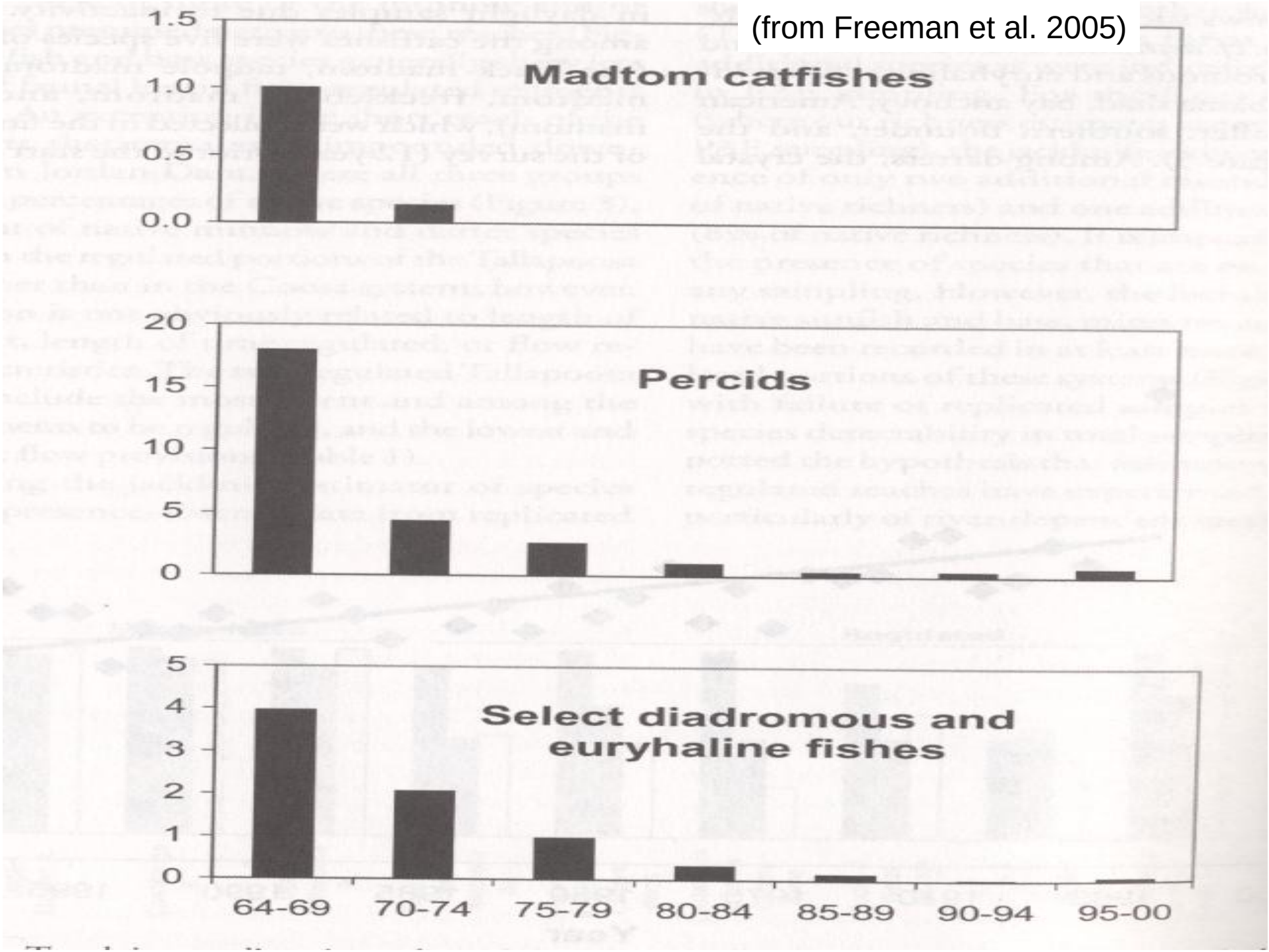
(from Maret & Mebane 2005; 286 kg)

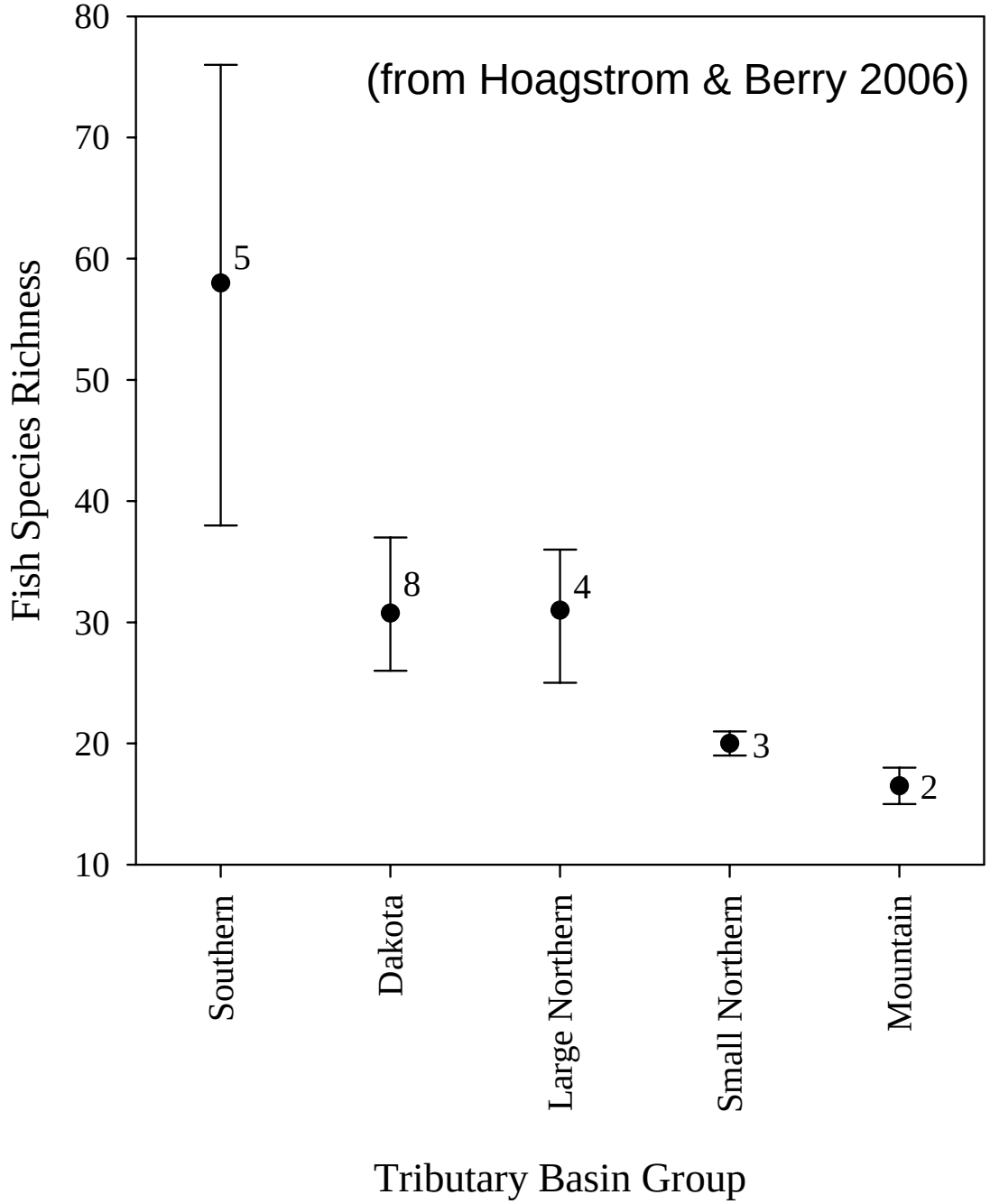
(from Ebel et al. 1989)

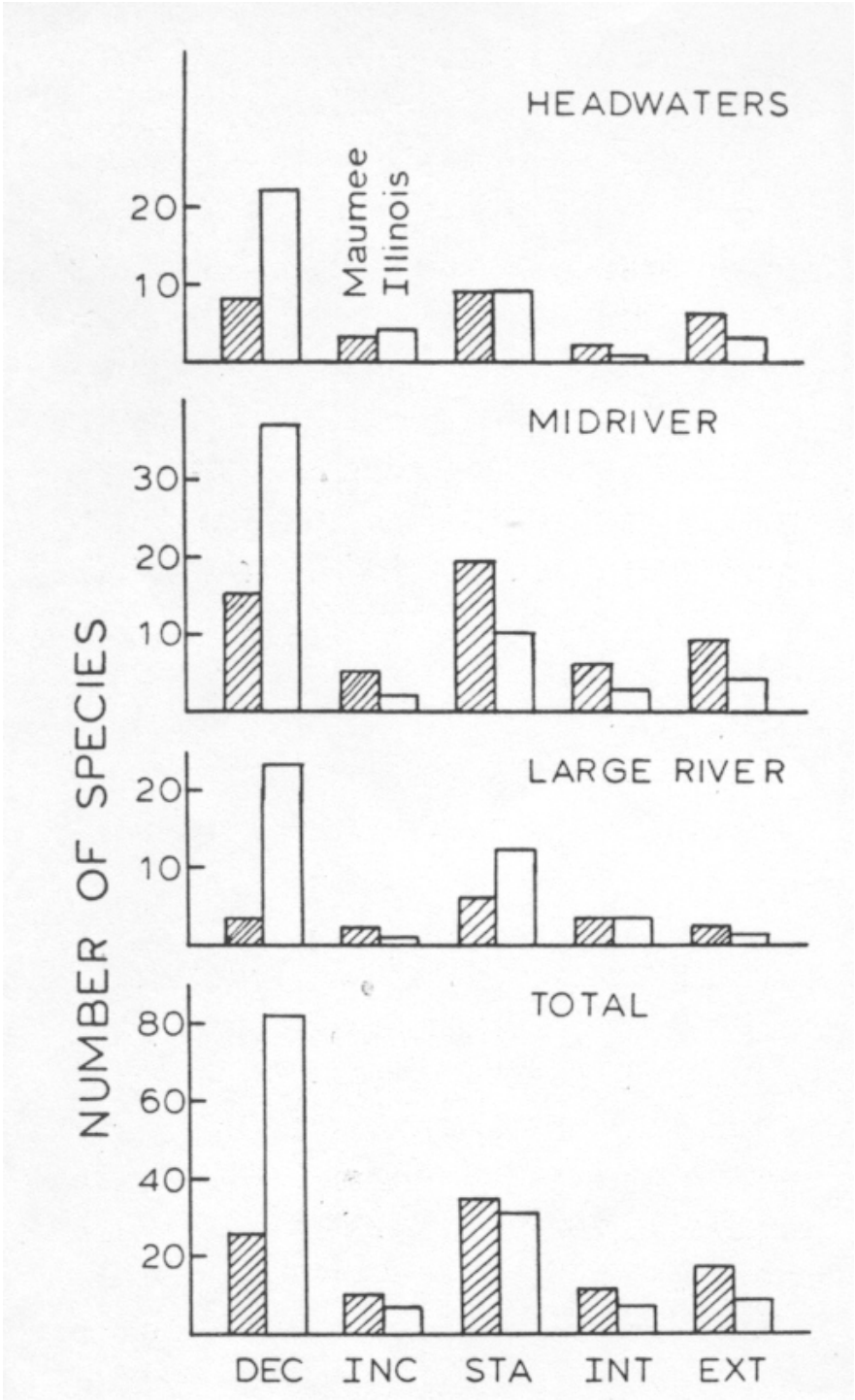




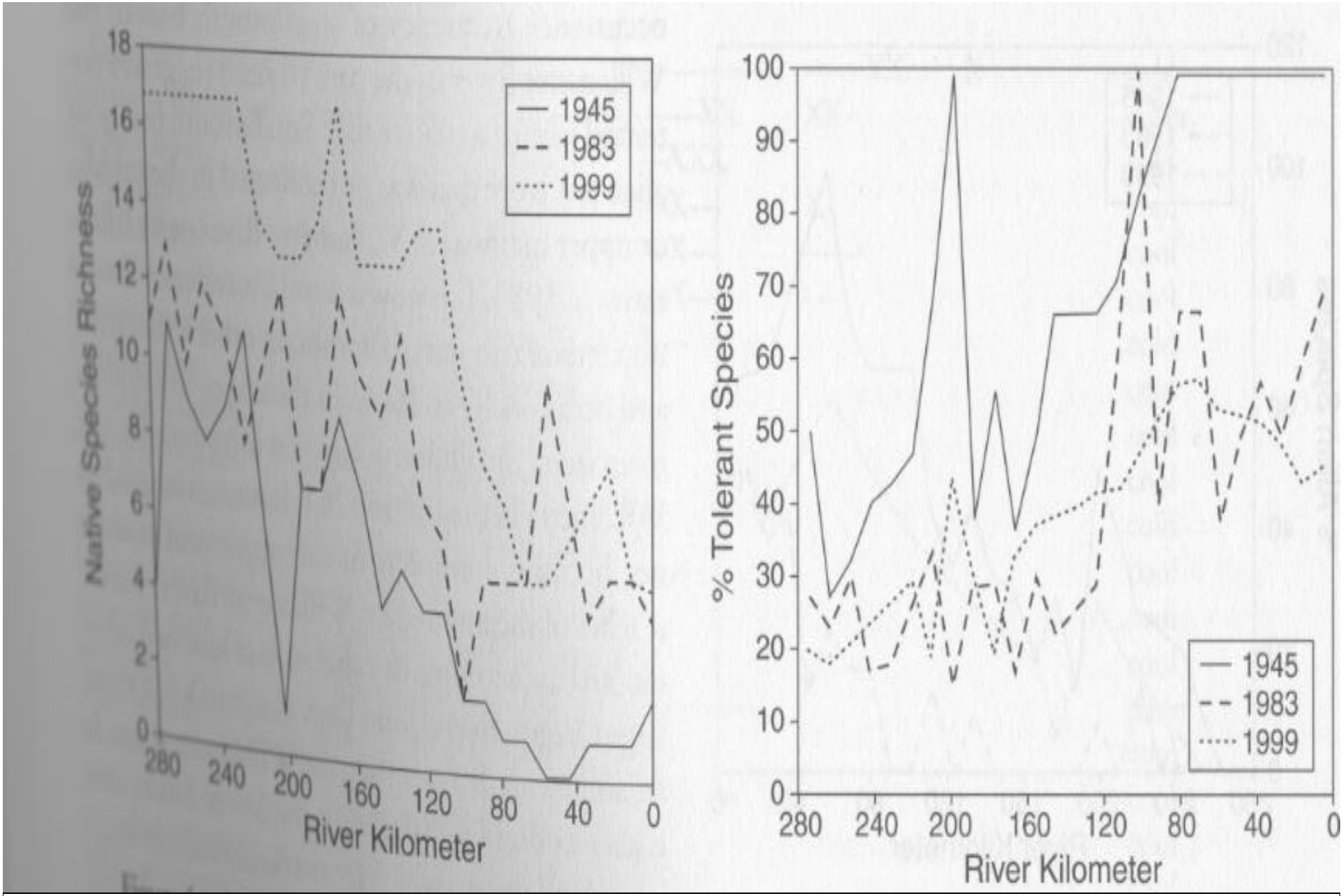
(from Freeman et al. 2005)



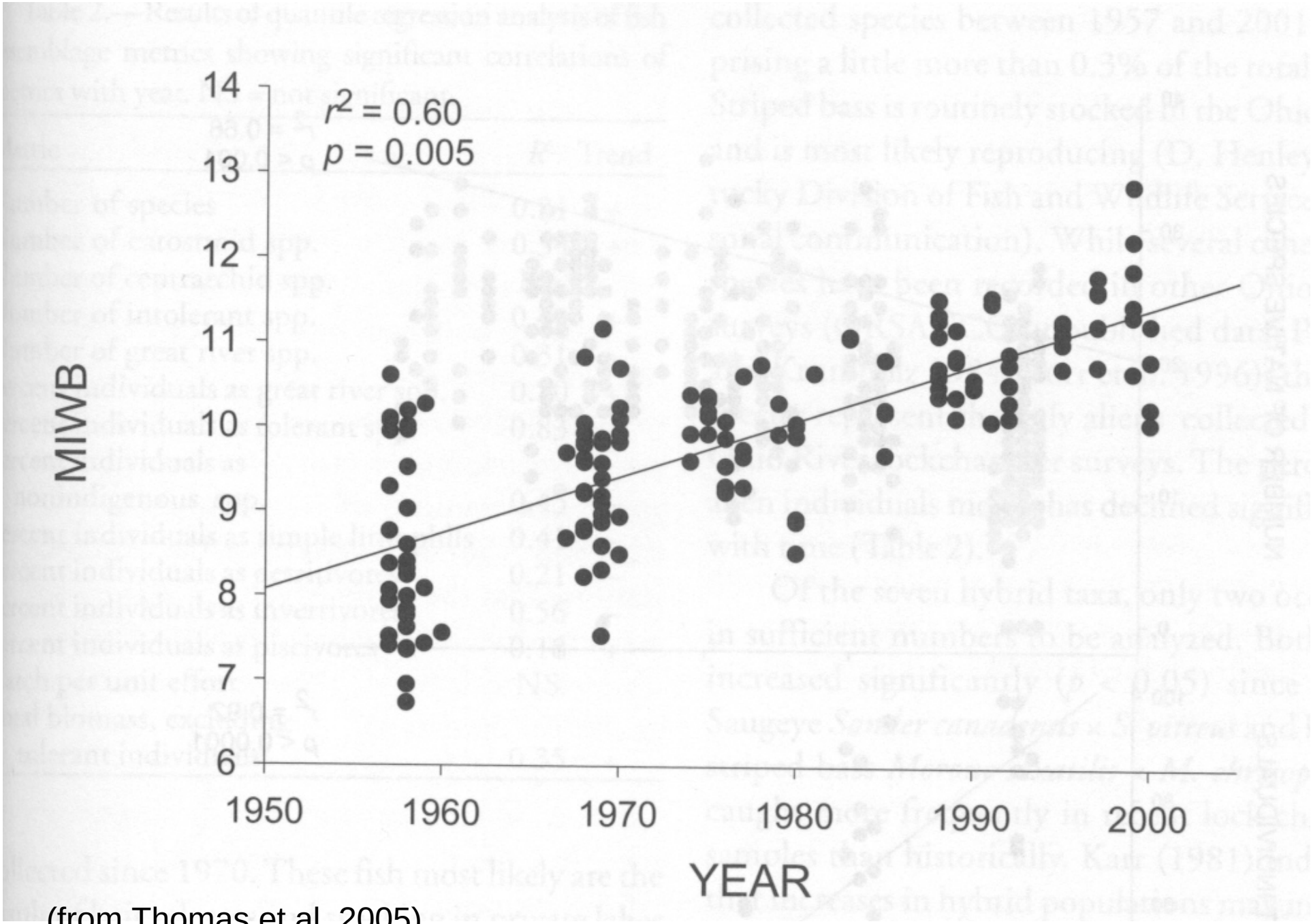




(from Karr et al. 1985)



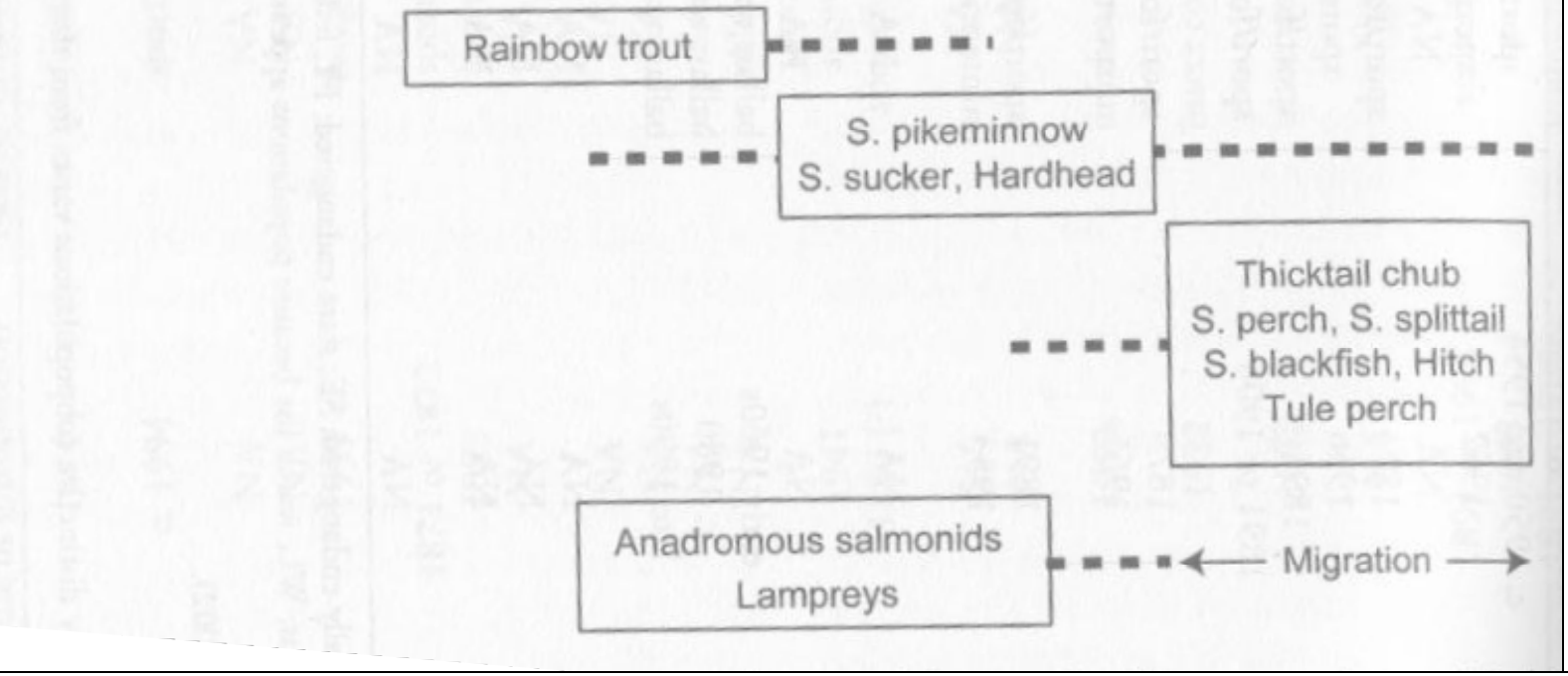
(from Hughes et al. 2005)

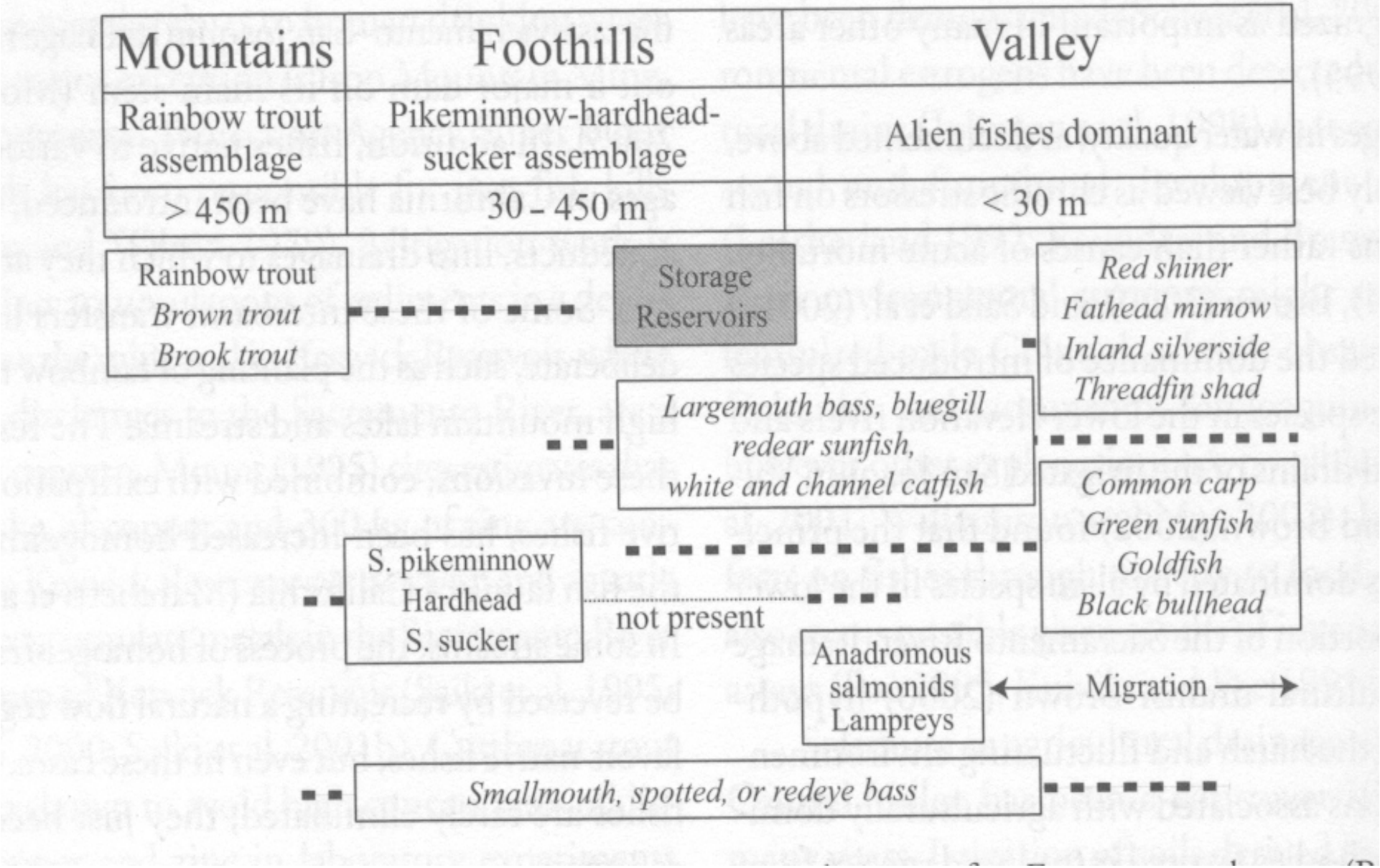


(from Thomas et al. 2005)

(from Brown & Moyle 2005)

Mountains	Mountains	Foothills	Valley
Fishless	Rainbow trout assemblage	Pikeminnow-hardhead-sucker assemblage	Deep-bodied fishes assemblage
> 1,000 m	450 – 1,000 m	30 – 450 m	< 30 m



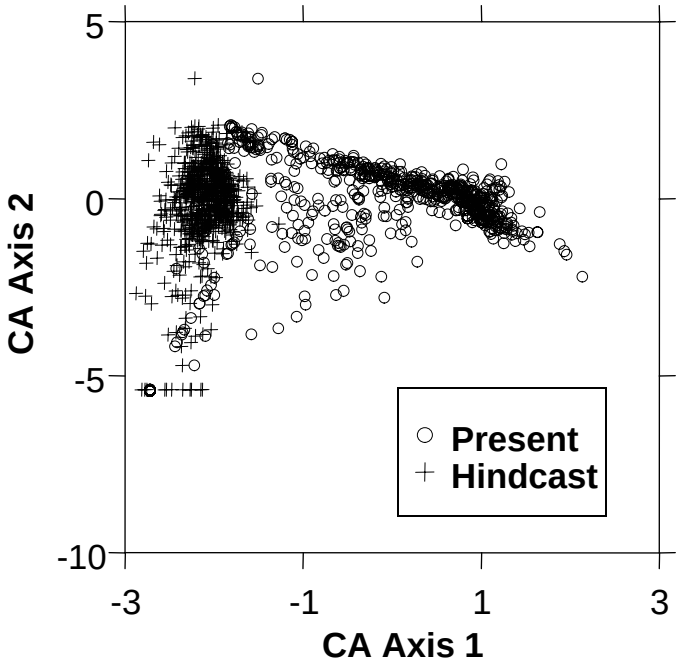


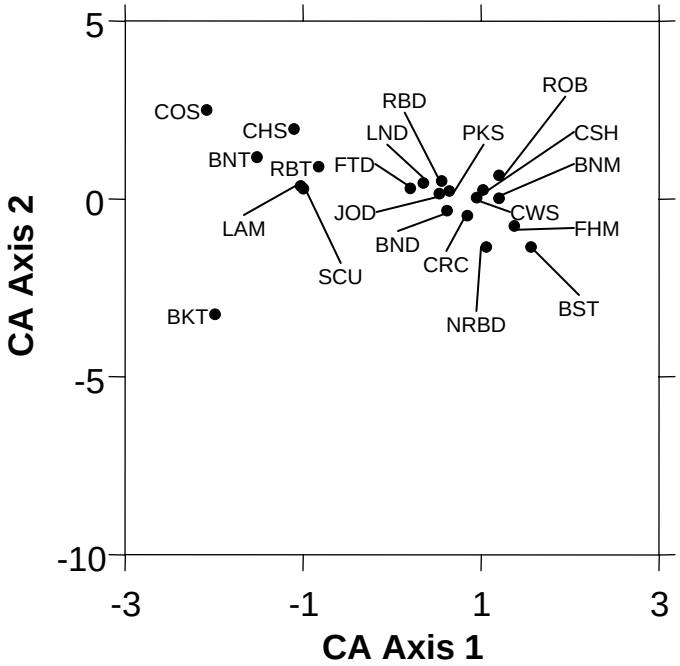
(from Brown & Moyle 2005)

Native Fishes of the Lower Colorado Main Stem

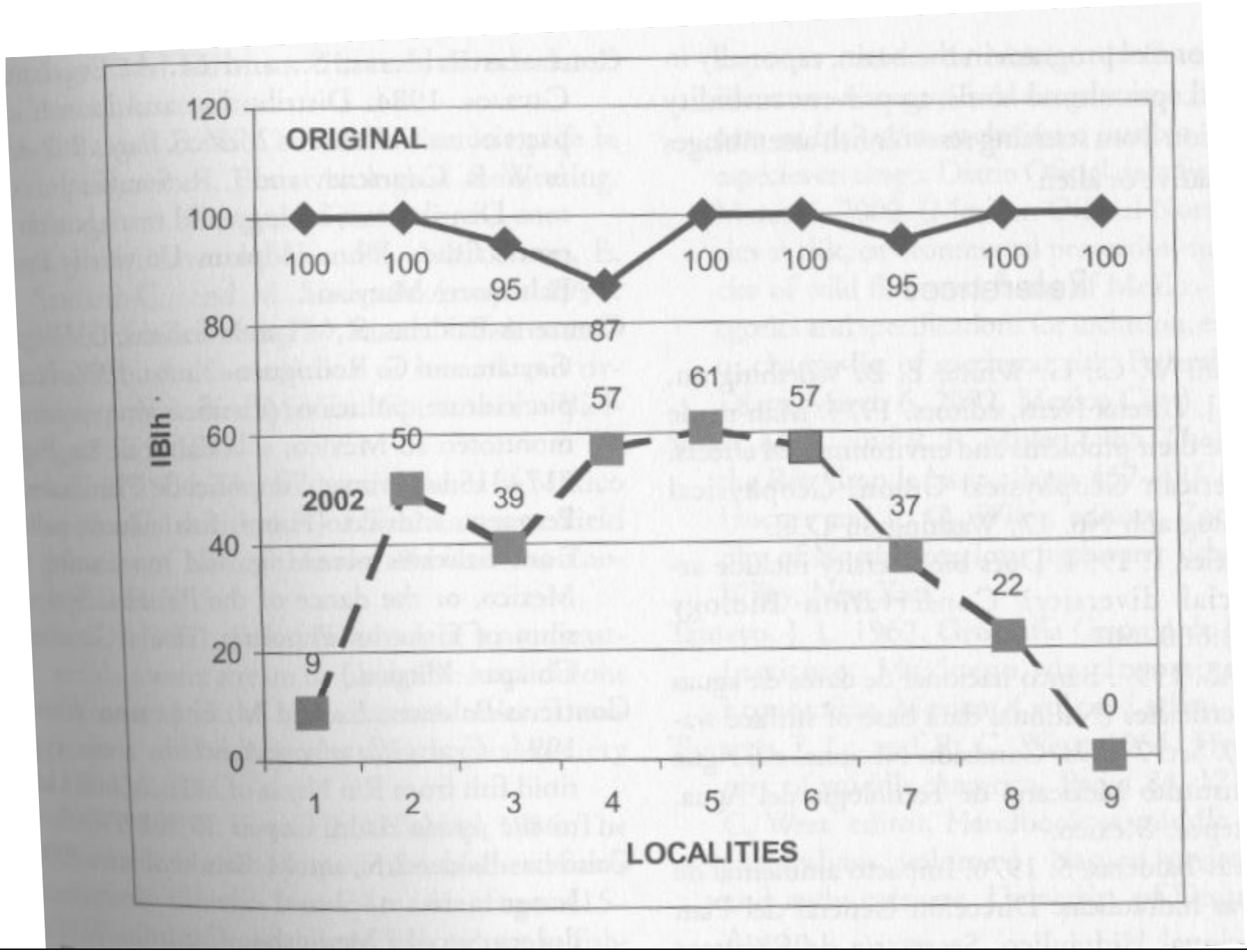
(from Mueller et al. 2005)

Species	Historical Abundance	Current Status
Bonytail	abundant	endangered
Roundtail chub	rare	extirpated
Humpback chub	rare	endangered
Colorado pikeminnow	common	endangered
Woundfin	common	endangered
Razorback sucker	abundant	endangered
Flannelmouth sucker	rare	uncommon
Desert pupfish	abundant	endangered
Sonoran topminnow	common	endangered
Gila topminnow	abundant	endangered

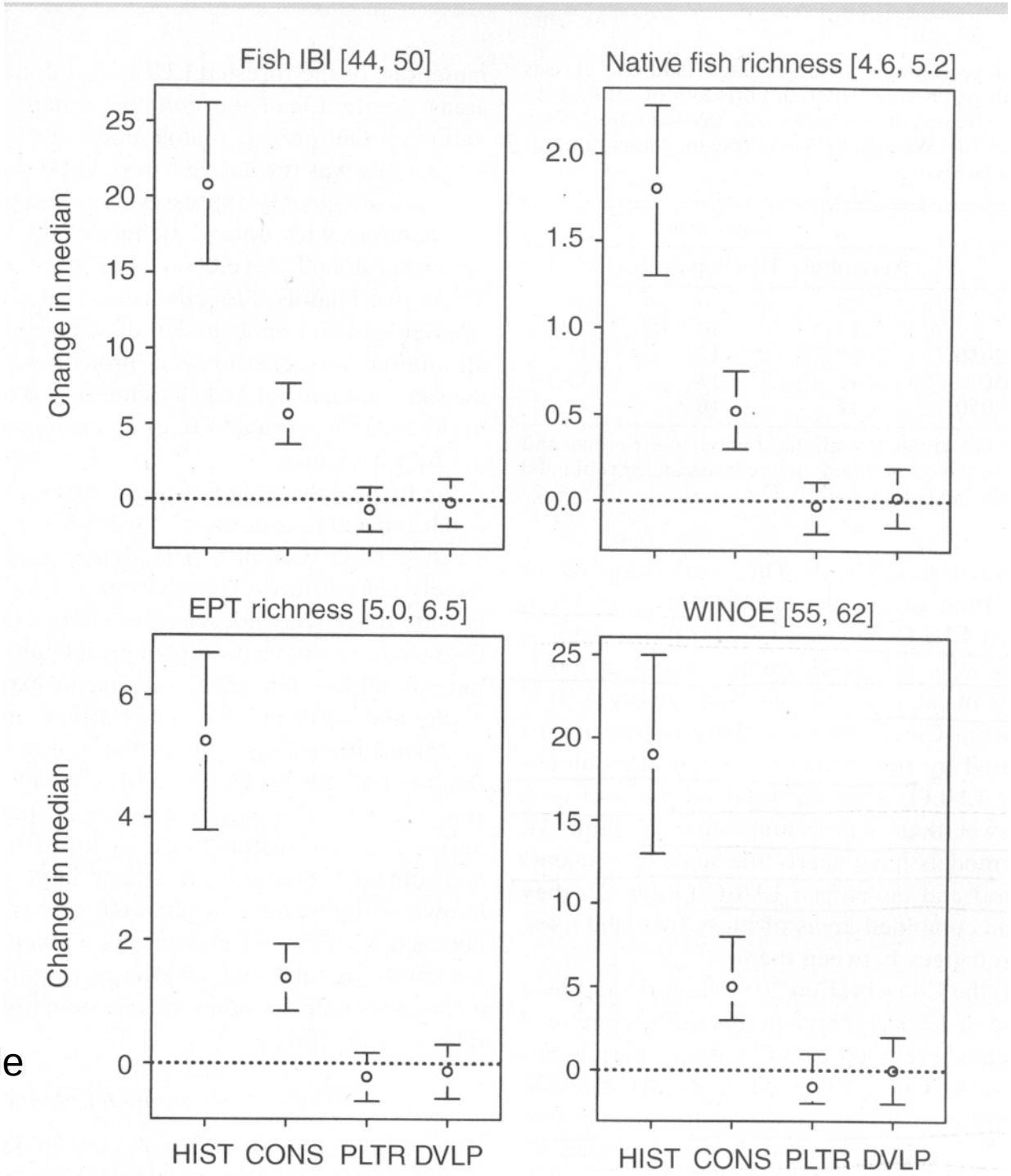




(from Kilgour & Stanfield 2006)

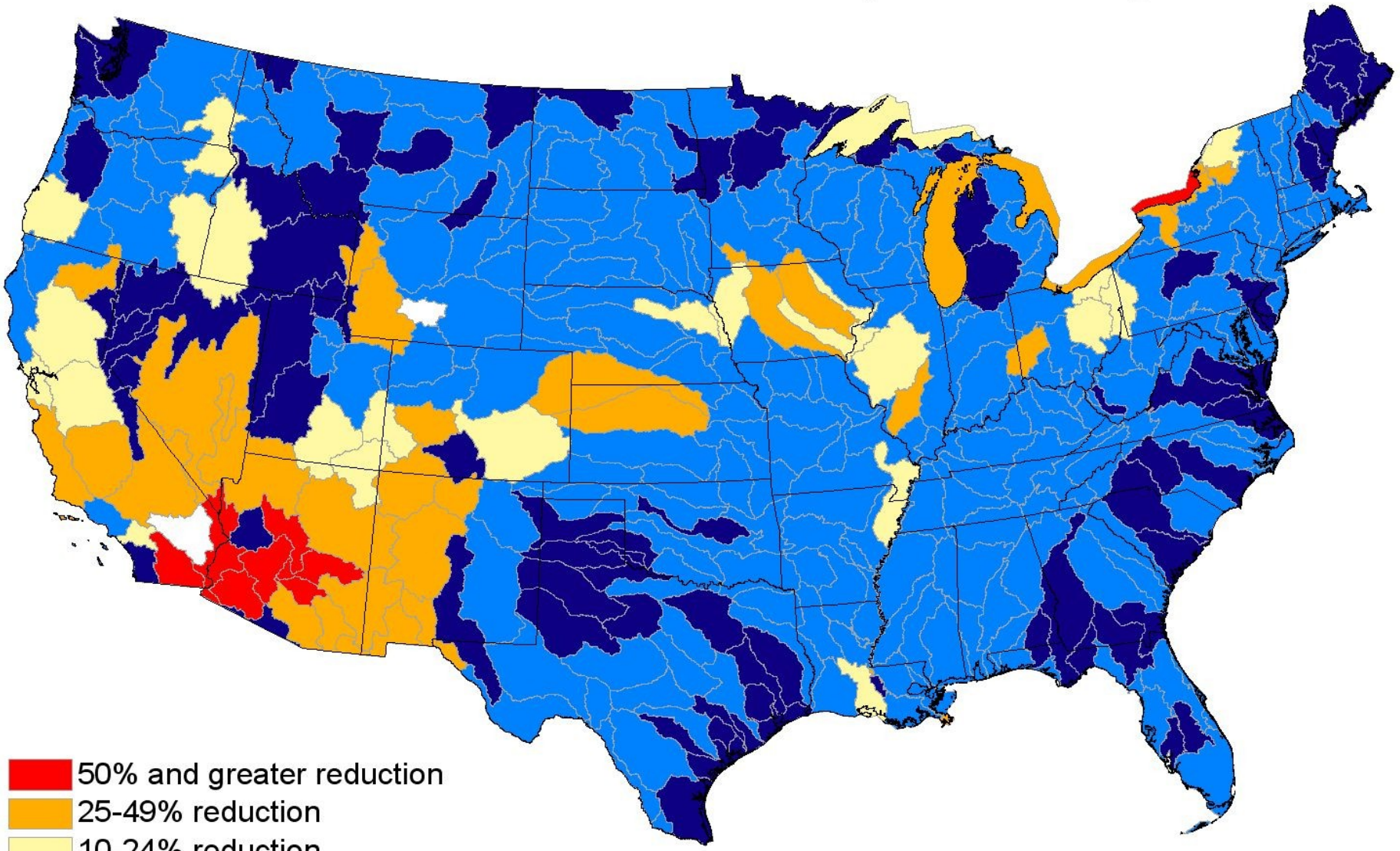


(from Contreras-Balderas et al. 2005)



(from VanSickle et al. 2004)

% Reduction in Native Fish Fauna Diversity Within a 6-digit HUC



50% and greater reduction
25-49% reduction
10-24% reduction
1-9% reduction
0% reduction
Fishless

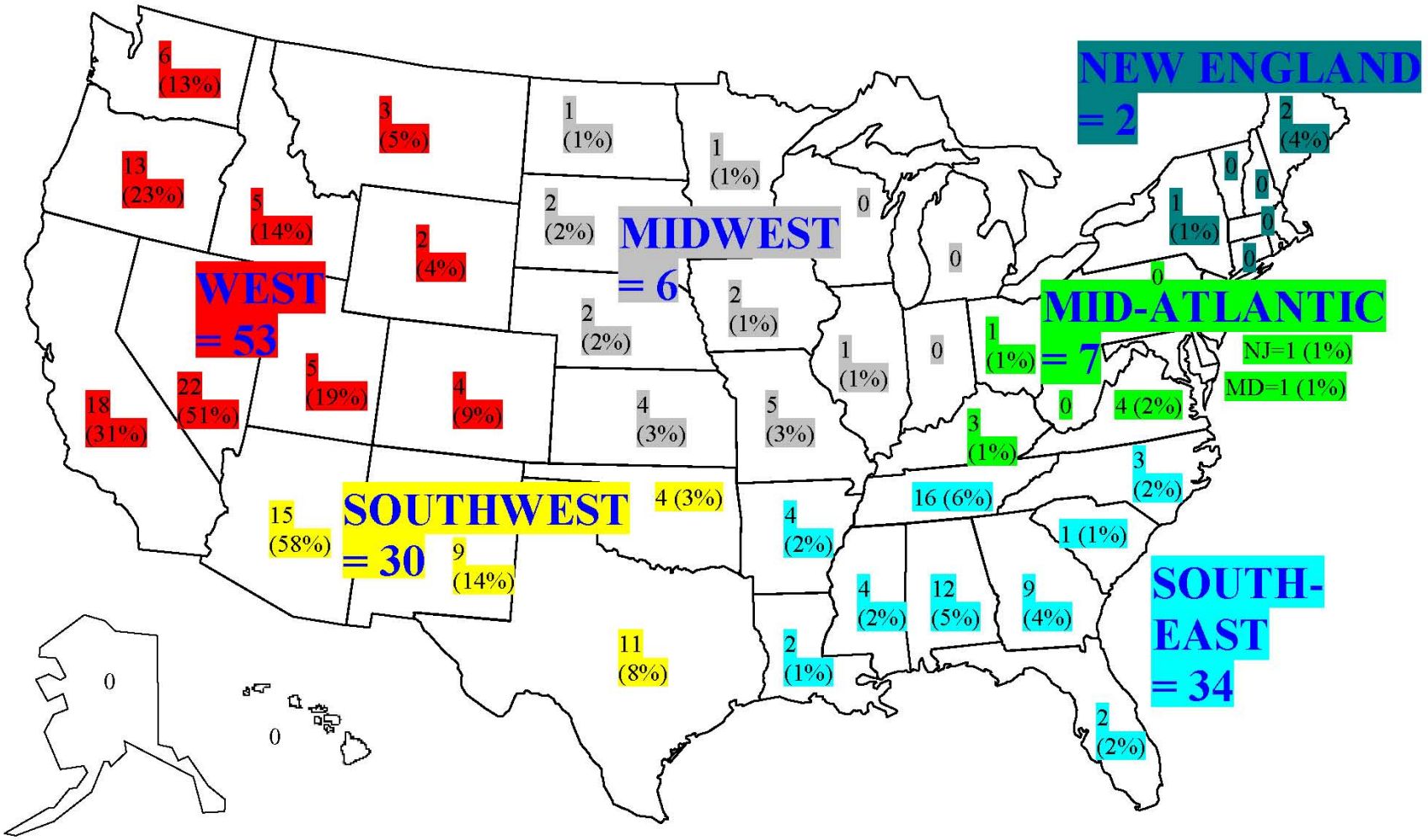
NOTE: Current species numbers are based on a count of species that have at least one "current" record for that species within any 8-digit HUC within the 6-digit HUC

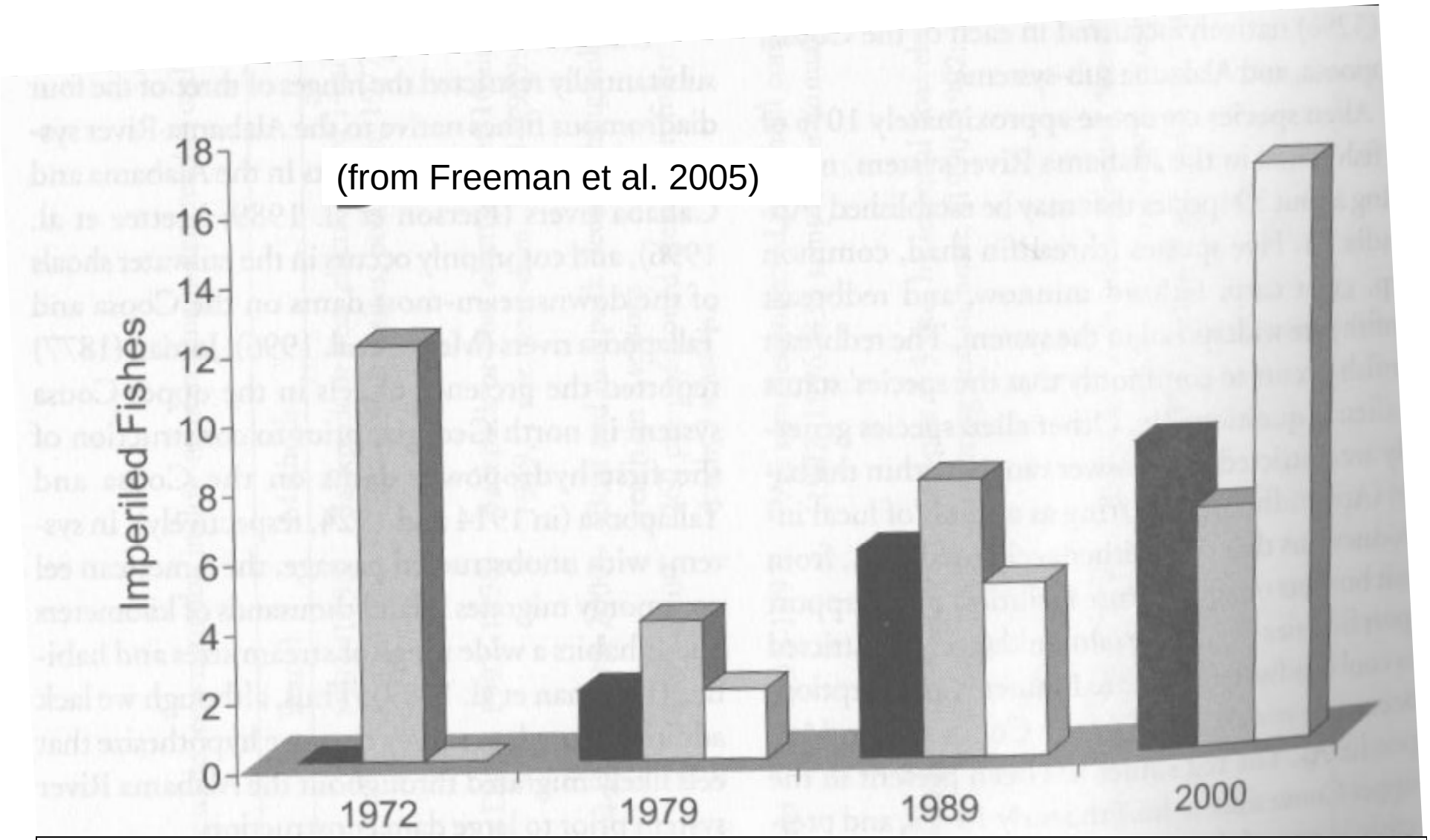
100 0 100 200 300 Miles

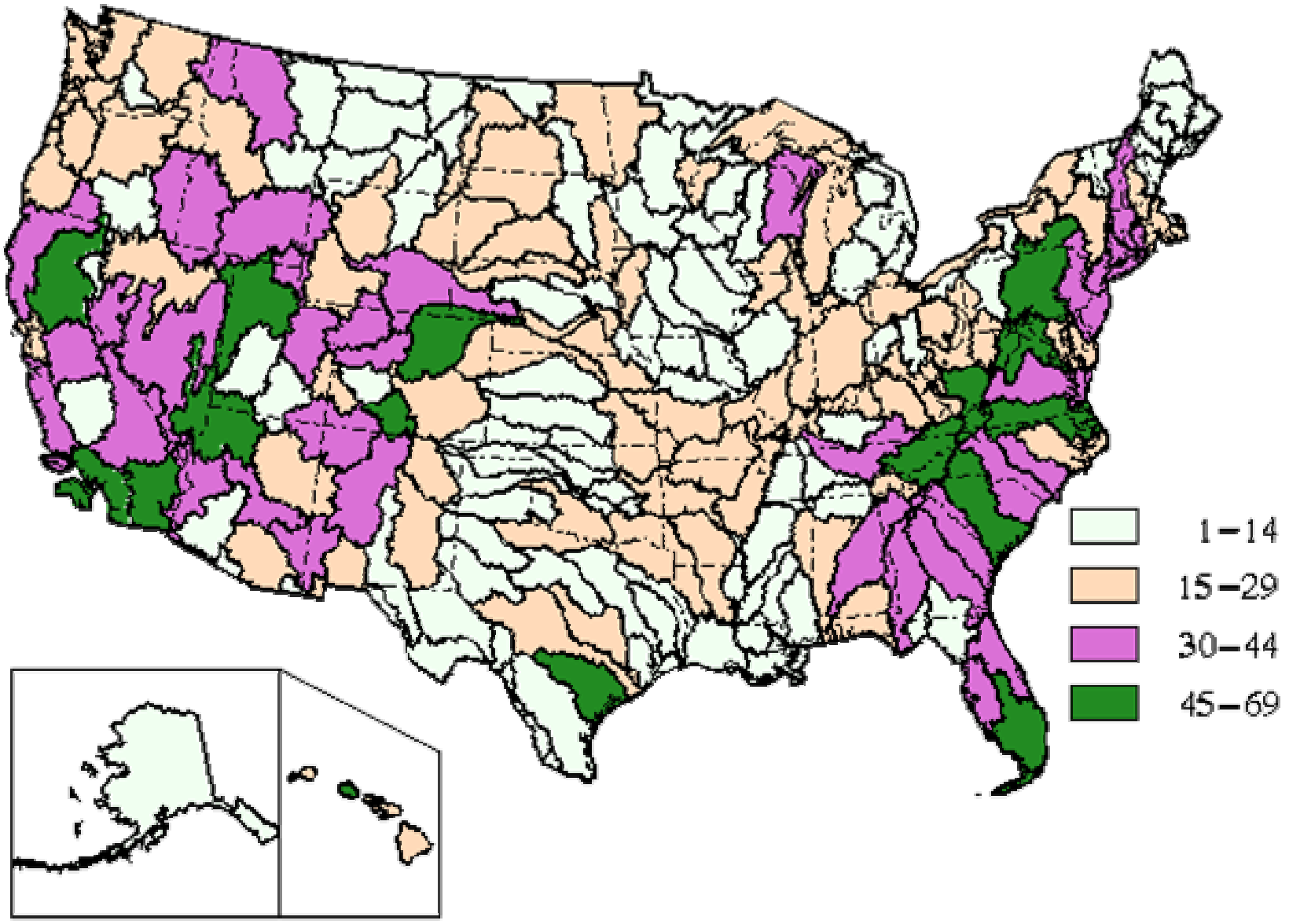
NatureServe
A Network Connecting Science With Conservation

Map Created 3/2005

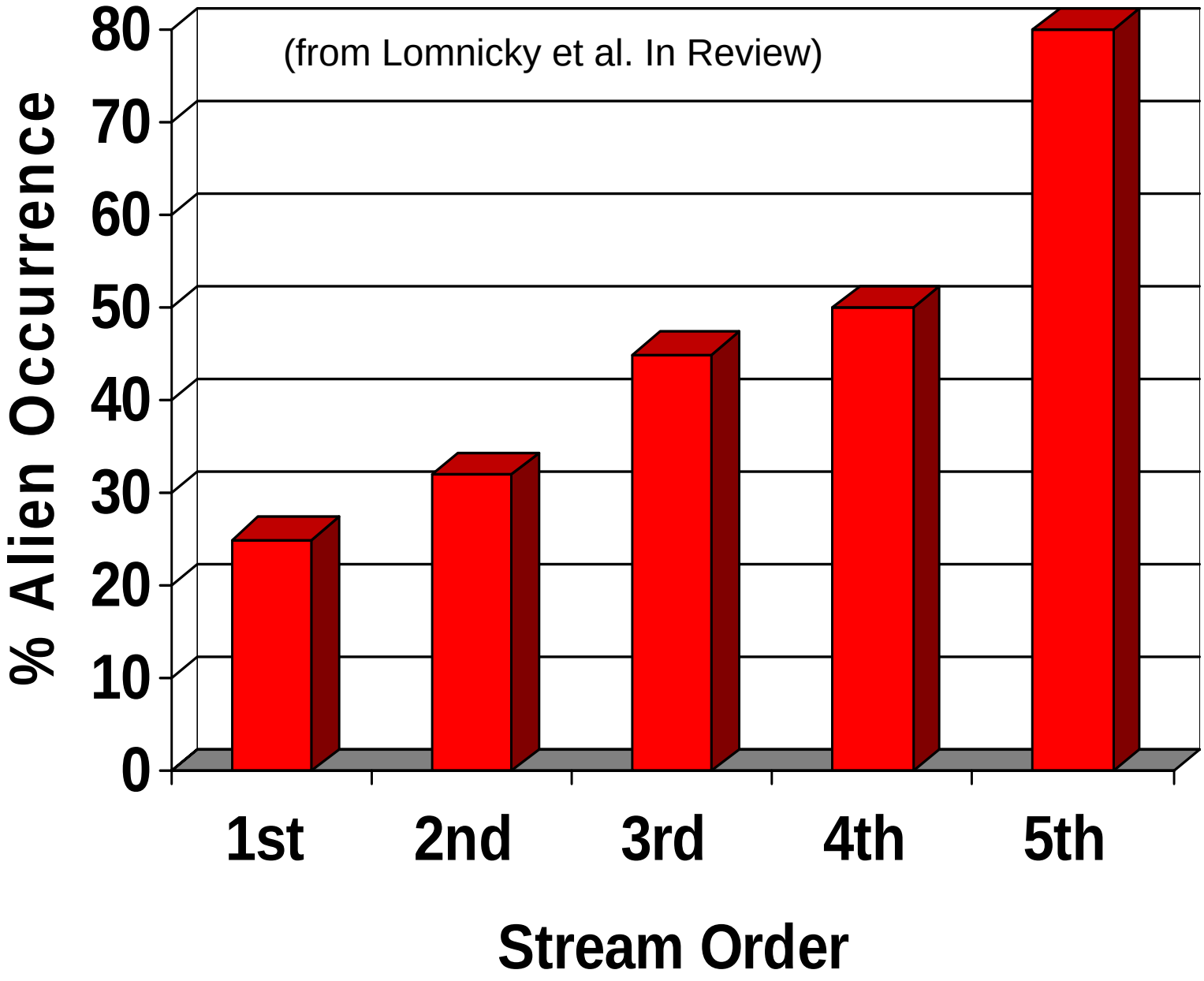
(from Reed & Czech 2005)



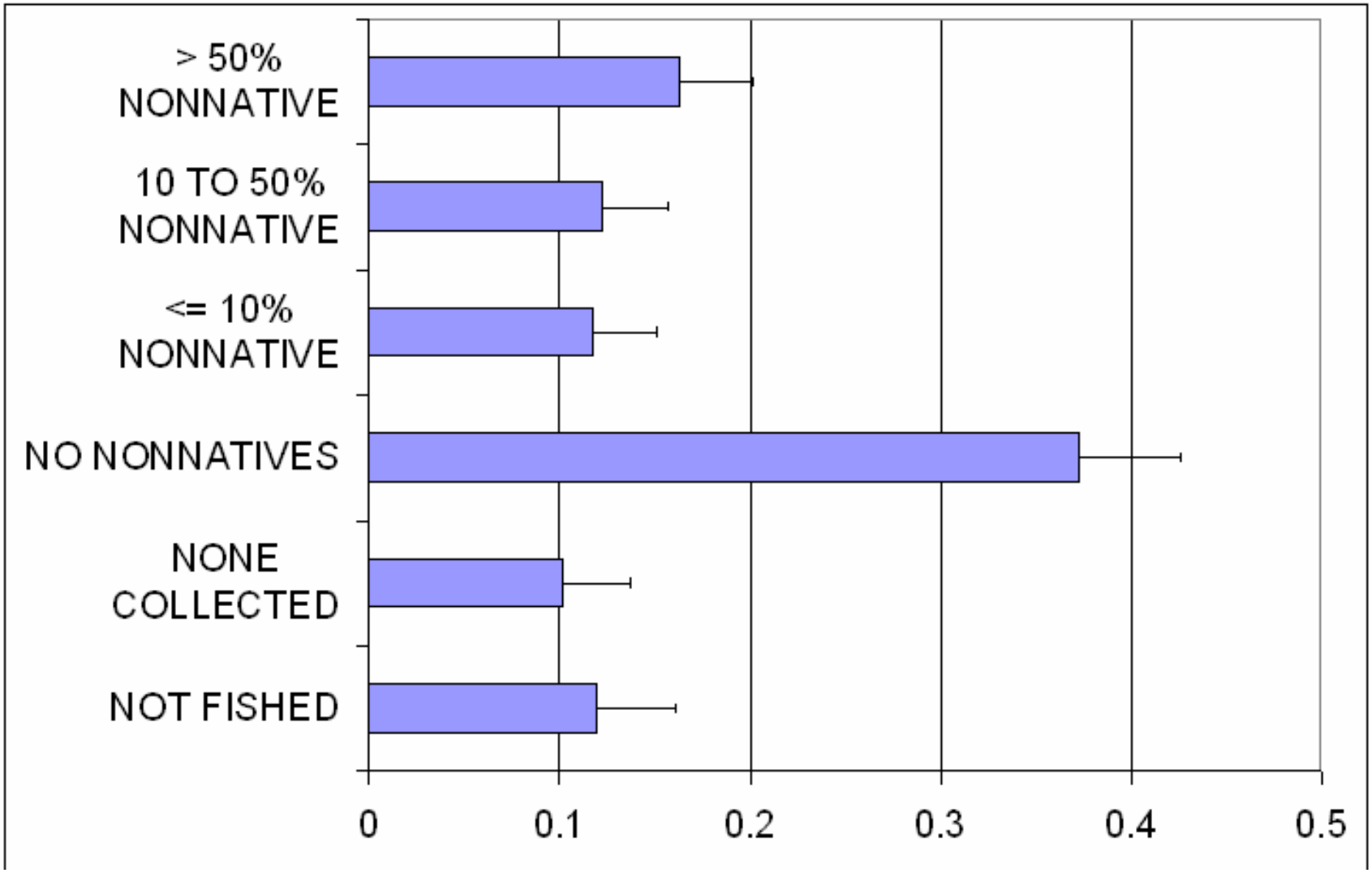




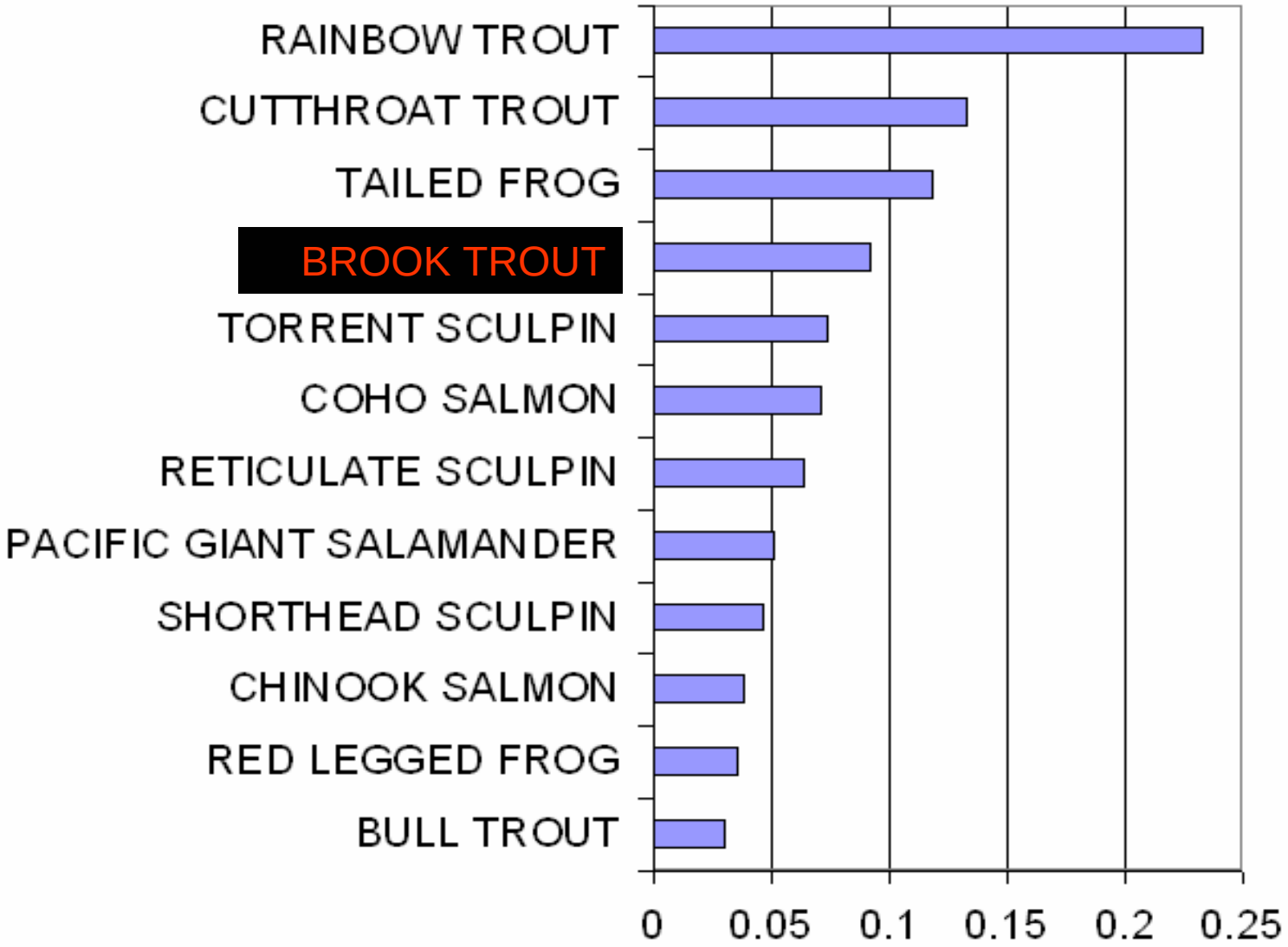
Number of fish species introduced into USGS 4-digit HUC subregions. Fuller et al. 1999



EMAP-West Aquatic Vertebrate Proportionate Abundance by Proportion of Stream Length (from Lomnicky et al. In Review)

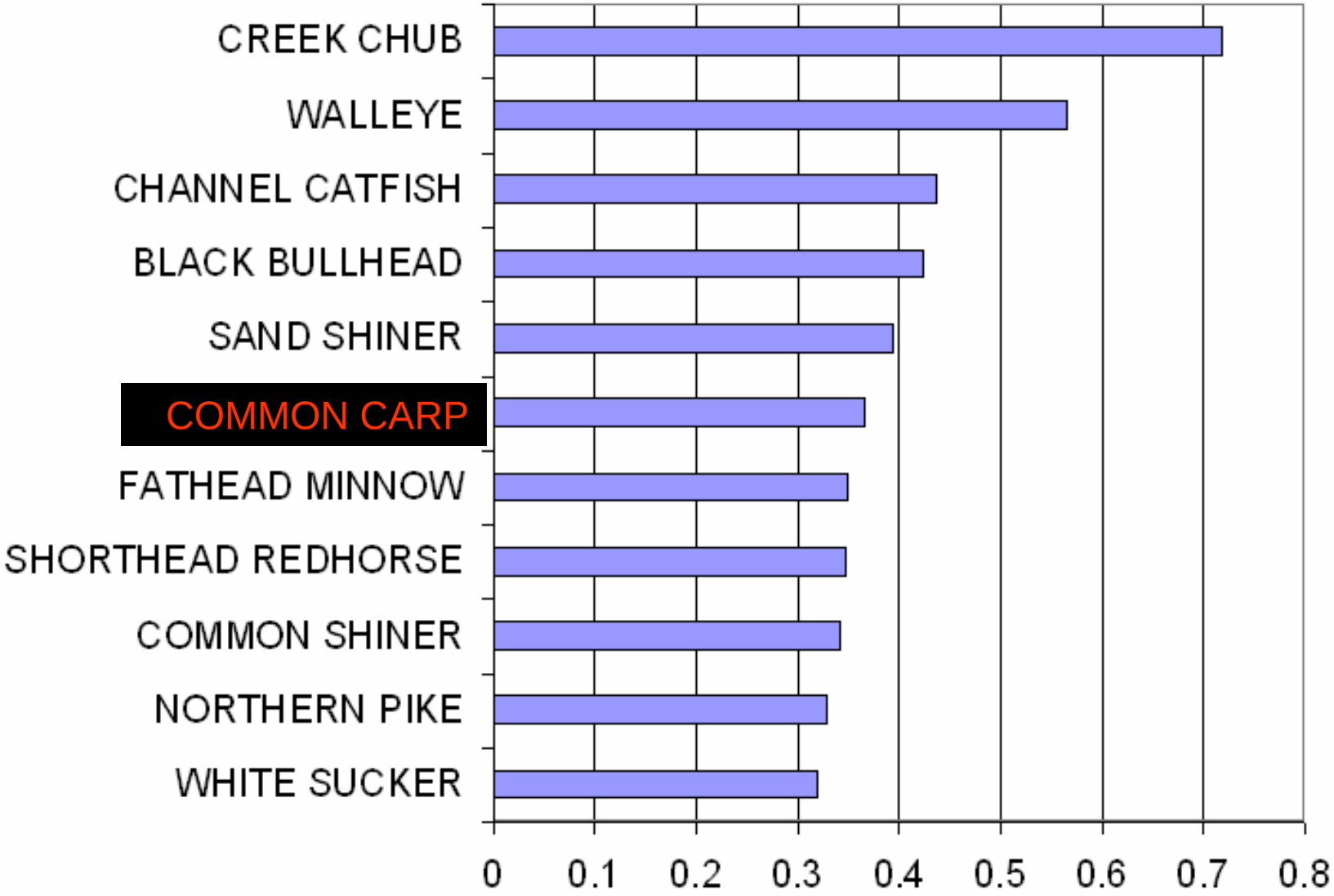


Predominate Species in Washington
(from Lomnicky et al In Review)



Predominate Species in North Dakota

(from Lomnicky et al. In Review)



Predominate Species in Arizona
(from Lomnicky et al. In Review)