Copeia, 2001(4), pp. 916-927

Stream Erosion and Densities of *Etheostoma rubrum* (Percidae) and Associated Riffle-Inhabiting Fishes: Biotic Stability in a Variable Habitat

Stephen T. Ross, Martin T. O'Connell, David M. Patrick, Carlos A. Latorre, William T. Slack, Jeremy G. Knight, and S. David Wilkins

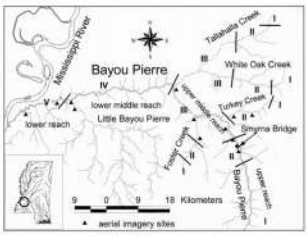

TABLE 2. MOVEMENT OF THE KNICKPOINT AT SITE I-12 ON THE UPPER REACH OF BAYOU PIERRE (nd = NO DATA). Data from 1994 are based on field observations.

	Year						
	1940	1964	1978	1985	1990	1992	1994
Distance (m) between knickpoint and Smyrna bridge	−4115	−2956	−1433	122	975	1500	3000
Average knickpoint migration rate (m/yr)	nd	48	124	222	171	263	750

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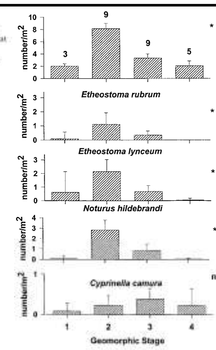


Fig. 4. Densities of all riffle-inhabiting fishes and the four numerically dominant species in 1993–1994 enclosure samples from Bayou Pierre. Vertical lines are 95% CI; asterisks indicate significant differences. Differences for total riffle fishes tested with ANOVA ($F = 4.04$; $P = 0.012$); differences for individual species tested with K-W with α corrected for multiple comparisons (*Etheostoma rubrum*, $\chi^2 = 12.5$, $P = 0.006$; *Etheostoma lynceum*, $\chi^2 = 11.4$, $P = 0.010$; *Etheostoma hildebrandi*, $\chi^2 = 12.0$, $P = 0.007$; *Cyprinella camura*, $\chi^2 = 1.9$, $P = 0.592$).

Pressures on Fishes – Introduced Species

- Intentional introductions – aquaculture, mosquito control, vegetation control, game fish
- Unintentional introductions – aquaculture, ornamentals, ballast water
- Reservoirs often facilitate invasions by modifying local habitat, causing local extirpation of native species

- Impacts on natives
  - Predation
  - Competition
  - Hybridization
  - Disease

- Assessing impacts

UGANDA - L. VICTORIA WATERS TRAWL MEAN CATCH RATES BY SPECIES, NORTHERN SECTOR

Species	1968–71	1981	1982	1983
	510 hauls ca.510 hrs	127 hauls 144.5 hrs	191 hauls 223.4 hrs	263 hauls 269.5 hrs
Haplochromis spp.	668.20	543.30	294.34	270.84
Oreochromis esculentus	29.79	0.15	0.04	0.01
O. variabilis	1.04	8.70	1.97	1.07
O. niloticus	3.36	13.60	6.56	5.03
O. leucostictus	0.18	0.11	0.02	0.01
Tilapia zillii	-	-	-	-
Bagrus docmac	33.26	4.09	8.37	11.24
Clarias mossambicus	32.60	15.07	7.16	4.32
Protopterus aethiopicus	22.08	2.66	1.09	2.23
Lates niloticus	0.96	5.02	42.08	57.47
Synodontis victoriae	4.77	0.91	0.27	0.35
S. afrofischeri	0.10	0.01	0.00	0.01
Other species	2.56	0.32	1.40	2.69
Total	796.72	594.94	363.30	355.28

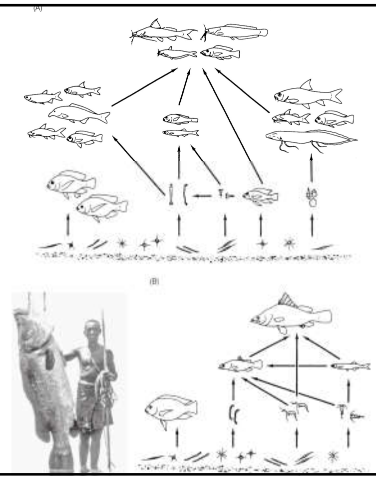
Source : Okaronon et al. (1984)

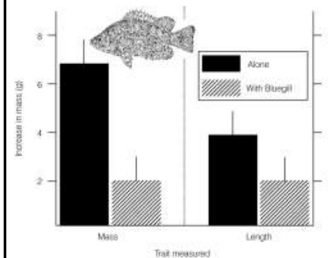
Cascading Effects of the Introduced Nile Perch on the Detritivorous/Phytoplanktivorous Species in the Sublittoral Areas of Lake Victoria

Tijs Goldschmidt; Frans Witte; Jan Wanink

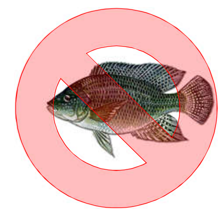
Conservation Biology, Vol. 7, No. 3. (Sep., 1993), pp. 686-700.

(1) Lates replaced 109+ species of haplochromine piscivors and the piscivorous catfishes (*Bagrus docmak* and *Clarias gariepinis*).
(2) *Oreochromis niloticus* replaced the indigenous *O. esculentus* and *O. variabilis*.
(3) The zooplanktivorous cyprinid *Rastrineobola argentea* replaced 20+ species of zooplanktivorous haplochromines.
(4) *Caridina* replaced the detritivorous haplochromines.





Sacramento perch competition
with introduced bluegill.



Long term trends...

ELSEVIER Biological Conservation 118 (2004) 121–131
www.elsevier.com/locate/biocon

Patterns of fish invasions in the Great Plains of North America

Keith B. Gido [a,*], Jacob F. Schaefer [b], Jimmie Pigg [c,♣]
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Received 27 January 2003; received in revised form 13 June 2003; accepted 21 July 2003

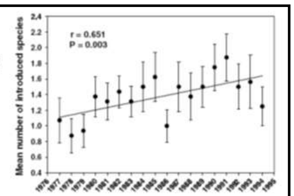


Fig. 5. Relationship between mean number of introduced species across 18 years of sampling 16 stream sites in Oklahoma between 1977 and 1994. Vertical bars represent one standard error.

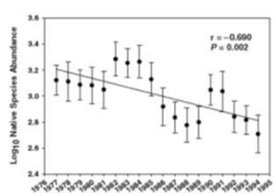
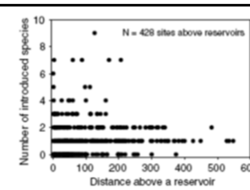


Fig. 6. Relationship between mean abundance of native species across 18 years of sampling 16 stream sites in Oklahoma between 1977 and 1994.

Introductions and Reservoirs



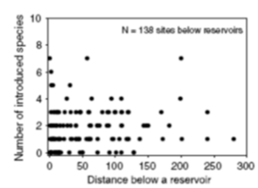


Fig. 4. Relationship between total number of introduced species and distance upstream (top) and downstream (bottom) from a reservoir. Only sites in which water flowed directly to or from a reservoir were used in these plots.

Reservoirs – combined threats

- Habitat alteration
- Hydrograph alteration
- Barrier to migration
- Source for introduced species
- Spurs urban development

Climate Change and range contractions

Ecology Letters, (2006) **9**: 1321–1330 doi: 10.1111/j.1461-0248.2006.00986.x

Thermal range predicts bird population resilience to extreme high temperatures

Update *TRENDS in Ecology and Evolution* Vol.21 No.8

Full text provided

Research Focus

Range retractions and extinction in the face of climate warming

Chris D. Thomas, Aldina M.A. Franco and Jane K. Hill

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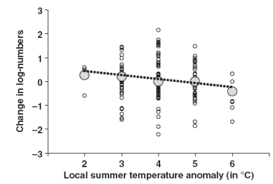
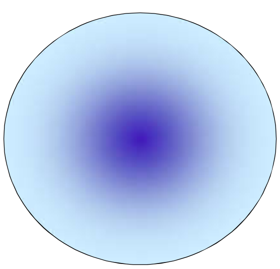


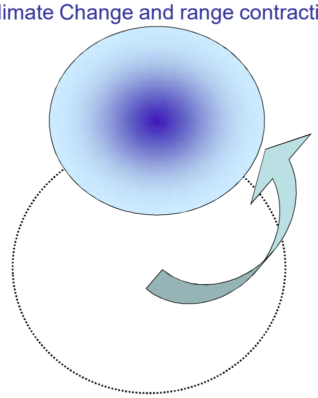
Figure 1 Example of the response of 2003–2004 local population growth rates to 2003 temperature anomalies in the Rook *Corvus frugilegus* (L.), showing a negative linear trend with summer temperature anomaly (in °C). Small circles represent each site where the species was recorded during the breeding bird survey, large grey circles are mean values, and the dashed line shows the linear response of growth rate to the temperature anomaly. The local growth rate (*y*-axis) shown here is the change in log-numbers between 2003 and 2004.

Climate Change and range contractions



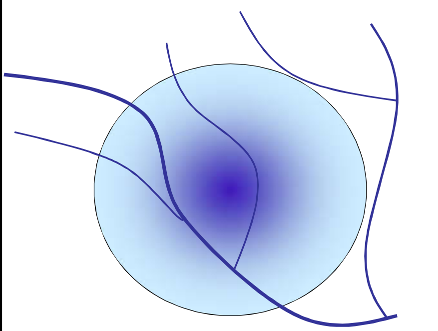
Core theory – conditions at the core of a species range are ideal. Optimal conditions deteriorate linearly from the core. Species are least fit on the edges of their distribution.

Climate Change and range contractions

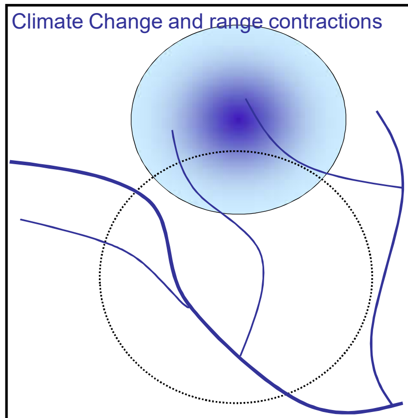


Climate change will shift species range, move the core and potentially shrink the range.

Climate Change and range contractions

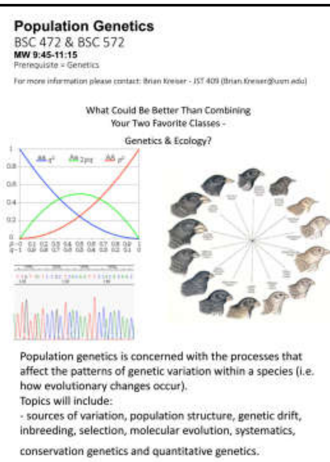


Climate Change and range contractions



Population Genetics

- Critical tool for conserving species
  - Identify what to conserve
  - Connectivity between populations
  - Indicators of bottlenecks
  - Effective population size
  - Genetic diversity
  - Local adaptation



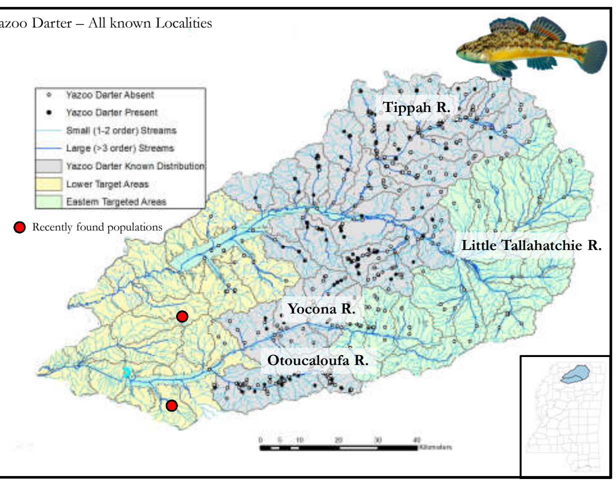
Population Genetics
BSC 472 & BSC 572
MW 9:45-11:15
Prerequisite = Genetics

For more information please contact: Brian Kreiser - JST 409 (Brian.Kreiser@usm.edu)

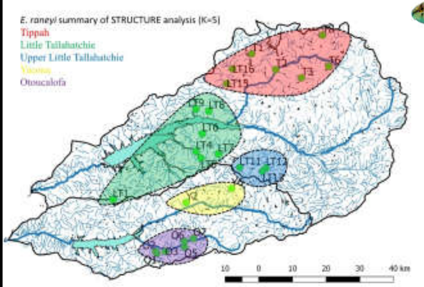
What Could Be Better Than Combining
Your Two Favorite Classes -
Genetics & Ecology?

Population genetics is concerned with the processes that affect the patterns of genetic variation within a species (i.e. how evolutionary changes occur).
Topics will include:
- sources of variation, population structure, genetic drift, inbreeding, selection, molecular evolution, systematics, conservation genetics and quantitative genetics.

Yazoo Darter – All known Localities



Identified 5 genetically distinct populations



- Large difference between two major subbasins
- Heterozygosity
  - Little Tallahatchie: 15.4-22.2%
  - Yocona: 5-3-6.5%
- Effective population size
  - Little Tallahatchie: 0.029 – 0.039
  - Yocona: 0.015-0.018

- Ongoing propagation efforts to bolster existing populations, potential reintroduce new ones.
- Critical to understand population genetic structure first – where do you get your broodstock?
- Mistakes made in salmon hatcheries
- Introducing new populations that are locally adapted to different streams may be futile