

Relating flow-ecology relationships to management objectives (MI example)

Paul Seelbach

Institute for Fisheries Research
Michigan Department of Natural Resources and
University of Michigan

Reference flows

River types

Degree of flow alteration

Ecological response curves

Ecological targets

enviro. targets

Implement program

2. Narrative criteria from Biological Condition Gradient

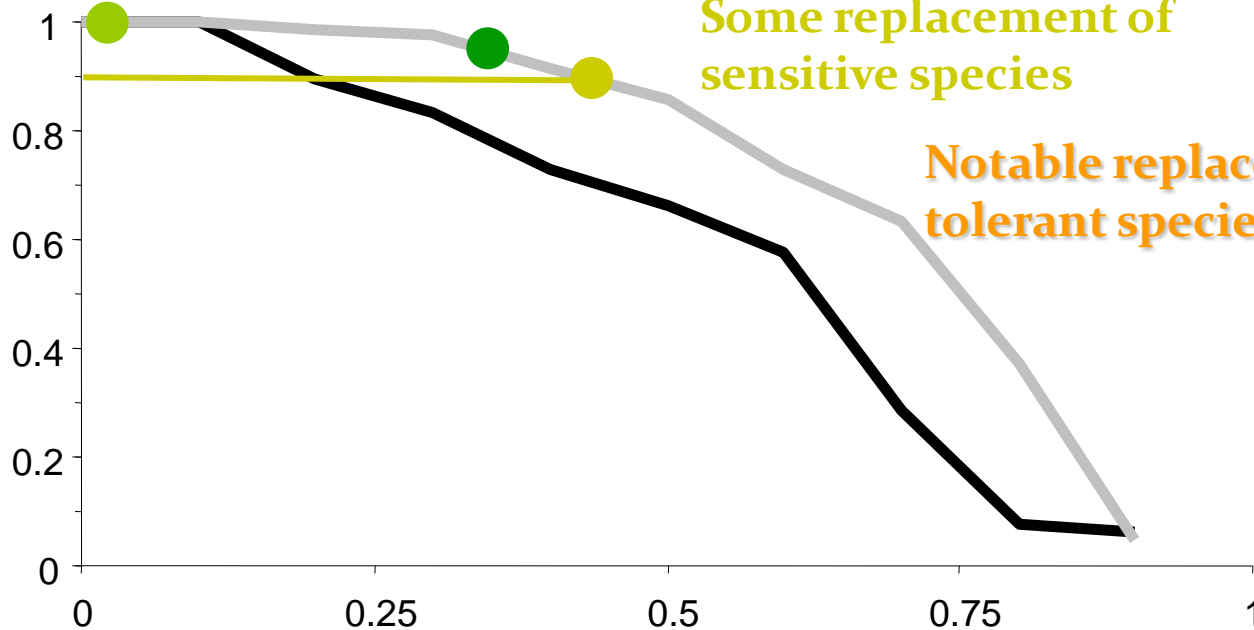
1. x-axis

Baseline or existing condition

Some density changes in fish

Some replacement of sensitive species

Notable replacement by tolerant species



Reference flows

River types

Degree of flow alteration

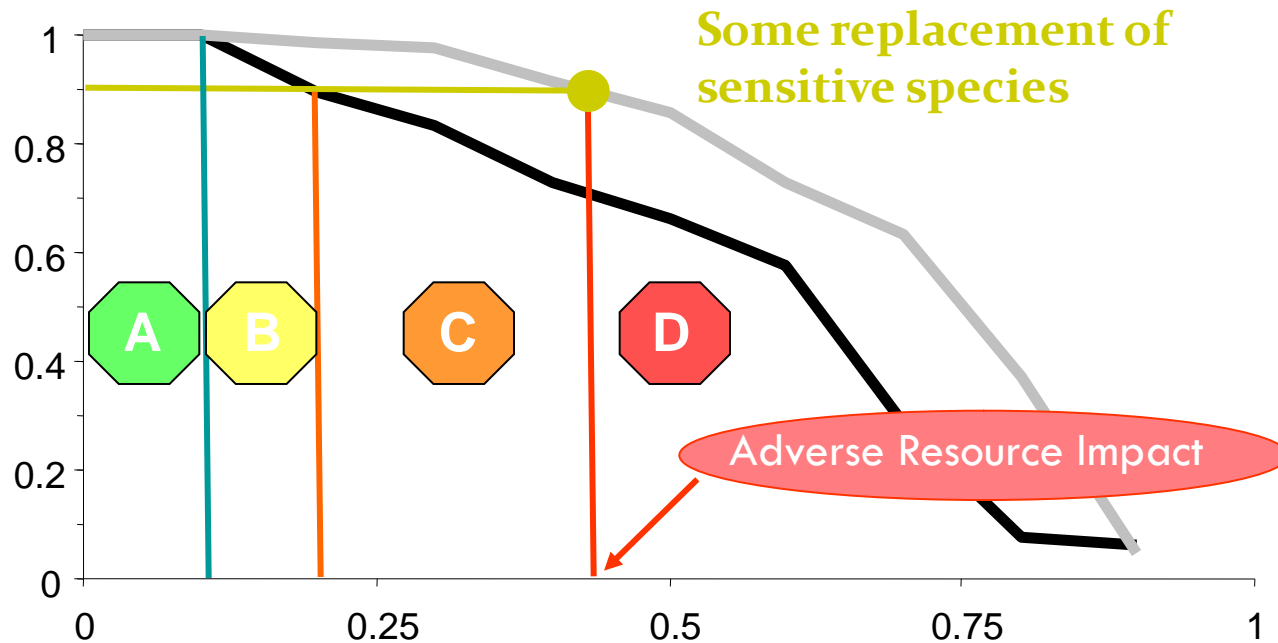
Ecological response curves

Ecological targets

Enviro. flow targets

Implement program

2. Incremental risk zones, and Incremental engagement, responsibility, and regulation



1. y-axis

Reference flows

River types

Degree of flow alteration

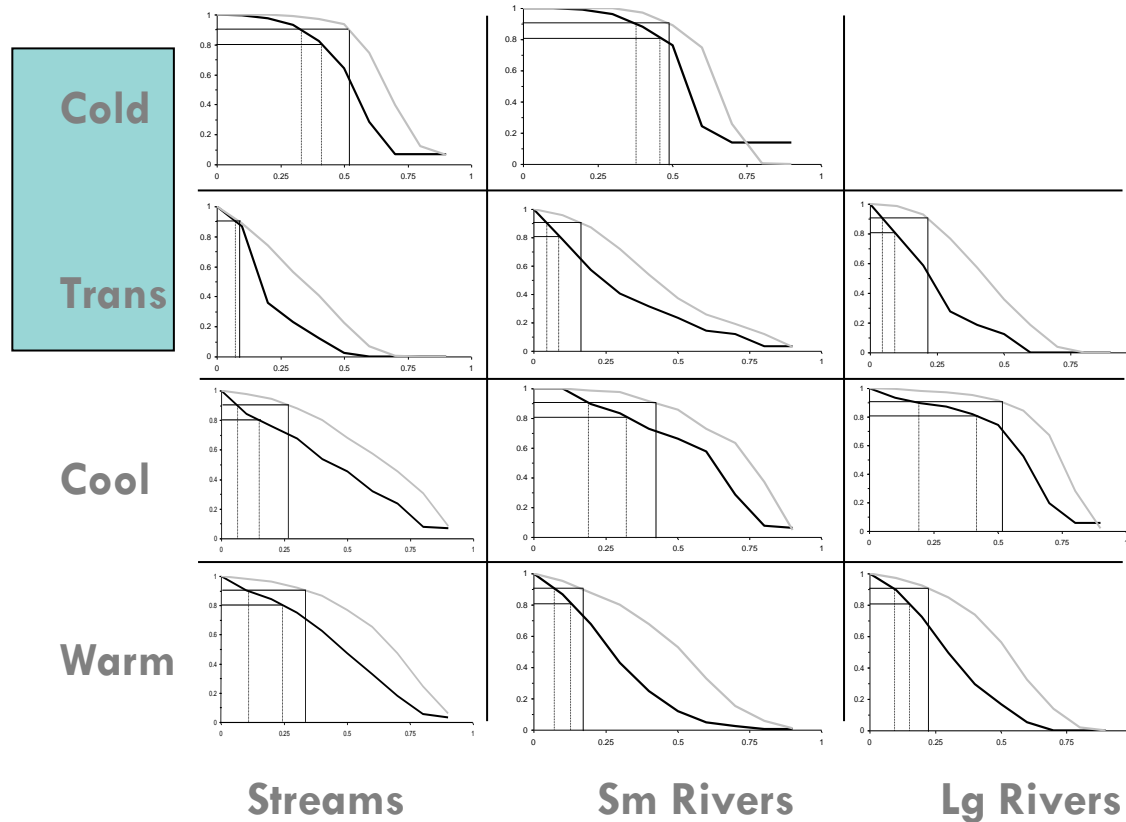
Ecological response curves

Ecological targets

Enviro.
flow
targets

Implement program

Curves and target zones per each ecological river type.
Geographies of biological response **and social values.**



Zone A



The proposed withdrawal has passed in Zone A.

Zone B



The proposed withdrawal has passed in Zone B.

Zone C



The proposed withdrawal is in Zone C and is approaching the ARJ line.

Zone D



The proposed withdrawal has failed in Zone D, and is likely to have an adverse resource impact.

- Zones are set by law
- Numerical values are different for each stream type

	A/B	B/C	ARI	A/B	B/C	ARI	A/B	B/C	ARI
COLD	14%	14%	20%	10.5%	10.5%	21%			
TRANS		4%	4%		2%	2%		3%	3%
COOL	6%	15%	25%	15%	19%	25%	14%	19%	25%
WARM	10%	18%	24%	8%	13%	17%	10%	16%	22%
	Stream			Small River			Large River		

Allowed percent withdrawal from Index Flow

Zone A Withdrawal

- Register and proceed

Zone B Withdrawal

- Register and proceed
- Cold-transition system: site-specific review required
- DEQ notification: groups that have requested notification, such as: conservation district, regional planning agency

Zone C

- Site-specific review required
- Certify use of environmentally sound and economically feasible conservation measures
- DEQ notifies: large quantity users (of the same water source); and local governments and groups that have requested notification.

Zone D

- Site-specific review required
- Cannot proceed if confirmed in Zone D
- Potential for “preventative measures”

A few more thoughts:

Science provided template that framed the social discussions leading to ultimate policy. It did not (does not) resolve all social discussions.

Collaborative council oversaw development of the science (ownership and ultimately defense of).

The science template will also contribute enormously to ongoing/future efforts related to water planning and education (beyond the immediate regulatory program).

