

# Monitoring Kentucky Wetland and Stream Mitigation Projects: Past, Present and Future



National Stream  
Restoration Conference  
August 2022

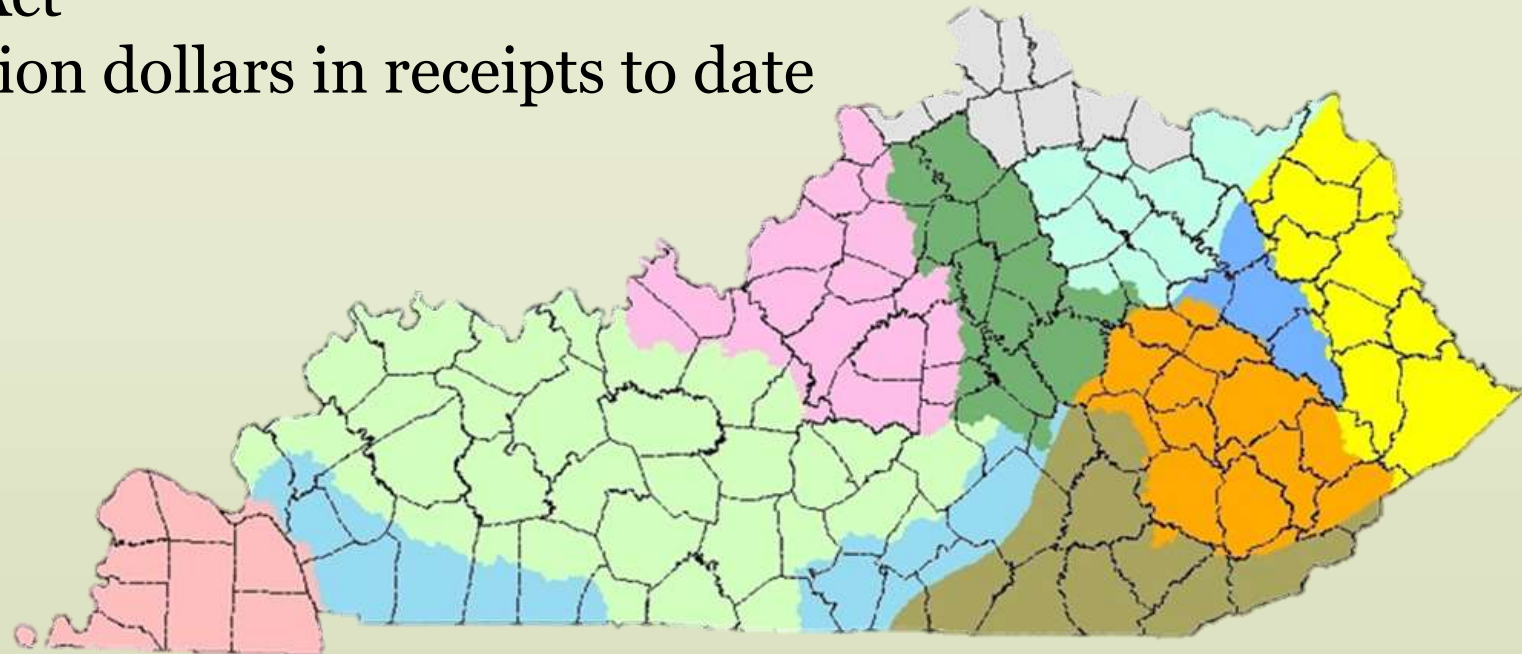
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## All about us....

- Kentucky Wetland and Stream Fee-in-Lieu-Of Mitigation Fund (FILO)
- Mission: Perform wetland and stream mitigation under the Clean Water Act
- Over 300 million dollars in receipts to date
- 100 Projects





## Mitigation Project Monitoring: Past Goals and Objectives

**Natural  
Channel  
Design**

**Habitat  
Improvement**

**Stability**







## Mitigation Project Monitoring: Past

- Annual Targets
- Rapid Assessments
- Simple Reports
- Mostly Qualitative in Nature
- Time and Cost effective

Are Goals and Objectives Met?

Year 1 Monitoring Report (2008)  
Red Lick Stream Restoration Project  
(Estill Co.)



Sponsor: KDFWR  
Service Area: Upper Kentucky River

**Table 1. East Fork Little Sandy Monitoring Schedule**

Component	Data Collection	As-Built	Year 1 2011	Year 2 2012	Year 3 2013	Year 4 2014	Year 5 2015
Geomorphology	Cross-sections	X					X
	Grade and Structure Visual Inspection	X	X	X	X	X	X
	Bank Erosion Hazard Index (BEHI)		X				X
	Photograph Restored Reaches	X	XX	XX	XX	XX	XX
Habitat	RBP (high gradient)		X		X		X
Vegetation	Stem Count – Trees and Shrubs	X	X	X	X	X	X
	Percent Cover – Herbaceous Plants	X	X	X	X	X	X
	Photograph Riparian Zones	X	XX	XX	XX	XX	XX
	Plant Species List	X	X	X	X	X	X

*XX = indicates photos will be taken twice a year.*



## Mitigation Project Monitoring: Present Goals and Objectives

Natural  
Channel  
Design

Stability

Biology

Habitat  
Improvement

Hydrology







## Mitigation Project Monitoring: Present

- Annual Targets
  - ~~Rapid Assessments~~
  - ~~Simple Reports~~
  - Qualitative in Nature
  - Time and Cost ~~Effective~~
- Lengthy
- And Quantitative

Detailed

# Are Goals and Objectives Met?







**Simple Cost-  
Effective  
Monitoring**

**Versus**

**Detailed  
Expensive  
Monitoring**





Table 1. Minors Creek Stream Restoration Project Monitoring Schedule

Data Collection		As-Built	Year 1		Year 2		Year 3		Year 4		Year 5	
			Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
Hydrology	Flow type & bankfull flow evidence	X		X		X		X		X		X
	BHR, MWR, and W/D measurements	X			X						X	
Geomorphology	Cross-sections & profiles	X			X						X	
	BEHI evaluation		X		X		X		X		X	
	Visual inspection of channels and structures; photograph and document areas of erosion	X	X		X		X		X		X	
	Photograph project reaches	X	X	X	X	X	X	X	X	X	X	X
	RBP assessment (high gradient)			X		X		X		X		X
Vegetation	Trees & Shrubs – Stem count and density (including invasive species, volunteers, and planted)		X	X	X	X		X		X		X
	Herbaceous Plants - % ground cover (including invasive species, volunteers, and planted)		X	X	X	X		X		X		X
	Photograph Veg. Plots		X	X	X	X		X		X		X
	Total Plant Species List	X		X		X		X		X		X
Bio	Macroinvertebrate and fish survey										X	

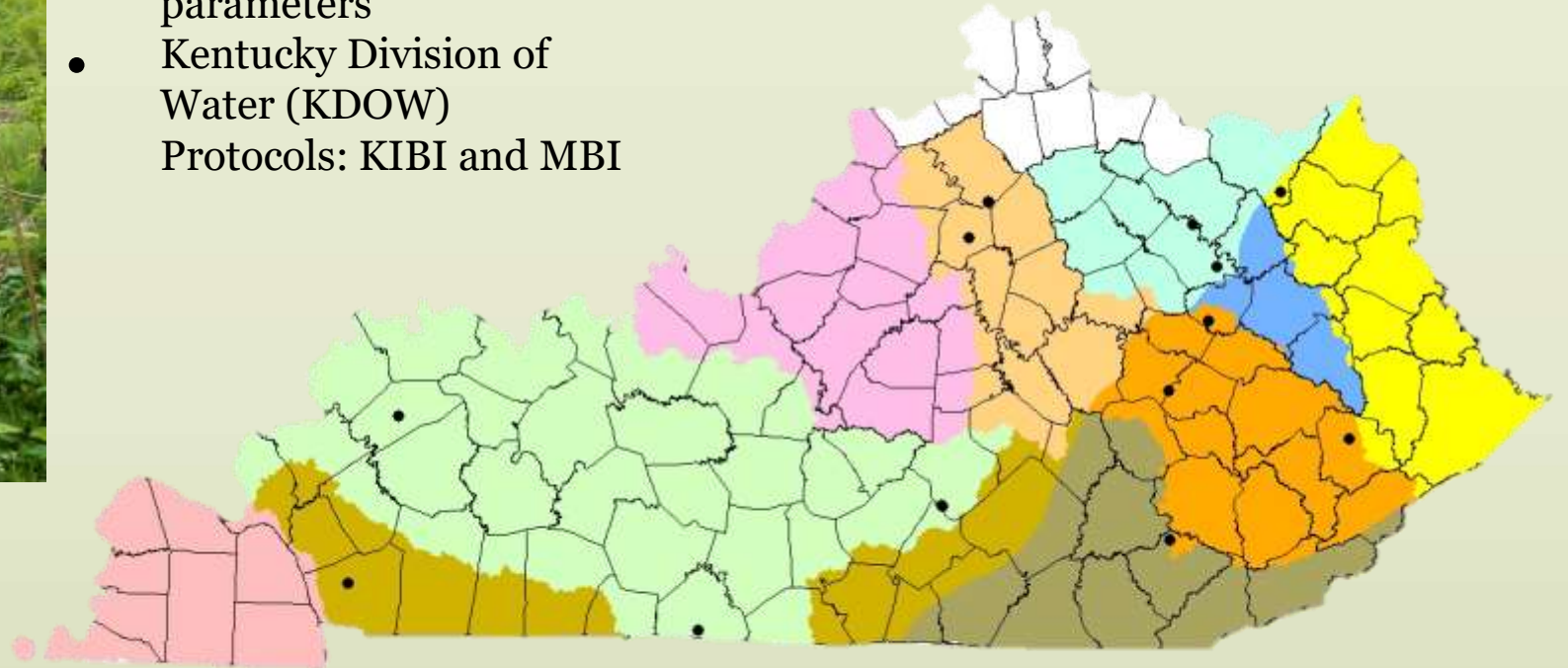
X = Data collection to be completed.

Can standardized biological sampling be linked to success?



## Mitigation Project Monitoring: Biological Sampling

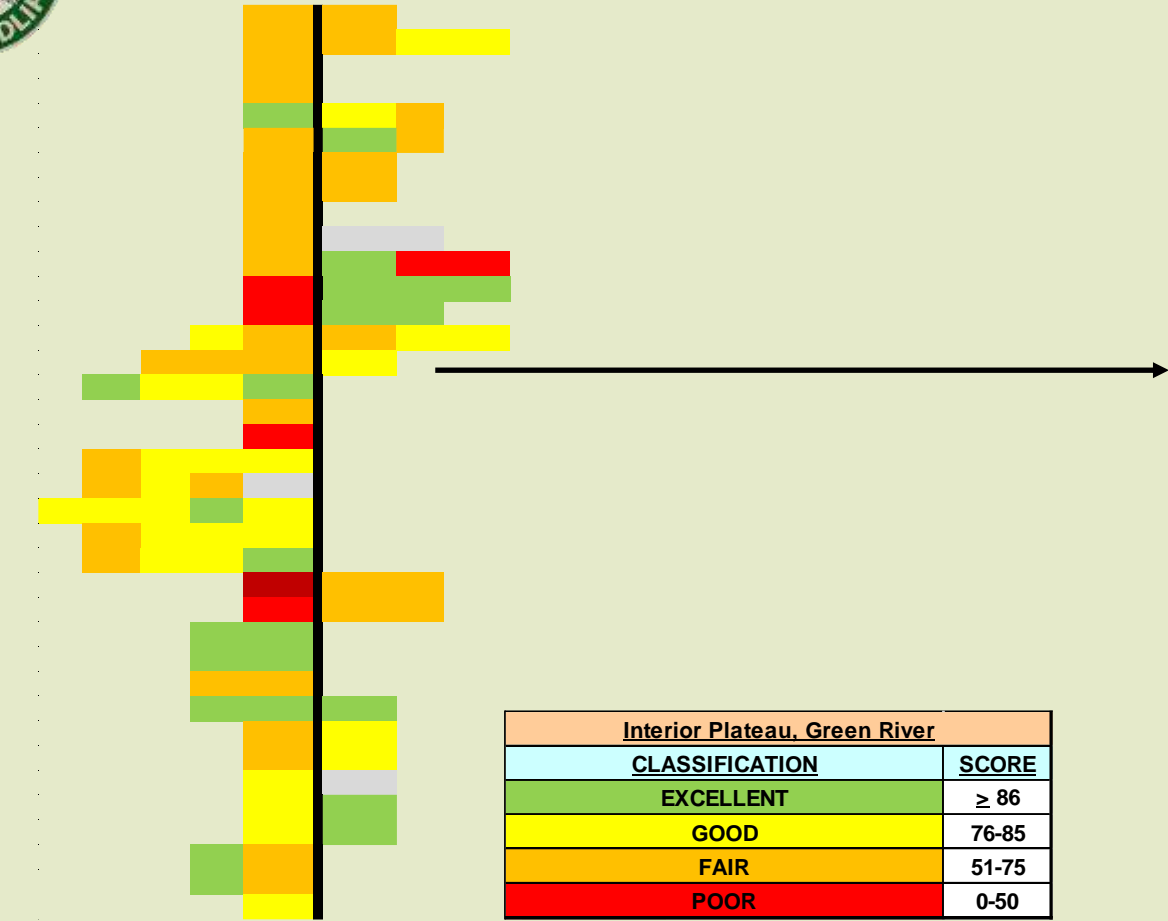
- Supplemental to habitat parameters
- Kentucky Division of Water (KDOW)  
Protocols: KIBI and MBI







Sites



Time

GOOSE CREEK FISH SAMPLE	PRE-RESTORATION 10/20/2017	POST-RESTORATION 08/03/2020
<b>Species</b>	<b>Count</b>	<b>Count</b>
<i>Campostoma oligolepis</i>	76	143
<i>Cyprinella spiloptera</i>	1	9
<i>Luxilus chrysocephalus</i>	29	32
<i>Lythrurus fasciolaris</i>	9	80
<i>Notropis buccatus</i>	0	8
<i>Notropis leuciodus</i>	6	4
<i>Notropis micropteryx</i>	0	34
<i>Notropis volucellus</i>	47	0
<i>Pimephales notatus</i>	3	32
<i>Semotilus atromaculatus</i>	6	15
<i>Hypentelium nigricans</i>	11	26
<i>Moxostoma duquesnei</i>	0	8
<i>Noturus elegans</i>	9	1
<i>Fundulus catenatus</i>	14	2
<i>Gambusia affinis</i>	0	1
<i>Cottus carolinae</i>	16	5
<i>Ambloplites rupestris</i>	0	7
<i>Lepomis cyanellus</i>	1	10
<i>Lepomis macrochirus</i>	0	2
<i>Lepomis megalotis</i>	1	0
<i>Lepomis sp.</i>	2	1
<i>Micropterus dolomieu</i>	0	1
<i>Etheostoma bellum</i>	17	13
<i>Etheostoma blennioides</i>	19	16
<i>Etheostoma caeruleum</i>	66	23
<i>Etheostoma flabellare</i>	29	1
<i>Etheostoma rafinesquei</i>	29	22
<i>Etheostoma spectabile</i>	13	4
<i>Etheostoma zonale</i>	4	13
<b>n=</b>	<b>408</b>	<b>513</b>

<b>Species Richness</b>	<b>22</b>	<b>27</b>
<b>KIBI</b>	<b>75-Fair</b>	<b>84-Good</b>





## Mitigation Project Monitoring Case Study: Goose Creek

- Drainage Area: 42.3 sq. mi.
- 13,226 ft. of Stream Restored
- 8.6 ac of Wetland Restored





# Stargazing Minnow

## *Phenacobius uranops*



“Clear Water”

“Clean Pebbles or Gravel”

“Riffles and Runs”

“Species of Special Concern”





## Mitigation Project Monitoring: Future

### Continue...

- Clear Goals and Objectives
- Meaningful Effective Data

### USGS Protocol

- Habitat Parameters
- KIBI







# Questions?

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