

A photograph of a lizard, likely a spiny-tailed lizard, resting on a rocky riverbank. The lizard has a green body with yellow and orange markings on its head and back. The background shows a rocky stream bed with some sparse vegetation. A blue wavy graphic is at the top of the image.

15 Years of Biological Monitoring in Oklahoma Rivers and Streams

Types of Biological Survey Designs

- **Fixed Station**-a chosen set of sites. Used to make assessment decisions for individual waterbodies. Trends in individual sites. Think 303(d) List.
- **Targeted Monitoring**-is at the watershed or basin level. You chose parameters, timing, or location based on pollutant of concern which is often previously identified. Good for determining permit compliance, etc.
- **Probabilistic (Statistical)**-estimates are made based on a sample of a population. Think political polls. Trends in populations. Sites are **randomly** chosen based on design scale. How extensive is a particular stressor present in a sample frame (population)?

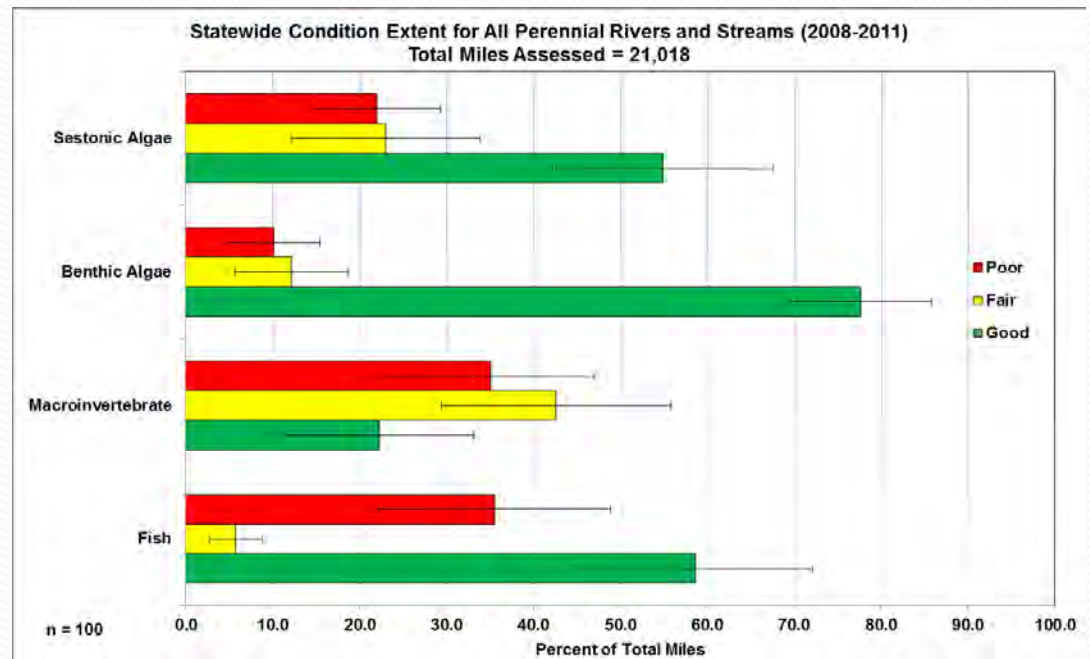
Parameters the OWRB Collects During Biological Sampling

- **Fish**-collected at each site following Oklahoma Rapid Bioassessment Protocol (RBP). Electrofish or seine
- **Macroinvertebrates**-collected at each site using RBP Protocol or Large River Protocol (LRP) developed in conjunction with National Rivers and Streams Assessment (NRSA).
- **Algae**-sestonic and benthic algae for chlorophyll/biomass and ID (NRSA).
- **Habitat Assessment**-a semi-qualitative (RBP) and semi-quantitative (NRSA) habitat evaluation is completed throughout a predetermined stream reach (40xWW). Considers stream depth, width, substrate, in-stream cover, sediment load, erosion, and riparian condition.
- **Water Collection**-nutrients, minerals, metals, Bac-t, chlorophyll, HAT
- **In-situ**- D.O., pH, temp, cond, etc.
- **Stream Flow Measurement**

The Probabilistic Approach

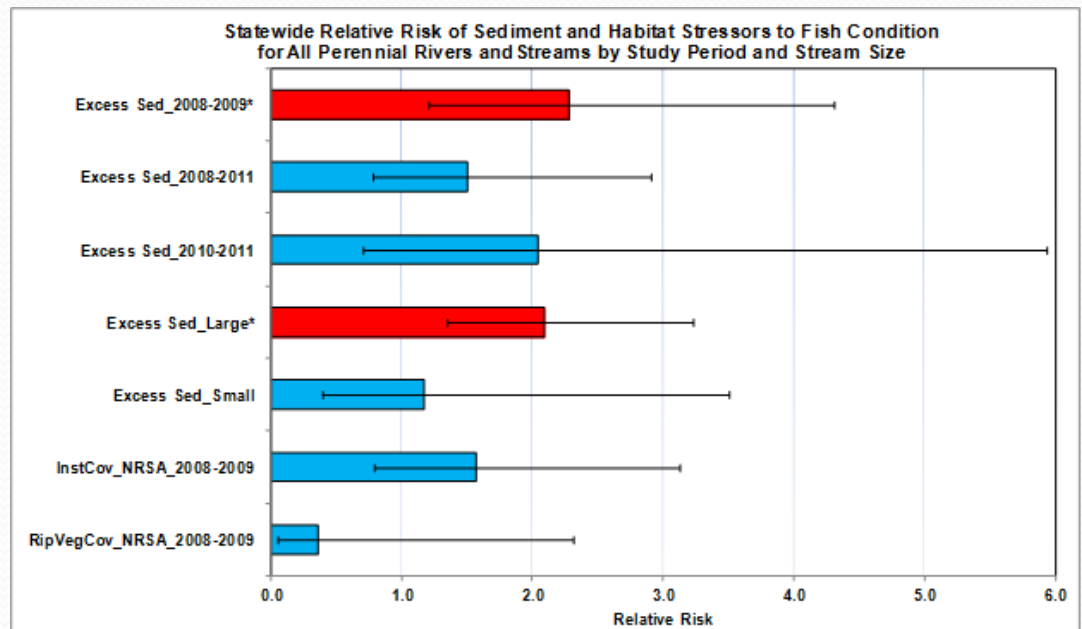
Stressor Extent-

Estimates the proportion of a population into condition classes (Good, Fair, Poor). Ex. What % of streams in Oklahoma are in poor condition for fish?



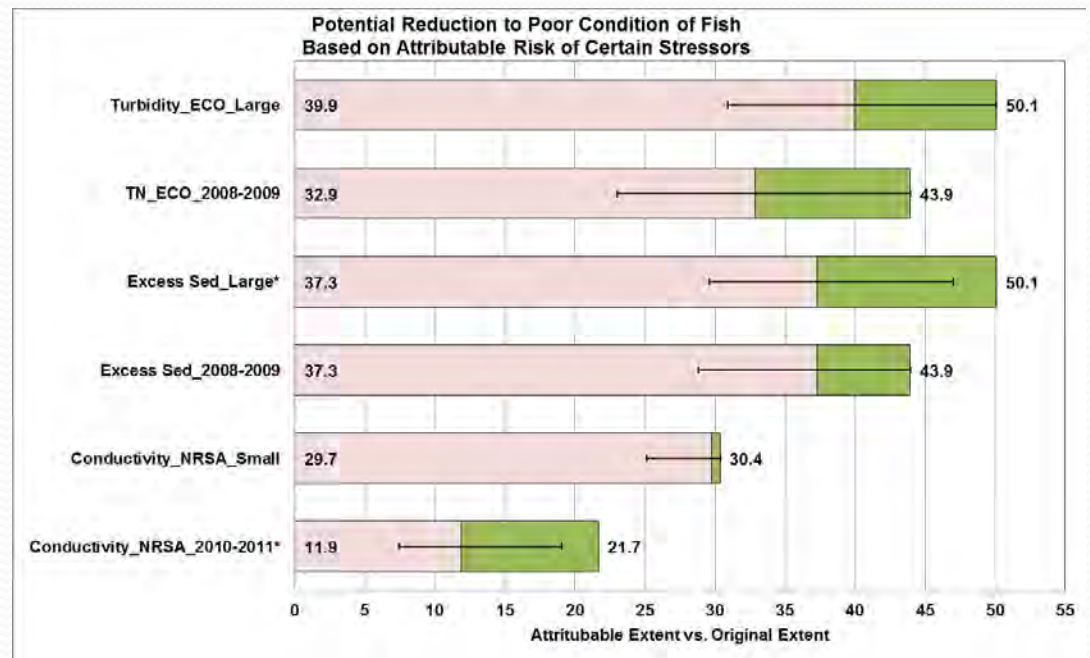
The Probabilistic Approach

Relative Risk-develops a relationship between biological condition (poor fish), and the extent to which a stressor is present. Ex. If excess sediment is present, fish are 2.3 times more likely to be in poor condition.



The Probabilistic Approach

Attributable Risk-
actual affect eliminating
a stressor *could* have on
an indicator. Ex. If we
could eliminate excess
sediment in large rivers,
the percentage of fish in
Poor condition would be
reduced by 13%.



Where are we and where have we been in 15 years?

- 2004-2005 Wadeable Streams Assessment (WSA)
- 2005-2007 Regional Environmental Monitoring and Assessment Program (REMAP)
- 2008-2009 National Rivers and Streams Assessment (NRSA 1)
- 2010-2012 Statewide Study
- 2013-2014 (NRSA 2)
- 2015-2017 Statewide Study
- 2018-2019 Initial (NRSA 3)



Conclusions

- Probabilistic Monitoring fills a large data gap and compliments other programs. Section 305(b), 303(d) Clean Water Act.
- Is an efficient tool for assessing overall condition of the states waters.
- Trends in populations can be seen thru multiple visits over time. Has the overall health of my creek improved or gotten worse over time?
- Data is very useful and most importantly needs to be accessible to the public as well as the scientific community.
- The OWRB is trending toward nationally consistent methods integration that meet the specific needs of decision makers in the state of Oklahoma.



Questions

