# *Statewide Stream/River Probabilistic Monitoring Network for the State of Oklahoma from 2013-2017*

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## List of Acronyms

| | |
|---|---|
| Cd | Cadmium |
| CPP | Continuing Planning Process |
| Cu | Copper |
| DC | Direct Current |
| DO | Dissolved Oxygen |
| DP | Deep Pools |
| ECO | Ecoregion |
| EPA | Environmental Protection Agency |
| FPFH | Forested Plains and Flint Hills |
| GPP | Generator Powered Pulsator |
| GRTS | Generalized Random Tessellation Stratified |
| HBI | Hilsenhoff Biotic Index |
| IBI | Index of Biological Integrity |
| ISC | Instream Cover |
| LBM | Loose Bed Material |
| LRC-COMP | Large River Coarse-Composite |
| LRF-SUB | Large River Fine-Substrate |
| LRF-THAB | Large River Fine-Targeted Habitat |
| NARS | National Aquatic Resources Survey |
| NRSA | National Rivers and Streams Assessment |
| OCC | Oklahoma Conservation Commission |
| OCCFIBI | Oklahoma Conservation Commission Fish Index of Biological integrity |
| ODEQ | Oklahoma Department of Environmental Quality |
| OKFIBI | Oklahoma Fish Index of Biological Integrity |
| OKLS | Oklahoma Large Stream |
| OKRM | Oklahoma River Major |
| OKRO | Oklahoma River Other |
| OKSS | Oklahoma Small Stream |
| OWRB | Oklahoma Water Resources Board |
| Pb | Lead |
| QAPP | Quality Assurance Project Plan |
| QMP | Quality Management Plan |
| RBP | Rapid Bioassessment Protocol |
| REMAP | Regional Environmental Monitoring Assessment Program |
| RVC | Riparian Vegetative Cover |
| Se | Selenium |
| SED | Sediment |
| SEL | State Environmental Laboratory |

**List of Acronyms (Continued)**

| | |
|---|---|
| SL | Screening Limit |
| SSV | Streamside Vegetation |
| TF | Temperate Forest |
| TN | Total Nitrogen |
| TP | Total Phosphorus |
| USAP | Use Support Assessment Protocol |
| WPT | Western Plains and Tablelands |
| WSA | Wadeable Streams Assessment |
| Zn | Zinc |

## EXECUTIVE SUMMARY

From 2013-2017, Oklahoma completed its 5th and 6th statewide surveys of lotic waters. In Sample Year (SY) 2013-2014, Oklahoma participated in the National Rivers and Streams Assessment (NRSA) sampling 51 stations. The NRSA is a vital component of the OWRB Probabilistic Monitoring Program. The 2013-2017 study population included perennial streams and rivers throughout Oklahoma and continued through the NRSA draw into the remaining oversample sites. So that all sizes of perennial waterbodies are adequately represented, the design will assign unequal proportions to several Strahler Orders, including 1st – 2nd, 3rd-4th, 5th-6th, and above 6th order rivers. Additionally, the study will characterize the three separate aggregated ecoregions of Oklahoma as defined in the “2005-2007 Implementation of a Stream/River Monitoring Sampling Network for the State of Oklahoma” (OWRB, 2009). By combining the two studies, Oklahoma can report on several temporal scales, and on two size classes—smaller streams ($1^{st}$-$4^{th}$ Order) and rivers ($5^{th}$ and above) and the three aggregated ecoregions of Oklahoma. The three aggregated ecoregions of Oklahoma are the Forested Plains and Flint Hills (FPFH), Temperate Forests (TF), and the Western Plains and Tablelands (WPT). For this study the temporal scales include:

- 69 sites in the 2013-2014 sampling period (51 NRSA Sites)
- 81 sites in the 2015-2017 sampling period
- 150 sites over the 2013-2017 sampling period

Table 1. Timeline of Past, Present, and Future OWRB Biological Streams Monitoring Studies. Final Reports are Available on the OWRB Web Site at http://www.owrb.ok.gov

| Project Name | Probabilistic Timeline | Project Sample Years |
|---|---|---|
| Wadeable Streams Assessment (WSA) | 1st | 2004 |
| Regional Environmental Monitoring and Assessment Program (REMAP) | 2nd | 2005-2007 |
| National Rivers and Streams Assessment (NRSA) (Round 1) | 3rd | 2008-2009 |
| Statewide Probabilistic Monitoring | 4th | 2010-2011 |
| Data Analysis Year | N/A | 2012 |
| National Rivers and Streams Assessment (NRSA) (Round 2) | 5th | 2013-2014 |
| Statewide Probabilistic Monitoring | 6th | 2015-2017 |
| National Rivers and Streams Assessment (NRSA) (Round 3) | 7th | 2018-2019 |
| Statewide Probabilistic Monitoring | 8th | 2020-2022 |

This probability-based survey was designed to assist Oklahoma's water quality managers in several ways.

1. Estimate the condition of multi-assemblage biological indicators for Oklahoma's waters through a statistically valid approach.
2. Estimate the extent of stressors that may be associated with biological condition.
3. Evaluate the relationship between stressors and biological condition for use in various long and short-term environmental management strategies.
4. Assess waters for inclusion in Oklahoma's Integrated Water Quality Report.

Furthermore, in keeping with the environmental goals of the state, an effective long-term management strategy based on sound and defensible science can be developed using this data.

To assess ecological health, one-time collections were made for a variety of biological, chemical, and physical parameters. When sites were verified as target, a sampling schedule was implemented. All target sites were visited once (in rare instances twice) during a late spring to late summer index period (June 1 – September 15) under base flow conditions. The studies measured the condition of three biotic assemblages—fish, macroinvertebrates, and sestonic/ benthic algae (Table 15)—as well as a variety of stressors including nutrients, conductivity, turbidity (Table 16), habitat/sedimentation (Table 19), and toxics (Table 16). Habitat/sedimentation data are presented in tabular form in this report. Further data analyses are needed for these parameters. These data will likely be presented in a future addendum to this report. Fish data were analyzed using two indices of biological integrity (IBI) commonly used in Oklahoma bioassessment studies, as well as the IBI developed by the NRSA. Macroinvertebrate data were analyzed using a Benthic-IBI (B-IBI) developed for Oklahoma benthic communities (OCC, 2005b) and is commonly used by the OCC and OWRB Water Quality Divisions (OCC, 2008; OWRB, 2009; ODEQ, 2012). To estimate condition of algal biomass, chlorophyll *a* concentrations were compared to several screening levels.

Data outputs include: 1) Relative extent of indicator and stressor condition, 2) Relative risk of stressors to indicators, and 3) Attributable risk of stressors to indicator extent. Data will also combine with other sources and be included in future 303(d) assessments of the Oklahoma Integrated Water Quality Report.

Highlights of the relative extent include:

- For fish, 15.8% of total stream/river miles were in poor condition.
- 23% of total miles were in poor condition for macroinvertebrates.
- For algae, 23.8% sestonic (water column) and 10% (benthic) of total miles were in poor condition.
- For the four biological indicators, rivers had a much greater proportion of miles in poor condition for macroinvertebrates (35.5%) and sestonic algae (43.4%) than for fish (15.1%) and benthic algae (7.1%). The percentages for fish and benthic algae in poor condition for total miles on rivers were very similar to the poor condition percentages on streams (fish- 16.1%, benthic algae- 11.1%).
- Total phosphorus extent in poor condition for all sites was 45.8%.
- Total nitrogen extent in poor condition for all sites was 41%.
- Total phosphorus (TP) and total nitrogen (TN) extent in poor condition was noticeably higher in rivers (TP- 63.1%, TN- 49.7%) than in streams (TP- 39%, TN- 37.4%).

- Sample year 2015, a major flood year for Oklahoma, had the greatest percentage of miles in good condition for conductivity at 52%; showing that conductivity was positively associated with high amounts of rainfall.
- Turbidity extent in poor condition was between 14% (2013) and 35.5% (2014) depending on the sample year.

The current study allows for unique analysis between both study periods and waterbody size.

- For fish, 15.1% of river miles were in poor condition.
- For fish, 16.1% of stream miles were in poor condition.
- For macroinvertebrates, 35.5% of river miles were in poor condition.
- For macroinvertebrates, 17.9% of stream miles were in poor condition.
- Benthic algae show a different trend than the other biological indicators. The poor condition is higher in streams (11.1%) than in rivers (7.1%).
- For stressors, three of four are trending downward between study periods when comparing SY 13-15 to SY 15-17. The only stressor trending upward is conductivity (13-15, 22.1% to 15-17, 23.3%).
- On a positive note, nutrients (TP, TN) are showing strong statistically valid downward trends between sample years 13-15 and sample years 15-17. TN poor condition was at 46.8% for SY 13-15 and fell to just 30.0% in poor condition for SY 15-17. For TP, poor condition was 50.5% for sample years 13-15 and fell to just 37.3% for sample years 15-17.

Relative Risk analyses provided the following results:

- For fish, TP and TN demonstrate significant relative risk in streams at 4.2 (TP) and 2.9 (TN).
- The relative risk of poor macroinvertebrate condition is 5.1 to 7.8 times greater with poor TP condition for all stream sites.
- For all sites, streams, and the Temperate Forests aggregated ecoregion risk for poor macroinvertebrate condition is 2.8 to 4.4 times greater with poor TN condition.
- For the statewide assessment category, the risk of poor sestonic algae condition was significant for all stressors (TP, TN, conductivity, and turbidity).
- For the 2013-2017 study, nutrients (TN, TP) demonstrated no relative risk to benthic algae condition.
- With poor conductivity condition, the risk of poor benthic algae condition increased by 8.3 times in the Forested Plains and Flint Hills aggregated ecoregion.

Trend Analyses provided the following results:

- For indicators, fish are showing a significant trend downward between the 2008-2011 and 2013-2017 studies (35.5% to 15.8% of total miles in poor condition).
- For stressors, conductivity is trending upward between studies going from 14.6% to 23.8% of total miles in poor condition.
- TN is trending upward between studies going from 28.6% to 41.0% of total miles in poor condition.
- TP is trending upward between studies going from 39.3% to 45.9% of total miles in poor condition.

Attributable risk analyses provided the following results:

- Notably, for fish, reduction of TP and TN on streams and TN in the Western Plains and Tablelands aggregated ecoregion could create a significant reduction of poor condition for fish.
- For macroinvertebrates, reduction of TP and TN statewide and in streams would both create a significant decrease in the poor condition of the macroinvertebrate community.
- Sestonic algal condition shows significant reduction in poor condition when all four stressors (TN, TP, conductivity, and turbidity) analyzed for the statewide study are reduced.
- Benthic algae response to the reduction of stressors was quite different from that of sestonic algae. Benthic algae only responded to reduction of conductivity in the Forested Plains and Flint Hills aggregated ecoregion and by the reduction of turbidity in rivers respectively.

## INTRODUCTION

Several agencies conduct water quality monitoring in the State of Oklahoma. These agencies meet complementary monitoring objectives that support the management of Oklahoma's surface waters. The two primary components of the statewide monitoring program include (a) the Beneficial Use Monitoring Program, a long-term, fixed-station water quality monitoring network of the Oklahoma Water Resources Board (OWRB), and (b) Oklahoma Conservation Commission's (OCC) Small-Watershed Rotating Basin Monitoring Program, targeting water quality and ecological conditions in waters flowing from 11-digit hydrologic units. Additionally, the state bi-annually completes a water quality monitoring strategy that describes their existing programs in detail and monitoring objectives that cannot be met with existing resources (OWRB, 2018a). These objectives include the ability to make statistically valid inferences about environmental conditions throughout the state, based on a probabilistic selection of sites. Meeting this objective will improve the capacity to make condition estimates, as required by section 305(b) of the Clean Water Act. Also required is a description of the quality for all lotic waters, and to what extent all waters provide for the protection and propagation of aquatic life. The Environmental Protection Agency (EPA) released guidance establishing the "10 Required Elements of a State Water Monitoring and Assessment Program" (USEPA, 2005). Among other things, the document states, "a State monitoring program will likely integrate several monitoring designs (e.g., fixed station, intensive and screening-level monitoring, rotating basin, judgmental and probability design) to meet the full range of decision needs. The State monitoring design should include probability-based networks (at the watershed or state-level) that support statistically valid inferences about the condition of all state water types, over time. EPA expects the State to use the most efficient combination of monitoring designs to meet its objectives."

As stated, Oklahoma has several monitoring programs that met these requirements including the Beneficial Use Monitoring Program (BUMP) and the Rotating Basin Monitoring Program (RBMP) (OWRB, 2018a). Furthermore, the state developed several programs to intensively monitor areas that have been listed on Oklahoma's 303(d) list of impaired waters (ODEQ, 2018).

In 2001, the state requested assistance with design of a probabilistic approach to stream and river site selection from the U.S. Environmental Protection Agency, Office of Research and Development (ORD), Western Ecology Division (OWRB, 2006a). Study design was completed, but Oklahoma agencies remained unable to initiate further planning and implementation due to a lack of resources. In 2004, the OWRB and OCC took part in the National Wadeable Streams Assessment (WSA) (USEPA, 2006), which was fortuitous to future planning efforts for several reasons. First, timing of the study coincided with discussions in the state about launching a probabilistic design. Although money was a question, staff and management were worried staff time could not be spent performing all of the necessary reconnaissance work or sampling that is required in a random based monitoring program. Participating in the WSA instilled confidence that this type of monitoring could be accomplished without impeding the success of other programs. In fact, this facet of Oklahoma's monitoring program has only enhanced other programs. Second, since the state showed interest in implementing a random design, USEPA Region 6 began working with staff to find appropriate funding. Initial funding came through a Clean Water Act (CWA) Section 104(b)(3) grant. This money funded the SY 2005. The study investigated feasibility on two fronts—logistic and funding. The logistic portion could be overcome through proper planning and coordination of staff. The funding, however, was not easily dealt with because of program priorities. In 2005, another funding opportunity became available when the USEPA announced further funding of the Regional Environmental Monitoring and Assessment Program (REMAP) (OWRB, 2009). Funding from the REMAP grant allowed the state to continue implementation of probabilistic monitoring for an additional two years through 2007. Through this study, the OWRB completed a large-scale statewide assessment of perennial rivers and streams, as well as assessments for three large ecoregion groupings including the Western and High Plains, the Forested Plains and Flint Hills, and the Eastern Highlands. A significant limitation during that study was the inability to determine biological condition in large rivers.

In 2008, Oklahoma began its $3^{rd}$ (2008-2009 NRSA) and $4^{th}$ (2010-2011 Statewide) surveys. The data was published in 2013 (OWRB, 2013) and is included in the trend analysis between studies. A subset of sites sampled for the 2013-2017 study are revisit sites from 2008-2011. This allows for trends between studies.

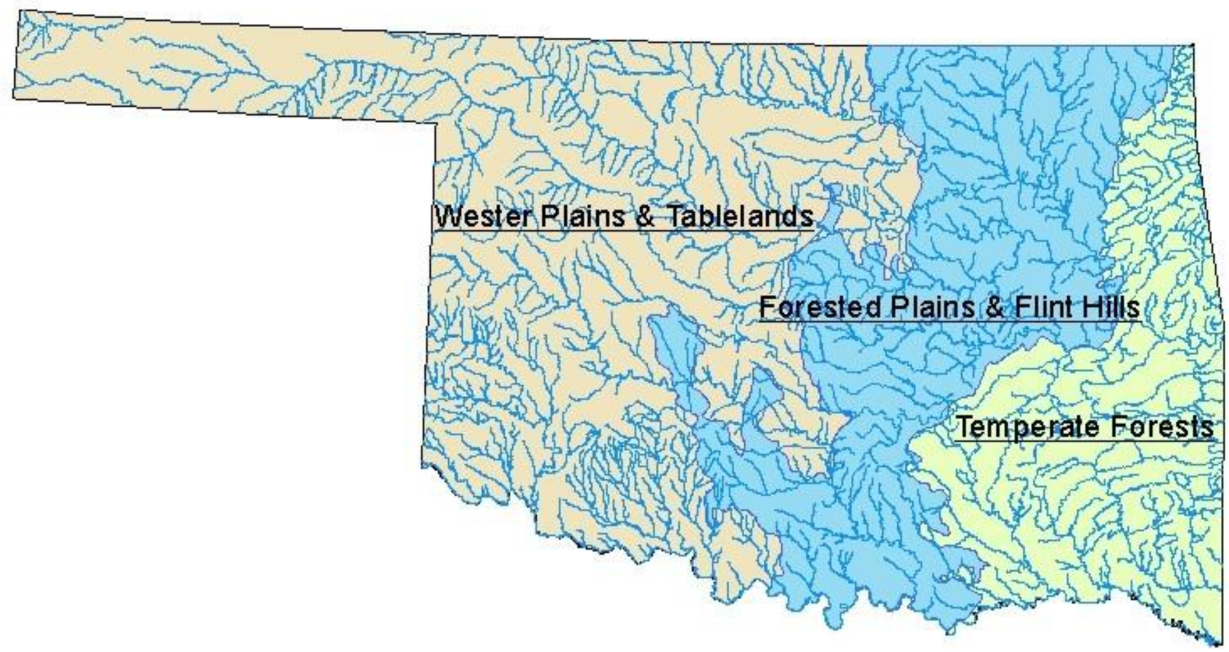
From 2013-2017, Oklahoma completed its 5th and 6th statewide surveys of lotic waters. In Sample Year (SY) 2013-2014, Oklahoma participated in the National Rivers and Streams Assessment (NRSA) sampling 51 stations. An additional 18 sites were sampled in 2013-2014 that were not part of the NRSA study which increased the sample size for the two-year period to 69 sites. In SY 2015-2017, Oklahoma completed its 6th statewide probabilistic study with a sample size of 81 perennial streams and rivers. The new study population for both studies included perennial streams and rivers throughout Oklahoma and continued through the NRSA draw into the remaining oversample sites. So that all sizes of perennial waterbodies were adequately represented, the design assigned unequal proportions to several Strahler Orders, including 1st – 2nd, 3-4th, 5-6th, and above 6th order rivers. Additionally, the study characterized the three separate aggregated ecoregions of Oklahoma as defined in the "2005-2007 Implementation of a Stream/River Monitoring Sampling Network for the State of Oklahoma" (OWRB, 2009). By combining the two studies, Oklahoma can report on several temporal scales, and on two size classes—smaller (streams) and larger waterbodies (rivers) and the three aggregated ecoregions including the Forested Plains and Flint Hills (FPFH), Temperate Forests (TF), and the Western Plains and Tablelands (WPT). Temporal scales include:

- 69 sites in the 2013-2014 sampling period (51 NRSA sites)
- 81 sites in the 2015-2017 sampling period
- 150 sites over the 2013-2017 sampling period

The probability-based survey was designed to assist Oklahoma's water quality managers in several ways. Furthermore, in keeping with the environmental goals of the state, an effective long-term management strategy based on sound and defensible science can be developed using this data. The four over-arching goals were:

1. Estimate the condition of multi-assemblage biological indicators for Oklahoma's waters through a statistically valid approach.
2. Estimate the extent of stressors that may be associated with biological condition.
3. Evaluate the relationship between stressors and condition for use in various long and short-term environmental management strategies.
4. Assess waters for inclusion in Oklahoma's Integrated Water Quality Report.

The current assessment allows the state to make a statistically valid assessment of the condition for all of Oklahoma's streams and rivers, as required under Section 305(b) of the Clean Water Act (CWA) (ODEQ, 2012). The sample size allows for a statewide estimate of fish, macroinvertebrate, and algal condition on three temporal scales (all years, yearly, and by two years), two size classes (rivers and streams), as well as within the three aggregated ecoregions (FPFH, TF, WPT) (




). Additionally, stressor extent is evaluated for several potential environmental stressors (TP, TN, conductivity, and turbidity). Under the guidelines of the Integrated Listing Methodology (ODEQ, 2012), data allow for the assessment of the Fish & Wildlife Propagation beneficial use on more waters of the state. Although currently limited to certain beneficial uses and associated criteria, the support status of more waters can be determined using data collected in these studies. Finally, the survey provides information that will allow for better long and short-range planning and resource allocation.

A benefit of probabilistic design is that data results can be applied in a much broader context. For example, the relationship of condition can be associated with stressor extent through methodologies like relative risk analysis. The 2013-2017 study yielded a wealth of biological, chemical, and physical data across a broad gradient of environmental conditions which supports the evaluation of these stressor-indicator relationships. Data can be used to calibrate existing biocriteria ranges, establish reference condition, and assist in nutrient criteria development. When integrated with fixed-station networks such as the OWRB's Beneficial Use Monitoring program (BUMP), probabilistic data can assist in identifying local areas of concern.

Also, although not accomplished by this report, landscape metrics can be associated with stressors and condition to develop predictive models. Probabilistic data can also assist in efforts to regionalize environmental concerns. A bottom up approach to management identifies not only statewide issues but allows managers to identify local and regional concerns first, which often lead to issues farther down the watershed, and put resources where they are needed. This probabilistic methodology adds a valuable layer to that management approach.

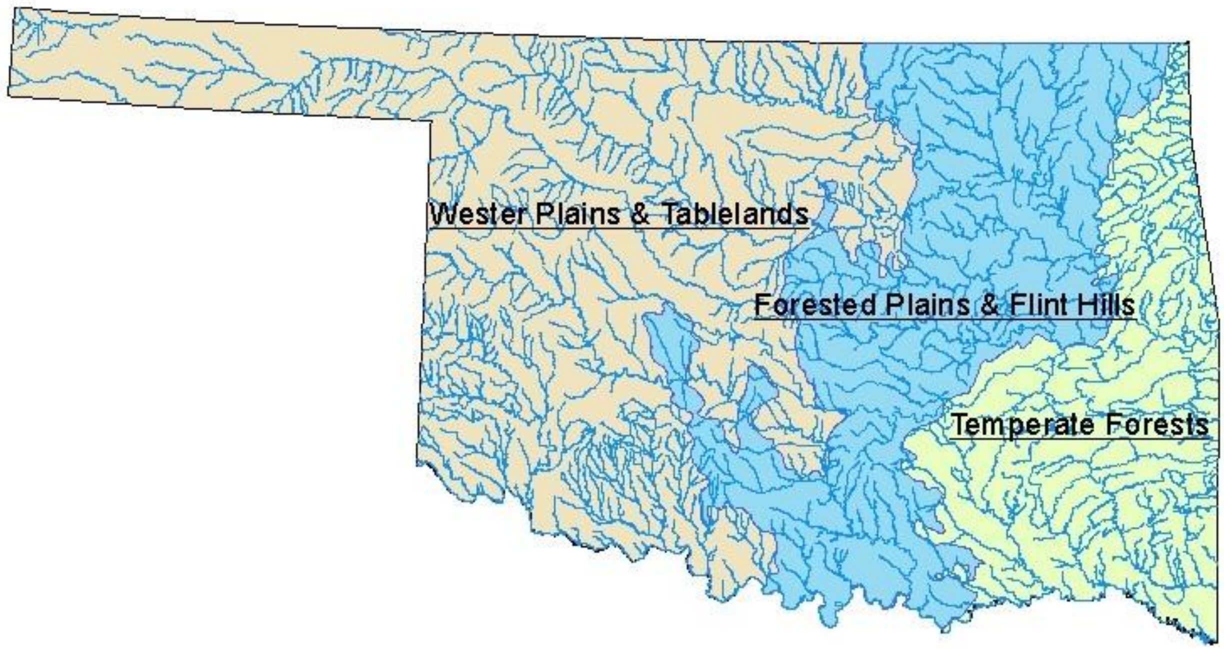



Figure 1. Map of the three Aggregated Ecoregions of Oklahoma- Western Plains and Tablelands (WPT), Forested Plains and Flint Hills (FPFH), and Temperate Forests (TF).

## METHODS

### Study Design

A Generalized Random Tessellation Stratified (GRTS) survey design (Stevens, 1997; Stevens, Jr., D. L., and A. R. Olsen, 2004) was used to select stream sample sites across the state (USEPA, 2013-2014 NRSA QAPP). The original design for the five-year study emanated from Oklahoma's site file for the 2013-2014 NRSA study. Unequal probability categories were defined separately for Rivers Major (RM), Rivers Other (RO), Large Streams (LS), and Small Streams (SS). A few other categories were also defined such as Revisit (RV), river revisit from 2009 (R9), and stream revisit from 2009 (S9). The terms wadeable and non-wadeable were used to designate Strahler order classes and did not imply that the streams were actually wadeable or non-wadeable, as defined by protocol. For the wadeable stream category, unequal selection probabilities were defined for 1st, 2nd, 3rd, and 4th order streams so that an equal number of sites would occur for each order. Then these unequal selection probabilities were adjusted by the Wadeable Streams Assessment (WSA) nine aggregated ecoregion categories as defined by the National Aquatic Resource Survey (NARS) survey, so that an equal number of sites would occur in each WSA nine aggregated ecoregion category. For the non-wadeable river category, unequal selection probabilities were defined for 5$^{th}$, 6$^{th}$, 7$^{th}$, and 8$^{th}$ + Strahler order rivers so that the expected number of sites nationally would be 350, 275, 175, and 100 sites, respectively. Then these unequal selection probabilities were adjusted by WSA nine aggregated ecoregion categories so that an equal number of sites would occur in each WSA nine aggregated ecoregion category. Additionally, certain sites were selected as revisit sites from the 2008-2009 NRSA, and included in the initial study design, weighted equally across the Strahler order categories mentioned above. In Oklahoma for the five-year study period (2013-2017) the expected sample size was 150 for both wadeable streams and non-wadeable rivers combined. Oversample sites were provided for each Strahler order grouping. Site replacement was done within the two major Strahler order categories, 1$^{st}$-4$^{th}$ and 5$^{th}$+.

The study was spatially, temporally, and hydrologically limited. Spatially, the study was limited to only streams defined as perennial in flow and excluded all sites within a reservoir flood pool. Temporal limitations were defined by biological index periods. The index period for fish assemblage in Oklahoma was May 15$^{th}$ through September 15$^{th}$ with an optional extension to October 1$^{st}$ if the stream had not risen above summer seasonal base flow (OWRB, 2013a). The summer index habitat period for macroinvertebrate assemblage in Oklahoma was June 1$^{st}$ through September 15$^{th}$ with collections completed in as short a time period as possible (OWRB, 2013c). The winter index habitat period for macroinvertebrate assemblage in Oklahoma was January 1$^{st}$ through March 15$^{th}$. Hydrologically, this study was limited by extensive flooding in 2015 which made sampling very challenging logistically. However, this obstacle was overcome through planning and rearranging of the sampling schedule.

The study and subsequent site selection were designed to allow for five reporting periods and sub-categorization of “river major”, “river other”, “large stream”, and “small stream” sites. The 2013-2017 study was sub-categorized to evaluate data in one and two-year increments as well as by the three aggregated ecoregions and by rivers and streams. The rolling bi-annual data included 2013-2014, 2014-2015, 2015-2016, and 2016-2017, as well as the total survey period from 2013-2017. The 2013-2017 data was also sub-categorized by three-year increments to assist in trend analysis.

## Site Reconnaissance

Limited site accessibility is the most serious problem with any probabilistic study. Unlike a fixed station design, study sites are typically not accessible by public roads and may only be accessed by foot. Compounding the problem is private ownership of land and the need to respect a landowner’s choice of who may or may not access the property. Finally, probabilistic sites are selected from data frames that are not 100% accurate and may include non-candidate sites. Fortunately, proper planning and having an excess of available oversample sites can alleviate these issues. During the EPA’s Wadeable Streams Assessment (USEPA, 2006) and Oklahoma’s Statewide Probabilistic Study (REMAP) (OWRB, 2009) the OWRB developed (with assistance from EPA documentation) and implemented a three stage reconnaissance plan.

The first stage of planning is a “desktop” reconnaissance to determine if the proposed site is a candidate site. Candidate sites must meet certain criteria, including: 1) perennial flow, 2) not within normal pool elevation of a lake (oxbows or reservoirs), 3) not a wetland/swamp dominated river, 4) accessible by foot, and 5) landowner permission granted. Initially, each site was located using a variety of resources including Google Earth Pro, and other GIS mapping tools (North American Commission for Environmental Cooperation, 1997). For each site, a site reconnaissance and tracking form (Figure 2) was created with the ultimate determination made to “accept” or “reject”. At the outset, required hydrological characteristics were verified, and if not met, the site was rejected without further consideration. Then, a series of site maps containing at least two geographic scales were included with the site tracking form and the necessary information to determine landowner was collected, including legal description of site and county. The County Assessor website is the main source of landowner information. However, for some problem sites, staff used a variety of other resources including previously developed relationships with local landowners/business owners or personal visits to nearby residences. Finally, a landowner permission packet was sent to each landowner, including a standardized permission letter (Figure 3), maps, a study brochure, and self-addressed/stamped envelope for them to review and mail back to the OWRB either approving or not allowing access to their property. Based on landowner response, the site was accepted, accepted with restrictions/further instructions, or rejected. Response to permission requests was occasionally slow for a variety of reasons. Therefore, a two-stage process was developed to deal with slow responses. After two to three weeks staff attempted contact by phone, and if unsuccessful, would send a reminder postcard. If still unsuccessful, in-person contact was attempted. If each of these attempts failed, the site was rejected.

Once site accessibility was verified, and labeled as a study target site, a second planning stage was initiated. The planning objective was simply to collect thorough, well-documented information to assist field crews in locating and accessing sampling reach. Through color aerial satellite imagery, considerable satellite imagery was gathered using the desktop. Notes were incorporated into the tracking form for special considerations such as hazards, best route of entry, time of travel, etc. Unfortunately, some sites required an on-site initial visit to complete the planning phase. Concerns arose about cost versus benefit of an extra site visit. However, over the course of three years, crews discovered that much of the information collected during the initial on-site planning visit was of great benefit on the actual day of sampling. Furthermore, because sites could be visited in batches and only one staff member was required, little expense was incurred.

Final planning stage involved all activities up to the first sampling visit and involved compiling a complete site packet. The packet incorporated all information gathered in stages one and two, including a completed tracking form, landowner permission letter, and pertinent pictures and maps. In addition, all necessary field forms and labels were compiled and a checklist of equipment needed was completed.

During the 2013-2017 study period a total of 250 sites were evaluated. Of these 250 sites, 150 were able to be sampled. The other 100 sites were rejected for various reasons such as access permission was denied by the landowner, dry channel, impounded stream, etc. The two most common reasons a site was rejected was access permission denied and dry channel (Figure 8).

Probabilistic Monitoring – Site Reconnaissance & Tracking Form

Stream Name: Brazil Creek

Site ID: OKLS-1181

Lat/Long: 35.14874 / -94.70434

Site Type: <u>target</u> or oversample

Sample Status: <u>Accepted</u> or Rejected

If rejected, what is the reason:

- [ ] Landowner Denied Permission
- [ ] Site is Dry
- [ ] Site is Impounded (part of a lake)
- [ ] Site is Not Riverine Habitat (i.e., wetland, swamp, etc.)
- [ ] Site is Not Physically Accessible
- [ ] Other, Please Explain:

If rejected, what site replaces this one:

Landowner Contact Information:

John Doe (Doe Land & Cattle Co.)
P.O. Box A
Your Town, OK 11111
(580)555-2222

Landowner Requests:

None. You can drive down to the site if you need to. (see attached permission letter)

Directions/Access to Site:

From Your Town, go west on SH 1 for 3.25 miles. The property is South of this point. Walk or drive across pasture to get to the X-site. (See attached maps)

Figure 2. Template Site Reconnaissance and Tracking Form

Date

John Doe Trust
C/O Jane Doe
Rt. 1 Box 1
Anywhere, OK  74534

Dear Sir/Madam:

The Oklahoma Water Resources Board (OWRB) is conducting a five-year project to perform environmental assessments on 210 to 220 randomly selected streams across Oklahoma.  This effort involves on-site visits by OWRB personnel to a stream adjacent to your property to take samples of the water, fish and other aquatic life, and to gather other information concerning stream habitat such as measurements of stream width and depth and observations of stream bed and vegetation characteristics.  The findings of the study are not intended for enforcement or regulatory purposes.

One of the sites that we would like to assess is a point on Your Creek located on your property in Section 1, Township 1 N, Range 1 E, in Your County, Oklahoma.  We have enclosed a copy of a topographic map with the site identified by an "X" at the specific point on the stream to be sampled.

We are writing to ask for your permission to come onto your property to visit the site and conduct sampling activities.  We realize that working on your property is a privilege and we will respect your landowner rights at all times.  If you grant us permission, we will make no more than three visits to your land.  The first visit will be for site reconnaissance and will occur sometime between March and April of 2013.  A crew of one to two people will use your land to access the site and only gather information about site accessibility.  In addition, one or two more visits will be made between May and October of 2013 for sampling and collection.  We expect to have a crew of no more than four OWRB employees or its contractors coming on site during the sample collection visits.   Fish will only be collected during one of these visits.

Once a sampling date is set, OWRB employees will contact you, either by telephone or in person, before entering onto your land.  After OWRB staff contact you, they will access the site either on foot or by vehicle and collect the necessary samples and data.  Other than driving or walking across your land and walking in and around the stream site, we expect that staff will not leave any trace of their activity.  Staff will honor any special instructions you have, such as accessing land only by foot, driving on pasture roads only, and opening and closing gates responsibly.

If you are agreeable to the activities described above, please complete and sign one copy of the "Landowner Permission" page and mail it back to us in the enclosed, stamped return envelope by Date.  We have enclosed a duplicate of this page, which you may keep for your records.  Please include contact information so that we may contact you by phone.  Thank you for your consideration.  If you have any questions about this request, please contact please contact Josh Bailey (Biological Monitoring Coordinator) or Chris Hargis (Environmental Programs Specialist) at 405-530-8800.Sincerely,

Josh Bailey
Probabilistic Monitoring Coordinator

Enclosures: Topo map
Duplicate original of letter
Return envelope

LANDOWNER PERMISSION

I grant permission to the employees of the Oklahoma Water Resources Board to come onto my property and conduct stream sampling activities as described in this letter.

_________ Permission granted

_________ Permission granted, subject to the following restrictions or instructions:

______________________________________________________________________

_________ Permission not granted

Landowner's Name (please print): ________________________________________

Landowner's Signature: ________________________________________

Landowner's Daytime Phone No. ________________________________________

Figure 3. Template landowner permission letter

**Data Collection**

When sites were verified as target a sampling schedule was implemented. All target sites were visited once (in rare instances twice) during a late spring to late summer index period (June 1 – September 15), under base flow conditions. To assess ecological health, one-time collections were made for a variety of biological, chemical, and physical parameters (Table 2). Collections also included a comprehensive water chemistry sample and measurement of *in situ* water quality parameters including water temperature, dissolved oxygen, pH, and specific conductance. Additionally, biological assemblages were collected including fish, macroinvertebrates, sestonic algae (sestonic chlorophyll *a*), and benthic periphyton (benthic algae) in the form of benthic chlorophyll *a*. A comprehensive suite of physical habitat, riparian, and anthropogenic disturbance measurements were made as well as a variety of site observational information along with photodocumentation as needed. The physical habitat and sediment data are only presented in tabular form in this report. The current plan is to submit a future addendum to this report with graphics for these data.

Table 2. Water quality variables included in study.

| SAMPLE VARIABLES | | |
|---|---|---|
| ***In situ* Variables** | | |
| Dissolved Oxygen (D. O.) | % D. O. Saturation | pH |
| Water Temperature | Specific Conductance | |
| **Field Variables** | | |
| Nephelometric Turbidity | Total Alkalinity | Total Hardness |
| Instantaneous Flow | Phenolphthalein Alkalinity | |
| **Laboratory Variables--General Chemistry** | | |
| Total Kjeldahl Nitrogen | Nitrate/Nitrite | Total Phosphorus |
| Nitrate Nitrogen | Nitrite Nitrogen | Ammonia Nitrogen |
| Total Dissolved Solids—gravimetric | Chlorides | Sulfates |
| Total Settleable Solids | Total Suspended Solids | |
| **Laboratory Variables—Metals** | | |
| Arsenic | Cadmium | Chromium |
| Copper | Lead | Mercury |
| Nickel | Selenium | Silver |
| Zinc | Thallium | Calcium |
| Barium | Iron | Magnesium |
| Potassium | Sodium | |
| **Biological Variables** | | |
| Fish | Macroinvertebrates | Sestonic chlorophyll *a* |
| Habitat—NRSA Forms | Habitat—RBP form | Benthic chlorophyll *a* |

From 2013-2014, all NRSA collections strictly followed the NRSA field operations manual (USEPA, NRSA 2013-2014 Field Operations Manual, 2013) and Quality Assurance Project Plan (USEPA, 2013-2014 NRSA QAPP). Sample analyses for these years were provided by the NRSA contract laboratories and data/assessments for all samples and assemblages were provided by the USEPA through either their National Aquatic Resource Survey (NARS) Share file portal (https://nars.sharefile.com/) (USEPA, 2019) or personal communication from EPA staff (Mitchell, Personal Communications, 2013-2014 NRSA Data, USEPA. ).

For the remaining 2013-14 sites and for SY 2015-17, data for water quality variables was collected following the OWRB Standard Operating Procedures (OWRB, 2013). Several variables (pH, dissolved oxygen, water temperature, and specific conductance) were monitored *in-situ* utilizing a YSI® multi-probe instrument. The probes (except water temperature) of all instruments were calibrated at least weekly and verified daily with appropriate standards. Measurements were taken at the thalweg of the channel at a depth of at least 0.1 meters and no greater than one-half of the total depth. The data were uploaded from the instrument and saved to a data recorder, then transferred manually to a field log sheet or electronically on a field computer and uploaded into the OWRB Water Quality database. Data for all other variables were amassed from water quality samples collected at the station. Grab samples were the standard method of collection during this study. The sample was collected at the deepest, fastest flowing portion of the horizontal transect by completely submerging the bottle, allowing it to fill to the top, and capping the bottle after all air was removed. Prior to filling, each bottle was primed (rinsed) three times with ambient stream water. Each sample included three bottles for general chemistry analyses (two ice preserved and one sulfuric acid preserved), one bottle for total metals analysis (nitric acid preserved), two bottles for dissolved metals analysis and one bottle each for field chemistry analysis and sestonic chlorophyll *a* (ice preserved and kept in the dark).  For benthic chlorophyll *a*, a sample was composited, placed on ice to be preserved, and kept dark. For 2013-2014, sample analysis was provided by the NRSA contract laboratories. From 2015-2017, the Oklahoma Department of Environmental Quality-State Environmental Laboratory (ODEQ-SEL) in accordance with the ODEQ's Quality Management Plan (QTRACK No. 19-014) (ODEQ, 2018) analyzed samples for most parameters listed in Table 2. OWRB personnel measured hardness and alkalinity using Hach® titration protocols, and nephelometric turbidity using a Hach® Portable turbidimeter.

Samples for algal biomass were collected in both the sestonic and benthic zones of each waterbody and processed in accordance with OWRB standard operating procedures (OWRB, 2006b).  Sestonic samples were processed from water collected during the general water quality collection. Sestonic chlorophyll *a* samples were processed by passing the sample water through a 0.45 micron filter (47-mm diameter) subsequently putting the filter in the dark (wrapped inside aluminum foil) placing the filter on dry ice (if in the field) or in a freezer (if at the OWRB lab) until the filter can be ground and sent in for analysis by the Oklahoma Department of Environmental Quality. A benthic sample was processed from a reach-wide transect based collection composite. Benthic filters were extracted using an alternate method, whereby filters are placed in a standard aliquot of ethanol (25 mL) and extracted at room temperature for at least 72 hours. All chlorophyll *a* samples were analyzed by NRSA contract lab (2013-2014) and the ODEQ SEL (2015-2017) under the previously mentioned QMP (ODEQ, 2018). Additionally, a 50-mL sample was collected from both water column and benthic composites for subsequent sestonic and benthic algal ID analysis. These samples were preserved with 10% formalin, wrapped with foil, and placed at 4$^{o}$C.

Biological assemblages included aquatic macroinvertebrates and fish that were collected in accordance with Oklahoma's Rapid Bioassessment Protocols (RBP) (OWRB, 1999) and the OWRB's biological collection protocols (OWRB, 2013a; OWRB, 2013c). Collections were completed over a 150-4000 meter reach depending on average wetted width of the selected site. Fish were collected during the summer index period using a backpack, pram (tote barge), or boat depending upon the depth of the river or stream. The pram unit consisted of a Smith-Root 2.5 generator powered pulsator (GPP) attached to a 3000W Honda generator, and were operated with DC output current at 2-8 amps. The boat was equipped with a 9.0 GPP powered by a 9,000 Kohler generator, and operated at a DC output range of 4-30 amps. A battery powered Smith-Root/Aquashock backpack electrofisher was used on rare occasions in sites too narrow for pram setup. Using two netters (one netter during NRSA site visits) with ¼ inch mesh dip nets collections were made in an upstream direction (wadeables) or downstream direction (boatables) with target effort depending on reach length, site conditions, and protocol. When existing habitats could not be effectively electrofished, supplemental or stand-alone collections were made using 6' X 10-20' seines of ¼ inch mesh equipped with 8' brailles. Fish were processed at several intervals during each collection. Most fish were processed in the field, including enumeration and identification to species. Representative site voucher collections were made with a combination of appropriate photodocumentation and representative species vouchers. Fish that were not readily identifiable were fixed in 10% formalin and returned to the OWRB laboratory for identification and enumeration. Additionally, all representative voucher fish were fixed in a 10% formalin solution, subsequently preserved in 70% ethanol and permanently housed in the OWRB fish collection library that is currently located at the University of Central Oklahoma in Edmond, Oklahoma. OWRB fish photodocumentation is housed on one of the OWRB network drives.

Aquatic macroinvertebrate collections were made during the summer and winter index period of each study year (OWRB, 2013c). Each sampling event included a variety of samples as defined in the OWRB's macroinvertebrate collection protocols. At wadeable sites staff collected samples from available targeted habitats including streamside vegetation, woody debris, and rocky riffles. The streamside vegetation (SSV) and woody debris (Woody) collections were semi-qualitative samples collected over flowing portions of the reach for total collection times of three (SSV) and five minutes (Woody), respectively. The streamside sample was collected using a 500-micron D-frame net to agitate various types of fine structure sample including fine roots, algae, and emergent and overhanging vegetation. Likewise, the wood sample was collected using a 500-micron D-frame net to agitate, scrape, and brush wood of any size in various states of decay. A standard dish cleaning brush was utilized to help dislodge macroinvertebrates from woody debris. Wood that could be removed from the stream was scanned for additional organisms. Riffle collection was a quantitative sample of three composites representing slow, medium, and fast areas of the selected riffle. Each sub-sample was collected by fully disturbing one square meter of substrate into a 500-micron zooplankton seine (kick net). The standard household dish washing brush was also utilized in collections of macroinvertebrate riffle samples. At non-wadeable sites, a large river collection protocol was used, with sub-protocol determined by dominant reach substrate, either fine substrate (silt and sand) or coarse substrate (fine gravel and larger). In each protocol, dominant substrate is sampled at each transect and within each sub-reach the dominant targeted habitat is sampled. The primary difference between sub-protocols was the treatment of samples. Coarse substrate protocol requires that all samples are processed and composited in a final collection type called large river coarse-composite (LRC-Comp). While at the large river fine (LRF) sites, collections were kept separate and processed as LRF-THab (targeted habitat) and LRF-Sub (substrate) samples in two different D-frame nets. At all LR (large river) sites, a riffle composite is collected, if available. All samples were field post-processed in a 500-micron sieve bucket to remove large material and silt to reduce sample size to fill no more than ¾ of a quart sample jar. All nets and buckets were thoroughly scanned to ensure that no organisms were lost. After processing, each sample type was preserved independently in quart size wide mouth polypropylene jars with ethanol as a preservative and an interior and exterior label for sample differentiation. Samples were then sent to the contract laboratory for sorting, identification, and enumeration. Taxonomic data for each sample were grouped and metrics calculated by the contract laboratory. In general, most organisms were identified to genera with midges identified to tribe. The contract lab used in this study was Rhithron Associates, Inc., Missoula, MT.

Additionally, a detailed habitat assessment was conducted targeting in-stream substrate, in-stream fish cover (ISC), wetted and bank full width, water depth, bank and riparian measurements, as well as anthropogenic disturbance characteristics. Collections included both Oklahoma's semi-qualitative RBP habitat protocols (OWRB, 2013b), and the NRSA semi-quantitative habitat protocols (USEPA, NRSA 2013-2014 Field Operations Manual, 2013). To date, the USEPA assessments have not been processed.

Discharge and/or stage data were also collected at each site (OWRB, 2016a). Flow was determined through several methods including direct measurement of instantaneous discharge using a flow meter, interpolation of flow from a stage/discharge rating curve developed by the United States Geological Survey (USGS) or the OWRB, or through estimation of discharge using a float test (OWRB, 2004).

For a more detailed discussion of sampling procedures please visit the OWRB website at:
http://www.owrb.ok.gov/quality/monitoring/monitoring.php#SOPs

## Analytical Methods

Condition classes for biotic assemblages and stressors were assigned by either the USEPA or OWRB, depending on study year. All data collected from 2013-2014 were processed and assessed by USEPA staff and associated labs. All data collected from 2015-2017 were processed and assessed by OWRB staff and/or contracted labs.

## Analysis of Fish Biological Condition

Fish community structure can be a useful biological indicator of water quality. Fishes have highly variable tolerance levels to water pollution. There are over 170 species of fishes in Oklahoma. These 27 families of Oklahoma fishes are highly variable in life span, tolerance, spawning behavior, and other life history traits (Jester, 1992). Spatially these species are all highly variable across Oklahoma. Some species are ubiquitous and occur throughout Oklahoma such as the Red shiner. Other species such as the Banded pygmy sunfish only occur in Southeastern Oklahoma in a very limited range of specialized stream sites. Oklahoma also has its fair share of threatened and endangered fishes such as the Leopard darter, Arkansas river shiner, and the Neosho madtom. The fish community that is collected from a stream/river can tell you a lot about the water quality and habitat type of the site sampled. Fish are highly susceptible to low oxygen levels that are often related directly to water quality degradation by inputs of high levels of nutrients (TP, TN) that may result in excess algal blooms.

Fish IBIs are a very useful tool for evaluating the health of a fish community. These IBIs use specific metrics to populate a score that is used to determine whether a fish community is in good, fair, or poor condition (Table 15) and to determine if Beneficial uses such as Fish and Wildlife Propagation are being met.

Fish data were analyzed using two indices of biological integrity (IBI) commonly used in Oklahoma bioassessment studies, as well as the IBI developed by the NRSA. State biocriteria methods are outlined in Oklahoma's Use Support Assessment Protocols (OWRB, 2016b). In addition, an IBI commonly used by the OCC's Water Quality Division was used to provide an alternative bioassessment (OCC, 2005a; OCC, 2008; ODEQ, 2012). All metrics and IBI calculations were made using the OWRB's "Fish Assessment Workbook", an automated calculator OWRB staff built in Microsoft Excel (OWRB, 2016). The NRSA condition assessments were taken from the tabular fish condition file on the USEPA's NARS Share file web site (USEPA, 2019).

Oklahoma's Fish Index of Biological Integrity (OKFIBI) uses a common set of metrics throughout the state (**Error! Reference source not found.**). Each metric is scored as 5, 3, or 1 depending on the calculated value, and scores are summed to reach two subcategory totals for sample composition and fish condition (OWRB, 2016). The two subcategories are then summed for a final IBI score. The score is compared to an ecoregional reference value to determine support status. For example, if the final IBI score is between 25-34, the status for sites in the Ouachita Mountain Ecoregion is deemed undetermined. Likewise, for scores greater than 34 and less than 25, the status is supported or not supported, respectively.

The Oklahoma Conservation Commission Fish Index of biological Integrity (OCCFIBI) uses "a modified version of Karr's Index of Biotic Integrity (IBI) as adapted from Plafkin et al., 1989 (OCC, 2008; ODEQ, 2012). The metrics as well as the scoring system are in Table 4. Metric scores are calculated in two ways for both the test site and composite reference metric values of high-quality streams in the ecoregion (OCC, 2005a). Species richness values (total, sensitive benthic, sunfish, and intolerant) are compared to composite reference value to obtain a "percent of reference". A score of 5, 3, or 1 is then given to the site depending on the percentages outlined in Table 5, while the reference composite is given a default score of 5. Proportional metrics (% individuals as tolerant, insectivorous cyprinids, and lithophilic spawners) are scored by comparing the base metric score for both the test site and the reference composite to the percentile ranges given in Table 4. After all metrics are scored, total scores are calculated for the test and composite reference sites. Finally, the site final score is compared to the composite reference final score and a percent of reference is obtained. The percent of reference is compared to the percentages in
Table 5 and an integrity classification is assigned with scores falling between assessment ranges classified in the closest scoring group.
Fish taxonomic results for each site were analyzed to produce a raw score for the OKFIBI and a percent of reference score for the OCCFIBI. Additionally, when available, the condition class determined from the NRSA analysis was included in the evaluation. A combination of these assessments were considered when assigning a final fish condition class of good, fair, or poor.

Table 3. Index of biological integrity used to calculate Oklahoma's fish scores. Referenced figures may be found in OAC 785:15: Appendix C.

| Metric | Value | Scoring 5 | 3 | 1 | Score |
|---|---|---|---|---|---|
| Total # of species | | >23 | 12-22 | <12 | |
| Shannon's Diversity based upon numbers | | >2.50 | 2.49-1.50 | <1.50 | |
| # of sunfish species | | >3 | 2 to 3 | <2 | |
| # of species comprising 75% of sample | | >5 | 3 to 4 | <3 | |
| Number of intolerant species | | >5 | 3-5 | <3 | |
| Percentage of tolerant species | | <33% | 33-57% | >57% | |
| TOTAL SCORE FOR SAMPLE COMPOSITION | | | | | 0 |
| Percentage of lithophils | | >36 | 18 to 36 | <18 | |
| Percentage of DELT anomalies | | <0.1 | 0.1-1.3 | >1.3 | |
| Total individuals | | >200 | 75 to 200 | <75 | |
| TOTAL SCORE FOR FISH CONDITION | | | | | 0 |
| TOTAL SCORE | | | | | 0 |

Table 4. Metrics and scoring criteria used in the calculation of OCC's index of biological integrity.

| Metrics | 5 | 3 | 1 |
|---|---|---|---|
| Number of species | >67% | 33-67% | <33% |
| Number of sensitive benthic species | >67% | 33-67% | <33% |
| Number of sunfish species | >67% | 33-67% | <33% |
| Number of intolerant species | >67% | 33-67% | <33% |
| Proportion tolerant individuals | <10% | 10-25% | >25% |
| Proportion insectivorous cyprinid individuals | >45% | 20-45% | <20% |
| Proportion individuals as lithophilic spawners | >36% | 18-36% | <18% |

Table 5. Integrity classification scores and descriptions used with OCC's index of biological integrity.

| % Comparison to the Reference Score | Integrity Class | Characteristics |
|---|---|---|
| >97% | Excellent | Comparable to pristine conditions, exceptional species assemblage |
| 80 - 87% | Good | Decreased species richness, especially intolerant species |
| 67 - 73% | Fair | Intolerant and sensitive species rare or absent |
| 47 - 57% | Poor | Top carnivores and many expected species absent or rare; omnivores and tolerant species dominant |
| 26 - 37% | Very Poor | Few species and individuals present; tolerant species dominant; diseased fish frequent |

## Analysis of Macroinvertebrate Biological Condition

Macroinvertebrates play a key role in aquatic ecology as both a food source for fish and as a grazer on algae. They have long been used as biological indicators of water quality for a variety of reasons. For instance, some macroinvertebrates spend their entire life in water. However, the life history of macroinvertebrates is highly variable. Other species only live in water as immature forms before hatching and flying away to spend their adult life as terrestrial insects. There are many factors that influence macroinvertebrate health such as quality/abundance of food sources, dissolved oxygen levels, bottom substrate types, nutrient levels, water pH, and riparian vegetation (Utah, 2019). These biological indicators are very sensitive to disturbances in riparian zones and degradation of water quality. The riparian zone controls food and habitat availability such as rotten wood and leaf matter. These are key elements to the life cycles of many macroinvertebrates. Stream morphology, water quality and overall stream health play important roles in determining the composition of macroinvertebrate communities that can thrive in a stream or river. Macroinvertebrate mobility and habitat preferences are highly variable. Species such as crayfish are very mobile while others may spend their entire aquatic life cycle in a single riffle. However, macroinvertebrates are not as mobile as fish are. This makes them highly susceptible to any and all changes to their aquatic environment such as the addition of pollutants. This is an example of why macroinvertebrates are very useful indicators of water quality and stream health.

Macroinvertebrate data were analyzed using a Benthic-IBI (B-IBI) developed for Oklahoma benthic communities (OCC, 2005a) and commonly used by the OCC and OWRB Water Quality Division(OCC, 2008; OWRB, 2009; OWRB, 2010a; ODEQ, 2012), as well as the IBI developed by the NRSA. Metrics and scoring criteria (Table 6) are taken from the original “Rapid Bioassessment Protocols for Use in Streams and Rivers” (Plafkin, 1989) with slight modifications to the EPT/Total and Shannon-Weaver tolerance metrics (OCC, 2008). Metrics were calculated by OWRB contractors and IBI calculations were made using the OWRB’s “B-IBI Assessment Workbook v. 4”, an automated calculator built by OWRB Staff in Microsoft Excel (OWRB, 2016). The NRSA condition assessments were taken from the tabular macroinvertebrate condition file on the USEPA’s NARS share file site (USEPA, 2019).

Calculation of the B-IBI is similar to the fish OCC-IBI discussed previously. Metric scores are calculated in two ways for both test site and composite reference metric values of high-quality streams in each ecoregion (OCC, 2008). Species richness (total and EPT) and modified HBI values that are compared to the composite reference value to obtain a “percent of reference”. A score of 6, 4, 2 or 0 is then assigned to the site depending on the percentages outlined in Table 6., while the reference composite is given a default score of 6. Proportional metrics (% dominant 2 taxa and %EPT of total) as well as the Shannon-Weaver Diversity Index are scored by comparing the base metric score for both the test site and reference composite to the percentile ranges given in Table 6. After all macroinvertebrate metrics are scored, total scores are calculated for test and composite reference sites. The site final score is then compared to the composite reference final score and a percent of reference is obtained (Appendix C, Table 18). The percent of reference is compared to the percentages in Table 7; and an integrity classification is assigned with scores falling between assessment ranges classified in the closest scoring group.

Macroinvertebrate taxonomic results for each site were analyzed to produce a percent of reference score for the OKBIBI. From these scores, biological integrity classifications were assigned. For NRSA sites, the condition classification assigned by the NRSA was used since samples were processed as 500 individual sub-samples. Instead of rarifying samples to a 100 individual sub-sample to allow use in Oklahoma’s B-IBI, it was decided that using NRSA condition assignments was more defensible and efficacious for final data analyses. Furthermore, the NRSA IBI was used to assign condition classes for large rivers that were too large to be processed through Oklahoma B-IBI. These samples were compared to national reference metrics and screening limits developed for the NRSA.

Table 6. Metrics and scoring criteria used in the calculation of the B-IBI.

| B-IBI Metrics | 6 | 4 | 2 | 0 |
|---|---|---|---|---|
| Taxa Richness | >80% | 60-80% | 40-60% | <40% |
| Modified HBI | >85% | 70-85% | 50-70% | <50% |
| EPT/Total | >30% | 20-30% | 10-20% | <10% |
| EPT Taxa | >90% | 80-90% | 70-80% | <70% |
| % Dominant 2 Taxa | <20% | 20-30% | 30-40% | >40% |
| Shannon-Weaver Diversity Index | >3.5 | 2.5-3.5 | 1.5-2.5 | <1.5 |

Table 7. Integrity classification scores and descriptions used with the B-IBI.

| % Comparison to the Reference Score | Biological Condition | Characteristics |
|---|---|---|
| >83% | Non-impaired | Comparable to the best situation expected in that ecoregion; balanced trophic and community structure for stream size |
| 54 - 79% | Slightly Impaired | Community structure and species richness less than expected; percent contribution of tolerant forms increased and loss of some intolerant species |
| 21 - 50% | Moderately Impaired | Fewer species due to loss of most intolerant forms; reduction in EPT index |
| <17% | Severely Impaired | Few species present; may have high densities of 1 or 2 taxa |

**<u>Analysis of Algal Biomass</u>**

Algae play a key role in aquatic ecology acting as an important primary producer in aquatic food webs providing a food source for a wide variety of fish and macroinvertebrates. Furthermore, algae are indispensable producers of oxygen for aquatic organisms. Algal blooms are also an important indicator of water quality perturbance and nutrient productivity. Introduction of nutrients to waterbodies occurs through several sources including runoff from urban and agricultural areas, wastewater treatment discharges, and a variety of other sources. As nutrient concentrations increase, uptake by primary producers increase. This leads to algal blooms which may result in stress to fish and/or fish kills if toxic algae are present or if oxygen levels drop too low. As eutrophication happens, aquatic life and human health beneficial uses can become impaired, as well as the aesthetic and recreational appeal of waterbodies. This sort of impact to our water resources can be detrimental to not only the fish and wildlife propagation beneficial use but also to the recreational use of lakes and rivers if they must be closed during heavy use times (i.e. holidays) due to concerns about harmful algal blooms. This can be detrimental to the local economy near a popular lake (reservoir) or river. High levels of algae may also result in taste and odor issues in drinking water. In addition, high levels of harmful bacteria may also cause human health concerns and make drinking water unsafe.

In order to quantify eutrophication, algae were measured in both the benthic and water column areas of all study streams. Various measures exist to determine algal biomass including chlorophyll *a* and ash free dry mass. For this study, chlorophyll *a* concentrations were calculated because the Oklahoma Water Quality Standards (OWQS) (OWRB, 2016c) provide screening levels for both benthic and sestonic chlorophyll *a*.

To estimate condition of algae, chlorophyll *a* concentrations were compared to several screening levels. First, Oklahoma's Use Support Assessment Protocol (USAP) (OWRB, 2016c) provides a screening level for chlorophyll *a* in the aesthetic beneficial use. A value of 100 $mg/m^2$ represents a nuisance level for benthic algae and was used as the cut-point for poor-fair condition. Second, the OWRB has collected chlorophyll *a* across the state for several programs throughout the years. To provide an alternate screening level, the 25$^{th}$ percentile of all OWRB benthic data were calculated at 45.7 $mg/m^2$, which was used as the cut-point for fair-good condition. Similarly, several screening levels were established for sestonic chlorophyll *a.* The OWQS includes a standard for sensitive water supplies of 10 $mg/m^3$ of chlorophyll a (OWRB, 2016c), which was set as the fair-good cut-point for condition assessment. Additionally, to establish the cut-point for the poor-fair condition, the distribution of all OWRB sestonic chlorophyll a data were considered as a screening level (OWRB, 2009). The mean of all concentrations calculates at 19 $mg/m^3$ and was set as the poor-fair cut-point for sestonic chlorophyll *a* analyses.

## **Stressor Methodology**

During each visit several physical and water quality parameters were collected. These included nutrients, *in situ* measurements, metals, and salinity (specific conductivity) (Table 2). Stressor concentration can have a negative effect on biological communities. This effect can lead to decreased biological integrity (e.g., the effect of nutrients on fish condition) or may be responsible for the increase in a negative condition (e.g., the effect of total phosphorus on sestonic algal biomass concentration). Quantifying stressor extent is important for a variety of reasons including development and refinement of water quality screening levels and criteria, locating hotspots, and understanding the cause and effect relationship between stressors and indicators of biological integrity. Stressor descriptions are given in Table 8.

Table 8. Descriptions of stressors affecting biological condition.

| Stressor Description | Stressor (code) | Source |
|---|---|---|
| Total nitrogen screening level (SL) from the National Rivers and Streams Assessment (NRSA) | TN_NRSA | USEPA |
| Total nitrogen SL from USEPA's regional nutrient criteria development | TN_ECO | USEPA |
| Total phosphorus SL from the NRSA | TP_NRSA | USEPA |
| Total phosphorus SL from USEPA's regional nutrient criteria development | TP_ECO | USEPA |
| Conductivity SL from the NRSA | Cond_NRSA | USEPA |
| Conductivity SL based on regional OWRB historical data | Cond_ECO | USEPA |
| Turbidity SL from USEPA's regional nutrient criteria development | Turb_ECO | USEPA |
| Sediment based on sediment metric from NRSA and combination of %loose bed material, % embeddedness, and % deep pools from Oklahoma's Rapid Bioassessment | Excess_Sed | USEPA/ OWRB |
| Instream cover assessment from the NRSA | InstCov | USEPA |
| Riparian vegetation cover from the NRSA | RipVegCov | USEPA |
| Metals chronic criteria for fish/wildlife propagation beneficial use housed in App. G, Table 2 of OWQS | XxChronic | OWRB |

Nutrient stressors include measures of total phosphorus and total nitrogen (nitrate + nitrite + total Kjeldahl nitrogen). Two sources were used to determine screening levels for each parameter giving a variety of nutrient levels based upon stream characteristics and/or regional variation (Table 9). First, regional nutrient criteria were developed based on Omernik Level III ecoregions. The lower end thresholds represent the 25$^{th}$ percentile of data from a variety of sources (USEPA, 2000a; USEPA, 2001b; USEPA, 2001a; USEPA, 2001b; OWRB, 2009), while the upper end thresholds were developed from OCC regional monitoring data(OCC, 2005b; OCC, 2006a; OCC, 2006b; OCC, 2007; OCC, 2008; OCC, 2014). The nutrient cut-point thresholds are in Table 9.

Additionally, both salinity (specific conductivity) and turbidity were evaluated as water quality stressors and are described in Table 10. Conductivity was used as a surrogate for salinity and several sources including both the USEPA regional criteria development (USEPA, 2000a; USEPA, 2000b; USEPA, 2001a; USEPA, 2001b) and regional screening limits developed for Oklahoma's original statewide assessment were used for data analysis (OWRB, 2009). Turbidity screening levels were based only on the USEPA regional criteria development reports. The cut-points for conductivity and turbidity are provided in Table 10.

Numerical criteria for metals are housed in Appendix G, Table 2 of the Oklahoma Water Quality Standards (OWQS) (OWRB, 2016c). The OWQS provides criteria for several metals, but only cadmium, copper, lead, selenium, and zinc are considered in this study (Table 16 and Table 20). These analytes have both ecological and human health significance and appear often in Oklahoma's Integrated Report as causes of impairment (ODEQ, 2018). No other metals showed any level of potential impairment in the study. To facilitate analysis, dissolved metals concentrations were compared to the dissolved chronic criterion.

Sedimentation was analyzed as a potential stressor to biological condition by using the state rule (Table 19) (ODEQ, 2012). For this report, only stressor condition (good, fair, poor) was calculated (Table 19). To date, no relative risk/attributable risk were calculated for sediment or other habitat parameters. These data may be provided in a future addendum to this report. For sites monitored as part of the NRSA, sedimentation assessments were taken from the tabular habitat condition file on the USEPA's NARS Share file web site (USEPA, 2019). For sites monitored in 2015-2017, metrics were calculated based on results from Oklahoma's Rapid Bioassessment Protocol (OWRB, 1999; OWRB, 2013b; OWRB, 2013c). The assessment consists of a variety of measurements including discharge, stream width and depth, substrates, embeddedness, habitat classification (pool, run, and riffle), fish cover, presence of point bars, erosion, and riparian structure. Metrics are scored based on predetermined ranges and a total score is obtained (Table 19). Oklahoma's USAP (OWRB, 2016c) contains a protocol for determining sedimentation based upon loose bottom substrates (%LBS), embeddedness (%EMB), and presence of deep pools (%DP). Screening levels for sedimentation metrics are determined by comparing final site scores to a percent of reference condition. Reference condition is derived from the habitat scores for ecoregion based on high quality sites developed by the OCC (OCC, 2005a). For the most part, all high-quality sites in an Omernik Level III ecoregion were used to develop reference condition. However, in certain ecoregions, some Omernik Level IV ecoregions were broken out from the whole. Omernik Level IV ecoregions used are the Broken Red Plains and Cross Timbers Transition of the Central Great Plains and the Arbuckle Uplift of the Cross Timbers. Additionally, the reference condition used is separated by aquatic life tier, and sites used to determine reference condition are required to be within two Strahler orders of the test stream. Finally, the cut-points for poor-fair-good are based on pre-determined percent of reference for each metric, with two or three metrics deemed to be fair or poor, respectively (Table 19). Additionally, both instream cover and riparian vegetative cover were also evaluated as part of the NRSA. These stressors are included in the analysis of NRSA sites (Table 16).

## Statistical Methods

Processing of data for indicator extent, stressor extent, relative risk, and attributable risk values were accomplished by our colleagues at the USEPA Office of Wetlands, Oceans and Watersheds with R-statistical Software (Mitchell, EPA Assistance, 2019-2020)) using R-scripts developed for the NARS program (Van Sickle, J., 2012). Adjusted site weights were calculated and provided by our colleagues with the USEPA Western Ecology Division (Kincaid, 2019). References to ecoregions throughout this document refer to those published by USEPA (Omernik, J.M., 1987).

Table 9. Ecoregion screening levels used as good/fair/poor cut-points for nutrient stressor analyses.

| Ecoregion | TN _NRSA Poor_Fair (mg/L) | TN _NRSA Fair_Good (mg/L) | TN _ECO Poor_Fair (mg/L) | TN _ECO Fair_Good (mg/L) | TP _NRSA Poor_Fair (mg/L) | TP _NRSA Fair_Good (mg/L) | TP _ECO Poor_Fair (mg/L) | TP _ECO Fair_Good (mg/L) |
|---|---|---|---|---|---|---|---|---|
| Southwest Tablelands | 1.570 | 0.698 | 1.050 | 0.450 | 0.095 | 0.052 | 0.055 | 0.025 |
| Central Great Plains | 1.570 | 0.698 | 1.600 | 0.840 | 0.095 | 0.052 | 0.130 | 0.090 |
| Cross Timbers | 1.570 | 0.698 | 0.900 | 0.680 | 0.095 | 0.052 | 0.110 | 0.038 |
| Arbuckle Uplift | 1.570 | 0.698 | 1.500 | 0.680 | 0.095 | 0.052 | 0.050 | 0.038 |
| South Central Plains | 2.078 | 1.092 | 0.750 | 0.385 | 0.108 | 0.056 | 0.070 | 0.050 |
| Ouachita Mountains | 0.535 | 0.296 | 0.450 | 0.300 | 0.024 | 0.018 | 0.025 | 0.010 |
| Arkansas Valley | 0.535 | 0.296 | 0.683 | 0.270 | 0.024 | 0.018 | 0.060 | 0.043 |
| Ozark Highlands | 0.535 | 0.296 | 1.500 | 0.379 | 0.024 | 0.018 | 0.070 | 0.007 |
| Central Irregular Plains | 3.210 | 1.750 | 1.150 | 0.712 | 0.338 | 0.165 | 0.160 | 0.093 |

Table 10. Ecoregion screening levels used as good/fair/poor cut-points for conductivity and turbidity stressor analyses.

| Ecoregion | Cond _NRSA Poor_Fair (uS/cm2) | Cond _NRSA Fair_Good (uS/cm2) | Cond _ECO Poor_Fair (uS/cm2) | Cond _ECO Fair_Good (uS/cm2) | Turb _ECO Poor_Fair (NTU) | Turb _ECO Fair_Good (NTU) |
|---|---|---|---|---|---|---|
| Southwest Tablelands | 2000 | 1000 | 2300 | 1000 | 20 | 12 |
| Central Great Plains | 2000 | 1000 | 2925 | 1000 | 45 | 22 |
| Cross Timbers | 2000 | 1000 | 1000 | 550 | 40 | 4 |
| Arbuckle Uplift | 2000 | 1000 | 1000 | 500 | 7 | 4 |
| South Central Plains | 1000 | 500 | 500 | 180 | 20 | 10 |
| Ouachita Mountains | 1000 | 500 | 500 | 65 | 10 | 5 |
| Arkansas Valley | 1000 | 500 | 500 | 160 | 20 | 7 |
| Ozark Highlands | 1000 | 500 | 500 | 285 | 5 | 2 |
| Central Irregular Plains | 2000 | 1000 | 1000 | 450 | 40 | 16 |

**Site Evaluation and Miles Assessed**

Between the years of 2013 and 2017 a total of 150 randomly chosen sites were chosen as candidate target sites representing a total of 21,101 river/stream miles. The total sampleable river and stream miles assessed for the study period breaks down as follows:

- Total Miles Assessed= 21,101 ( Figure 4)
- SY_13 Total Miles Assessed = 5,525
- SY_14 Total Miles Assessed = 5,349
- SY_15 Total Miles Assessed = 3,922
- SY_16 Total Miles Assessed = 3,057
- SY_17 Total Miles Assessed = 3,248
- Total River Miles Assessed (2013-2017) = 6,068
- Total Stream Miles Assessed (2013-2017) = 15,033

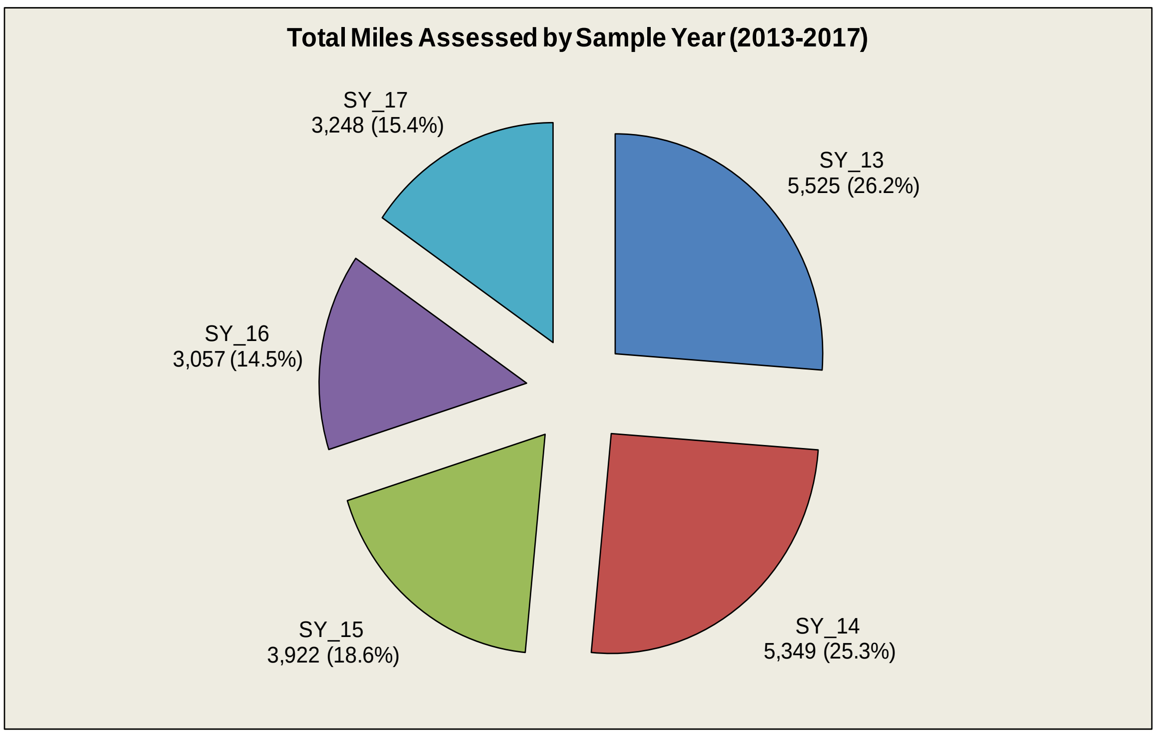



Figure 4. Total Miles Assessed and Percentages of Total Miles for Each Sample Year for the 2013-2017 Study Period. Total Miles Assessed= 21,101.

Total miles assessed for this study were calculated for rolling two-year study periods (13-14, 14-15, 15-16, and 16-17) (Figure 5). In addition, total miles assessed were also calculated for the three Aggregated Oklahoma ecoregions (FPFH, TF, and WPT) (Figure 6), and for a comparison of rivers versus streams for the five year study period (Figure 7). The 3 Aggregated ecoregions of Oklahoma are the Forested Plains and Flint Hills (FPFH), the Temperate Forests (TF), and the Western Plains and Tablelands. These three aggregated ecoregions have been used to combine similar Level three ecoregions of Oklahoma into more manageable units (Figure 1). Additionally, Figure 8 shows the site evaluation status for all sites. For the total study period 250 sites were evaluated and 150 were sampled.

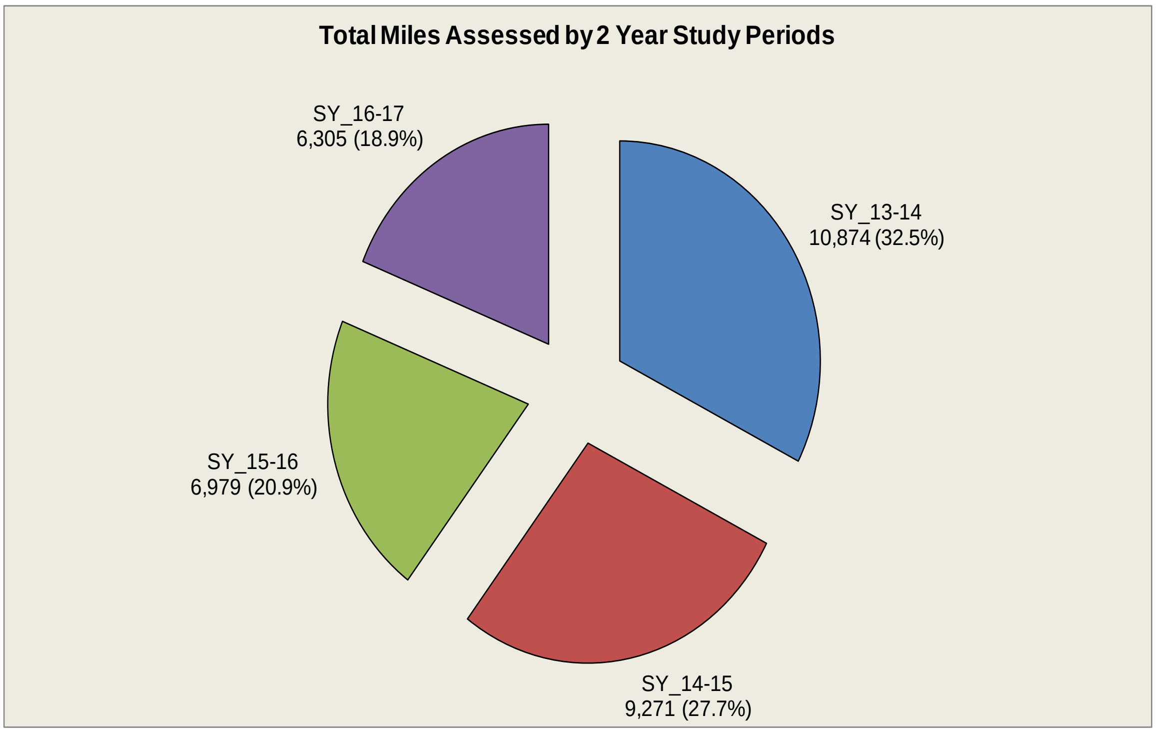



Figure 5. Total Miles Assessed and Percentages of Total Miles by Two Year Study Periods.

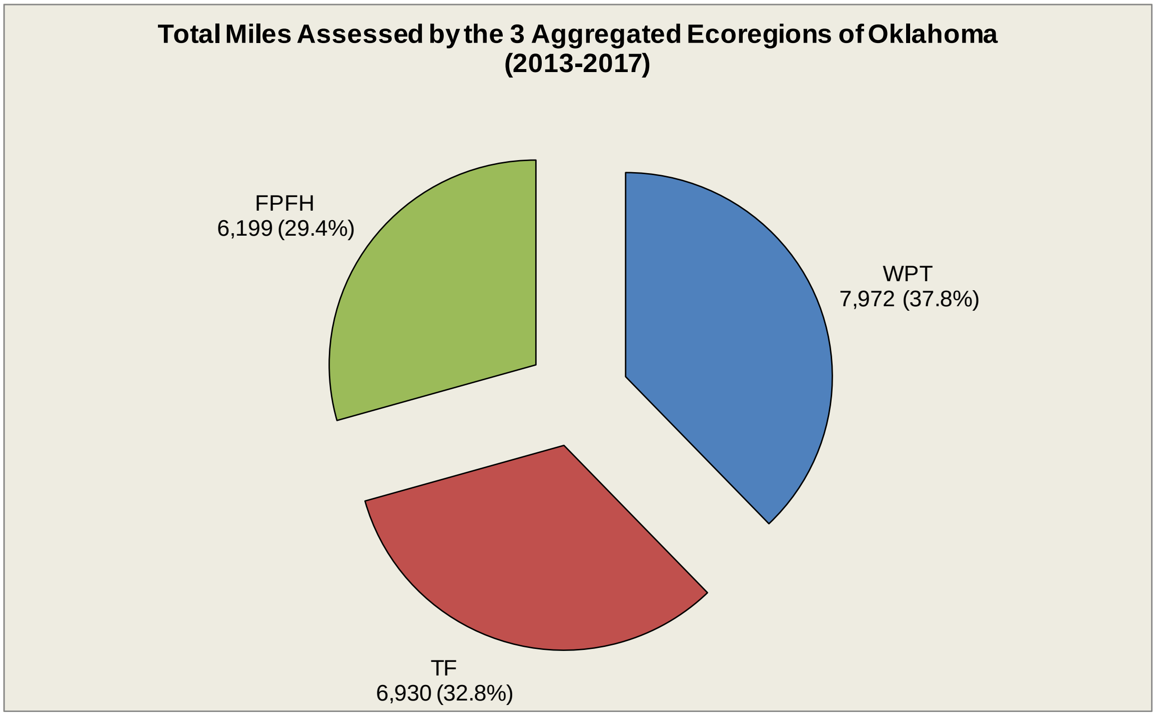



Figure 6. Total Miles Assessed and Percentages of Total Miles for the Three Aggregated Ecoregions of Oklahoma.

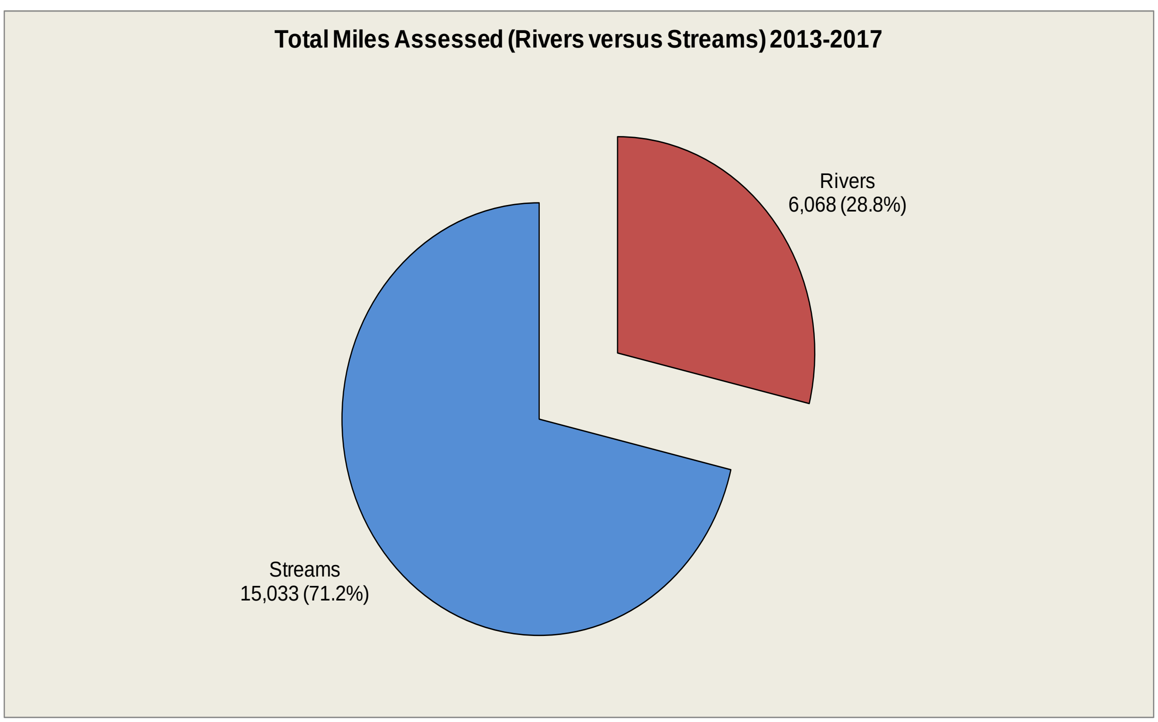



Figure 7. Total Miles Assessed and Percentages of Total Miles for Rivers and Streams.

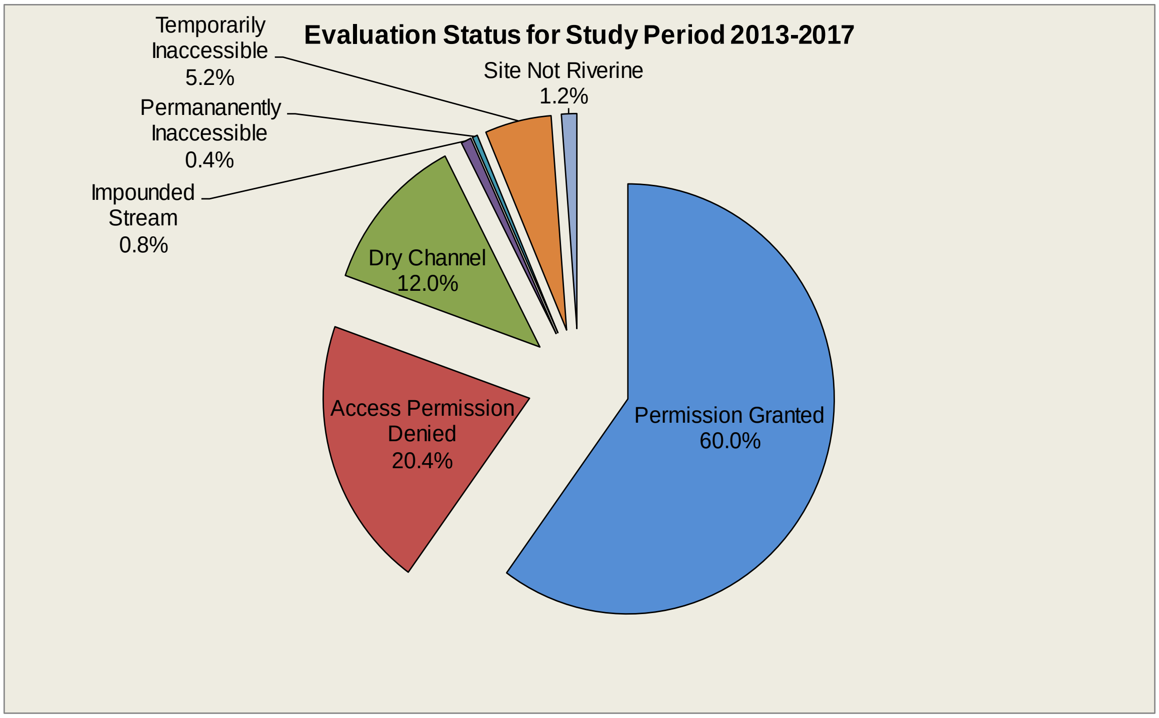



Figure 8. Site Evaluation Status for Study Period 2013-2017. Total Sites Evaluated was 250. Total Sites Sampled was 150.

**Biological Indicator Condition Extent**

Statewide condition extent estimates were made for benthic macroinvertebrates (aquatic bugs), fish, sestonic algae, and periphyton (benthic algae). For each biotic assemblage, the indicator condition was categorized as good, fair, or poor based on methodology described in the "Methods" section, and percentages for each condition category are based on "percent of total miles". For data that were not collected or not assessed for other reasons, a fourth category was created and named as Not Assessed in all graphics of this report. In Figure 9, good/fair/poor estimates are grouped for each indicator (fish, bugs, benthic algae, and sestonic algae) for the entire five-year study. In Figures 10-17, yearly and bi-yearly extent estimates for each biological indicator are depicted with standard error for each classification. For figures 18-20, indicator extent data for waterbody size comparisons are presented (rivers versus streams). Figures 21-23 show indicator extent data for the three aggregated ecoregions of Oklahoma.

For fish extent, the stream miles in good condition was above 50% for every year of this study except for 2013 (Figure 10). For the 2013-2017 study 55.8% of total miles were in good condition for fish compared to 58% in the 2008-2011 report (OWRB, 2013). Nearly 16% of total stream/river miles were classified in poor condition for fish for the 2013-2017 study (Figure 9).

For bugs nearly 23% of stream miles were classified in poor condition ( Figure 9). In SY 2013 macroinvertebrate poor condition on rivers and streams was approaching 47% of total miles (Figure 11). River miles in poor condition was substantially higher than stream miles in poor condition for macroinvertebrates from 2013-2017.

A relatively small percentage of miles are classified in poor condition for benthic algae (benthic chlorophyll *a*). For the five year study period, approximately 10% of miles are in poor condition, with 53% of miles in good condition ( Figure 9). In the 2008-2011 study period these values were 10% and 75% indicating no change in benthic algae for poor condition stream miles and a major decline in the number of stream miles in good condition (OWRB, 2013). Benthic algae condition (when compared to sestonic algae condition) was much more consistent when comparing rivers and streams data. For rivers 59% of stream miles were in good condition for benthic algae compared to 50.7% for streams (Figure 20).

For sestonic algae (sestonic chlorophyll *a*), the percentage of total miles in poor condition was 24% from the 2013-2017 study ( Figure 9). This percentage was nearly the same in the 2008-2011 study (OWRB, 2013). For the 2013-2017 study 61.6% of total miles were in good condition for sestonic algae compared to 55% for the 2008-2011 study. Sestonic algae condition was highly variable among rivers and streams. Approximately 43% of river miles are in poor condition for sestonic algae as compared to 16% of stream miles (Figure 20).

As a general trend, the WPT aggregated ecoregions of Oklahoma, which resides in western Oklahoma, when compared to the other two aggregated ecoregions (FPFH and TF of eastern Oklahoma) tends to have more miles in poor condition for all indicators (fish, bugs, benthic algae, and sestonic algae) (Figures 21- 23). These differences could be attributed to a variety of factors including climatological and land use variability between the three aggregated ecoregions.

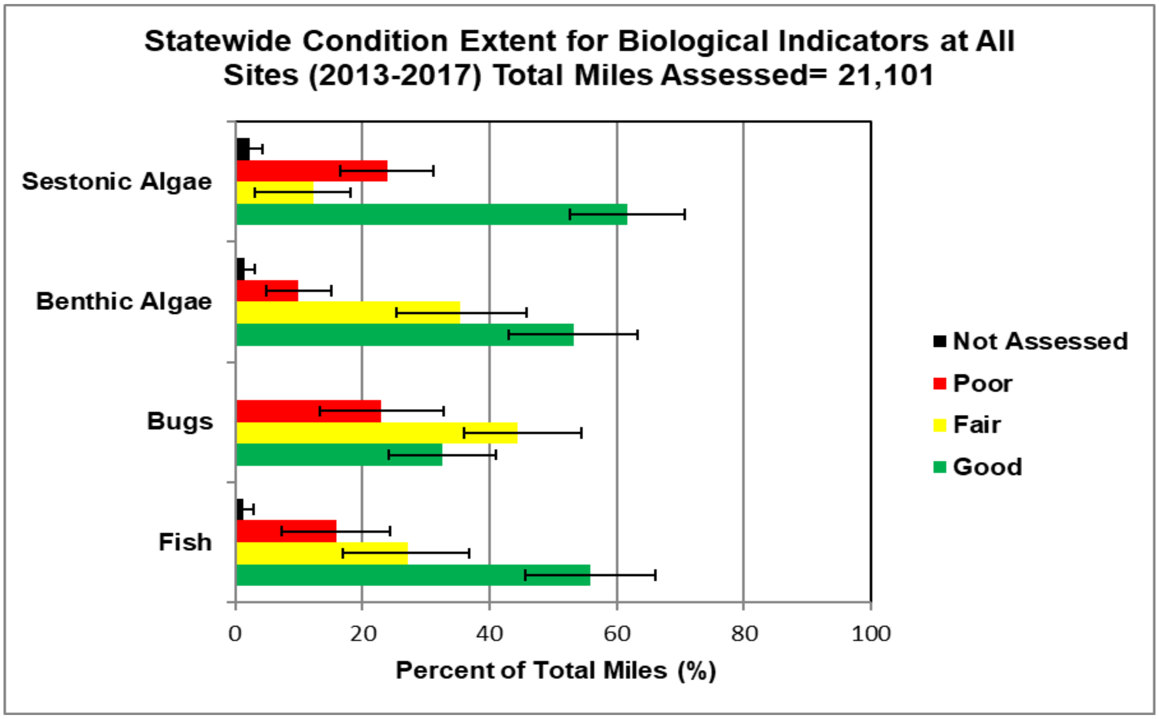



Figure 9. Biological Indicator Condition Extent for All Sites Statewide from 2013-2017. Upper and Lower Confidence Bounds Represent a 95% Confidence Interval.

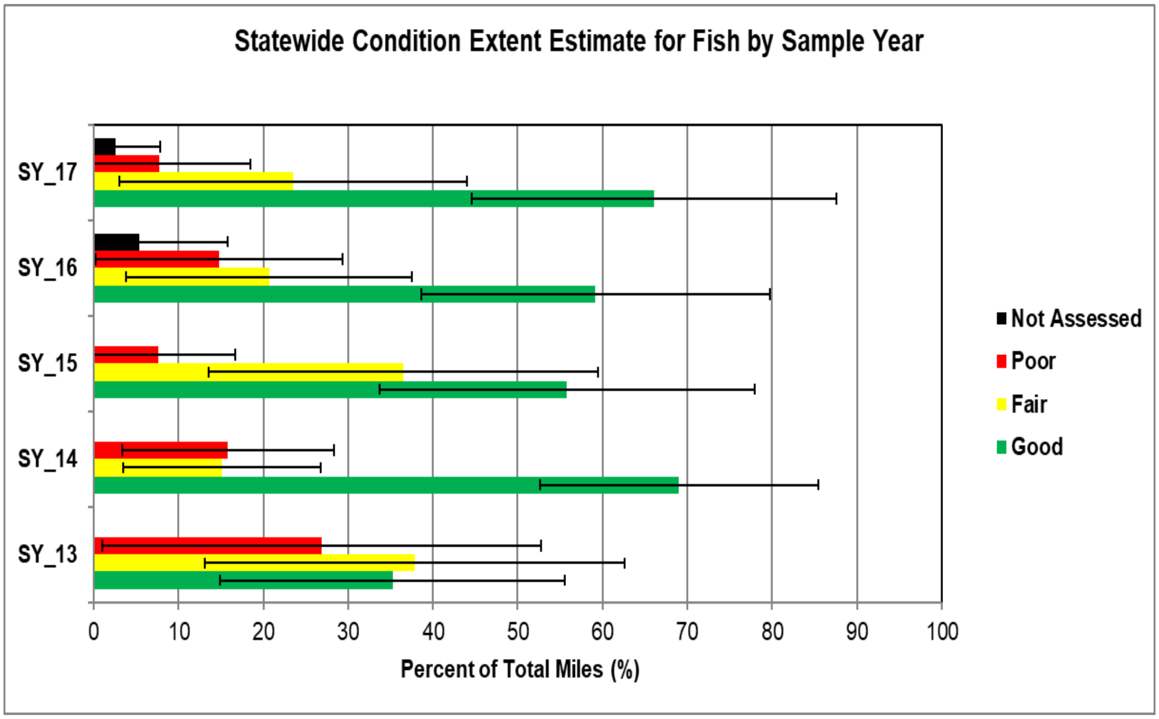



Figure 10. Fish Condition Extent Estimated Statewide for Oklahoma (2013-2017). Upper and Lower Confidence Bounds Represent a 95% Confidence Interval

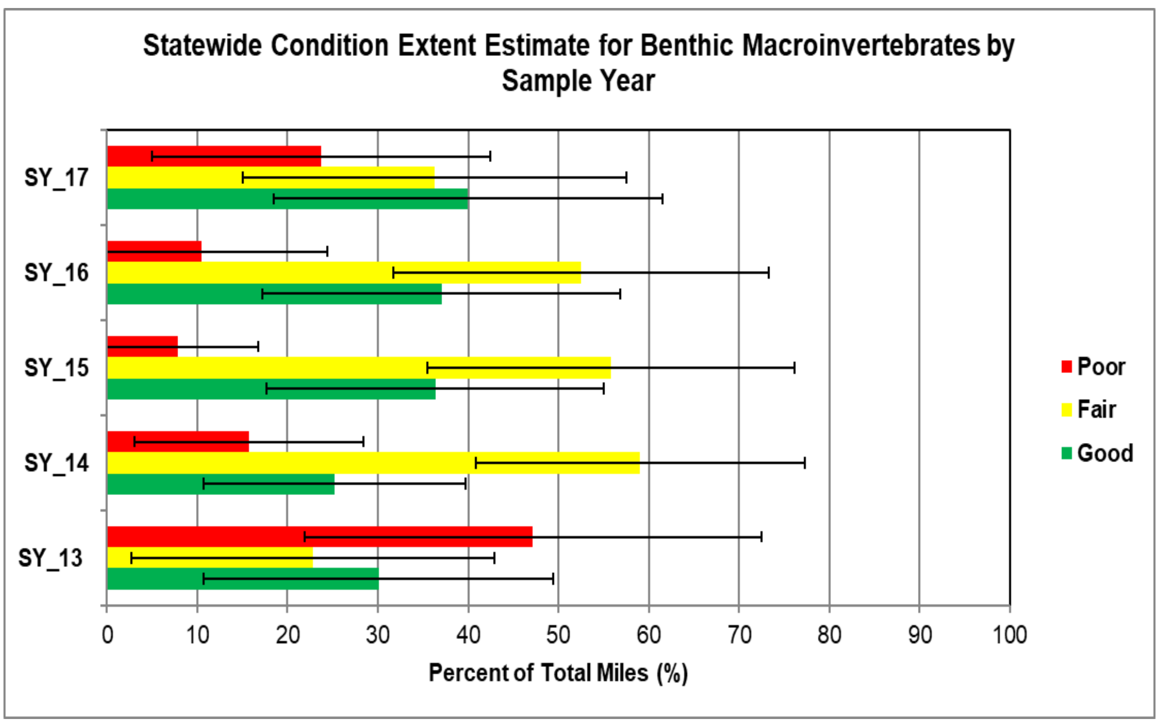



Figure 11. Benthic Macroinvertebrates Condition Extent Estimated Statewide for Oklahoma (2013-2017). Upper and lower confidence bounds represent a 95% confidence Interval.

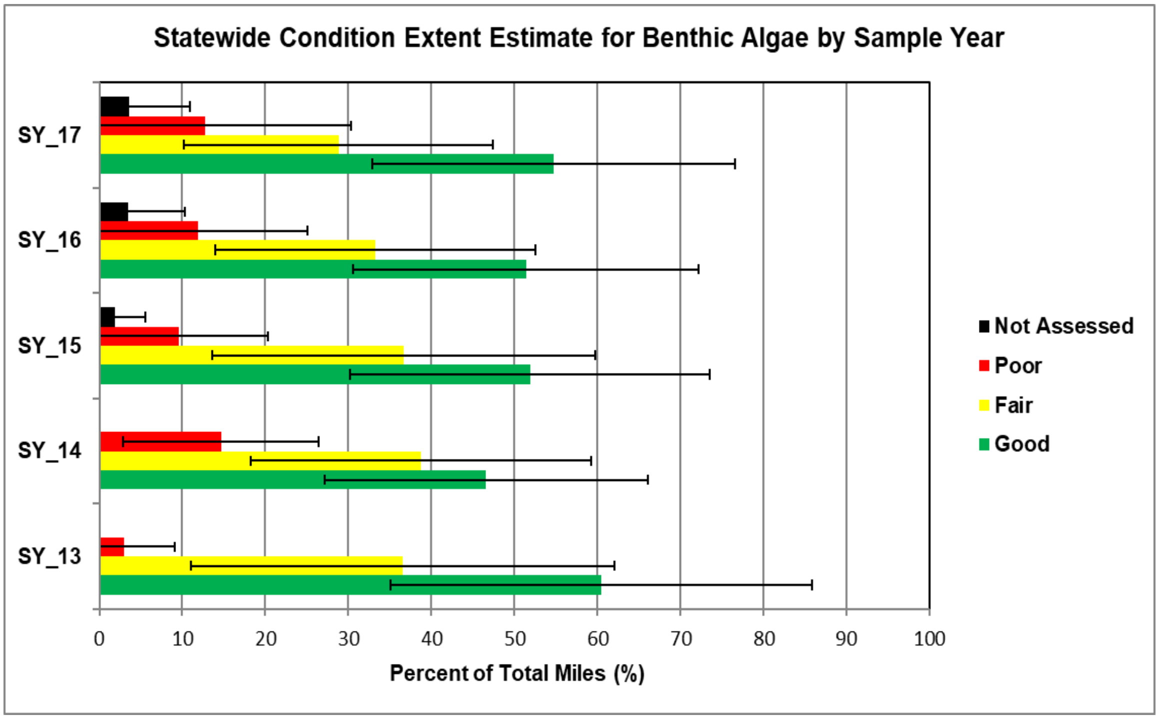



Figure 12. Benthic Algae Condition Extent Estimated Statewide for Oklahoma (2013-2017). Upper and lower confidence bounds represent a 95% confidence Interval.

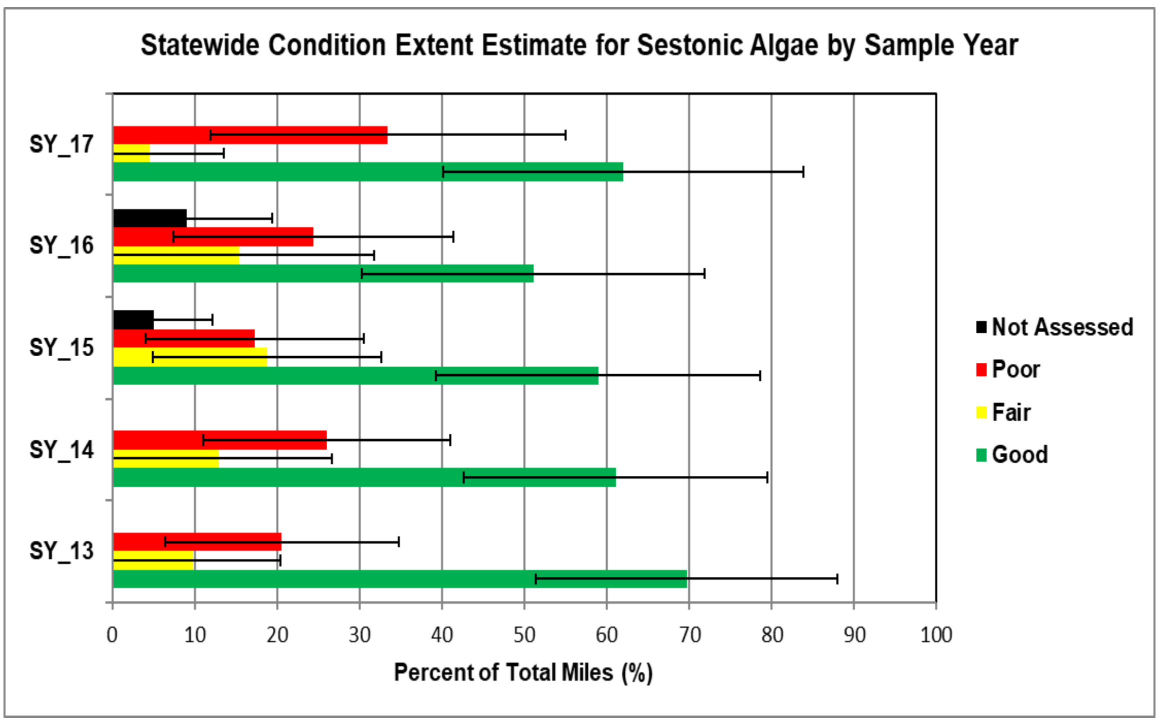



Figure 13. Sestonic Algae Condition Extent Estimated Statewide for Oklahoma (2013-2017). Upper and lower confidence bounds represent a 95% confidence Interval.

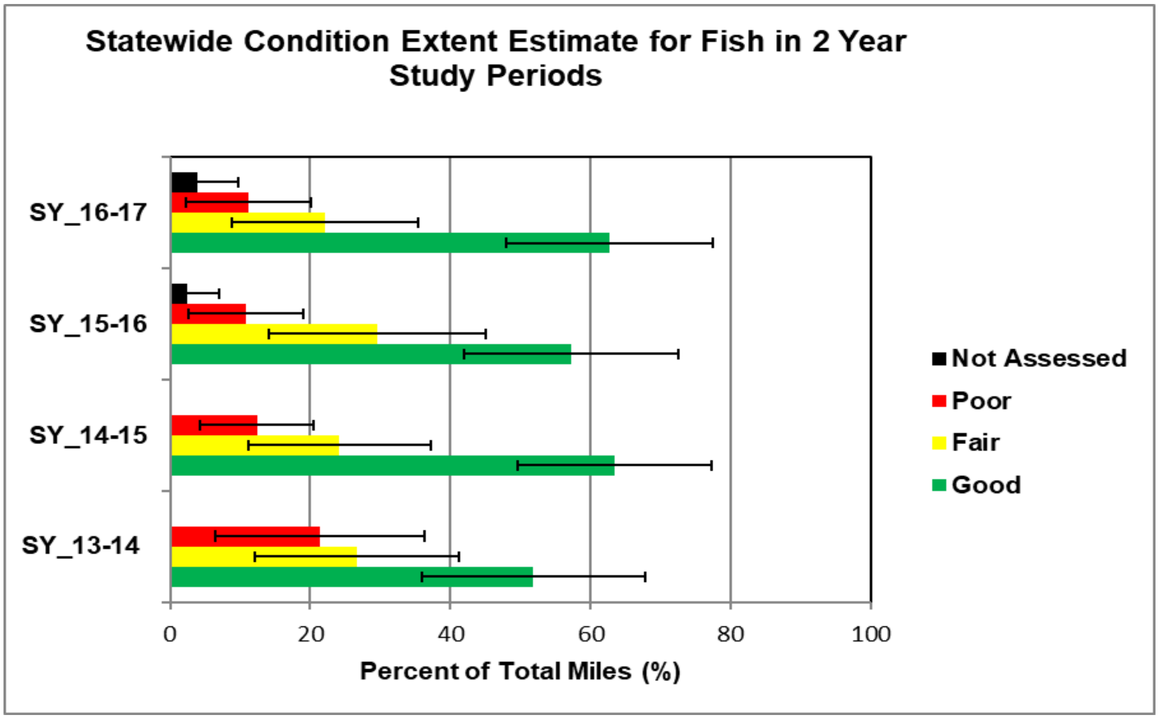



Figure 14. Fish Condition Extent Estimated Statewide by 2 Year Study Periods for Oklahoma (2013-2017). Upper and Lower Confidence Bounds Represent a 95% Confidence Interval.

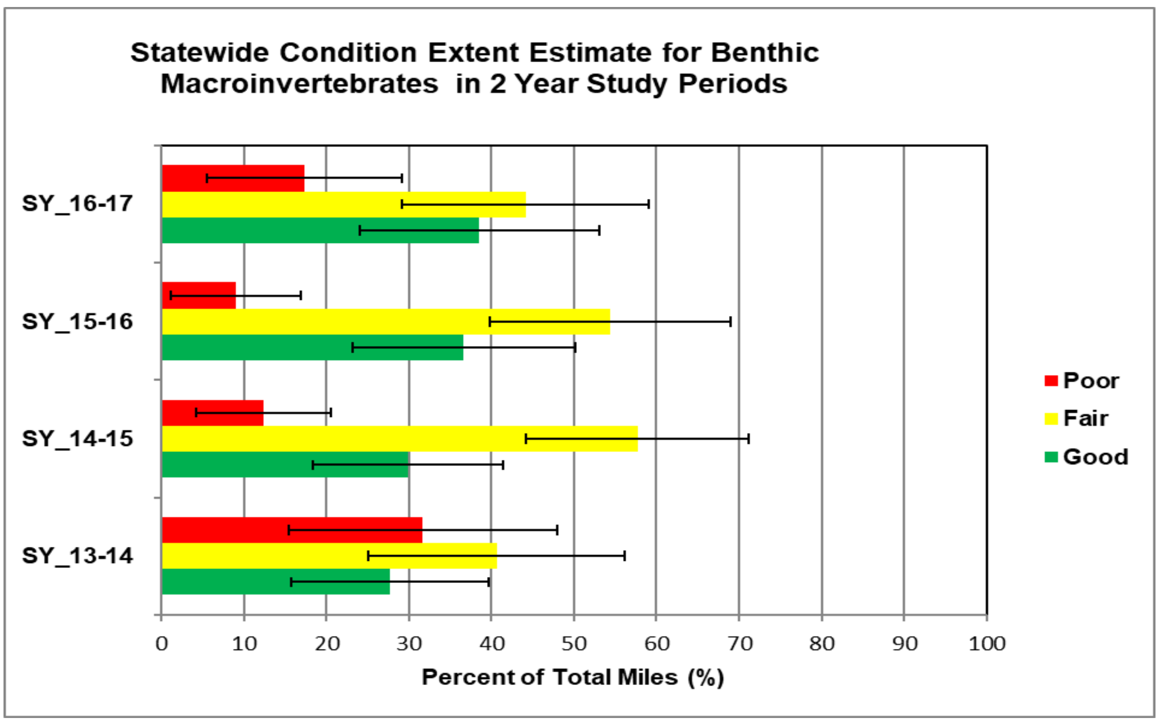



Figure 15. Benthic Macroinvertebrate Condition Extent Estimated Statewide by 2 Year Study Periods for Oklahoma (2013-2017).

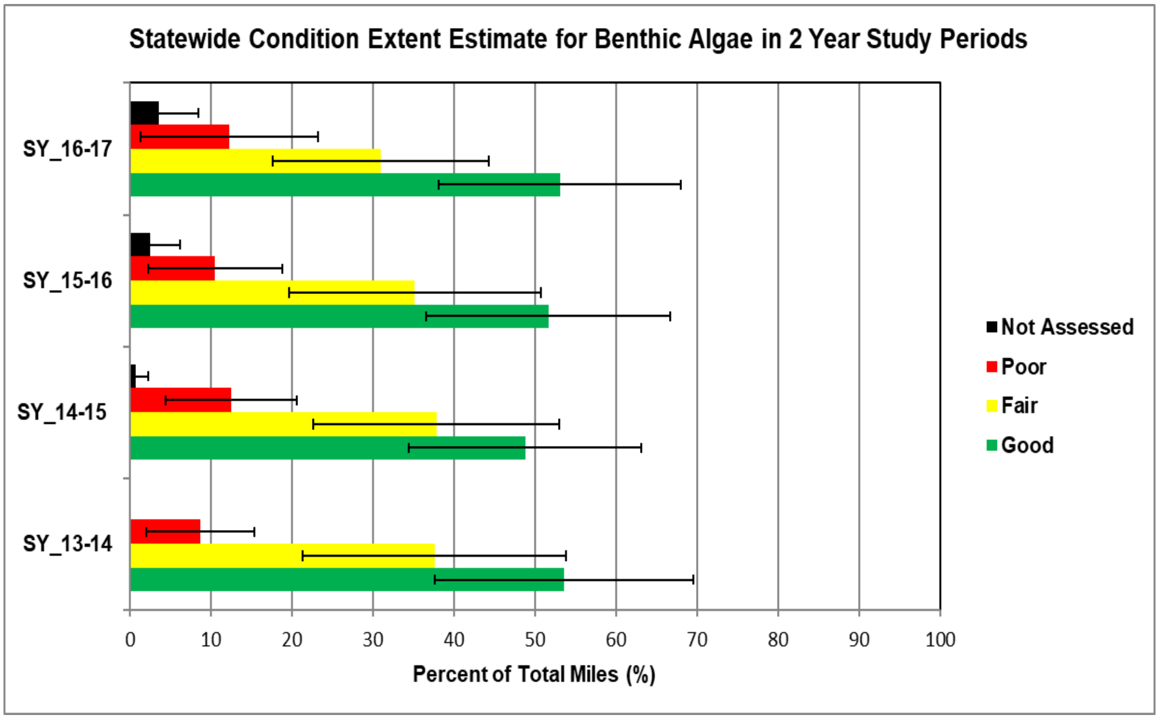



Figure 16. Biological Indicator Condition Extent Estimated Statewide for Benthic Algae for 2 Year Study Periods. Upper and Lower Bounds Represent a 95% Confidence Interval.

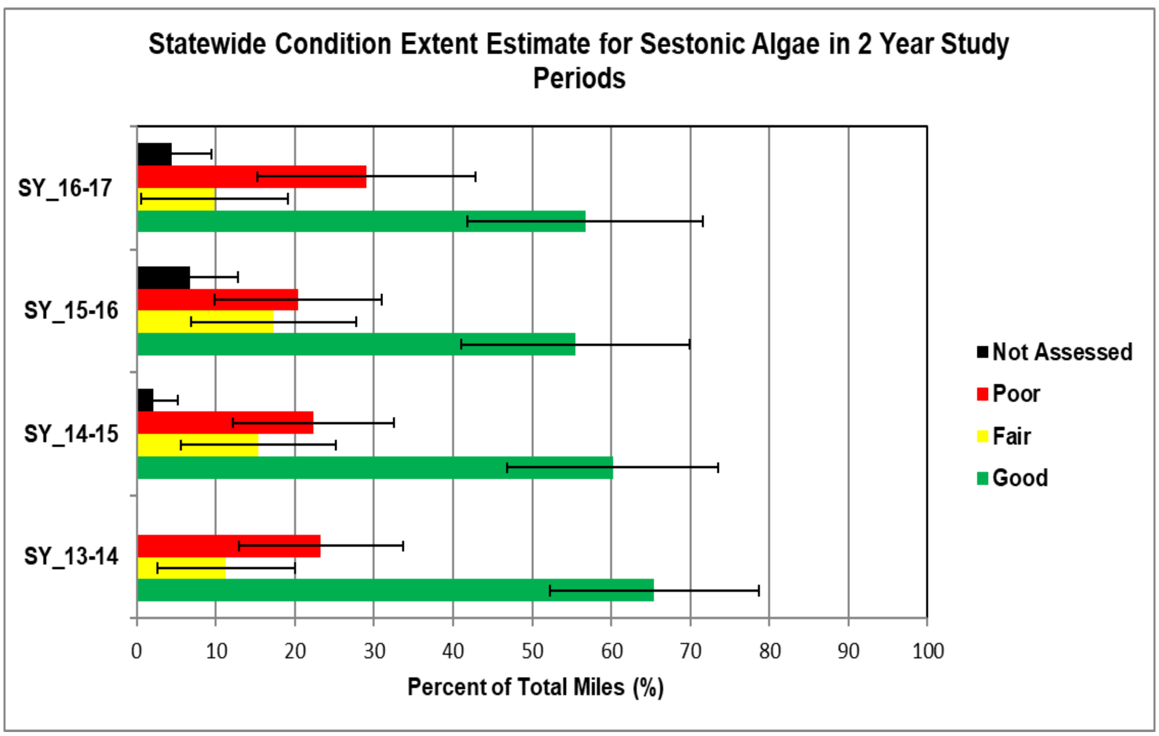



Figure 17. Biological Indicator Condition Extent Estimated Statewide for Sestonic Algae for 2 Year Study Periods. Upper and Lower Bounds Represent a 95% Confidence Interval.

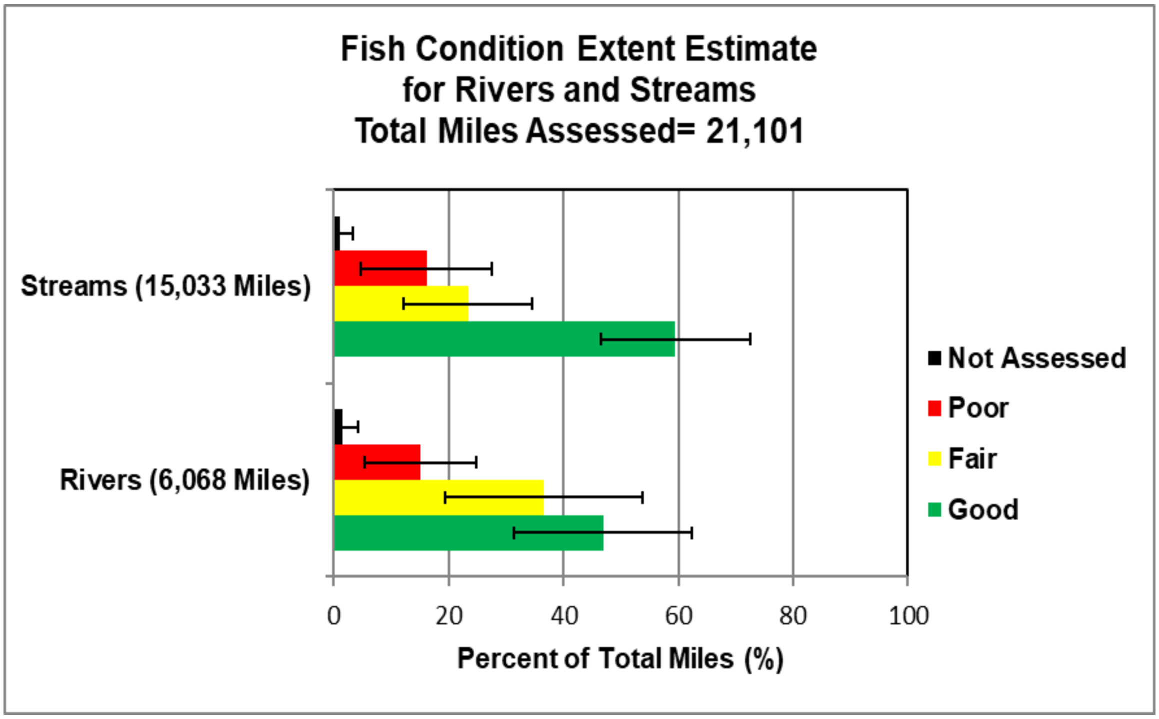



Figure 18. Fish Condition Extent Estimated Statewide for the Rivers (N=58) and Streams (N=92) of Oklahoma for Sample Years 2013-2017. Upper and Lower Bounds Represent a 95% Confidence Interval.

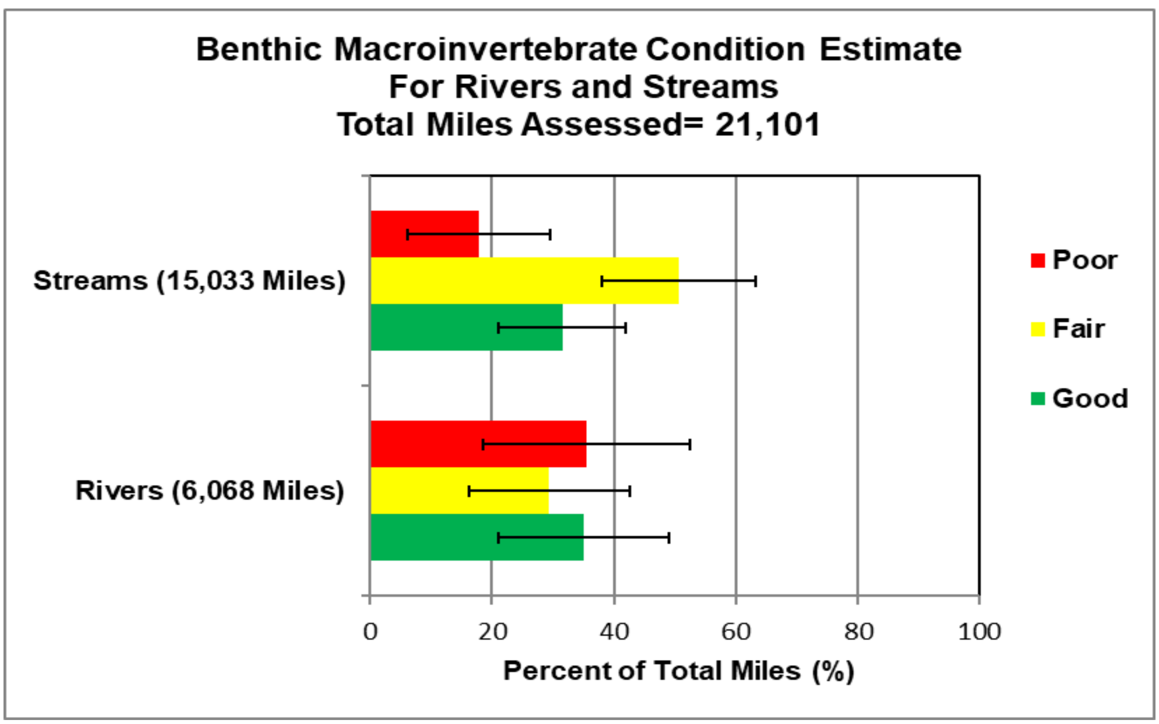



Figure 19. Benthic Macroinvertebrate Condition Extent Estimated Statewide for Oklahoma Rivers(N=58) and Streams(N=92) for Sample Years 2013-2017.

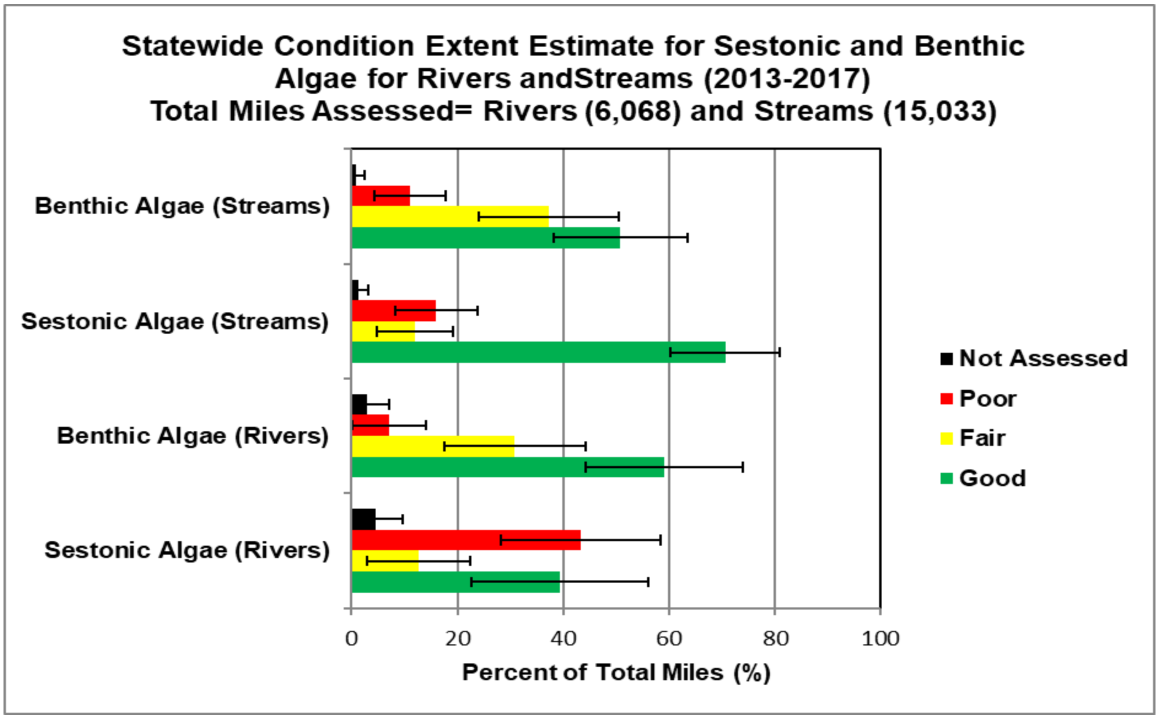



Figure 20. Biological Indicator Condition Extent Estimated Statewide for Sestonic and Benthic Algae for all Rivers and Streams (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

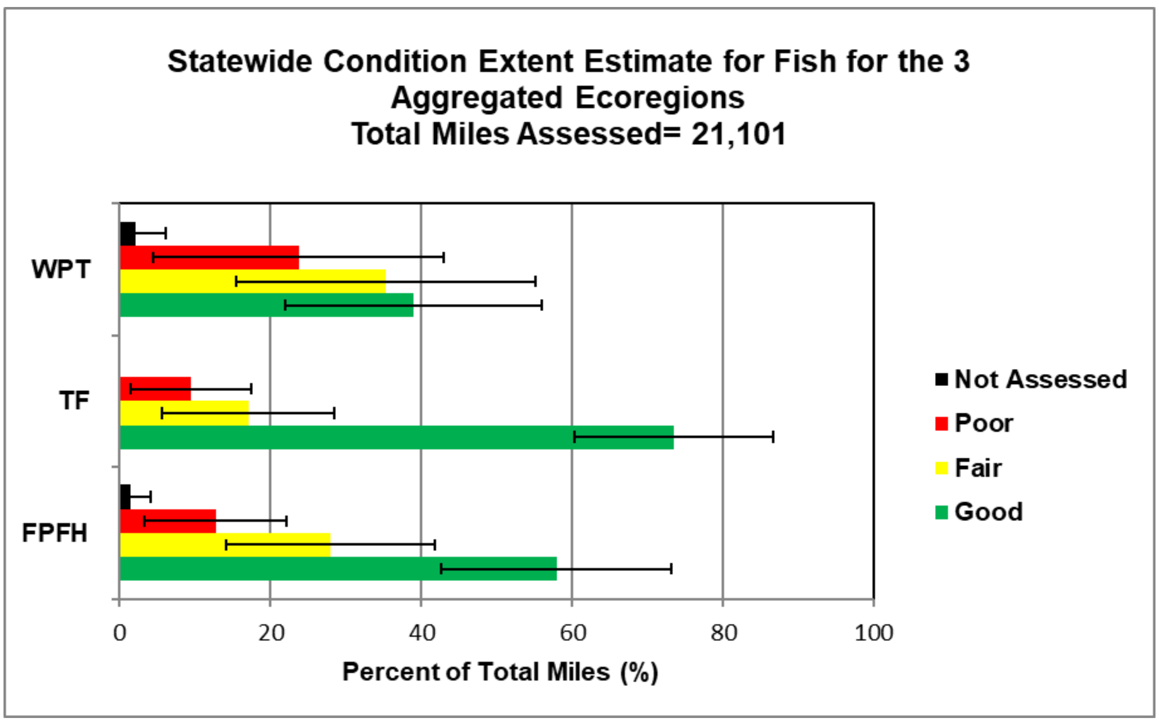



Figure 21. Fish Condition Extent Estimated Statewide for the 3 Aggregated Ecoregions of Oklahoma from 2013-2017. Upper and Lower Bounds Represent a 95% Confidence Interval.

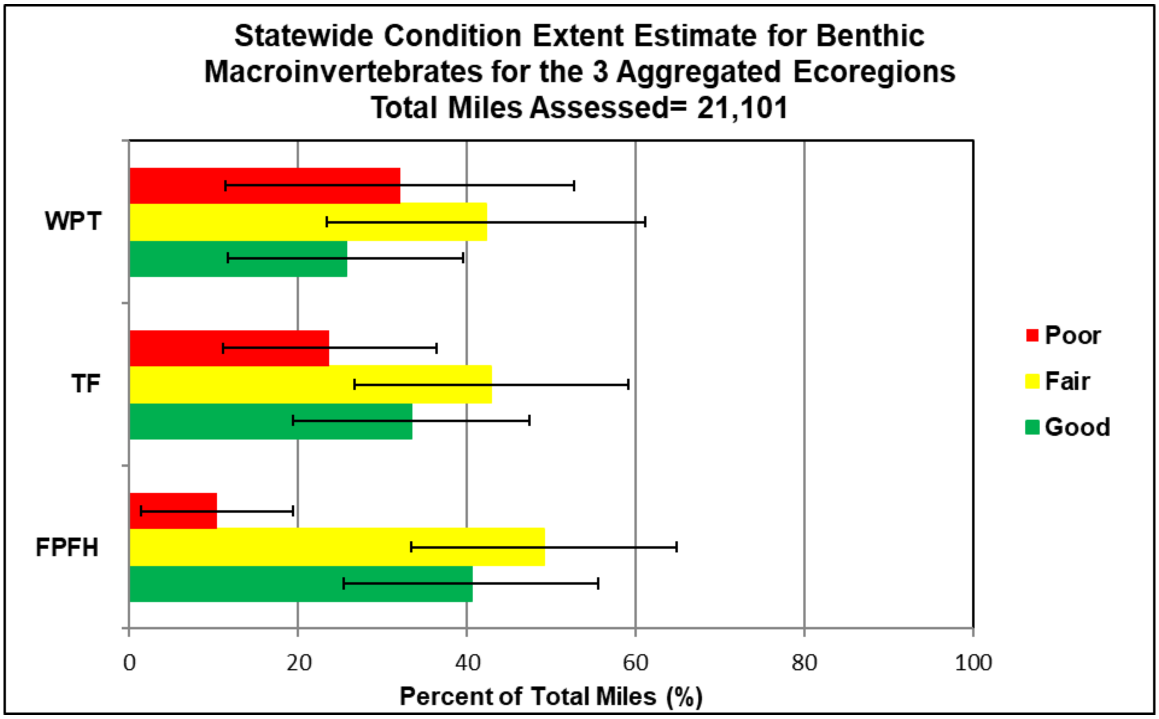



Figure 22. Benthic Macroinvertebrate Condition Extent Estimated Statewide for the 3 Aggregated Ecoregions of Oklahoma from 2013-2017.

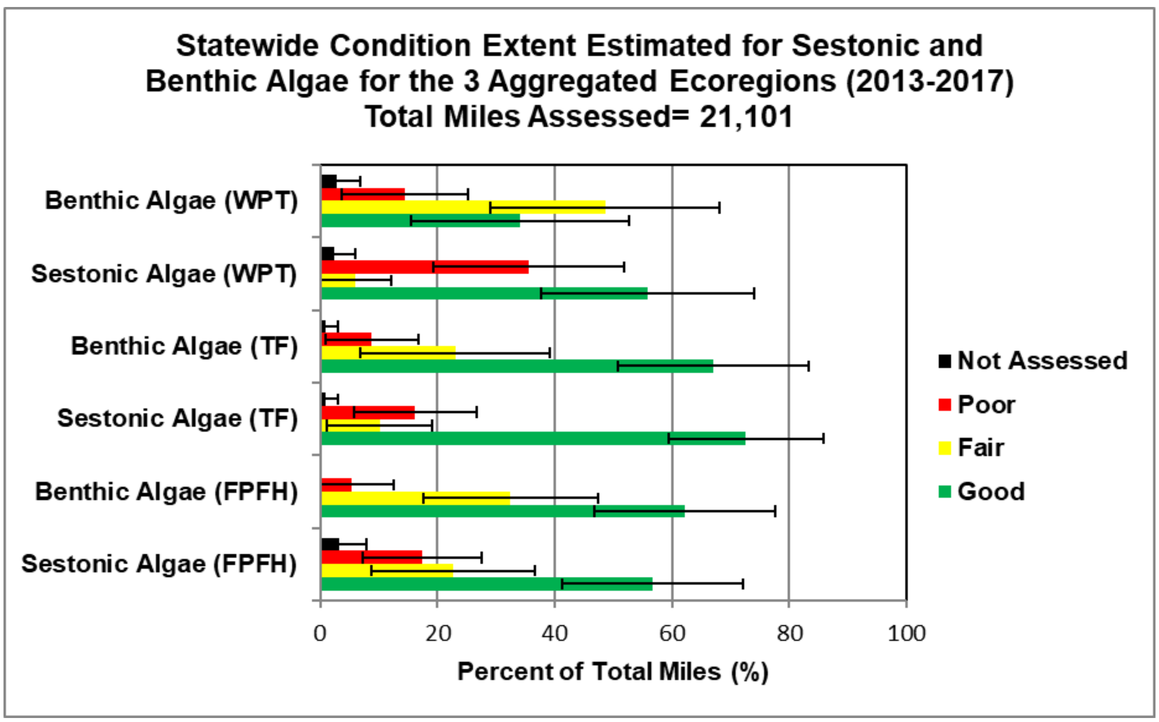



Figure 23. Biological Indicator Condition Extent Estimated Statewide for Sestonic and Benthic Algae in the 3 Aggregated Ecoregions of Oklahoma (2013-2017).

**Stressor Extent**

Statewide condition extent estimates were made for TP, TN, conductivity, and turbidity. Estimates employed the Omernick level III ecoregion screening levels. For each stressor the condition was categorized as good, fair, or poor based on methodology described in the "Methods" section, and percentages for each condition category are based on "percent of total miles".

In Figures 24-43, good/fair/poor estimates for nutrients (TP and TN), conductivity and turbidity are grouped for each stressor by all years, individual sample years, two-year study periods, the three aggregated ecoregions, and rivers/streams. From 2013-2017 the total phosphorus extent in poor condition was generally 32-57%, while the percent of total miles in good condition ranged from 12-38% (Figure 24). During the 2008-2011 reporting period 30-40% of total stream/river miles were in poor condition for phosphorus (OWRB, 2013). This demonstrates that phosphorus continues to be a major concern for water quality. When considering stream size, approximately 63% of river miles were in poor condition for TP, which is significantly higher than in streams (38%) (Figure 40).

Total nitrogen extent in good condition ranged from 27% in SY_16 to 18% in SY_14 (Figure 25). However, TN poor condition varied greatly from year to year with 19% in SY_16 and 57% in SY_13 (Figure 26). During the 2008-2011 reporting period the total nitrogen extent ranged from 25% in 2008-2009 to almost 40% in poor condition from 2010-2011 (OWRB, 2013). Poor condition of TN over the five-year study period in rivers was 49% (Figure 41). During the same five-year period, poor condition of TN in streams was 37%. Along with the aforementioned results for TP, TN data demonstrates that management of both nutrients is necessary to improve water quality.

Although, phosphorus is a primary concern to many water quality managers this demonstrates that nitrogen should be just as big of a concern for degradation of water quality. Excess nutrients continue to be a statewide problem for Oklahoma's rivers and streams. This is evident by looking at
Figure 36 and Figure 37. These two graphs illustrate that nutrient extent in poor condition remains high in all three of the aggregated ecoregions for both total phosphorus and total nitrogen. More than 50% of total stream/river miles in the WPT and TF were in poor condition for TP. TN ranged between 38-44% in poor condition for the three aggregated ecoregions. Although not explicitly included in this report, excess nutrients in Oklahoma's flowing waterbodies may eventually lead to eutrophication and poor water quality in Oklahoma's many lakes.

Conductivity extent in good condition was fairly consistent (25%-44%) for three out of five years in the study (Figure 27). In SY_15 52% of the stream miles were in good condition for conductivity. This sample year was a major flood year for Oklahoma in which the state set a record for the highest recorded average statewide rainfall amount at 48 inches (Mesonet, 2015). However, poor condition for conductivity ranged from 15-37% for the study. Conductivity extent as a whole was in the worst condition in the Western Plains and Tablelands aggregated ecoregion (Figure 38). This is to be expected because this aggregate of ecoregions is composed of western Oklahoma where naturally high conductivity areas exist on certain rivers and streams (Survey, Oklahoma Geological, 2008). However, not all of western Oklahoma is naturally salty. Some areas have been impacted by anthropogenic activities that have exacerbated the problem. As with nutrients, conductivity condition is significantly different when comparing streams to rivers. The percent of river miles in poor condition was 34% compared to just 19% of stream miles in poor condition (Figure 42).

Turbidity extent was highly variable during the five-year study. During the flood year of 2015 the highest extent of miles in the fair condition was recorded with a staggering 54% (Figure 28). However, at only 29%, SY 2015 did not have the highest percentage of total miles in the good condition. Turbidity extent in poor condition ranged from 14% to 35% while the extent ranged from 19-60% for good condition. Turbidity extent for poor condition was very similar between the 2008-2011 study period and the 2013-2017 study (OWRB, 2013). However, there were major differences for stream miles in the good condition and in the rivers/streams comparison between the 2 studies. For the three aggregated ecoregions, turbidity follows the opposite pattern of conductivity. The Western Plains and Tablelands aggregated ecoregion is in the best condition overall for turbidity extent (Figure 39). During the previous 2008-2011 reporting period rivers (37%) and streams (9%) were quite variable for poor turbidity condition (OWRB, 2013). This pattern was similar but not nearly as variable in the 2013-2017 reporting period (rivers-27%, streams- 18% in poor condition for turbidity) (Figure 43). SY 2017 was the best year for turbidity condition with both the highest percentage of miles in good condition (60%) and the lowest percentage of miles in poor condition (14%) (Figure 28). This will be an interesting trend to track in the next five-year report (2018-2022).

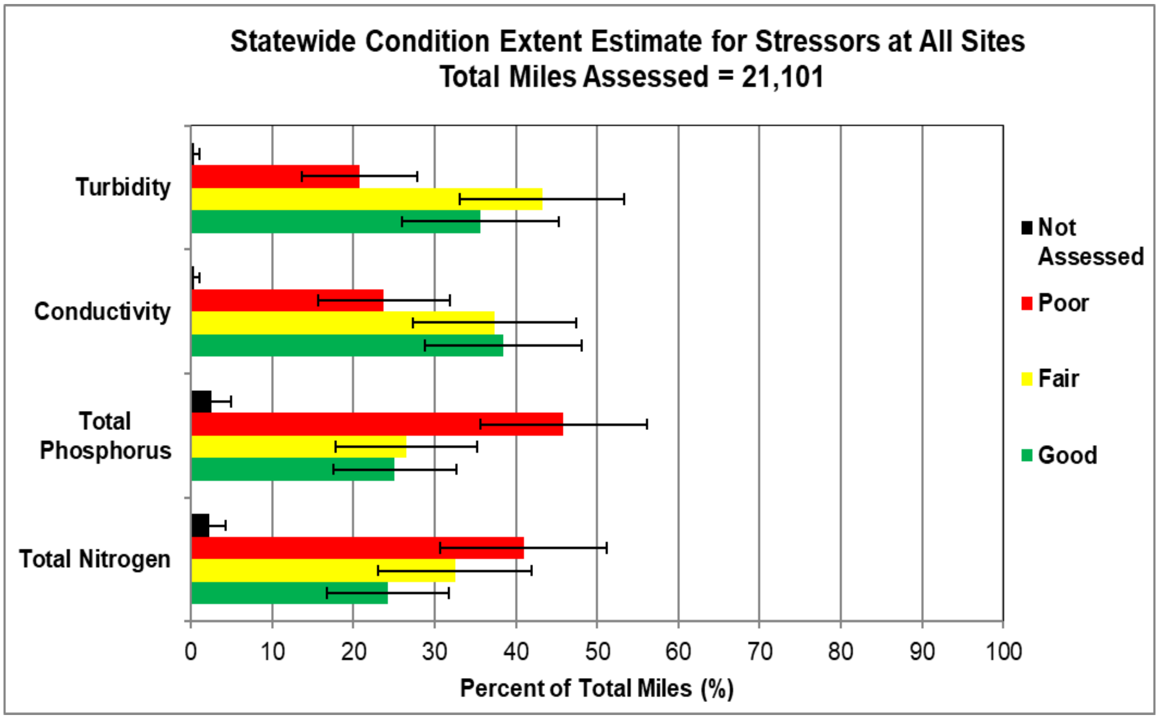



Figure 24. Condition Extent Estimated Statewide for Stressors at All Sites from 2013-2017. Upper and Lower Bounds Represent a 95% Confidence Interval.

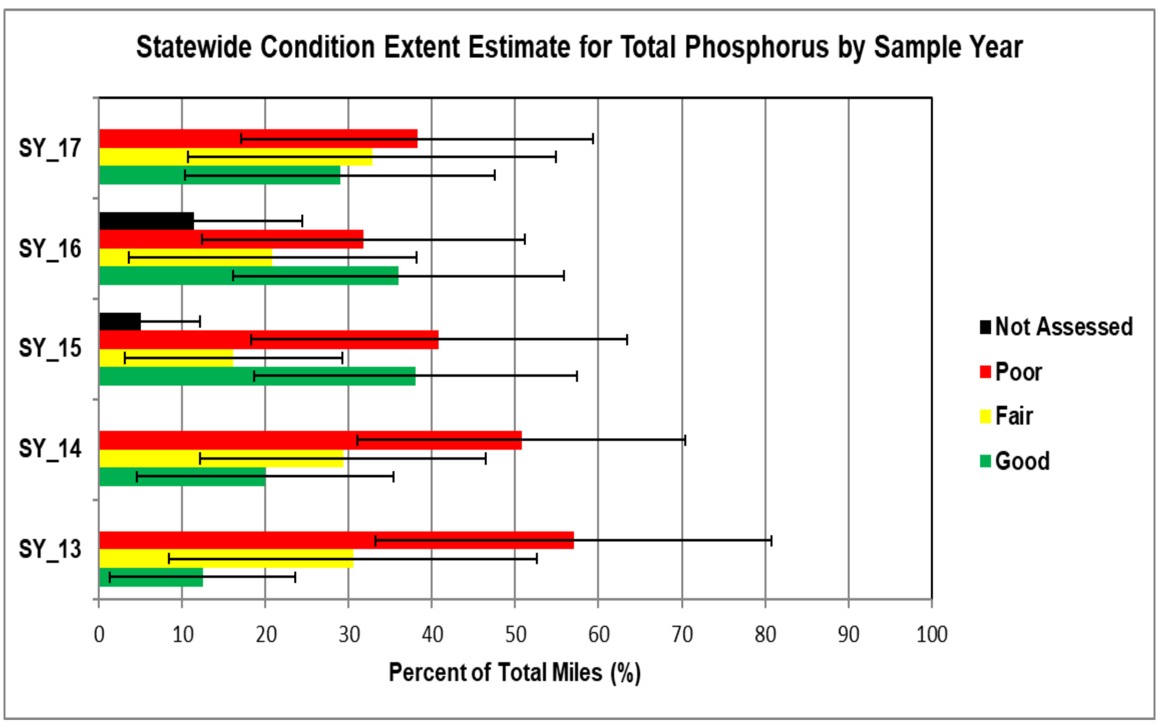



Figure 25. Stressor Extent Estimated Statewide for Total Phosphorus for All Sample Years (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

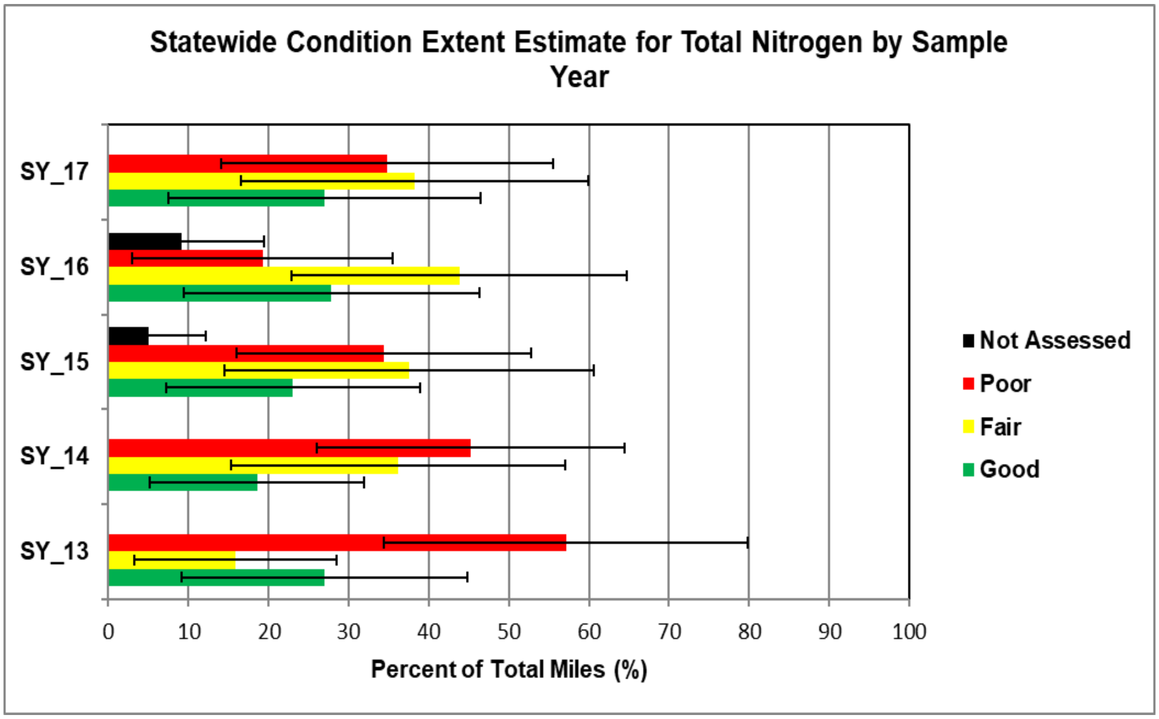



Figure 26. Stressor Extent Estimated Statewide for Total Nitrogen for All Sample Years (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

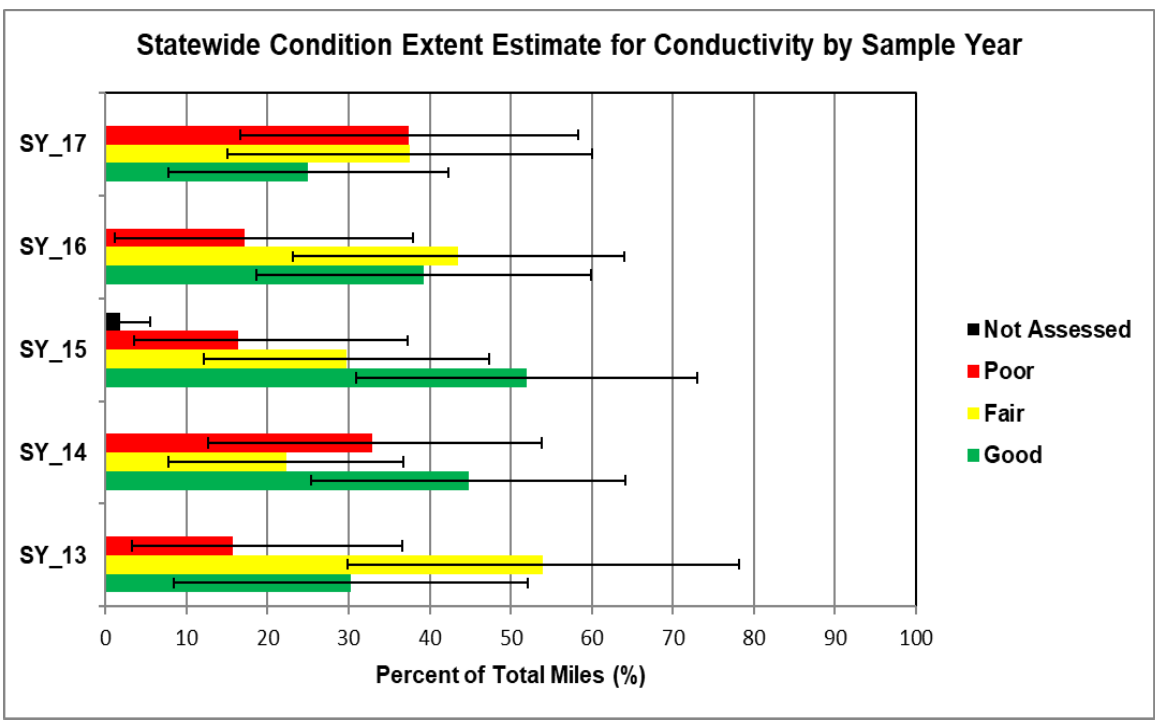



Figure 27. Stressor Extent Estimated Statewide for Conductivity for All Sample Years (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval. SY 2015 was a Major Flood Year for Oklahoma.

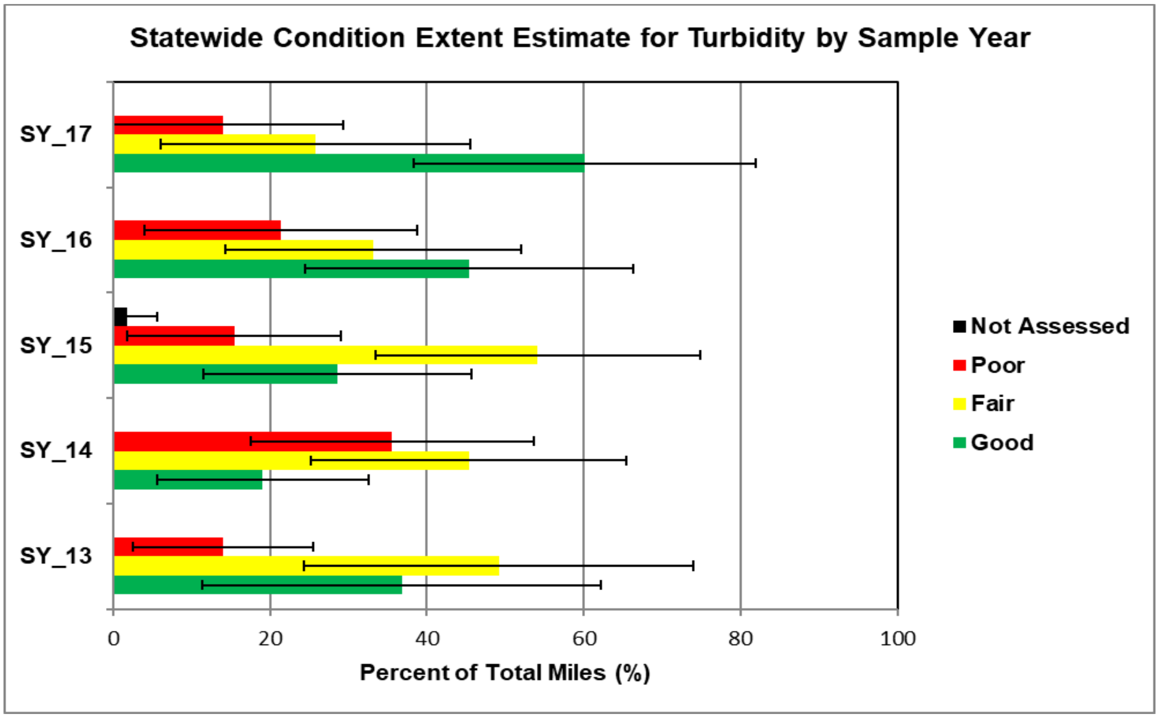



Figure 28. Stressor Extent Estimated Statewide for Turbidity for All Sample Years (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval. SY 2015 was a Major Flood Year for Oklahoma.

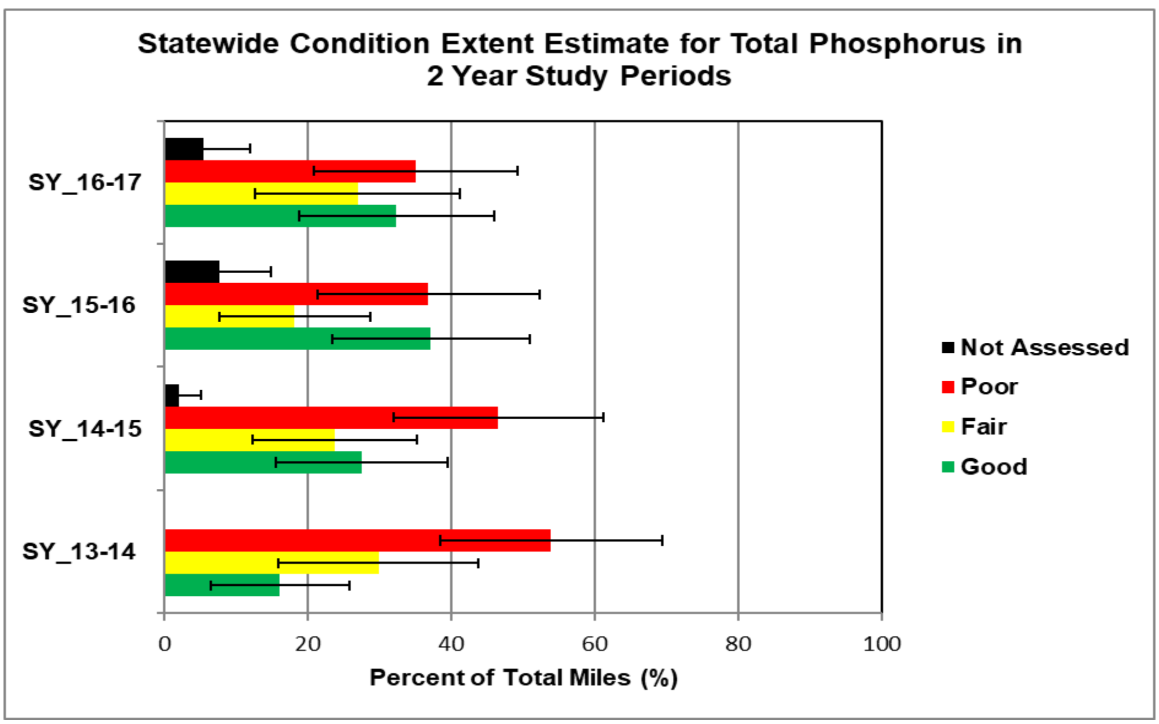



Figure 29. Stressor Extent Estimated Statewide for Total Phosphorus for 2 Year Study Periods. Upper and Lower Bounds Represent a 95% Confidence Interval.

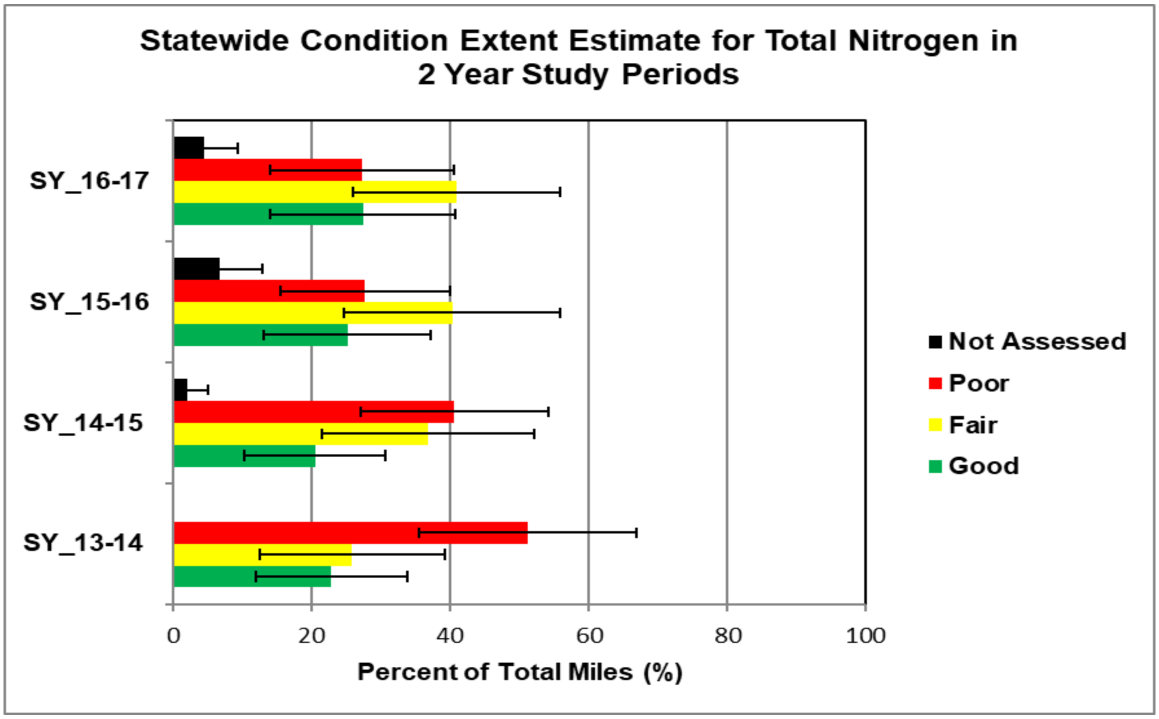



Figure 30. Stressor Extent Estimated Statewide for Total Nitrogen for 2 Year Study Periods. Upper and Lower Bounds Represent a 95% Confidence Interval.

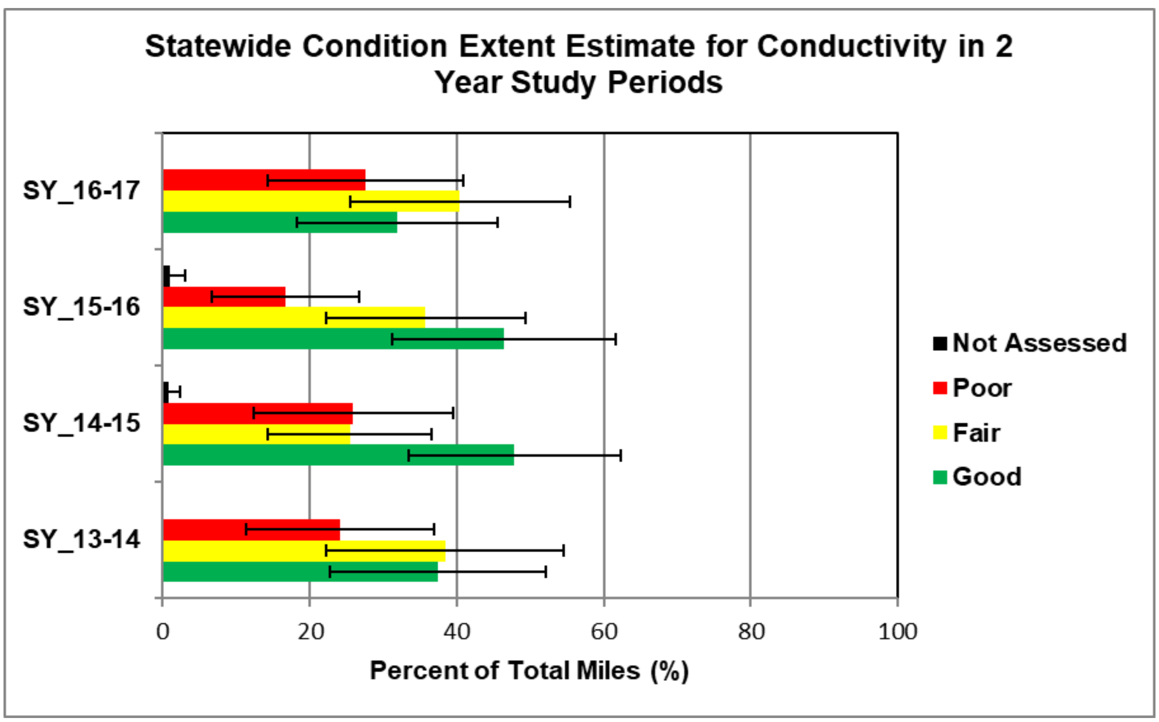



Figure 31. Stressor Extent Estimated Statewide for Conductivity for 2 Year Study Periods. Upper and Lower Bounds Represent a 95% Confidence Interval.

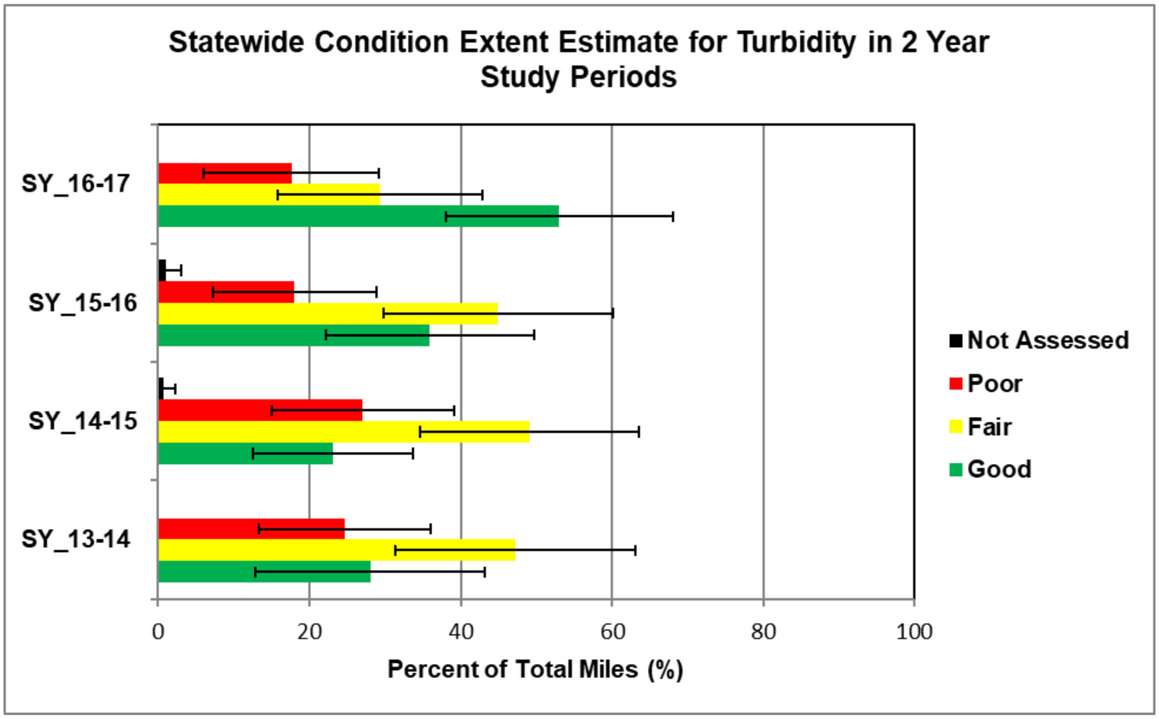



Figure 32. Stressor Extent Estimated Statewide for Turbidity for 2 Year Study Periods. Upper and Lower Bounds Represent a 95% Confidence Interval.

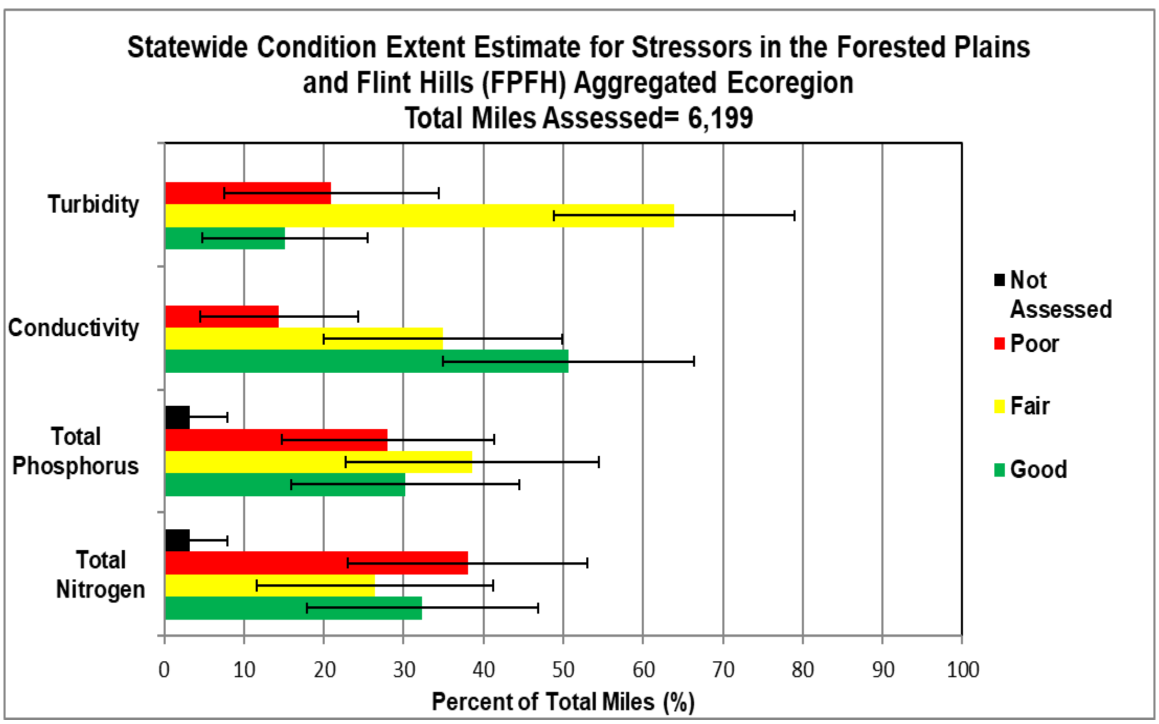



Figure 33. Stressor Condition Extent Estimated Statewide for the Forested Plains and Flint Hills Aggregated Ecoregion of Oklahoma (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

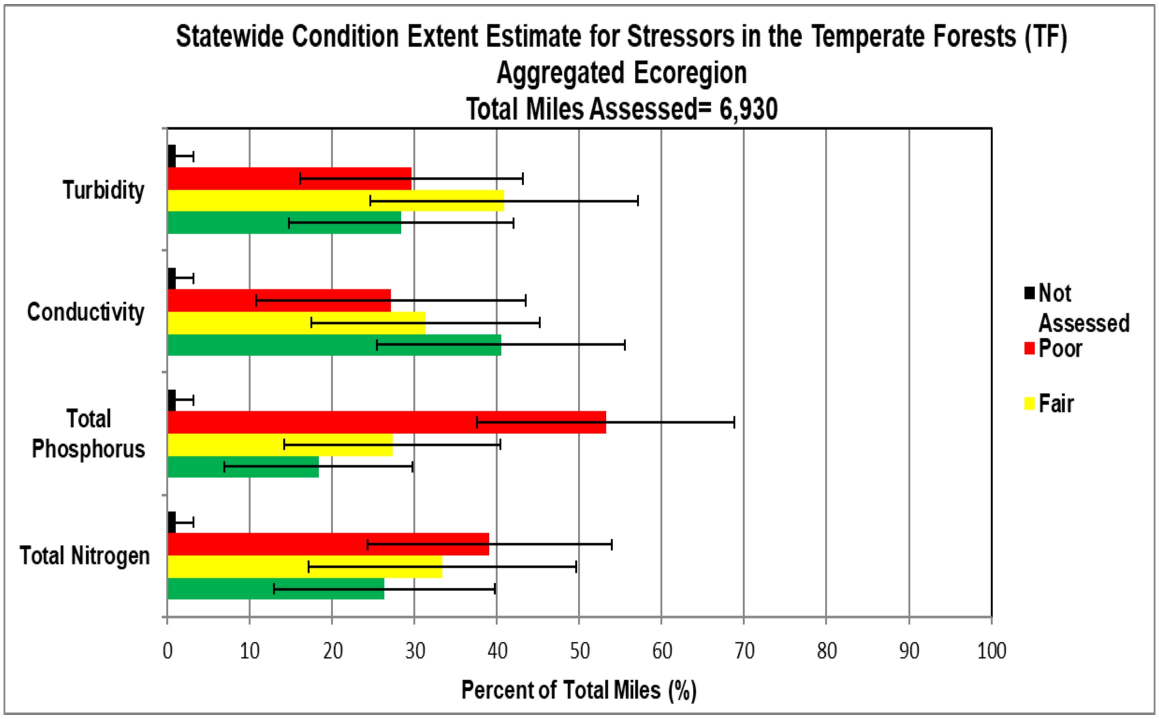



Figure 34. Stressor Condition Extent Estimated Statewide for the Temperate Forests Aggregated Ecoregion of Oklahoma (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

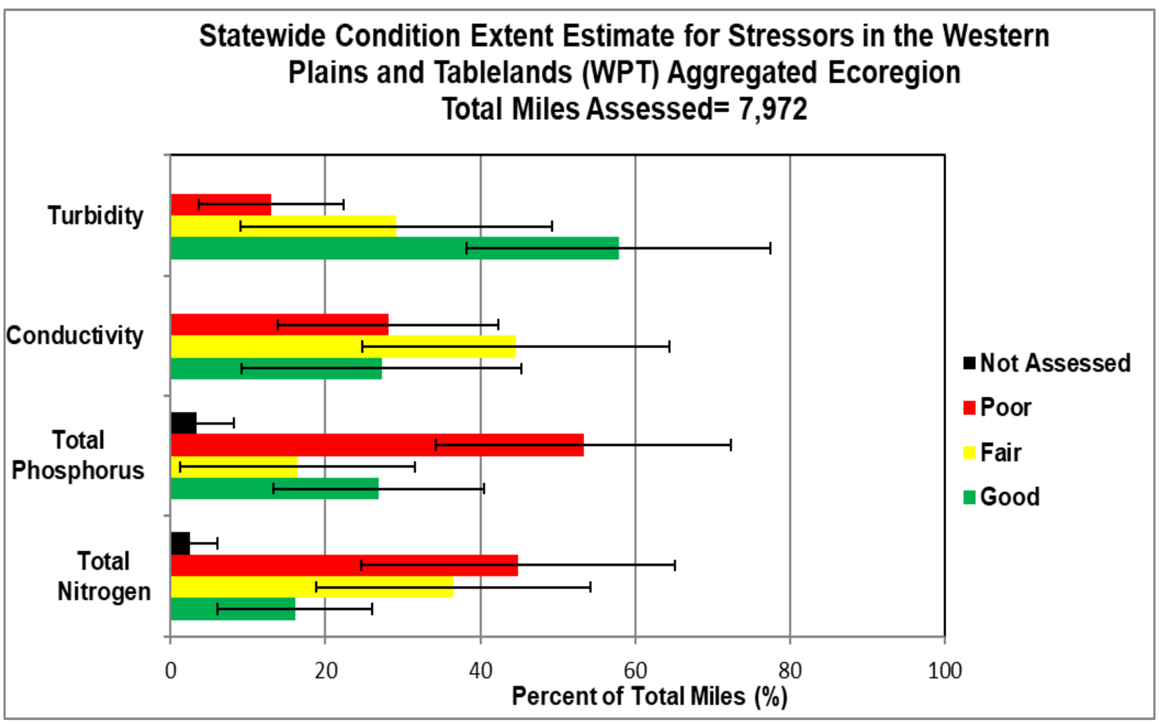



Figure 35. Stressor Condition Extent Estimated Statewide for the Western Plains and Tablelands Aggregated Ecoregion of Oklahoma (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

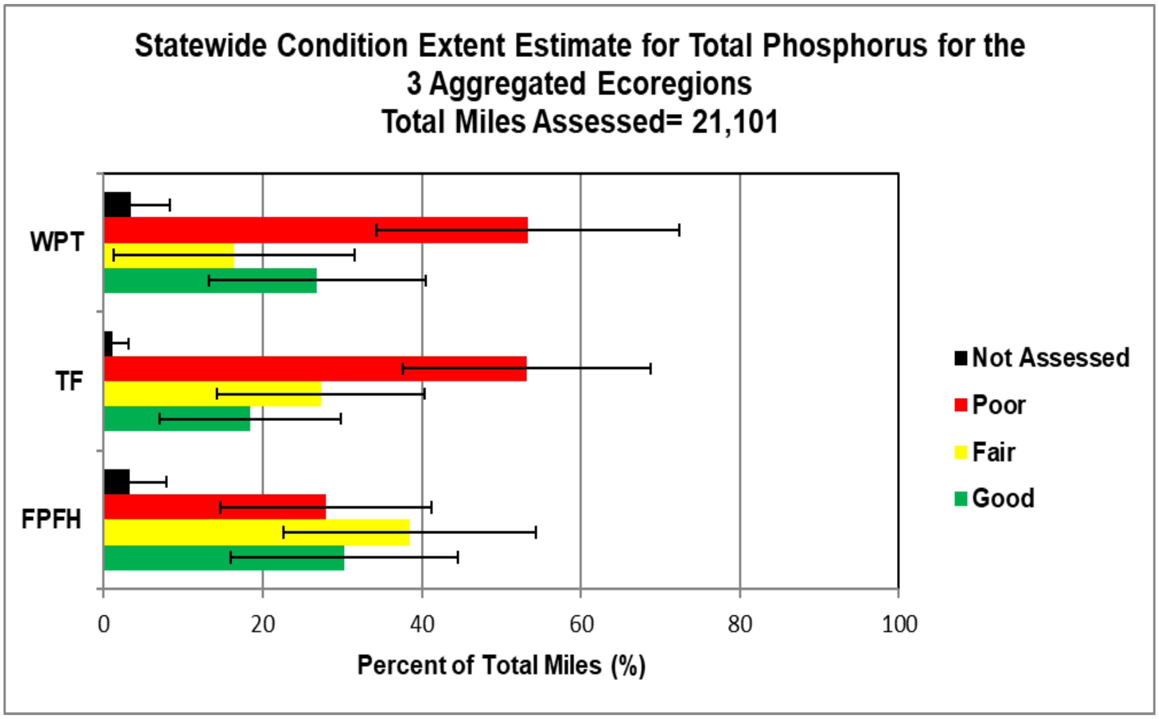



Figure 36. Condition Extent Estimated Statewide for Total Phosphorus in the 3 Aggregated Ecoregions of Oklahoma (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

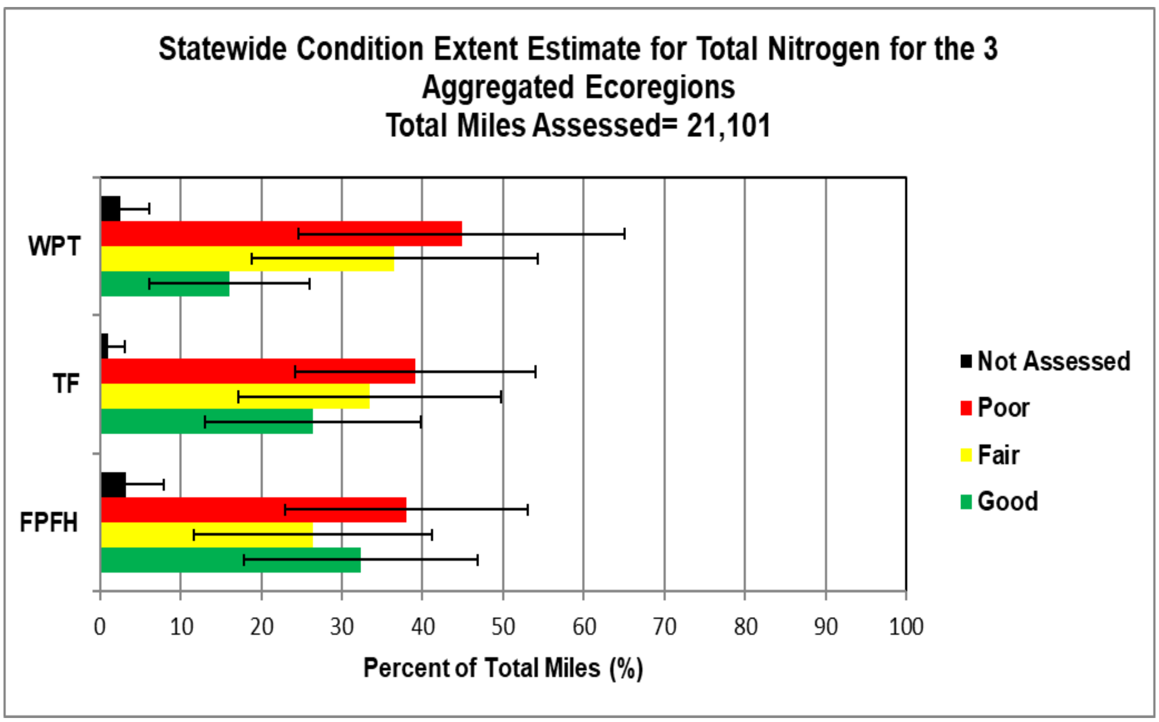



Figure 37. Condition Extent Estimated Statewide for Total Nitrogen in the 3 Aggregated Ecoregions of Oklahoma (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

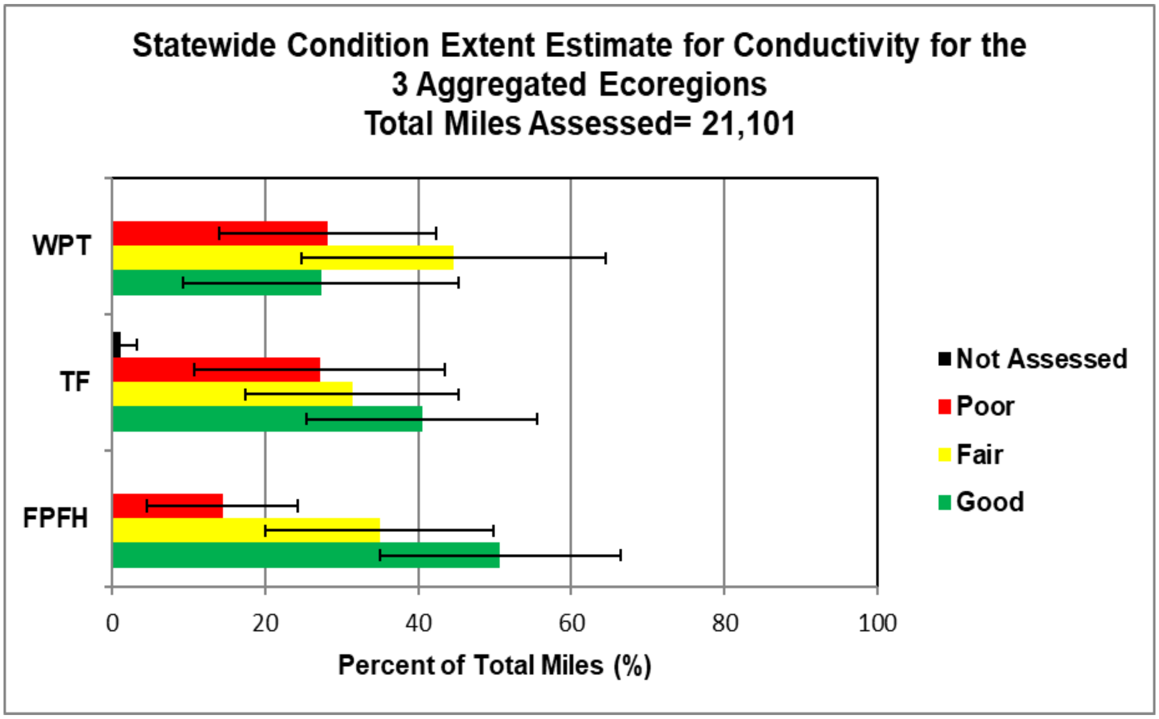



Figure 38. Condition Extent Estimated Statewide for Conductivity in the 3 Aggregated Ecoregions of Oklahoma (2013-2017).

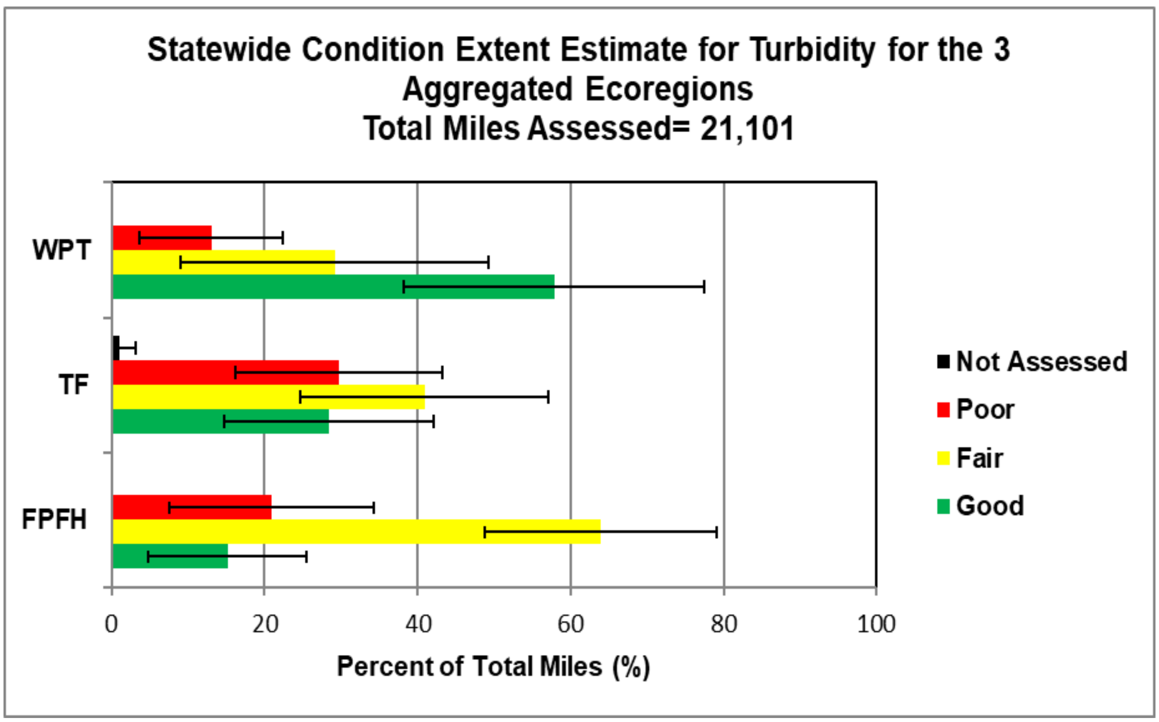



Figure 39. Condition Extent Estimated Statewide for Turbidity in the 3 Aggregated Ecoregions of Oklahoma (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

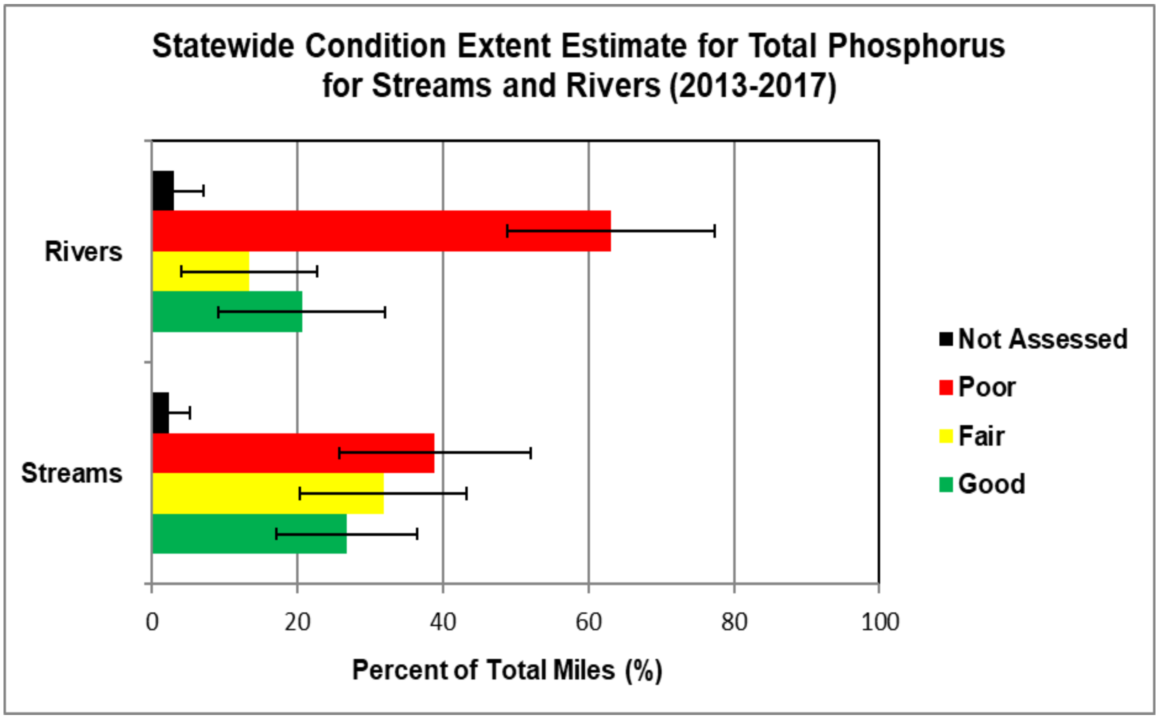



Figure 40. Stressor Extent Estimated Statewide for Total Phosphorus for Streams and Rivers (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

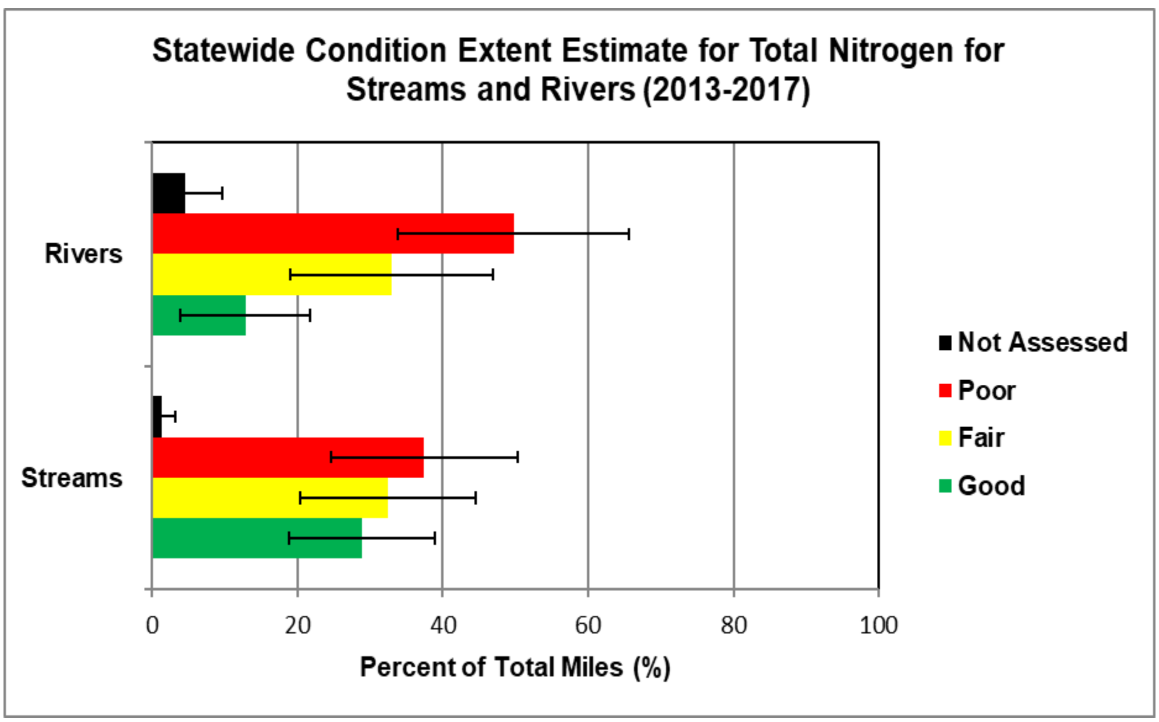



Figure 41. Stressor Extent Estimated Statewide for Total Nitrogen for Streams and Rivers (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

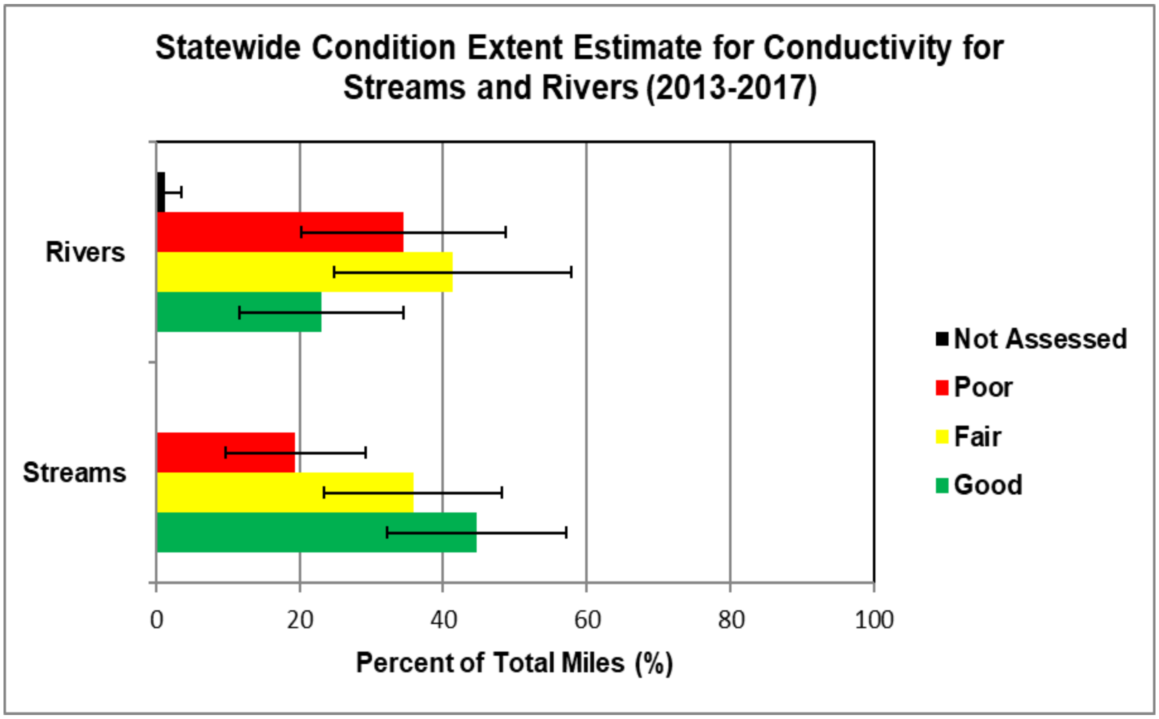



Figure 42. Stressor Extent Estimated Statewide for Conductivity for Streams and Rivers (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

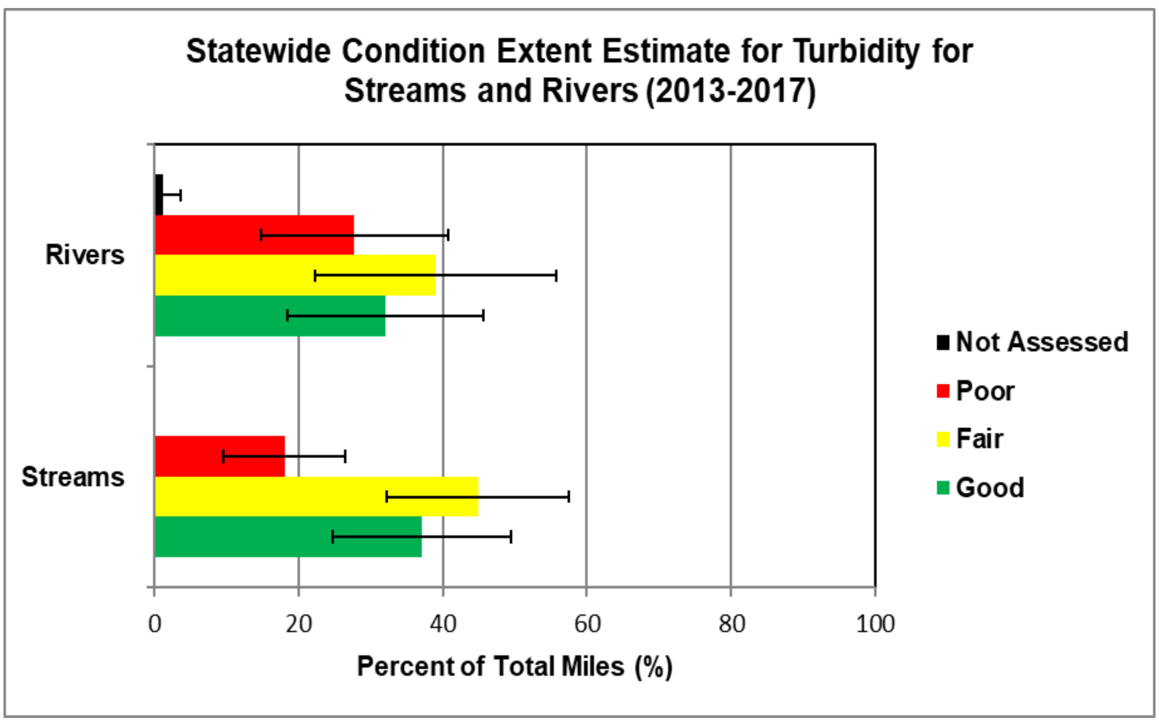



Figure 43. Stressor Extent Estimated Statewide for Turbidity for Streams and Rivers (2013-2017). Upper and Lower Bounds Represent a 95% Confidence Interval.

## Relative Risk Methodology

The concept of using relative risk to develop a relationship between biological condition and stressor extent was developed initially for the USEPA's National WSA (USEPA, 2006). Van Sickle et al. (2006) drew upon a practice commonly used in medical sciences to determine the relationship of a stressor (e.g., high cholesterol) to a medical condition (e.g., heart disease). The method calculates a ratio between the number of streams with poor biological condition/high stressor concentration and those with poor biological condition/low stressor concentration. If the ratio is above one, it indicates that biological condition is likely affected by high stressor concentrations (i.e., concentrations above a preset level). As the ratio increases beyond one, the relative risk of the stressor increases (Van Sickle, J., 2004).

The following analyses include a comparison of a variety of stressors to biological conditions for fish, macroinvertebrates, and algal biomass (sestonic and benthic). For each stressor, relative risk is determined for the entire five-year statewide study, for the three aggregated ecoregions, and for two waterbody sizes (rivers versus streams comparison). The analysis uses a binomial designation of good/poor for condition and high/low for stressor concentration. These binomial designations are then placed in a two-way contingency table to determine relative risk. Two initial ratios are determined. The ratio for poor condition with high stressor concentration is compared to the total number of sites having high stressor concentration, regardless of condition. Likewise, the ratio for poor condition with low stressor concentration is compared to the total number of sites having low stressor concentrations, regardless of condition. These two ratios are then used to calculate relative risk. For each indicator and stressor, the good and fair conditions were collapsed into a good condition for purposes of calculating relative risk. Significant relative risk will be determined by applying a 95% confidence, which must remain above one for risk to be considered significant. Relative risk was not determined for all categories. Some categories did not have any sites in poor condition.

## Relative Risk to Fish Condition

The relative risks of various stressors to fish condition are represented in Figures 44-47. The relative risk of poor fish condition is generally greater than one when most stressors are in poor condition. However, very few of these relationships are significant for relative risk. For the 2013-2017 study period, the nutrients (total phosphorus and total nitrogen) showed a significant relative risk to poor fish condition (Figure 44 & Figure 45). For instance, if total phosphorus is in poor condition the risk of poor fish condition is 4.2 times greater for all streams (Figure 44). Likewise, if total nitrogen is in poor condition, the risk of poor fish condition is 4.2 times greater for the Western Plains and Tablelands Aggregated Ecoregion and 2.9 times greater for all streams (Figure 45). However, the risk for poor fish condition related to poor condition of conductivity and/or turbidity was not significant (Figure 46 & Figure 47).

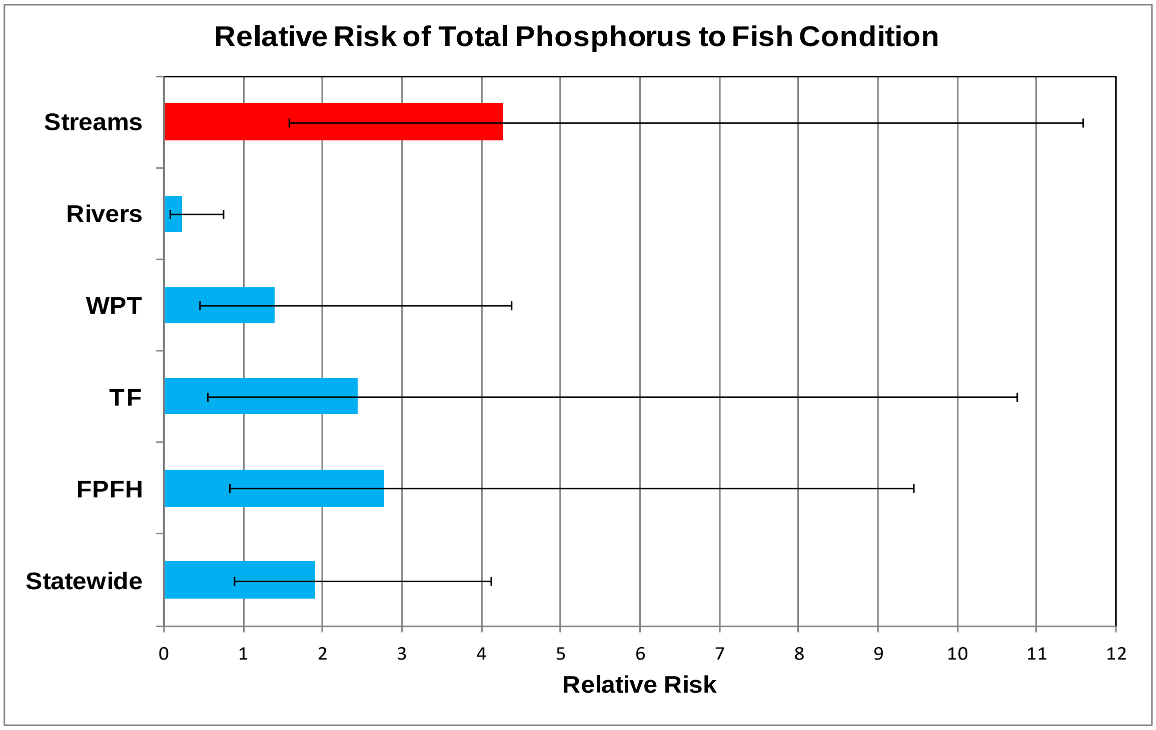



Figure 44. Relative Risk of Total Phosphorus as a Stressor Affecting Poor Fish Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

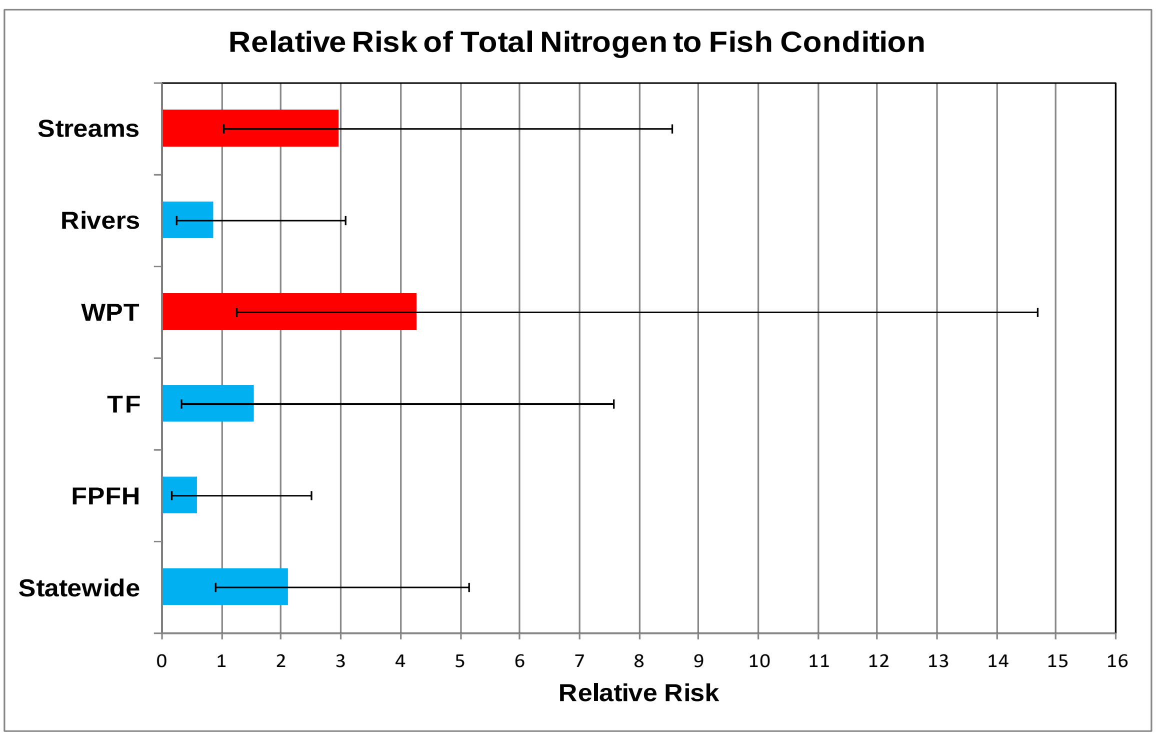



Figure 45. Relative Risk of Total Nitrogen as a Stressor Affecting Poor Fish Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

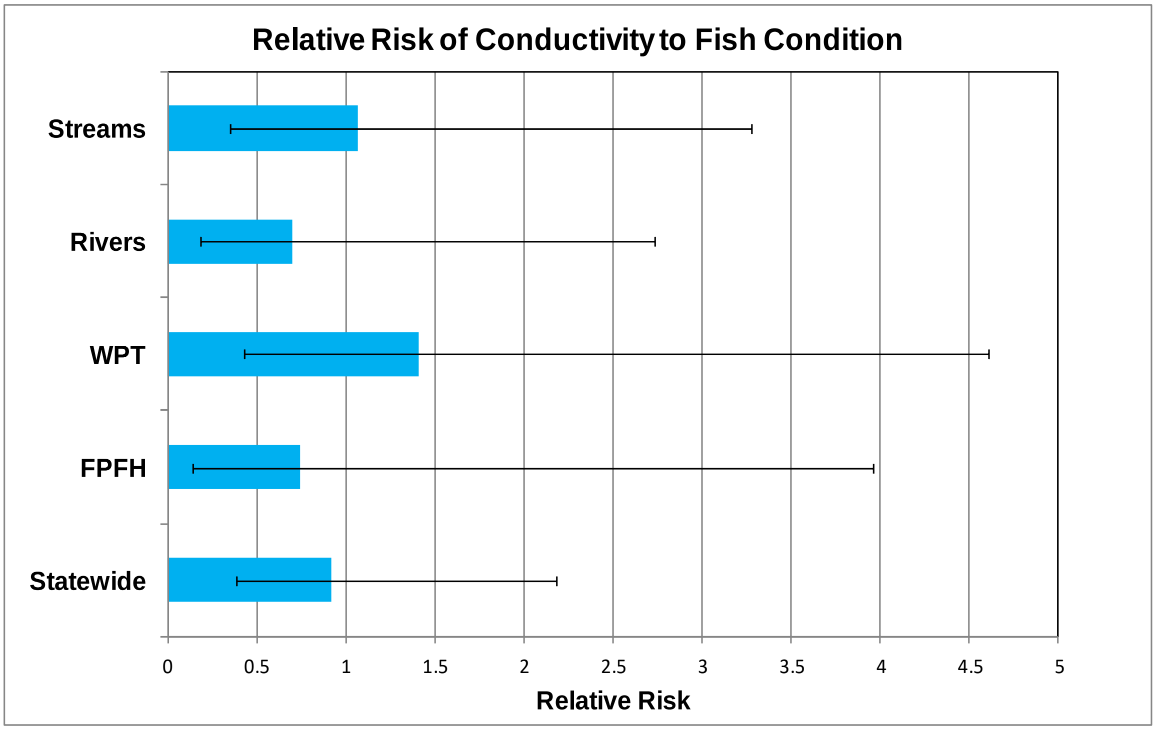



Figure 46. Relative Risk of Conductivity as a Stressor Affecting Poor Fish Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

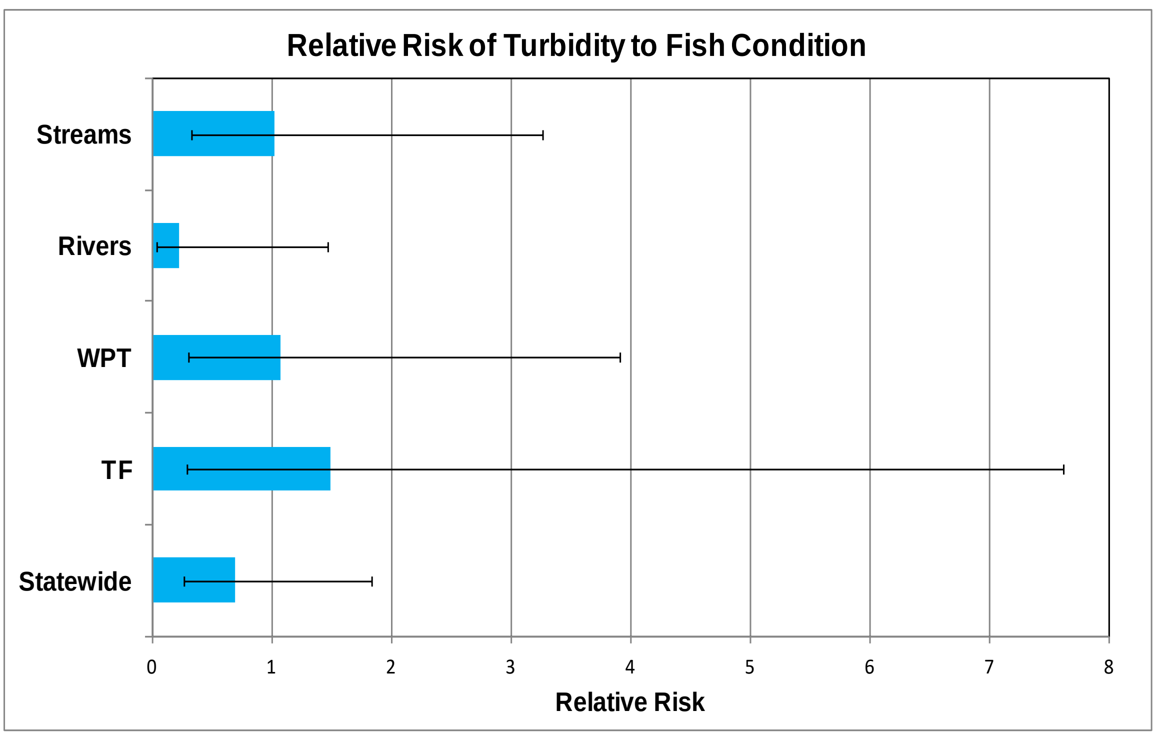



Figure 47. Relative Risk of Turbidity as a Stressor Affecting Poor Fish Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

**Relative Risk to Macroinvertebrate Condition**

The relative risks of various stressors to macroinvertebrate condition are shown in Figures 48-51. As with fish, the relative risk of poor macroinvertebrate condition is generally greater than 1 when most stressors are in poor condition, but unlike fish, many of the stressors demonstrate significant risk. During the 2013-2017 study period, the risk of poor macroinvertebrate condition is 5.1 to 7.8 times greater with poor total phosphorus condition for all stream sites as well as two out of the three aggregated ecoregions (TF = 3.4, WPT = 7.8) (Figure 48). Additionally, there is a general statewide risk to macroinvertebrates of greater than 5 times when total phosphorus (TP) is in poor condition.

Total nitrogen shows a similar pattern of relative risk. For all sites, streams, and the Temperate Forests (TF) aggregated ecoregion risk for poor macroinvertebrate condition is 2.8 to 4.4 times greater with poor total nitrogen condition (statewide = 2.8 , streams = 4.3, TF = 4.4) (Figure 49). For conductivity and turbidity the relative risk of poor macroinvertebrate condition is limited to certain aggregated ecoregions (
Figure 50 & Figure 51). When conductivity is in poor condition, the risk of macroinvertebrate poor condition for the Forested Plains and Flint Hills aggregated ecoregion is 11.9 times more likely (
Figure 50). Turbidity demonstrates a relative risk of 3.4 to poor macroinvertebrate condition for the TF aggregated ecoregion (Figure 51).

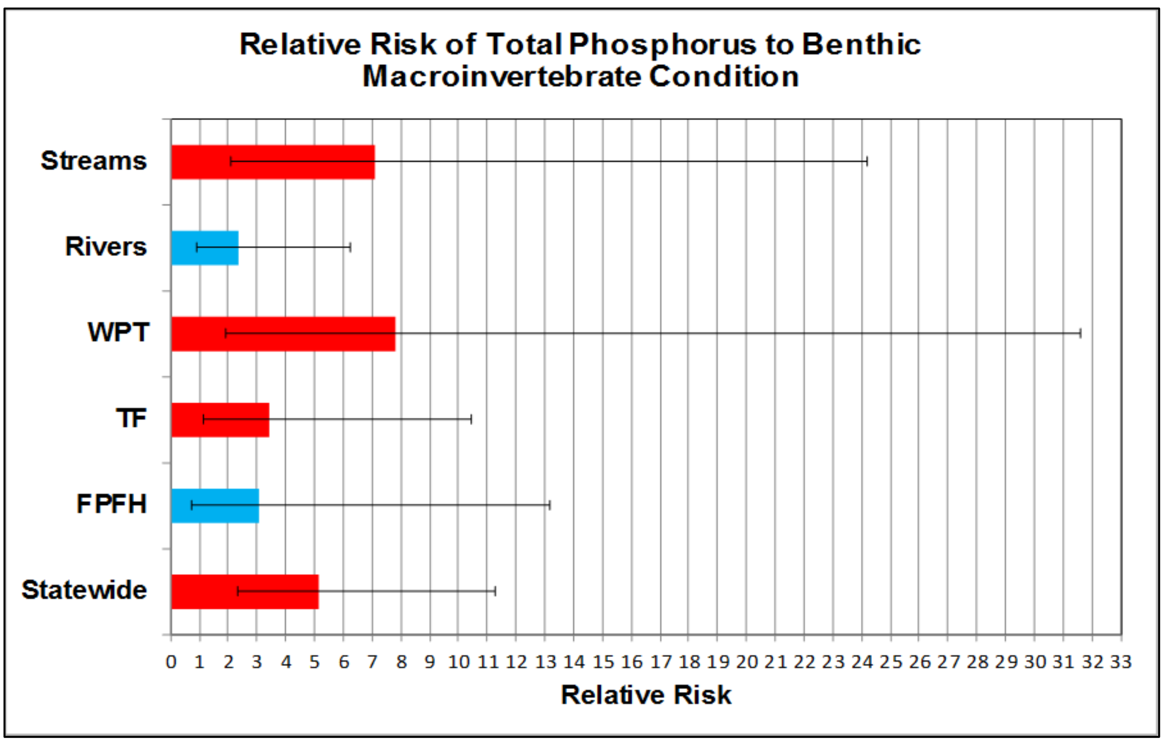



Figure 48. Relative Risk of Total Phosphorus as a Stressor Affecting Poor Condition of Benthic Macroinvertebrates. Upper and Lower Bounds Represent a 95% Confidence Interval.

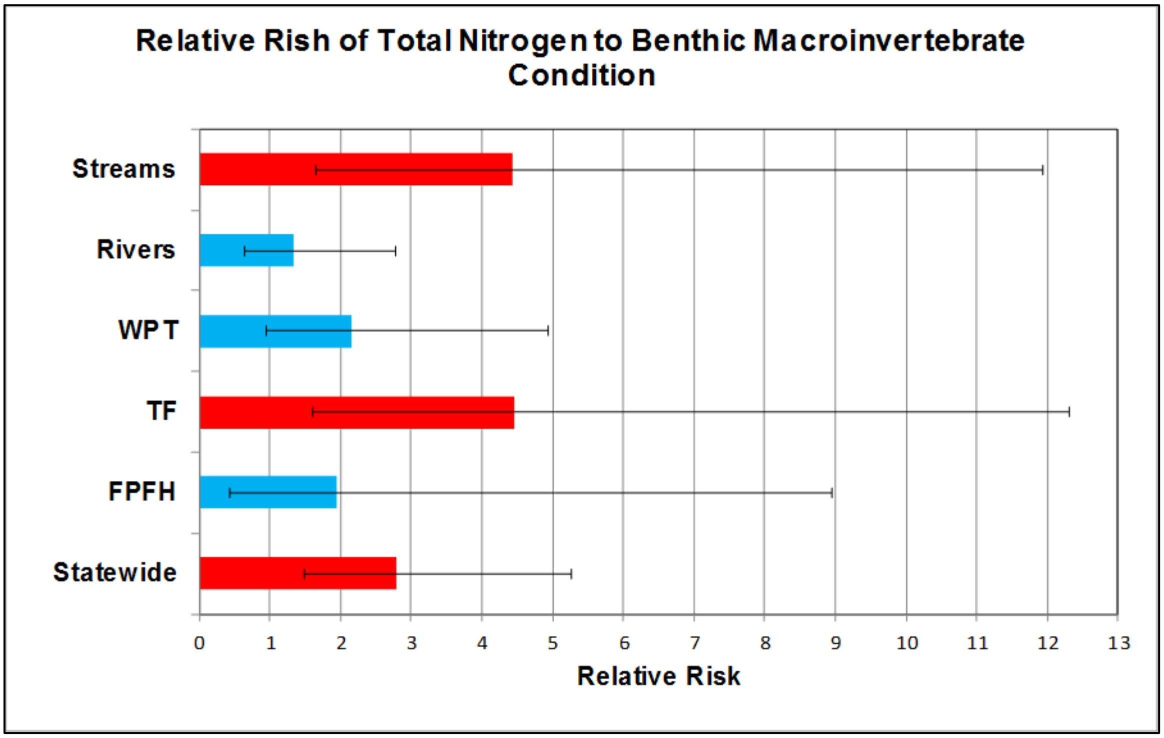



Figure 49. Relative Risk of Total Nitrogen as a Stressor Affecting Poor Condition of Benthic Macroinvertebrates. Upper and Lower Bounds Represent a 95% Confidence Interval.

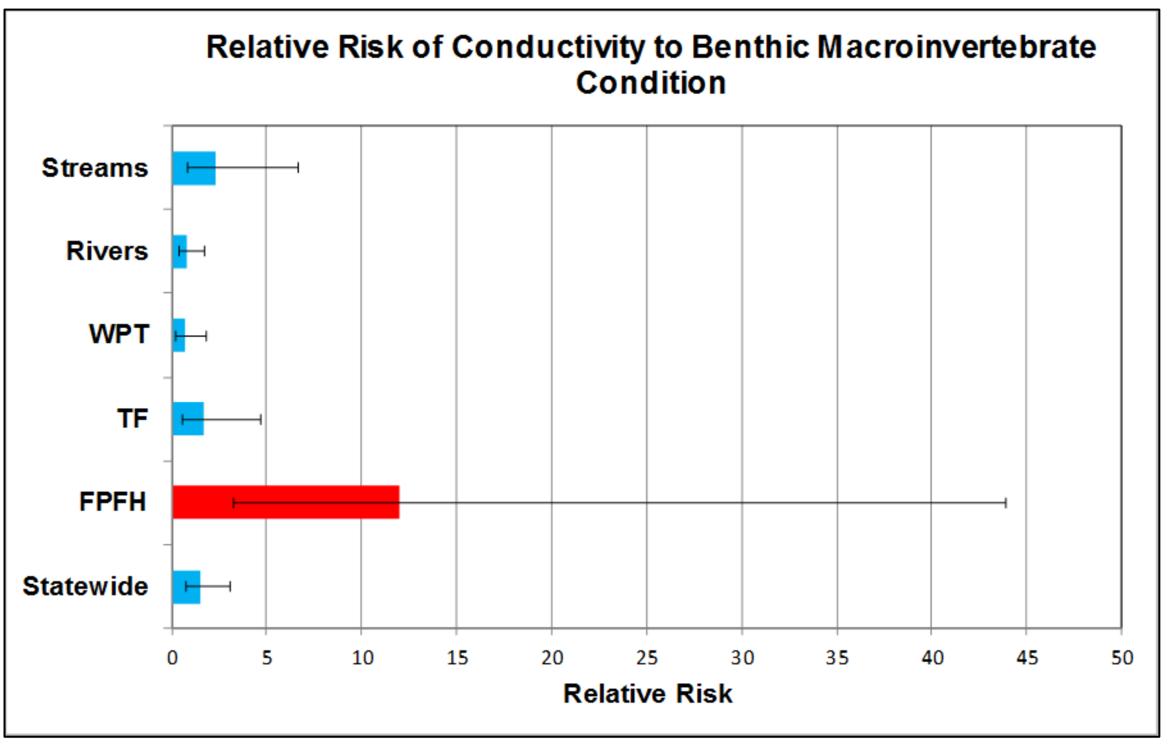


Figure 50. Relative Risk of Conductivity as a Stressor Affecting Poor Condition of Benthic Macroinvertebrates. Upper and Lower Bounds Represent a 95% Confidence Interval.

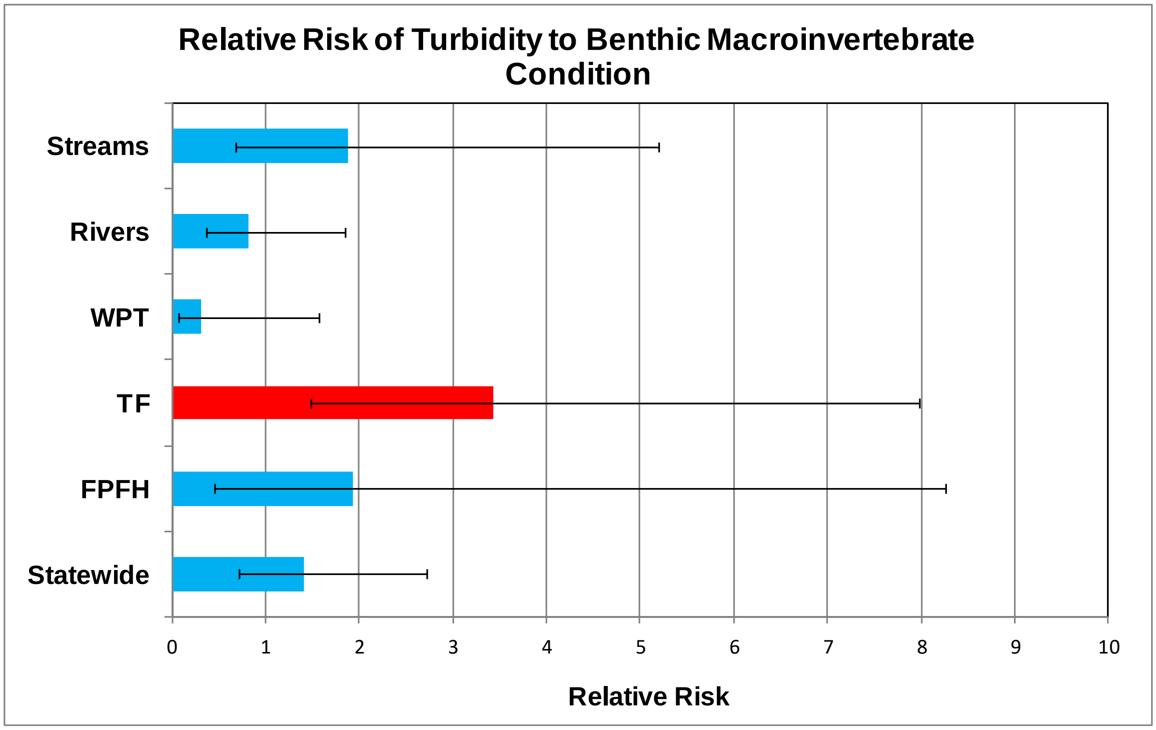



Figure 51. Relative Risk of Turbidity as a Stressor Affecting Poor Condition of Benthic Macroinvertebrates. Upper and Lower Bounds Represent a 95% Confidence Interval.

**Relative Risk to Sestonic Algae Condition**

The relative risks of various stressors to sestonic algae condition are represented in Figures 52-55. Sestonic algae show greater significant relative risk than do benthic algae. For the statewide assessment category, the risk of poor sestonic algae condition was significant for all stressors (TP, TN, conductivity, and turbidity) (Figures 52- 55). For instance, when total nitrogen is in poor condition in the FPFH aggregated ecoregion the risk of poor sestonic algae condition is an astounding 18 times greater (Figure 53). Also, when total phosphorus is in poor condition in the FPFH aggregated ecoregion the risk is nearly 6. Poor conductivity condition was 1.9 to 3.9 times more likely to lead to poor sestonic algae condition in the statewide category, as well as for rivers (1.9), and in two out of the three aggregated ecoregions (WPT = 2.2, TF = 3.9) (Figure 54). Likewise poor turbidity condition showed a similar significant relative risk to poor sestonic algae condition; and the risk was 1.8 to 2.3 times more likely for the statewide category (1.8), for rivers (2.2), and for the WPT (2.3) aggregated ecoregion (Figure 55).

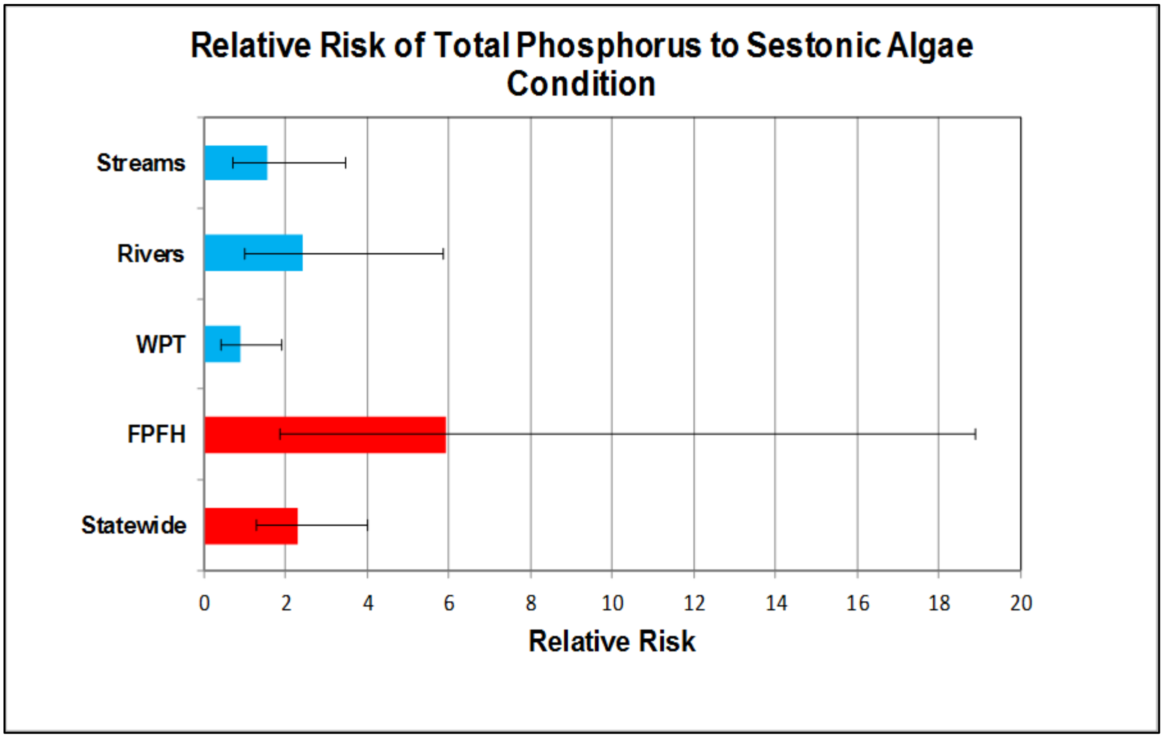



Figure 52. Relative Risk of Total Phosphorus as a Stressor Affecting Poor Sestonic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

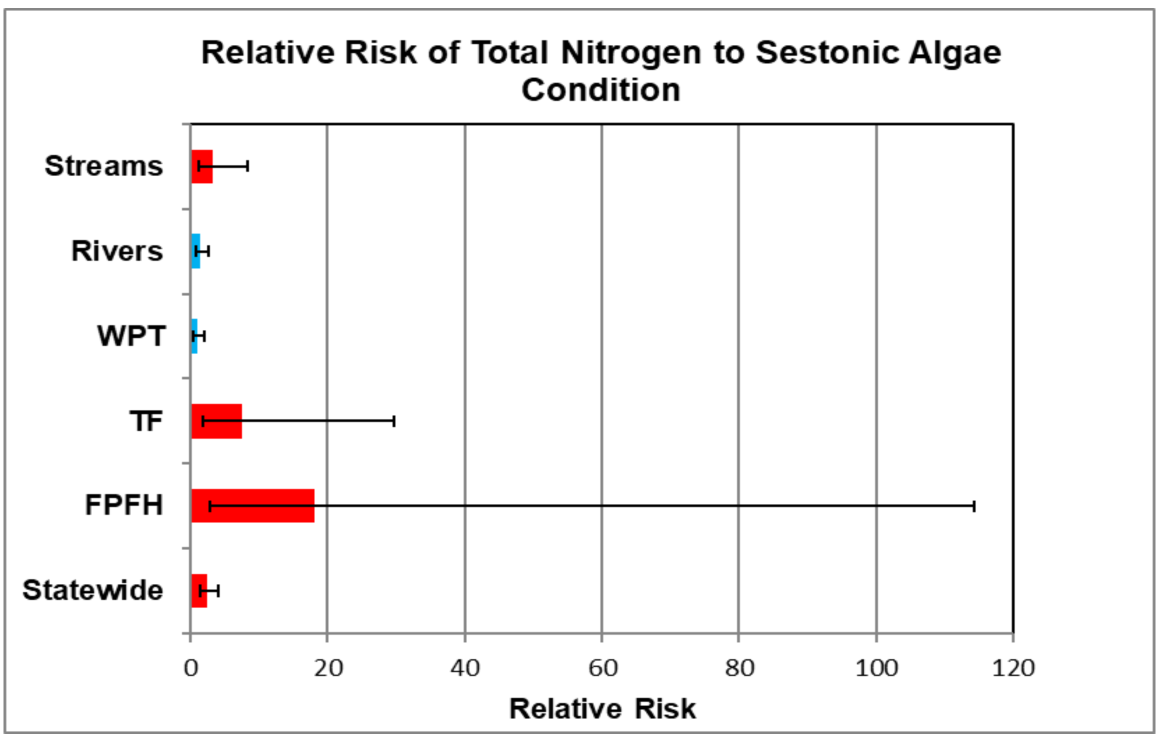



Figure 53. Relative Risk of Total Nitrogen as a Stressor Affecting Poor Sestonic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

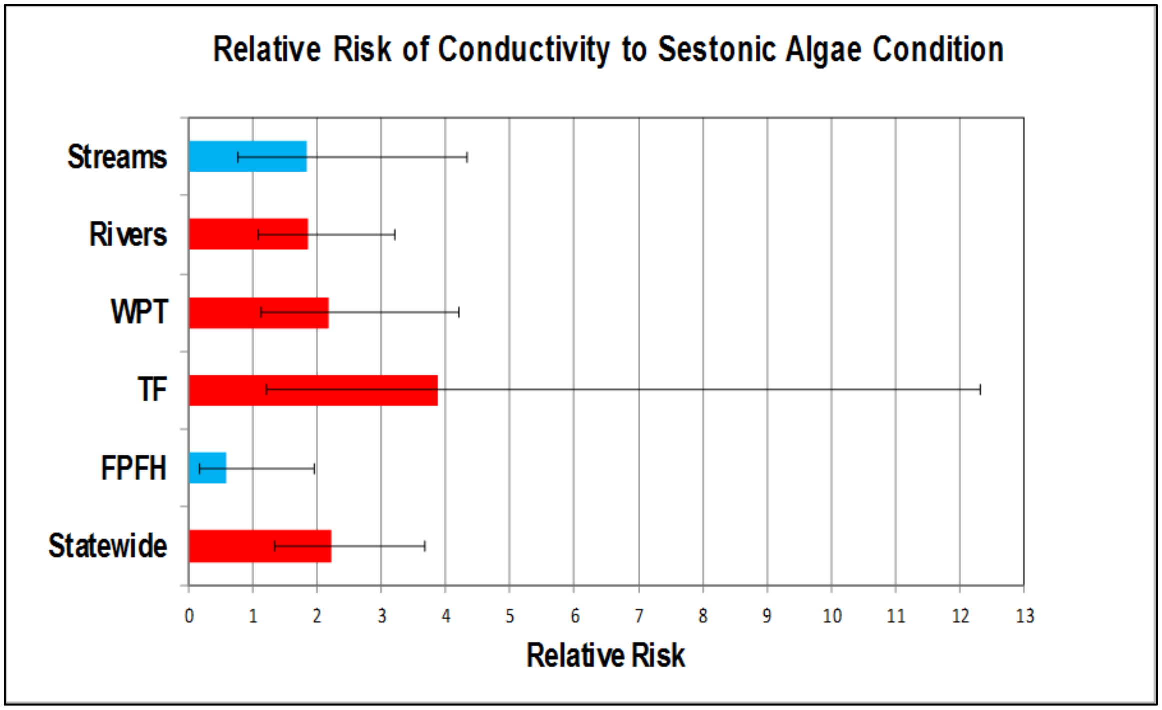



Figure 54. Relative Risk of Conductivity as a Stressor Affecting Poor Sestonic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

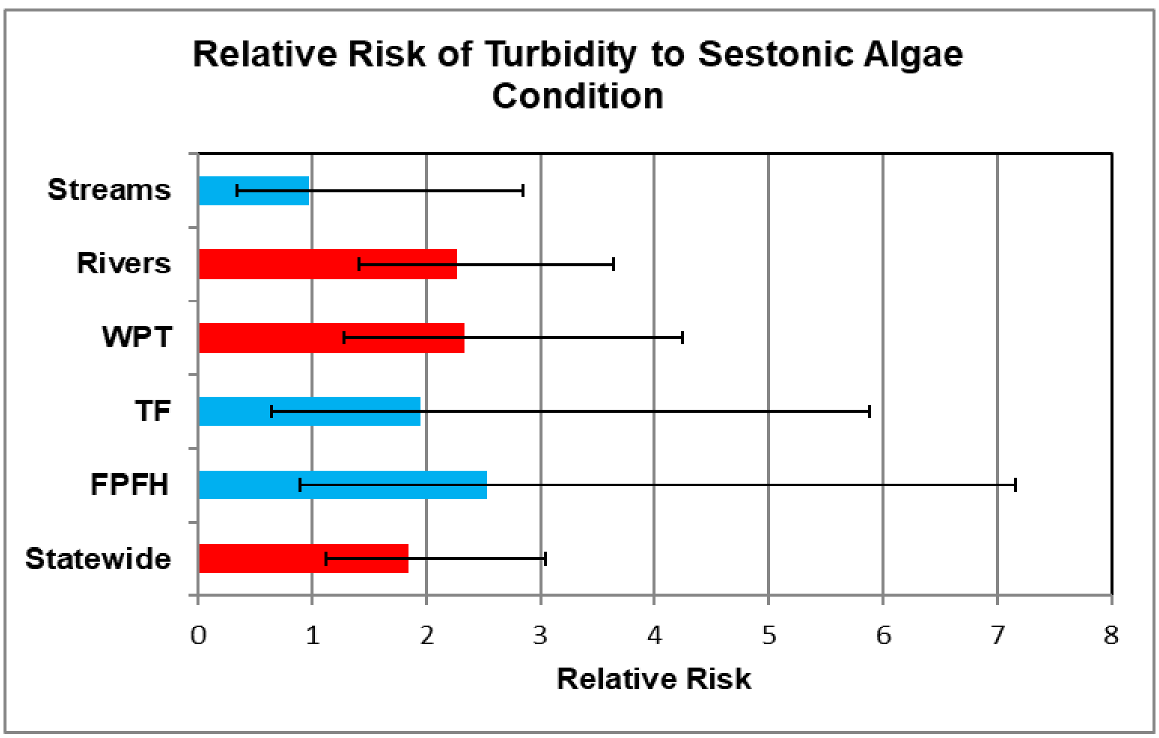



Figure 55. Relative Risk of Turbidity as a Stressor Affecting Poor Sestonic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

## Relative Risk to Benthic Algae Condition

The relative risks of various stressors to benthic algae condition are represented in Figures 56-59. For the 2013-2017 study, nutrients (TN, TP) demonstrated no relative risk to benthic algae condition (Figure 56 & Figure 57). This is very interesting because nutrients demonstrated high risk in terms of poor sestonic algae condition. This could be indicative of the stressor endpoints used to determine condition for benthic condition. In future iterations, stressor endpoints will be reviewed for ecological relevance and potentially adjusted.

With poor conductivity condition, the risk of poor benthic algae condition increased by 8.3 times in the FPFH aggregated ecoregion (Figure 58). Poor turbidity condition extent increased risk by 6.8 times on rivers (Figure 59). All other stressor risk to benthic algae condition was not significant.

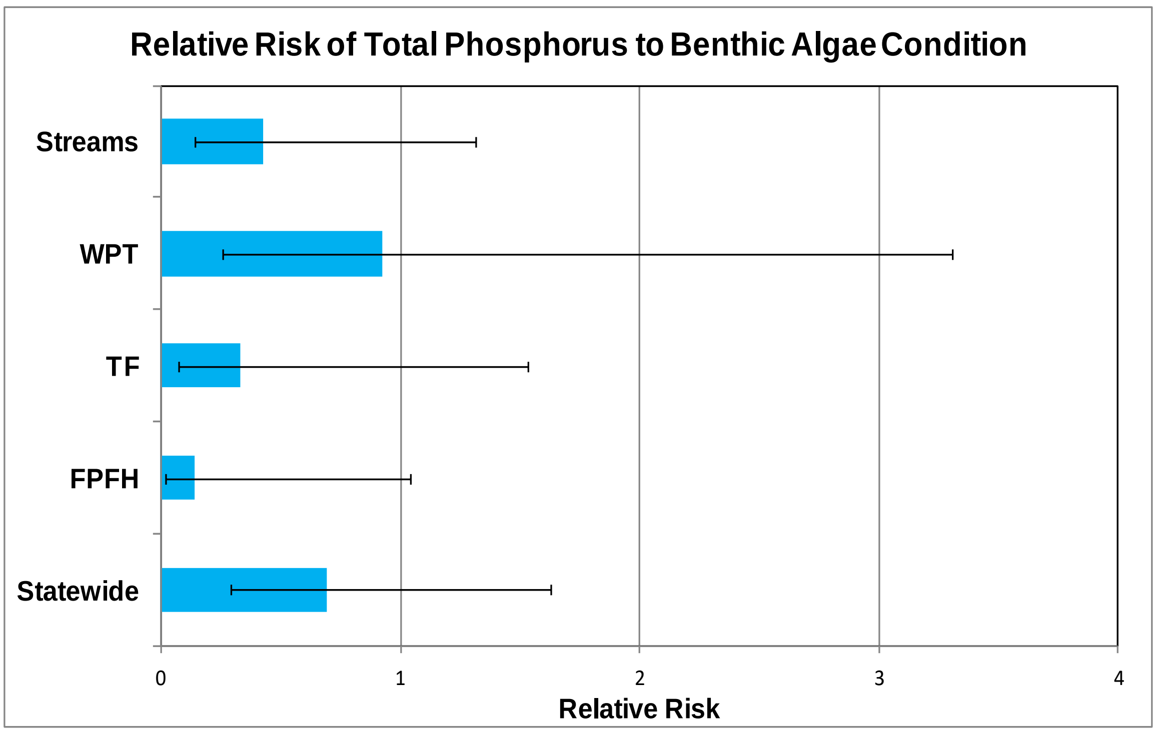



Figure 56. Relative Risk of Total Phosphorus as a Stressor Affecting Poor Benthic Algae Condition. Upper and Lower Bounds Represents a %95 Confidence Interval.

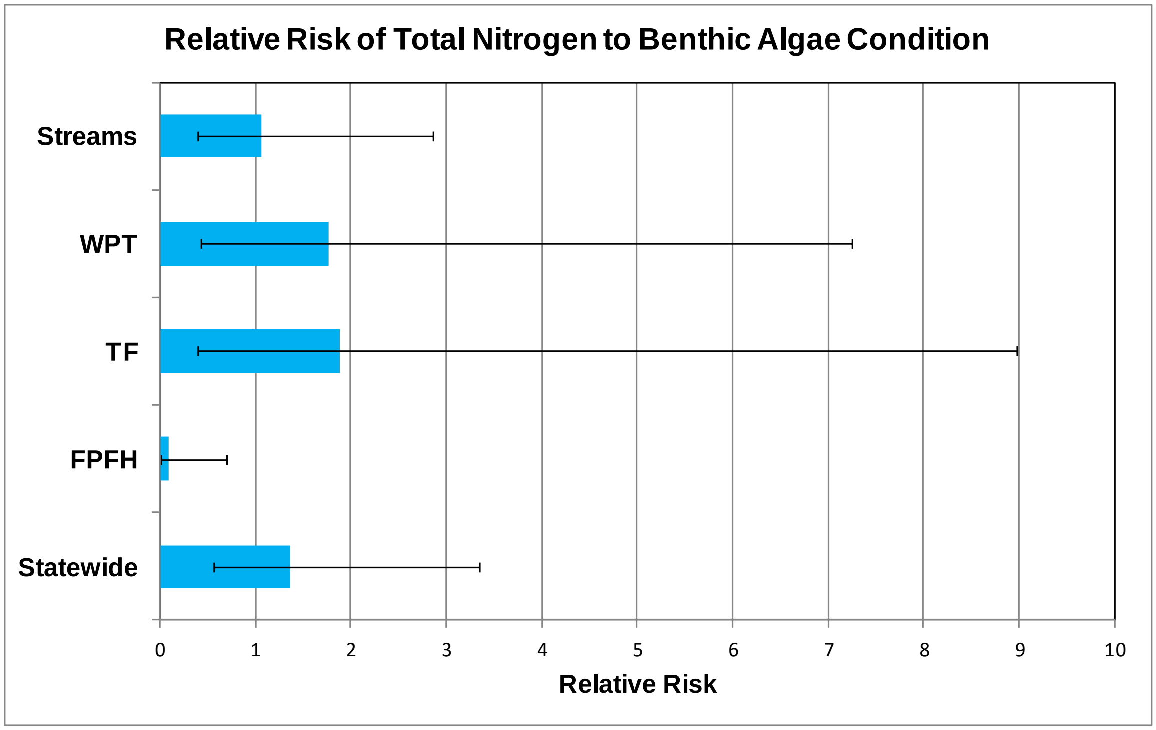



Figure 57. Relative Risk of Total Nitrogen as a Stressor Affecting Poor Benthic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

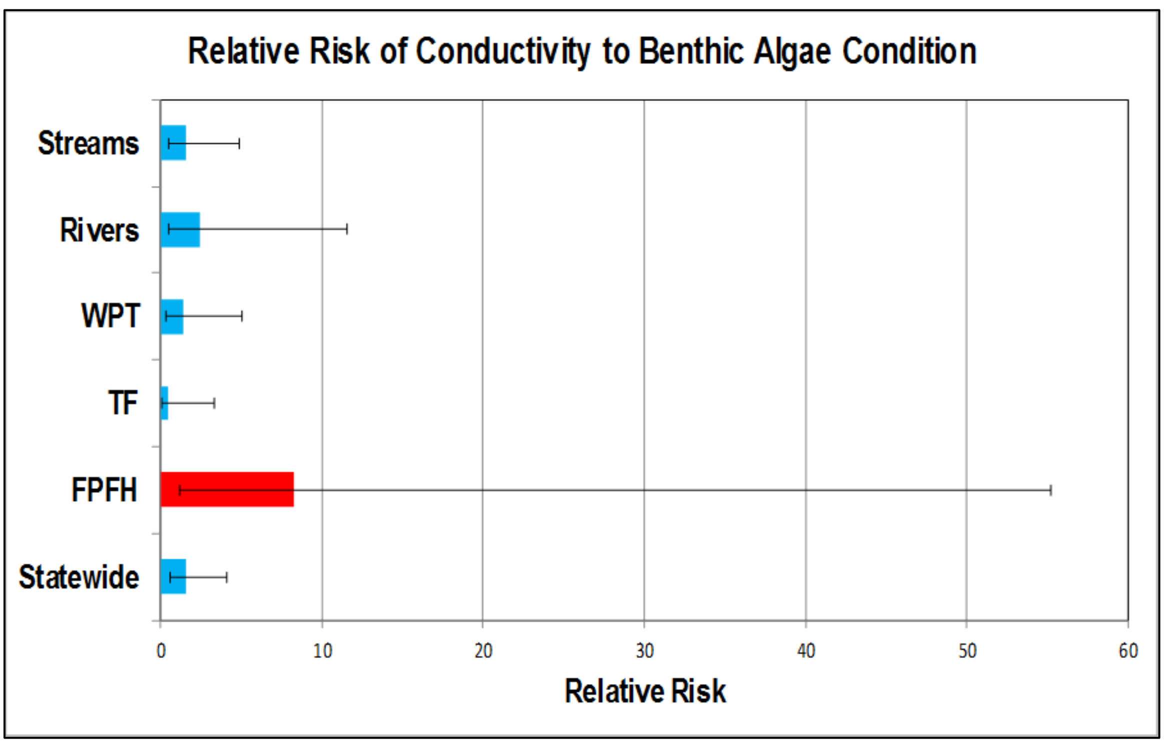



Figure 58. Relative Risk of Conductivity as a Stressor Affecting Poor Benthic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

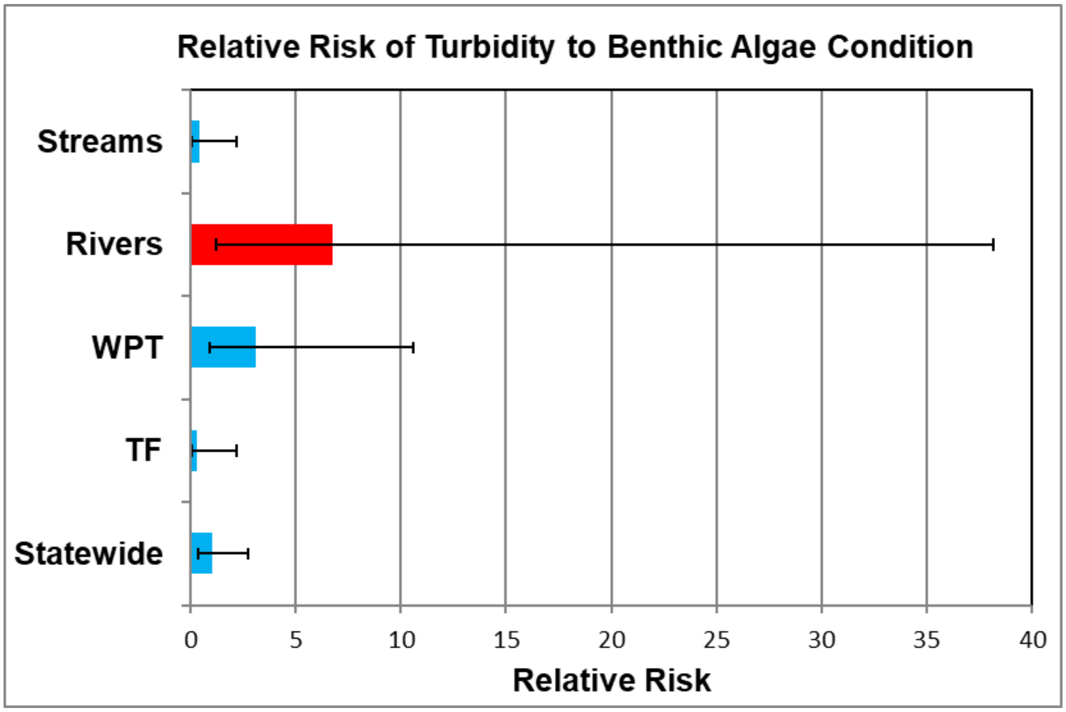



Figure 59. Relative Risk of Turbidity as a Stressor Affecting Poor Benthic Algae Condition. Upper and Lower Bounds Represent a 95% Confidence Interval.

## DISCUSSION AND RECOMMENDATIONS

### Oklahoma's Integrated Water Quality Report

Oklahoma's environmental agencies gather and assess data across the state for a wide variety of biological, chemical, and physical water quality indicators. These data collections meet the federal Clean Water Act requirements to compile a list of impaired waterbodies and determine the condition of all these waters. These reports are compiled in the biannual Oklahoma Water Quality Assessment Integrated Report (ODEQ, 2018).

The 2013-2017 study benefits this report in several ways. First, this report marks Oklahoma's fifth and sixth statistically based assessments on the condition of Oklahoma's lotic waters. The OWRB recommends that this report be adopted into the 305(b) section of the 2020 or 2022 integrated report. Included graphics can be used to show overall statewide and regional condition. Second, individual lotic waterbodies not yet included in Oklahoma's Integrated Report (ODEQ, 2018) now have some level of assessment. The OWRB regularly submits waters for inclusion on Oklahoma's 303(d) list and will do so again in 2020. As a part of OWRB's submission, waterbodies assessed as part of this study will be included for consideration as not only category five (impaired), but as category three (not impaired for some uses). Because of assessment rules housed in Oklahoma's Continuing Planning Process (CPP) (ODEQ, 2012) and USAP (OWRB, 2016c), certain water quality parameters will not be included as part of the assessment. Most of Oklahoma's assessment protocols require that certain data requirements be met including the number of samples required to make an assessment determination. Protocols were developed to either assess short-term or long-term exposure. Short-term exposure protocols are written as percent exceedances, with a minimum of ten samples being required. Long-term exposure protocols are based upon some measure of central tendency, but typically require a minimum number of samples to calculate the applicable descriptive statistic. Some exceptions to these rules include biological assessments, application of the sediment criteria, and a single sample maximum of 200 $mg/m^3$ for benthic chlorophyll *a*. All other parameters included in this study will not be included in assessments for the impaired waters list but will be made publicly available in the event that another entity can include the data in their assessment. To ensure inclusion of relevant data, stations will be placed in the most current version of the OWRB Assessment Workbook (OWRB, 2016), which is not only used to assess waters for the Oklahoma Integrated Report but for the OWRB's Beneficial Use Monitoring Program (BUMP) (OWRB, 2018).

### Differences in Indicator/Stressor Levels for 2008-2011

In 2013, the Oklahoma Water Resources Board published a report titled "Statewide Stream/River Probabilistic Monitoring Network for the State of Oklahoma from 2008-2011 (OWRB, 2013)." This report was a precursor to this current 2013-2017 report. These past studies have allowed for unique analysis between both study periods and waterbody size. These studies are also useful in change analysis between reporting periods. Differences in poor condition of both indicators and stressors for the 2008-2011 report are presented in **Error! Reference source not found.**. The analysis simply compares the differences in percent of total miles in poor condition and establishes significant difference between periods or size. The arrows in the trend column merely indicate the direction of a potential trend.

For indicators, both fish and macroinvertebrates demonstrate a downward change in poor condition between study periods, with only the fish having a significant downward change (**Error! Reference source not found.**). Conversely, both algal indicators show an upward change, with only the benthic algae trend having significance. Likewise, TN, conductivity, turbidity, and sediment all show an upward change between the two study periods, with only turbidity and sediment having a significant change (**Error! Reference source not found.**). Notably, environmental conditions, particularly drought, became more acute in 2010-2011, and high water was an issue during a portion of the 2009 summer index period.

All indicators and stressors have a larger percentage of river miles in poor condition than stream miles in poor condition. And, apart from sediment, all differences are significant. Likely, this exists for several reasons. Two possible reasons may be that larger rivers and streams carry much heavier pollutant loads because they have a much larger area of input; and secondly, the development and refinement of reference condition, metrics, and stressor criteria/screening limits need continued development at both ecoregion and size scales. Data exists to perform these tasks and would eliminate much of the potential noise that is present in current assessments.

Table 11. The percentage of total miles for indicators and stressors in poor condition compared between two-year study periods, as well as large and small waterbodies for 2008-2011. Arrows show direction of potential change (** = significant at alpha of 0.95).

| Indicator/Stressor | 2008-09 %Poor | 2010-11 %Poor | Change | River %Poor | Stream %Poor | Change |
|---|---|---|---|---|---|---|
| Fish | 43.9% | 21.7% | ↓** | 50.1% | 30.4% | ** |
| Macroinvertebrates | 40.6% | 25.7% | ↓ | 62.3% | 24.7% | ** |
| Benthic Algae | 3.7% | 21.3% | ↑** | 21.7% | 5.9% | ** |
| Sestonic Algae | 18.2% | 28.3% | ↑ | 60.6% | 6.8% | ** |
| Conductivity_ECO | 10.6% | 21.4% | ↑ | 38.5% | 5.5% | ** |
| Conductivity_NRSA | 16.7% | 22.7% | ↑ | 55.0% | 5.1% | ** |
| TN_ECO | 23.4% | 37.5% | ↑ | 40.3% | 24.1% | ** |
| TN_NRSA | 12.2% | 22.3% | ↑ | 31.3% | 10.1% | ** |
| TP_ECO | 40.7% | 36.9% | ↓ | 73.8% | 26.2% | ** |
| TP_NRSA | 31.0% | 40.1% | ↑ | 76.4% | 18.3% | ** |
| Turbidity_ECO | 11.5% | 26.6% | ↑** | 36.9% | 9.5% | ** |
| Sediment | 15.8% | 51.3% | ↑** | 34.9% | 26.2% | NS |

**Differences in Indicator/Stressor Levels for 2013-2017**

The 2013-2017 study allows for unique analysis between both study periods and waterbody sizes (rivers and streams). Differences in poor condition of both indicators and stressors for the 2013-2017 report are presented in

Table 12. The analysis simply compares the differences in percent of total miles in poor condition and establishes significant difference between time periods or waterbody sizes. The arrows in the change column merely indicate the direction of a potential change.

For indicators, both fish and macroinvertebrates demonstrate a downward change in poor condition between study periods, with neither being significant at the 95% confidence interval (

Table 12). For algae, both sestonic and benthic have an upward trend in poor condition with neither being significant.

For stressors, total nitrogen and total phosphorus both demonstrate a downward change in poor condition between the two study periods (SY 13/14/15, SY 15/16/17). Both trends are statistically significant (**). Notably, environmental conditions, particularly high water levels were an issue during a portion of the 2013 and 2015 index periods. It is important to note that Table 11 is a two year average of poor condition while Table 12 is a three year average. Lastly, for indicators both benthic macroinvertebrates and sestonic algae have much higher percentages of total miles in poor condition for rivers than for streams (

Table 12). This change is statistically significant (**). For stressors, total phosphorus and conductivity have a higher percentage of miles in poor condition for rivers than for streams. These two changes are also statistically significant at the 95% confidence interval.

Table 12. The percentage of total miles for indicators and stressors in poor condition compared between three year study periods, as well as a rivers and streams comparison for 2013-2017. Arrows show direction of potential trend (** = significant at alpha of 0.95).

| Indicator/Stressor | 2013-15 %Poor | 2015-17 %Poor | Change | Rivers %Poor | Streams %Poor | Change |
|---|---|---|---|---|---|---|
| Fish | 17.8% | 9.8% | ↓ | 15.1% | 16.1% | NS |
| Macroinvertebrates | 25.3% | 13.7% | ↓ | 35.5% | 17.9% | ** |
| Benthic Algae | 9.0% | 11.3% | ↑ | 7.1% | 11.1% | NS |
| Sestonic Algae | 21.7% | 24.5% | ↑ | 43.4% | 16% | ** |
| Conductivity_ECO | 22.1% | 23.3% | ↑ | 34.5% | 19.4% | ** |
| TN_ECO | 46.8% | 30.0% | ↓** | 50.0% | 37.4% | NS |
| TP_ECO | 50.5% | 37.3% | ↓** | 63.1% | 39.0% | ** |
| Turbidity_ECO | 22.2% | 16.8% | ↓ | 27.8% | 18.0% | NS |

**Indicator/Stressor 10 Year Trend Analysis**

Past and present studies with similar designs allow for trend analysis. Differences in percentages of total miles in poor condition of both indicators and stressors for the 2008-2011 and 2013-2017 reporting periods are presented in **Error! Reference source not found.**. Sample year 2012 was a reporting year for the OWRB and no probabilistic monitoring streams sites were sampled in that year.

It is important to note that **Error! Reference source not found.** summarizes the poor condition percentages for the two reporting periods which were different length study periods. The 2008-2011 probabilistic monitoring study lasted four years. The 5th year was a reporting year. The 2013-2017 study ran into a 5th year of sampling. The original design was to complete all sampling by the end of the 4th year. After the 2013-2014 NRSA study, we had to re-evaluate progress. Due to budget constraints, we decided to move sampling into the 5th year. This is the only major difference in the two data sets when utilizing them for comparison and long-term trend analysis.

On a positive note, three out of the four biological indicators are trending downward between study periods. However, only the fish downward trend is significant at the 95% confidence interval (**). Sestonic algae was the only indicator trending upward between the two reporting periods (**Error! Reference source not found.**).

For stressors, the news is not good. All stressors are trending upward (three out of four are significant at alpha of 0.95). This is a major concern for water quality in Oklahoma's rivers and streams. Specifically, this trend is concerning for nutrients (TN and TP). These two nutrients play a vital role in determining the health of rivers and streams and may result in excess algal growth in Oklahoma's lakes. This perhaps is why sestonic algae are also trending upward between the two study periods (**Error! Reference source not found.**). Excess algal growth can lead to water quality issues such as low oxygen which may result in fish kills, harmful algal blooms, and degradation of drinking water supplies.

Table 13. The percentage of total miles for indicators and stressors in poor condition compared between reporting periods (2008-2011 compared to 2013-2017). Arrows show direction of potential trend (** = significant at alpha of 0.95).

| Indicator/Stressor | 2008-11 %Poor | 2013-17 %Poor | Trend |
|---|---|---|---|
| Fish | 35.5% | 15.8% | ↓** |
| Macroinvertebrates | 35.1% | 23.0% | ↓ |
| Benthic Algae | 10.2% | 10.0% | ↓ |
| Sestonic Algae | 22.0% | 23.9% | ↑ |
| Conductivity_ECO | 14.6% | 23.8% | ↑** |
| TN_ECO | 28.6% | 41.0% | ↑** |
| TP_ECO | 39.3% | 45.9% | ↑** |
| Turbidity_ECO | 17.1% | 20.8% | ↑ |

**Attributable Risk**

To determine the affect a stressor has on a particular biological indicator relative risk analyses were made for each stressor-indicator pair and presented in the results section of this report (Figures 44-59). However, is there a way to determine how much affect a proportional reduction in a stressor would have on the incidence of poor condition in an indicator? Attributable risk provides an elimination scenario to investigate this relationship and potential beneficial outcomes of reduction (Van Sickle, J., and S.G. Paulsen, 2008). Although assailable assumptions are made about causality and the analysis requires elimination of the stressor, it is still a useful extension of the stressor extent and risk models already used in probability assessments. As reported in the draft NRSA report:

> "Attributable risk represents the magnitude or importance of a potential stressor and can be used to help rank and set priorities for policymakers and managers. Attributable risk is derived by combining relative extent and relative risk into a single

number for purposes of ranking. Conceptually, attributable risk provides an estimate of the proportion of poor biological conditions that could be reduced if high levels of a particular stressor were eliminated. This risk number is presented in terms of the percent of length that could be improved" (USEPA, 2013-2014 NRSA Draft Report, 2013).

The result of attributable risk for the current Oklahoma study is provided in Figures 60-63. In order to provide a meaningful analysis, an assumption was made that if relative risk was not significant, then calculation of an elimination scenario was not meaningful. Therefore, pollutant elimination analyses were only performed where stressor/indicator relative risk was significant (See Figures 44-59). Confidence intervals were also calculated for each risk analysis, and significant potential reduction only exists where the upper confidence bound does not equal the original percent in poor condition. The original extent is presented in the green colored bars below. The attributable extent is presented in the pink colored bars below. This extent represents the percentage of change in poor condition of an indicator in total miles once the stressor has been eliminated.

Notably, for fish, reduction of TP and TN in streams could result in a significant decrease in poor fish condition (Figure 60). This is also true for TN for the WPT aggregated ecoregion. For macroinvertebrates, elimination of both TP and TN could have a significant effect on poor condition (Figure 61). The elimination of TP in the WPT could result in a 25% lowering of the percent of miles in poor condition. Eliminating conductivity (6.4% reduction, FPFH) and turbidity (10% reduction, TF) in certain aggregated ecoregions can also result in a significant improvement in macroinvertebrate condition. Sestonic algae condition shows potential promise with a variety of pollutant elimination scenarios (Figure 63). Reduction in turbidity, conductivity, and nutrients (TP, TN) all show some significant potential for reduction in poor sestonic algae condition for the statewide analysis. Reduction of TP and TN statewide both show the same amount of positive significance for the potential reduction in sestonic algal growth (8.9%). Benthic algae, on the other hand only respond to reductions in conductivity in the FPFH aggregated ecoregion (2.8%) and turbidity in rivers (4.4%) (Figure 62).

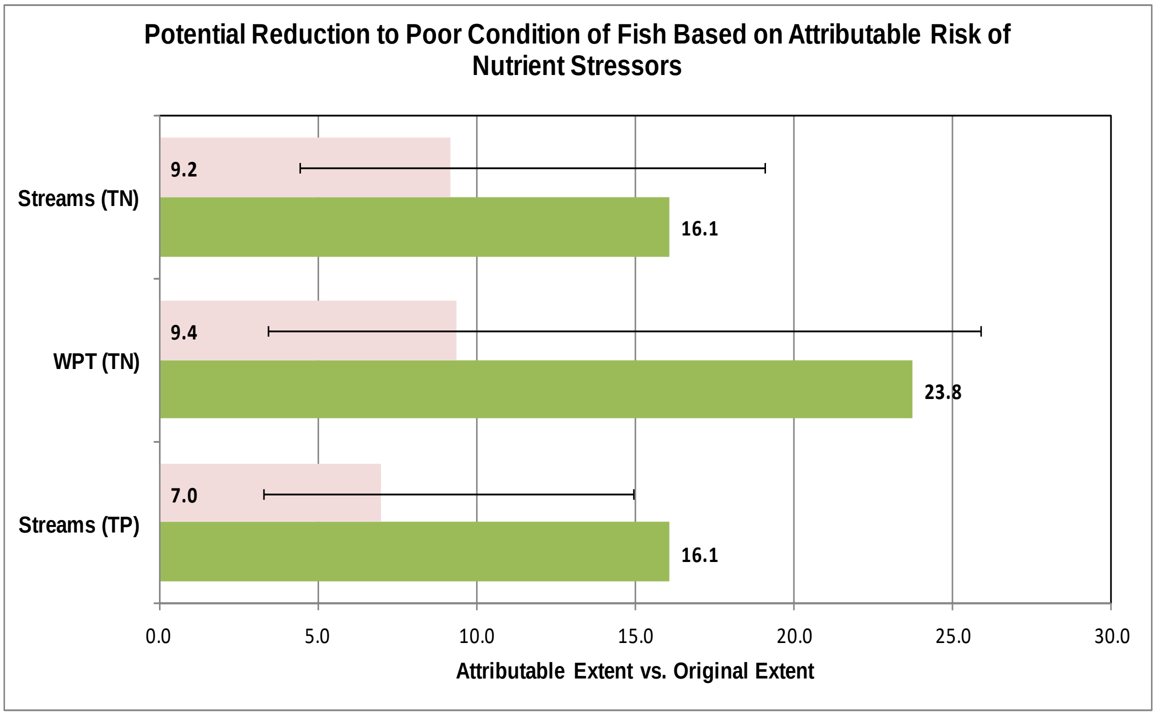



Figure 60. Potential Reduction to Poor Condition of Fish Based on the Attributable Risk of Stressors Having Significant Relative Risk.

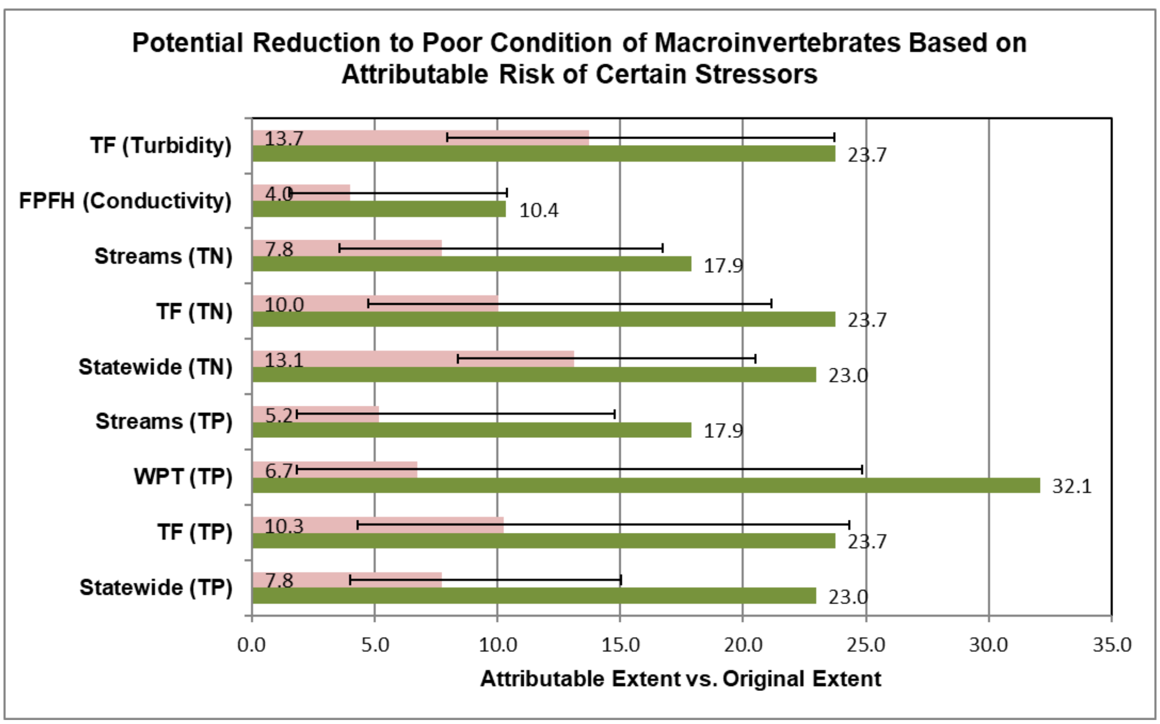



Figure 61. Potential Reduction to Poor Condition of Macroinvertebrates Based on the Attributable Risk of Stressors Having Significant Relative Risk. Upper and Lower Bounds Represent a 95% Confidence Interval.

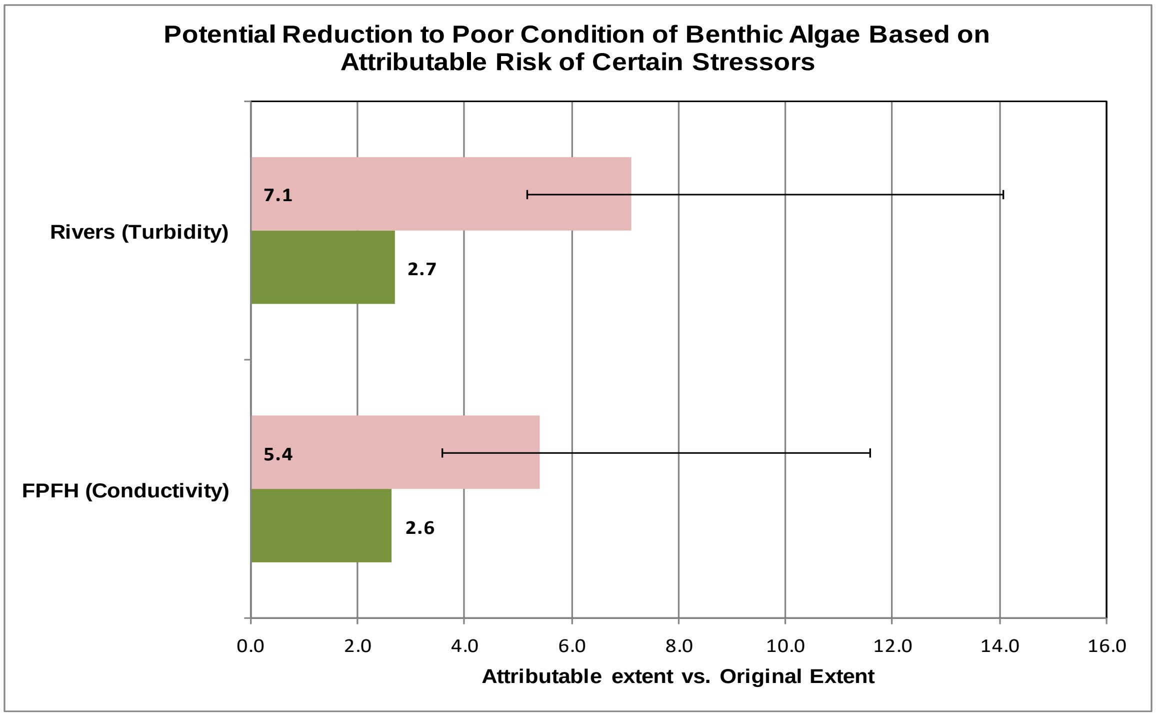



Figure 62. Potential Reduction to Poor Condition of Benthic Algae Based on the Attributable Risk of Stressors Having Significant Relative Risk.

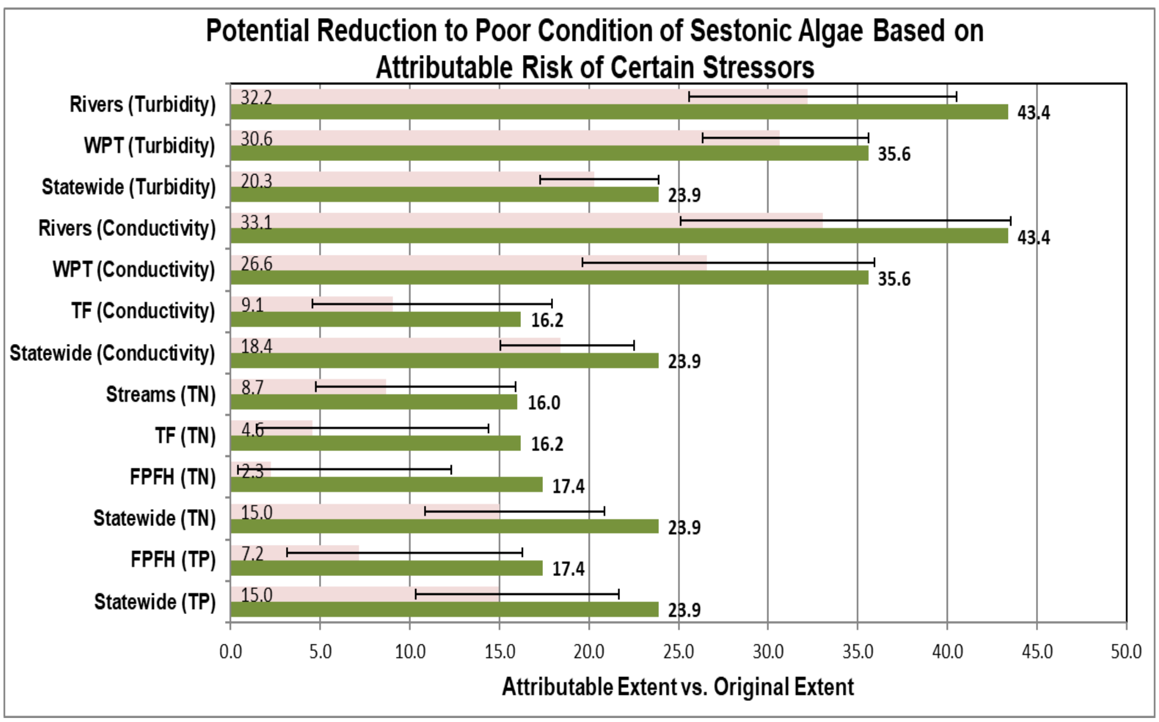



Figure 63. Potential Reduction of Poor Condition of Sestonic Algae Based on Attributable Risk of Stressors Having Significant Relative Risk.

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## APPENDIX A – TARGET STATION METADATA

Table 14. Appendix A—Metadata for Target Sites.

| Site_ID | Waterbody | LAT | LON | Size_Cat | Study_Cat | Strah_Cat | Agg_ECO | WGT13_14 | WGT14_15 | WGT15_16 | WGT16_17 | WGT_17 | WGT13_17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRM-1006 | Arkansas River | 36.5858 | -97.0339 | Rivers Major | 13-14 | 8 | WPT | 93.37 | 46.68 | 0.00 | 0.00 | 0.00 | 37.35 |
| OKS9-0932 | Bear Creek | 35.7493 | -97.1343 | Streams Revisit | 13-14 | 4 | FPFH | 145.77 | 72.88 | 0.00 | 0.00 | 0.00 | 58.31 |
| OKS9-0938 | Big Eagle Creek | 34.5313 | -94.7144 | Streams Revisit | 13-14 | 4 | TF | 182.64 | 91.32 | 0.00 | 0.00 | 0.00 | 73.06 |
| OKRO-1087 | Black Fork River | 34.8525 | -94.6172 | Rivers Other | 13-14 | 5 | TF | 98.54 | 49.27 | 0.00 | 0.00 | 0.00 | 39.42 |
| OKLS-1181 | Brazil Creek | 35.1481 | -94.7019 | Large Streams | 13-14 | 4 | TF | 118.40 | 59.20 | 0.00 | 0.00 | 0.00 | 47.36 |
| OKS9-0937 | Caddo Creek | 34.2751 | -97.1923 | Streams Revisit | 13-14 | 3 | FPFH | 201.64 | 100.82 | 0.00 | 0.00 | 0.00 | 80.66 |
| OKR9-0901 | Canadian River | 35.9258 | -99.5152 | Rivers Revisit | 13-14 | 7 | WPT | 76.36 | 38.18 | 0.00 | 0.00 | 0.00 | 30.54 |
| OKR9-0913 | Canadian River | 35.8145 | -98.7021 | Rivers Revisit | 13-14 | 7 | WPT | 76.36 | 38.18 | 0.00 | 0.00 | 0.00 | 30.54 |
| OKR9-0902 | Chikaskia River | 36.9580 | -97.4219 | Rivers Revisit | 13-14 | 6 | WPT | 93.37 | 46.68 | 0.00 | 0.00 | 0.00 | 37.35 |
| OKR9-0906 | Cimarron River | 36.0550 | -98.1290 | Rivers Revisit | 13-14 | 6 | WPT | 106.71 | 53.36 | 0.00 | 0.00 | 0.00 | 42.69 |
| OKR9-0908 | Cimarron River | 35.9249 | -97.8639 | Rivers Revisit | 13-14 | 6 | WPT | 106.71 | 53.36 | 0.00 | 0.00 | 0.00 | 42.69 |
| OKRM-1002 | Cimarron River | 35.9677 | -97.1255 | Rivers Major | 13-14 | 6 | WPT | 106.71 | 53.36 | 0.00 | 0.00 | 0.00 | 42.69 |
| OKRO-1088 | Deep Fork River | 35.6855 | -96.4149 | Rivers Other | 13-14 | 5 | FPFH | 73.03 | 36.51 | 0.00 | 0.00 | 0.00 | 29.21 |
| OKRO-1089 | Elm Fork of the Red River | 34.8890 | -99.3774 | Rivers Other | 13-14 | 5 | WPT | 148.59 | 74.29 | 0.00 | 0.00 | 0.00 | 59.44 |
| OKLS-1176 | Glover River | 34.0670 | -94.9053 | Large Streams | 13-14 | 4 | TF | 182.64 | 91.32 | 0.00 | 0.00 | 0.00 | 73.06 |
| OKSS-1405 | Illinois River | 35.9870 | -94.9162 | Small Streams | 13-14 | 2 | TF | 167.39 | 83.70 | 0.00 | 0.00 | 0.00 | 66.96 |
| OKR9-0907 | Kiamichi River | 34.6357 | -95.1216 | Rivers Revisit | 13-14 | 5 | TF | 72.86 | 36.43 | 0.00 | 0.00 | 0.00 | 29.14 |
| OKRM-1008 | Kiamichi River | 34.2270 | -95.4932 | Rivers Major | 13-14 | 6 | TF | 72.86 | 36.43 | 0.00 | 0.00 | 0.00 | 29.14 |
| OKS9-0931 | Little Tony Creek | 34.8393 | -98.3060 | Streams Revisit | 13-14 | 2 | WPT | 864.24 | 432.12 | 0.00 | 0.00 | 0.00 | 345.69 |
| OKS9-0933 | Mud Creek | 36.9513 | -95.0354 | Streams Revisit | 13-14 | 2 | FPFH | 122.55 | 61.28 | 0.00 | 0.00 | 0.00 | 49.02 |
| OKLS-1182 | Muddy Boggy River | 34.7561 | -96.3830 | Large Streams | 13-14 | 4 | TF | 182.64 | 91.32 | 0.00 | 0.00 | 0.00 | 73.06 |
| OKRO-1086 | Muddy Boggy River | 34.1947 | -95.8476 | Rivers Other | 13-14 | 6 | TF | 72.86 | 36.43 | 0.00 | 0.00 | 0.00 | 29.14 |
| OKR9-0909 | Otter Creek | 34.5916 | -99.0238 | Rivers Revisit | 13-14 | 5 | WPT | 148.59 | 74.29 | 0.00 | 0.00 | 0.00 | 59.44 |
| OKS9-0939 | Pennington Creek | 34.3459 | -96.6995 | Streams Revisit | 13-14 | 4 | FPFH | 201.64 | 100.82 | 0.00 | 0.00 | 0.00 | 80.66 |
| OKS9-0936 | Polecat Creek | 35.9655 | -96.3681 | Streams Revisit | 13-14 | 4 | FPFH | 78.34 | 39.17 | 0.00 | 0.00 | 0.00 | 31.34 |
| OKR9-0912 | Red River | 33.9122 | -95.5494 | Rivers Revisit | 13-14 | 7 | TF | 72.86 | 36.43 | 0.00 | 0.00 | 0.00 | 29.14 |
| OKRM-1001 | Red River | 33.7837 | -96.1715 | Rivers Major | 13-14 | 7 | TF | 72.86 | 36.43 | 0.00 | 0.00 | 0.00 | 29.14 |
| OKRM-1004 | Red River | 33.8791 | -95.9129 | Rivers Major | 13-14 | 7 | TF | 72.86 | 36.43 | 0.00 | 0.00 | 0.00 | 29.14 |
| OKS9-0935 | Sergeant Major Creek | 35.5454 | -99.7227 | Streams Revisit | 13-14 | 2 | WPT | 563.11 | 281.55 | 0.00 | 0.00 | 0.00 | 225.24 |

| Site_ID | Waterbody | LAT | LON | Size_Cat | Study_Cat | Strah_Cat | Agg_ECO | WGT13_14 | WGT14_15 | WGT15_16 | WGT16_17 | WGT_17 | WGT13_17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKR9-0905 | Washita River | 35.5300 | -99.1302 | Rivers Revisit | 13-14 | 6 | WPT | 596.07 | 298.03 | 0.00 | 0.00 | 0.00 | 238.43 |
| OKR9-0911 | Washita River | 34.2221 | -96.7069 | Rivers Revisit | 13-14 | 6 | FPFH | 206.93 | 103.47 | 0.00 | 0.00 | 0.00 | 82.77 |
| OKS9-0934 | West Fork of Sandy Creek | 35.7177 | -96.3770 | Streams Revisit | 13-14 | 3 | FPFH | 145.77 | 72.88 | 0.00 | 0.00 | 0.00 | 58.31 |
| OKRM-1022 | Arkansas River | 36.9548 | -96.9387 | Rivers Major | 14-15 | 7 | FPFH | 8.92 | 17.85 | 8.92 | 0.00 | 0.00 | 7.14 |
| OKS9-0941 | Browns Creek | 35.7556 | -96.2101 | Streams Revisit | 14-15 | 3 | FPFH | 72.88 | 145.77 | 72.88 | 0.00 | 0.00 | 58.31 |
| OKRM-1021 | Canadian River | 35.0258 | -97.3541 | Rivers Major | 14-15 | 7 | WPT | 38.18 | 76.36 | 38.18 | 0.00 | 0.00 | 30.54 |
| OKSS-1431 | Cedar Creek | 36.7601 | -96.2896 | Small Streams | 14-15 | 1 | FPFH | 61.28 | 122.55 | 61.28 | 0.00 | 0.00 | 49.02 |
| OKRO-1102 | Clear Boggy Creek | 34.0964 | -95.8940 | Rivers Other | 14-15 | 5 | TF | 36.43 | 72.86 | 36.43 | 0.00 | 0.00 | 29.14 |
| OKSS-1429 | Ingersoll Creek | 34.5484 | -95.8965 | Small Streams | 14-15 | 2 | TF | 78.39 | 156.78 | 78.39 | 0.00 | 0.00 | 62.71 |
| OKSS-1430 | Little Vian Creek | 35.4690 | -94.9544 | Small Streams | 14-15 | 1 | TF | 83.70 | 167.39 | 83.70 | 0.00 | 0.00 | 66.96 |
| OKRO-1103 | Mountain Fork River | 34.1366 | -94.6823 | Rivers Other | 14-15 | 6 | TF | 36.43 | 72.86 | 36.43 | 0.00 | 0.00 | 29.14 |
| OKR9-0904 | North Canadian River | 35.3994 | -95.7926 | Rivers Revisit | 14-15 | 6 | FPFH | 36.51 | 73.03 | 36.51 | 0.00 | 0.00 | 29.21 |
| OKRO-1092 | North Canadian River | 35.5649 | -97.9499 | Rivers Other | 14-15 | 6 | WPT | 56.29 | 112.58 | 56.29 | 0.00 | 0.00 | 45.03 |
| OKLS-1204 | Pine Creek | 34.1739 | -96.0874 | Large Streams | 14-15 | 3 | TF | 91.32 | 182.64 | 91.32 | 0.00 | 0.00 | 73.06 |
| OKR9-0903 | Red River | 33.8636 | -97.0060 | Rivers Revisit | 14-15 | 7 | FPFH | 24.93 | 49.86 | 24.93 | 0.00 | 0.00 | 19.94 |
| OKRM-1020 | Red River | 33.8710 | -95.4325 | Rivers Major | 14-15 | 7 | TF | 36.43 | 72.86 | 36.43 | 0.00 | 0.00 | 29.14 |
| OKRM-1026 | Red River | 34.2033 | -99.1178 | Rivers Major | 14-15 | 7 | WPT | 74.29 | 148.59 | 74.29 | 0.00 | 0.00 | 59.44 |
| OKSS-1444 | Roaring Creek | 34.8510 | -97.9106 | Small Streams | 14-15 | 1 | FPFH | 97.52 | 195.04 | 97.52 | 0.00 | 0.00 | 78.01 |
| OKSS-1403 | Rock Creek | 34.3653 | -94.4671 | Small Streams | 14-15 | 1 | TF | 78.39 | 156.78 | 78.39 | 0.00 | 0.00 | 62.71 |
| OKLS-1222 | Sandy Creek | 34.4434 | -99.6526 | Large Streams | 14-15 | 4 | WPT | 66.77 | 133.54 | 66.77 | 0.00 | 0.00 | 53.42 |
| OKLS-1209 | Tenmile Creek | 34.3029 | -95.6581 | Large Streams | 14-15 | 4 | TF | 91.32 | 182.64 | 91.32 | 0.00 | 0.00 | 73.06 |
| OKLS-1203 | Wildhorse Creek | 35.9251 | -96.7199 | Large Streams | 14-15 | 3 | WPT | 59.36 | 118.71 | 59.36 | 0.00 | 0.00 | 47.48 |
| OKSS-1408 | Alabama Creek | 35.3658 | -96.1527 | Small Streams | 14-15 | 1 | FPFH | 172.67 | 345.34 | 172.67 | 0.00 | 0.00 | 138.14 |
| OKRM-1011 | Arkansas River | 35.3815 | -94.4463 | Rivers Major | 14-15 | 9 | TF | 49.27 | 98.54 | 49.27 | 0.00 | 0.00 | 39.42 |
| OKSS-1414 | Bad Creek | 35.3481 | -96.0438 | Small Streams | 14-15 | 2 | FPFH | 172.67 | 345.34 | 172.67 | 0.00 | 0.00 | 138.14 |
| OKRV-2013 | Baron Fork | 35.9511 | -94.6582 | Revisit Site | 14-15 | 4 | TF | 59.20 | 118.40 | 59.20 | 0.00 | 0.00 | 47.36 |
| OKLS-1201 | Butler Creek | 35.5911 | -95.4229 | Large Streams | 14-15 | 3 | FPFH | 39.17 | 78.34 | 39.17 | 0.00 | 0.00 | 31.34 |
| OKSS-1415 | Dry Creek | 36.8324 | -96.4390 | Small Streams | 14-15 | 1 | FPFH | 61.28 | 122.55 | 61.28 | 0.00 | 0.00 | 49.02 |
| OKLS-1191 | Hickory Creek | 36.9895 | -96.1073 | Large Streams | 14-15 | 3 | FPFH | 76.10 | 152.21 | 76.10 | 0.00 | 0.00 | 60.88 |

| Site_ID | Waterbody | LAT | LON | Size_Cat | Study_Cat | Strah_Cat | Agg_ECO | WGT13_14 | WGT14_15 | WGT15_16 | WGT16_17 | WGT_17 | WGT13_17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRM-1016 | Illinois River | 35.9379 | -94.9195 | Rivers Major | 14-15 | 6 | TF | 49.27 | 98.54 | 49.27 | 0.00 | 0.00 | 39.42 |
| OKLS-1190 | Little Blue Creek | 34.4614 | -96.6210 | Large Streams | 14-15 | 3 | FPFH | 39.89 | 79.79 | 39.89 | 0.00 | 0.00 | 31.92 |
| OKRV-2001 | North Fork of the Red River | 35.1033 | -99.3977 | Revisit Site | 14-15 | 7 | WPT | 74.29 | 148.59 | 74.29 | 0.00 | 0.00 | 59.44 |
| OKRM-1010 | Red River | 34.0850 | -98.5145 | Rivers Major | 14-15 | 7 | WPT | 74.29 | 148.59 | 74.29 | 0.00 | 0.00 | 59.44 |
| OKRM-1013 | Red River | 33.9959 | -98.0266 | Rivers Major | 14-15 | 7 | WPT | 74.29 | 148.59 | 74.29 | 0.00 | 0.00 | 59.44 |
| OKSS-1447 | Rush Creek | 34.6921 | -97.6668 | Small Streams | 14-15 | 2 | FPFH | 97.52 | 195.04 | 97.52 | 0.00 | 0.00 | 78.01 |
| OKLS-1212 | Sans Bois Creek | 35.0992 | -95.3401 | Large Streams | 14-15 | 4 | TF | 59.20 | 118.40 | 59.20 | 0.00 | 0.00 | 47.36 |
| OKLS-1185 | Snake Creek | 35.8481 | -95.8879 | Large Streams | 14-15 | 4 | FPFH | 39.17 | 78.34 | 39.17 | 0.00 | 0.00 | 31.34 |
| OKLS-1184 | Taloka Creek | 35.3069 | -95.1706 | Large Streams | 14-15 | 4 | TF | 291.23 | 582.47 | 291.23 | 0.00 | 0.00 | 232.99 |
| OKRO-1095 | Verdigris River | 36.3883 | -95.6639 | Rivers Other | 14-15 | 6 | FPFH | 42.54 | 85.08 | 42.54 | 0.00 | 0.00 | 34.03 |
| OKLS-1188 | Wolf Creek | 35.4606 | -95.8612 | Large Streams | 14-15 | 4 | FPFH | 72.88 | 145.77 | 72.88 | 0.00 | 0.00 | 58.31 |
| OKRV-2029 | Bird Creek | 35.0399 | -96.4658 | Revisit Site | 15-16 | 1 | FPFH | 0.00 | 44.61 | 89.23 | 44.61 | 0.00 | 35.69 |
| OKRV-2011 | Canadian River | 35.3464 | -97.8572 | Revisit Site | 15-16 | 3 | WPT | 0.00 | 55.87 | 111.75 | 55.87 | 0.00 | 44.70 |
| OKRO-1107 | Caney River | 36.6762 | -95.9652 | Rivers Other | 15-16 | 6 | FPFH | 0.00 | 42.54 | 85.08 | 42.54 | 0.00 | 34.03 |
| OKRV-2016 | Clear Boggy Creek | 34.0683 | -95.8146 | Revisit Site | 15-16 | 5 | TF | 0.00 | 36.43 | 72.86 | 36.43 | 0.00 | 29.14 |
| OKRV-2010 | Coal Creek | 36.0069 | -95.9930 | Revisit Site | 15-16 | 2 | FPFH | 0.00 | 76.23 | 152.47 | 76.23 | 0.00 | 60.99 |
| OKRV-2040 | Curl Creek | 36.5976 | -95.8610 | Revisit Site | 15-16 | 2 | FPFH | 0.00 | 61.28 | 122.55 | 61.28 | 0.00 | 49.02 |
| OKRV-2035 | Deep Fork River | 35.6402 | -96.9082 | Revisit Site | 15-16 | 5 | FPFH | 0.00 | 36.51 | 73.03 | 36.51 | 0.00 | 29.21 |
| OKRV-2014 | Holly Creek | 34.3519 | -95.1133 | Revisit Site | 15-16 | 1 | TF | 0.00 | 78.39 | 156.78 | 78.39 | 0.00 | 62.71 |
| OKRV-2034 | Jim Creek | 35.2193 | -97.0668 | Revisit Site | 15-16 | 1 | FPFH | 0.00 | 44.61 | 89.23 | 44.61 | 0.00 | 35.69 |
| OKRV-2080 | Little Cabin Creek | 36.8257 | -95.0766 | Revisit Site | 15-16 | 2 | FPFH | 0.00 | 61.28 | 122.55 | 61.28 | 0.00 | 49.02 |
| OKRV-2006 | Lyon Creek | 36.1325 | -97.7442 | Revisit Site | 15-16 | 4 | WPT | 0.00 | 59.36 | 118.71 | 59.36 | 0.00 | 47.48 |
| OKRV-2074 | Madden Creek | 36.7031 | -95.4182 | Revisit Site | 15-16 | 1 | FPFH | 0.00 | 61.28 | 122.55 | 61.28 | 0.00 | 49.02 |
| OKSS-1434 | Mill Creek | 34.2099 | -95.4635 | Small Streams | 15-16 | 1 | TF | 0.00 | 78.39 | 156.78 | 78.39 | 0.00 | 62.71 |
| OKRV-2012 | Mud Creek | 34.1054 | -97.6645 | Revisit Site | 15-16 | 4 | WPT | 0.00 | 66.77 | 133.54 | 66.77 | 0.00 | 53.42 |
| OKSS-1449 | Mud Creek | 36.9414 | -95.0080 | Small Streams | 15-16 | 2 | FPFH | 0.00 | 61.28 | 122.55 | 61.28 | 0.00 | 49.02 |
| OKRO-1106 | Muddy Boggy River | 33.9415 | -95.5992 | Rivers Other | 15-16 | 6 | TF | 0.00 | 36.43 | 72.86 | 36.43 | 0.00 | 29.14 |
| OKRV-2019 | Neosho River | 36.8781 | -94.8933 | Revisit Site | 15-16 | 7 | FPFH | 0.00 | 42.54 | 85.08 | 42.54 | 0.00 | 34.03 |
| OKRO-1098 | North Canadian River | 35.3303 | -96.0960 | Rivers Other | 15-16 | 6 | FPFH | 0.00 | 36.51 | 73.03 | 36.51 | 0.00 | 29.21 |

| Site_ID | Waterbody | LAT | LON | Size_Cat | Study_Cat | Strah_Cat | Agg_ECO | WGT13_14 | WGT14_15 | WGT15_16 | WGT16_17 | WGT_17 | WGT13_17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRV-2004 | North Fork of Walnut Creek | 35.1620 | -97.6089 | Revisit Site | 15-16 | 3 | WPT | 0.00 | 55.87 | 111.75 | 55.87 | 0.00 | 44.70 |
| OKSS-1410 | Peterson Creek | 34.5339 | -95.3984 | Small Streams | 15-16 | 1 | TF | 0.00 | 78.39 | 156.78 | 78.39 | 0.00 | 62.71 |
| OKRV-2020 | Polecat Creek | 35.9649 | -96.4021 | Revisit Site | 15-16 | 4 | FPFH | 0.00 | 39.17 | 78.34 | 39.17 | 0.00 | 31.34 |
| OKRM-1023 | Poteau River | 34.8775 | -94.4742 | Rivers Major | 15-16 | 5 | TF | 0.00 | 49.27 | 98.54 | 49.27 | 0.00 | 39.42 |
| OKRM-1017 | Red River | 33.7242 | -97.1539 | Rivers Major | 15-16 | 7 | FPFH | 0.00 | 24.93 | 49.86 | 24.93 | 0.00 | 19.94 |
| OKRV-2079 | Rock Creek | 36.5022 | -95.2675 | Revisit Site | 15-16 | 1 | FPFH | 0.00 | 61.28 | 122.55 | 61.28 | 0.00 | 49.02 |
| OKRV-2033 | Shady Grove Creek | 35.4708 | -95.4587 | Revisit Site | 15-16 | 4 | FPFH | 0.00 | 39.17 | 78.34 | 39.17 | 0.00 | 31.34 |
| OKRV-2007 | Sweetwater Creek | 35.3072 | -99.9551 | Revisit Site | 15-16 | 4 | WPT | 0.00 | 66.77 | 133.54 | 66.77 | 0.00 | 53.42 |
| OKSS-1416 | Trib. To Fivemile Creek | 35.4003 | -98.6004 | Small Streams | 15-16 | 1 | WPT | 0.00 | 281.55 | 563.11 | 281.55 | 0.00 | 225.24 |
| OKSS-1409 | Trib. To Fourteenmile Creek | 36.0136 | -95.0338 | Small Streams | 15-16 | 2 | TF | 0.00 | 42.86 | 85.71 | 42.86 | 0.00 | 34.29 |
| OKRV-2009 | Turkey Creek | 36.0070 | -97.9341 | Revisit Site | 15-16 | 4 | WPT | 0.00 | 59.36 | 118.71 | 59.36 | 0.00 | 47.48 |
| OKSS-1436 | Unnamed Creek | 34.5859 | -96.6251 | Small Streams | 15-16 | 1 | TF | 0.00 | 78.39 | 156.78 | 78.39 | 0.00 | 62.71 |
| OKRV-2088 | Verdigris River | 36.1977 | -95.7016 | Revisit Site | 15-16 | 7 | FPFH | 0.00 | 42.54 | 85.08 | 42.54 | 0.00 | 34.03 |
| OKRV-2068 | California Creek | 36.8984 | -95.7368 | Revisit Site | 16-17 | 1 | FPFH | 0.00 | 0.00 | 61.28 | 122.55 | 61.28 | 49.02 |
| OKRV-2102 | Canadian River | 35.0355 | -97.3573 | Revisit Site | 16-17 | 4 | WPT | 0.00 | 0.00 | 55.87 | 111.75 | 55.87 | 44.70 |
| OKRO-1111 | Caney River | 36.4798 | -95.8452 | Rivers Other | 16-17 | 6 | FPFH | 0.00 | 0.00 | 42.54 | 85.08 | 42.54 | 34.03 |
| OKSS-1439 | Carter Creek | 34.2436 | -94.8326 | Small Streams | 16-17 | 2 | TF | 0.00 | 0.00 | 78.39 | 156.78 | 78.39 | 62.71 |
| OKRV-2043 | Cimarron River | 36.8742 | -99.3603 | Revisit Site | 16-17 | 7 | WPT | 0.00 | 0.00 | 53.36 | 106.71 | 53.36 | 42.69 |
| OKSS-1472 | Dance Creek | 35.1882 | -96.9581 | Small Streams | 16-17 | 2 | FPFH | 0.00 | 0.00 | 44.61 | 89.23 | 44.61 | 35.69 |
| OKRV-2028 | Deep Fork River | 35.5695 | -95.9389 | Revisit Site | 16-17 | 6 | FPFH | 0.00 | 0.00 | 36.51 | 73.03 | 36.51 | 29.21 |
| OKSS-1438 | Dumpling Creek | 34.2297 | -95.5825 | Small Streams | 16-17 | 2 | TF | 0.00 | 0.00 | 78.39 | 156.78 | 78.39 | 62.71 |
| OKRO-1099 | Elk River | 36.6406 | -94.6455 | Rivers Other | 16-17 | 5 | TF | 0.00 | 0.00 | 36.03 | 72.06 | 36.03 | 28.82 |
| OKRO-1099 | Elk River (revisit) | 36.6406 | -94.6455 | Rivers Other | 16-17 | 5 | TF | 0.00 | 0.00 | 36.03 | 72.06 | 36.03 | 28.82 |
| OKRV-2026 | Fourche Maline visit #1 | 34.9166 | -94.9485 | Revisit Site | 16-17 | 5 | TF | 0.00 | 0.00 | 49.27 | 98.54 | 49.27 | 39.42 |
| OKRV-2025 | Greenleaf Creek | 36.9334 | -98.8729 | Revisit Site | 16-17 | 2 | WPT | 0.00 | 0.00 | 82.10 | 164.19 | 82.10 | 65.68 |
| OKRV-2044 | Julian Creek | 34.9697 | -96.9740 | Revisit Site | 16-17 | 2 | FPFH | 0.00 | 0.00 | 44.61 | 89.23 | 44.61 | 35.69 |
| OKLS-1186 | Little Beaver Creek | 34.5246 | -98.0859 | Large Streams | 16-17 | 3 | WPT | 0.00 | 0.00 | 66.77 | 133.54 | 66.77 | 53.42 |
| OKLS-1196 | Mt. Fork of Sans Bois Creek | 35.0711 | -95.1553 | Large Streams | 16-17 | 3 | TF | 0.00 | 0.00 | 59.20 | 118.40 | 59.20 | 47.36 |
| OKLS-1193 | North Boggy Creek | 34.6062 | -96.0139 | Large Streams | 16-17 | 4 | TF | 0.00 | 0.00 | 91.32 | 182.64 | 91.32 | 73.06 |

| Site_ID | Waterbody | LAT | LON | Size_Cat | Study_Cat | Strah_Cat | Agg_ECO | WGT13_14 | WGT14_15 | WGT15_16 | WGT16_17 | WGT_17 | WGT13_17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRO-1108 | Red Rock Creek | 36.4882 | -97.1008 | Rivers Other | 16-17 | 5 | WPT | 0.00 | 0.00 | 46.68 | 93.37 | 46.68 | 37.35 |
| OKLS-1192 | Rock Creek | 34.0712 | -94.4781 | Large Streams | 16-17 | 3 | TF | 0.00 | 0.00 | 91.32 | 182.64 | 91.32 | 73.06 |
| OKRV-2027 | South Fork of Dirty Creek | 35.4529 | -95.2145 | Revisit Site | 16-17 | 4 | FPFH | 0.00 | 0.00 | 39.17 | 78.34 | 39.17 | 31.34 |
| OKSS-1419 | Trib. To Kiamichi River | 34.6783 | -94.4735 | Small Streams | 16-17 | 1 | TF | 0.00 | 0.00 | 78.39 | 156.78 | 78.39 | 62.71 |
| OKRV-2070 | Tyner Creek | 36.4381 | -95.9965 | Revisit Site | 16-17 | 2 | FPFH | 0.00 | 0.00 | 61.28 | 122.55 | 61.28 | 49.02 |
| OKRV-2021 | Unnamed Creek | 36.7534 | -98.2483 | Revisit Site | 16-17 | 1 | WPT | 0.00 | 0.00 | 82.10 | 164.19 | 82.10 | 65.68 |
| OKSS-1456 | Unnamed Creek | 35.0408 | -96.1825 | Small Streams | 16-17 | 1 | TF | 0.00 | 0.00 | 82.99 | 165.98 | 82.99 | 66.39 |
| OKSS-1426 | West Terrapin Creek | 34.2963 | -95.0784 | Small Streams | 16-17 | 2 | TF | 0.00 | 0.00 | 78.39 | 156.78 | 78.39 | 62.71 |
| OKSS-1425 | Wickliffe Creek (revisit) | 36.3250 | -95.0646 | Small Streams | 16-17 | 1 | TF | 0.00 | 0.00 | 42.86 | 85.71 | 42.86 | 34.29 |
| OKRV-2039 | Wolf Creek | 36.3505 | -99.6982 | Revisit Site | 16-17 | 7 | WPT | 0.00 | 0.00 | 53.22 | 106.43 | 53.22 | 42.57 |
| OKRV-2032 | Wolf Creek | 36.2871 | -99.9500 | Revisit Site | 16-17 | 7 | WPT | 0.00 | 0.00 | 53.22 | 106.43 | 53.22 | 42.57 |
| OKLS-1198 | Big Creek | 34.9218 | -96.9221 | Large Streams | 2017 | 3 | FPFH | 0.00 | 0.00 | 0.00 | 135.53 | 271.05 | 54.21 |
| OKRV-2036 | Big Creek | 34.7075 | -94.5340 | Revisit Site | 2017 | 3 | TF | 0.00 | 0.00 | 0.00 | 59.20 | 118.40 | 23.68 |
| OKRV-2015 | Bitter Creek | 34.7809 | -99.3922 | Revisit Site | 2017 | 4 | WPT | 0.00 | 0.00 | 0.00 | 66.77 | 133.54 | 26.71 |
| OKRV-2101 | Black Bear Creek | 36.3452 | -97.1905 | Revisit Site | 2017 | 4 | WPT | 0.00 | 0.00 | 0.00 | 82.90 | 165.81 | 33.16 |
| OKLS-1197 | Black Fork | 34.7574 | -94.4611 | Large Streams | 2017 | 3 | TF | 0.00 | 0.00 | 0.00 | 59.20 | 118.40 | 23.68 |
| OKLS-1197 | Black Fork (Revisit) | 34.7574 | -94.4611 | Large Streams | 2017 | 3 | TF | 0.00 | 0.00 | 0.00 | 59.20 | 118.40 | 23.68 |
| OKRV-2061 | Blue River | 34.0867 | -96.3613 | Revisit Site | 2017 | 4 | FPFH | 0.00 | 0.00 | 0.00 | 39.89 | 79.79 | 15.96 |
| OKRM-1014 | Canadian River | 35.8325 | -98.7301 | Rivers Major | 2017 | 7 | WPT | 0.00 | 0.00 | 0.00 | 38.18 | 76.36 | 15.27 |
| OKRM-1015 | Canadian River | 35.1467 | -95.8999 | Rivers Major | 2017 | 7 | TF | 0.00 | 0.00 | 0.00 | 96.52 | 193.04 | 38.61 |
| OKRM-1014 | Canadian River (Revisit) | 35.8325 | -98.7301 | Rivers Major | 2017 | 7 | WPT | 0.00 | 0.00 | 0.00 | 38.18 | 76.36 | 15.27 |
| OKRV-2030 | Caney River | 36.6842 | -95.9800 | Revisit Site | 2017 | 6 | FPFH | 0.00 | 0.00 | 0.00 | 42.54 | 85.08 | 17.02 |
| OKRV-2022 | Caston Creek | 34.9600 | -94.7384 | Revisit Site | 2017 | 4 | TF | 0.00 | 0.00 | 0.00 | 59.20 | 118.40 | 23.68 |
| OKRV-2023 | Chikaskia River | 36.9097 | -97.3654 | Revisit Site | 2017 | 6 | WPT | 0.00 | 0.00 | 0.00 | 46.68 | 93.37 | 18.67 |
| OKRV-2098 | Cottonwood Creek | 35.7684 | -97.6306 | Revisit Site | 2017 | 4 | WPT | 0.00 | 0.00 | 0.00 | 59.36 | 118.71 | 23.74 |
| OKRO-1105 | Elk Creek | 35.1752 | -99.2801 | Rivers Other | 2017 | 5 | WPT | 0.00 | 0.00 | 0.00 | 74.29 | 148.59 | 29.72 |
| OKLS-1213 | Gap Creek | 35.0840 | -94.5408 | Large Streams | 2017 | 3 | TF | 0.00 | 0.00 | 0.00 | 59.20 | 118.40 | 23.68 |
| OKSS-1420 | Island bayou | 33.8328 | -96.2577 | Small Streams | 2017 | 2 | FPFH | 0.00 | 0.00 | 0.00 | 72.27 | 144.54 | 28.91 |
| OKLS-1194 | Little Washita River | 34.9567 | -97.9265 | Large Streams | 2017 | 4 | WPT | 0.00 | 0.00 | 0.00 | 140.70 | 281.41 | 56.28 |

| Site_ID | Waterbody | LAT | LON | Size_Cat | Study_Cat | Strah_Cat | Agg_ECO | WGT13_14 | WGT14_15 | WGT15_16 | WGT16_17 | WGT_17 | WGT13_17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKSS-1446 | Middle Creek | 35.1586 | -96.0053 | Small Streams | 2017 | 2 | TF | 0.00 | 0.00 | 0.00 | 82.99 | 165.98 | 33.20 |
| OKRV-2037 | North Fork of the Red River | 34.8671 | -99.3123 | Revisit Site | 16-17 | 8 | WPT | 0.00 | 0.00 | 0.00 | 148.59 | 74.29 | 59.44 |
| OKRV-2105 | Salt Fork of the Arkansas River | 36.9436 | -98.7743 | Revisit Site | 2017 | 5 | WPT | 0.00 | 0.00 | 0.00 | 46.68 | 93.37 | 18.67 |
| OKLS-1238 | Salt Fork of the Red River | 34.7704 | -99.4366 | Large Streams | 2017 | 4 | WPT | 0.00 | 0.00 | 0.00 | 66.77 | 133.54 | 26.71 |
| OKLS-1242 | Station Creek | 34.9875 | -99.6686 | Large Streams | 2017 | 3 | WPT | 0.00 | 0.00 | 0.00 | 66.77 | 133.54 | 26.71 |
| OKRV-2077 | Tomike Creek | 34.9253 | -97.1586 | Revisit Site | 2017 | 2 | WPT | 0.00 | 0.00 | 0.00 | 16.55 | 33.10 | 6.62 |
| OKSS-1466 | Turkey Creek North (unnamed) | 34.1970 | -95.1855 | Small Streams | 2017 | 1 | TF | 0.00 | 0.00 | 0.00 | 78.39 | 156.78 | 31.36 |
| OKLS-1227 | Unnamed Creek | 36.3949 | -99.0050 | Large Streams | 2017 | 3 | WPT | 0.00 | 0.00 | 0.00 | 59.36 | 118.71 | 23.74 |

## APPENDIX B – CONDITION CLASSES

Table 15. Appendix B—Biological Indicator Condition Classes

| SITE NAME | SITE_ID | FISH | MACRO | Ses_Algae | Ben_Algae | | SITE NAME | SITE_ID | FISH | MACRO | Ses_Algae | Ben_Algae |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arkansas River | OKRM-1006 | GOOD | POOR | GOOD | FAIR | | Curl Creek | OKRV-2040 | GOOD | FAIR | FAIR | GOOD |
| Bear Creek | OKS9-0932 | FAIR | GOOD | GOOD | GOOD | | Deep Fork River | OKRV-2035 | FAIR | GOOD | GOOD | FAIR |
| Canadian River | OKRV-2011 | FAIR | FAIR | POOR | FAIR | | Holly Creek | OKRV-2014 | GOOD | GOOD | GOOD | FAIR |
| Big Eagle Creek | OKS9-0938 | FAIR | GOOD | GOOD | GOOD | | Jim Creek | OKRV-2034 | GOOD | FAIR | GOOD | GOOD |
| Black Fork River | OKRO-1087 | FAIR | POOR | GOOD | GOOD | | Little Cabin Creek | OKRV-2080 | GOOD | FAIR | GOOD | GOOD |
| Brazil Creek | OKLS-1181 | GOOD | FAIR | POOR | GOOD | | Lyon Creek | OKRV-2006 | FAIR | POOR | POOR | FAIR |
| Caddo Creek | OKS9-0937 | GOOD | GOOD | GOOD | FAIR | | Madden Creek | OKRV-2074 | GOOD | FAIR | GOOD | GOOD |
| Canadian River | OKR9-0901 | FAIR | FAIR | GOOD | GOOD | | Mill Creek | OKSS-1434 | GOOD | FAIR | GOOD | GOOD |
| Caney River | OKRO-1107 | GOOD | GOOD | FAIR | FAIR | | Mud Creek | OKRV-2012 | GOOD | GOOD | POOR | POOR |
| Canadian River | OKR9-0913 | GOOD | POOR | FAIR | GOOD | | Mud Creek | OKSS-1449 | GOOD | FAIR | FAIR | GOOD |
| Chikaskia River | OKR9-0902 | FAIR | FAIR | POOR | GOOD | | Muddy Boggy River | OKRO-1106 | FAIR | FAIR | POOR | GOOD |
| Coal Creek | OKRV-2010 | GOOD | FAIR | GOOD | GOOD | | Neosho River | OKRV-2019 | FAIR | GOOD | FAIR | GOOD |
| Cimarron River | OKR9-0906 | POOR | POOR | GOOD | GOOD | | Unnamed Creek | OKLS-1227 | POOR | FAIR | GOOD | GOOD |
| Cimarron River | OKR9-0908 | GOOD | POOR | POOR | FAIR | | North Canadian River | OKRO-1098 | GOOD | GOOD | POOR | GOOD |
| Cimarron River | OKRM-1002 | GOOD | POOR | POOR | FAIR | | North Fork of Walnut Creek | OKRV-2004 | GOOD | FAIR | GOOD | FAIR |
| Deep Fork River | OKRO-1088 | FAIR | GOOD | POOR | FAIR | | Peterson Creek | OKSS-1410 | FAIR | FAIR | GOOD | GOOD |
| Elm Fork of the Red River | OKRO-1089 | POOR | POOR | POOR | FAIR | | Polecat Creek | OKRV-2020 | POOR | FAIR | GOOD | GOOD |
| Glover River | OKLS-1176 | GOOD | GOOD | GOOD | GOOD | | Poteau River | OKRM-1023 | GOOD | FAIR | FAIR | GOOD |
| Illinois River | OKSS-1405 | GOOD | GOOD | GOOD | POOR | | Red River | OKRM-1017 | FAIR | FAIR | POOR | GOOD |
| Kiamichi River | OKR9-0907 | GOOD | FAIR | GOOD | FAIR | | Rock Creek | OKRV-2079 | FAIR | FAIR | GOOD | POOR |
| Kiamichi River | OKRM-1008 | POOR | POOR | GOOD | GOOD | | Shady Grove Creek | OKRV-2033 | FAIR | GOOD | GOOD | GOOD |
| Little Tony Creek | OKS9-0931 | POOR | POOR | GOOD | FAIR | | Sweetwater Creek | OKRV-2007 | POOR | GOOD | FAIR | FAIR |
| Mud Creek | OKS9-0933 | POOR | POOR | POOR | GOOD | | Trib. To Fivemile Creek | OKSS-1416 | FAIR | FAIR | GOOD | FAIR |
| Muddy Boggy River | OKLS-1182 | FAIR | POOR | FAIR | GOOD | | Trib. To Fourteenmile Creek | OKSS-1409 | GOOD | GOOD | GOOD | FAIR |
| Muddy Boggy River | OKRO-1086 | POOR | FAIR | POOR | GOOD | | Turkey Creek | OKRV-2009 | GOOD | GOOD | POOR | POOR |
| Otter Creek | OKR9-0909 | FAIR | POOR | POOR | FAIR | | Unnamed Creek | OKSS-1436 | GOOD | FAIR | GOOD | GOOD |
| Pennington Creek | OKS9-0939 | GOOD | GOOD | GOOD | FAIR | | Verdigris River | OKRV-2088 | GOOD | GOOD | GOOD | GOOD |
| Polecat Creek | OKS9-0936 | FAIR | FAIR | GOOD | GOOD | | California Creek | OKRV-2068 | GOOD | GOOD | NA | GOOD |

| SITE NAME | SITE_ID | FISH | MACRO | Ses_Algae | Ben_Algae | | SITE NAME | SITE_ID | FISH | MACRO | Ses_Algae | Ben_Algae |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Red River | OKR9-0912 | GOOD | POOR | POOR | GOOD | | Canadian River | OKRV-2102 | GOOD | GOOD | POOR | POOR |
| Red River | OKRM-1001 | GOOD | FAIR | FAIR | GOOD | | Caney River | OKRO-1111 | GOOD | GOOD | POOR | GOOD |
| Red River | OKRM-1004 | GOOD | FAIR | POOR | GOOD | | Carter Creek | OKSS-1439 | FAIR | FAIR | GOOD | GOOD |
| Sergeant Major Creek | OKS9-0935 | FAIR | FAIR | GOOD | GOOD | | Cimarron River | OKRV-2043 | FAIR | FAIR | POOR | GOOD |
| Washita River | OKR9-0905 | FAIR | FAIR | GOOD | GOOD | | Dance Creek | OKSS-1472 | POOR | FAIR | GOOD | FAIR |
| Washita River | OKR9-0911 | FAIR | GOOD | FAIR | GOOD | | Deep Fork River | OKRV-2028 | POOR | GOOD | POOR | GOOD |
| West Fork of Sandy Creek | OKS9-0934 | GOOD | GOOD | GOOD | GOOD | | Dumpling Creek | OKSS-1438 | GOOD | GOOD | GOOD | POOR |
| Arkansas River | OKRM-1022 | POOR | POOR | POOR | POOR | | Elk River | OKRO-1099 | GOOD | GOOD | GOOD | FAIR |
| Salt Fork of the Red River | OKLS-1238 | GOOD | FAIR | GOOD | FAIR | | Salt Fork of the Arkansas River | OKRV-2105 | GOOD | GOOD | GOOD | FAIR |
| Browns Creek | OKS9-0941 | FAIR | FAIR | FAIR | FAIR | | Fourche Maline | OKRV-2026 | GOOD | FAIR | POOR | GOOD |
| Canadian River | OKRM-1021 | GOOD | POOR | POOR | FAIR | | Greenleaf Creek | OKRV-2025 | GOOD | GOOD | POOR | FAIR |
| Cedar Creek | OKSS-1431 | POOR | GOOD | GOOD | GOOD | | Julian Creek | OKRV-2044 | FAIR | FAIR | GOOD | GOOD |
| Clear Boggy Creek | OKRO-1102 | GOOD | GOOD | GOOD | POOR | | Little Beaver Creek | OKLS-1186 | GOOD | GOOD | GOOD | FAIR |
| Ingersoll Creek | OKSS-1429 | POOR | FAIR | GOOD | GOOD | | Mt. Fork of Sans Bois Creek | OKLS-1196 | GOOD | FAIR | GOOD | GOOD |
| Little Vian Creek | OKSS-1430 | GOOD | FAIR | GOOD | GOOD | | North Boggy Creek | OKLS-1193 | POOR | FAIR | FAIR | GOOD |
| Mountain Fork River | OKRO-1103 | POOR | POOR | GOOD | FAIR | | Red Rock Creek | OKRO-1108 | GOOD | GOOD | NA | POOR |
| North Canadian River | OKR9-0904 | FAIR | FAIR | POOR | GOOD | | Rock Creek | OKLS-1192 | GOOD | FAIR | GOOD | GOOD |
| North Canadian River | OKRO-1092 | GOOD | GOOD | POOR | FAIR | | South Fork of Dirty Creek | OKRV-2027 | GOOD | FAIR | NA | FAIR |
| Pine Creek | OKLS-1204 | GOOD | POOR | POOR | FAIR | | Trib. To Kiamichi River | OKSS-1419 | FAIR | POOR | GOOD | GOOD |
| Red River | OKR9-0903 | FAIR | POOR | POOR | FAIR | | Tyner Creek | OKRV-2070 | FAIR | POOR | FAIR | FAIR |
| Red River | OKRM-1020 | GOOD | POOR | POOR | GOOD | | Unnamed Creek | OKRV-2021 | NA | POOR | GOOD | GOOD |
| Red River | OKRM-1026 | FAIR | POOR | POOR | FAIR | | Unnamed Creek | OKSS-1456 | GOOD | FAIR | FAIR | FAIR |
| Roaring Creek | OKSS-1444 | POOR | FAIR | GOOD | GOOD | | West Terrapin Creek | OKSS-1426 | GOOD | GOOD | GOOD | GOOD |
| Rock Creek | OKSS-1403 | GOOD | GOOD | GOOD | GOOD | | Wickliffe Creek | OKSS-1425 | GOOD | GOOD | GOOD | FAIR |
| Sandy Creek | OKLS-1222 | POOR | POOR | POOR | POOR | | Wolf Creek | OKRV-2039 | GOOD | FAIR | POOR | FAIR |
| Tenmile Creek | OKLS-1209 | GOOD | POOR | GOOD | GOOD | | Wolf Creek | OKRV-2032 | POOR | FAIR | NA | NA |
| Wildhorse Creek | OKLS-1203 | GOOD | FAIR | FAIR | FAIR | | Big Creek | OKLS-1198 | FAIR | FAIR | GOOD | GOOD |
| Alabama Creek | OKSS-1408 | GOOD | FAIR | GOOD | FAIR | | Big Creek | OKRV-2036 | GOOD | GOOD | GOOD | GOOD |

| SITE NAME | SITE_ID | FISH | MACRO | Ses_Algae | Ben_Algae | | SITE NAME | SITE_ID | FISH | MACRO | Ses_Algae | Ben_Algae |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arkansas River | OKRM-1011 | FAIR | FAIR | GOOD | POOR | | Bitter Creek | OKRV-2015 | FAIR | FAIR | POOR | POOR |
| Turkey Creek North (unnamed creek) | OKSS-1466 | GOOD | FAIR | GOOD | GOOD | | Black Bear Creek | OKRV-2101 | GOOD | FAIR | GOOD | GOOD |
| Bad Creek | OKSS-1414 | GOOD | FAIR | FAIR | GOOD | | Tomike Creek | OKRV-2077 | GOOD | FAIR | GOOD | GOOD |
| Baron Fork | OKRV-2013 | GOOD | GOOD | GOOD | POOR | | Black Fork | OKLS-1197 | GOOD | GOOD | GOOD | GOOD |
| Butler Creek | OKLS-1201 | GOOD | FAIR | POOR | FAIR | | Blue River | OKRV-2061 | GOOD | FAIR | GOOD | FAIR |
| Dry Creek | OKSS-1415 | GOOD | GOOD | GOOD | GOOD | | Canadian River | OKRM-1014 | GOOD | GOOD | GOOD | GOOD |
| Hickory Creek | OKLS-1191 | GOOD | POOR | POOR | GOOD | | Canadian River | OKRM-1015 | FAIR | POOR | POOR | GOOD |
| Illinois River | OKRM-1016 | GOOD | GOOD | GOOD | GOOD | | Station Creek | OKLS-1242 | POOR | FAIR | POOR | FAIR |
| Little Blue Creek | OKLS-1190 | GOOD | GOOD | GOOD | FAIR | | Caney River | OKRV-2030 | NA | GOOD | POOR | FAIR |
| North Fork of the Red River | OKRV-2001 | POOR | FAIR | GOOD | GOOD | | Caston Creek | OKRV-2022 | GOOD | GOOD | GOOD | FAIR |
| Red River | OKRM-1010 | FAIR | FAIR | GOOD | GOOD | | Chikaskia River | OKRV-2023 | GOOD | GOOD | POOR | GOOD |
| Red River | OKRM-1013 | GOOD | GOOD | POOR | POOR | | Cottonwood Creek | OKRV-2098 | GOOD | GOOD | GOOD | NA |
| Rush Creek | OKSS-1447 | GOOD | POOR | GOOD | POOR | | Elk Creek | OKRO-1105 | GOOD | GOOD | GOOD | FAIR |
| Sans Bois Creek | OKLS-1212 | GOOD | GOOD | GOOD | GOOD | | Gap Creek | OKLS-1213 | GOOD | NA | GOOD | GOOD |
| Snake Creek | OKLS-1185 | GOOD | FAIR | FAIR | FAIR | | Island bayou | OKSS-1420 | GOOD | POOR | GOOD | FAIR |
| Taloka Creek | OKLS-1184 | GOOD | FAIR | GOOD | FAIR | | Little Washita River | OKLS-1194 | GOOD | GOOD | POOR | POOR |
| Verdigris River | OKRO-1095 | GOOD | GOOD | GOOD | GOOD | | Middle Creek | OKSS-1446 | FAIR | POOR | POOR | GOOD |
| Wolf Creek | OKLS-1188 | FAIR | FAIR | POOR | GOOD | | North Fork of the Red River | OKRV-2037 | GOOD | POOR | FAIR | GOOD |
| Bird Creek | OKRV-2029 | POOR | POOR | FAIR | GOOD | | Clear Boggy Creek | OKRV-2016 | GOOD | GOOD | NA | NA |

Table 16. Appendix B—Stressor Indicator Condition Classes

| Site_ID | TN_NRSA | TN_ECO | TP_NRSA | TP_ECO | COND_NRSA | COND_ECO | TURB_ECO | Cd | Cu | Pb | Se | Zn | ISC_NRSA | SED_NRSA | RVC_NRSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRM-1006 | FAIR | FAIR | POOR | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD |
| OKS9-0932 | GOOD | GOOD | FAIR | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKS9-0938 | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | NA | NA | NA | NA | NA | GOOD | GOOD | GOOD |
| OKRO-1087 | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | FAIR | POOR | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKLS-1181 | FAIR | FAIR | POOR | POOR | GOOD | FAIR | FAIR | NA | NA | NA | NA | NA | GOOD | POOR | GOOD |
| OKS9-0937 | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKR9-0901 | GOOD | GOOD | GOOD | GOOD | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD |
| OKR9-0913 | GOOD | GOOD | FAIR | GOOD | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD |
| OKR9-0902 | GOOD | GOOD | POOR | POOR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD |
| OKR9-0906 | GOOD | GOOD | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKR9-0908 | FAIR | FAIR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKRM-1002 | FAIR | FAIR | POOR | POOR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD |
| OKRO-1088 | FAIR | POOR | POOR | POOR | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD |
| OKRO-1089 | POOR | POOR | FAIR | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | FAIR | GOOD | GOOD |
| OKLS-1176 | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD |
| OKSS-1405 | POOR | POOR | POOR | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR |
| OKR9-0907 | FAIR | FAIR | POOR | POOR | GOOD | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKRM-1008 | FAIR | POOR | POOR | POOR | GOOD | FAIR | POOR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKS9-0931 | POOR | POOR | POOR | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD |
| OKS9-0933 | FAIR | POOR | POOR | POOR | GOOD | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD |
| OKLS-1182 | POOR | POOR | POOR | POOR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD |
| OKRO-1086 | GOOD | POOR | FAIR | POOR | GOOD | FAIR | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKR9-0909 | POOR | POOR | POOR | POOR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD |
| OKS9-0939 | GOOD | GOOD | FAIR | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKS9-0936 | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |

| Site_ID | TN_NRSA | TN_ECO | TP_NRSA | TP_ECO | COND_NRSA | COND_ECO | TURB_ECO | Cd | Cu | Pb | Se | Zn | SED | ISC_NRSA | RVC_NRSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKR9-0912 | GOOD | POOR | POOR | POOR | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | FAIR |
| OKRM-1001 | GOOD | POOR | POOR | POOR | POOR | POOR | POOR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKRM-1004 | GOOD | FAIR | FAIR | POOR | POOR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | POOR |
| OKS9-0935 | POOR | POOR | POOR | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKR9-0905 | POOR | POOR | POOR | POOR | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD |
| OKR9-0911 | FAIR | FAIR | POOR | POOR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | GOOD |
| OKS9-0934 | GOOD | GOOD | GOOD | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKRM-1022 | POOR | POOR | POOR | POOR | FAIR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD |
| OKS9-0941 | FAIR | POOR | POOR | POOR | GOOD | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | FAIR | GOOD |
| OKRM-1021 | POOR | POOR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | FAIR |
| OKSS-1431 | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR |
| OKRO-1102 | GOOD | POOR | POOR | POOR | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD |
| OKSS-1429 | GOOD | GOOD | POOR | POOR | GOOD | FAIR | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | GOOD |
| OKSS-1430 | GOOD | GOOD | POOR | GOOD | GOOD | FAIR | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKRO-1103 | FAIR | FAIR | FAIR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKR9-0904 | FAIR | POOR | POOR | POOR | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD |
| OKRO-1092 | FAIR | FAIR | POOR | POOR | GOOD | GOOD | POOR | NA | NA | NA | NA | NA | GOOD | GOOD | GOOD |
| OKLS-1204 | FAIR | POOR | POOR | POOR | FAIR | POOR | FAIR | NA | NA | NA | NA | NA | POOR | FAIR | POOR |
| OKR9-0903 | FAIR | POOR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | POOR | GOOD | GOOD |
| OKRM-1020 | GOOD | POOR | POOR | POOR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | POOR |
| OKRM-1026 | FAIR | GOOD | POOR | FAIR | POOR | POOR | POOR | GOOD | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD |
| OKSS-1444 | FAIR | FAIR | POOR | POOR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD |
| OKSS-1403 | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | FAIR | POOR | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | FAIR |
| OKLS-1222 | POOR | POOR | POOR | POOR | POOR | POOR | POOR | GOOD | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD |
| OKLS-1209 | POOR | POOR | POOR | POOR | GOOD | FAIR | POOR | POOR | GOOD | POOR | GOOD | GOOD | GOOD | POOR | GOOD |
| OKLS-1203 | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| OKSS-1408 | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |

| Site_ID | TN_NRSA | TN_ECO | TP_NRSA | TP_ECO | COND_NRSA | COND_ECO | TURB_ECO | Cd | Cu | Pb | Se | Zn | SED | ISC_NRSA | RVC_NRSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRM-1011 | POOR | POOR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1414 | FAIR | POOR | FAIR | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2013 | POOR | FAIR | POOR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1201 | GOOD | POOR | GOOD | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1415 | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1191 | FAIR | POOR | FAIR | FAIR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRM-1016 | POOR | POOR | POOR | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1190 | FAIR | FAIR | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2001 | FAIR | FAIR | GOOD | GOOD | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRM-1010 | POOR | POOR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRM-1013 | POOR | POOR | POOR | POOR | POOR | POOR | POOR | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKSS-1447 | FAIR | FAIR | FAIR | FAIR | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKLS-1212 | POOR | POOR | POOR | POOR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1185 | FAIR | POOR | FAIR | FAIR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1184 | POOR | FAIR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1095 | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1188 | POOR | POOR | POOR | POOR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2029 | GOOD | GOOD | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2011 | FAIR | FAIR | FAIR | GOOD | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1107 | GOOD | POOR | GOOD | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2016 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| OKRV-2010 | GOOD | FAIR | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2040 | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2035 | POOR | POOR | POOR | POOR | FAIR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2014 | FAIR | FAIR | POOR | POOR | GOOD | GOOD | POOR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKRV-2034 | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |

| Site_ID | TN_NRSA | TN_ECO | TP_NRSA | TP_ECO | COND_NRSA | COND_ECO | TURB_ECO | Cd | Cu | Pb | Se | Zn | SED | ISC_NRSA | RVC_NRSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRV-2080 | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2006 | POOR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2074 | GOOD | POOR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKSS-1434 | POOR | POOR | POOR | POOR | GOOD | FAIR | FAIR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKRV-2012 | FAIR | GOOD | FAIR | GOOD | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKSS-1449 | GOOD | POOR | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1106 | GOOD | POOR | FAIR | POOR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2019 | GOOD | FAIR | FAIR | POOR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1098 | FAIR | POOR | POOR | POOR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2004 | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1410 | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2020 | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRM-1023 | POOR | POOR | POOR | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRM-1017 | FAIR | POOR | POOR | POOR | POOR | POOR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2079 | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2033 | GOOD | GOOD | GOOD | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2007 | POOR | POOR | POOR | POOR | POOR | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1416 | FAIR | FAIR | POOR | POOR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1409 | FAIR | FAIR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2009 | POOR | POOR | POOR | POOR | FAIR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1436 | GOOD | GOOD | FAIR | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2088 | GOOD | FAIR | GOOD | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2068 | NA | NA | NA | NA | GOOD | GOOD | GOOD | NA | NA | NA | NA | NA | NA | NA | NA |
| OKRV-2102 | POOR | POOR | POOR | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1111 | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1439 | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKRV-2043 | GOOD | GOOD | FAIR | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |

| Site_ID | TN_NRSA | TN_ECO | TP_NRSA | TP_ECO | COND_NRSA | COND_ECO | TURB_ECO | Cd | Cu | Pb | Se | Zn | SED | ISC_NRSA | RVC_NRSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKSS-1472 | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2028 | FAIR | POOR | POOR | POOR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1438 | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1099 | POOR | FAIR | POOR | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2026 | POOR | POOR | POOR | POOR | GOOD | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2025 | FAIR | FAIR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2044 | GOOD | GOOD | GOOD | GOOD | FAIR | POOR | FAIR | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKLS-1186 | FAIR | GOOD | GOOD | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKLS-1196 | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | FAIR | POOR | POOR | POOR | GOOD | GOOD | NA | NA | NA |
| OKLS-1193 | POOR | POOR | POOR | POOR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRO-1108 | NA | NA | POOR | POOR | GOOD | GOOD | POOR | #NA | NA | NA | NA | NA | NA | NA | NA |
| OKLS-1192 | FAIR | FAIR | POOR | POOR | GOOD | FAIR | GOOD | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKRV-2027 | NA | NA | NA | NA | GOOD | FAIR | FAIR | #NA | NA | NA | NA | NA | NA | NA | NA |
| OKSS-1419 | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | POOR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKRV-2070 | GOOD | POOR | FAIR | POOR | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2021 | FAIR | FAIR | NA | NA | POOR | POOR | GOOD | #NA | NA | NA | NA | NA | NA | NA | NA |
| OKSS-1456 | POOR | FAIR | POOR | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1426 | FAIR | FAIR | FAIR | FAIR | GOOD | FAIR | FAIR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKSS-1425 | POOR | FAIR | POOR | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2039 | FAIR | FAIR | FAIR | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2032 | NA | NA | NA | NA | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1198 | GOOD | GOOD | FAIR | FAIR | GOOD | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2036 | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | FAIR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKRV-2015 | POOR | POOR | POOR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2101 | FAIR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1197 | GOOD | GOOD | POOR | FAIR | GOOD | GOOD | FAIR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |
| OKLS-1197 | GOOD | GOOD | POOR | FAIR | GOOD | GOOD | FAIR | POOR | GOOD | POOR | GOOD | GOOD | NA | NA | NA |

| Site_ID | TN_NRSA | TN_ECO | TP_NRSA | TP_ECO | COND_NRSA | COND_ECO | TURB_ECO | Cd | Cu | Pb | Se | Zn | SED | ISC_NRSA | RVC_NRSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OKRV-2061 | GOOD | GOOD | GOOD | FAIR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRM-1015 | POOR | POOR | POOR | POOR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRM-1014 | GOOD | GOOD | GOOD | GOOD | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2030 | POOR | POOR | POOR | POOR | GOOD | GOOD | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2022 | POOR | POOR | POOR | GOOD | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2023 | FAIR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2098 | FAIR | GOOD | POOR | POOR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRO-1105 | FAIR | FAIR | POOR | FAIR | FAIR | FAIR | GOOD | NA | NA | NA | NA | NA | NA | NA | NA |
| OKLS-1213 | POOR | FAIR | POOR | POOR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1420 | POOR | POOR | POOR | POOR | FAIR | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1194 | FAIR | FAIR | POOR | FAIR | POOR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKSS-1446 | POOR | POOR | POOR | POOR | GOOD | FAIR | FAIR | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKRV-2037 | FAIR | FAIR | FAIR | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2105 | GOOD | GOOD | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1238 | FAIR | FAIR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKLS-1242 | POOR | POOR | FAIR | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKRV-2077 | FAIR | FAIR | FAIR | FAIR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | POOR | GOOD | NA | NA | NA |
| OKSS-1466 | POOR | POOR | POOR | POOR | GOOD | FAIR | GOOD | POOR | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |
| OKLS-1227 | FAIR | FAIR | GOOD | GOOD | POOR | POOR | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD | NA | NA | NA |

Table 17. Appendix C—Fish Assessment Information

| Site_ID | Final_Fish_Cond | NRSA_Cond | OKFIBI_Score | OKFIBI_Class | OKFIBI_Cond | OCCFIBI_Score | OCCFIBI_Class | OCCFIBI_Cond |
|---|---|---|---|---|---|---|---|---|
| OKRM-1006 | FAIR | FAIR | 33 | Supporting | GOOD | 93 | EXCELLENT | GOOD |
| OKS9-0932 | FAIR | POOR | 28 | No Crit | ND | 68 | FAIR | FAIR |
| OKS9-0938 | FAIR | POOR | 33 (CWAC) | No Crit | ND | 68 | FAIR | FAIR |
| OKRO-1087 | POOR | POOR | 39 | Supporting | GOOD | 93 | EXCELLENT | GOOD |
| OKLS-1181 | GOOD | POOR | 37 | Supporting | GOOD | 93 | EXCELLENT | GOOD |
| OKS9-0937 | GOOD | FAIR | 30 | No Crit | ND | 78 | GOOD | GOOD |
| OKR9-0901 | FAIR | POOR | 19 | Undetermined | FAIR | 78 | GOOD | GOOD |
| OKR9-0913 | GOOD | POOR | 27 | Supporting | GOOD | 78 | GOOD | GOOD |
| OKR9-0902 | GOOD | POOR | 26 | Supporting | GOOD | 70 | FAIR | FAIR |
| OKRM-1002 | GOOD | POOR | 26 | Supporting | GOOD | 78 | GOOD | GOOD |
| OKR9-0908 | GOOD | POOR | 26 | Supporting | GOOD | 78 | GOOD | GOOD |
| OKR9-0906 | POOR | NA | 19 | Undetermined | FAIR | 56 | POOR | POOR |
| OKRO-1088 | GOOD | POOR | 24 | No Crit | ND | 91 | EXCELLENT | GOOD |
| OKRO-1089 | POOR | NA | 19 | Undetermined | FAIR | 48 | POOR | POOR |
| OKLS-1176 | GOOD | GOOD | 39 (CWAC) | No Crit | ND | 93 | EXCELLENT | GOOD |
| OKSS-1405 | GOOD | NA | 41 (CWAC) | Supporting | GOOD | 89 | GOOD | GOOD |
| OKRM-1008 | POOR | POOR | 32 | Undetermined | FAIR | 70 | FAIR | FAIR |
| OKR9-0907 | GOOD | FAIR | 41 | Supporting | GOOD | 100 | EXCELLENT | GOOD |
| OKS9-0931 | POOR | POOR | 12 | Not Supporting | POOR | 30 | VERY POOR | POOR |
| OKS9-0933 | POOR | POOR | 20 | Not Supporting | POOR | 56 | POOR | POOR |
| OKRO-1086 | POOR | POOR | 30 | No Crit | ND | 60 | POOR | POOR |
| OKLS-1182 | GOOD | POOR | 28 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKR9-0909 | FAIR | POOR | 24 | Supporting | GOOD | 56 | POOR | POOR |
| OKS9-0939 | GOOD | GOOD | 37 (CWAC) | No Crit | ND | ND (CWAC), 108 (WWAC, Arbuckles) | EXCELLENT | GOOD |
| OKS9-0936 | FAIR | FAIR | 26 | No Crit | ND | 68 | FAIR | FAIR |
| OKR9-0912 | GOOD | GOOD | 34 | No Crit | ND | 84 | GOOD | GOOD |
| OKRM-1004 | GOOD | GOOD | 26 | No Crit | ND | 68 | FAIR | FAIR |
| OKRM-1001 | GOOD | GOOD | 24 | No Crit | ND | 68 | FAIR | FAIR |
| OKS9-0935 | FAIR | GOOD | 27 (HLAC) | No Crit | ND | 74 | FAIR | FAIR |

| Site_ID | Final_Fish_Cond | NRSA_Cond | OKFIBI_Score | OKFIBI_Class | OKFIBI_Cond | OCCFIBI_Score | OCCFIBI_Class | OCCFIBI_Cond |
|---|---|---|---|---|---|---|---|---|
| OKR9-0911 | FAIR | POOR | 22 | No Crit | ND | 65 | FAIR | FAIR |
| OKR9-0905 | FAIR | POOR | 22 | Supporting | GOOD | 70 | FAIR | FAIR |
| OKS9-0934 | GOOD | GOOD | 33 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKSS-1408 | GOOD | NA | 37 | No Crit | ND | 100 | EXCELLENT | GOOD |
| OKRM-1011 | FAIR | NA | 32.5 | Undetermined | FAIR | 70 | FAIR | FAIR |
| OKSS-1414 | GOOD | NA | 35 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKRV-2013 | GOOD | NA | 43 (CWAC) | Supporting | GOOD | 94 | EXCELLENT | GOOD |
| OKLS-1201 | GOOD | NA | 31 | Supporting | GOOD | 84 | GOOD | GOOD |
| OKSS-1415 | GOOD | NA | 35 | No Crit | ND | 85 | GOOD | GOOD |
| OKLS-1191 | GOOD | NA | 28 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKRM-1016 | GOOD | NA | 41 (CWAC) | Supporting | GOOD | 88 | GOOD | GOOD |
| OKLS-1190 | GOOD | NA | 41 | No Crit | ND | 116 | EXCELLENT | GOOD |
| OKRV-2001 | POOR | NA | 13 | Not Supporting | POOR | 48 | POOR | POOR |
| OKRM-1010 | FAIR | NA | 19 | Undetermined | FAIR | 78 | GOOD | GOOD |
| OKRM-1013 | GOOD | NA | 27 | Supporting | GOOD | 85 | GOOD | GOOD |
| OKSS-1447 | GOOD | NA | 29 | No Crit | ND | 84 | GOOD | GOOD |
| OKLS-1212 | GOOD | NA | 37 | Supporting | GOOD | 85 | GOOD | GOOD |
| OKLS-1185 | GOOD | NA | 29 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKLS-1184 | GOOD | NA | 35 | Supporting | GOOD | 78 | GOOD | GOOD |
| OKRO-1095 | GOOD | NA | 35 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKLS-1188 | FAIR | NA | 32 | No Crit | ND | 76 | FAIR | FAIR |
| OKRM-1022 | POOR | POOR | 28 | Undetermined | FAIR | 78 | GOOD | GOOD |
| OKS9-0941 | FAIR | FAIR | 24 | No Crit | ND | 63 | FAIR | FAIR |
| OKRM-1021 | GOOD | FAIR | 22 | Supporting | GOOD | 70 | FAIR | FAIR |
| OKSS-1431 | POOR | GOOD | 16 | No Crit | ND | 60 | POOR | POOR |
| OKRO-1102 | GOOD | FAIR | 39 | No Crit | ND | 108 | EXCELLENT | GOOD |
| OKSS-1429 | POOR | NA | 15 | Not Supporting | POOR | 56 | POOR | POOR |
| OKSS-1430 | GOOD | POOR | 41 (CWAC) | No Crit | ND | ND (CWAC), 107 (WWAC, AV) | EXCELLENT | GOOD |
| OKRO-1103 | POOR | POOR | 35 (Trout Fishery) | No Crit | ND | 81 | GOOD | GOOD |

| Site_ID | Final_Fish_Cond | NRSA_Cond | OKFIBI_Score | OKFIBI_Class | OKFIBI_Cond | OCCFIBI_Score | OCCFIBI_Class | OCCFIBI_Cond |
|---|---|---|---|---|---|---|---|---|
| OKRO-1092 | GOOD | FAIR | 29 | Supporting | GOOD | 85 | GOOD | GOOD |
| OKR9-0904 | FAIR | POOR | 30 | No Crit | ND | 65 | FAIR | FAIR |
| OKLS-1204 | GOOD | POOR | 33 | No Crit | ND | 108 | EXCELLENT | GOOD |
| OKR9-0903 | FAIR | POOR | 31 | No Crit | ND | 74 | FAIR | FAIR |
| OKRM-1020 | GOOD | GOOD | 30 | No Crit | ND | 84 | GOOD | GOOD |
| OKRM-1026 | FAIR | NA | 21 | Undetermined | FAIR | 78 | GOOD | GOOD |
| OKSS-1444 | POOR | NA | 21 | No Crit | ND | 56 | POOR | POOR |
| OKSS-1403 | GOOD | FAIR | 31 | Undetermined | FAIR | 92 | EXCELLENT | GOOD |
| OKLS-1222 | POOR | NA | 18 | Not Supporting | POOR | 60 | POOR | POOR |
| OKLS-1209 | GOOD | POOR | 35 | Supporting | GOOD | 100 | EXCELLENT | GOOD |
| OKLS-1203 | GOOD | FAIR | 26 | Supporting | GOOD | 91 | EXCELLENT | GOOD |
| OKRV-2029 | POOR | NA | 18 | No Crit | ND | 44 | POOR | POOR |
| OKRV-2011 | FAIR | NA | 28 | Supporting | GOOD | 56 | POOR | POOR |
| OKRO-1107 | GOOD | NA | 35 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKRV-2016 | GOOD | NA | 37 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKRV-2010 | GOOD | NA | 30 | Supporting | GOOD | 84 | GOOD | GOOD |
| OKRV-2040 | GOOD | NA | 33 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKRV-2035 | FAIR | NA | 30 | No Crit | ND | 74 | FAIR | FAIR |
| OKRV-2014 | GOOD | NA | 25 | Undetermined | FAIR | 100 | EXCELLENT | GOOD |
| OKRV-2034 | GOOD | NA | 22 | No Crit | ND | 92 | EXCELLENT | GOOD |
| OKRV-2080 | GOOD | NA | 35 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKRV-2006 | FAIR | NA | 24 | Supporting | GOOD | 65 | FAIR | FAIR |
| OKRV-2074 | GOOD | NA | 27 | Undetermined | FAIR | 78 | GOOD | GOOD |
| OKSS-1434 | GOOD | NA | 39 | Supporting | GOOD | 108 | EXCELLENT | GOOD |
| OKRV-2012 | GOOD | NA | 24 | Supporting | GOOD | 76 | FAIR | FAIR |
| OKSS-1449 | GOOD | NA | 31 | Supporting | GOOD | 84 | GOOD | GOOD |
| OKRO-1106 | FAIR | NA | 30 | No Crit | ND | 76 | FAIR | FAIR |
| OKRV-2019 | FAIR | NA | 29 | Undetermined | FAIR | 76 | FAIR | FAIR |
| OKRO-1098 | GOOD | NA | 32 | No Crit | ND | 83 | GOOD | GOOD |

| Site_ID | Final_Fish_Cond | NRSA_Cond | OKFIBI_Score | OKFIBI_Class | OKFIBI_Cond | OCCFIBI_Score | OCCFIBI_Class | OCCFIBI_Cond |
|---|---|---|---|---|---|---|---|---|
| OKRV-2004 | GOOD | NA | 26 | Supporting | GOOD | 91 | EXCELLENT | GOOD |
| OKSS-1410 | FAIR | NA | 21 | Not Supporting | POOR | 68 | FAIR | FAIR |
| OKRV-2020 | POOR | NA | 26 | No Crit | ND | 60 | POOR | POOR |
| OKRM-1023 | GOOD | NA | 39 | Supporting | GOOD | 93 | EXCELLENT | GOOD |
| OKRM-1017 | FAIR | NA | 30 | No Crit | ND | 74 | FAIR | FAIR |
| OKRV-2079 | FAIR | NA | 24 | Undetermined | FAIR | 78 | GOOD | GOOD |
| OKRV-2033 | FAIR | NA | 26 | Undetermined | FAIR | 76 | FAIR | FAIR |
| OKRV-2007 | POOR | NA | 20 | Undetermined | FAIR | 52 | POOR | POOR |
| OKSS-1416 | FAIR | NA | 20 | Undetermined | FAIR | 65 | FAIR | FAIR |
| OKSS-1409 | GOOD | NA | 43 (CWAC) | Supporting | GOOD | 89 | GOOD | GOOD |
| OKRV-2009 | GOOD | NA | 22 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKSS-1436 | GOOD | NA | 35 | Supporting | GOOD | 93 | EXCELLENT | GOOD |
| OKRV-2088 | GOOD | NA | 31 | Supporting | GOOD | 76 | FAIR | FAIR |
| OKRV-2068 | GOOD | NA | 35 | Supporting | GOOD | 100 | EXCELLENT | GOOD |
| OKRV-2102 | GOOD | NA | 24 | Supporting | GOOD | 91 | EXCELLENT | GOOD |
| OKRO-1111 | GOOD | NA | 30 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKSS-1439 | FAIR | NA | 23 (CWAC) | No Crit | ND | 64 | FAIR | FAIR |
| OKRV-2043 | FAIR | NA | 19 | Undetermined | FAIR | 48 | POOR | POOR |
| OKSS-1472 | POOR | NA | 24 | No Crit | ND | 44 | POOR | POOR |
| OKRV-2028 | POOR | NA | 24 | No Crit | ND | 48 | POOR | POOR |
| OKSS-1438 | GOOD | NA | 37 | No Crit | ND | 108 | EXCELLENT | GOOD |
| OKRO-1099 | GOOD | NA | 39 (CWAC) | Supporting | GOOD | 88 | GOOD | GOOD |
| OKRV-2026 | GOOD | NA | 41 | Supporting | GOOD | 107 | EXCELLENT | GOOD |
| OKRV-2025 | GOOD | NA | 23 | Supporting | GOOD | 91 | EXCELLENT | GOOD |
| OKRV-2044 | FAIR | NA | 20 | No Crit | ND | 68 | FAIR | FAIR |
| OKLS-1186 | GOOD | NA | 26 | Supporting | GOOD | 91 | EXCELLENT | GOOD |
| OKLS-1196 | GOOD | NA | 33 | Undetermined | FAIR | 93 | EXCELLENT | GOOD |
| OKLS-1193 | POOR | NA | 24 | Not Supporting | POOR | 70 | FAIR | FAIR |
| OKRO-1108 | GOOD | NA | 26 | Supporting | GOOD | 85 | GOOD | GOOD |

*No fish collected during sampling- very salty site. **Site not sampled for fish-unable to launch boat.

| Site_ID | Final_Fish_Cond | NRSA_Cond | OKFIBI_Score | OKFIBI_Class | OKFIBI_Cond | OCCFIBI_Score | OCCFIBI_Class | OCCFIBI_Cond |
|---|---|---|---|---|---|---|---|---|
| OKLS-1192 | GOOD | NA | 39 | Supporting | GOOD | 108 | EXCELLENT | GOOD |
| OKRV-2027 | GOOD | NA | 35 | Supporting | GOOD | 92 | EXCELLENT | GOOD |
| OKSS-1419 | FAIR | NA | 21 | Not Supporting | POOR | 76 | FAIR | FAIR |
| OKRV-2070 | FAIR | NA | 25 | Undetermined | FAIR | 68 | FAIR | FAIR |
| OKRV-2021* | ND | NA | ND | ND | ND | ND | ND | ND |
| OKSS-1456 | GOOD | NA | 39 | Supporting | GOOD | 86 | GOOD | GOOD |
| OKSS-1426 | GOOD | NA | 33 | Undetermined | FAIR | 108 | EXCELLENT | GOOD |
| OKSS-1425 | GOOD | NA | 33 | Supporting | GOOD | 82 | GOOD | GOOD |
| OKRV-2039 | GOOD | NA | 29 | No Crit | ND | 109 | EXCELLENT | GOOD |
| OKRV-2032 | POOR | NA | 22 | No Crit | ND | 57 | POOR | POOR |
| OKLS-1198 | FAIR | NA | 19 | No Crit | ND | 76 | FAIR | FAIR |
| OKRV-2036 | GOOD | NA | 35 (CWAC) | No Crit | ND | 81 | GOOD | GOOD |
| OKRV-2015 | FAIR | NA | 16 | Not Supporting | POOR | 74 | FAIR | FAIR |
| OKRV-2101 | GOOD | NA | 22 | Supporting | GOOD | 83 | GOOD | GOOD |
| OKLS-1197 | GOOD | NA | 36 (CWAC) | No Crit | ND | 87 | GOOD | GOOD |
| OKRV-2061 | GOOD | NA | 37 | No Crit | ND | 109 | EXCELLENT | GOOD |
| OKRM-1014 | GOOD | NA | 24 | Supporting | GOOD | 78 | GOOD | GOOD |
| OKRM-1015 | FAIR | NA | 30 | Undetermined | FAIR | 63 | FAIR | FAIR |
| OKRV-2030** | ND | NA | ND | ND | ND | ND | ND | ND |
| OKRV-2022 | GOOD | NA | 37 | Supporting | GOOD | 93 | EXCELLENT | GOOD |
| OKRV-2023 | GOOD | NA | 29 | Supporting | GOOD | 85 | GOOD | GOOD |
| OKRV-2098 | GOOD | NA | 29 | Supporting | GOOD | 100 | EXCELLENT | GOOD |
| OKRO-1105 | GOOD | NA | 24 (HLAC) | No Crit | ND | 78 | GOOD | GOOD |
| OKLS-1213 | GOOD | NA | 37 | Supporting | GOOD | 85 | GOOD | GOOD |
| OKSS-1420 | GOOD | NA | 27 | Supporting | GOOD | ND | ND | ND |
| OKLS-1194 | GOOD | NA | 26 | Supporting | GOOD | 100 | EXCELLENT | GOOD |
| OKSS-1446 | FAIR | NA | 32 | Undetermined | FAIR | 70 | FAIR | FAIR |
| OKRV-2037 | GOOD | NA | 25 | Supporting | GOOD | 78 | GOOD | GOOD |
| OKRV-2105 | GOOD | NA | 27 | Supporting | GOOD | 93 | EXCELLENT | GOOD |

| Site_ID | Final_Fish_Cond | NRSA_Cond | OKFIBI_Score | OKFIBI_Class | OKFIBI_Cond | OCCFIBI_Score | OCCFIBI_Class | OCCFIBI_Cond |
|---|---|---|---|---|---|---|---|---|
| OKLS-1238 | GOOD | NA | 26 | Supporting | GOOD | 91 | EXCELLENT | GOOD |
| OKLS-1242 | POOR | NA | 16 | Not Supporting | POOR | 57 | POOR | POOR |
| OKRV-2077 | GOOD | NA | 24 | Supporting | GOOD | 65 | FAIR | FAIR |
| OKSS-1466 | GOOD | NA | 35 | Supporting | GOOD | 100 | EXCELLENT | GOOD |
| OKLS-1227 | POOR | NA | 20 | Undetermined | FAIR | 57 | POOR | POOR |

Table 18. Appendix C—Macroinvertebrate Assessment Information (2013-2014 NRSA samples not included)

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M01724 | OKRM-1006 | LRF | SUB | 10.00 | 1.00 | 1.82% | 59.09% | 3.41 | 6.40 | 64.86 | Slightly Impaired |
| M01725 | OKRM-1006 | LRF | THAB | 17.00 | 4.00 | 14.91% | 34.21% | 2.50 | 6.52 | 97.30 | Non-Impaired |
| M01898 | OKRM-1006 | LRF | THAB | 16.00 | 5.00 | 20.91% | 57.27% | 2.78 | 6.69 | 115.56 | Reference |
| M01709 | OKS9-0932 | RBP | Woody | 19.00 | 3.00 | 8.02% | 69.14% | 2.34 | 7.52 | 56.76 | Slightly Impaired |
| M01710 | OKS9-0932 | RBP | SSV | 15.00 | 4.00 | 19.27% | 51.38% | 2.97 | 7.02 | 94.74 | Non-Impaired |
| M01875 | OKS9-0932 | RBP | Woody | 16.00 | 4.00 | 34.86% | 50.46% | 3.06 | 6.76 | 74.58 | Slightly Impaired |
| M01876 | OKS9-0932 | RBP | SSV | 19.00 | 3.00 | 16.36% | 56.36% | 2.84 | 7.22 | 58.06 | Slightly Impaired |
| M01929 | OKS9-0932 | RBP | Woody | 24.00 | 8.00 | 40.52% | 34.48% | 3.83 | 6.28 | 108.47 | Reference |
| M01930 | OKS9-0932 | RBP | SSV | 22.00 | 5.00 | 22.12% | 45.13% | 3.24 | 6.55 | 70.97 | Slightly Impaired |
| M01895 | OKS9-0938 | RBP | Riffle | 25.00 | 10.00 | 65.29% | 45.45% | 3.50 | 4.56 | 91.84 | Non-Impaired |
| M01896 | OKS9-0938 | RBP | SSV | 22.00 | 10.00 | 25.66% | 50.44% | 3.35 | 5.65 | 81.25 | Slightly Impaired |
| M01991 | OKS9-0938 | RBP | Riffle | 18.00 | 11.00 | 30.56% | 66.20% | 2.48 | 5.26 | 83.87 | Non-Impaired |
| M01992 | OKS9-0938 | RBP | SSV | 32.00 | 11.00 | 22.41% | 39.66% | 3.95 | 6.31 | 109.76 | Reference |
| M01755 | OKRO-1087 | LRC | COMP | 15.00 | 4.00 | 20.49% | 67.21% | 2.46 | 7.30 | 89.19 | Non-Impaired |
| M01756 | OKRO-1087 | RBP | Riffle | 25.00 | 9.00 | 35.90% | 29.49% | 3.70 | 5.19 | 128.30 | Reference |
| M01917 | OKRO-1087 | LRC | COMP | 37.00 | 7.00 | 10.08% | 33.61% | 3.03 | 6.85 | 90.32 | Slightly Impaired |
| M01918 | OKRO-1087 | RBP | Riffle | 17.00 | 8.00 | 27.03% | 55.86% | 4.53 | 5.74 | 81.25 | Non-Impaired |
| M01752 | OKLS-1181 | RBP | SSV | 17.00 | 1.00 | 11.20% | 56.80% | 2.81 | 7.29 | 71.05 | Slightly Impaired |
| M01753 | OKLS-1181 | RBP | Riffle | 24.00 | 4.00 | 23.26% | 46.51% | 3.53 | 4.88 | 90.57 | Non-Impaired |
| M01754 | OKLS-1181 | RBP | Woody | 22.00 | 4.00 | 3.97% | 69.05% | 2.73 | 7.12 | 81.08 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M01901 | OKLS-1181 | RBP | SSV | 23.00 | 8.00 | 11.82% | 50.00% | 3.36 | 6.76 | 75.00 | Slightly Impaired |
| M01902 | OKLS-1181 | RBP | Riffle | 17.00 | 6.00 | 66.48% | 64.25% | 2.56 | 4.80 | 87.50 | Non-Impaired |
| M01903 | OKLS-1181 | RBP | Woody | 28.00 | 12.00 | 29.06% | 40.17% | 3.71 | 6.30 | 87.50 | Non-Impaired |
| M01926 | OKS9-0937 | RBP | Woody | 26.00 | 4.00 | 28.32% | 31.86% | 4.06 | 6.61 | 81.36 | Slightly Impaired |
| M01927 | OKS9-0937 | RBP | SSV | 30.00 | 6.00 | 11.68% | 51.09% | 3.37 | 7.39 | 77.42 | Slightly Impaired |
| M01976 | OKS9-0937 | RBP | Woody | 11.00 | 2.00 | 1.89% | 82.08% | 1.56 | 5.58 | 47.37 | Moderately Impaired |
| M01980 | OKS9-0937 | RBP | SSV | 21.00 | 1.00 | 0.92% | 55.05% | 3.11 | 5.98 | 58.54 | Slightly Impaired |
| M02129 | OKS9-0937 | RBP | Woody | 19.00 | 2.00 | 3.17% | 30.16% | 3.69 | 6.41 | 78.95 | Slightly Impaired |
| M02130 | OKS9-0937 | RBP | SSV | 16.00 | 0.00 | 0.00% | 60.36% | 2.68 | 6.73 | 58.54 | Slightly Impaired |
| M01825 | OKR9-0901 | LRF | THAB | 22.00 | 2.00 | 9.91% | 28.83% | 3.91 | 7.00 | 97.78 | Non-Impaired |
| M01824 | OKR9-0901 | LRF | SUB | 9.00 | 2.00 | 5.71% | 88.57% | 1.57 | 5.93 | 53.33 | Moderately Impaired |
| M01837 | OKR9-0901 | LRF | THAB | 19.00 | 4.00 | 10.89% | 52.48% | 3.25 | 6.70 | 106.67 | Reference |
| M01838 | OKR9-0901 | LRF | SUB | 9.00 | 3.00 | 22.92% | 50.00% | 2.74 | 6.47 | 88.89 | Non-Impaired |
| M01855 | OKR9-0901 | LRF | THAB | 18.00 | 5.00 | 23.15% | 39.81% | 3.29 | 6.91 | 124.44 | Reference |
| M01857 | OKR9-0901 | LRF | SUB | 8.00 | 1.00 | 1.59% | 61.90% | 2.28 | 5.60 | 53.33 | Moderately Impaired |
| M01773 | OKR9-0901 | LRF | THAB | 28.00 | 2.00 | 3.74% | 33.64% | 4.07 | 6.31 | 81.08 | Slightly Impaired |
| M01774 | OKR9-0901 | LRF | SUB | 3.00 | 0.00 | 0.00% | 66.67% | 1.58 | 5.67 | 48.65 | Moderately Impaired |
| M01864 | OKR9-0913 | LRF | THAB | 17.00 | 6.00 | 26.71% | 56.16% | 2.94 | 6.22 | 115.56 | Reference |
| M01866 | OKR9-0913 | LRF | SUB | 14.00 | 4.00 | 13.76% | 72.48% | 2.49 | 6.50 | 97.78 | Non-Impaired |
| M01973 | OKR9-0913 | LRF | THAB | 18.00 | 3.00 | 29.29% | 45.71% | 2.89 | 6.76 | 97.78 | Non-Impaired |
| M01974 | OKR9-0913 | LRF | SUB | 19.00 | 1.00 | 10.37% | 31.85% | 3.55 | 6.35 | 97.78 | Non-Impaired |
| M02140 | OKR9-0913 | LRF | THAB | 17.00 | 1.00 | 4.24% | 42.37% | 3.27 | 6.25 | 71.11 | Slightly Impaired |
| M02141 | OKR9-0913 | LRF | SUB | 19.00 | 1.00 | 3.42% | 40.17% | 3.48 | 6.42 | 71.11 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M01820 | OKR9-0902 | LRF | THAB | 14.00 | 1.00 | 3.70% | 69.44% | 3.11 | 7.88 | 71.11 | Slightly Impaired |
| M01868 | OKR9-0902 | LRF | THAB | 14.00 | 1.00 | 5.26% | 72.93% | 1.95 | 7.79 | 62.22 | Slightly Impaired |
| M01967 | OKR9-0902 | LRF | THAB | 29.00 | 9.00 | 23.93% | 28.21% | 4.17 | 6.57 | 142.22 | Reference |
| M01808 | OKR9-0902 | LRF | SUB | 13.00 | 1.00 | 5.77% | 50.96% | 3.14 | 7.71 | 64.86 | Slightly Impaired |
| M01809 | OKR9-0902 | LRF | THAB | 12.00 | 1.00 | 2.84% | 70.45% | 2.11 | 7.60 | 56.76 | Slightly Impaired |
| M01821 | OKR9-0902 | LRF | SUB | 11.00 | 1.00 | 19.66% | 71.79% | 2.21 | 6.26 | 71.11 | Slightly Impaired |
| M01704 | OKR9-0906 | LRF | THAB | 10.00 | 0.00 | 0.00% | 62.73% | 2.30 | 6.13 | 56.76 | Slightly Impaired |
| M01705 | OKR9-0906 | LRF | SUB | 7.00 | 0.00 | 0.00% | 85.61% | 1.55 | 5.97 | 48.65 | Moderately Impaired |
| M01869 | OKR9-0906 | LRF | SUB | 5.00 | 0.00 | 0.00% | 89.22% | 1.44 | 7.30 | 44.44 | Moderately Impaired |
| M01870 | OKR9-0906 | LRF | THAB | 7.00 | 0.00 | 0.00% | 88.46% | 1.23 | 6.23 | 44.44 | Moderately Impaired |
| M01715 | OKR9-0908 | LRF | SUB | 7.00 | 0.00 | 0.00% | 91.98% | 1.17 | 5.98 | 40.54 | Moderately Impaired |
| M01716 | OKR9-0908 | LRF | THAB | 12.00 | 0.00 | 0.00% | 71.17% | 2.39 | 5.72 | 56.76 | Slightly Impaired |
| M01865 | OKR9-0908 | LRF | THAB | 19.00 | 5.00 | 16.51% | 63.30% | 2.92 | 6.59 | 106.67 | Reference |
| M01867 | OKR9-0908 | LRF | SUB | 15.00 | 2.00 | 2.59% | 64.66% | 2.41 | 7.59 | 62.22 | Slightly Impaired |
| M01707 | OKRM-1002 | LRF | THAB | 10.00 | 2.00 | 1.85% | 69.44% | 2.35 | 6.76 | 56.76 | Slightly Impaired |
| M01708 | OKRM-1002 | LRF | SUB | 10.00 | 0.00 | 0.00% | 54.46% | 2.86 | 6.06 | 64.86 | Slightly Impaired |
| M01871 | OKRM-1002 | LRF | SUB | 7.00 | 1.00 | 0.74% | 80.74% | 1.82 | 6.93 | 53.33 | Moderately Impaired |
| M01878 | OKRM-1002 | LRF | THAB | 8.00 | 2.00 | 25.34% | 67.81% | 2.09 | 6.17 | 71.11 | Slightly Impaired |
| M01706 | OKRO-1088 | RBP | Woody | 20.00 | 6.00 | 10.75% | 36.56% | 3.64 | 5.58 | 113.51 | Reference |
| M01900 | OKRO-1088 | RBP | Woody | 19.00 | 11.00 | 85.32% | 47.71% | 3.14 | 5.61 | 94.92 | Non-Impaired |
| M01797 | OKRO-1089 | LRC | COMP | 8.00 | 0.00 | 0.00% | 79.28% | 1.94 | 6.53 | 48.65 | Moderately Impaired |
| M01839 | OKRO-1089 | RBP | SSV | 6.00 | 0.00 | 0.00% | 78.95% | 2.07 | 7.74 | 41.38 | Moderately Impaired |
| M01841 | OKRO-1089 | RBP | Woody | 7.00 | 0.00 | 0.00% | 84.82% | 1.48 | 7.80 | 32.79 | Moderately Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M01893 | OKLS-1176 | RBP | Riffle | 15.00 | 7.00 | 62.99% | 31.50% | 2.96 | 4.69 | 73.47 | Slightly Impaired |
| M01894 | OKLS-1176 | LRC | COMP | 28.00 | 8.00 | 32.43% | 22.52% | 4.35 | 5.02 | 100.00 | Non-Impaired |
| M01915 | OKLS-1176 | LRC | COMP | 32.00 | 11.00 | 30.16% | 38.10% | 4.05 | 5.86 | 100.00 | Non-Impaired |
| M02085 | OKLS-1176 | RBP | Riffle | 22.00 | 12.00 | 33.06% | 46.28% | 3.46 | 5.54 | 85.71 | Non-Impaired |
| M02086 | OKLS-1176 | LRC | COMP | 30.00 | 7.00 | 30.48% | 29.52% | 4.20 | 5.74 | 93.75 | Non-Impaired |
| M01728 | OKSS-1405 | RBP | Riffle | 28.00 | 11.00 | 48.19% | 63.13% | 2.91 | 5.15 | 105.66 | Reference |
| M01729 | OKSS-1405 | LRC | COMP | 16.00 | 7.00 | 13.95% | 75.19% | 1.87 | 5.84 | 89.19 | Non-Impaired |
| M01968 | OKSS-1405 | LRC | COMP | 34.00 | 15.00 | 38.33% | 23.33% | 4.57 | 5.52 | 115.91 | Reference |
| M01969 | OKSS-1405 | RBP | Riffle | 20.00 | 13.00 | 45.79% | 46.73% | 3.82 | 4.17 | 93.75 | Non-Impaired |
| M01913 | OKR9-0907 | RBP | Riffle | 20.00 | 8.00 | 59.47% | 40.78% | 2.98 | 4.64 | 87.50 | Non-Impaired |
| M01914 | OKR9-0907 | LRC | COMP | 33.00 | 10.00 | 30.30% | 31.06% | 4.26 | 6.22 | 106.67 | Reference |
| M02026 | OKR9-0907 | LRC | COMP | 29.00 | 11.00 | 28.70% | 33.33% | 4.04 | 5.36 | 100.00 | Non-Impaired |
| M02027 | OKR9-0907 | RBP | Riffle | 21.00 | 7.00 | 19.27% | 52.29% | 3.07 | 5.11 | 85.71 | Non-Impaired |
| M01879 | OKRM-1008 | LRC | COMP | 22.00 | 6.00 | 11.32% | 54.72% | 3.42 | 6.74 | 56.25 | Slightly Impaired |
| M02028 | OKRM-1008 | LRC | COMP | 24.00 | 4.00 | 9.82% | 66.96% | 2.96 | 6.16 | 50.00 | Moderately Impaired |
| M01842 | OKS9-0931 | RBP | Woody | 13.00 | 0.00 | 0.00% | 70.07% | 2.48 | 7.84 | 45.90 | Moderately Impaired |
| M01843 | OKS9-0931 | RBP | SSV | 10.00 | 0.00 | 0.00% | 75.86% | 1.76 | 7.71 | 41.38 | Moderately Impaired |
| M02103 | OKS9-0931 | RBP | SSV | 14.00 | 0.00 | 0.00% | 59.41% | 2.67 | 6.10 | 71.11 | Slightly Impaired |
| M02104 | OKS9-0931 | RBP | Woody | 12.00 | 0.00 | 0.00% | 76.00% | 2.14 | 6.22 | 62.22 | Slightly Impaired |
| M01908 | OKS9-0933 | RBP | SSV | 9.00 | 0.00 | 0.00% | 89.47% | 1.04 | 7.93 | 34.48 | Moderately Impaired |
| M01909 | OKS9-0933 | RBP | Woody | 10.00 | 0.00 | 0.00% | 77.57% | 1.90 | 7.97 | 42.86 | Moderately Impaired |
| M02093 | OKS9-0933 | RBP | Woody | 14.00 | 0.00 | 0.00% | 62.81% | 2.79 | 7.67 | 64.86 | Slightly Impaired |
| M01810 | OKLS-1182 | RBP | Woody | 21.00 | 1.00 | 0.87% | 51.30% | 3.16 | 6.04 | 64.86 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M01811 | OKLS-1182 | RBP | SSV | 11.00 | 0.00 | 0.00% | 68.64% | 2.34 | 6.33 | 55.26 | Slightly Impaired |
| M01925 | OKLS-1182 | RBP | Woody | 21.00 | 2.00 | 35.71% | 41.96% | 3.57 | 6.88 | 75.00 | Slightly Impaired |
| M01761 | OKRO-1086 | RBP | SSV | 20.00 | 1.00 | 3.33% | 60.83% | 2.94 | 7.01 | 63.16 | Slightly Impaired |
| M01762 | OKRO-1086 | RBP | Woody | 26.00 | 4.00 | 3.08% | 56.92% | 3.14 | 6.93 | 81.08 | Slightly Impaired |
| M01923 | OKRO-1086 | LRF | SUB | 21.00 | 5.00 | 10.29% | 41.18% | 3.62 | 5.98 | 70.97 | Slightly Impaired |
| M01924 | OKRO-1086 | LRF | THAB | 23.00 | 4.00 | 4.39% | 48.25% | 3.44 | 6.48 | 51.61 | Moderately Impaired |
| M01791 | OKR9-0909 | RBP | SSV | 23.00 | 1.00 | 3.01% | 47.59% | 3.43 | 7.34 | 63.16 | Slightly Impaired |
| M01792 | OKR9-0909 | RBP | Woody | 18.00 | 0.00 | 0.00% | 47.27% | 3.16 | 7.72 | 64.86 | Slightly Impaired |
| M01840 | OKR9-0909 | RBP | Woody | 22.00 | 1.00 | 1.85% | 25.93% | 3.85 | 8.00 | 72.13 | Slightly Impaired |
| M01766 | OKS9-0939 | RBP | Woody | 23.00 | 5.00 | 30.38% | 43.46% | 3.47 | 5.95 | 113.51 | Reference |
| M01767 | OKS9-0939 | RBP | SSV | 26.00 | 9.00 | 29.95% | 37.43% | 3.61 | 5.60 | 118.42 | Reference |
| M01768 | OKS9-0939 | RBP | Riffle | 13.00 | 4.00 | 72.22% | 76.98% | 1.96 | 4.43 | 75.47 | Slightly Impaired |
| M01860 | OKS9-0939 | RBP | Woody | 21.00 | 6.00 | 18.60% | 55.04% | 3.10 | 5.91 | 81.36 | Slightly Impaired |
| M01861 | OKS9-0939 | RBP | Riffle | 35.00 | 13.00 | 51.49% | 51.26% | 3.32 | 5.00 | 88.89 | Non-Impaired |
| M01862 | OKS9-0939 | RBP | SSV | 29.00 | 5.00 | 22.65% | 34.81% | 3.82 | 5.93 | 83.87 | Non-Impaired |
| M01806 | OKS9-0936 | RBP | SSV | 22.00 | 1.00 | 7.46% | 39.30% | 3.11 | 6.91 | 71.05 | Slightly Impaired |
| M01807 | OKS9-0936 | RBP | Woody | 8.00 | 2.00 | 6.09% | 80.87% | 1.64 | 5.94 | 48.65 | Moderately Impaired |
| M01897 | OKS9-0936 | RBP | SSV | 26.00 | 2.00 | 26.12% | 42.54% | 3.53 | 6.68 | 70.97 | Slightly Impaired |
| M01899 | OKS9-0936 | RBP | Woody | 18.00 | 5.00 | 64.75% | 70.49% | 2.16 | 6.83 | 74.58 | Slightly Impaired |
| M01910 | OKR9-0912 | LRF | THAB | 11.00 | 2.00 | 1.74% | 62.61% | 2.53 | 7.53 | 53.33 | Moderately Impaired |
| M02123 | OKR9-0912 | LRF | SUB | 13.00 | 2.00 | 3.28% | 60.66% | 2.66 | 7.30 | 53.33 | Moderately Impaired |
| M02124 | OKR9-0912 | LRF | THAB | 10.00 | 3.00 | 12.70% | 78.57% | 1.74 | 6.10 | 46.67 | Moderately Impaired |
| M01931 | OKRM-1001 | LRF | THAB | 10.00 | 0.00 | 0.00% | 75.00% | 1.97 | 7.61 | 40.00 | Moderately Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02117 | OKRM-1001 | LRF | THAB | 22.00 | 3.00 | 5.17% | 43.10% | 3.58 | 6.55 | 60.00 | Slightly Impaired |
| M02118 | OKRM-1001 | LRF | SUB | 20.00 | 7.00 | 14.29% | 48.05% | 3.41 | 6.86 | 80.00 | Slightly Impaired |
| M01928 | OKRM-1004 | LRC | COMP | 16.00 | 2.00 | 1.90% | 75.71% | 3.11 | 7.81 | 53.33 | Moderately Impaired |
| M02131 | OKRM-1004 | LRF | SUB | 20.00 | 5.00 | 11.82% | 55.45% | 3.08 | 7.22 | 73.33 | Slightly Impaired |
| M02132 | OKRM-1004 | LRF | THAB | 17.00 | 6.00 | 12.96% | 53.09% | 2.86 | 6.47 | 80.00 | Slightly Impaired |
| M01817 | OKS9-0935 | RBP | SSV | 15.00 | 1.00 | 1.87% | 50.94% | 2.75 | 6.59 | 57.14 | Slightly Impaired |
| M01836 | OKS9-0935 | RBP | SSV | 20.00 | 3.00 | 3.95% | 69.74% | 2.26 | 6.56 | 45.65 | Moderately Impaired |
| M01777 | OKR9-0905 | RBP | SSV | 29.00 | 6.00 | 4.85% | 34.80% | 3.92 | 6.59 | 102.63 | Reference |
| M01778 | OKR9-0905 | RBP | Woody | 21.00 | 4.00 | 7.14% | 43.65% | 3.39 | 6.20 | 81.08 | Slightly Impaired |
| M01844 | OKR9-0905 | RBP | Woody | 21.00 | 4.00 | 6.25% | 76.39% | 1.95 | 7.45 | 52.46 | Moderately Impaired |
| M01845 | OKR9-0905 | RBP | SSV | 10.00 | 1.00 | 8.62% | 78.16% | 1.63 | 7.58 | 41.38 | Moderately Impaired |
| M01757 | OKR9-0911 | LRF | SUB | 14.00 | 2.00 | 1.79% | 63.39% | 2.38 | 7.70 | 56.76 | Slightly Impaired |
| M01758 | OKR9-0911 | LRF | THAB | 13.00 | 1.00 | 1.77% | 56.64% | 2.75 | 7.26 | 64.86 | Slightly Impaired |
| M01863 | OKR9-0911 | LRF | THAB | 14.00 | 6.00 | 43.93% | 39.25% | 3.06 | 6.73 | 118.42 | Reference |
| M01803 | OKS9-0934 | RBP | Riffle | 9.00 | 1.00 | 0.50% | 96.02% | 1.18 | 5.99 | 37.74 | Moderately Impaired |
| M01804 | OKS9-0934 | RBP | SSV | 15.00 | 1.00 | 0.90% | 62.16% | 2.70 | 7.34 | 63.16 | Slightly Impaired |
| M01805 | OKS9-0934 | RBP | Woody | 16.00 | 2.00 | 1.44% | 55.40% | 2.65 | 6.48 | 64.86 | Slightly Impaired |
| M01904 | OKS9-0934 | RBP | Woody | 30.00 | 5.00 | 13.51% | 34.46% | 4.02 | 7.06 | 81.36 | Slightly Impaired |
| M01905 | OKS9-0934 | RBP | SSV | 31.00 | 3.00 | 4.20% | 26.05% | 4.28 | 7.18 | 70.97 | Slightly Impaired |
| M02302 | OKRM-1022 | LRF | THAB | 10.00 | 3.00 | 40.18% | 63.39% | 2.23 | 5.85 | 64.29 | Slightly Impaired |
| M02333 | OKRM-1022 | LRF | SUB | 12.00 | 2.00 | 3.45% | 72.41% | 2.06 | 6.22 | 50.00 | Moderately Impaired |
| M02334 | OKRM-1022 | LRF | THAB | 9.00 | 2.00 | 3.77% | 82.08% | 1.48 | 6.13 | 35.71 | Moderately Impaired |
| M02014 | OKS9-0941 | RBP | Woody | 13.00 | 1.00 | 6.09% | 72.17% | 2.36 | 7.86 | 55.26 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02201 | OKS9-0941 | RBP | Woody | 16.00 | 2.00 | 2.91% | 68.93% | 2.43 | 6.32 | 47.46 | Moderately Impaired |
| M02224 | OKS9-0941 | RBP | Woody | 18.00 | 1.00 | 0.75% | 76.87% | 1.87 | 6.31 | 47.46 | Moderately Impaired |
| M01975 | OKRM-1021 | LRF | THAB | 13.00 | 3.00 | 7.76% | 67.24% | 2.52 | 7.14 | 80.00 | Slightly Impaired |
| M01979 | OKRM-1021 | LRF | SUB | 8.00 | 0.00 | 0.00% | 45.45% | 2.85 | 7.64 | 62.22 | Slightly Impaired |
| M02155 | OKRM-1021 | LRF | THAB | 18.00 | 4.00 | 8.47% | 49.15% | 2.98 | 7.00 | 97.78 | Non-Impaired |
| M02156 | OKRM-1021 | LRF | SUB | 14.00 | 4.00 | 6.17% | 66.67% | 2.60 | 7.62 | 97.78 | Non-Impaired |
| M02047 | OKSS-1431 | RBP | SSV | 27.00 | 8.00 | 22.03% | 43.22% | 3.72 | 5.41 | 102.44 | Reference |
| M02048 | OKSS-1431 | RBP | Riffle | 20.00 | 8.00 | 28.87% | 43.81% | 3.40 | 5.27 | 83.87 | Non-Impaired |
| M02182 | OKSS-1431 | RBP | SSV | 24.00 | 5.00 | 8.40% | 52.67% | 3.30 | 6.73 | 58.06 | Slightly Impaired |
| M02082 | OKRO-1102 | RBP | Woody | 14.00 | 3.00 | 2.54% | 87.29% | 1.58 | 5.91 | 46.67 | Moderately Impaired |
| M02083 | OKRO-1102 | RBP | SSV | 18.00 | 4.00 | 5.04% | 68.91% | 2.74 | 6.03 | 57.14 | Slightly Impaired |
| M02084 | OKRO-1102 | RBP | Riffle | 17.00 | 4.00 | 7.05% | 63.46% | 2.72 | 5.94 | 64.29 | Slightly Impaired |
| M02240 | OKRO-1102 | RBP | Woody | 20.00 | 9.00 | 43.97% | 32.76% | 3.73 | 4.55 | 100.00 | Non-Impaired |
| M02241 | OKRO-1102 | RBP | SSV | 28.00 | 9.00 | 38.32% | 38.32% | 3.88 | 4.80 | 100.00 | Non-Impaired |
| M02133 | OKSS-1429 | RBP | Riffle | 18.00 | 2.00 | 15.97% | 46.22% | 3.23 | 5.03 | 55.10 | Slightly Impaired |
| M02134 | OKSS-1429 | LRC | COMP | 12.00 | 4.00 | 28.95% | 79.82% | 1.96 | 5.26 | 50.00 | Moderately Impaired |
| M02098 | OKSS-1430 | RBP | SSV | 20.00 | 2.00 | 2.80% | 53.27% | 3.11 | 6.83 | 50.00 | Moderately Impaired |
| M02099 | OKSS-1430 | RBP | Riffle | 17.00 | 5.00 | 7.14% | 80.00% | 1.69 | 5.93 | 43.75 | Moderately Impaired |
| M02100 | OKSS-1430 | RBP | Woody | 13.00 | 1.00 | 6.25% | 75.00% | 2.29 | 6.73 | 45.16 | Moderately Impaired |
| M02207 | OKSS-1430 | RBP | Woody | 15.00 | 5.00 | 12.50% | 55.36% | 2.95 | 6.17 | 75.00 | Slightly Impaired |
| M02208 | OKSS-1430 | RBP | Riffle | 15.00 | 8.00 | 41.44% | 59.46% | 2.70 | 5.05 | 87.50 | Non-Impaired |
| M02209 | OKSS-1430 | RBP | SSV | 26.00 | 7.00 | 16.17% | 44.91% | 3.52 | 7.11 | 81.25 | Slightly Impaired |
| M02121 | OKRO-1103 | RBP | Riffle | 32.00 | 12.00 | 28.85% | 56.73% | 3.11 | 5.57 | 79.59 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02122 | OKRO-1103 | LRC | COMP | 16.00 | 5.00 | 5.83% | 74.17% | 1.88 | 7.48 | 43.75 | Moderately Impaired |
| M01730 | OKR9-0904 | LRF | THAB | 18.00 | 2.00 | 3.59% | 64.07% | 2.59 | 7.68 | 64.86 | Slightly Impaired |
| M01731 | OKR9-0904 | LRF | SUB | 13.00 | 0.00 | 0.00% | 81.25% | 1.82 | 7.40 | 56.76 | Slightly Impaired |
| M02303 | OKR9-0904 | LRF | THAB | 15.00 | 4.00 | 3.03% | 73.33% | 2.23 | 7.13 | 71.05 | Slightly Impaired |
| M01823 | OKRO-1092 | RBP | SSV | 4.00 | 0.00 | 0.00% | 89.47% | 1.35 | 5.81 | 44.44 | Moderately Impaired |
| M01822 | OKRO-1092 | RBP | Woody | 12.00 | 1.00 | 11.43% | 70.48% | 2.35 | 6.39 | 71.11 | Slightly Impaired |
| M02197 | OKRO-1092 | RBP | Woody | 22.00 | 9.00 | 23.36% | 68.22% | 2.65 | 5.76 | 85.25 | Non-Impaired |
| M02198 | OKRO-1092 | RBP | SSV | 19.00 | 7.00 | 47.06% | 48.74% | 3.21 | 5.60 | 96.55 | Non-Impaired |
| M02227 | OKRO-1092 | RBP | Woody | 24.00 | 8.00 | 13.39% | 69.29% | 2.45 | 6.03 | 72.13 | Slightly Impaired |
| M02228 | OKRO-1092 | RBP | SSV | 29.00 | 10.00 | 50.36% | 39.57% | 3.78 | 6.26 | 110.34 | Reference |
| M02114 | OKLS-1204 | RBP | Woody | 13.00 | 1.00 | 1.16% | 51.16% | 2.86 | 6.85 | 53.33 | Moderately Impaired |
| M02127 | OKR9-0903 | LRF | SUB | 8.00 | 0.00 | 0.00% | 84.86% | 1.33 | 7.35 | 39.47 | Moderately Impaired |
| M02128 | OKR9-0903 | LRF | THAB | 11.00 | 1.00 | 2.10% | 88.11% | 1.66 | 7.23 | 47.37 | Moderately Impaired |
| M02299 | OKR9-0903 | LRF | THAB | 12.00 | 4.00 | 8.11% | 68.47% | 2.17 | 7.12 | 71.05 | Slightly Impaired |
| M02125 | OKRM-1020 | LRF | THAB | 12.00 | 5.00 | 41.44% | 55.86% | 2.65 | 5.66 | 86.67 | Non-Impaired |
| M02126 | OKRM-1020 | LRF | SUB | 16.00 | 6.00 | 17.28% | 50.62% | 3.04 | 6.73 | 80.00 | Slightly Impaired |
| M02112 | OKRM-1026 | LRF | THAB | 4.00 | 0.00 | 0.00% | 77.59% | 1.67 | 6.22 | 53.33 | Moderately Impaired |
| M02113 | OKRM-1026 | LRF | SUB | 6.00 | 0.00 | 0.00% | 68.57% | 1.98 | 5.99 | 53.33 | Moderately Impaired |
| M02262 | OKRM-1026 | LRF | SUB | 14.00 | 3.00 | 32.50% | 45.00% | 3.25 | 7.81 | 106.67 | Reference |
| M02263 | OKRM-1026 | LRF | THAB | 10.00 | 1.00 | 0.95% | 83.81% | 1.45 | 6.25 | 53.33 | Moderately Impaired |
| M02101 | OKSS-1444 | RBP | Woody | 25.00 | 4.00 | 11.82% | 32.73% | 3.89 | 5.75 | 102.63 | Reference |
| M02102 | OKSS-1444 | RBP | SSV | 26.00 | 6.00 | 14.52% | 33.87% | 3.76 | 6.15 | 102.44 | Reference |
| M02157 | OKSS-1444 | RBP | Woody | 27.00 | 4.00 | 8.33% | 40.83% | 3.81 | 5.78 | 61.02 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02252 | OKSS-1403 | RBP | Riffle | 21.00 | 11.00 | 59.81% | 39.25% | 3.51 | 4.60 | 97.96 | Non-Impaired |
| M02253 | OKSS-1403 | RBP | SSV | 23.00 | 7.00 | 22.41% | 50.00% | 3.31 | 5.60 | 81.25 | Slightly Impaired |
| M02318 | OKSS-1403 | RBP | SSV | 26.00 | 10.00 | 39.62% | 39.62% | 3.79 | 4.75 | 100.00 | Non-Impaired |
| M02319 | OKSS-1403 | RBP | Riffle | 29.00 | 11.00 | 44.92% | 28.81% | 4.09 | 3.95 | 97.96 | Non-Impaired |
| M02260 | OKLS-1222 | RBP | Woody | 15.00 | 1.00 | 2.72% | 79.89% | 1.98 | 6.53 | 45.90 | Moderately Impaired |
| M02261 | OKLS-1222 | RBP | SSV | 14.00 | 0.00 | 0.00% | 52.08% | 2.53 | 7.03 | 55.17 | Slightly Impaired |
| M02339 | OKLS-1222 | RBP | Woody | 10.00 | 0.00 | 0.00% | 87.40% | 1.26 | 7.79 | 53.33 | Moderately Impaired |
| M02340 | OKLS-1222 | RBP | SSV | 13.00 | 0.00 | 0.00% | 72.12% | 2.34 | 7.72 | 62.22 | Slightly Impaired |
| M02029 | OKLS-1209 | RBP | Woody | 12.00 | 2.00 | 8.04% | 58.04% | 2.68 | 6.83 | 43.75 | Moderately Impaired |
| M02030 | OKLS-1209 | RBP | Riffle | 25.00 | 6.00 | 14.68% | 39.45% | 4.02 | 5.51 | 67.35 | Slightly Impaired |
| M02031 | OKLS-1209 | RBP | SSV | 24.00 | 2.00 | 3.60% | 46.85% | 3.33 | 6.85 | 50.00 | Moderately Impaired |
| M02176 | OKLS-1209 | RBP | Riffle | 29.00 | 10.00 | 22.22% | 41.98% | 3.88 | 5.18 | 85.71 | Non-Impaired |
| M02177 | OKLS-1209 | RBP | SSV | 28.00 | 8.00 | 24.14% | 62.07% | 3.06 | 7.22 | 81.25 | Slightly Impaired |
| M02178 | OKLS-1209 | RBP | Woody | 22.00 | 9.00 | 29.31% | 42.24% | 3.48 | 6.83 | 92.86 | Non-Impaired |
| M02043 | OKLS-1203 | RBP | SSV | 21.00 | 2.00 | 17.86% | 36.61% | 3.51 | 6.75 | 97.78 | Non-Impaired |
| M02044 | OKLS-1203 | RBP | Woody | 29.00 | 4.00 | 20.00% | 32.31% | 3.98 | 7.12 | 133.33 | Reference |
| M02218 | OKLS-1203 | RBP | SSV | 27.00 | 6.00 | 18.94% | 43.94% | 3.67 | 7.08 | 89.66 | Non-Impaired |
| M02219 | OKLS-1203 | RBP | Woody | 26.00 | 7.00 | 18.92% | 48.65% | 3.40 | 6.80 | 78.69 | Slightly Impaired |
| M02038 | OKSS-1408 | RBP | Woody | 17.00 | 1.00 | 3.64% | 49.09% | 3.23 | 7.30 | 63.16 | Slightly Impaired |
| M02039 | OKSS-1408 | RBP | SSV | 31.00 | 3.00 | 12.10% | 45.22% | 3.73 | 6.91 | 73.17 | Slightly Impaired |
| M02040 | OKSS-1408 | RBP | Riffle | 20.00 | 7.00 | 35.78% | 64.22% | 2.66 | 4.22 | 83.87 | Non-Impaired |
| M02137 | OKSS-1408 | RBP | SSV | 27.00 | 3.00 | 11.65% | 22.33% | 4.23 | 6.68 | 87.80 | Non-Impaired |
| M02138 | OKSS-1408 | RBP | Riffle | 15.00 | 5.00 | 45.39% | 53.95% | 2.73 | 3.85 | 64.52 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02139 | OKSS-1408 | RBP | Woody | 26.00 | 3.00 | 17.76% | 34.58% | 3.91 | 6.80 | 86.84 | Non-Impaired |
| M02199 | OKSS-1408 | RBP | Woody | 26.00 | 5.00 | 10.28% | 54.21% | 3.46 | 6.84 | 67.80 | Slightly Impaired |
| M02200 | OKSS-1408 | RBP | SSV | 20.00 | 3.00 | 9.52% | 57.94% | 2.94 | 7.47 | 51.61 | Moderately Impaired |
| M01814 | OKRM-1011 | LRF | THAB | 16.00 | 2.00 | 4.39% | 50.00% | 2.94 | 7.30 | 64.86 | Slightly Impaired |
| M01815 | OKRM-1011 | LRF | SUB | 12.00 | 1.00 | 0.92% | 60.55% | 2.55 | 7.48 | 64.86 | Slightly Impaired |
| M02211 | OKRM-1011 | LRC | COMP | 19.00 | 4.00 | 14.85% | 48.51% | 3.21 | 5.71 | 58.06 | Slightly Impaired |
| M02298 | OKRM-1011 | LRC | COMP | 15.00 | 4.00 | 8.04% | 57.14% | 2.83 | 6.88 | 51.61 | Moderately Impaired |
| M02036 | OKSS-1414 | RBP | Woody | 20.00 | 1.00 | 24.77% | 38.53% | 3.49 | 7.14 | 86.84 | Non-Impaired |
| M02037 | OKSS-1414 | RBP | SSV | 22.00 | 3.00 | 11.57% | 50.41% | 3.19 | 7.23 | 65.85 | Slightly Impaired |
| M02296 | OKSS-1414 | RBP | SSV | 28.00 | 4.00 | 6.03% | 49.14% | 3.74 | 5.99 | 58.06 | Slightly Impaired |
| M02297 | OKSS-1414 | RBP | Woody | 21.00 | 3.00 | 2.91% | 41.75% | 3.55 | 7.29 | 61.02 | Slightly Impaired |
| M02311 | OKRV-2013 | RBP | Woody | 20.00 | 6.00 | 24.53% | 66.98% | 2.74 | 5.00 | 68.18 | Slightly Impaired |
| M02312 | OKRV-2013 | RBP | SSV | 30.00 | 11.00 | 47.88% | 44.85% | 3.58 | 4.39 | 91.84 | Non-Impaired |
| M02313 | OKRV-2013 | RBP | Riffle | 20.00 | 11.00 | 52.22% | 59.11% | 3.12 | 4.06 | 78.00 | Slightly Impaired |
| M02370 | OKRV-2013 | RBP | SSV | 21.00 | 8.00 | 15.05% | 63.59% | 2.77 | 5.65 | 61.22 | Slightly Impaired |
| M02371 | OKRV-2013 | RBP | Woody | 21.00 | 4.00 | 10.92% | 65.55% | 2.74 | 5.80 | 61.36 | Slightly Impaired |
| M02372 | OKRV-2013 | RBP | Riffle | 22.00 | 13.00 | 56.34% | 58.69% | 3.04 | 3.71 | 84.00 | Non-Impaired |
| M02172 | OKRV-2013 | RBP | Riffle | 20.00 | 7.00 | 60.80% | 52.00% | 3.15 | 4.88 | 81.25 | Slightly Impaired |
| M02173 | OKRV-2013 | LRC | COMP | 53.00 | 14.00 | 38.77% | 36.44% | 4.06 | 5.60 | 109.09 | Reference |
| M02009 | OKLS-1201 | RBP | Woody | 23.00 | 2.00 | 9.35% | 40.19% | 3.65 | 7.46 | 72.97 | Slightly Impaired |
| M02010 | OKLS-1201 | RBP | SSV | 19.00 | 2.00 | 2.48% | 34.71% | 3.50 | 7.37 | 78.95 | Slightly Impaired |
| M02210 | OKLS-1201 | RBP | Woody | 17.00 | 2.00 | 26.13% | 50.45% | 2.84 | 6.82 | 71.43 | Slightly Impaired |
| M02041 | OKSS-1415 | RBP | SSV | 22.00 | 5.00 | 22.32% | 45.54% | 3.48 | 6.37 | 66.67 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02042 | OKSS-1415 | RBP | Riffle | 25.00 | 7.00 | 42.17% | 32.53% | 3.61 | 4.81 | 96.77 | Non-Impaired |
| M02183 | OKSS-1415 | RBP | SSV | 20.00 | 4.00 | 9.01% | 43.24% | 3.39 | 6.64 | 53.33 | Moderately Impaired |
| M02052 | OKLS-1191 | RBP | Woody | 11.00 | 2.00 | 2.68% | 89.29% | 1.30 | 7.60 | 39.47 | Moderately Impaired |
| M02246 | OKLS-1191 | LRC | COMP | 22.00 | 4.00 | 16.51% | 53.21% | 3.23 | 6.68 | 86.84 | Non-Impaired |
| M01717 | OKRM-1016 | LRC | COMP | 27.00 | 13.00 | 21.76% | 58.80% | 3.09 | 5.45 | 105.41 | Reference |
| M01718 | OKRM-1016 | RBP | Riffle | 28.00 | 18.00 | 66.32% | 38.54% | 3.64 | 4.94 | 120.75 | Reference |
| M02166 | OKRM-1016 | LRC | COMP | 23.00 | 12.00 | 50.00% | 30.56% | 3.67 | 4.89 | 109.09 | Reference |
| M02074 | OKLS-1190 | RBP | Riffle | 21.00 | 7.00 | 35.46% | 61.70% | 3.00 | 5.23 | 90.32 | Non-Impaired |
| M02075 | OKLS-1190 | RBP | SSV | 34.00 | 8.00 | 18.24% | 29.73% | 4.09 | 6.00 | 109.76 | Reference |
| M02076 | OKLS-1190 | RBP | Woody | 22.00 | 8.00 | 29.09% | 33.64% | 3.72 | 5.83 | 118.42 | Reference |
| M02179 | OKLS-1190 | RBP | Riffle | 28.00 | 8.00 | 24.22% | 42.19% | 3.75 | 5.60 | 88.89 | Non-Impaired |
| M02180 | OKLS-1190 | RBP | Woody | 15.00 | 4.00 | 31.75% | 39.68% | 3.27 | 5.39 | 81.36 | Slightly Impaired |
| M02181 | OKLS-1190 | RBP | SSV | 21.00 | 5.00 | 33.95% | 44.95% | 3.44 | 5.45 | 77.42 | Slightly Impaired |
| M02230 | OKRV-2001 | RBP | Woody | 19.00 | 3.00 | 45.45% | 60.33% | 2.88 | 6.49 | 72.13 | Slightly Impaired |
| M02345 | OKRV-2001 | RBP | Woody | 9.00 | 0.00 | 0.00% | 66.67% | 2.41 | 6.12 | 53.33 | Moderately Impaired |
| M02346 | OKRV-2001 | RBP | SSV | 15.00 | 1.00 | 0.85% | 65.81% | 2.60 | 5.83 | 71.11 | Slightly Impaired |
| M02264 | OKRM-1010 | LRF | SUB | 9.00 | 2.00 | 14.29% | 50.00% | 2.90 | 5.50 | 71.11 | Slightly Impaired |
| M02265 | OKRM-1010 | LRF | THAB | 7.00 | 2.00 | 3.10% | 91.47% | 1.11 | 6.02 | 44.44 | Moderately Impaired |
| M02309 | OKRM-1010 | LRF | SUB | 17.00 | 0.00 | 0.00% | 65.69% | 2.44 | 6.18 | 62.22 | Slightly Impaired |
| M02310 | OKRM-1010 | LRF | THAB | 20.00 | 1.00 | 1.48% | 44.44% | 3.31 | 6.46 | 71.11 | Slightly Impaired |
| M02300 | OKRM-1013 | LRF | THAB | 14.00 | 5.00 | 13.60% | 74.40% | 2.12 | 6.05 | 97.78 | Non-Impaired |
| M02301 | OKRM-1013 | LRF | SUB | 10.00 | 3.00 | 14.56% | 64.08% | 2.44 | 7.74 | 80.00 | Slightly Impaired |
| M02307 | OKRM-1013 | LRF | THAB | 20.00 | 3.00 | 14.29% | 39.29% | 3.44 | 5.95 | 97.78 | Non-Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02308 | OKRM-1013 | LRF | SUB | 10.00 | 2.00 | 2.50% | 90.00% | 1.00 | 4.94 | 44.44 | Moderately Impaired |
| M02342 | OKRM-1013 | LRF | THAB | 12.00 | 1.00 | 4.55% | 81.82% | 1.87 | 5.90 | 62.22 | Slightly Impaired |
| M02341 | OKRM-1013 | LRF | SUB | 14.00 | 1.00 | 0.82% | 66.39% | 2.59 | 6.27 | 71.11 | Slightly Impaired |
| M02105 | OKSS-1447 | RBP | SSV | 17.00 | 1.00 | 29.81% | 47.12% | 3.20 | 7.08 | 73.17 | Slightly Impaired |
| M02106 | OKSS-1447 | RBP | Riffle | 15.00 | 3.00 | 9.60% | 71.19% | 2.29 | 5.84 | 45.16 | Moderately Impaired |
| M02184 | OKSS-1447 | RBP | SSV | 24.00 | 6.00 | 19.41% | 62.76% | 2.57 | 7.01 | 77.42 | Slightly Impaired |
| M02202 | OKLS-1212 | RBP | SSV | 12.00 | 2.00 | 22.64% | 47.17% | 2.99 | 6.33 | 56.25 | Slightly Impaired |
| M02203 | OKLS-1212 | RBP | Woody | 22.00 | 6.00 | 26.17% | 39.25% | 3.66 | 5.74 | 93.75 | Non-Impaired |
| M02204 | OKLS-1212 | RBP | Riffle | 14.00 | 6.00 | 39.47% | 61.40% | 2.58 | 4.54 | 87.50 | Non-Impaired |
| M02034 | OKLS-1212 | RBP | Woody | 24.00 | 6.00 | 22.06% | 40.44% | 3.45 | 6.28 | 77.42 | Slightly Impaired |
| M02035 | OKLS-1212 | RBP | SSV | 25.00 | 5.00 | 19.05% | 55.78% | 3.18 | 6.40 | 56.25 | Slightly Impaired |
| M02011 | OKLS-1185 | RBP | Woody | 5.00 | 1.00 | 3.51% | 93.86% | 1.03 | 5.91 | 39.47 | Moderately Impaired |
| M02096 | OKLS-1185 | RBP | Woody | 12.00 | 2.00 | 6.03% | 63.79% | 2.49 | 5.91 | 55.26 | Slightly Impaired |
| M02097 | OKLS-1185 | RBP | SSV | 14.00 | 1.00 | 2.33% | 86.63% | 1.79 | 5.97 | 51.22 | Moderately Impaired |
| M02229 | OKLS-1185 | RBP | Woody | 19.00 | 4.00 | 35.83% | 58.33% | 3.04 | 6.15 | 74.58 | Slightly Impaired |
| M02077 | OKLS-1184 | RBP | Riffle | 15.00 | 3.00 | 36.16% | 58.19% | 2.61 | 5.93 | 68.75 | Slightly Impaired |
| M02078 | OKLS-1184 | RBP | SSV | 17.00 | 3.00 | 15.53% | 40.78% | 3.34 | 6.77 | 56.25 | Slightly Impaired |
| M02079 | OKLS-1184 | RBP | Woody | 18.00 | 3.00 | 16.07% | 55.36% | 2.97 | 7.04 | 58.06 | Slightly Impaired |
| M02205 | OKLS-1184 | RBP | Riffle | 13.00 | 3.00 | 48.91% | 81.39% | 1.96 | 5.11 | 56.25 | Slightly Impaired |
| M02206 | OKLS-1184 | RBP | Woody | 23.00 | 4.00 | 18.24% | 52.20% | 3.38 | 5.88 | 68.75 | Slightly Impaired |
| M02089 | OKRO-1095 | LRC | COMP | 25.00 | 8.00 | 25.00% | 37.04% | 3.99 | 6.31 | 121.62 | Reference |
| M02090 | OKRO-1095 | RBP | Riffle | 15.00 | 8.00 | 39.47% | 70.18% | 2.49 | 4.92 | 98.11 | Non-Impaired |
| M02220 | OKRO-1095 | RBP | Riffle | 10.00 | 6.00 | 12.99% | 91.60% | 0.69 | 4.29 | 51.61 | Moderately Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02221 | OKRO-1095 | LRC | COMP | 9.00 | 6.00 | 14.07% | 91.11% | 0.93 | 4.45 | 64.86 | Slightly Impaired |
| M02144 | OKLS-1188 | LRF | SUB | 15.00 | 2.00 | 5.68% | 54.55% | 3.09 | 7.47 | 63.16 | Slightly Impaired |
| M02145 | OKLS-1188 | LRF | THAB | 14.00 | 2.00 | 1.83% | 83.49% | 1.42 | 7.82 | 47.37 | Moderately Impaired |
| M02174 | OKLS-1188 | LRF | SUB | 11.00 | 3.00 | 10.87% | 56.52% | 2.74 | 7.69 | 63.16 | Slightly Impaired |
| M02175 | OKLS-1188 | LRF | THAB | 20.00 | 4.00 | 10.38% | 70.75% | 2.26 | 7.53 | 78.95 | Slightly Impaired |
| M02549 | OKRV-2029 | RBP | SSV | 12.00 | 1.00 | 0.91% | 79.09% | 1.74 | 7.77 | 38.71 | Moderately Impaired |
| M02646 | OKRV-2029 | RBP | SSV | 17.00 | 2.00 | 76.22% | 81.62% | 1.60 | 6.90 | 73.17 | Slightly Impaired |
| M02320 | OKRV-2011 | RBP | Woody | 12.00 | 2.00 | 6.09% | 73.04% | 2.00 | 6.23 | 62.22 | Slightly Impaired |
| M02321 | OKRV-2011 | RBP | SSV | 15.00 | 2.00 | 2.42% | 55.15% | 2.86 | 6.36 | 71.11 | Slightly Impaired |
| M02550 | OKRV-2011 | LRF | THAB | 17.00 | 9.00 | 16.73% | 77.70% | 2.25 | 6.56 | 97.78 | Non-Impaired |
| M02551 | OKRV-2011 | LRF | SUB | 18.00 | 7.00 | 36.54% | 55.77% | 3.06 | 6.45 | 124.44 | Reference |
| M02330 | OKRO-1107 | LRF | SUB | 12.00 | 2.00 | 12.73% | 60.00% | 2.70 | 6.09 | 72.97 | Slightly Impaired |
| M02331 | OKRO-1107 | LRF | THAB | 14.00 | 3.00 | 6.15% | 66.15% | 2.61 | 6.06 | 64.86 | Slightly Impaired |
| M02332 | OKRO-1107 | RBP | Riffle | 13.00 | 7.00 | 37.07% | 48.28% | 2.79 | 5.23 | 98.11 | Non-Impaired |
| M02538 | OKRO-1107 | RBP | Riffle | 21.00 | 12.00 | 75.32% | 42.13% | 3.33 | 4.56 | 90.32 | Non-Impaired |
| M02536 | OKRO-1107 | LRF | THAB | 15.00 | 5.00 | 10.22% | 70.07% | 2.21 | 7.23 | 89.19 | Non-Impaired |
| M02537 | OKRO-1107 | LRF | SUB | 26.00 | 10.00 | 41.28% | 28.44% | 4.09 | 5.94 | 137.84 | Reference |
| M02472 | OKRV-2016 | LRF | SUB | 19.00 | 10.00 | 78.48% | 60.76% | 2.71 | 3.17 | 80.00 | Slightly Impaired |
| M02473 | OKRV-2016 | LRF | THAB | 20.00 | 10.00 | 60.53% | 31.58% | 3.69 | 4.48 | 106.67 | Reference |
| M02578 | OKRV-2016 | RBP | Woody | 14.00 | 7.00 | 70.34% | 45.52% | 2.77 | 4.85 | 87.50 | Non-Impaired |
| M02672 | OKRV-2016 | RBP | Woody | 21.00 | 9.00 | 53.64% | 42.73% | 3.52 | 4.27 | 93.33 | Non-Impaired |
| M02360 | OKRV-2010 | RBP | Woody | 17.00 | 3.00 | 4.46% | 47.32% | 3.10 | 6.86 | 64.86 | Slightly Impaired |
| M02361 | OKRV-2010 | RBP | SSV | 18.00 | 1.00 | 0.89% | 52.68% | 3.06 | 6.63 | 63.16 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02362 | OKRV-2010 | RBP | Riffle | 13.00 | 3.00 | 4.38% | 65.69% | 2.38 | 6.48 | 45.28 | Moderately Impaired |
| M02432 | OKRV-2010 | RBP | Riffle | 14.00 | 6.00 | 50.00% | 66.46% | 2.28 | 5.90 | 77.42 | Slightly Impaired |
| M02433 | OKRV-2010 | RBP | SSV | 22.00 | 4.00 | 22.81% | 42.98% | 3.34 | 7.45 | 68.97 | Slightly Impaired |
| M02434 | OKRV-2010 | RBP | Woody | 19.00 | 5.00 | 17.74% | 66.13% | 2.73 | 7.13 | 85.71 | Non-Impaired |
| M02494 | OKRV-2010 | RBP | Riffle | 14.00 | 7.00 | 63.19% | 47.85% | 2.86 | 4.67 | 90.32 | Non-Impaired |
| M02495 | OKRV-2010 | RBP | Woody | 17.00 | 5.00 | 42.24% | 67.24% | 2.51 | 5.64 | 100.00 | Non-Impaired |
| M02502 | OKRV-2040 | LRF | THAB | 23.00 | 11.00 | 51.33% | 30.09% | 3.84 | 5.13 | 129.73 | Reference |
| M02503 | OKRV-2040 | LRF | SUB | 21.00 | 7.00 | 42.75% | 56.49% | 3.12 | 5.61 | 113.51 | Reference |
| M02637 | OKRV-2040 | RBP | Woody | 15.00 | 4.00 | 10.48% | 75.00% | 2.36 | 6.65 | 81.08 | Slightly Impaired |
| M02576 | OKRV-2035 | RBP | Woody | 11.00 | 3.00 | 23.68% | 78.07% | 2.01 | 6.70 | 54.24 | Slightly Impaired |
| M02577 | OKRV-2035 | RBP | SSV | 23.00 | 7.00 | 14.88% | 73.49% | 2.42 | 6.33 | 70.97 | Slightly Impaired |
| M02655 | OKRV-2035 | RBP | SSV | 18.00 | 5.00 | 21.88% | 59.38% | 2.93 | 6.05 | 87.80 | Non-Impaired |
| M02656 | OKRV-2035 | RBP | Woody | 13.00 | 5.00 | 22.94% | 49.54% | 2.83 | 6.13 | 102.63 | Reference |
| M02314 | OKRV-2014 | RBP | SSV | 33.00 | 12.00 | 27.03% | 27.93% | 4.30 | 5.06 | 100.00 | Non-Impaired |
| M02315 | OKRV-2014 | RBP | Woody | 29.00 | 9.00 | 38.60% | 39.47% | 3.81 | 4.95 | 100.00 | Non-Impaired |
| M02316 | OKRV-2014 | RBP | Riffle | 29.00 | 9.00 | 26.59% | 32.94% | 3.88 | 4.44 | 85.71 | Non-Impaired |
| M02383 | OKRV-2014 | RBP | Riffle | 28.00 | 12.00 | 49.17% | 21.67% | 4.21 | 4.84 | 104.08 | Reference |
| M02384 | OKRV-2014 | RBP | Woody | 23.00 | 12.00 | 40.91% | 37.27% | 3.72 | 4.94 | 114.29 | Reference |
| M02385 | OKRV-2014 | RBP | SSV | 38.00 | 7.00 | 12.04% | 25.93% | 4.63 | 5.86 | 93.75 | Non-Impaired |
| M02534 | OKRV-2034 | RBP | SSV | 19.00 | 7.00 | 35.96% | 45.61% | 3.39 | 6.69 | 90.32 | Non-Impaired |
| M02535 | OKRV-2034 | RBP | Riffle | 24.00 | 9.00 | 25.48% | 61.10% | 2.63 | 6.30 | 82.54 | Slightly Impaired |
| 4003500.01RBP-SSV | OKRV-2034 | RBP | SSV | 31.00 | 3.00 | 4.81% | 33.65% | 4.16 | 6.44 | 73.17 | Slightly Impaired |
| 4003500.01RBP-Woody | OKRV-2034 | RBP | Woody | 22.00 | 4.00 | 10.91% | 37.27% | 3.63 | 6.60 | 102.63 | Reference |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02324 | OKRV-2080 | RBP | SSV | 21.00 | 1.00 | 13.19% | 57.64% | 3.00 | 6.84 | 71.05 | Slightly Impaired |
| M02325 | OKRV-2080 | RBP | Woody | 22.00 | 2.00 | 20.47% | 36.84% | 3.41 | 7.25 | 89.19 | Non-Impaired |
| M02326 | OKRV-2080 | RBP | Riffle | 11.00 | 2.00 | 13.28% | 74.22% | 2.22 | 6.17 | 52.83 | Moderately Impaired |
| M02498 | OKRV-2080 | RBP | Woody | 17.00 | 4.00 | 12.04% | 62.96% | 2.59 | 7.38 | 71.43 | Slightly Impaired |
| M02499 | OKRV-2080 | RBP | SSV | 20.00 | 2.00 | 9.09% | 40.91% | 3.45 | 7.78 | 55.17 | Slightly Impaired |
| M02377 | OKRV-2006 | RBP | SSV | 12.00 | 0.00 | 0.00% | 77.68% | 1.98 | 6.59 | 41.38 | Moderately Impaired |
| M02378 | OKRV-2006 | RBP | Woody | 12.00 | 1.00 | 0.85% | 79.49% | 1.65 | 6.31 | 45.90 | Moderately Impaired |
| M02365 | OKRV-2006 | RBP | Woody | 7.00 | 0.00 | 0.00% | 91.23% | 0.96 | 6.78 | 44.44 | Moderately Impaired |
| M02322 | OKRV-2074 | RBP | Woody | 14.00 | 1.00 | 8.84% | 64.09% | 2.20 | 6.30 | 56.76 | Slightly Impaired |
| M02323 | OKRV-2074 | RBP | SSV | 20.00 | 3.00 | 6.84% | 53.75% | 2.87 | 6.71 | 78.95 | Slightly Impaired |
| M02401 | OKRV-2074 | RBP | SSV | 11.00 | 4.00 | 10.00% | 50.00% | 2.65 | 5.69 | 55.17 | Slightly Impaired |
| M02402 | OKRV-2074 | RBP | Woody | 13.00 | 6.00 | 24.77% | 62.39% | 2.54 | 5.64 | 92.86 | Non-Impaired |
| M02349 | OKSS-1434 | RBP | SSV | 26.00 | 4.00 | 15.22% | 33.33% | 3.92 | 6.36 | 68.75 | Slightly Impaired |
| M02350 | OKSS-1434 | RBP | Woody | 34.00 | 6.00 | 11.71% | 38.74% | 4.12 | 6.51 | 68.75 | Slightly Impaired |
| M02351 | OKSS-1434 | RBP | Riffle | 18.00 | 3.00 | 11.71% | 54.95% | 2.69 | 5.48 | 55.10 | Slightly Impaired |
| M02386 | OKSS-1434 | RBP | Woody | 9.00 | 4.00 | 35.00% | 72.50% | 2.21 | 5.39 | 64.29 | Slightly Impaired |
| M02387 | OKSS-1434 | RBP | SSV | 25.00 | 4.00 | 8.62% | 60.34% | 3.13 | 7.58 | 50.00 | Moderately Impaired |
| M02306 | OKRV-2012 | RBP | Woody | 13.00 | 0.00 | 0.00% | 55.24% | 2.73 | 7.65 | 71.11 | Slightly Impaired |
| M02474 | OKRV-2012 | RBP | Woody | 22.00 | 8.00 | 40.68% | 39.83% | 3.59 | 6.74 | 104.92 | Reference |
| M02493 | OKSS-1449 | RBP | SSV | 16.00 | 2.00 | 26.73% | 42.57% | 3.36 | 7.13 | 68.97 | Slightly Impaired |
| M02496 | OKSS-1449 | RBP | Woody | 24.00 | 4.00 | 15.50% | 48.84% | 3.30 | 7.44 | 71.43 | Slightly Impaired |
| M02358 | OKRO-1106 | LRF | THAB | 16.00 | 1.00 | 4.10% | 53.28% | 2.92 | 6.97 | 53.33 | Moderately Impaired |
| M02359 | OKRO-1106 | LRF | SUB | 20.00 | 2.00 | 1.77% | 54.87% | 3.01 | 7.39 | 53.33 | Moderately Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02560 | OKRO-1106 | LRF | SUB | 17.00 | 3.00 | 2.70% | 43.24% | 3.06 | 6.87 | 53.33 | Moderately Impaired |
| M02561 | OKRO-1106 | LRF | THAB | 18.00 | 5.00 | 14.29% | 48.57% | 3.29 | 7.57 | 73.33 | Slightly Impaired |
| M02335 | OKRV-2019 | LRC | COMP | 28.00 | 5.00 | 4.35% | 50.43% | 3.38 | 6.93 | 89.19 | Non-Impaired |
| M02369 | OKRV-2019 | LRF | SUB | 22.00 | 3.00 | 3.51% | 44.74% | 3.24 | 6.62 | 64.86 | Slightly Impaired |
| M02435 | OKRV-2019 | LRF | THAB | 13.00 | 5.00 | 14.55% | 77.27% | 1.67 | 7.29 | 89.19 | Non-Impaired |
| M02436 | OKRV-2019 | LRF | SUB | 17.00 | 4.00 | 9.46% | 43.24% | 3.40 | 7.89 | 81.08 | Slightly Impaired |
| M02544 | OKRV-2019 | LRF | SUB | 14.00 | 3.00 | 29.21% | 56.18% | 2.83 | 6.12 | 81.08 | Slightly Impaired |
| M02545 | OKRV-2019 | LRF | THAB | 19.00 | 8.00 | 24.55% | 57.27% | 2.78 | 6.55 | 105.41 | Reference |
| M02368 | OKRV-2019 | LRF | THAB | 19.00 | 3.00 | 5.13% | 70.09% | 2.57 | 7.12 | 64.86 | Slightly Impaired |
| M02570 | OKRO-1098 | LRF | SUB | 13.00 | 5.00 | 22.02% | 60.55% | 3.01 | 7.18 | 102.63 | Reference |
| M02571 | OKRO-1098 | LRF | THAB | 14.00 | 5.00 | 34.04% | 58.16% | 2.58 | 6.17 | 110.53 | Reference |
| M02649 | OKRO-1098 | LRF | THAB | 12.00 | 3.00 | 37.84% | 74.77% | 2.26 | 5.52 | 78.95 | Slightly Impaired |
| M02650 | OKRO-1098 | LRF | SUB | 7.00 | 2.00 | 9.38% | 78.13% | 1.94 | 6.34 | 47.37 | Moderately Impaired |
| M02375 | OKRV-2004 | RBP | SSV | 11.00 | 3.00 | 7.21% | 66.67% | 2.55 | 6.70 | 62.07 | Slightly Impaired |
| M02376 | OKRV-2004 | RBP | Woody | 12.00 | 4.00 | 5.50% | 71.56% | 2.01 | 7.00 | 52.46 | Moderately Impaired |
| M02304 | OKRV-2004 | RBP | Woody | 24.00 | 1.00 | 0.83% | 34.71% | 3.70 | 6.97 | 88.89 | Non-Impaired |
| M02305 | OKRV-2004 | RBP | SSV | 19.00 | 2.00 | 5.61% | 34.58% | 3.65 | 6.86 | 88.89 | Non-Impaired |
| M02352 | OKSS-1410 | RBP | Woody | 17.00 | 6.00 | 12.32% | 68.84% | 2.50 | 5.60 | 56.25 | Slightly Impaired |
| M02353 | OKSS-1410 | RBP | SSV | 19.00 | 7.00 | 10.97% | 68.35% | 2.65 | 5.62 | 62.50 | Slightly Impaired |
| M02354 | OKSS-1410 | RBP | Riffle | 12.00 | 6.00 | 22.32% | 61.61% | 2.51 | 5.25 | 55.10 | Slightly Impaired |
| M02415 | OKSS-1410 | RBP | Riffle | 25.00 | 8.00 | 43.52% | 26.85% | 4.18 | 5.10 | 97.96 | Non-Impaired |
| M02418 | OKSS-1410 | RBP | SSV | 18.00 | 4.00 | 28.70% | 50.93% | 3.01 | 6.28 | 62.50 | Slightly Impaired |
| M02403 | OKRV-2020 | RBP | SSV | 19.00 | 5.00 | 21.74% | 50.43% | 3.19 | 6.69 | 70.97 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02404 | OKRV-2020 | RBP | Woody | 15.00 | 7.00 | 28.19% | 63.76% | 2.46 | 6.83 | 81.36 | Slightly Impaired |
| M02657 | OKRV-2020 | RBP | SSV | 17.00 | 4.00 | 74.64% | 76.09% | 1.95 | 6.73 | 80.49 | Slightly Impaired |
| M02658 | OKRV-2020 | RBP | Woody | 21.00 | 7.00 | 45.69% | 52.59% | 3.11 | 6.45 | 110.53 | Reference |
| M02355 | OKRM-1023 | RBP | Riffle | 21.00 | 10.00 | 24.11% | 45.39% | 3.46 | 5.56 | 81.25 | Slightly Impaired |
| M02356 | OKRM-1023 | LRF | SUB | 36.00 | 8.00 | 6.21% | 32.77% | 3.97 | 6.33 | 83.87 | Non-Impaired |
| M02357 | OKRM-1023 | LRF | THAB | 21.00 | 4.00 | 3.13% | 44.38% | 3.36 | 6.08 | 51.61 | Moderately Impaired |
| M02598 | OKRM-1023 | RBP | Riffle | 19.00 | 7.00 | 26.42% | 54.72% | 2.78 | 6.35 | 81.25 | Slightly Impaired |
| M02597 | OKRM-1023 | LRC | COMP | 25.00 | 3.00 | 6.73% | 43.27% | 3.74 | 6.29 | 58.06 | Slightly Impaired |
| M02574 | OKRM-1017 | LRF | THAB | 11.00 | 5.00 | 18.52% | 78.52% | 1.68 | 7.40 | 78.95 | Slightly Impaired |
| M02575 | OKRM-1017 | LRF | SUB | 11.00 | 3.00 | 7.53% | 77.42% | 2.27 | 8.22 | 47.37 | Moderately Impaired |
| M02666 | OKRM-1017 | LRF | SUB | 15.00 | 2.00 | 6.73% | 37.50% | 3.26 | 6.22 | 71.05 | Slightly Impaired |
| M02665 | OKRM-1017 | LRF | THAB | 17.00 | 3.00 | 15.74% | 39.81% | 3.25 | 6.68 | 78.95 | Slightly Impaired |
| M02317 | OKRV-2079 | RBP | Woody | 19.00 | 2.00 | 3.25% | 66.67% | 2.74 | 7.06 | 64.86 | Slightly Impaired |
| M02429 | OKRV-2079 | RBP | SSV | 18.00 | 3.00 | 47.17% | 59.43% | 3.00 | 7.14 | 75.86 | Slightly Impaired |
| M02430 | OKRV-2079 | RBP | Woody | 22.00 | 5.00 | 38.94% | 45.13% | 3.50 | 6.39 | 107.14 | Reference |
| M02431 | OKRV-2079 | RBP | Riffle | 22.00 | 4.00 | 31.72% | 56.55% | 3.00 | 6.84 | 70.97 | Slightly Impaired |
| M02568 | OKRV-2033 | RBP | Woody | 24.00 | 8.00 | 20.95% | 39.05% | 3.75 | 6.79 | 107.14 | Reference |
| M02569 | OKRV-2033 | RBP | SSV | 16.00 | 4.00 | 17.92% | 35.85% | 3.18 | 7.10 | 68.97 | Slightly Impaired |
| M02653 | OKRV-2033 | RBP | SSV | 18.00 | 3.00 | 49.54% | 68.81% | 2.62 | 7.10 | 102.63 | Reference |
| M02654 | OKRV-2033 | RBP | Woody | 16.00 | 5.00 | 37.29% | 58.47% | 2.62 | 6.62 | 113.51 | Reference |
| M02347 | OKRV-2007 | RBP | Woody | 14.00 | 0.00 | 0.00% | 41.07% | 3.13 | 6.67 | 71.11 | Slightly Impaired |
| M02348 | OKRV-2007 | RBP | SSV | 24.00 | 0.00 | 0.00% | 38.41% | 3.59 | 7.09 | 88.89 | Non-Impaired |
| M02388 | OKRV-2007 | RBP | Woody | 16.00 | 7.00 | 70.59% | 49.67% | 2.83 | 5.11 | 91.80 | Non-Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02389 | OKRV-2007 | RBP | SSV | 17.00 | 4.00 | 41.59% | 47.79% | 3.19 | 6.20 | 96.55 | Non-Impaired |
| M02379 | OKSS-1416 | RBP | Woody | 15.00 | 1.00 | 1.42% | 75.18% | 2.24 | 6.96 | 45.90 | Moderately Impaired |
| M02380 | OKSS-1416 | RBP | SSV | 19.00 | 2.00 | 3.39% | 61.86% | 2.78 | 7.04 | 55.17 | Slightly Impaired |
| M02343 | OKSS-1416 | RBP | Woody | 14.00 | 2.00 | 4.46% | 61.61% | 2.61 | 6.24 | 71.11 | Slightly Impaired |
| M02344 | OKSS-1416 | RBP | SSV | 20.00 | 3.00 | 4.72% | 66.04% | 2.82 | 6.23 | 97.78 | Non-Impaired |
| M02336 | OKSS-1409 | RBP | Woody | 21.00 | 12.00 | 31.97% | 53.28% | 3.14 | 3.72 | 95.45 | Non-Impaired |
| M02337 | OKSS-1409 | RBP | Riffle | 30.00 | 16.00 | 68.53% | 25.87% | 4.28 | 3.04 | 96.00 | Non-Impaired |
| M02338 | OKSS-1409 | RBP | SSV | 28.00 | 10.00 | 26.32% | 38.60% | 3.88 | 6.09 | 91.84 | Non-Impaired |
| M02500 | OKSS-1409 | RBP | Woody | 22.00 | 8.00 | 29.17% | 44.79% | 3.43 | 5.97 | 86.67 | Non-Impaired |
| M02501 | OKSS-1409 | RBP | Riffle | 20.00 | 9.00 | 68.09% | 43.62% | 3.32 | 4.48 | 87.50 | Non-Impaired |
| M02363 | OKRV-2009 | RBP | SSV | 20.00 | 2.00 | 2.10% | 56.64% | 2.97 | 7.25 | 71.11 | Slightly Impaired |
| M02364 | OKRV-2009 | RBP | Woody | 22.00 | 4.00 | 4.92% | 59.84% | 3.14 | 7.58 | 97.78 | Non-Impaired |
| M02390 | OKRV-2009 | RBP | Woody | 19.00 | 10.00 | 69.23% | 61.54% | 2.94 | 5.20 | 91.80 | Non-Impaired |
| M02327 | OKSS-1436 | RBP | SSV | 15.00 | 2.00 | 18.09% | 59.57% | 2.76 | 5.00 | 56.25 | Slightly Impaired |
| M02328 | OKSS-1436 | RBP | Woody | 17.00 | 1.00 | 5.50% | 44.95% | 3.19 | 5.20 | 51.61 | Moderately Impaired |
| M02329 | OKSS-1436 | RBP | Riffle | 16.00 | 2.00 | 21.50% | 39.25% | 3.19 | 5.20 | 68.75 | Slightly Impaired |
| M02416 | OKSS-1436 | RBP | Riffle | 14.00 | 4.00 | 13.19% | 58.24% | 2.73 | 6.33 | 56.25 | Slightly Impaired |
| M02419 | OKSS-1436 | RBP | SSV | 19.00 | 2.00 | 5.77% | 46.15% | 3.37 | 6.52 | 50.00 | Moderately Impaired |
| M02366 | OKRV-2088 | LRF | THAB | 13.00 | 1.00 | 0.87% | 80.00% | 1.83 | 6.32 | 56.76 | Slightly Impaired |
| M02367 | OKRV-2088 | LRF | SUB | 21.00 | 2.00 | 6.31% | 34.23% | 3.58 | 6.87 | 81.08 | Slightly Impaired |
| M02437 | OKRV-2088 | LRF | THAB | 10.00 | 5.00 | 34.78% | 60.87% | 2.64 | 6.82 | 113.51 | Reference |
| M02438 | OKRV-2088 | LRF | SUB | 8.00 | 0.00 | 0.00% | 89.74% | 1.07 | 7.91 | 40.54 | Moderately Impaired |
| M02634 | OKRV-2068 | RBP | Riffle | 15.00 | 5.00 | 17.75% | 58.44% | 2.72 | 5.83 | 90.57 | Non-Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02635 | OKRV-2068 | RBP | Woody | 17.00 | 6.00 | 8.73% | 57.94% | 2.68 | 6.61 | 89.19 | Non-Impaired |
| M02727 | OKRV-2068 | RBP | SSV | 20.00 | 3.00 | 3.97% | 52.38% | 3.23 | 6.39 | 55.17 | Slightly Impaired |
| M02728 | OKRV-2068 | RBP | Woody | 33.00 | 8.00 | 18.26% | 32.17% | 4.25 | 6.68 | 100.00 | Non-Impaired |
| M02732 | OKRV-2102 | LRF | SUB | 9.00 | 2.00 | 5.61% | 64.49% | 1.95 | 7.42 | 53.33 | Moderately Impaired |
| M02733 | OKRV-2102 | LRF | THAB | 10.00 | 4.00 | 2.57% | 95.72% | 1.23 | 7.17 | 80.00 | Slightly Impaired |
| 4003504.01LRF-Sub | OKRV-2102 | LRF | SUB | 12.00 | 3.00 | 16.96% | 44.64% | 2.90 | 6.79 | 88.89 | Non-Impaired |
| 4003504.01LRF-Thab | OKRV-2102 | LRF | THAB | 24.00 | 5.00 | 3.20% | 63.64% | 2.77 | 7.72 | 97.78 | Non-Impaired |
| 4003525.01LRF-Sub | OKRV-2102 | LRF | SUB | 17.00 | 1.00 | 0.89% | 56.25% | 2.72 | 7.53 | 71.11 | Slightly Impaired |
| 4003525.01LRF-Thab | OKRV-2102 | LRF | THAB | 21.00 | 4.00 | 7.73% | 53.04% | 3.29 | 6.89 | 97.78 | Non-Impaired |
| M02638 | OKRO-1111 | LRF | THAB | 24.00 | 9.00 | 33.03% | 33.94% | 3.82 | 5.89 | 129.73 | Reference |
| M02639 | OKRO-1111 | LRF | SUB | 21.00 | 3.00 | 9.01% | 36.94% | 3.59 | 6.38 | 81.08 | Slightly Impaired |
| M02716 | OKRO-1111 | RBP | Woody | 21.00 | 8.00 | 36.51% | 40.48% | 3.56 | 6.12 | 107.14 | Reference |
| M02669 | OKSS-1439 | RBP | Riffle | 12.00 | 6.00 | 64.08% | 73.94% | 2.09 | 3.39 | 42.86 | Moderately Impaired |
| M02670 | OKSS-1439 | RBP | SSV | 16.00 | 6.00 | 40.71% | 61.06% | 2.93 | 4.93 | 68.75 | Slightly Impaired |
| M02671 | OKSS-1439 | RBP | Woody | 18.00 | 8.00 | 60.91% | 49.09% | 3.07 | 4.64 | 81.25 | Slightly Impaired |
| M02741 | OKSS-1439 | RBP | SSV | 24.00 | 3.00 | 2.63% | 42.98% | 3.63 | 7.34 | 56.25 | Slightly Impaired |
| M02742 | OKSS-1439 | RBP | Riffle | 23.00 | 8.00 | 40.57% | 35.85% | 3.81 | 4.54 | 91.84 | Non-Impaired |
| M02630 | OKRV-2043 | LRF | THAB | 9.00 | 1.00 | 0.57% | 87.36% | 1.40 | 5.91 | 44.44 | Moderately Impaired |
| M02631 | OKRV-2043 | LRF | SUB | 4.00 | 0.00 | 0.00% | 97.08% | 0.33 | 6.00 | 44.44 | Moderately Impaired |
| M02700 | OKRV-2043 | LRF | SUB | 4.00 | 0.00 | 0.00% | 90.57% | 0.68 | 5.68 | 44.44 | Moderately Impaired |
| M02701 | OKRV-2043 | LRF | THAB | 13.00 | 0.00 | 0.00% | 64.55% | 3.15 | 7.55 | 71.11 | Slightly Impaired |
| M02737 | OKSS-1472 | RBP | Woody | 14.00 | 3.00 | 29.63% | 67.59% | 2.45 | 7.13 | 61.02 | Slightly Impaired |
| 4003501.01RBP-Woody | OKSS-1472 | RBP | Woody | 24.00 | 7.00 | 28.42% | 33.33% | 3.76 | 6.44 | 118.42 | Reference |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02659 | OKRV-2028 | RBP | Woody | 18.00 | 8.00 | 27.43% | 48.67% | 3.22 | 5.87 | 102.63 | Reference |
| M02715 | OKRV-2028 | RBP | Woody | 16.00 | 6.00 | 40.15% | 60.61% | 2.74 | 5.43 | 94.92 | Non-Impaired |
| M02757 | OKSS-1438 | RBP | SSV | 29.00 | 5.00 | 10.69% | 41.98% | 3.73 | 6.72 | 62.50 | Slightly Impaired |
| M02758 | OKSS-1438 | RBP | Riffle | 21.00 | 6.00 | 29.79% | 43.26% | 3.37 | 5.12 | 81.25 | Slightly Impaired |
| 4003522.01RBP-SSV | OKSS-1438 | RBP | SSV | 26.00 | 11.00 | 25.86% | 37.93% | 3.95 | 5.94 | 107.14 | Reference |
| 4003522.01Riffle | OKSS-1438 | RBP | Riffle | 34.00 | 13.00 | 45.09% | 39.27% | 3.88 | 4.66 | 107.14 | Reference |
| M02645 | OKRO-1099 | LRC | COMP | 27.00 | 12.00 | 35.14% | 29.73% | 4.05 | 5.27 | 115.91 | Reference |
| M02695 | OKRO-1099 | LRC | COMP | 22.00 | 7.00 | 21.50% | 41.12% | 3.54 | 6.14 | 88.64 | Non-Impaired |
| M02723 | OKRO-1099 | LRC | COMP | 24.00 | 8.00 | 30.77% | 38.46% | 3.79 | 5.86 | 109.09 | Reference |
| M02724 | OKRO-1099 | RBP | Riffle | 20.00 | 10.00 | 66.45% | 36.84% | 3.67 | 4.93 | 100.00 | Non-Impaired |
| M02719 | OKRV-2026 | RBP | SSV | 22.00 | 7.00 | 28.68% | 31.01% | 3.82 | 6.40 | 93.75 | Non-Impaired |
| M02720 | OKRV-2026 | RBP | Woody | 26.00 | 10.00 | 55.36% | 56.25% | 3.30 | 5.14 | 87.50 | Non-Impaired |
| M02721 | OKRV-2026 | RBP | Riffle | 25.00 | 9.00 | 52.53% | 72.05% | 2.37 | 4.92 | 81.25 | Slightly Impaired |
| 4003509.01RBP-SSV | OKRV-2026 | RBP | SSV | 22.00 | 5.00 | 8.85% | 35.40% | 3.71 | 6.09 | 62.50 | Slightly Impaired |
| 4003509.01RBP-Woody | OKRV-2026 | RBP | Woody | 30.00 | 4.00 | 13.11% | 34.43% | 3.95 | 6.57 | 70.97 | Slightly Impaired |
| 4003509.01Riffle | OKRV-2026 | RBP | Riffle | 19.00 | 6.00 | 10.22% | 62.77% | 2.72 | 5.63 | 68.75 | Slightly Impaired |
| 4003531.01RBP-SSV | OKRV-2026 | RBP | SSV | 22.00 | 3.00 | 2.94% | 48.53% | 3.31 | 6.74 | 50.00 | Moderately Impaired |
| 4003531.01RBP-Woody | OKRV-2026 | RBP | Woody | 29.00 | 4.00 | 10.08% | 50.39% | 3.49 | 7.07 | 58.06 | Slightly Impaired |
| 4003531.01Riffle | OKRV-2026 | RBP | Riffle | 20.00 | 2.00 | 4.13% | 49.59% | 3.43 | 5.48 | 50.00 | Moderately Impaired |
| M02628 | OKRV-2025 | RBP | Woody | 18.00 | 3.00 | 43.29% | 66.46% | 2.67 | 6.62 | 106.67 | Reference |
| M02629 | OKRV-2025 | RBP | SSV | 17.00 | 3.00 | 39.81% | 49.07% | 3.04 | 7.08 | 124.44 | Reference |
| M02698 | OKRV-2025 | RBP | SSV | 18.00 | 3.00 | 25.57% | 54.79% | 2.94 | 7.42 | 82.76 | Slightly Impaired |
| M02699 | OKRV-2025 | RBP | Woody | 18.00 | 4.00 | 53.96% | 61.87% | 2.70 | 6.82 | 78.69 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02647 | OKRV-2044 | RBP | SSV | 15.00 | 2.00 | 73.91% | 79.13% | 1.77 | 6.89 | 73.17 | Slightly Impaired |
| M02648 | OKRV-2044 | RBP | Woody | 14.00 | 3.00 | 27.78% | 60.49% | 2.59 | 6.94 | 78.95 | Slightly Impaired |
| M02693 | OKRV-2044 | RBP | SSV | 17.00 | 4.00 | 34.86% | 52.29% | 3.02 | 6.66 | 70.97 | Slightly Impaired |
| M02694 | OKRV-2044 | RBP | Woody | 15.00 | 5.00 | 33.33% | 37.96% | 3.33 | 6.23 | 88.14 | Non-Impaired |
| M02756 | OKLS-1186 | RBP | Woody | 19.00 | 8.00 | 65.63% | 44.53% | 3.35 | 4.77 | 91.80 | Non-Impaired |
| 4003515.01RBP-SSV | OKLS-1186 | RBP | SSV | 22.00 | 4.00 | 18.35% | 48.62% | 3.45 | 6.34 | 106.67 | Reference |
| 4003515.01RBP-Woody | OKLS-1186 | RBP | Woody | 16.00 | 4.00 | 6.36% | 60.91% | 2.86 | 6.15 | 97.78 | Non-Impaired |
| M02660 | OKLS-1196 | RBP | SSV | 27.00 | 9.00 | 46.43% | 52.68% | 3.50 | 5.35 | 87.50 | Non-Impaired |
| M02661 | OKLS-1196 | RBP | Riffle | 22.00 | 10.00 | 26.78% | 73.56% | 2.19 | 5.20 | 75.00 | Slightly Impaired |
| M02711 | OKLS-1196 | RBP | SSV | 30.00 | 5.00 | 29.91% | 37.38% | 4.04 | 5.92 | 81.25 | Slightly Impaired |
| M02712 | OKLS-1196 | RBP | Riffle | 19.00 | 7.00 | 13.76% | 43.12% | 3.66 | 5.44 | 81.25 | Slightly Impaired |
| M02718 | OKLS-1193 | RBP | Woody | 26.00 | 6.00 | 24.55% | 41.82% | 3.51 | 6.80 | 87.50 | Non-Impaired |
| 4003523.01RBP-Woody | OKLS-1193 | RBP | Woody | 24.00 | 2.00 | 1.79% | 41.07% | 3.55 | 7.39 | 58.06 | Slightly Impaired |
| M02731 | OKRO-1108 | RBP | Woody | 24.00 | 4.00 | 5.00% | 65.00% | 2.98 | 6.57 | 59.02 | Slightly Impaired |
| 4003528.01RBP-SSV | OKRO-1108 | RBP | SSV | 23.00 | 3.00 | 9.76% | 47.15% | 3.42 | 6.87 | 97.78 | Non-Impaired |
| 4003528.01RBP-Woody | OKRO-1108 | RBP | Woody | 18.00 | 3.00 | 9.91% | 57.66% | 2.97 | 6.65 | 80.00 | Slightly Impaired |
| M02667 | OKLS-1192 | RBP | Riffle | 21.00 | 8.00 | 54.05% | 32.43% | 3.46 | 4.53 | 79.59 | Slightly Impaired |
| M02668 | OKLS-1192 | RBP | SSV | 25.00 | 7.00 | 32.41% | 29.66% | 3.82 | 5.57 | 93.75 | Non-Impaired |
| M02706 | OKLS-1192 | RBP | SSV | 18.00 | 2.00 | 6.73% | 31.73% | 3.68 | 6.41 | 62.50 | Slightly Impaired |
| M02707 | OKLS-1192 | RBP | Riffle | 20.00 | 6.00 | 34.45% | 35.29% | 3.59 | 5.42 | 79.59 | Slightly Impaired |
| M02651 | OKRV-2027 | RBP | SSV | 17.00 | 3.00 | 7.47% | 65.52% | 2.68 | 6.75 | 78.95 | Slightly Impaired |
| M02652 | OKRV-2027 | RBP | Woody | 15.00 | 2.00 | 17.43% | 56.88% | 2.83 | 7.01 | 72.97 | Slightly Impaired |
| M02729 | OKRV-2027 | RBP | SSV | 22.00 | 1.00 | 1.68% | 50.42% | 3.22 | 6.08 | 55.17 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02730 | OKRV-2027 | RBP | Woody | 24.00 | 4.00 | 9.35% | 30.84% | 3.78 | 7.20 | 78.57 | Slightly Impaired |
| M02675 | OKSS-1419 | RBP | Riffle | 29.00 | 20.00 | 87.40% | 28.35% | 3.94 | 1.97 | 85.71 | Non-Impaired |
| M02740 | OKSS-1419 | RBP | Riffle | 8.00 | 6.00 | 10.26% | 93.16% | 0.78 | 3.93 | 30.61 | Moderately Impaired |
| M02636 | OKRV-2070 | RBP | Woody | 15.00 | 0.00 | 0.00% | 60.00% | 2.81 | 7.35 | 64.86 | Slightly Impaired |
| M02717 | OKRV-2070 | RBP | Woody | 10.00 | 0.00 | 0.00% | 55.75% | 2.37 | 7.81 | 42.86 | Moderately Impaired |
| 4003512.01LRF-SUB | OKRV-2021 | LRF | SUB | 6.00 | 2.00 | 12.50% | 75.00% | 2.00 | 5.40 | 62.22 | Slightly Impaired |
| M02702 | OKRV-2021 | LRF | SUB | 0.00 | 0.00 | 0.00% | 0.00% | 0.00 | 0.00 | 44.44 | Moderately Impaired |
| 4003524.01RBP-Woody | OKSS-1456 | RBP | Woody | 23.00 | 3.00 | 5.75% | 40.23% | 3.72 | 7.22 | 58.06 | Slightly Impaired |
| M02734 | OKSS-1456 | RBP | SSV | 27.00 | 4.00 | 5.29% | 42.94% | 3.63 | 7.29 | 56.25 | Slightly Impaired |
| M02673 | OKSS-1426 | RBP | Riffle | 24.00 | 13.00 | 45.32% | 42.45% | 3.59 | 4.42 | 91.84 | Non-Impaired |
| M02674 | OKSS-1426 | RBP | Woody | 34.00 | 14.00 | 51.38% | 23.85% | 4.51 | 4.66 | 106.25 | Reference |
| M02708 | OKSS-1426 | RBP | SSV | 35.00 | 4.00 | 6.36% | 35.45% | 4.34 | 5.85 | 62.50 | Slightly Impaired |
| M02640 | OKSS-1425 | RBP | Riffle | 30.00 | 14.00 | 52.15% | 29.23% | 4.03 | 4.25 | 102.00 | Reference |
| M02641 | OKSS-1425 | RBP | SSV | 21.00 | 9.00 | 29.46% | 40.18% | 3.61 | 5.26 | 79.59 | Slightly Impaired |
| M02642 | OKSS-1425 | RBP | Woody | 24.00 | 13.00 | 52.07% | 33.88% | 3.91 | 4.08 | 109.09 | Reference |
| M02696 | OKSS-1425 | RBP | Woody | 18.00 | 7.00 | 27.88% | 46.15% | 3.30 | 6.55 | 86.67 | Non-Impaired |
| M02697 | OKSS-1425 | RBP | Riffle | 16.00 | 6.00 | 41.43% | 36.67% | 3.41 | 5.27 | 81.25 | Slightly Impaired |
| M02676 | OKSS-1425 | RBP | Riffle | 36.00 | 14.00 | 48.67% | 35.90% | 3.87 | 4.36 | 96.00 | Non-Impaired |
| M02677 | OKSS-1425 | RBP | Woody | 25.00 | 11.00 | 45.05% | 30.63% | 4.07 | 4.61 | 109.09 | Reference |
| M02722 | OKSS-1425 | RBP | Woody | 21.00 | 4.00 | 34.12% | 35.29% | 3.59 | 5.50 | 86.67 | Non-Impaired |
| M02624 | OKRV-2039 | RBP | Woody | 28.00 | 6.00 | 17.19% | 50.78% | 3.46 | 6.56 | 92.31 | Non-Impaired |
| M02625 | OKRV-2039 | RBP | SSV | 18.00 | 4.00 | 8.11% | 57.66% | 3.07 | 6.77 | 57.14 | Slightly Impaired |
| M02703 | OKRV-2039 | RBP | SSV | 20.00 | 7.00 | 28.04% | 65.42% | 2.60 | 6.87 | 84.78 | Non-Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M02704 | OKRV-2039 | RBP | Woody | 18.00 | 5.00 | 23.02% | 61.11% | 2.78 | 6.83 | 83.87 | Non-Impaired |
| M02632 | OKRV-2032 | RBP | SSV | 18.00 | 2.00 | 19.85% | 47.06% | 3.07 | 6.98 | 64.29 | Slightly Impaired |
| M02633 | OKRV-2032 | RBP | Woody | 15.00 | 2.00 | 3.70% | 41.36% | 3.14 | 7.22 | 61.54 | Slightly Impaired |
| M02705 | OKRV-2032 | RBP | SSV | 15.00 | 2.00 | 37.93% | 63.79% | 2.69 | 7.32 | 71.74 | Slightly Impaired |
| 4003505.01RBP-SSV | OKLS-1198 | RBP | SSV | 13.00 | 2.00 | 18.80% | 54.70% | 2.65 | 6.57 | 65.85 | Slightly Impaired |
| 4003505.01RBP-Woody | OKLS-1198 | RBP | Woody | 9.00 | 1.00 | 10.28% | 58.88% | 2.56 | 6.57 | 63.16 | Slightly Impaired |
| 4003579.01RBP-SSV | OKLS-1198 | RBP | SSV | 16.00 | 4.00 | 60.87% | 54.35% | 2.87 | 6.55 | 64.52 | Slightly Impaired |
| 4003534.01Riffle | OKRV-2036 | RBP | Riffle | 27.00 | 13.00 | 28.33% | 56.11% | 3.15 | 6.41 | 79.59 | Slightly Impaired |
| 4003576.01RBP-SSV | OKRV-2036 | RBP | SSV | 22.00 | 8.00 | 28.70% | 36.52% | 3.72 | 5.01 | 93.75 | Non-Impaired |
| 4003576.01Riffle | OKRV-2036 | RBP | Riffle | 24.00 | 9.00 | 67.42% | 50.76% | 3.35 | 4.02 | 85.71 | Non-Impaired |
| 4003517.01RBP-Woody | OKRV-2015 | RBP | Woody | 10.00 | 2.00 | 4.09% | 89.09% | 1.58 | 6.11 | 62.22 | Slightly Impaired |
| 4003593.01RBP-SSV | OKRV-2015 | RBP | SSV | 15.00 | 3.00 | 7.03% | 65.63% | 2.70 | 6.62 | 68.97 | Slightly Impaired |
| 4003529.01RBP-SSV | OKRV-2101 | RBP | SSV | 16.00 | 1.00 | 0.83% | 57.02% | 2.63 | 7.39 | 71.11 | Slightly Impaired |
| 4003529.01RBP-Woody | OKRV-2101 | RBP | Woody | 16.00 | 1.00 | 3.70% | 36.11% | 3.12 | 7.03 | 80.00 | Slightly Impaired |
| 4003571.01RBP-Woody | OKRV-2101 | RBP | Woody | 16.00 | 6.00 | 56.03% | 53.19% | 3.04 | 5.63 | 91.80 | Non-Impaired |
| 4003535.01RBP-SSV | OKLS-1197 | RBP | SSV | 27.00 | 9.00 | 29.52% | 43.81% | 3.76 | 5.99 | 87.50 | Non-Impaired |
| 4003535.01RBP-Woody | OKLS-1197 | RBP | Woody | 32.00 | 9.00 | 19.27% | 38.53% | 3.93 | 6.03 | 87.50 | Non-Impaired |
| 4003535.01Riffle | OKLS-1197 | RBP | Riffle | 29.00 | 10.00 | 37.82% | 39.10% | 4.21 | 4.20 | 85.71 | Non-Impaired |
| 4003577.01RBP-SSV | OKLS-1197 | RBP | SSV | 15.00 | 5.00 | 33.33% | 64.81% | 3.12 | 4.70 | 75.00 | Slightly Impaired |
| 4003577.01Riffle | OKLS-1197 | RBP | Riffle | 28.00 | 13.00 | 57.06% | 25.15% | 4.09 | 4.51 | 104.08 | Reference |
| 4003605.01RBP-SSV | OKLS-1197 | RBP | SSV | 35.00 | 12.00 | 21.80% | 40.60% | 4.40 | 4.87 | 87.50 | Non-Impaired |
| 4003605.01Riffle | OKLS-1197 | RBP | Riffle | 17.00 | 6.00 | 50.56% | 33.71% | 3.40 | 4.39 | 67.35 | Slightly Impaired |
| 4003502.01LRF-Sub | OKRV-2061 | LRF | SUB | 22.00 | 2.00 | 1.67% | 48.33% | 3.24 | 6.82 | 63.16 | Slightly Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4003502.01LRF-Thab | OKRV-2061 | LRF | THAB | 24.00 | 7.00 | 16.91% | 27.94% | 4.05 | 6.74 | 118.42 | Reference |
| 4003580.01RBP-Woody | OKRV-2061 | RBP | Woody | 24.00 | 4.00 | 29.25% | 37.74% | 3.92 | 5.24 | 81.36 | Slightly Impaired |
| 4003580.01RBP-SSV | OKRV-2061 | RBP | SSV | 29.00 | 4.00 | 12.84% | 26.61% | 4.30 | 5.63 | 77.42 | Slightly Impaired |
| 4003506.01LRF-Sub | OKRM-1015 | LRF | SUB | 10.00 | 1.00 | 0.65% | 61.44% | 2.30 | 7.67 | 38.71 | Moderately Impaired |
| 4003506.01LRF-Thab | OKRM-1015 | LRF | THAB | 17.00 | 3.00 | 9.09% | 58.74% | 2.73 | 7.23 | 51.61 | Moderately Impaired |
| 4003582.01LRF-SUB | OKRM-1015 | LRF | SUB | 15.00 | 6.00 | 15.45% | 67.48% | 3.31 | 7.50 | 70.97 | Slightly Impaired |
| 4003582.01LRF-THAB | OKRM-1015 | LRF | THAB | 11.00 | 4.00 | 7.35% | 90.20% | 1.29 | 6.05 | 38.71 | Moderately Impaired |
| 4003533.01LRF-Sub | OKRM-1015 | LRF | SUB | 9.00 | 1.00 | 0.88% | 79.82% | 1.63 | 7.64 | 38.71 | Moderately Impaired |
| 4003533.01LRF-Thab | OKRM-1015 | LRF | THAB | 14.00 | 3.00 | 9.73% | 46.90% | 3.06 | 6.94 | 51.61 | Moderately Impaired |
| 4003520.01LRF-Thab | OKRM-1014 | LRF | THAB | 16.00 | 4.00 | 12.15% | 50.47% | 3.16 | 6.06 | 106.67 | Reference |
| 4003520.01LRF-SUB | OKRM-1014 | LRF | SUB | 11.00 | 2.00 | 8.57% | 48.57% | 2.85 | 6.52 | 71.11 | Slightly Impaired |
| 4003588.01LRF-SUB | OKRM-1014 | LRF | SUB | 12.00 | 8.00 | 85.59% | 63.96% | 2.37 | 5.83 | 115.56 | Reference |
| 4003588.01LRF-THAB | OKRM-1014 | LRF | THAB | 23.00 | 11.00 | 78.91% | 46.09% | 3.31 | 5.88 | 124.44 | Reference |
| 4003618.01RBP-SSV | OKRM-1014 | RBP | SSV | 28.00 | 10.00 | 36.82% | 44.28% | 3.36 | 6.02 | 96.55 | Non-Impaired |
| 4003530.01LRF-SUB | OKRV-2030 | LRF | SUB | 26.00 | 8.00 | 30.46% | 40.40% | 3.71 | 5.98 | 118.42 | Reference |
| 4003530.01LRF-Thab | OKRV-2030 | LRF | THAB | 22.00 | 8.00 | 20.83% | 60.00% | 2.95 | 5.88 | 102.63 | Reference |
| 4003570.01RBP-Woody | OKRV-2030 | RBP | Woody | 16.00 | 6.00 | 51.89% | 61.32% | 2.84 | 5.24 | 94.92 | Non-Impaired |
| 4003508.01RBP-SSV | OKRV-2022 | RBP | SSV | 26.00 | 4.00 | 11.45% | 48.09% | 3.61 | 6.78 | 62.50 | Slightly Impaired |
| 4003508.01RBP-Woody | OKRV-2022 | RBP | Woody | 23.00 | 5.00 | 12.32% | 45.65% | 3.39 | 7.05 | 64.52 | Slightly Impaired |
| 4003508.01Riffle | OKRV-2022 | RBP | Riffle | 37.00 | 5.00 | 32.79% | 45.90% | 3.15 | 6.60 | 68.75 | Slightly Impaired |
| 4003587.01RBP-SSV | OKRV-2022 | RBP | SSV | 28.00 | 10.00 | 38.25% | 46.77% | 3.22 | 5.46 | 87.50 | Non-Impaired |
| 4003587.01RBP-Woody | OKRV-2022 | RBP | Woody | 19.00 | 8.00 | 29.94% | 55.41% | 3.13 | 5.63 | 81.25 | Slightly Impaired |
| 4003587.01Riffle | OKRV-2022 | RBP | Riffle | 27.00 | 10.00 | 41.59% | 59.88% | 3.08 | 5.75 | 87.50 | Non-Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4003527.01LRF-SUB | OKRV-2023 | LRF | SUB | 21.00 | 5.00 | 8.00% | 60.00% | 2.90 | 6.14 | 97.78 | Non-Impaired |
| 4003527.01LRF-THAB | OKRV-2023 | LRF | THAB | 11.00 | 1.00 | 0.92% | 69.72% | 2.17 | 6.39 | 62.22 | Slightly Impaired |
| 4003572.01RBP-SSV | OKRV-2023 | RBP | SSV | 22.00 | 8.00 | 38.30% | 47.52% | 3.24 | 5.75 | 96.55 | Non-Impaired |
| 4003572.01RBP-Woody | OKRV-2023 | RBP | Woody | 24.00 | 10.00 | 55.40% | 41.01% | 3.60 | 5.55 | 98.36 | Non-Impaired |
| 4003572.01Riffle | OKRV-2023 | RBP | Riffle | 15.00 | 8.00 | 84.62% | 77.40% | 2.09 | 4.84 | 83.87 | Non-Impaired |
| 4003513.01RBP-SSV | OKRV-2098 | RBP | SSV | 18.00 | 2.00 | 38.06% | 67.16% | 2.68 | 6.78 | 97.78 | Non-Impaired |
| 4003513.01RBP-Woody | OKRV-2098 | RBP | Woody | 15.00 | 2.00 | 43.65% | 54.76% | 2.80 | 6.79 | 97.78 | Non-Impaired |
| 4003596.01RBP-Woody | OKRV-2098 | RBP | Woody | 23.00 | 7.00 | 29.91% | 40.17% | 3.68 | 6.30 | 91.80 | Non-Impaired |
| 4003521.01RBP-SSV | OKRO-1105 | RBP | SSV | 17.00 | 4.00 | 8.98% | 53.52% | 2.75 | 6.58 | 97.78 | Non-Impaired |
| 4003521.01RBP-Woody | OKRO-1105 | RBP | Woody | 8.00 | 4.00 | 20.49% | 65.57% | 2.08 | 5.89 | 97.78 | Non-Impaired |
| 4003569.01RBP-SSV | OKRO-1105 | RBP | SSV | 19.00 | 5.00 | 47.89% | 53.52% | 2.99 | 5.69 | 96.55 | Non-Impaired |
| 4003569.01RBP-Woody | OKRO-1105 | RBP | Woody | 9.00 | 5.00 | 64.94% | 62.99% | 2.13 | 5.38 | 78.69 | Slightly Impaired |
| 4003510.01RBP-SSV | OKLS-1213 | RBP | SSV | 23.00 | 4.00 | 7.45% | 61.49% | 3.07 | 6.87 | 50.00 | Moderately Impaired |
| 4003510.01RBP-Woody | OKLS-1213 | RBP | Woody | 24.00 | 2.00 | 3.36% | 46.22% | 3.54 | 7.31 | 58.06 | Slightly Impaired |
| 4003584.01RBP-SSV | OKLS-1213 | RBP | SSV | 15.00 | 3.00 | 21.93% | 58.77% | 2.63 | 6.65 | 62.50 | Slightly Impaired |
| 4003519.01RBP-SSV | OKSS-1420 | RBP | SSV | 17.00 | 2.00 | 8.11% | 31.08% | 3.56 | 6.69 | 62.50 | Slightly Impaired |
| 4003519.01RBP-Woody | OKSS-1420 | RBP | Woody | 20.00 | 5.00 | 11.29% | 64.52% | 2.58 | 7.03 | 56.25 | Slightly Impaired |
| 4003585.01RBP-SSV | OKSS-1420 | RBP | SSV | 18.00 | 3.00 | 6.76% | 64.19% | 2.79 | 5.62 | 50.00 | Moderately Impaired |
| 4003585.01RBP-Woody | OKSS-1420 | RBP | Woody | 21.00 | 6.00 | 8.87% | 70.97% | 2.46 | 7.15 | 50.00 | Moderately Impaired |
| 4003514.01RBP-Woody | OKLS-1194 | RBP | Woody | 17.00 | 2.00 | 13.93% | 52.46% | 2.99 | 5.80 | 80.00 | Slightly Impaired |
| 4003589.01RBP-SSV | OKLS-1194 | RBP | SSV | 30.00 | 7.00 | 23.58% | 36.59% | 3.95 | 6.29 | 103.45 | Reference |
| 4003589.01RBP-Woody | OKLS-1194 | RBP | Woody | 21.00 | 9.00 | 51.83% | 37.17% | 3.32 | 5.13 | 98.36 | Non-Impaired |
| 4003507.01RBP-Woody | OKSS-1446 | RBP | Woody | 16.00 | 3.00 | 2.13% | 63.30% | 2.44 | 7.85 | 45.16 | Moderately Impaired |

| Sample ID Number | Site ID | Sample_Type | Habitat | Sp_Rich | EPT_Rich | %EPT | %DOM | S-D | HBI | %REF | Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4003586.01RBP-Woody | OKSS-1446 | RBP | Woody | 14.00 | 3.00 | 3.17% | 82.54% | 1.98 | 7.77 | 43.75 | Moderately Impaired |
| M02621 | OKRV-2037 | LRF | SUB | 6.00 | 0.00 | 0.00% | 88.18% | 1.22 | 6.09 | 44.44 | Moderately Impaired |
| M02622 | OKRV-2037 | LRF | THAB | 8.00 | 0.00 | 0.00% | 72.55% | 2.03 | 6.28 | 53.33 | Moderately Impaired |
| M02623 | OKRV-2037 | RBP | Riffle | 7.00 | 0.00 | 0.00% | 80.97% | 1.57 | 6.04 | 52.17 | Moderately Impaired |
| 4003594.01LRF-SUB | OKRV-2037 | LRF | SUB | 10.00 | 2.00 | 1.75% | 69.30% | 2.23 | 6.37 | 62.22 | Slightly Impaired |
| 4003594.01LRF-THAB | OKRV-2037 | LRF | THAB | 12.00 | 1.00 | 2.41% | 43.98% | 2.86 | 6.62 | 71.11 | Slightly Impaired |
| M02662 | OKRV-2037 | LRF | SUB | 9.00 | 0.00 | 0.00% | 78.75% | 1.83 | 6.19 | 53.33 | Moderately Impaired |
| M02663 | OKRV-2037 | LRF | THAB | 9.00 | 0.00 | 0.00% | 87.36% | 1.46 | 6.09 | 44.44 | Moderately Impaired |
| M02664 | OKRV-2037 | RBP | Riffle | 6.00 | 0.00 | 0.00% | 94.13% | 1.05 | 6.02 | 43.48 | Moderately Impaired |
| 4003526.01RBP-SSV | OKRV-2105 | RBP | SSV | 19.00 | 5.00 | 9.68% | 68.28% | 2.52 | 5.97 | 97.78 | Non-Impaired |
| 4003573.01RBP-SSV | OKRV-2105 | RBP | SSV | 18.00 | 7.00 | 60.21% | 61.78% | 2.85 | 4.99 | 89.66 | Non-Impaired |
| 4003516.01RBP-SSV | OKLS-1238 | RBP | SSV | 16.00 | 5.00 | 23.94% | 59.86% | 2.71 | 5.87 | 115.56 | Reference |
| 4003591.01RBP-SSV | OKLS-1238 | RBP | SSV | 19.00 | 7.00 | 18.98% | 68.98% | 2.29 | 5.76 | 75.86 | Slightly Impaired |
| 4003591.01RBP-Woody | OKLS-1238 | RBP | Woody | 16.00 | 7.00 | 27.27% | 65.34% | 2.19 | 5.54 | 78.69 | Slightly Impaired |
| 4003518.01RBP-SSV | OKLS-1242 | RBP | SSV | 18.00 | 2.00 | 14.75% | 40.98% | 3.25 | 7.08 | 80.00 | Slightly Impaired |
| 4003592.01RBP-SSV | OKLS-1242 | RBP | SSV | 15.00 | 4.00 | 17.86% | 55.71% | 2.93 | 6.60 | 82.76 | Slightly Impaired |
| 4003503.01RBP-SSV | OKRV-2077 | RBP | SSV | 8.00 | 2.00 | 2.10% | 74.83% | 1.94 | 7.63 | 53.33 | Moderately Impaired |
| 4003503.01RBP-Woody | OKRV-2077 | RBP | Woody | 12.00 | 1.00 | 1.75% | 64.04% | 2.35 | 7.46 | 62.22 | Slightly Impaired |
| 4003595.01RBP-SSV | OKRV-2077 | RBP | SSV | 15.00 | 3.00 | 10.87% | 57.97% | 2.83 | 7.08 | 75.86 | Slightly Impaired |
| 4003595.01RBP-Woody | OKRV-2077 | RBP | Woody | 13.00 | 3.00 | 23.36% | 65.42% | 2.29 | 6.92 | 59.02 | Slightly Impaired |
| 4003532.01RBP-SSV | OKSS-1466 | RBP | SSV | 28.00 | 5.00 | 26.92% | 32.05% | 4.05 | 6.54 | 75.00 | Slightly Impaired |
| 4003532.01RBP-Woody | OKSS-1466 | RBP | Woody | 25.00 | 5.00 | 38.39% | 53.57% | 3.30 | 6.79 | 68.75 | Slightly Impaired |
| 4003532.01Riffle | OKSS-1466 | RBP | Riffle | 24.00 | 12.00 | 34.12% | 35.91% | 3.63 | 4.73 | 97.96 | Non-Impaired |
| 4003511.01RBP-SSV | OKLS-1227 | RBP | SSV | 22.00 | 2.00 | 7.21% | 58.56% | 2.98 | 7.44 | 71.11 | Slightly Impaired |
| 4003590.01RBP-SSV | OKLS-1227 | RBP | SSV | 22.00 | 3.00 | 13.46% | 60.58% | 2.86 | 7.46 | 75.86 | Slightly Impaired |

Table 19. Appendix C—Habitat Assessment Information (Statewide Probabilistic Monitoring Sites Only)

| Station_ID | Station_Name | %LBM | %EMB | %DP | Class | Total Points |
|---|---|---|---|---|---|---|
| OKLS-1184 | Taloka Creek | 92.00% | 96.20% | 52.00% | FAIR | 104.0 |
| OKLS-1185 | Snake Creek | 100.00% | 100.00% | 20.00% | POOR | 81.7 |
| OKLS-1186 | Little Beaver Creek | 96.00% | 94.80% | 0.00% | POOR | 88.1 |
| OKLS-1190 | Little Blue Creek | 26.00% | 41.90% | 48.00% | FAIR | 105.3 |
| OKLS-1191 | Hickory Creek | 72.00% | 81.90% | 80.00% | FAIR | 89.1 |
| OKLS-1192 | Rock Creek | 0.00% | 26.90% | 52.00% | GOOD | 109.0 |
| OKLS-1193 | North Boggy Creek | 60.00% | 62.60% | 80.00% | FAIR | 90.9 |
| OKLS-1194 | Little Washita River | 52.00% | 51.90% | 0.00% | FAIR | 97.6 |
| OKLS-1196 | Mt. Fork of Sans Bois Creek | 0.00% | 22.60% | 28.00% | FAIR | 115.3 |
| OKLS-1197 | Black Fork | 0.00% | 6.20% | 28.00% | GOOD | 103.6 |
| OKLS-1198 | Big Creek | 94.00% | 92.80% | 0.00% | POOR | 103.6 |
| OKLS-1201 | Butler Creek | 100.00% | 100.00% | 40.00% | FAIR | 87.6 |
| OKLS-1212 | Sans Bois Creek | 30.00% | 37.20% | 52.00% | FAIR | 104.8 |
| OKLS-1213 | Gap Creek | 23.00% | 33.10% | 44.00% | GOOD | 106.8 |
| OKLS-1227 | Unnamed Creek | 100.00% | 99.50% | 60.00% | FAIR | 95.1 |
| OKLS-1238 | Salt Fork of the Red River | 100.00% | 100.00% | 0.00% | POOR | 97.8 |
| OKLS-1242 | Station Creek | 94.00% | 95.50% | 4.00% | POOR | 87.5 |
| OKRM-1010 | Red River | 100.00% | 100.00% | 0.00% | NA** | 75.4 |
| OKRM-1013 | Red River | 99.00% | 100.00% | 8.00% | NA** | 90.3 |
| OKRM-1014 | Canadian River | 100.00% | 100.00% | 0.00% | POOR | 106.2 |
| OKRM-1015 | Canadian River | 100.00% | 100.00% | 0.00% | POOR | 88.5 |
| OKRO-1098 | North Canadian River | 97.00% | 96.20% | 4.00% | POOR | 104.6 |
| OKRO-1105 | Elk Creek | 69.00% | 84.50% | 0.00% | FAIR | 111.1 |
| OKRO-1108 | Red Rock Creek | 89.00% | 93.30% | 80.00% | FAIR | 96.7 |
| OKRV-2001 | North Fork of the Red River | 100.00% | 100.00% | 0.00% | FAIR | 84.5 |
| OKRV-2004 | North Fork of Walnut Creek | 86.00% | 84.50% | 40.00% | FAIR | 109.8 |
| OKRV-2006 | Lyon Creek | 58.00% | 63.20% | 36.00% | GOOD | 94.3 |
| OKRV-2007 | Sweetwater Creek | 100.00% | 100.00% | 36.00% | FAIR | 125.3 |
| OKRV-2009 | Turkey Creek | 86.00% | 79.80% | 36.00% | FAIR | 118.8 |
| OKRV-2010 | Coal Creek v1 | 0.00% | 16.40% | 56.00% | GOOD | 112.8 (v1), 93.1 (v2) |

| Station_ID | Station_Name | %LBM | %EMB | %DP | Class | Total Points |
|---|---|---|---|---|---|---|
| OKRV-2011 | Canadian River | 100.00% | 100.00% | 0.00% | POOR | 110.0 |
| OKRV-2012 | Mud Creek | 100.00% | 100.00% | 0.00% | NA** | 87.9 |
| OKRV-2013 | Baron Fork | 5.00% | 26.00% | 44.00% | FAIR | 112.5 |
| OKRV-2014 | Holly Creek | 5.00% | 26.40% | 4.00% | FAIR | 105.3 |
| OKRV-2015 | Bitter Creek | 94.00% | 97.30% | 8.00% | POOR | 87.1 |
| OKRV-2016 | Clear Boggy Creek | 78.00% | 83.10% | 16.00% | POOR | 111.7 |
| OKRV-2020 | Polecat Creek | 98.00% | 100.00% | 8.00% | POOR | 117.6 |
| OKRV-2021 | Unnamed Creek | 100.00% | 100.00% | 0.00% | POOR | 61.4 |
| OKRV-2022 | Caston Creek | 35.00% | 50.50% | 40.00% | FAIR | 118.5 |
| OKRV-2023 | Chikaskia River | 75.00% | 81.20% | 12.00% | POOR | 106.7 |
| OKRV-2025 | Greenleaf Creek | 52.00% | 80.20% | 8.00% | FAIR | 88.4 |
| OKRV-2026 | Fourche Maline v1 | 17.00% | 36.70% | 56.00% | GOOD | 124.8 |
| OKRV-2027 | South Fork of Dirty Creek | 80.00% | 94.70% | 72.00% | FAIR | 107.7 |
| OKRV-2029 | Bird Creek | 100.00% | 100.00% | 0.00% | POOR | 88.6 |
| OKRV-2032 | Wolf Creek | 99.00% | 99.90% | 72.00% | GOOD | 102.0 |
| OKRV-2033 | Shady Grove Creek | 90.00% | 88.00% | 56.00% | FAIR | 90.2 |
| OKRV-2034 | Jim Creek | 95.00% | 94.50% | 0.00% | POOR | 90.1 |
| OKRV-2035 | Deep Fork River | 99.00% | 100.00% | 4.00% | POOR | 99.8 |
| OKRV-2036 | Big Creek | 0.00% | 17.90% | 12.00% | GOOD | 116.8 |
| OKRV-2037 | North Fork of the Red River | 90.00% | 94.80% | 36.00% | GOOD | 114.9 |
| OKRV-2039 | Wolf Creek | 98.00% | 98.80% | 0.00% | FAIR | 111.4 |
| OKRV-2040 | Curl Creek | 27.00% | 32.40% | 60.00% | GOOD | 109.2 |
| OKRV-2043 | Cimarron River | 98.00% | 98.20% | 0.00% | FAIR | 78.3 |
| OKRV-2044 | Julian Creek | 100.00% | 99.50% | 0.00% | POOR | 94.7 |
| OKRV-2068 | California Creek | 40.00% | 57.70% | 24.00% | FAIR | 97.0 |
| OKRV-2070 | Tyner Creek | 99.00% | 95.00% | 36.00% | FAIR | 79.5 |
| OKRV-2074 | Madden Creek | 15.00% | 29.80% | 28.00% | GOOD | 98.7 |
| OKRV-2077 | Tomike Creek | 100.00% | 100.00% | 0.00% | POOR | 82.0 |
| OKRV-2079 | Rock Creek | 6.00% | 27.40% | 52.00% | GOOD | 100.6 |
| OKRV-2080 | Little Cabin Creek | 4.00% | 7.10% | 16.00% | GOOD | 94.4 |
| OKRV-2098 | Cottonwood Creek | 96.00% | 95.00% | 12.00% | POOR | 99.4 |

| Station_ID | Station_Name | %LBM | %EMB | %DP | Class | Total Points |
|---|---|---|---|---|---|---|
| OKRV-2101 | Black Bear Creek | 79.00% | 84.40% | 0.00% | POOR | 89.7 |
| OKRV-2102 | Canadian River | 100.00% | 100.00% | 4.00% | POOR | 100.0 |
| OKRV-2105 | Salt Fork of the Arkansas River | 100.00% | 100.00% | 0.00% | POOR | 110.5 |
| OKSS-1408 | Alabama Creek | 61.00% | 75.70% | 52.00% | FAIR | 97.5 |
| OKSS-1409 | Trib. To Fourteenmile Creek | 0.00% | 16.20% | 16.00% | GOOD | 110.0 |
| OKSS-1410 | Peterson Creek | 0.00% | 36.40% | 0.00% | FAIR | 71.7 |
| OKSS-1414 | Bad Creek | 83.00% | 99.50% | 52.00% | FAIR | 87.1 |
| OKSS-1415 | Dry Creek | 69.00% | 79.05% | 52.00% | FAIR | 102.9 |
| OKSS-1416 | Trib. To Fivemile Creek | 95.00% | 84.30% | 16.00% | POOR | 85.7 |
| OKSS-1419 | Trib. To Kiamichi River | 0.00% | 56.40% | 0.00% | FAIR | 91.2 |
| OKSS-1420 | Island bayou | 100.00% | 100.00% | 80.00% | FAIR | 107.1 |
| OKSS-1425 | Wickliffe Creek (Revisit) | 1.00% | 20.50% | 12.00% | FAIR | 98.1 |
| OKSS-1426 | West Terrapin Creek | 0.00% | 11.70% | 20.00% | FAIR | 98.0 |
| OKSS-1434 | Mill Creek | 1.00% | 35.70% | 24.00% | GOOD | 99.3 |
| OKSS-1436 | Unnamed Creek | 1.00% | 24.50% | 4.00% | FAIR | 95.1 |
| OKSS-1438 | Dumpling Creek | 10.00% | 45.20% | 28.00% | FAIR | 101.8 |
| OKSS-1439 | Carter Creek | 9.00% | 40.70% | 0.00% | FAIR | 80.9 |
| OKSS-1447 | Rush Creek | 98.00% | 98.10% | 4.00% | POOR | 86.7 |
| OKSS-1449 | Mud Creek | 2.00% | 1.10% | 8.00% | GOOD | 69.0 |
| OKSS-1456 | Unnamed Creek | 45.00% | 66.40% | 8.00% | POOR | 81.4 |
| OKSS-1466 | Turkey Creek North (unnamed creek) | 13.00% | 29.50% | 24.00% | FAIR | 102.6 |
| OKSS-1472 | Dance Creek | 98.00% | 96.70% | 0.00% | POOR | 97.7 |
| OKLS-1188 | Wolf Creek | ND | ND | ND | ND* | ND |
| OKRM-1011 | Arkansas River v1 | ND | ND | ND | ND* | ND |
| OKRM-1016 | Illinois River | ND | ND | ND | ND* | ND |
| OKRM-1017 | Red River | ND | ND | ND | ND* | ND |
| OKRM-1023 | Poteau River | ND | ND | ND | ND* | ND |
| OKRO-1095 | Verdigris River | ND | ND | ND | ND* | ND |
| OKRO-1099 | Elk River | ND | ND | ND | ND* | ND |

| Station_ID | Station_Name | %LBM | %EMB | %DP | Class | Total Points |
|---|---|---|---|---|---|---|
| OKRO-1106 | Muddy Boggy River | ND | ND | ND | ND* | ND |
| OKRO-1107 | Caney River | ND | ND | ND | ND* | ND |
| OKRO-1111 | Caney River | ND | ND | ND | ND* | ND |
| OKRV-2019 | Neosho River v1 | ND | ND | ND | ND* | ND |
| OKRV-2028 | Deep Fork River | ND | ND | ND | ND* | ND |
| OKRV-2030 | Caney River | ND | ND | ND | ND* | ND |
| OKRV-2061 | Blue River | ND | ND | ND | ND* | ND |
| OKRV-2088 | Verdigris River | ND | ND | ND | ND* | ND |
| OKSS-1446 | Middle Creek | ND | ND | ND | ND* | ND |

*Denotes non-wadeable site.
**No scoring criteria available.

Table 20. Appendix C---Chemistry, Chlorophyll, and Metals Data

| Source | Station ID | Sample date | N, Total (mg/L) | P, Total (mg/L) | SpC (uS/cm2) | Turbidity (NTU) | Ses_Chla (mg/m3) | Ben_Chla (mg/m2) | Cd, Dis (ug/L) | Cu, Dis (ug/L) | Pb, Dis (ug/L) | Se, TR (ug/L) | Zn, Dis (ug/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NRSA | OKRM-1006 | 7/16/2013 | 1.016 | 0.176 | 1019 | 4 | 7.960 | 50.310 | 1.000 | 1.000 | 1.000 | 2.400 | 5.000 |
| NRSA | OKS9-0932 | 7/8/2013 | 0.453 | 0.059 | 740 | 13.3 | 2.010 | 37.580 | 0.180 | 1.650 | 0.220 | 1.000 | 5.000 |
| NRSA | OKS9-0938 | 7/15/2013 | 0.178 | 0.024 | 49 | 3.0 | 0.564 | 24.545 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRO-1087 | 8/5/2013 | 0.28 | 0.0418 | 57 | 12 | 6.743 | 32.724 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKLS-1181 | 7/17/2013 | 0.499 | 0.07 | 251 | 16.5 | 68.000 | 20.966 | #N/A | N/A | N/A | 1.000 | NA |
| NRSA | OKS9-0937 | 8/12/2013 | 0.345 | 0.054 | 513 | 9.33 | 2.030 | 90.266 | 1.000 | 1.000 | 1.000 | 1.000 | 6.900 |
| NRSA | OKR9-0901 | 6/18/2013 | 0.246 | 0.037 | 2519 | 3 | 0.440 | 10.740 | 0.180 | 1.480 | 0.120 | 1.000 | 5.000 |
| NRSA | OKR9-0913 | 6/25/2013 | 0.596 | 0.069 | 2726 | 4 | 10.667 | 18.093 | 0.180 | 4.200 | 0.250 | 1.000 | 5.000 |
| NRSA | OKR9-0902 | 7/1/2013 | 0.645 | 0.149 | 683 | 30.3 | 27.200 | 24.540 | 0.180 | 0.860 | 0.160 | 1.000 | 5.000 |
| NRSA | OKR9-0906 | 7/2/2013 | 0.596 | 0.052 | 23390 | 4.0 | 9.640 | 23.894 | 0.180 | 3.800 | 0.140 | 1.000 | 5.000 |
| NRSA | OKR9-0908 | 6/26/2013 | 1.358 | 0.223 | 9457 | 32 | 50.885 | 53.998 | 0.180 | 2.630 | 0.240 | 2.000 | 5.000 |
| NRSA | OKRM-1002 | 7/9/2013 | 1.104 | 0.218 | 5903 | 10 | 22.971 | 91.050 | 0.180 | 2.470 | 0.230 | 1.300 | 5.000 |
| NRSA | OKRO-1088 | 7/15/2013 | 0.953 | 0.223 | 916 | 193.3 | 23.480 | 74.883 | 1.000 | 1.600 | 1.000 | 1.000 | 5.100 |
| NRSA | OKRO-1089 | 6/12/2013 | 2.168 | 0.083 | 43767 | 15.89 | 28.267 | 50.606 | 0.180 | 6.200 | 0.120 | 10.000 | 7.100 |
| NRSA | OKLS-1176 | 8/6/2013 | 0.224 | 0.0404 | 64 | 6 | 4.312 | 30.640 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKSS-1405 | 9/17/2013 | 1.511 | 0.065 | 306 | 3 | 1.784 | 152.671 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKR9-0907 | 8/6/2013 | 0.303 | 0.0691 | 136 | 18 | 9.234 | 48.024 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRM-1008 | 7/8/2013 | 0.461 | 0.073 | 236 | 17 | 6.224 | 14.915 | 0.180 | 1.040 | 0.620 | 1.000 | 5.000 |
| NRSA | OKS9-0931 | 6/10/2013 | 2.433 | 1.082 | 1260 | 11.7 | 1.851 | 46.001 | 0.180 | 1.600 | 0.310 | 1.500 | 5.000 |
| NRSA | OKS9-0933 | 7/30/2013 | 2.775 | 0.635 | 221 | 7.0 | 21.120 | 21.314 | 1.000 | 6.100 | 1.000 | 1.000 | 5.200 |
| NRSA | OKLS-1182 | 8/13/2013 | 0.795 | 0.178 | 524 | 94.66 | 16.000 | 27.167 | 1.000 | 2.600 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRO-1086 | 8/12/2013 | 0.916 | 0.093 | 273 | 18 | 47.652 | 44.094 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKR9-0909 | 6/11/2013 | 3.41 | 0.829 | 630 | 433.33 | 151.200 | 59.590 | 1.000 | 1.000 | 1.000 | 1.000 | 7.600 |
| NRSA | OKS9-0939 | 6/25/2013 | 0.586 | 0.056 | 695 | 10.33 | 3.136 | 64.532 | 0.180 | 0.630 | 0.120 | 1.000 | 5.000 |
| NRSA | OKS9-0936 | 7/17/2013 | 0.61 | 0.051 | 477 | 42.7 | 5.208 | 22.589 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |

| Source | Station ID | Sample date | N, Total (mg/L) | P, Total (mg/L) | SpC (uS/cm2) | Turbidity (NTU) | Ses_Chla (mg/m3) | Ben_Chla (mg/m2) | Cd, Dis (ug/L) | Cu, Dis (ug/L) | Pb, Dis (ug/L) | Se, TR (ug/L) | Zn, Dis (ug/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NRSA | OKR9-0912 | 7/30/2013 | 0.786 | 0.113 | 967 | 6 | 21.440 | 21.291 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRM-1001 | 8/20/2013 | 0.759 | 0.115 | 1842 | 28 | 13.029 | 27.024 | 1.000 | 1.000 | 13.900 | 1.400 | 5.000 |
| NRSA | OKRM-1004 | 8/13/2013 | 0.626 | 0.095 | 1554 | 23.66 | 20.320 | 18.616 | 1.000 | 1.000 | 1.000 | 2.900 | 5.000 |
| NRSA | OKS9-0935 | 6/4/2013 | 2.368 | 0.111 | 614 | 25 | 1.984 | 36.000 | 0.180 | 0.280 | 0.120 | 2.060 | 5.000 |
| NRSA | OKR9-0905 | 6/18/2013 | 1.686 | 0.246 | 2295 | 27.66 | 9.953 | 37.059 | 0.180 | 6.900 | 0.180 | 1.900 | 5.000 |
| NRSA | OKR9-0911 | 6/26/2013 | 0.755 | 0.194 | 866 | 38.3 | 18.571 | 20.919 | 0.180 | 2.700 | 0.200 | 1.100 | 5.000 |
| NRSA | OKS9-0934 | 7/23/2013 | 0.58 | 0.045 | 711 | 10.66 | 4.095 | 35.465 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRM-1022 | 9/24/2014 | 2.52 | 0.594 | 1470 | 36.7 | 199.800 | 120.624 | 0.500 | 1.300 | 0.500 | 3.200 | 5.000 |
| NRSA | OKS9-0941 | 7/22/2014 | 1.223 | 0.116 | 442 | 31.7 | 18.060 | 79.260 | 1.000 | 1.000 | 1.000 | 1.100 | 5.000 |
| NRSA | OKRM-1021 | 6/2/2014 | 2.209 | 0.718 | 916 | 20.3 | 150.300 | 72.898 | 1.000 | 1.300 | 1.000 | 2.700 | 5.000 |
| NRSA | OKSS-1431 | 6/23/2014 | 0.49 | 0.047 | 231 | 7.3 | 6.960 | 35.822 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRO-1102 | 7/29/2014 | 0.759 | 0.168 | 326 | 62.7 | 7.730 | 107.035 | 1.000 | 1.600 | 1.000 | 1.000 | 5.000 |
| NRSA | OKSS-1429 | 7/8/2014 | 0.141 | 0.042 | 69 | 3.0 | 7.510 | 16.555 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKSS-1430 | 7/9/2014 | 0.215 | 0.04 | 191 | 3.0 | 4.220 | 38.620 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKRO-1103 | 8/12/2014 | 0.358 | 0.019 | 35 | 4.0 | 0.950 | 47.173 | 0.500 | 1.000 | 0.500 | 1.000 | 1.000 |
| NRSA | OKR9-0904 | 9/23/2014 | 1.449 | 0.395 | 699 | 59.0 | 38.100 | 45.686 | 0.500 | 1.400 | 0.500 | 2.300 | 5.000 |
| NRSA | OKRO-1092 | 6/30/2014 | 1.134 | 0.242 | 858 | 68.3 | 47.830 | 86.062 | NA | NA | NA | NA | NA |
| NRSA | OKLS-1204 | 6/16/2014 | 1.093 | 0.156 | 513 | 13.23 | 28.320 | 84.740 | NA | NA | NA | NA | NA |
| NRSA | OKR9-0903 | 9/15/2014 | 0.991 | 0.131 | 2928 | 40.0 | 43.240 | 59.521 | 0.500 | 1.400 | 0.500 | 5.100 | 5.000 |
| NRSA | OKRM-1020 | 8/11/2014 | 0.861 | 0.143 | 868 | 43.7 | 38.720 | 41.816 | 0.500 | 1.400 | 0.500 | 1.900 | 5.000 |
| NRSA | OKRM-1026 | 8/19/2014 | 0.809 | 0.11 | 12430 | 66.3 | 26.320 | 83.864 | 0.500 | 6.700 | 0.500 | 13.600 | 6.100 |
| NRSA | OKSS-1444 | 6/3/2014 | 0.721 | 0.238 | 792 | 7.3 | 1.110 | 45.370 | 1.000 | 1.000 | 1.000 | 2.000 | 5.000 |
| NRSA | OKSS-1403 | 8/4/2014 | 0.085 | 0.023 | 36 | 8.3 | 0.730 | 28.701 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| NRSA | OKLS-1222 | 8/20/2014 | 2.034 | 0.187 | 10610 | 86.0 | 106.840 | 134.232 | 0.500 | 7.800 | 0.500 | 19.200 | 8.100 |
| NRSA | OKLS-1209 | 6/16/2014 | 0.729 | 0.103 | 102 | 43.3 | 1.350 | 21.979 | 1.000 | 2.400 | 1.000 | 1.000 | 28.400 |
| NRSA | OKLS-1203 | 7/14/2014 | 0.656 | 0.067 | 507 | 58.3 | 13.470 | 50.905 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| OWRB | OKSS-1408 | 7/9/2014 | 0.81 | 0.028 | 257 | 60.0 | 8.550 | 50.100 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |

| Source | Station ID | Sample date | N, Total (mg/L) | P, Total (mg/L) | SpC (uS/cm2) | Turbidity (NTU) | Ses_Chla (mg/m3) | Ben_Chla (mg/m2) | Cd, Dis (ug/L) | Cu, Dis (ug/L) | Pb, Dis (ug/L) | Se, TR (ug/L) | Zn, Dis (ug/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OWRB | OKRM-1011 | 7/15/2014 | 0.78 | 0.08 | 1028 | 9.3 | 9.580 | 269.000 | 1.000 | 1.000 | 1.000 | 1.700 | 5.000 |
| OWRB | OKSS-1414 | 9/8/2014 | 1.09 | 0.057 | 438 | 37.3 | 16.600 | 7.400 | 0.500 | 1.700 | 0.500 | 1.700 | 5.000 |
| OWRB | OKRV-2013 | 6/10/2014 | 1.12 | 0.041 | 253 | 1.0 | 0.930 | 188.000 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKLS-1201 | 7/16/2014 | 1.3 | 0.105 | 348 | 30.3 | 23.200 | 82.100 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKSS-1415 | 6/24/2014 | 0.69 | 0.012 | 456 | 35.7 | 4.600 | 21.500 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKLS-1191 | 8/5/2014 | 1.36 | 0.061 | 372 | 73.3 | 19.600 | 40.200 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKRM-1016 | 6/10/2014 | 1.61 | 0.037 | 308 | 3.0 | 1.410 | 44.415 | 1.000 | 1.000 | 1.000 | 1.100 | 5.000 |
| OWRB | OKLS-1190 | 6/18/2014 | 0.8 | 0.022 | 597 | 10.0 | 1.000 | 55.800 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKRV-2001 | 7/29/2014 | 1.13 | 0.034 | 2657 | 6.3 | 7.200 | 22.500 | 1.000 | 2.300 | 1.000 | 3.200 | 5.000 |
| OWRB | OKRM-1010 | 8/18/2014 | 1.94 | 0.183 | 11570 | 40.0 | 8.990 | 41.500 | 0.500 | 6.300 | 0.500 | 8.200 | 5.000 |
| OWRB | OKRM-1013 | 9/16/2014 | 2.49 | 0.195 | 5954 | 99.7 | 148.000 | 494.000 | 0.500 | 3.500 | 0.500 | 6.900 | 5.000 |
| OWRB | OKSS-1447 | 6/4/2014 | 0.73 | 0.054 | 1799 | 3.7 | 1.700 | 129.000 | 1.000 | 1.200 | 1.000 | 6.400 | 10.400 |
| OWRB | OKLS-1212 | 7/7/2014 | 0.93 | 0.092 | 137 | 34.3 | 3.590 | 11.400 | 1.000 | 2.300 | 1.000 | 1.000 | 11.900 |
| OWRB | OKLS-1185 | 7/22/2014 | 1.19 | 0.076 | 302 | 99.7 | 12.400 | 58.900 | 1.000 | 1.300 | 1.000 | 1.000 | 5.000 |
| OWRB | OKLS-1184 | 7/8/2014 | 0.66 | 0.154 | 1335 | 16.7 | 4.390 | 87.700 | 1.000 | 1.300 | 1.000 | 1.000 | 9.300 |
| OWRB | OKRO-1095 | 7/22/2014 | 0.81 | 0.065 | 374 | 9.0 | 0.430 | 17.500 | 1.000 | 1.400 | 1.000 | 1.900 | 5.000 |
| OWRB | OKLS-1188 | 6/18/2014 | 1.82 | 0.195 | 224 | 47.3 | 168.000 | 24.900 | 1.000 | 2.700 | 1.000 | 1.000 | 8.200 |
| OWRB | OKRV-2029 | 8/24/2015 | 0.48 | 0.02 | 9844 | 3.0 | 13.600 | 13.644 | 0.500 | 1.100 | 0.500 | 62.300 | 5.000 |
| OWRB | OKRV-2011 | 8/25/2015 | 1.25 | 0.081 | 2023 | 12.3 | 27.300 | 90.434 | 0.500 | 1.400 | 0.500 | 2.500 | 5.000 |
| OWRB | OKRO-1107 | 8/17/2015 | 1.52 | 0.134 | 434 | 32.3 | 10.400 | 49.475 | 0.500 | 1.600 | 0.500 | 1.700 | 11.300 |
| OWRB | OKRV-2016 | 9/1/2015 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| OWRB | OKRV-2010 | 7/13/2015 | 0.78 | 0.044 | 694 | 19.0 | 3.350 | 20.512 | 0.500 | 2.400 | 0.500 | 2.700 | 5.000 |
| OWRB | OKRV-2040 | 8/11/2015 | 0.64 | 0.054 | 443 | 19.0 | 14.100 | 19.195 | 0.500 | 1.200 | 0.500 | 1.000 | 5.000 |
| OWRB | OKRV-2035 | 8/31/2015 | 3.64 | 0.666 | 1114 | 9.3 | 8.710 | 82.401 | 0.500 | 2.000 | 0.500 | 3.900 | 5.000 |
| OWRB | OKRV-2014 | 6/16/2015 | 0.32 | 0.031 | 36 | 13.3 | 1.110 | 56.400 | 0.500 | 1.000 | 0.500 | 1.000 | 5.000 |
| OWRB | OKRV-2034 | 8/18/2015 | 0.29 | 0.008 | 582 | 7.0 | 1.640 | 26.575 | 0.500 | 1.300 | 0.500 | 1.800 | 6.700 |
| OWRB | OKRV-2080 | 8/5/2015 | 1.3 | 0.081 | 365 | 29.7 | 9.340 | 9.221 | 0.500 | 2.200 | 0.500 | 1.800 | 5.000 |
| OWRB | OKRV-2006 | 6/8/2015 | 2.83 | 0.153 | 2812 | 3.0 | 19.600 | 51.400 | 0.500 | 2.200 | 0.500 | 8.800 | 5.000 |

| Source | Station ID | Sample date | N, Total (mg/L) | P, Total (mg/L) | SpC (uS/cm2) | Turbidity (NTU) | Ses_Chla (mg/m3) | Ben_Chla (mg/m2) | Cd, Dis (ug/L) | Cu, Dis (ug/L) | Pb, Dis (ug/L) | Se, TR (ug/L) | Zn, Dis (ug/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OWRB | OKRV-2074 | 6/30/2015 | 1.2 | 0.025 | 3548 | 3.0 | 1.390 | 29.840 | 0.500 | 1.000 | 0.500 | 157.000 | 43.200 |
| OWRB | OKSS-1434 | 6/15/2015 | 0.61 | 0.035 | 110 | 9.0 | 7.000 | 21.900 | 0.500 | 1.000 | 0.500 | 1.000 | 5.000 |
| OWRB | OKRV-2012 | 7/27/2015 | 0.76 | 0.069 | 2158 | 24.0 | 36.200 | 116.000 | 0.500 | 2.200 | 0.500 | 6.800 | 5.000 |
| OWRB | OKSS-1449 | 8/4/2015 | 1.25 | 0.115 | 336 | 7.0 | 14.800 | 13.481 | 0.500 | 1.400 | 0.500 | 1.600 | 5.000 |
| OWRB | OKRO-1106 | 8/25/2015 | 0.78 | 0.09 | 881 | 25.3 | 36.600 | 18.052 | 0.500 | 1.200 | 0.500 | 1.200 | 5.000 |
| OWRB | OKRV-2019 | 7/20/2015 | 0.99 | 0.309 | 384 | 72.0 | 11.900 | 7.970 | 0.500 | 1.400 | 0.500 | 1.000 | 5.000 |
| OWRB | OKRO-1098 | 8/31/2015 | 1.2 | 0.186 | 808 | 28.3 | 28.500 | 42.595 | 0.500 | 1.400 | 0.500 | 2.200 | 5.000 |
| OWRB | OKRV-2004 | 6/10/2015 | 1.03 | 0.052 | 867 | 11.0 | 8.950 | 97.400 | 0.500 | 1.000 | 0.500 | 1.200 | 7.300 |
| OWRB | OKSS-1410 | 7/7/2015 | 0.18 | 0.02 | 45 | 11.7 | 1.840 | 41.774 | 0.500 | 1.000 | 0.500 | 1.000 | 12.700 |
| OWRB | OKRV-2020 | 6/29/2015 | 0.66 | 0.024 | 774 | 9.3 | 1.800 | 21.184 | 0.500 | 1.400 | 0.500 | 2.500 | 16.200 |
| OWRB | OKRM-1023 | 9/22/2015 | 0.73 | 0.053 | 152 | 10.0 | 11.500 | 9.330 | 0.500 | 1.000 | 0.500 | 1.000 | 5.000 |
| OWRB | OKRM-1017 | 9/2/2015 | 1.11 | 0.117 | 7392 | 30.0 | 42.400 | 34.993 | 0.500 | 3.600 | 0.500 | 9.200 | 5.400 |
| OWRB | OKRV-2079 | 7/14/2015 | 1.09 | 0.082 | 417 | 34.7 | 0.770 | 130.000 | 0.500 | 1.900 | 0.500 | 1.000 | 5.100 |
| OWRB | OKRV-2033 | 9/1/2015 | 0.56 | 0.009 | 1387 | 4.0 | 2.580 | 26.316 | 0.500 | 1.000 | 0.500 | 1.500 | 37.600 |
| OWRB | OKRV-2007 | 6/23/2015 | 2.13 | 0.237 | 2719 | 175.7 | 13.800 | 82.500 | 0.500 | 2.400 | 0.500 | 3.800 | 5.000 |
| OWRB | OKSS-1416 | 6/9/2015 | 1.32 | 0.16 | 567 | 23.7 | 3.970 | 56.500 | 0.500 | 1.000 | 0.500 | 1.000 | 11.300 |
| OWRB | OKSS-1409 | 8/10/2015 | 0.48 | 0.025 | 156 | 1 | 0.500 | 55.369 | 0.500 | 1.000 | 0.500 | 1.100 | 5.000 |
| OWRB | OKRV-2009 | 6/22/2015 | 1.96 | 0.433 | 1835 | 23.0 | 41.400 | 522.000 | 0.500 | 2.600 | 0.500 | 3.400 | 9.600 |
| OWRB | OKSS-1436 | 7/6/2015 | 0.25 | 0.022 | 571 | 2.0 | 0.490 | 45.410 | 0.500 | 1.000 | 0.500 | 1.000 | 7.600 |
| OWRB | OKRV-2088 | 7/21/2015 | 0.77 | 0.117 | 331 | 16.0 | 4.490 | 14.092 | 0.500 | 1.500 | 0.500 | 1.000 | 5.000 |
| OWRB | OKRV-2068 | 8/15/2016 | N/A | N/A | 426 | 7.3 | N/A | 39.020 | N/A | N/A | N/A | N/A | N/A |
| OWRB | OKRV-2102 | 8/22/2016 | 3.76 | 0.379 | 1110 | 17.3 | 276 | 193.152 | 0.500 | 1.230 | 0.500 | 3.490 | 11.700 |
| OWRB | OKRO-1111 | 7/26/2016 | 0.91 | 0.078 | 411 | 33.0 | 27.1 | 45.037 | 0.500 | 1.830 | 0.500 | 2.350 | 5.000 |
| OWRB | OKSS-1439 | 8/31/2016 | 0 | 0.01 | 48 | 3.0 | 0.5 | 17.841 | 1.000 | 1.000 | 1.000 | 1.000 | 15.600 |
| OWRB | OKRV-2043 | 6/28/2016 | 0.69 | 0.083 | 10398 | 7.0 | 22.9 | 22.538 | 0.500 | 1.000 | 0.500 | 1.240 | 5.000 |
| OWRB | OKSS-1472 | 8/24/2016 | 0.39 | 0.021 | 680 | 9.0 | 2.33 | 63.982 | 0.500 | 1.000 | 0.500 | 1.060 | 7.870 |
| OWRB | OKRV-2028 | 7/25/2016 | 1.17 | 0.52 | 593 | 31.7 | 37.7 | 23.181 | 0.500 | 1.710 | 0.500 | 3.470 | 5.000 |
| OWRB | OKSS-1438 | 9/13/2016 | 0.66 | 0.046 | 96 | 9.3 | 2.4 | 103.336 | 2.24 | 1.000 | 1.000 | 1.070 | 32.500 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OWRB | OKRO-1099 | 6/21/2016 | 1.24 | 0.032 | 309 | 3.0 | 3.07 | 69.548 | 0.500 | 1.000 | 0.500 | 1.850 | 5.000 |
| OWRB | OKRV-2026 | 8/2/2016 | 0.84 | 0.095 | 207 | 46.3 | 20.5 | 41.187 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKRV-2025 | 6/27/2016 | 1.01 | 0.037 | 3333 | 6.3 | 30.5 | 55.905 | 0.500 | 1.150 | 0.500 | 27.000 | 17.900 |
| OWRB | OKRV-2044 | 6/20/2016 | 0.31 | 0.018 | 1311 | 4.0 | 3.08 | 21.429 | 0.500 | 2.690 | 0.500 | 12.000 | 5.290 |
| OWRB | OKLS-1186 | 9/12/2016 | 0.79 | 0.026 | 1197 | 5.0 | 1.2 | 49.179 | 1.000 | 1.000 | 1.000 | 5.090 | 6.490 |
| OWRB | OKLS-1196 | 7/18/2016 | 0.25 | 0.018 | 86 | 8.0 | 3.63 | 33.742 | 0.500 | 3.620 | 0.770 | 2.320 | 5.000 |
| OWRB | OKLS-1193 | 8/1/2016 | 1.07 | 0.152 | 125 | 137.7 | 13.4 | 18.217 | 1.000 | 2.030 | 1.080 | 1.000 | 6.930 |
| OWRB | OKRO-1108 | 8/17/2016 | ND | 0.319 | 680 | 146.3 | ND | 105.320 | NA | NA | 1.000 | NA | NA |
| OWRB | OKLS-1192 | 7/11/2016 | 0.4 | 0.03 | 66 | 4.0 | 9.02 | 19.559 | 0.500 | 1.000 | 0.500 | 1.710 | 5.000 |
| OWRB | OKRV-2027 | 8/16/2016 | NA | NA | 850 | 16.7 | N/A | 51.730 | NA | NA | NA | NA | NA |
| OWRB | OKSS-1419 | 8/30/2016 | 0 | 0.017 | 24 | 13.0 | 0.050 | 32.901 | 1.000 | 1.000 | 1.000 | 1.000 | 9.950 |
| OWRB | OKRV-2070 | 7/27/2016 | 1.56 | 0.265 | 545 | 104.7 | 10.6 | 63.608 | 0.500 | 1.000 | 0.500 | 1.980 | 5.000 |
| OWRB | OKRV-2021 | 6/28/2016 | 1.17 | ND | 123389 | 13.7 | 2.96 | 13.024 | NA | NA | NA | 302.000 | NA |
| OWRB | OKSS-1456 | 8/23/2016 | 0.54 | 0.05 | 140 | 18.3 | 14.5 | 65.623 | 0.500 | 1.000 | 0.500 | 1.000 | 6.220 |
| OWRB | OKSS-1426 | 7/12/2016 | 0.41 | 0.022 | 91 | 6.0 | 1.04 | 37.973 | 0.500 | 1.000 | 0.500 | 1.440 | 5.000 |
| OWRB | OKSS-1425 | 6/22/2016 | 0.85 | 0.028 | 214 | 4.0 | 0.67 | 62.238 | 0.500 | 1.000 | 0.500 | 1.870 | 5.000 |
| OWRB | OKRV-2039 | 7/5/2016 | 0.82 | 0.095 | 1555 | 5.3 | 25.5 | 49.853 | 0.500 | 1.250 | 0.550 | 2.370 | 14.000 |
| OWRB | OKRV-2032 | 7/6/2016 | NA | NA | 1315 | 4.0 | NA | NA | 0.500 | 1.000 | 0.500 | 3.740 | 6.080 |
| OWRB | OKLS-1198 | 6/5/2017 | 0.6 | 0.079 | 585 | 23.3 | 2.78 | 19.130 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKRV-2036 | 7/10/2017 | 0 | 0.01 | 36 | 7.0 | 0.92 | 33.400 | 1.000 | 1.830 | 1.000 | 1.000 | 5.000 |
| OWRB | OKRV-2015 | 6/6/2017 | 6.84 | 0.127 | 5398 | 19.7 | 28 | 148.520 | 1.000 | 4.370 | 1.000 | 31.800 | 5.000 |
| OWRB | OKRV-2101 | 7/31/2017 | 0.99 | 0.73 | 996 | 18.0 | 5.15 | 35.110 | 1.000 | 1.580 | 1.000 | 3.400 | 5.000 |
| OWRB | OKLS-1197 | 7/11/2017 | 0.23 | 0.025 | 43 | 10.0 | 5.2 | 32.350 | 1.000 | 1.000 | 1.000 | 1.000 | 7.420 |
| OWRB | OKLS-1197 | 7/11/2017 | 0.23 | 0.025 | 43 | 10.0 | 5.2 | 32.350 | 1.000 | 1.000 | 1.000 | 1.000 | 7.420 |
| OWRB | OKRV-2061 | 9/5/2017 | 0.23 | 0.044 | 492 | 12.0 | 1.93 | 47.947 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OWRB | OKRM-1015 | 7/18/2017 | 1.44 | 0.136 | 734 | 23.7 | 50.4 | 34.090 | 1.000 | 1.120 | 1.000 | 1.900 | 7.520 |
| OWRB | OKRM-1014 | 6/20/2017 | 0.61 | 0.023 | 2883 | 11.3 | 4.89 | 24.600 | 1.000 | 1.000 | 1.000 | 1.100 | 5.000 |
| OWRB | OKRV-2030 | 8/29/2017 | 1.68 | 0.219 | 390 | 15.3 | 19.2 | 75.500 | 1.000 | 3.510 | 1.000 | 1.000 | 5.000 |
| OWRB | OKRV-2022 | 9/11/2017 | 7.37 | 0.028 | 642 | 6.0 | 5.17 | 48.810 | 1.000 | 1.080 | 1.000 | 1.600 | 5.000 |
| OWRB | OKRV-2023 | 8/2/2017 | 0.89 | 0.176 | 752 | 13.7 | 22.6 | 37.970 | 1.000 | 1.060 | 1.000 | 3.000 | 5.000 |
| OWRB | OKRV-2098 | 6/26/2017 | 0.73 | 0.161 | 1875 | 11.3 | 1.17 | NA | 1.000 | 1.470 | 1.000 | 8.180 | 5.000 |
| OWRB | OKRO-1105 | 6/21/2017 | 1.07 | 0.117 | 1470 | 11.3 | 3.04 | 80.180 | NA | NA | NA | NA | NA |
| OWRB | OKLS-1213 | 8/21/2017 | 0.63 | 0.088 | 94 | 68.0 | 4.58 | 7.150 | 1.000 | 1.270 | 1.000 | 1.000 | 5.000 |
| OWRB | OKSS-1420 | 9/13/2017 | 3.78 | 1.01 | 1016 | 7.7 | 1.01 | 84.740 | 1.000 | 2.410 | 1.000 | 1.100 | 5.000 |
| OWRB | OKLS-1194 | 6/19/2017 | 1.46 | 0.1 | 2124 | 11.3 | 39.4 | 124.550 | 1.000 | 1.000 | 1.000 | 4.190 | 5.000 |
| OWRB | OKSS-1446 | 7/17/2017 | 1.38 | 0.152 | 235 | 16.7 | 119 | 45.800 | 1.000 | 1.000 | 1.000 | 1.070 | 5.000 |
| OWRB | OKRV-2037 | 6/13/2017 | 1.03 | 0.057 | 16413 | 14.3 | 15.7 | 44.615 | 1.000 | 4.560 | 1.000 | 27.200 | 7.120 |
| OWRB | OKRV-2105 | 8/1/2017 | 0.5 | 0.031 | 3724 | 20.7 | 4.38 | 46.100 | 1.000 | 2.870 | 1.000 | 2.400 | 5.000 |
| OWRB | OKLS-1238 | 6/12/2017 | 0.85 | 0.013 | 4242 | 2.0 | 3.7 | 61.980 | 1.000 | 2.970 | 1.000 | 7.160 | 5.000 |
| OWRB | OKLS-1242 | 6/12/2017 | 1.97 | 0.074 | 3767 | 17.3 | 23.5 | 68.590 | 1.000 | 2.110 | 1.000 | 12.200 | 5.000 |
| OWRB | OKRV-2077 | 6/5/2017 | 1.4 | 0.094 | 663 | 19.7 | 4.17 | 24.329 | 1.000 | 1.000 | 1.000 | 5.210 | 5.000 |
| OWRB | OKSS-1466 | 7/25/2017 | 0.71 | 0.1 | 81 | 2.0 | 4.5 | 29.840 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 |
| OWRB | OKLS-1227 | 7/5/2017 | 1.28 | 0.027 | 3298 | 4.0 | 1.89 | 35.440 | 1.000 | 1.690 | 1.000 | 4.440 | 7.590 |