

Fish Biocriteria For Western Corn Belt Plains Ecoregion

Prepared for

**Prairie Band Potawatomi
Indian Nation**

by

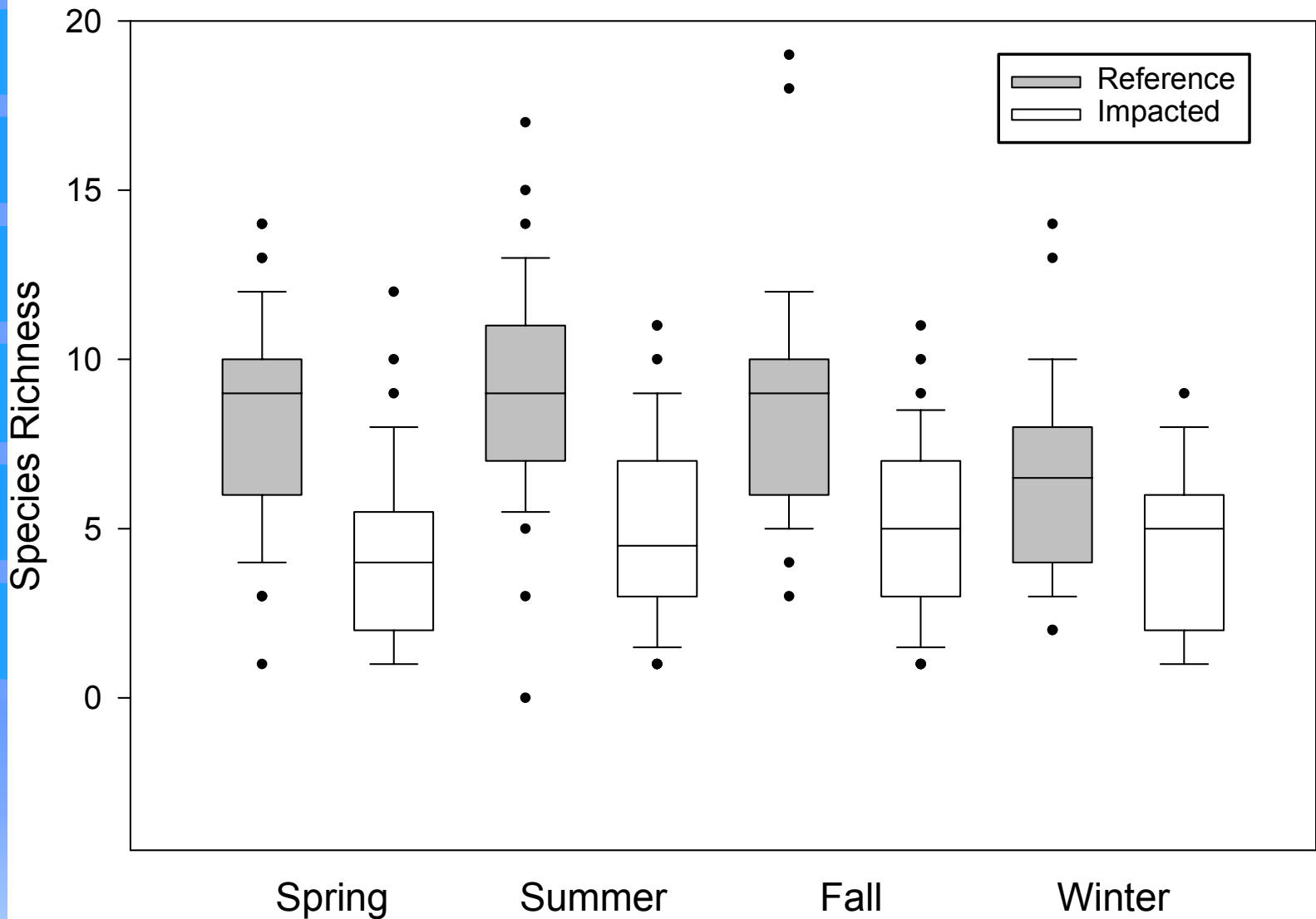
Kansas Biological Survey

Data Collection

- **Sixteen selected streams from the Western Corn Belt Plains ecoregion were sampled each season for 2 1/2 years for a total of ten collection events.**
- **Five sites on each stream were sampled during each event.**
- **Habitat, periphyton, macroinvertebrates and fish were sampled.**
- **Fish sampling involved electroshocking and exhaustive seining.**

Metric Selection

- **The data from the fish samples were compiled and 46 candidate metrics were calculated for reference and impacted sites.**
 - **24 Richness Metrics**
 - **3 Abundance Metrics**
 - **12 Composition Metrics**
 - **7 Diversity Metrics**
- **Box plots were created for each metric to compare reference and impacted metric values.**



Seasonal comparison of native fish species richness values from reference & impacted sites from the WCBP ecoregion

Metric Selection (Continued)

- **Metrics were selected on the basis of two criteria:**
 - **Good separation between reference and impacted box plots.**
 - **Low variability.**
- **Based on this criteria, 26 metrics were potentially useful, but many of these metrics were redundant.**
- **In order to identify and eliminate some redundancies, a correlation matrix was used and the list of metrics was reduced to 11.**

Selected fish biocriteria richness metrics used in the WCBP ecoregion IBI

- **RICHNESS**
 - Native Species Richness
 - Family Richness
 - Sunfish Richness
 - Darter and Madtom Richness
 - Simple Lithophil Richness
 - Pioneer Richness
- **ABUNDANCE**
 - Abundance per 100m
- **COMPOSITION**
 - Proportion of Omnivores and Generalists
- **DIVERSITY**
 - Shannon's (Numbers)
 - Index of Well Being
 - Gleason's

Index of Biotic Integrity

- **Once the metrics were selected, an Index of Biotic Integrity was calculated.**
- **A scoring system similar to EPA's RBP was used. This involved assigning a score of 1, 3 or 5 to lower, middle and upper metric values, respectively.**
- **The upper, middle and lower divisions were determined using natural breaks when present, but when data was scattered, the chart was divided into thirds.**

Scoring for WCBP IBI metrics

Metric	1	3	5
Native Species Richness	<5	5-8	>8
Family Richness	<2	2-3	>3
Sunfish Richness	<1	1	>1
Darter & Madtom Richness	<1	1	>1
Simple Lithophil Richness	<1	1	>1
Pioneer Richness	<2	2-3	>3
Abundance per 100m	<300	300-750	>750
Proportion of Omnivores & Generalists	>40%	40-20	<20%
Shannon's (Numbers)	<1	1-1.4	>1.4
Index of Well Being	<6	6-8	>8
Gleason's	<1.3	1.3-1.7	>1.7

Index of Biotic Integrity (Continued)

- The score from each metric was summed to produce a raw value between 11 and 55 (11=Impacted & 55 = Reference)**
- The raw score was multiplied by 10/11 to obtain an even integer.**
- This value was then multiplied by 2 to increase the spread.**

Soldier Creek

- **The IBI was then applied to Soldier Creek as part of the ecological assessment of this WCBP stream.**
- **Individual metrics and the IBI were compared with box plots to determine how Soldier Creek ranked among other streams in the WCBP ecoregion.**



Box plots comparing native species richness values from WCBP reference & impacted sites to Soldier Creek site values.



Box plots comparing WCBP reference & impacted site IBI scores to Soldier Creek site scores.

Conclusions

- **Comparisons of Soldier Creek to WCBP reference & impacted sites imply that Soldier Creek is at least a reference site in this ecoregion.**
- **In reality the Soldier Creek sites may be more impacted than the IBI score indicates due to the increased size of Soldier Creek compared to the other streams in this study.**

Conclusions (Continued)

- **Further studies of fish communities from larger streams of the WCBP ecoregion will allow modifications of the WCBP IBI and improve accuracy in the future.**
- **However, the limited, tolerant fauna of this region may prevent the development of successful biocriteria for this region, particularly in small headwater streams.**