# Plains Sucker – Dissolved Oxygen Summary

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# Stressor: Dissolved Oxygen (DO mg/L)

# Response**:** System Capacity (%)

# Species: Plains Sucker (*Pantosteus jordani*)

# Life Stage: adult

# Function Derivation: landscape correlation, expert judgement

# Transferability of Function: This stressor-response function is suitable for use on Plains Sucker populations within the Missouri River drainage and the Saskatchewan-Nelson River drainage in Canada; however, Milk River populations are subject to increased flows annually from April-October and may have adapted differing physiologies accordingly. Since Plains Sucker and the Cordilleran Sucker used to belong to a single species, Mountain Sucker, it may be reasonable to assume they have similar tolerances to DO; however, this has not been studied, so caution should be taken. Little is known about the physiological similarities between Plains Sucker and other catostomids and caution should be taken when using this function on other species.

# Detailed SR Function Description

Derivation of the function:

Dissolved oxygen (DO) is measured as a concentration of mg·L¯¹. It is critical for respiration, and thus, fish survival. For Plains Sucker, DO tolerances have not been tested experimentally and without biomass data from natural populations, upper and lower thresholds are difficult to estimate. The lower bound for this SR function was determined by the lowest oxygen concentration at which Plains Sucker were found (~ 2mg·L¯¹).

Source of stressor data to apply the function:

Practical application of the SR function necessitates that users obtain estimates of stressor magnitude (level) in the target system. Currently we only have DO data for a single site that contains Plains Sucker across its distribution. More data is being collected by Fisheries and Oceans Canada.

# Stressor-Response Function

**Figure 1:** Stressor-response (SR) functions for dissolved oxygen (DO, mg/L) and Plains Sucker system capacity (%).

# Stressor-Response Table

**Table 1:** Inflection points and limits used to create SR function for Plains Sucker.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Dissolved O2 (mg/L)** | **Mean System** **Capacity (%)** | **SD** | **Lower Limit** | **Upper Limit** |
| 12 | 100 | 0 | 0 | 100 |
| 10 | 100 | 0 | 0 | 100 |
| 8 | 100 | 0 | 0 | 100 |
| 6 | 100 | 0 | 0 | 100 |
| 4 | 80 | 0 | 0 | 100 |
| 2 | 60 | 0 | 0 | 100 |
| 1 | 0 | 0 | 0 | 100 |
| 0 | 0 | 0 | 0 | 100 |

# SR Curve Confidence and Sources of Uncertainty

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Low Confidence** | **Moderate Confidence** | **High Confidence** |
| **Data Source for SR Function** | **X** |  |  |
| Rationale --> | This SR function was developed using expert opinion, based on field observation and knowledge of literature on Mountain Sucker, the species under which Plains Sucker was previously called. |
| **Shape of SR Function** | **X** |  |  |
|  Rationale --> | The general shape of the function is likely correct but minimum and maximum values are estimated. |
| **Data Variance/****Consistency** | **X**  |  |  |
|  Rationale --> | Since the SR function was developed from expert opinion there is no data to compare to the curve, nor to show consistency within or among populations. |
| **Applicability to System** |  | **X** |  |
|  Rationale --> | This SR function was developed from expert opinion based on field observation of Plains Sucker, and thus are specific to the Missouri River drainage and Saskatchewan-Nelson drainage during summer months. There is no age-specific data available. |
| **Potential Stressor Interactions**  | **X** |  |  |
|  Rationale --> | There is a high probability that other variables, such as temperature, will influence the shape of the stressor-response function. The interaction between temperature (or any other environmental stressor) and DO have not been studied using statistical analysis or in a controlled laboratory setting. |

# Recommended Citation

Jarvis, L. 2022. Dissolved oxygen stressor-response function for Plains Sucker. Department of Fisheries and Oceans CEMPRA model for Plains Sucker.

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# References