**Great Plains BCG Level 2-6 Narratives (5/14/2024) - DRAFT**

Level 2, Minimal changes in structure of the biotic community and minimal changes in ecosystem function—Most native taxa are maintained with some changes in biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

We are going to keep an open mind about the possibility of Level 2 sites while also keeping perspective on the fact that there have been major changes across the landscape over a relatively short period of time, such as channelization, water extraction and nutrient enrichment\*. Areas like the Iowan Surface area, which are among the best we’ve seen so far biologically, could have had even more taxa in the past, in particular highly sensitive ones (e.g., Attribute II), but we have no way of knowing this for sure. There are still some ‘pockets’ of relatively unimpacted areas, although those might be ‘islands’ with limited opportunity for recruitment/self-maintaining populations. We will put forth quantitative rules for Level 2 but won’t have enough Level 2 samples to fully test and confirm these rules.

\*some GP soils have naturally high phosphorus levels, but given the high agricultural land use and low watershed condition scores (IWIs < 0.5), we assume nutrients are higher than natural today.

Level 3, Evident changes in structure of the biotic community and minimal changes in ecosystem function— conditions are complex and resilient enough to support the presence of sensitive taxa; all macroinvertebrate COET groups are present and sensitive and intermediate taxa from the COET groups are represented; fluvial fish taxa and benthic invertivores are well-represented; ecosystem functions are fully maintained through redundant attributes of the system; indicators of good quality habitat (e.g., edge habitat, *woody debris in the CIP and WCBP)* and stable hydrology are present; the most tolerant taxa *(IV worse and V) can occur in moderate numbers but not dominate the community. In some cases, the community may be imbalanced due to the occurrence of ‘patchy’ taxa or eruptive occurrences. Hyper-dominance can be apparent in a sample as a function of life cycle patterns (migrations or reproductive cycles), the way samples are collected and proce*s*sed*, *or due to ‘patchy’ habitat (it is rare to find evenly distributed good quantity and quality woody debris and edge habitat in GP streams).*

Further refine for site classes?

* CIP, WCBP, CGP, Iowa Surface
* soft bottom/glide pool vs. rocky riffle
* medium/large size (not headwaters and not large rivers)

Level 4, Moderate changes in structure of the biotic community with minimal changes in ecosystem function—Moderate changes in structure; for macroinvertebrates, sensitive taxa may be missing but all COET groups are present, sensitive and intermediate COET taxa still occur (albeit potentially in reduced numbers compared to Level 3); for fish, fluvial taxa and native cyprinids are represented with minimal diversity; the most tolerant taxa *(IV worse and V) are present, potentially in higher numbers than Level 3, but still do not dominate the community;* indicators of good quality, stable habitat and intact hydrology are present*;* ecosystem functions largely maintained through redundant attributes. *In some cases, the community may imbalanced due to the occurrence of ‘patchy’ taxa (which sometimes occurs naturally for reasons mentioned above).*

Further refine for site classes?

* CIP, WCBP, CGP, Iowa Surface
* soft bottom/glide pool vs. rocky riffle
* medium/large size (not headwaters and not large rivers)

Level 5, Major changes in structure of the biotic community and moderate changes in ecosystem function—Sensitive taxa may be missing; for macroinvertebrates, up to two COET groups may be missing; sensitive and intermediate members of the COET are missing or are markedly reduced; *taxa that are on the higher end of the tolerance gradient (IV worse and V) can occur in high numbers;* for fish, native individuals are still dominant and highly tolerant individuals are numerous, but not entirely dominant; indicators of good quality, stable habitat and intact hydrology are missing*;* conspicuously unbalanced distribution of major groups from those expected; ecosystem function shows reduced complexity and redundancy; increased build-up or export of unused materials. *Changes in ecosystem function (as indicated by marked changes in food-web structure and guilds) are critical in distinguishing between levels 4 and 5.*

Further refine for site classes?

* CIP, WCBP, CGP, Iowa Surface
* soft bottom/glide pool vs. rocky riffle
* medium/large size (not headwaters and not large rivers)

Level 6, Severe changes in structure of the biotic community and major loss of ecosystem function—Extreme changes in structure; wholesale changes in taxonomic composition (e.g., loss of three or more COET groups); extreme alterations from normal densities and distributions; ecosystem functions are severely altered. Level 6 systems are taxonomically depauperate (i.e., low diversity and/or reduced number of organisms) compared to the other levels. For example, extremely high or low densities of organisms caused by excessive organic pollution, severe toxicity, and/or severe habitat alteration may characterize level 6 systems. Non-native and highly tolerant taxa may predominate.