# DMS (formerly EEP) Watershed Prioritization Tool

## Objectives/overview:

Using publicly available and up-to-date data, we are developing a tool for the NC Department of Mitigation Services (DMS) to prioritize HUC12s within a HUC8 for mitigation activities. In the broader scope, prioritization is based on a weighted mixture of species habitat, water quality, hydrology, and geomorphology; however, this repository is specific to species habitat.

The ultimate goal of this toolkit is to provide DMS with a table of HUC12s and the following attributes:

* Indication of **current habitat status**: "OK as is", "Restorable", or "Beyond repair"
* For those HUC6s that are classified "OK as is":
  + What is the level of threat to it remaining "OK", i.e. its "conservation demand"? and
  + What conservation activities might alleviate these threats?
* For those that are "Restorable":
  + What is the **Habitat Uplift Potential** for a given management strategy?

## Calculating current habitat status (HUC 12)

Current habitat status of a catchment is classified as either “Good”, “Restorable”, or “Beyond Repair”.

* A catchment is deemed “Good” if it has either high known taxonomic richness, high expected taxonomic richness, or high habitat suitability for key indicator species.
* If a catchment is not deemed “Good”, it is classified as “Restorable” if it as many of the habitat characteristics correlated with known taxonomic richness or with presence of an indicator species, and those characteristics that it is missing can be corrected through mitigation.
* If a catchment is not deemed “Good” and the habitat factors it is lacking cannot be corrected through mitigation, it is classified as “Beyond Repair”.

### Calculating known taxonomic richness

Using occurrence data collected by Mark Endries, we tabulate the number of observations of a given taxonomic group (fish, mussels, etc.) found within each NHD+ catchment. We tally both raw observations and also rarity-weighted observations, i.e., scoring species with a lower G-ranking higher.

The result – a table of catchments with columns for each taxa listing raw and rarity-weighted richness – indicates where species have been observed. However, little can be inferred about the catchments with zero richness as those simply may not have been visited.

### Calculating expected taxonomic richness

We calculate the correlations between known taxonomic richness scores and a suite of habitat characteristics tabulated for each NHD Catchment (Table X) to identify which factors are likely to contribute to high taxonomic richness in catchments where no observations have been attempted. Catchments with these characteristics are assigned high expected taxonomic richness.

### Calculating habitat suitability

Similar to expected taxonomic richness.

To determine **current habitat status** of each HUC 12, we calculate the following:

* **Known biodiversity:**   
  This is a rarity weighted score of taxonomic species richness, determined from species observation records. Those with a high score are classified as "OK as is".
* **Expected biodiversity:**   
  By determining which habitat characteristics (at the catchment scale) correlate with known biodiversity, we identify the likelihood that other HUC12s within the HUC8 harbor high taxonomic richness based on their similarity to known diverse catchments. Those with a high score are classified as “OK as is”. Those with low scores are investigated as to why they may be low: those seen to be low because of changeable habitat characteristics are tagged as “Restorable”; those low because of unchangeable characteristics are tagged as “Beyond repair”.
* **Habitat likelihood:**Here we model the habitat likelihoods for a given suite of indicator species. Catchments with characteristics similar to those where the species have observed. Those with a high score are classified as “OK as is”. Those with low scores are investigated as to why they may be low: those seen to be low because of changeable habitat characteristics are tagged as “Restorable”; those low because of unchangeable characteristics are tagged as “Beyond repair”.

## Calculating Potential Uplift

These values at the HUC12 scale are derived by aggregating NHD+ catchment scale attributes. For each catchment within a given HUC8, we:

* Determine which biological and physical characteristics are statistically correlated with the presence of selected indicator species.
* Of these characteristics, which can be modified by mitigation activities.

## Calculating Conservation Potential

These values at the HUC12 scale are derived by aggregating NHD+ catchment scale attributes. For each catchment