Recovery Potential Metrics
Summary Form

Indicator Name: RARE TAXA PRESENCE

Type: Ecological Capacity

Rationale/Relevance to Recovery Potential: Rare taxa have repeatedly been associated with more diverse and functionally intact ecosystems, including aquatic ecosystems. Rare taxa are also often more sensitive to stressors, and their presence may imply that an impairment is relatively not as severe as other impairments. Increased eligibility and options for protection or restoration, elevated public and scientific concern and motivation to act, and other social factors may also be associated with rare taxa. These reasons support a probable association of the presence of rare aquatic taxa with generally higher recovery potential.

How Measured: Species rarity has been organized and categorized for most major taxonomic groups as part of Natural Heritage Programs in most states and through NatureServe's conservation status assessment methodologies.

Data Source: National datasets can be found through the NatureServe Explorer (See: http://www.natureserve.org/explorer/) or the USDA Plants Database (See: http://plants.usda.gov/). In addition, USFWS runs Critical Habitat Portal for obtaining GIS data for threatened and endangered species (http://criticalhabitat.fws.gov/crithab/). More detailed datasets can be found through Natural Heritage Programs available in most states.

Indicator Status (check one or more)
______ Developmental concept.
___x__ Plausible relationship to recovery.
______ Single documentation in literature or practice.
___x__ Multiple documentation in literature or practice.
______ Quantification.

Comments: Widespread applicability, providing data are accessible.

Examples from Supporting Literature (abbrev. Citations and points made):

- See http://www.natureserve.org/explorer/ranking.htm
- See rare and threatened fish populations survey tool at http://fisc.er.usgs.gov/development/map_object.html
- (Freeman and Marcinek 2006) Decisions regarding individual projects will be influenced by multiple factors, including the presence of rare or imperiled stream biota (e.g., species protected under the Endangered Species Act or Georgia's Endangered Wildlife Act) and economic considerations, but whatever decisions are made, one could predict effects on biological integrity in the affected stream systems (447).
- (Wall et al,, 2004) We superimposed fish presence events on the modeling results to give valley segment classes more practical meaning because the presence of an endangered species is often the primary impetus for conservation activity (961).
- (Palik et al., 2000) Restoration also requires prioritization of efforts. Prioritization depends as much on economic issues as ecological concerns (Wyant et al. 1995). An organization may prioritize restoration efforts based on current and historical abundance of an ecosystem, giving highest priority, for example, to restoring historically abundant ecosystems that are currently rare. The effort (cost) to restore a particular site is another factor in prioritization; effort depends on degree of similarity to a reference condition.

Highly disturbed sites require greater effort to restore than minimally disturbed sites (following the idea of thresholds of irreversibility; Aronson et al. 1993). Effective prioritization of restoration efforts requires information that integrates conservation status of ecosystems with effort to restore individual examples of these ecosystems (190).

- (Filipe et al., 2004) A. hispanica had the highest conservation value because it is a rare species endemic to the Guadiana River basin, B. comizo had a lower endemism value but was ranked second in conservation value because of its rarity and low total abundance. S. alburnoides complex had the lowest VS value because it was the most abundant and widespread taxon (195).
- (Filipe et al., 2004) To select priority areas for conservation of watercourses in the region according to the predetermined conservation goals, it is necessary to maximize biodiversity representation based on the available species data. Therefore, for the second step we used a method that ranks stream reaches according to probability of occurrence of a species, taking into account whether the species is endemic to a particular area and whether it is rare or abundant (193).
- (Filipe et al., 2004) Despite criticism (e.g. Smith & Theberge 1987; Williams & Araujo 2002), the use of aggregating criteria assessments was considered necessary because we assumed that an area's conservation value must take into account the relative importance of highly vulnerable species with localized distributions rather than merely species richness (196).
- (Lyons et. al., 2005) Less common species can be important in the resistance of a community to new species invasions. Lyons and Schwartz (2001) reduced plant community diversity by removing the less dominant species. Once diversity was significantly lower than the controls, they introduced an exotic grass. The diversity-reduction treatment experienced significantly higher rates of colonization than the control treatments. In addition, there was a significant positive correlation between the number of less common species removed and colonization of the introduced species. The results of this study suggest that invasion resistance may be conveyed by the aggregate effect of less common species on available resources (1021).
- (Hooper et. al. 2005) Studies of ecosystem recovery after disturbance have often found that ecosystems with more rapid recovery (i.e., greater resilience) were those with a higher diversity of response types (e.g., a mix of seeders and sprouters in the case of fire; Lavorel 1999) (17).
- (Palik et al. 2000) …we present an index that integrates information on historical and current rarity of ecosystems, and disturbance levels of individual polygons, to prioritize restoration efforts. The premise of the index is that highest priority be given to restoring (1) currently rare ecosystems that were also historically rare and (2) the least disturbed examples of these ecosystems, as these will require the least effort to restore (189).
- (Lyons and Schwartz 2001) Here we present the results of a field study using an experimental method in which diversity was altered by removal of less abundant species and the resulting disturbance was controlled for by removal of an equivalent amount of biomass of the most common species from paired plots. Following these manipulations, the exotic grass, Lolium temulentum, was introduced. We found that exotic species establishment was higher in plots in which diversity was successfully reduced by removal treatments and was inversely related to imposed species richness. These results demonstrate that less common species can significantly influence invasion events and highlight the potential role of less common species in the maintenance of ecosystem function (358).
- (Lyons and Schwartz 2001) In our study, uncommon species, as a group, made a small but nonetheless consistent and measurable contribution to invasion resistance (362).