



Guidelines for Assessing the Condition of Lands and Waters Managed by the U.S. Army Corps of Engineers

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INTRODUCTION: The Government Performance and Results Act of 1993 (GPRA) has required federal agencies to develop and track performance measures in order to improve efficiencies and outcomes of management activities. For the U.S. Army Corps of Engineers (USACE), the Environmental Stewardship business line is responsible for managing approximately 12 million acres of land and water. These areas, many of which are considered of high ecological significance, are managed to meet a wide array of local and regional objectives and needs. The wide variety of resource types and management opportunities, high public visibility, as well as the numerous current and future threats to ecological/biological integrity, present tremendous challenges for developing uniform performance metrics to meet GPRA requirements.

Within the Stewardship Support Program, the Corps' Natural Resource Management Branch has identified six performance measures that help address the complexities of this need. These six metrics include:

- Completion of Level 1 inventories.
- Mitigation compliance.
- Endangered Species Act compliance.
- Cultural resource compliance.
- Master Plan revisions and updates.
- Assessment of acres of “healthy and sustainable” lands (USACE 2010a).

The first five measures are process-oriented or are compliance-based whereby managers can already assess performance based on meeting current regulatory requirements or completing necessary biological resource inventory and stewardship planning efforts. The last measure, officially designated as “percent of healthy and sustainable acres on Corps fee-owned property,” requires a project level assessment of the condition of the landscapes across the Corps' ownership. This metric is an outcome measure that is linked to all natural resource management and stewardship activities that are the ultimate determinants of ecological quality and the desired state or future condition of the assessment area (Krause et al. 2004). Internal development of the “healthy and sustainable” measure currently is based on general definitions designed to have wide applicability across the variety of landscapes and conditions managed by the Corps.

The “healthy and sustainable” measure assigns condition ratings for assessed acreage of each Level 1 inventory vegetative subclass occurring on a project for entry into the Corps Operations and Maintenance Business and Information Link (OMBIL) (USACE 2010b) as (a) sustainable, (b) transitioning, (c) degraded, or (d) not assessed. The following definitions have been developed to standardize condition ratings:

- **Sustainable.** Meeting desired state. The acreage is not significantly impacted by any factors that can be managed and does not require intensive management. The acreage also meets operational goals and objectives set out in project OMP’s (Operational Management Plans) or other applicable management document. These acres are considered healthy and sustainable for future generations. Only minor management practices may be required to maintain the health.
- **Transitioning.** Managed to meet desired goals. The acreage is impacted by human or other environmental factors that require management of the acreage to meet goals and objectives outlined in the project OMP or other applicable management document.
- **Degraded.** Does not meet desired goals. The acreage is significantly impacted by human or other environmental factors that prevent the acreage from meeting desired goals outlined in the project OMP or other management documents. The acreage is not considered healthy. Intense management may be required to meet desired goals.
- **Not Assessed.** The acreage has not been assessed against operational goals and objectives. A condition rating cannot be determined.

Similar condition assessments are common among federal agencies. For example, the Corps’ condition levels very closely match the annual performance work metrics for landscape condition used by the U.S. Fish and Wildlife Service’s National Wildlife Refuge System’s GPRA reporting effort (U.S. Fish and Wildlife Service 2007). However, USACE natural resource management staff participation in assessments of how lands and waters match the aforementioned categories has been limited. This has occurred for a variety of reasons, but primarily because of requests for more process definition and clarification as well as a failure to link performance metrics to on-the-ground work execution (Martin and Krause 2007).

PURPOSE: The purpose of this document is to provide more concise and directed guidance to Natural Resource Management field staff for assessing land and water conditions by providing a step-by-step process that meets the intent of the Healthy and Sustainable Lands performance measure.

ASSESSING CONDITIONS: The following sections describe the recommended process the Corps field staff may follow to assess conditions under the current performance measure.

Setting Project Goals and Objectives. The Corps has requirements under Engineer Regulation 1130-2-540 (Chapter 2 - Natural Resources Stewardship) (USACE 1996) to manage natural resources on Corps of Engineers administered land and water in accordance with ecosystem management principles and to ensure their continued availability. As stated in the regulation, this continued availability can be accomplished by developing and fully implementing project

operational management plans that are based on management goals and objectives. Condition ratings are assigned to vegetation and non-vegetation sub-classes of the National Vegetation Classification System (NVCS) in the OMBIL input form (Figure 1). By definition, these condition assessments are first and foremost based on meeting natural resource objectives as outlined in a project’s Master Plan or OMP. Recognizing that goals and objectives for any specific vegetative cover can be almost infinite in extent, Table 1 provides an example of the natural resource objectives associated with NVCS sub-classes.

Figure 1. OMBIL input screen for condition assessment.

The first step in assessing conditions should be to determine the goals and objectives for the area under assessment. Without quantified objectives for project lands and waters, justification for funding is less clear and becomes questionable. To ensure that projects are developing goals to address stewardship needs and challenges, the first part of the condition assessment examines if set goals are being met. In general, projects should utilize their operational management plans, fish and wildlife plans, annual work plans, and master plans to set goals for the vegetation types present on the project.

Table 1. Example objectives for different NVCS subclasses.	
Vegetation Sub-class	Objectives
Deciduous Closed Tree Canopy	Maintain vegetation structure including canopy, subcanopy and shrub layer
	Maintain adequate stocking of seedlings to replace future canopy
	Hold exotic and invasive species to less than 15 percent of cover
	Maintain 1 percent harvest removals to regenerate forest
Herbaceous – Perennial Graminoid Vegetation	Maintain prairie vegetation in 95 percent native species
	Conduct prescribed burns every 5 years
	Restore 5 acres of damaged prairie ecosystem annually
Non-vegetated - Lake	Maintain lake waters for current state designation of fishable and suitable for swimming
	Increase fish habitat using artificial structures on 5 acres per year

Other Considerations for Setting Goals. There are many stressors that affect the ecological integrity of Corps lands and waters, often preventing management goals from being fully met. NatureServe (Faber-Langendoen et al. 2008) provides a list of natural and anthropogenic stressors that are common across projects and plant communities nationwide (Table 2). Managers should consider these when establishing objectives or evaluating the vegetative condition of a specific project. However, because these are broad categories, specific stressors may need to be further defined in the project-specific goals. For example, maintaining native plant communities and reducing exotic or invasive species are important goals across all vegetation types.

Specifying the exotic or invasive plant species threatening a project would allow Corps personnel to choose activities and performance measures appropriate to that project's needs.

Table 2. Example stressors to consider when developing goals and objectives.	
Vegetation (Biota) Stressors Checklist	
Mowing, grazing, excessive herbivory (within occurrence)	
Excessive human visitation	
Predation and habitat destruction by non-native vertebrates, including feral introduced naturalized species such as livestock, exotic game animals, pets (e.g., Virginia opossum, oryx, pigs, goats, burros, cats, dogs)	
Tree / sampling or shrub removal (cutting, chaining, cabling, herbiciding)	
Removal of woody debris	
Lack of appropriate treatment of non-native and nuisance plant species	
Pesticide application or vector control	
Lack of fire or too frequent fire	
Lack of floods or excessive floods for riparian areas	
Biological resource extraction or stocking (e.g., aquaculture, commercial fisheries, horticultural and medicinal plant collecting)	
Excessive organic debris (for recently logged sites)	
Other lack of vegetation management to conserve natural resources	
Filling or dumping of sediment or soils (N/A for restoration areas)	
Grading / compaction (N/A for restoration areas)	
Plowing / disking (N/A for restoration areas)	
Resource extraction (sediment, gravel, mineral, oil and/or gas)	
Impact of vegetation management on soils / substrate (e.g., terracing, pitting, drilling seed, chaining and root plowing)	
Excessive sediment or organic debris (e.g., excessive erosion, gullying, slope failure)	
Physical disturbance of soil / substrate by recreation vehicle tracks , livestock, logger skidding, etc.	
Trash or refuse dumping	

Table 3 illustrates the qualitative categories that can be assigned in assessing the integrity and intactness of native vegetation (Faber-Langendoen et al. 2008). Still, it is important to recognize that because each geographic region of the country differs, the percentages at different regions may have different goals.

Table 3. Example of vegetation metric.	
Vegetation Sub-class	Objectives
Relative Percent Cover of Native Plant Species	The relative percent cover of the plant species that are native to the region with respect to total vegetation cover.
Sustainable+ (A)	> 95 percent relative cover of native plant species
Sustainable (B)	80-94 percent relative cover of native plant species
Transitioning (C)	50-79 percent relative cover of native plant species
Degraded (D)	< 50 percent relative cover of native plant species

Vegetation structure may also be considered as a component in developing goals and objectives. Table 4 provides some examples of structural metrics useful for forest cover type evaluation and

assessment. In this example, easily obtainable remotely sensed imagery, aerial photography, or ground measurements can be used to quickly assign vegetation structure in a qualitative, yet meaningful fashion. Another important consideration in the evaluation process is determining whether goals are based on information that can actually be evaluated during the assessment. For example, a project might set a qualitative goal of “successful woody regeneration” following timber harvest in lieu of a quantitative goal of > 4,000 woody stems per acre if resources are unavailable to conduct a post-harvest survey at that detailed resolution.

Table 4. Example objectives for forest structure.	
Vegetation Structure – Forest (Closed Tree Canopy)	An Assessment of the Overall Structural Complexity of the Tree Layer
Sustainable	Remotely viewed total vegetation cover > 80 percent, woody cover > 40 percent. Either crown sizes show a wide diversity OR there are 20 or more tree stems > 50 cm dbh /ha.
Sustainable (Goal)	Remotely viewed total vegetation cover > 80 percent, woody cover > 10 percent. Either crown sizes show moderate diversity OR there are 10 or more tree stems > 50 cm dbh /ha.
Transitioning	Remotely viewed total vegetation cover > 50 percent, woody cover > 10 percent. Either crown sizes show low diversity OR there are 5 or more tree stems > 50 cm dbh /ha.
Degraded	Remotely viewed total vegetation cover < 50 percent, woody cover < 10 percent. Either crown sizes show low diversity OR there are < 5 tree stems > 50 cm dbh /ha.

By definition, areas that are maintained as lawns or facilities such as parking lots and building footprints are considered sustainable. However, a project may want to establish goals for non-vegetated areas for the aquatic resource such as the reservoir. Analogous to the previous examples, goals could be based on various water quality indices, in-lake structure for fish habitat, or regulatory designations such as being suitable for swimming or safe for catch and consumption of the wild fishery.

Goals Are Established – What is Next? A Level 1 inventory of the project areas should be evaluated. This inventory is meant to include either establishment of new goals or review and reassessment of goals from existing workplans, OMP’s, or Master Plans. Corps natural resource management personnel familiar with a project’s resources should then conduct a field examination/verification of how accurately the vegetation units were classified. Some projects will combine several areas, either adjacent or discontinuous, with similar goals and site conditions and evaluate them collectively. Another option is to evaluate each classified area or mapped polygon within a geographic information system relative to each objective. Figure 2 provides a flow chart process for condition assessment to assist in making decisions.

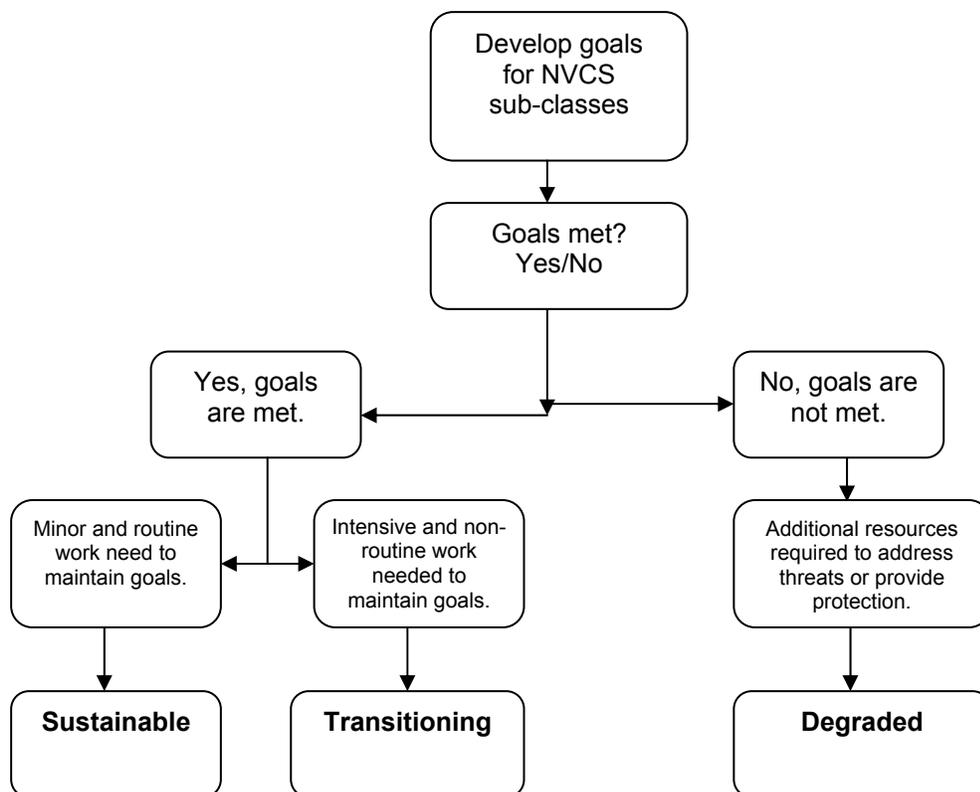


Figure 2. Conceptual process to determine condition assessment of Corps lands and waters.

SUMMARY: Regardless of the specific process used to establish goals and objectives, these assessment actions are critical components for documenting the condition of lands and waters managed by the Corps and the necessary reporting of these data. The condition assessment incorporates goals and objectives to provide the element of performance and site-specific issues. For instance, this assessment would avoid implying that a sustainable forest on Corps land is considered pristine or is more ecologically valuable than surrounding stands. Rather, the assessment would determine whether the land examined meets a desired state within the goals of the Corps project. Staff should then determine if current resources and routine practices are able to satisfactorily maintain the desired condition. Conversely, a wetland that is intact and functioning from an ecological perspective might still be considered degraded if invaded by a single aggressive aquatic invasive plant. This degraded categorization would be based on whether current resources are available or adequate for sustaining the condition into the future through effective control consistent with the stated goal. For the condition assessment to be useful, projects must establish goals and rate each applicable vegetated and non-vegetated area against those goals. Once the baselines for conditions are established, trends can be examined to better target agency-wide resources to meet desired goals in a more effective manner across the nation.

FUTURE RESEARCH: Many current resources can contribute to the capability of Corps projects to broadly classify and assess the conditions of land and water resources. Current classifications under Level 1 inventories and basic condition assessments described in this document provide general information about the current and near-term condition of Corps land and water resources. However, there is a need to develop and implement more rigorous protocols at a finer

“project-specific” resolution. This would help lessen ongoing fiscal and operational challenges faced by natural resource managers in the Corps. Cooperative efforts between NatureServe, the Stewardship Support Program, and the U.S. Army Engineer Research and Development Center are ongoing to evaluate available spatial databases and derive new databases that will have utility for assessing significance and also current and future threats within and across Corps projects. Incorporation and use of such databases will allow comparison and evaluation of natural resources and conditions of various aspects of Corps projects across scales with less impact to individual project resources and time.

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