DEPARTMENT OF THE ARMY
U.S. ARMY BIOLOGICAL TECHNICAL ASSISTANCE GROUP

Technical Document for Ecological Risk Assessment: Process for Developing Management Goals

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1. Purpose

The purpose of this document is to provide guidance to project managers and risk assessors in regard to developing management goals for ecological risk assessments (ERAs) at military installations. Army programs where this will apply are Installation Restoration Program (IRP), Base Realignment and Closure (BRAC) and Formerly Used Defense Sites (FUDS) where work is performed to comply with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Resource Conservation and Recovery Act (RCRA).

2. Background

In the planning phase, prior to conducting an ERA, social and political considerations are used with site information to develop management goals. These management goals are the cornerstone of subsequent phases of the risk assessment. The problem formulation phase of the ERA uses management goals to develop assessment endpoints. The analysis phase characterizes exposure and ecological effects. The last phase of the ERA, risk characterization, estimates risk to the environment and interprets the confidence of those estimates.

Management goals are defined as a general statement about the desired condition of ecological values of concern (USEPA, 1998). These goals may vary from "no unreasonable effects on bird survival" to "minimize surface water impacts" to "reestablish a tall grass prairie". Since ERA management goals often come from interpretations of law by regulators or the desires of the property owner and/or the local community, it is critical to involve all stakeholders when planning an ERA to ensure management goals are appropriate for the site and ecological communities of concern.

Another paper prepared by the Army Biological Technical Assistance Group (BTAG) titled *Technical Document for Ecological Risk Assessment: Planning for Data Collection* (USA BTAG 2002a), specifically addresses planning for data collection in the ERA. This paper addresses management goal development during the overall planning phase of the ERA. The planning phase of an ecological risk assessment should result in three products; 1) clearly established and articulated management goals, 2) characterization of decisions to be made within the context of the management goals, and 3) agreement

on the scope, complexity, and focus of the risk assessment (USEPA 1998). Well-developed ecological management goals are critical to a successful ERA. With these in place during the planning phase, the ERA may be designed and implemented in a manner that will address management decisions for the site. This paper provides the risk manager and project team guidance on developing ecological management goals that will be useful for further development and implementation of the ERA. It uses a process that first identifies important ecological places and then identifies valuable ecological resources associated with those places as a basis for management goal development.

Management objectives may be developed to help interpret general management goals for the risk assessment. Management objectives are more specific statements of the desired outcome; they support achievement of the goal. Often management objectives are translated into assessment endpoints. Development of assessment endpoints is discussed in the Army BTAG Technical Document *Selection of Assessment and Measurement Endpoints for Ecological Risk Assessment* (USA BTAG 2002b).

3. Army Recommended Practice

The Army's aim for its ERAs is to be consistent with all applicable laws, while stressing the establishment of site-specific, value-based objectives to guide the ERA. For the purposes of Army ERAs and management of chemical releases, the following over-arching management goal has been adopted.

> **Army Management Goal for ERA**: Protect valuable biological resources from unreasonable adverse effects due to the release of hazardous substances[1] associated with Army operations, including past Department of Defense operations for FUDS.

Management goals developed for specific sites or installations should be consistent with this over-arching goal.

4. Process for Developing Management Goals for ERA

This section discusses the recommended process for developing management goals for Army ERAs. This two-phased process may be used regardless of the program. Program specific considerations are presented in the Section 5.

Before a management goal can be developed, the actual resource, or resources, being managed must be identified (i.e., those resources potentially needing "protection"). A placed-based approach to determining valuable ecological resources can be useful for many Army sites and is advocated by the Army BTAG. What is meant here by a "place-based" approach is that several factors are taken into consideration for managing an area or site; regulatory requirements, the ecosystem, the needs of the

[1] As defined by Section 101[14] of CERCLA, to also include other constituents defined as eligible for identification, investigation and cleanup in *Management Guidance for the Defense Environmental Restoration Program* (DOD 2001),

installation or property owner to accomplish their mission or goals, and the environmental needs of the community or other stakeholders.

In the two-phased approach for ERA management goal development, the determination is first made whether important ecological places are present, then valuable biological resources within each place are identified as the focus for management goal development. This process is discussed below.

4.1. Identify Important Ecological Places

The first step for determining which resources should be the focus for management goal development is to determine important ecological places that may exist at the installation. These are geographic locations that contain ecologically important physical and biological attributes such as sensitive environments and/or significant habitats[2,3]. For example, the habitat of an endangered species or those within a wildlife refuge would both be considered important ecological places in this context. The basic principle, especially for active Army sites, is to protect valuable organisms that are a part of a larger, identifiable "biological resource" that deserves management for sustainability. Not every resource can be, or should be, fully protected from all potential adverse effects in every case.

Begin to identify important ecological places at the installation by using the Checklist in Table 1. Many of the important ecological places shown in this table are specific geographic areas that contain sensitive environments as identified in ERAGS (USEPA 1997a). Site-specific information should also be considered when identifying ecological places. Per Table 1, consult the Integrated Natural Resource Management Plan (INRMP), BRAC Cleanup Plan or Redevelopment Plan, or other official land management plans, when available. These resources are more fully discussed in Section 5. Appendix A of the *Hazard Ranking System Guidance Manual* (USEPA 1992) provides guidelines and other sources of information for identifying sensitive environments and can be a useful resource for this process.

If there are important ecological places present at the installation the management goal development process proceeds and valuable ecological resources are identified. If there are no important ecological places identified, the next step is to confirm whether the area or portions of it are managed for ecological purposes. If such area(s) are identified, the basis and purpose for managing the area is determined and used to develop management goals for use in the ERA. If there are no ecologically important places, and no areas at the site are managed for ecological purposes then identification of valuable ecological resources as described below is not necessary for further goal development. In the majority of cases, valuable ecological resources will not exist absent an ecologically important place. An appropriate management goal in this case is to prevent "unreasonable effects" such as widespread lethal impacts to plants and animals and should be documented as the goal.

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[2] H*abitat is an area with the combination of resources (i.e., food, cover, water) and environmental conditions (temperature, precipitation, presence or absence of predators and competitors) that promotes occupancy by individuals of a given species and allows those individuals to survive and reproduce.*

[3] *For the purposes of this document and for the process of developing management goals for ERA, significant habitats are rare, sensitive or important habitats.*

4.2. Identify Valuable Ecological Resources

Valuable ecological resources are defined as a specific local population or a specific local community of species that is associated with a nationally or locally important ecological place. Some ecological resources are considered valuable in their own right regardless of where they occur (e.g., endangered species, wetlands). This is not in conflict with the Army process for developing management goals because in most cases, such resources would be associated with at least one of the "important ecological places" defined in this framework. Valuable ecological resources include those under regulatory protection, those providing or affecting important resources (e.g., habitat for fisheries, game species), and may also include those important to stakeholders that have intrinsic or aesthetic value (e.g. wild flowers, butterflies, turtles, etc.) (USEPA 1997b).

4.3. Write Management Goals

After the valuable ecological resources are identified, the management goals for them may be defined. Consultation with stakeholders will be necessary to define the goals; stakeholders may include regulatory officials, the installation natural resource coordinator, the restoration advisory board (RAB), Fish and Wildlife Service officials, adjacent landowners, tribal government officials or community leaders. Some example goals follow.

Example Management Goals:

Sustain local small mammal populations.
Sustain local Eastern Bluebird populations.
Sustain local forest interior bird populations.
Maintain viable, self-sustaining brook trout populations that support a sport fishery.
Develop a tall grass prairie.
Maintain vegetative habitat and cover on tundra.
Maintain diversity of native biotic communities.
Maintain diversity of water-dependent wildlife.
Maintain native fish populations.

5. Program Considerations for Development of Management Goals

As discussed above and shown in Table 1, information specific to a site or installation should be used to develop management goals. The places this information may be found will vary by Army program. The Army performs ERAs under three programs: Active installations under the IRP, closing or realigning installations in the BRAC program, and formerly used sites in the FUDS program. Available information that is useful for establishing management goals differs between these programs and is discussed below.

At Army IRP sites, the installation INRMP can be very useful for risk managers and risk assessors for identifying site-specific valuable biological resources and management goals. Each military installation in the United States is required by the Sikes Act to prepare and implement an INRMP that establishes specific natural

resource management goals and objectives. The plan must be prepared in cooperation with the Secretary of the Interior, through the U.S. Fish and Wildlife Service, and the head of each appropriate State fish and wildlife agency, reflecting the mutual agreement of the parties concerning conservation, protection, and management of fish and wildlife resources.

In addition to identifying site-specific management goals, the INRMP can provide useful information on valuable biological resources at Army IRP sites. The INRMP identifies valued ecological receptors, including plant and animal populations and communities, habitats, and sensitive environments. Planning level surveys and associated maps showing topography, wetlands, surface waters, soils, flora, vegetative communities, threatened and endangered species, and fauna are typically included. The INRMP provides a "snapshot" of the current situation with a management implementation strategy for at least the next five years.

If no formal plans are identifiable, a site visit and Land Condition Trend Analysis (LCTA) reports, Land Use Land Cover maps (USGS 2005), topographic maps, and aerial photographs can help determine current and future land use, and whether the site contains sensitive environments or a locally important ecological place. Additional information useful for habitat identification can be obtained from discussions with representatives of private and government organizations which routinely collect and evaluate ecosystem or habitat information including the following: (1) Natural Resources Conservation Service, (2) U.S. Fish and Wildlife Service (FWS), (3) U.S Department of Agriculture, (4) state natural resource, wildlife, and park agencies, and (5) local government agencies (6) non-governmental organizations (e.g. Nature Conservancy).

> **IRP:** For active installations, review of the INRMP and consultation with the installation Natural Resources Coordinator should be the first step in planning for the ERA. The Base Management Plan also may be consulted for general information. Based on the specific natural resource management goals and objectives established for the installation, formulate site-specific management goals to support establishing assessment and measurement endpoints for the ERA. Additional information should be obtained from the Installation Natural Resource Coordinator, who was instrumental in development of the INRMP.
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> **BRAC:** For BRAC sites, consult the natural resource coordinator and the base transition coordinator (BTC) to determine intended land use and associated natural resource information. At a minimum, utilize the INRMP (if one exists for the installation) and the Base Reuse Plan for information.
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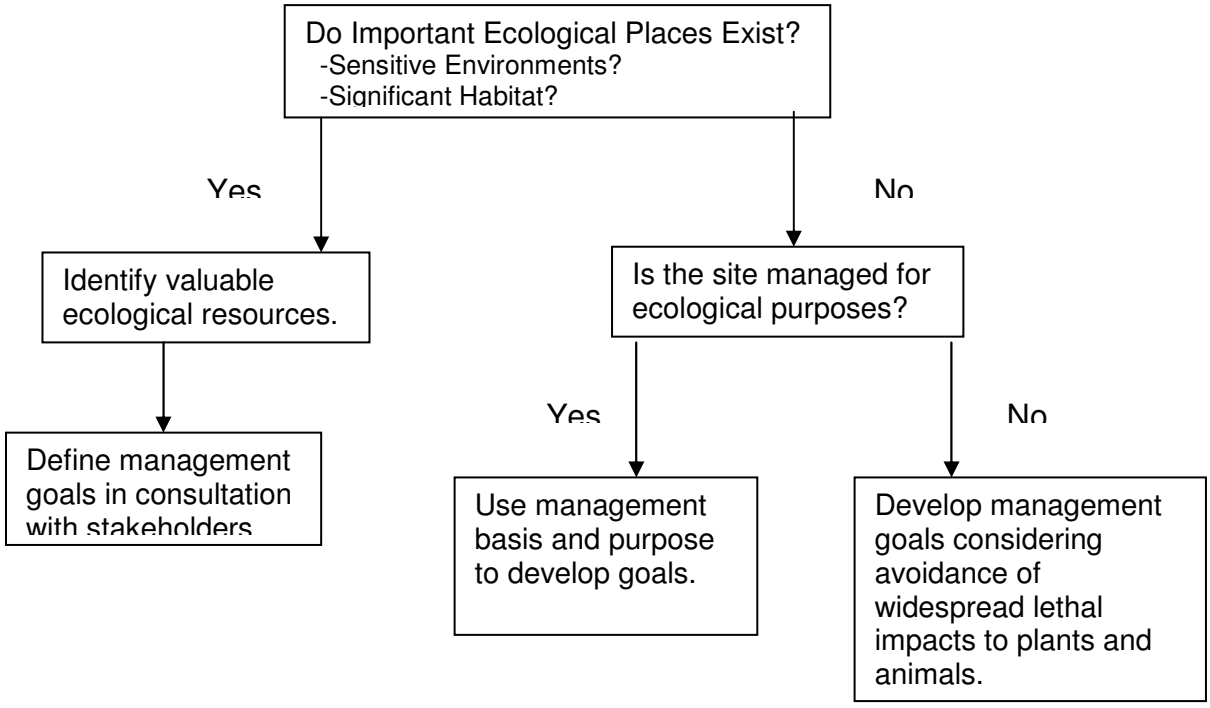
> **FUDS:** At FUDS sites, transfer of property from the Department of Defense to other parties has already taken place and installation plans will not be available. Therefore, gather information from local authorities and previous and/or current landowners regarding current and future land use for the site and adjacent properties.

6. Summary

Developing ERA management goals are critical to the success of an ERA. Articulated goals that reflect the values of local stakeholders, as well as the resource goals of the installation or property owner target the ERA towards the risk management decision that it will inform.

The two-phase approach presented in this paper and summarized below, allows for the consideration of different stakeholder views of an ecological place and its resources. The resultant ERA management goals and the discussion surrounding their development will be used to develop other products of the ERA planning phase and be critical for developing assessment endpoints in the problem formulation phase of the ERA.

ERA Management Goal Development Process Summary



References

16 U.S.C. §§ 670a-670o, Sikes Act of 1960, as amended.

DOD 2001. *Management Guidance for the Defense Environmental Restoration Program*, Office of the Deputy Under Secretary of Defense (Installations and Environment)**.**

U.S. Army (USA) BTAG 2002a. U.S. Army Biological Technical Assistance Group. *Technical Document for Ecological Risk Assessment: Planning for Data Collection*.

USA BTAG 2002b. U.S. Army Biological Technical Assistance Group. *Technical Document for Ecological Risk Assessment: Selection of Assessment and Measurement Endpoints.*

USEPA 1990. (See footnote at bottom of Table 1)

USEPA, November 1992. *Hazard Ranking System Guidance Manual*. EPA/540/R-92/026. Office of Solid Waste and Emergency Response.

USEPA, June 1997a. *Ecological Risk Assessment for Superfund: A Process for Designing and Conducting Ecological Risk Assessments* (ERAGS). EPA 540-R-97-006.

USEPA, January 1997b. *Priorities for Ecological Protection: An Initial List and Discussion Document for EPA*. EPA/600/S-97/002. Office of Research and Development.

USEPA, April 1998. *Guidelines for Ecological Risk Assessment*. EPA/630/R-95/002F. Risk Assessment Forum.

USEPA, June 2001. External Review Draft. *Planning for Ecological Risk Assessment: Developing Management Objectives*. EPA/630/R-01/001A. Risk Assessment Forum.

USGS, 2005. Land Use Land Cover Maps. United States Geological Survey, On-line database <http://edc.usgs.gov/products/landcover/lulc.html>.

PROJECT TEAM: This Technical Document for Ecological Risk Assessment is a product of the U.S. Army Biological Technical Assistance Group (BTAG). The Army BTAG provides Department of the Army (DA) environmental restoration program managers with technical information, guidance, and recommendations pertaining to ecological risk assessment (ERA) issues at Army environmental sites. The Army BTAG is sponsored and coordinated by the U.S. Army Environmental Center (USAEC), in its role as the Army's Installation Restoration Program Manager, and staffed with experts in the biological sciences, ecological risk assessment, natural resources, and toxicology with proficiency in field sampling, site evaluation and risk analysis techniques. Four Army organizations currently comprise the BTAG – USAEC, the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), the U.S. Army Corps of Engineers (USACE) Hazardous, Toxic and Radioactive Waste Center of Expertise (HTRW CX), USACE Engineer Research and Development Center (ERDC), and the U.S. Army Edgewood Chemical Biological Center (USA ECBC).

TABLE 1

Army Checklist for Important Ecological Places[4]

1	Locally important ecological place identified by the Integrated Natural Resource Management Plan, BRAC Cleanup Plan or Redevelopment Plan, or other official land management plans
2	Critical habitat for Federal designated endangered or threatened species
3	Marine Sanctuary
4	National Park
5	Designated Federal Wilderness Area
6	Areas identified under the Coastal Zone Management Act
7	Sensitive Areas identified under the National Estuary Program or Near Coastal Waters Program
8	Critical areas identified under the Clean Lakes Program
9	National Monument
10	National Seashore Recreational Area
11	National Lakeshore Recreational Area
12	Habitat known to be used by Federal designated or proposed endangered or threatened species
13	National preserve
14	National or State Wildlife Refuge
15	Unit of Coastal Barrier Resources System
16	Coastal Barrier (undeveloped)
17	Federal land designated for protection of natural ecosystems
18	Administratively Proposed Federal Wilderness Area
19	Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters
20	Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time
21	Terrestrial areas utilized for breeding by large or dense aggregations of animals
22	National river reach designated as Recreational
23	Habitat known to be used by state designated endangered or threatened species
24	Habitat known to be used by species under review as to its Federal endangered or threatened status
25	Coastal Barrier (partially developed)
26	Federally-designated Scenic or Wild River
27	State land designated for wildlife or game management
28	State-designated Scenic or Wild River
29	State-designated Natural Areas
30	Particular areas, relatively small in size, important to maintenance of unique biotic communities
31	State-designated areas for protection or maintenance of aquatic life
32	Wetlands
33	Fragile landscapes, land sensitive to degradation if vegetative habitat or cover diminishes

[4] Based on USEPA (1990) 55 FR 51624, Dec. 14, 1990 Table 4-23 – Sensitive Environments Rating Values and ERAGS (USEPA, 1997a) Exhibit 1-1 List of Sensitive Environments