Appendix B

Descriptions and Illustrative Examples of Systems (Conservation Targets)

This appendix provides additional information on selecting and defining focal conservation targets for site planning. Its primary emphasis is on conservation targets at functional landscapes, but concepts and examples should be useful across all conservation sites.

The appendix is divided into four sections:

1. a framework for viewing conservation targets at multiple spatial scales (with examples),
2. examples of multi-scale targets from several functional landscapes,
3. worksheets to help determine conservation targets at functional landscapes,
4. a worksheet for documenting ecoregional conservation targets or other elements of biodiversity that are nested within or subsumed by each focal conservation target, and for specifying the parameters of a monitoring program for each focal target.

The first section (pages B2-B6) summarizes a framework for viewing conservation targets at multiple spatial scales, as presented in Poiani et al. 1999[1]. Species and terrestrial, aquatic, and marine ecological communities and systems all occur across a variety of spatial or geographic scales. As described in Chapter IV (*Systems*), spatial scales include *fine*, *intermediate*, *coarse*, and *regional*. For species, the framework is applicable to individual populations, not to the species across its entire range, nor to single organisms. For communities and ecological systems, the framework is applicable to natural (or historic) individual occurrences. When using the framework, it is important to realize that nature is not easily assigned to discrete boxes. Species, communities, and ecological systems occur across a continuous gradient of spatial scales and it may be difficult to place a particular target in a specific category. General guidance is provided in terms of acreage and stream miles, but keep in mind that the size of occurrences of species, communities, and ecological systems will vary greatly across sites and ecoregions. These values may need to be adjusted for your site.

The second section (pages B7-B9) presents several examples of focal conservation targets identified at functional landscapes, with respect to spatial scale. You will notice that the selected targets often do not fall within discrete categories, and may encompass both terrestrial and aquatic systems. This reflects the dynamic and complex nature of ecological systems and species. The examples illustrate how targets can be defined and selected across multiple spatial and biological scales at conservation sites.

The third section (pages B10-B14) provides a series of worksheets to assist with choosing focal conservation targets for site conservation planning. The worksheets are intended to serve as "scratch paper," and should help make spatial and biodiversity scale more explicit in your thinking. Obviously, use only those sheets appro-priate to the potential targets at your site. And do not be afraid to place

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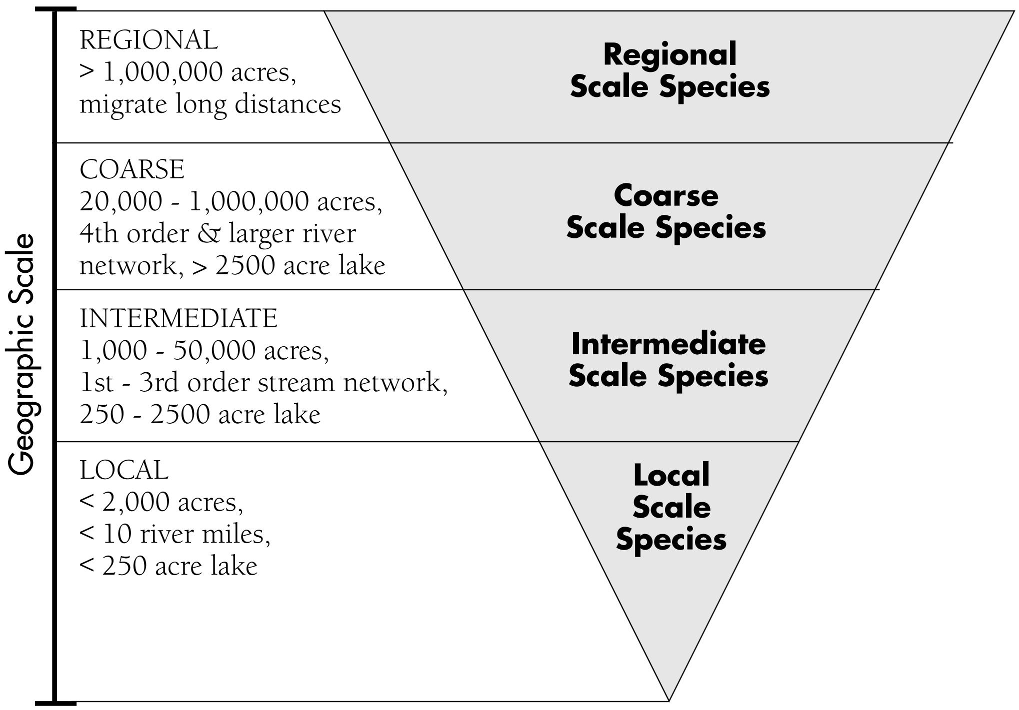
[1] Poiani, K., B. Richter, M. Anderson, and H. Richter. 1999. Biodiversity conservation at multiple scales. BioScience: in press.

targets between discrete categories (we recommend using a pencil for this exercise!). Keep in mind the worksheets were developed to help with the "Top Down" approach outlined in Chapter IV (*Systems*), although they may also be useful in the "Bottom Up" approach. Feel free to adjust worksheet headings as needed (e.g., matrix, large patch, and small patch framework for terrestrial communities/ ecological systems may not apply to your site or ecoregion). Remember—do not get bogged down in assigning targets to categories. Use the worksheets to help identify and select a subset of conservation targets that best represent the important biodiversity within your conservation site.

The fourth section (pages B15-B16) provides a worksheet template for documenting the ecoregional conservation targets and other elements of biodiversity that are nested within or subsumed by a focal conservation target. The template also allows the parameters of a monitoring program for the focal target to be documented. An illustrative example is provided.

Levels of Biodiversity and Spatial Scale

SPECIES



EXAMPLES

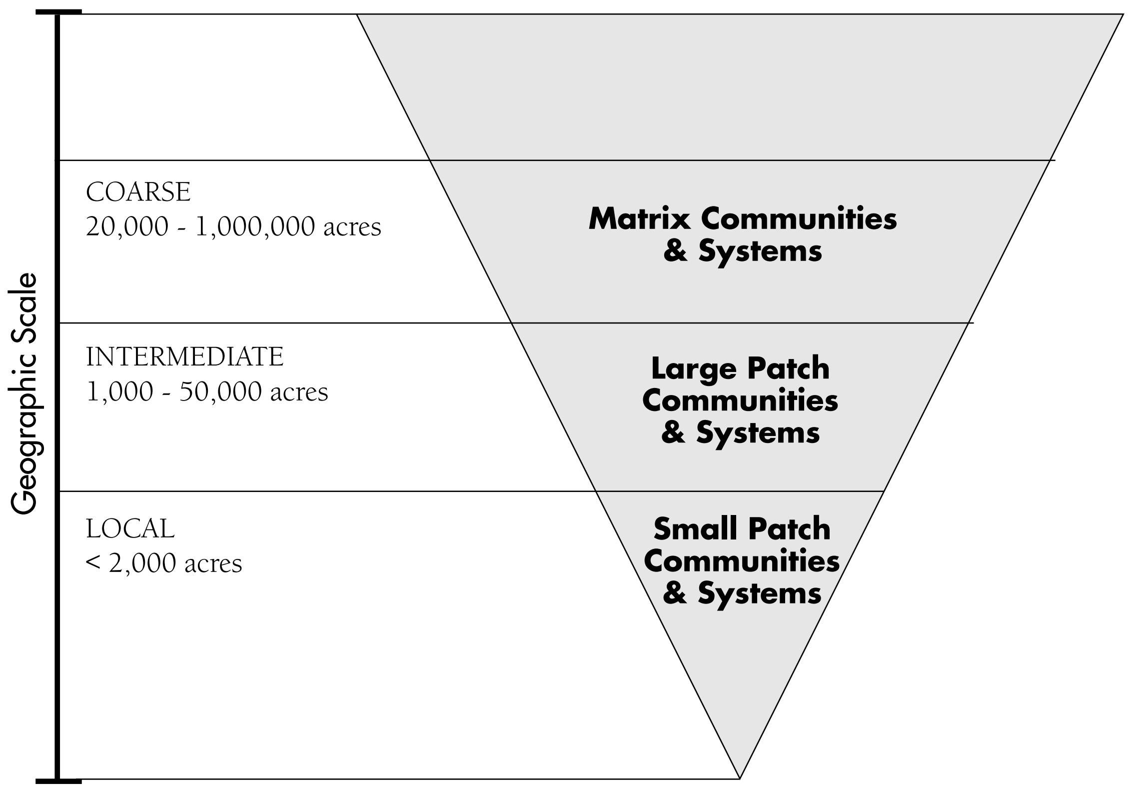
Regional Scale Species
- Caribou, moose, elk, pronghorn
- Wolves, jaguar, grizzly bear
- Migrating waterfowl, shorebirds
- American eel, Chinook salmon, Colorado pikeminnow

Coarse Scale Species
- Prairie chicken, red cockaded woodpecker, pine marten
- Black bear, bobcat, fox, badger
- Lake sturgeon, paddlefish, blue sucker

Intermediate Scale Species
- Prairie dog, black-footed ferret
- Timber rattlesnake, marbled salamander
- Bigmouth buffalo fish
- Dwarf wedge mussel

Local Scale Species
- Bay checkerspot butterfly
- Sandplain gerardia
- Burrowing mayflies, water striders
- Desert pupfish

TERRESTRIAL COMMUNITIES AND SYSTEMS



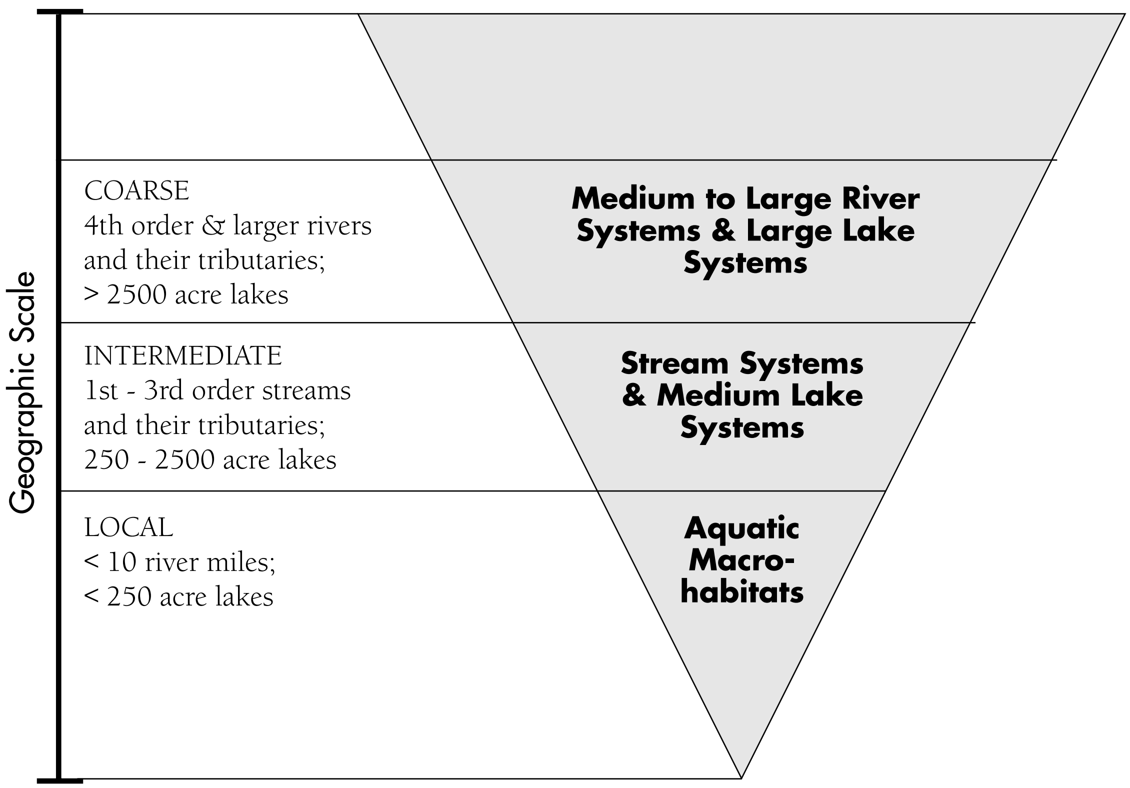
EXAMPLES

Matrix
- Spruce fir forest, longleaf pine forest, ponderosa pine forest
- Chaparral, tallgrass prairie, shortgrass prairie
- Sagebrush steppe, coastal sand plain

Large Patch
- Salt marsh, western emergent marsh
- Red maple swamp, bottomland wetland
- Desert annual grassland, pine barren
- Riparian complex, prairie-savanna complex
- Coastal beaches and dunes

Small Patch
- Fen, bog, seep, playa
- Glade, alpine summit, cliff
- Cave, serpentine grassland

AQUATIC COMMUNITIES AND SYSTEMS



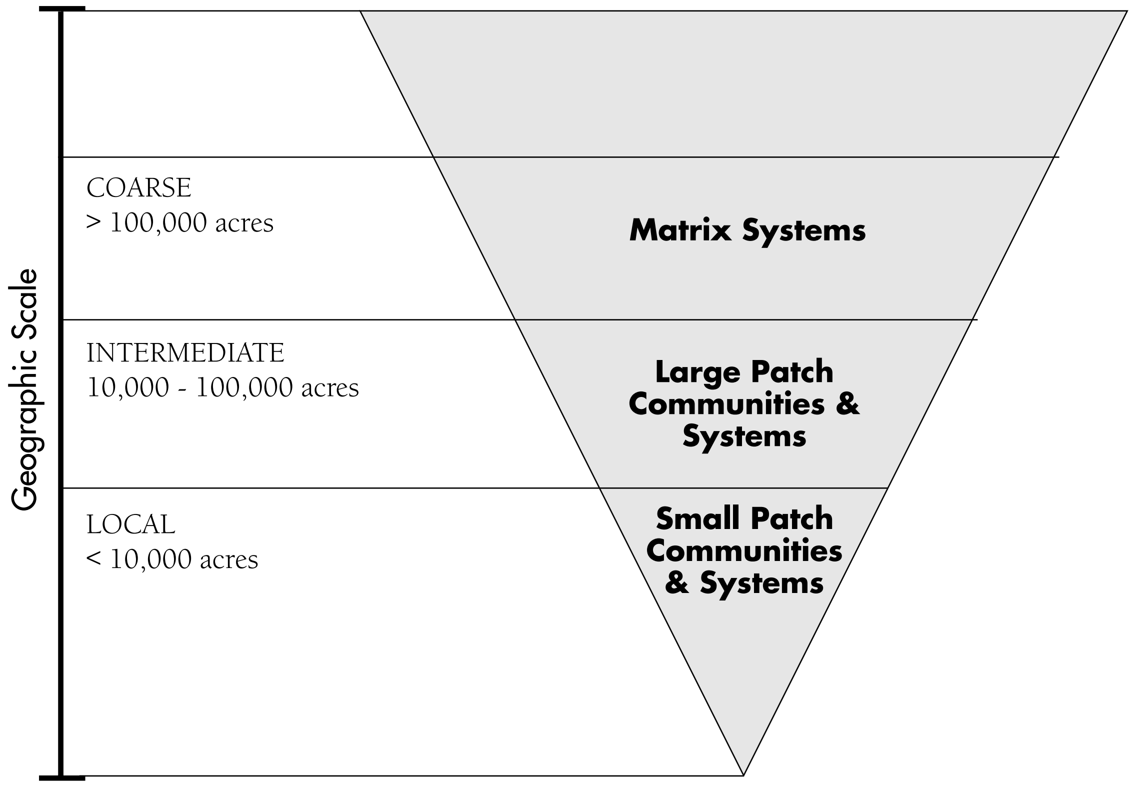
EXAMPLES

Medium–Large River Systems & Large Lake Systems
- Sixth order, warm water, low gradient river and its tributaries
- Series of connected, glacially-scoured, cold water, oligotrophic lakes
- Fifth order, snowmelt- and groundwater-fed mountain valley river in an alluvial valley, and its tributaries
- Five thousand acre, debris dam, groundwater-fed, mesotrophic lake

Stream Systems & Medium Lake Systems
- Third order, warm water, low gradient coastal plain stream and its tributaries
- Groundwater-fed headwater complex of small lakes, wetlands, and streams
- Thousand acre, fishless, alkaline desert playa lake

Aquatic Macrohabitats
- Alpine cirque lake
- First order, cold water, high gradient, groundwater-fed stream
- Four mile segment of a sixth order, warm water, low gradient river

MARINE COMMUNITIES AND SYSTEMS



EXAMPLES

Matrix
- Tropical mangrove forest
- Subtropical and tropical seagrass beds
- Coral reef

Large Patch
- Salt Marsh
- Sandy shore
- Temperate seagrass system
- Kelp bed

Small Patch
- Oyster reef
- Mid-shore rocky intertidal community
- Low-shore rocky intertidal community

Illustrative Examples of Focal Conservation Targets

MOSES COULEE, E. WASHINGTON

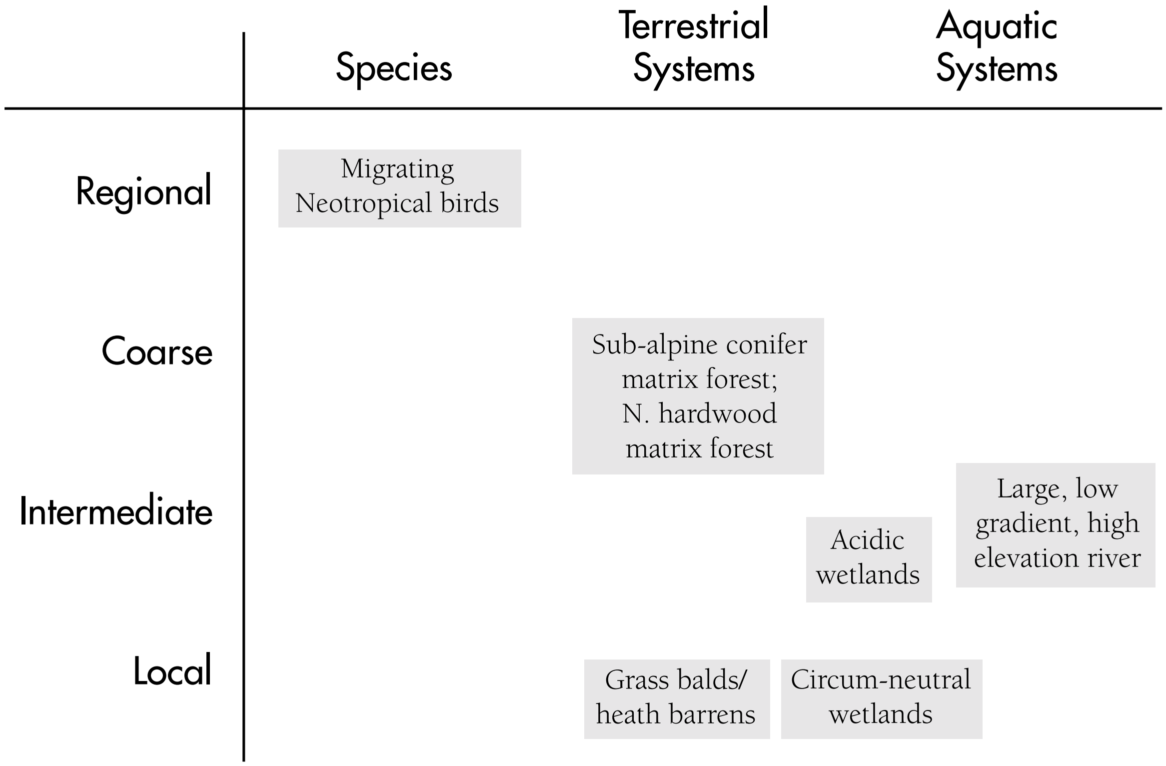
	Species	Terrestrial Systems	Aquatic Systems
Regional	Breeding colony of spotted bats		
Coarse	Sage grouse	Shrub-steppe matrix (i.e., assemblage of big sagebrush& bunchgrass communities	
Intermediate	Pygmy rabbit		Riparian vegetation complex
Local		Cliffs and talus habitats	Seeps and springs

GREATER EGLIN AIR FORCE BASE, FLORIDA*

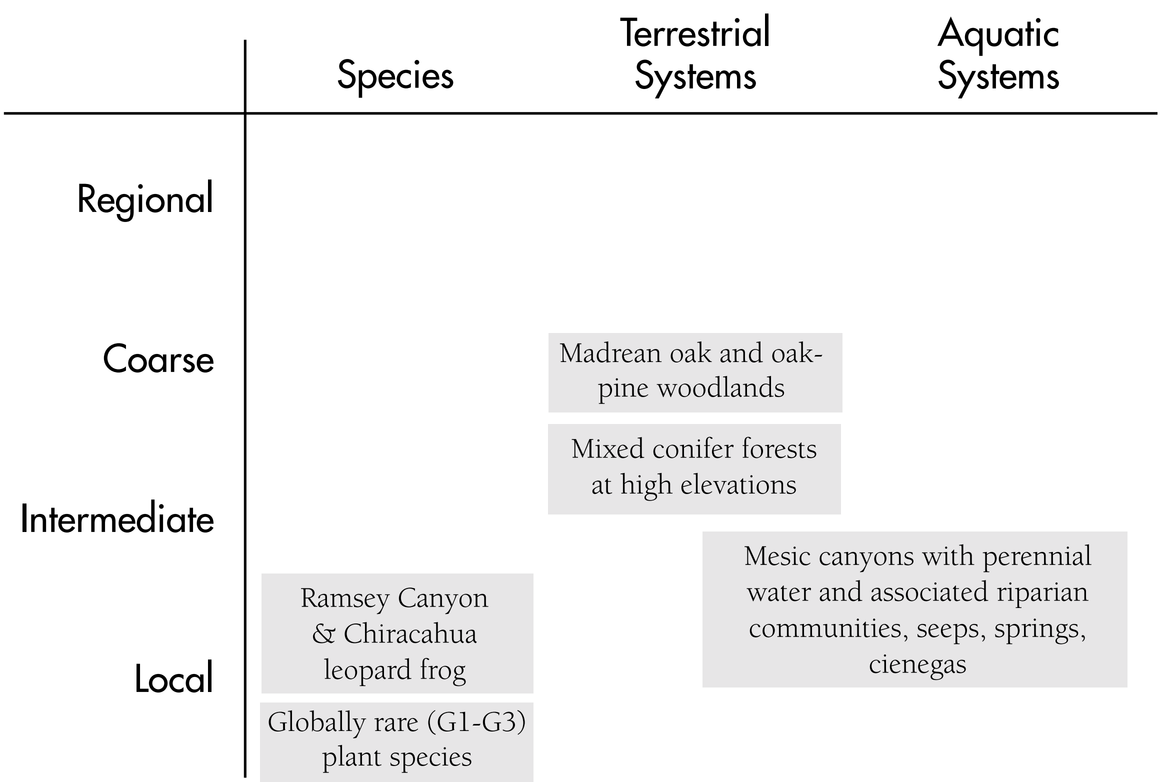
	Species	Terrestrial Systems	Aquatic Systems
Regional			
Coarse	Florida black bear	Longleaf pine sandhill forest matrix; Longleaf pine-mixed hardwood forest matrix	
Intermediate	Red-cockaded woodpecker Flatwoods salamander	Seepage stream/slope forest complex (including 7 communities & 35 G1-G3 plant & animal species	
Local	Florida bogfrog	Pitcherplant bogs-sandhill ponds	

* Excluding coastal, marine, and large river systems which are considered unique sites

CANAAN VALLEY/DOLLY SODS, WEST VIRGINIA



HUACHUCA MOUNTAINS, ARIZONA



MADRE DE LAS AGUAS, DOMINICAN REPUBLIC

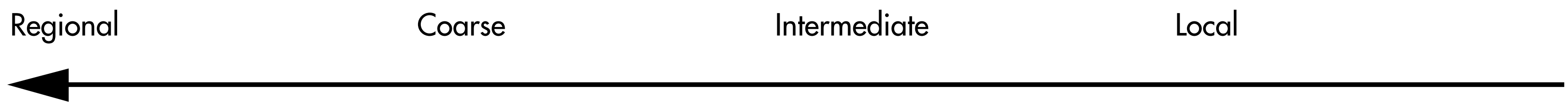
	Species	Terrestrial Systems	Aquatic Systems
Regional			
Coarse		Dense pine forest; Open pine forest; Humid and semi-humid broadleaf forests; Montane cloud forest	
Intermediate			Groundwater fed, 3rd order stream system over erosive soil in Nizao Ecological Group
Local		Sabana de Pajón (Pajón savannas/balds); Riparian forest complex	First order, high-gradient streams over non-erosive rock in Bao Ecological Group

RÍA LAGARTOS AND RÍA CELESTÚN, YUCATAN PENINSULA

	Species	Terrestrial Systems	Aquatic Systems
Regional			
Coarse		Seasonally flooded dry tropical forest; Savannah	
Intermediate			Mangroves; Coastal Strand; Coastal Lagoons
Local		Petenes (hummocks)	Barrier Dune Communities

Conservation Target/Spatial Scale Worksheets

SPECIES



List potential targets under the appropriate spatial scale, above. Species fall along a continuum, rather than strictly within spatial categories. Don't hesitate to place species anywhere along the continuum.

TERRESTRIAL ECOLOGICAL SYSTEMS

Matrix | Large Patch | Small Patch

List terrestrial ecological systems under the appropriate spatial scale, above. Terrestrial systems fall along a continuum, rather than strictly within spatial categories. Don't hesitate to place terrestrial systems anywhere along the continuum.

AQUATIC ECOLOGICAL SYSTEMS

Medium-Large River Systems, Large Lake Systems	Stream Systems, Medium Lake Systems	Aquatic Macrohabitats

List all aquatic ecological systems under the appropriate spatial scale, above. Aquatic systems fall along a continuum, rather than strictly within spatial categories. Don’t hesitate to place aquatic systems anywhere along the continuum.

MARINE ECOLOGICAL SYSTEMS

List all marine ecological systems under the appropriate spatial scale, above. More descriptive spatial categories will be added in the near future. Marine systems fall along a continuum, rather than strictly within spatial categories. Don't hesitate to place marine systems anywhere along the continuum.

Final List of Planning Targets

	Species	Terrestrial Systems	Aquatic Systems
Regional			
Coarse			
Intermediate			
Local			

From the previous worksheets, select a subset of no more than **eight** conservation targets that represent the biodiversity of the conservation site.

Nested Targets and Monitoring Program Worksheet

Conservation Site:

FOCAL TARGET:

Nested Ecoregional Targets/Other Elements of Biodiversity:

Monitoring Parameters:

Indicators	Viability Attribute	Methods	Timing & Frequency	Location	Personnel	Comments

Nested Targets and Monitoring Program Worksheet—Illustrative Example

Conservation Site: Cascade Head, OR

FOCAL TARGET: Coastal Headland Grassland

Nested Ecoregional Targets/Other Elements of Biodiversity:

Red fescue headland grassland community (G2S2) Bristly-stemmed Sidalcea (*Sidalcea hirtipes*) (G2S2)	Pacific Reedgrass Blue Wildrye community (G2S2)

Monitoring Parameters:

Indicators	Viability Attribute	Methods	Timing & Frequency	Location	Personnel	Comments
Qualitative mapping of non-native species distribution in 30m x 30m grid cells across whole site	Condition: ▸ Composition ▸ Structure Threat: ▸ Invasive weeds	Abundance ranks for priority non-native species are assigned for all grid cells using low elevation aerial photos	Surveys are done in June/July, every five years	Entire headland grassland	TNC ecologist	This spatially extensive method allows us to track distributional changes for a subset of invasive non-native species that we are most concerned about. This information is used to drive the timing and frequency of volunteer work parties and grassland restoration efforts.
Nested frequency samploing for plant community species composition	Condition: ▸ Composition	100 nested frequency quadrats randomly sampled within macroplots	▸ Sampling done in June/July ▸ Zika transects read every 5-10 years ▸ Research macro-plots read every 1-3 years and before and after prescribed burns	Sampling occurs in 100m x 100m or 50m x 100m macroplots distrib-uted throughout the headland	TNC ecologist and seasonal staff	This sampling gives us finer grain information on the condition of the grassland. We are using this informa-tion to adjust our fire management program and design grassland restoration strategies.

Appendix C

Illustrative List of Stresses and Sources

Illustrative List of Stresses

Habitat destruction or conversion
Habitat fragmentation
Habitat disturbance
Alteration of natural fire regimes
Nutrient loading
Sedimentation
Toxins/contaminants
Extraordinary predation/parasitism/disease
Modification of water levels; changes in natural flow patterns
Thermal alteration
Salinity alteration
Groundwater depletion
Resource depletion
Extraordinary competition for resources
Excessive herbivory
Altered composition/structure

Illustrative List of Sources of Stress

Agricultural and Forestry
- Incompatible crop production practices
- Incompatible livestock production practices
- Incompatible grazing practices
- Incompatible forestry practices

Land Development
- Incompatible primary home development
- Incompatible second home / resort development
- Incompatible commercial / industrial development
- Incompatible development of roads or utilities
- Conversion to agriculture or silviculture

Water Management
- Dam construction
- Construction of ditches, dikes, drainage or diversion systems
- Channelization of rivers or streams
- Incompatible operation of dams or reservoirs
- Incompatible operation of drainage or diversion systems
- Excessive groundwater withdrawal
- Shoreline stabilization

Point Source Pollution
- Industrial discharge
- Livestock feedlot
- Incompatible wastewater treatment
- Marina development
- Landfill construction or operation

Resource Extraction
- Incompatible mining practices
- Incompatible oil or gas drilling
- Overfishing or overhunting
- Poaching or commercial collecting

Recreation
- Incompatible recreational use
- Recreational vehicles

Land/Resource Management
- Fire suppression
- Incompatible management of/for certain species

Biological
- Parasites/pathogens
- Invasive/alien species

Examples of Threat Scenarios

This appendix includes six examples of different threat scenarios. In each case, stresses and sources of stress are listed along with their respective ranking factors. Overall Stress Ranks, Source Ranks, Threat Ranks (shown to the right of the divider next to the Contribution, Irreversibility, and Source Ranks), and the overall Threat-to-System rank are shown based on the scoring tables listed in Appendix A. Explanations are provided describing the basis of stress and source selection, the stress ranking, and the source ranking.

EXAMPLE 1: Home Development in a Forested Site

Threat Scenario: A forested landscape is being developed for single family homes. The system is the assemblage of neotropical migratory birds that nest in the forest. The homes are being built in two areas, which will fragment the forest into three small patches.

Stresses	Severity	Scope	Stress Rank
Habitat destruction or conversion	Very High	Medium	**Medium**
Habitat fragmentation	High	Very High	**High**

Sources of Stress		Habitat Destruction/ Conversion		Habitat Fragmentation		Threat-to-System Rank
		Medium		*High*		
Primary home development	Contribution	Very High	**Medium**	Very High	**High**	**High**
	Irreversibility	Very High		Very High		
	Source	*Very High*		*Very High*		
	Contribution					
	Irreversibility					
	Source					

Explanation:

Stress and Source selection: The conversion of forest to homes completely destroys habitat for the birds in areas where the conversion occurs. It also creates stress on the birds in the remaining forest fragments by increasing predation and nest parasitism rates, altering vegetation composition and structure, and changing the demographics and genetics of the bird populations.

Stress ranking: "Habitat destruction" is the most severe stress that could occur. The scope of this stress is "Medium" because it is projected to occur at only about 30% of the site. Because "Habitat fragmentation" causes less severe stress than "Habitat destruction", severity was ranked as "High" instead of "Very High". However, fragmentation will affect nesting birds throughout the site, so the scope is "Very High".

Source ranking: "Primary home development" is the sole cause of "habitat destruction" and "habitat fragmentation". It is unlikely to be effectively reversed once in place.

EXAMPLE 2: Invasive Plant Species in a Wetland

Threat Scenario: A graminoid-dominated wetland plant community is threatened by the invasion of an invasive non-native grass species that typically converts this type of wetland to a monoculture of the non-native grass. The conservation target is the natural plant community.

Stresses	Severity	Scope	Stress Rank
Extraordinary competition for resources	Very High	Medium	**Very High**

Sources of Stress		Altered composition/ structure				Threat-to-System Rank
		High				
Invasive/alien species	Contribution	Very High	**High**			**High**
	Irreversibility	Medium				
	Source	*High*				
	Contribution					
	Irreversibility					
	Source					

Explanation:

Stress and Source Selection: The "Extraordinary competition for resources" stress category is designed to capture the numerous more specific stresses inflicted by invasive/alien species such as competition for light (shading), soil resources, germination or vegetative growth space, and pollinators. Even though the non-native plant will alter species composition, an "Altered composition/structure" stress was not included since this stress would be largely redundant to the "Extraordinary competition for resources stress". Had the non-native species been an invasive tree or shrub predicted to alter the structure of the grassland, we would have also included a separate "Altered composition/structure" stress.

Stress Ranking: A Severity rank of "Very High" was assigned given the aggressive invasive nature of the non-native species that will eventually lead to a monoculture of the alien species. We assumed that at least some portion of the wetland area would be converted to such a monoculture stand during the next 10 years. Even though the invasive species is not now widespread, nor likely to be so within the next 10 years, the Scope was given a rank of "Very High" because within the next 10 years its distribution is likely to grow to a point that it will effectively be uncontrollable.

Source Ranking: The "Very High" Contribution rank was assigned because the invasive/alien species is the only source causing the competition for resources stress. The cost of reducing the stress inflicted by the invasive/alien species is going to be quite expensive, leading to the "High" Irreversibility rank.

EXAMPLE 3: Fire Suppression in a Grassland

Threat Scenario: A grassland community is threatened by fire suppression. The community evolved with a regular fire return interval of 5-10 years. Natural ignition sources included lightening (mainly via strikes that hit the adjacent forested area and then spread to the grassland) and Native Americans, who used fire as part of their wildlife management and agricultural practices. Fire has not occurred in the grassland during the last 100 years because of active fire suppression efforts and the absence of Native American ignition. The absence of fire has led to the invasion of many trees and shrubs into the grassland. The conservation target is the grassland system.

Stresses	Severity	Scope	Stress Rank
Altered composition/ structure	High	High	**High**

Sources of Stress		Competition for Resources				Threat-to-System Rank
		High				
Lack of Fire	Contribution	Very High	**High**			**Very High**
	Irreversibility	Medium				
	Source	*High*				
	Contribution					
	Irreversibility					
	Source					

Explanation:

Stress and Source Selection: The primary stress to the grassland system is the altered composition and structure caused by the encroachment and spread of native trees and shrubs. The absence of burning has also undoubtedly impacted various aspects of soil condition (e.g., carbon/nitrogen ratios) but the potential impacts of this stress are poorly understood and suspected to be less significant than the structural changes to the plant community. The source of stress is both the active suppression of wildfires and the lack of Native American ignition sources which were combined into "Lack of Fire".

Stress Ranking: This habitat alteration is a steady but relatively slow process that will *seriously degrade* (Severity = "High") the grassland system *throughout most* of the grassland system (Scope = "High").

Source Ranking: There is only a single listed source of stress so the Contribution is ranked "Very High". The prospects of abating this threat through a prescribed burning program are fairly good with a *reasonable commitment of additional resources* leading to an Irreversibility ranking of "Medium".

EXAMPLE 4: Cattle Grazing in a Grassland

Threat Scenario: A grassland community is threatened by season-long cattle grazing where the stubble heights at the end of the season average only 1cm. About 20% of the site is inaccessible to cattle. There's no evidence that native ungulates were ever very abundant in the area. The system is the entire grassland community.

Stresses	Severity	Scope	Stress Rank
Extraordinary competition for resources	High	High	**High**
Excessive herbivory	High	High	**High**
Altered composition/ structure	High	High	**High**

Sources of Stress		Extraordinary competition for resources		Excessive herbivory		Altered composition/ structure		Threat-to-System Rank
		High		*High*		*High*		
Grazing Practices	Contribution	High	**Medium**	Very High	**High**	Very High	**High**	**High**
	Irreversibility	Medium		Medium		Medium		
	Source	*Medium*		*Very High*		*Very High*		
Invasive/Alien species	Contribution	High	**Medium**					**Medium**
	Irreversibility	Medium						
	Source	*Medium*						

Explanation:

Stress and Source selection: Grasses at the site are stressed by "Excessive herbivory" and by "Extraordinary competition" for light, space, and nutrients. The stress of "Altered composition/ structure" refers to the reduced grass height, which alters the habitat structure for plants, invertebrates, small mammals, birds, and lizards. "Grazing practices" directly cause the stresses of "Excessive herbivory" and "Altered composition/structure". Invasive grasses are the source of the stress of "Extraordinary competition for resources". However, the current grazing practices create soil disturbance, which allows the invasive grasses to proliferate more abundantly at the site. Therefore, the current grazing regime is an indirect source of "Extraordinary competition for resources".

Stress ranking: The severity of "Excessive herbivory" was ranked "High" because plants are unable to reproduce and the stress is therefore seriously degrading, but not completely destroying, the target. The structure of the site has changed dramatically, and is not providing habitat for many species. However, the community has not been destroyed by the change in structure. The scope for all of the stresses is "High", because the grazing is widespread, but does not occur in all areas.

Source ranking: "Grazing practices" have been nearly the sole contributor to the stresses. Native herbivores are rare at the site. It is possible to reverse the stresses caused by the current grazing practices, but it will take a reasonable commitment of additional time and resources. Thus we ranked Irreversibility as "Medium".

EXAMPLE 5: Excessive Groundwater Withdrawal

Threat Scenario: Residential home development is threatening a Mesquite bosque riparian system. In addition to the outright habitat destruction associated with this development, residential wells are depleting the ground water supply. In the past 10 years, the average water table level has dropped to 10 m below ground level and is dropping at a rate of 2 m per year. Once the average water table level drops to more than 5 m below ground, declines in vegetation height and foliage abundance occur and seedling survivorship is reduced. Lowering of the water table below 15 m results in death of riparian mequite trees or conversion to shrub forms.

Stresses	Severity	Scope	Stress Rank
Habitat destruction	Very High	High	**High**
Modification of water levels	VeryHigh	Very High	**Very High**

<table>
<tr><th colspan="2" rowspan="2">Sources of Stress</th><th colspan="2">Habitat Destruction</th><th colspan="2">Modification of water levels</th><th rowspan="2">Threat-to-System Rank</th></tr>
<tr><th colspan="2">Very High</th><th colspan="2">High</th></tr>
<tr><td rowspan="3">Incompatible primary home development</td><td>Contribution</td><td>Very High</td><td rowspan="3">Very High</td><td>High</td><td rowspan="3">Very High</td><td rowspan="3">Very High</td></tr>
<tr><td>Irreversibility</td><td>Very High</td><td>High</td></tr>
<tr><td>Source</td><td>Very High</td><td>High</td></tr>
<tr><td rowspan="3">Excessive groundwater withdrawal</td><td>Contribution</td><td></td><td rowspan="3"></td><td>Very High</td><td rowspan="3">Very High</td><td rowspan="3">Very High</td></tr>
<tr><td>Irreversibility</td><td></td><td>High</td></tr>
<tr><td>Source</td><td></td><td>Very High</td></tr>
</table>

Explanation

Stress and Source Selection: Even though the construction and operation of groundwater wells is *part* of the incompatible primary home development source of stress, the impact of the lowered groundwater level on the riparian system clearly warrants the differentiation of two separate stresses and two separate sources of stress.

Stress Ranking: The Severity of the “Habitat destruction stress” receives a “Very High” rank given the projected type of housing development (i.e., removal of all native vegetation, extensive paving and planted lawn areas). There is a strip of habitat immediately adjacent to the river channel that cannot be developed under current zoning restrictions, so the Scope of this stress is given a “High” rather than a “Very High” rank. With the water table already at 10 m below the surface and dropping at a rate of 2 m per year, the projected impact of the “Modification of water level” stress within the next 10 years is quite severe, leading to the projected large scale mortality of mature trees throughout the riparian system. Thus, both Severity and Scope are given “Very High” ranks.

Source Ranking: “Incompatible primary home development” is the primary source behind the “Habitat destruction” stress so it received a “Very High” Contribution rank. For all intents and purposes, the construction of new residential homes is not reversible (i.e., Irreversibility=“Very High”). The “Incompatible primary home development” source is also a contributor to the “Modification of water levels” stress although it is given a lower Contribution rank (“High” instead of “Very High”) given the more direct influence of “Excessive groundwater withdrawal” from both existing and projected new wells. There’s a chance that residential wells could be eliminated through the extension of a municipal water supply line but the high cost of this solution led to Irreversibility ranks of “High” being assigned to both sources of stress.

EXAMPLE 6: Filling a Wetland

Threat Scenario: A 100 acre wetland represents the only known occurrence of a high-ranked plant community. The wetland is in private ownership and threatened by the dumping of fill. Assume that the entire wetland area is considered necessary for maintaining the viability of this target occurrence. Thus, if dumping of fill takes place, we'll need to restore the impacted portion of the wetland by removing the fill and replanting with native species to achieve our conservation goals at this site. The conservation target is the wetland plant community.

Stresses	Severity	Scope	Stress Rank
Habitat Destruction	Very High	Medium	**Very High**

Sources of Stress		Habitat Destruction				Threat-to-System Rank
		Very High				
Dumping of Fill	Contribution	Very High	**Very High**			**Very High**
	Irreversibility	Jigh				
	Source	*Very High*				
	Contribution					
	Irreversibility					
	Source					

Explanation:

Stress and Source Selection: The wetland habitat is destroyed when buried under several feet of fill so the stress is listed as "Habitat destruction". None of the sources on the Illustrative List of Sources of Stress fit this threat situation very well so a new source of stress, "Dumping of fill" was entered. Under the stated threat scenario, the "Dumping of fill" source of stress would be considered an *active source* as long as some potential exists for additional dumping of fill during the next 10 years. If all future dumping of fill is stopped, but some portion of the wetland area has been buried under fill, the "Dumping of fill" threat would change classification to a *historical source*. This historical source will continue to deliver stress to the filled wetland area until the fill is removed and the area is replanted with native wetland species.

Stress Ranking: Burial under several feet of fill is given a "Very High" Severity Rank and since the entire wetland area is threatened by filling, the stress also receives a "Very High" Scope Rank.

Source Ranking: The "Dumping of fill" source is the only identified source of the habitat destruction so it receives a "Very High" Contribution rank. The stress caused by the fill is reversible, but the high cost of removing the fill warrants a "High" Irreversibility rank.