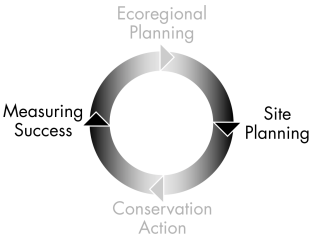
The Five-S Framework *for* Site Conservation

Appendices



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The Nature Conservancy®
Saving the Last Great Places

The Five-S Framework for Site Conservation:

A Practitioner's Handbook for Site Conservation Planning and Measuring Conservation Success

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The mission of The Nature Conservancy is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.

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Appendix A

A Step-by-Step Approach to Systems, Stresses, Sources, and Measures of Conservation Success

Systems/Biodiversity Health
Instructions

Use the attached *Systems Viability Worksheet* (see the *Illustrative Example*); or use the analogous automated worksheet template on the Viability sheet of the Microsoft Excel workbook entitled *Site Conservation/Measures of Conservation Success Workbook*.

IDENTIFY THE SYSTEMS.

Select **no more than eight** systems (i.e., focal conservation targets) to be the focus of planning and measuring success. See Appendix B (*Descriptions and Illustrative Examples of Systems*) for examples and worksheets.

The steps for identifying focal conservation targets (as described in Chapter IV) include:

1. Define the ecological systems and species groups (coarse, intermediate, and local scale, as appropriate) that occur at the site.
   A. Identify all ecological systems that characterize the terrestrial, aquatic, and marine components of the site, as appropriate (i.e., top-down approach).
   B. Consolidate individual species and ecological communities into major groupings and ecological systems, respectively (i.e., bottom-up approach).
2. Identify specific ecological communities, species, or species groups that occur at the site and have ecological attributes or conservation requirements not adequately captured within the previously defined ecological systems or species groups.
   A. Individual species or species groups that disperse, travel, or otherwise use resources across different ecological systems.
   B. Important attributtes of regional-scale species (or species groups) that should be conserved at the site.
   C. Individual species and ecological com-munities that have special conservation or management requirements.
3. Of the conservation targets identified through the first two steps, identify the eight that best meet the following criteria:
   - Reflect ecoregional conservation goals
   - Represent the biodiversity at the site
   - Are highly threatened
4. Check the list of eight focal conservation targets to ensure that all biodiversity targets identified

through ecoregional planning are adequately represented, and revise the focal targets as warranted.

ASSESS THE VIABILITY OF THE FOCAL CONSERVATION TARGETS.

Rank each focal target for *size*, *condition*, and *landscape context*, using the following scale:

- "Very Good" or 4.0
- "Good" or 3.5
- "Fair" or 2.5

  "Poor" or 1.0

The ranking of size, condition, and landscape context should be based on global EO rank specifications, if available, or otherwise on site-specific specifications, as described in Chapter IV of the handbook. If desired, size, condition, and landscape context can be weighted on a scale of 1.0, 0.75, 0.5, and 0.

It is important to document the rationale for the size, condition, and landscape context rankings you assign, and what changes would have to occur for the assigned rank to be upgraded or downgraded by one rank. The *Systems Viability Worksheet* of the Excel workbook has fields for including this documentation.

For each focal target, compute the average value of the numeric scores for size, condition, and landscape context. The simple average is used when all factors have equal weight; a weighed average is used if the factors have unequal weight. Determine the viability rank using the following table:

>= 3.75	Very Good
3.0 – 3.74	Good
1.75 – 2.99	Fair
< 1.75	Poor

(Note: the viability rank, based on size, condition, and landscape context, is computed automatically in the Systems Viability Worksheet *of the Excel workbook.)*

DETERMINE BIODIVERSITY HEALTH FOR THE SITE.

Assign a numeric score to the viability rank for each target: Very Good=4.0, Good=3.5, Fair=2.5, Poor 1.0. Compute the simple average of the scores and assign Biodiversity Health based on the average, using the same table as in the previous step.

(Note: the average viability score is computed and Biodiversity Health assigned automatically in the Systems Viability Worksheet *of the Excel workbook.)*

Systems Worksheet

Site _____

List conservation targets (no more than eight). For each target, record the rank and numerical score (and weighting, where appropriate) for size, condition, landscape context, and viability.

Ranks are Very Good=4.0; Good=3.5; Fair=2.5; Poor=1.0.

Weighting of size, condition, and landscape context should be 1.0, 0.75, 0.50, or 0; default weight is 1.0.

Conservation Target	Size	Wt.	Condition	Wt.	Landscape Context	Wt.	Viability Rank

AVERAGE VIABILITY SCORE = _____

BIODIVERSITY HEALTH = _____

The average viability score across all targets is converted to Biodiversity Health based on the following matrix:

>= 3.75	Very Good
3.0 – 3.74	Good
1.75 – 2.99	Fair
< 1.75	Poor

Systems Worksheet—Illustrative Example

Site *Agate Desert, OR*

List conservation targets (no more than eight). For each target, record the rank and numerical score (and weighting, where appropriate) for size, condition, landscape context, and viability.

Ranks are Very Good=4.0; Good=3.5; Fair=2.5; Poor=1.0.

Weighting of size, condition, and landscape context should be 1.0, 0.75, 0.50, or 0; default weight is 1.0. (*See documentation information in Excel spreadsheet for rationale of individual rankings*)

Conservation Target	Size	Wt.	Condition	Wt.	Landscape Context	Wt.	Viability Rank
Vernal pools/mounded prairie	G (3.5)	1	F (2.5)	1	F (2.5)	1	Fair
Vernal pool fairy shrimp	F (2.5)	1	F (2.5)	.75	F (2.5)	1	Fair
Lomatium cookii	F (2.5)	1	F (2.5)	1	F (2.5)	1	Fair
Limanthes species	F (2.5)	1	F (2.5)	1	F (2.5)	1	Fair
Chaparral	F (2.5)	1		0	P (1.0)	1	Fair
Pine - Oak	F (2.5)	1		0	F (2.5)	1	Fair

AVERAGE VIABILITY SCORE = 2.5

BIODIVERSITY HEALTH = Fair

The average viability score across all targets is converted to Biodiversity Health based on the following matrix:

>= 3.75	Very Good
3.0 – 3.74	Good
1.75 – 2.99	Fair
< 1.75	Poor

Stresses
Instructions

Use the enclosed *Stresses/Sources Worksheet* (refer to the *Illustrative Example*); or use the analogous automated worksheet templates in each of the eight individual conservation target sheets of the Microsoft Excel workbook entitled *Site Conservation/Measures of Conservation Success Workbook*. Prepare one work-sheet for focal conservation target.

 **LABEL THE WORKSHEET** with the name of the site, and the conservation target (taken from the Systems worksheet; *this is done automatically in the Excel workbook*) and provide a brief description of the system.

 **IDENTIFY THE STRESSES TO EACH SYSTEM.**

In the Stress table, list **up to eight** stresses for each system. You do not need to include every conceivable stress, but only those which are current (or likely to become a problem within the next ten years), proximate, and cause particular concern. Avoid listing stresses to a given system that are largely redundant (e.g. habitat destruction; habitat fragmentation; habitat degradation). Use the *Illustrative List of Stresses* in Appendix C as an aide, but also please consider other stresses that may be relevant and significant.

 **RANK THE STRESSES.**

Rank each stress you identified according to the following scale of significance:

- "Very High"
- "High"
- "Medium"
- "Low"

Please rank each stress based on an assessment of both severity and scope. The attached *Stress Ranking Guidelines* provide a set of benchmarks for ranking the severity and scope of stresses. The set of rules for determining a stress ranking, as a function of severity and scope, is also provided in table form. (*Note: the stress rank, based on severity and scope, is computed automatically in the* Stresses/Sources Worksheets *of the Excel worksheet.*)

It is important to document the rationale for selecting stresses, and for the severity and scope rankings you assign. The *Stresses/Sources Work-sheets* of the Excel workbook have fields for including this documentation. See Appendix C for examples.

Stress Ranking Guidelines

Severity of Damage — *What level of damage over at least some portion of the target occurrence can reasonably be expected within 10 years under current circumstances (given the continuation of the existing management/conservation situation)*	
Very High	The stress is likely to *destroy or eliminate* the conservation target over some portion of the target's occurrence at the site
High	The stress is likely to *seriously degrade* the conservation target over some portion of the target's occurrence at the site
Medium	The stress is likely to *moderately degrade* the conservation target over some portion of the target's occurrence at the site
Low	The stress is likely to *only slightly impair* the conservation target over some portion of the target's occurrence at the site

Scope of Damage — *What is the geographic scope of impact on the conservation target at the site that can reasonably be expected within 10 years under current circumstances (given the continuation of the existing situation)*	
Very High	The stress is likely to be *very widespread or pervasive in its scope*, and affect the conservation target *throughout the target's occurrences* at the site
High	The stress is likely to be *widespread in its scope*, and affect the conservation target at *many of its locations* at the site
Medium	The stress is likely to be *localized in its scope*, and affect the conservation target at *some of the target's locations* at the site
Low	The stress is likely to be *very localized in its scope*, and affect the conservation target at a *limited portion of the target's location* at the site

Stress Ranking Table

↓ ***SEVERITY***	***SCOPE***			
	Very High	**High**	**Medium**	**Low**
Very High	Very High	High	Medium	Low
High	High	High	Medium	Low
Medium	Medium	Medium	Medium	Low
Low	Low	Low	Low	—

Sources of Stress
Instructions

Use the enclosed *Stresses/Sources Worksheets* you have prepared for each system (refer to the *Illustrative Example*); or use the analogous automated worksheets each of the individual conservation target pages of the Microsoft Excel workbook entitled *Site Conservation/Measures of Conservation Success Workbook*.

LIST THE STRESSES TO THE SYSTEM.

As column headings in the Sources of Stress table, list the stresses to the conservation target from the Stresses table in the previous step. (*This is done automatically in the Excel worksheet*)

IDENTIFY THE SOURCES FOR EACH STRESS.

In the Sources of Stress table, list **up to eight** sources for the stresses to each system. Use the *Illustrative List of Sources* in Appendix C as an aide, but also please consider other sources that may be relevant and significant and cause particular concern. (*Note: a source may contribute to more than one stress.*) Also, indicate whether the source is "active" (i.e., expected to contribute *additional* stress to the conservation target within the next ten years) or "historical" (i.e., expected to contribute *no additional* stress to the conservation target wihin the next ten years).

RANK THE SOURCES.

Rank each source you identified according to the following scale of significance:

- "Very High"
- "High"
- "Medium"
- "Low"

Please rank each source based on an assessment of both contribution and irreversibility. The attached *Sources-of-Stress Ranking Guidelines* provide a set of benchmarks for ranking the contribution and irreversibility of a source to a stress. If a source does not contribute to a stress, leave the cell blank. The set of rules for determining the Source rank, as a function of contribution and irreversibility, is also provided in table form. (*Note: the Source rank, based on contribution and irreversibility, is determined automatically in the* Stresses/Sources Worksheets *of the Excel workbook.*)

It is important to document the rationale for selecting sources of stress, and for the contribution and irreversibility rankings you assign. The *Stresses/SourcesWorksheets* of the Excel workbook have fields for including this documentation. See Appendix C for examples.

DETERMINE THREAT RANK FOR EACH SOURCE-STRESS COMBINATION.

A Threat rank for each stress-source combination is determined based on the individual Stress and Source ranks. The Threat rank may be lower than or equal to, but not higher than, the Stress rank, i.e., the Stress rank serves as an upper limit for the Threat rank. For example, a "Very High" source of a "Medium" stress is only considered a "Medium" threat. The *Individual Threat Ranking Guidelines*

(page A-10) provide the set of rules, in table form, for ranking individual threats based on Stress and Source ranks. (*Note: the Individual Threat ranks, based on Stress and Source ranks, are determined automatically in the Excel worksheet*).

ENTER A THREAT-TO-SYSTEM RANK.

The Threat-to-System rank is the summary ranking of all threats associated with a particular source of stress for a conservation target. Each Threat-to-System rank summarizes the individual threat ranks shown in each stress column. The Threat-to-System rank is found in the far right column of the "Sources of Stress" table in each of the Stresses-Sources-Strategies worksheets. You can use the Threat-to-System Ranking Guidelines (pg. A-10) as an aide to determine these ranks manually.

Note: Threat-to-System Ranks are determined automatically in the Stresses-Sources-Strategies worksheets of the Excel workbook.

Source-of-Stress Ranking Guidelines

Contribution — *Expected contribution of the source, acting alone, to the full expression of a stress (as determined in the stress assessment) under current circumstances (i.e., given the continuation of the existing management/conservation situation)*	
Very High	The source is a *very large* contributor of the particular stress
High	The source is a *large* contributor of the particular stress
Medium	The source is a *moderate* contributor of the particular stress
Low	The source is a *low* contributor of the particular stress

Irreversibility — *Reversibility of the stress caused by the source of stress*	
Very High	The source produces a stress that is not reversible, for all intents and purposes (e.g. wetland converted to shopping center)
High	The source produces a stress that is reversible, but not practically affordable (e.g. wetland converted to agriculture)
Medium	The source produces a stress that is reversible with a reasonable commitment of additional resources (e.g. ditching and draining of wetland)
Low	The source produces a stress that is easily reversible at relatively low cost (e.g. ORVs trespassing in wetland)

Source Ranking Table

↓ ***IRREVERSIBILITY***	***CONTRIBUTION***			
	Very High	**High**	**Medium**	**Low**
Very High	Very High	High	High	Medium
High	Very High	High	Medium	Medium
Medium	High	Medium	Medium	Low
Low	High	Medium	Low	Low

Individual Threat Ranking Guidelines

Determine the Individual Threat Rank for each Stress-Source combination, based on the following table:

		SOURCE			
		Very High	**High**	**Medium**	**Low**
STRESS	**Very High**	Very High	Very High	High	Medium
	High	High	High	Medium	Low
	Medium	Medium	Medium	Low	Low
	Low	Low	Low	Low	—

Threat-to-System Ranking Guidelines

The Threat-to-System rank is determined by combining the individual ranks to which the source contributes using the following rules:

- Threat-to-System rank is never less than the highest Individual Threat Rank associated with a particular source of stress. For example, if any one of the threats associated with a source of stress is ranked Medium, the Threat-to-System rank will be at least Medium.
- *3-5-7 Rule*

  If there are multiple Individual Threat ranks for the same source of stress, the Threat-to-System rank may be adjusted upwards by using the "3-5-7" rule as follows:

Three High ranks equal a Very High	3H = 1VH
Five Medium ranks equal a High	5M = 1H
Seven Low ranks equal a Medium	7L = 1M

For example, assume you have the following Individual Threat ranks associated with a source of stress: two High's and five Medium's. The rules would be used to resolve the Threat-to-System rank as follows:

The Threat-to-System rank must be at least "High". However, you must also determine if the presence of five Medium's elevates the rank. Apply the "3-5-7" rule to find out.

2H + 5M	Given
2H + 1H = 3H	Because 5M = 1H according to the "3-5-7" Rule
= 1VH	Because 3H =1VH according to the "3-5-7" Rule

Yes, five Medium Individual Threat ranks increase the Threat-to-System rank from "High" to "Very High".

Here are some other combinations and their "solutions". If the application of the rule is unclear, try to resolve these:

Individual Threat Ranks	Threat-to System Rank
One Medium and Seven Low's	Medium
Four Medium's and Seven Low's	High
One Very High and Anything	Very High

Stresses/Sources Worksheet

Site _____

Name of System _____

Description:

Stresses

List stresses and provide stress ranks below.

Stress	Severity	Scope	Stress Rank

Note: Sources of Stress continued on next page.

Stresses/Sources Worksheet (page 2): Sources of Stress

COLUMNS: List as column headings the stresses to the system from the Stress table on the previous page.
ROWS: List up to eight sources in the first column. Record Contribution, Irreversibility, and Source ranks (left of divider) and **Threat rank** (right of divider) for each source in the subsequent columns. Threat-to-System rank for each source is recorded in the last column.

Stresses

Sources of Stress										**Threat-to-System Rank**
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									
	Contribution									
	Irreversibility									
Active/Historical	**Source**									

Stresses/Sources Worksheet—Illustrative Example

Site *Agate Desert, OR*

Name of System Vernal pools/mounded prairie

Description:

Stresses

List stresses and provide stress ranks below.

Stress	Severity	Scope	Stress Rank
Habitat destruction or conversion	Very High	High	**High**
Altered composition/structure	High	High	**High**
Extraordinary competition for resources	High	High	**High**
Habitat disturbance	High	Medium	**Medium**
Excessive herbivory	High	High	**High**
Nutrient loading	Medium	Medium	**Medium**
Extraordinary predation/disease	Medium	Medium	**Medium**

Note: Sources of Stress continued on next page.

Stresses/Sources Worksheet (page 2): Sources of Stress—Illustrative Example

COLUMNS: List as column headings the stresses to the system from the Stress table on the previous page.
ROWS: List up to eight sources in the first column. Record Contribution, Irreversibility, and Source ranks (left of divider) and **Threat rank** (right of divider) for each source in the subsequent columns. Threat-to-System rank for each source is recorded in the last column.

		Stresses																		**Threat-to-System Rank**
Sources of Stress		Habitat Destruction/ Conversion		Altered Composition/ Structure		Competition for Resources		Habitat Disturbance		Excessive Herbivory		Nutrient Loading		Extraordinary Predation						
Primary home development (Active)	Contribution	M												M						
	Irreversibility	VH	**High**											M	**Low**					**High**
	Source	**H**												**M**						
Commercial/ industrial development (Active)	Contribution	M												L						
	Irreversibility	VH	**High**											M	**Low**					**High**
	Source	**H**												**L**						
Grazing practices (Active)	Contribution			M		M		L		VH		M								
	Irreversibility			M	**Medium**	M	**Medium**	L	**Low**	M	**High**	L	**Low**							**High**
	Source			**M**		**M**		**L**		**H**		**L**								
Fire Suppression (Active)	Contribution			H		M														
	Irreversibility			M	**Medium**	M	**Medium**													**Medium**
	Source			**M**		**M**														
Wetland Fill (Historical)	Contribution	**L**																		
	Irreversibility	**H**	**Medium**																	**Medium**
	Source	**M**																		
Invasive/alien species (Active)	Contribution			H		H								H						
	Irreversibility			H	**High**	H	**High**							H	**Medium**					**High**
	Source			**H**		**H**								**H**						
Wastewater treatment (Active)	Contribution											M								
	Irreversibility											L	**Low**							**Low**
	Source											**L**								
Conversion to agriculture (Active)	Contribution	H		H				H												
	Irreversibility	H	**High**	H	**High**			H	**Medium**											**High**
	Source	**H**		**H**				**H**												

Overall Threat Ranks
Instructions

Use the attached *Threat SummaryWorksheets* (refer to the *Illustrative Example*); or use the analogous worksheet templates on the sum-mary sheet of the Microsoft Excel workbook entitled *Site Conservation/Measures of Conservation Success Workbook*. Note that there is a separate Threat Summary Worksheet for "active" and "historical" sources of stress, respectively. *(Note: all steps described on this page are completed automatically by the* Threat Summary Worksheets *in the Excel workbook.)*

LABEL THE WORKSHEET with the name of the site. Fill in the sources of stress and their Threat-to-System ranks for each system (taken from the Stresses/Sources worksheets). Active sources of stress should be listed in the Threat Summary for Active Sources table; historical sources of stress should be listed in the Threat Summary for Historical Sources table.

DETERMINE OVERALL THREAT RANK FOR EACH SOURCE OF STRESS.

The Overall Threat Rank (far right column of worksheet) for a given source of stress is determined by combining the Threat-to-System ranks for that source across all the identified systems at the site. Overall Threat ranks can be determined manually by applying the following rules.

If a source threatens multiple systems, apply the "3-5-7" rule to aggregate the Threat-to-System ranks of the source. (*See page A-10 for an explanation of this rule*.)

Apply the "2 prime" rule to further aggregate the ranks.

Two Very High threat rankings yield an Overall Threat Rank of Very High
One Very High or two High threat rankings yield an Overall Threat Rank of High
One High or two Medium threat rankings yield an Overall Threat Rank of Medium
Less than two Medium threat rankings yield an Overall Threat Rank of Low

Further description of these rules can be found in the Scoring Worksheet of the Excel spreadsheet.

DETERMINE THE "THREAT STATUS" OF THE SITE.

The Threat Status of the site is determined by applying the *2-Prime Rule*, as described above, to the Overall Threat ranks of the eight highest-ranked active sources.

- On the Summary Worksheet for Active Sources, aggregate the Overall Threat ranks of the eight highest-ranked active sources using the *Prime Rule*: three "High" threats are equivalent to one "Very High" threat; five "Medium" threats are equivalent to one "High" threat; and seven "Low" threats are equivalent to one "Medium" threat.
- Next, examine the aggregated Overall Threat ranks. If there are at least two "Very High" ranks, the Threat Status is "Very High"; at least two "High" ranks (or one "Very High" and one "High"), the Threat Status is "High"; at least two "Medium" ranks (or one "High" and one "Medium"), the Threat Status is "Medium."

Threat Summary Worksheet—Active Sources

Site _____

Fill in the Threat-to-System rank for each System-Source combination, and determine the Overall Threat rank for each Active Source using the 2-Prime Rule.

Sources	System One	System Two	System Three	System Four	System Five	System Six	System Seven	System Eight	**Overall Threat Rank**

Determine Threat Status by applying the 2-Prime Rule to the eight highest-ranked Overall Threats.

Threat Status and Abatement = _____

Threat Summary Worksheet—Historical Sources

Site _____

Fill in the Threat-to-System rank for each System-Source combination, and determine the Overall Threat rank for each Historical Source using the 2-Prime Rule.

Sources	System One	System Two	System Three	System Four	System Five	System Six	System Seven	System Eight	**Overall Threat Rank**

Overall Threats Worksheet—Active Sources: Illustrative Example

Site *Agate Desert, OR*

Fill in the Threat-to-System rank for each System-Source combination, and determine the Overall Thrat rank for each Source using the 2-Prime Rule.

Sources	Vernal pools/ mounded prairie	Vernal pool fairy shrimp.	*Lomatium cookii*	*Limnanthes* species	Chaparral	Pine - Oak			**Overall Threat Rank**
Commercial/industrial development	**High**	**Medium**	**Medium**	**High**	**Medium**	**High**			**High**
Conversion to agriculture or silviculture	**High**	**High**	**Medium**	**High**	**Medium**				**High**
Grazing practices	**High**	**Medium**	**High**	**High**	**Low**				**High**
Primary home development	**High**	**Medium**	**Medium**	**Medium**	**Medium**	**High**			**High**
Invasive/alien species	**High**		**Medium**	**Medium**	**Low**	**Medium**			**Medium**
Fire suppression	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**			**Medium**
Poaching or commercial collecting (snags & logs)						**High**			**Medium**
Wastewater treatment	**Low**	**Low**							**Low**
Log deck debris		**Low**							**Low**

Determine Threat Status by applying the 2-Prime Rule to the eight highest-ranked Overall Threats.

Threat Status and Abatement = High

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

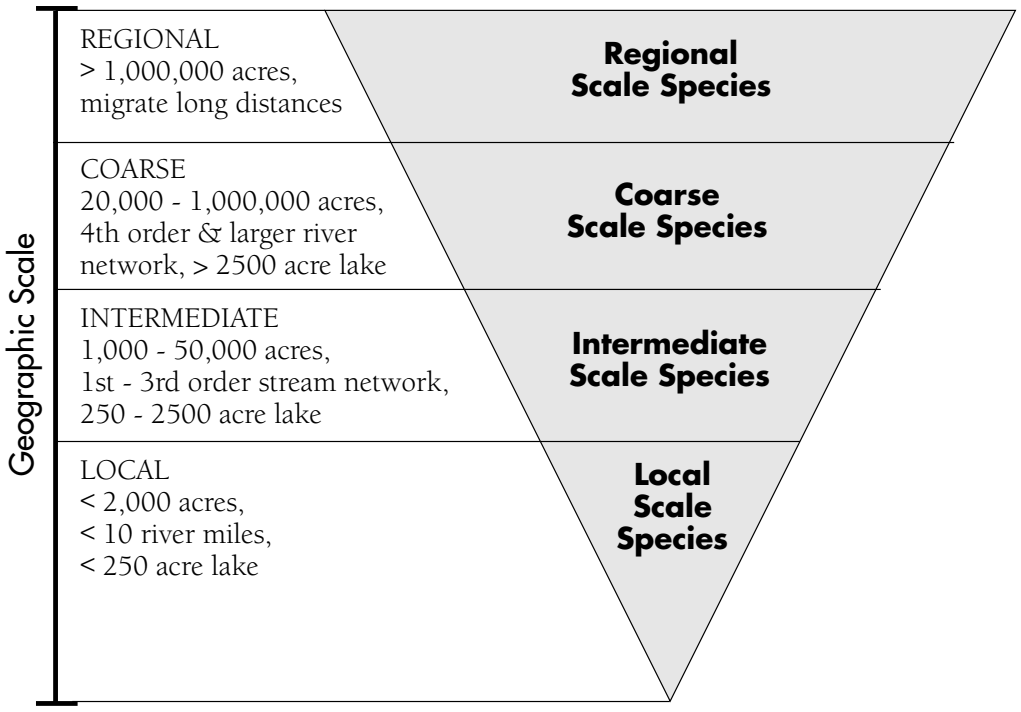
[1] Poiani, K., B. Richter, M. Anderson, and H. Richter. 1999. Biodiversity conservation at multiple scales. BioScience: in press.

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

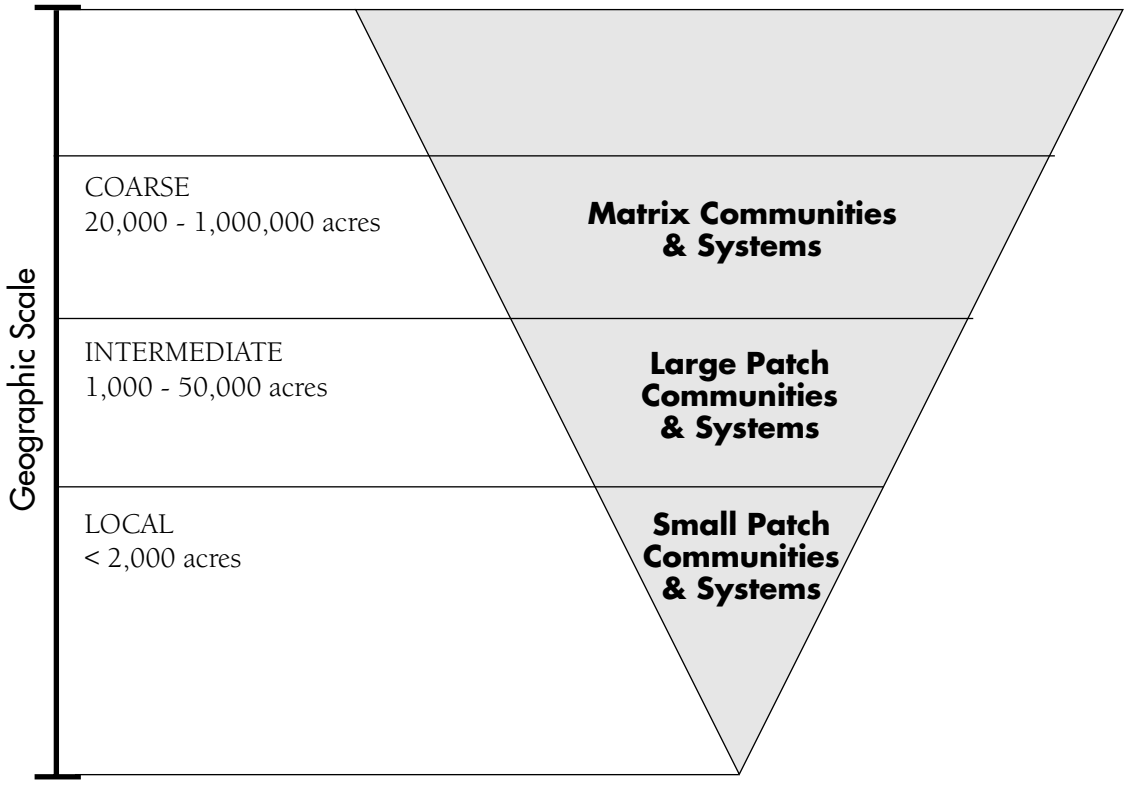
Regional Scale Species
- Caribou, moose, elk, pronghorn
- Wolves, jaguar, grizzly bear
- Migrating waterfowl, shorebirds
- American eel, Chinook salmon, Colorado pikeminnow

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



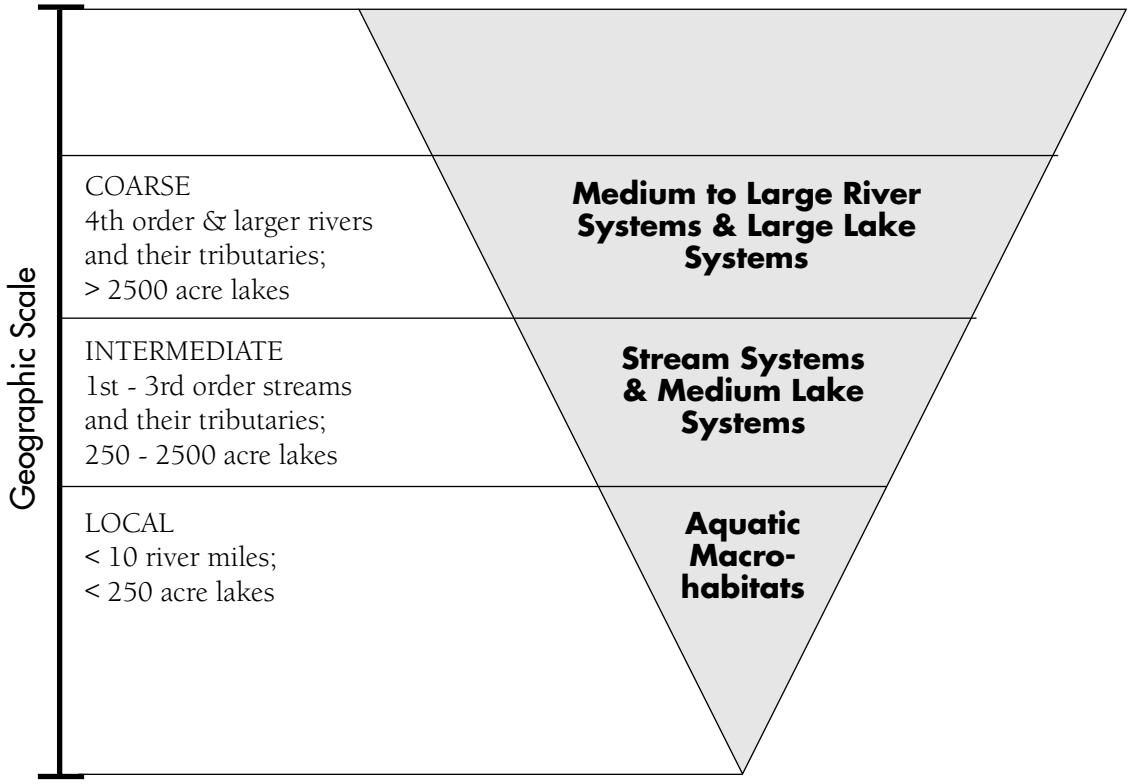
EXAMPLES

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



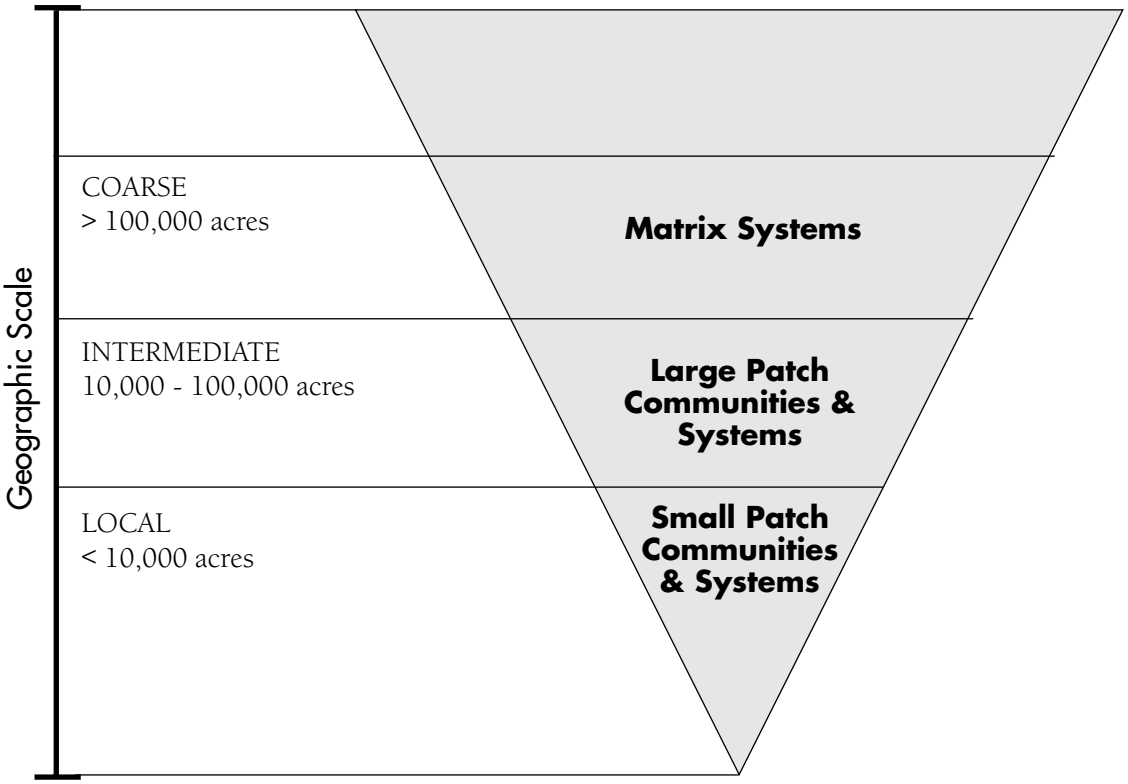
EXAMPLES

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

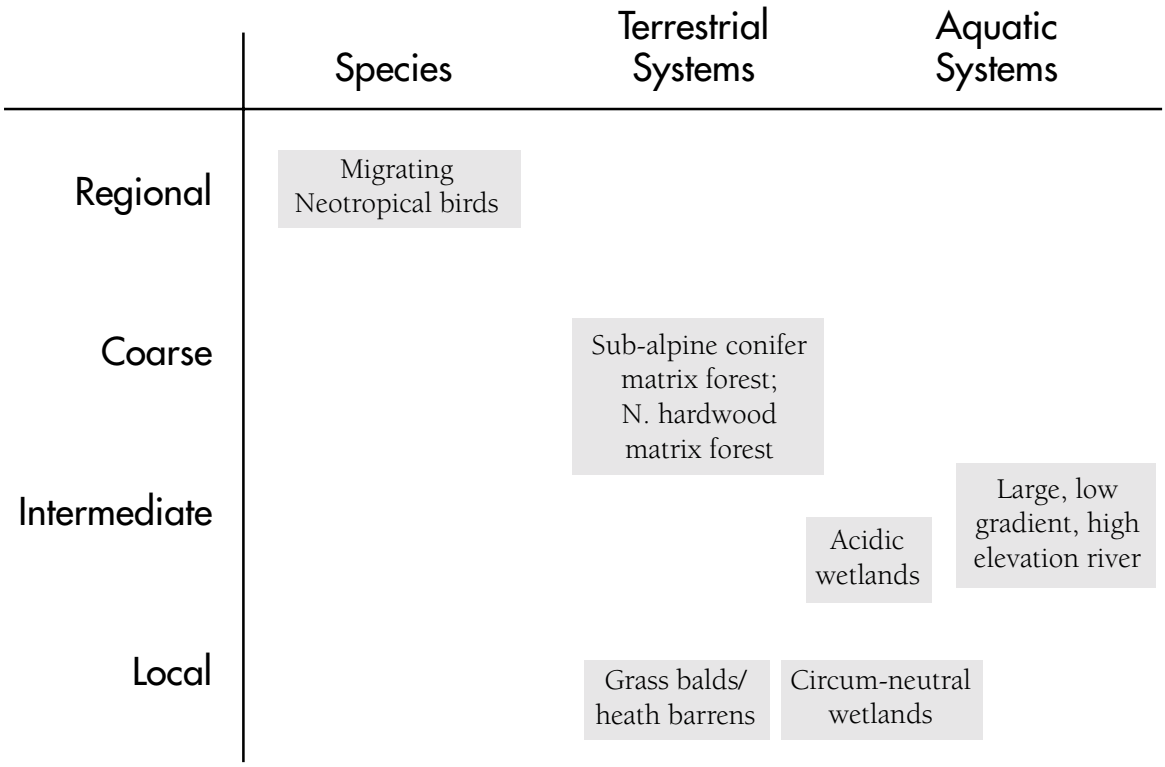
	Species	Terrestrial Systems	Aquatic Systems
Regional	Breeding colony of spotted bats		
Coarse	Sage grouse	Shrub-steppe matrix (i.e., assemblage of big sagebrush& bunchgrass communities	
Intermediate	Pygmy rabbit		Riparian vegetation complex
		Cliffs and talus habitats	
Local			Seeps and springs

GREATER EGLIN AIR FORCE BASE, FLORIDA*

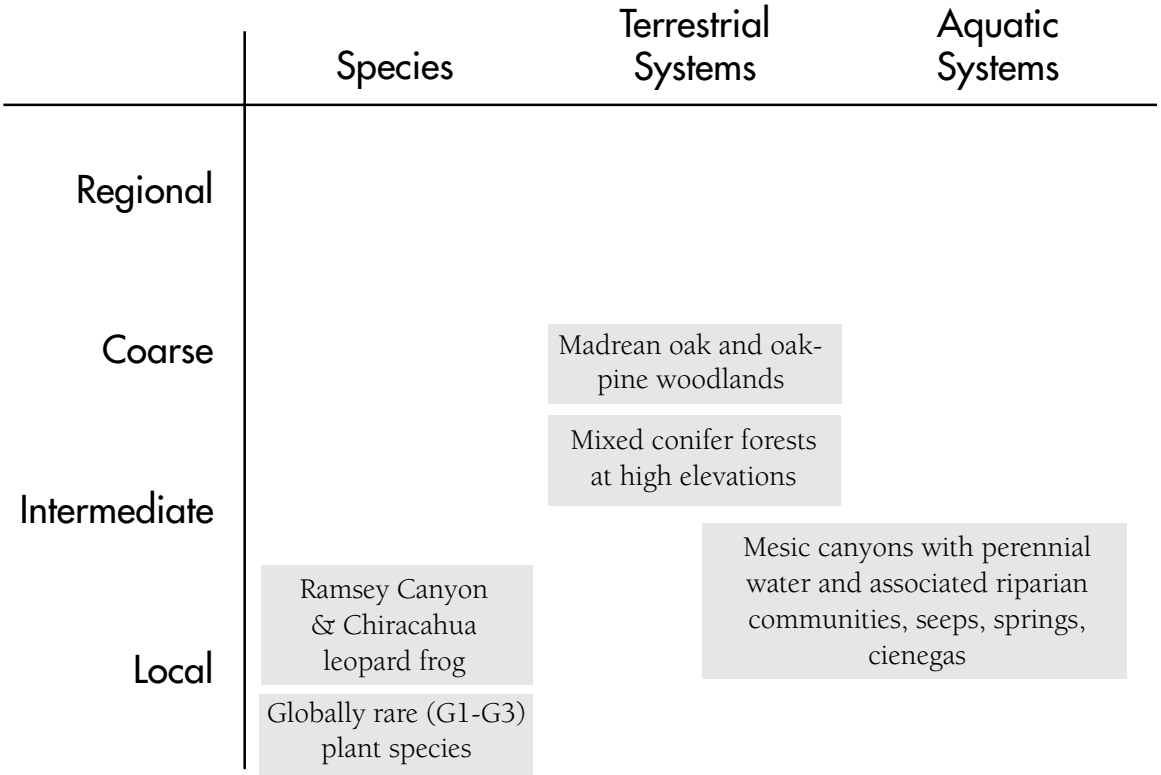
	Species	Terrestrial Systems	Aquatic Systems
Regional			
Coarse	Florida black bear	Longleaf pine sandhill forest matrix; Longleaf pine-mixed hardwood forest matrix	
	Red-cockaded woodpecker		
Intermediate		Seepage stream/slope forest complex (including 7 communities & 35 G1-G3 plant & animal species	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

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

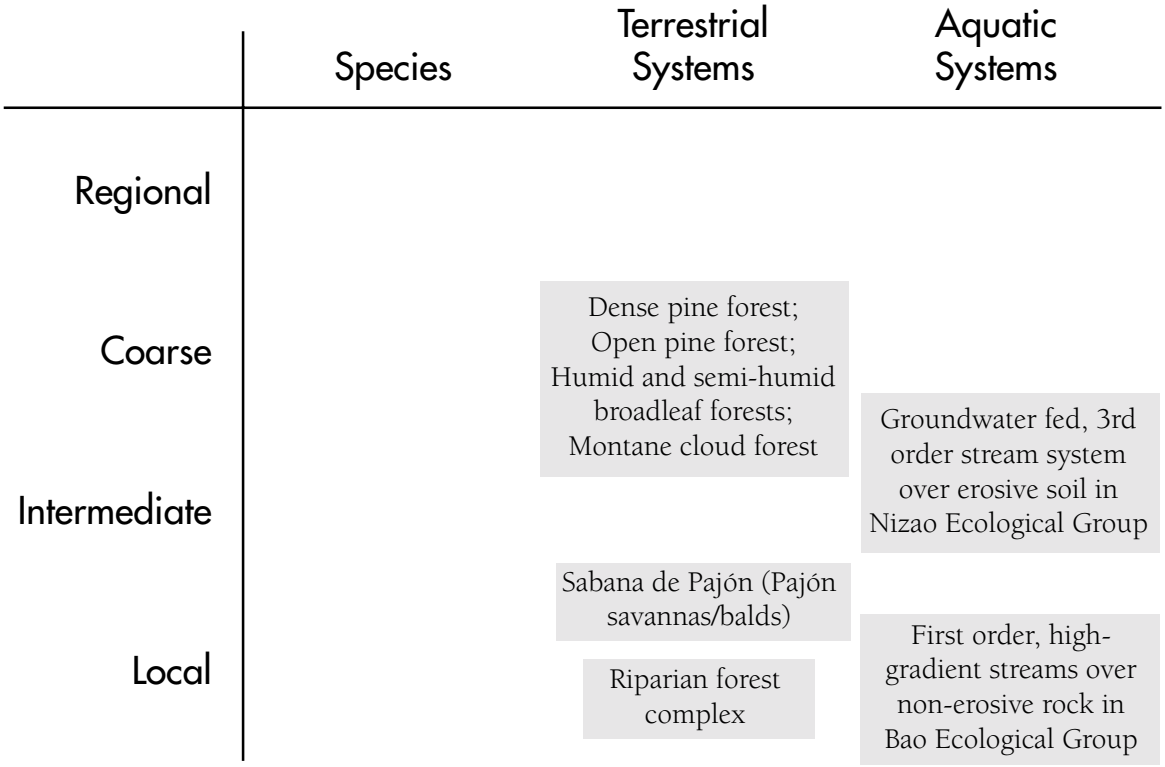
CANAAN VALLEY/DOLLY SODS, WEST VIRGINIA



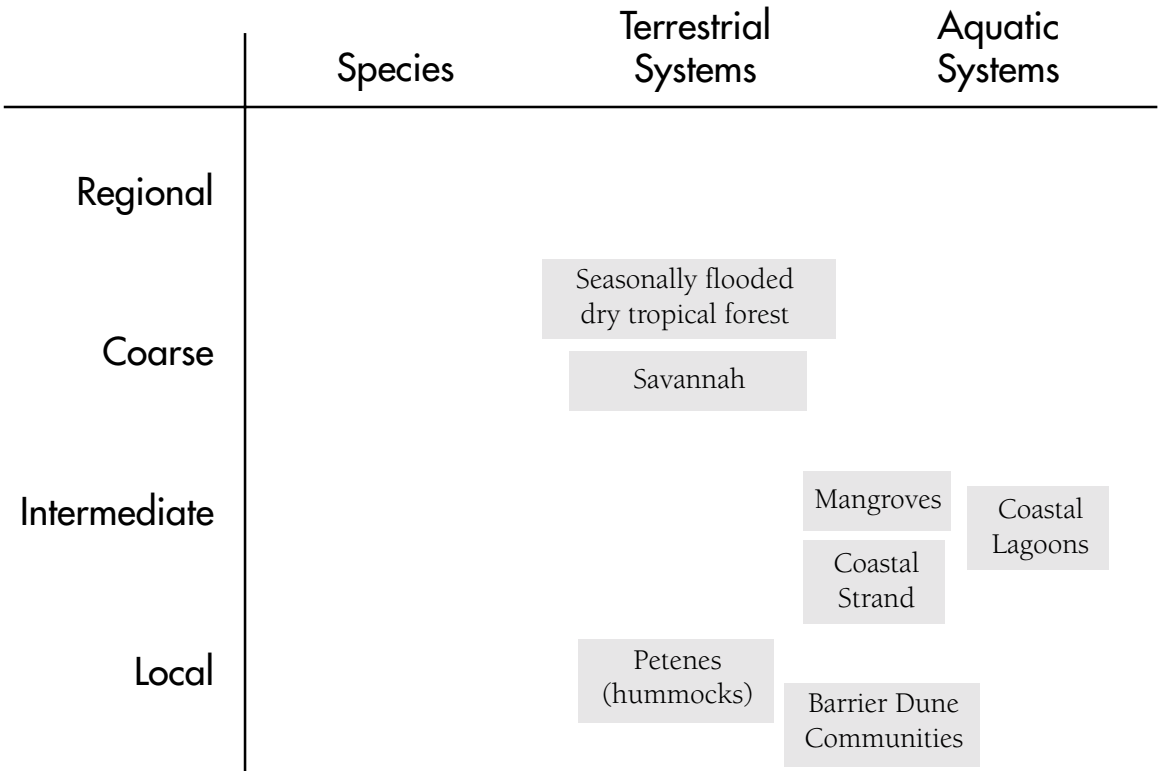
HUACHUCA MOUNTAINS, ARIZONA



MADRE DE LAS AGUAS, DOMINICAN REPUBLIC

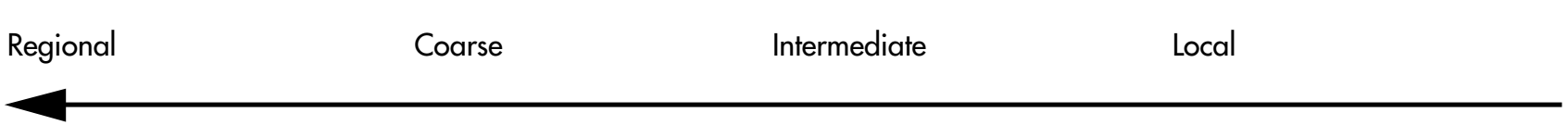


RÍA LAGARTOS AND RÍA CELESTÚN, YUCATAN PENINSULA



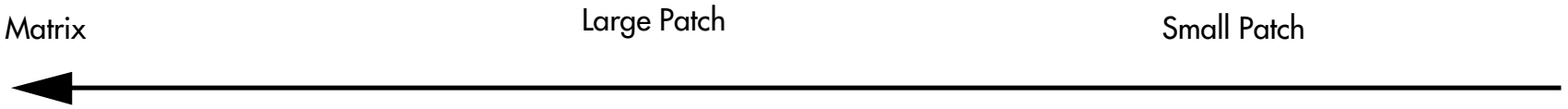
Conservation Target/Spatial Scale Worksheets

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



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

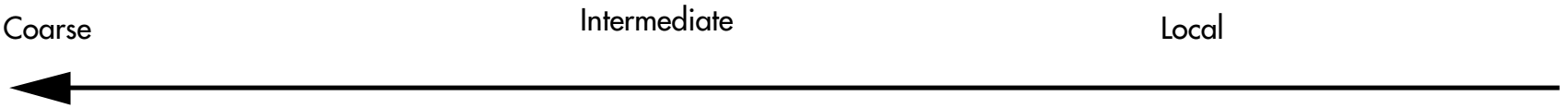
Medium-Large River Systems, Large Lake Systems

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 macroplots read every 1-3 years and before and after prescribed burns	Sampling occurs in 100m x 100m or 50m x 100m macroplots distributed 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 information 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**

Sources of Stress		Habitat Destruction		Modification of water levels		Threat-to-System Rank
		Very High		*High*		
Incompatible primary home development	Contribution	Very High	**Very High**	High	**Very High**	**Very High**
	Irreversibility	Very High		High		
	Source	*Very High*		*High*		
Excessive groundwater withdrawal	Contribution			Very High	**Very High**	**Very High**
	Irreversibility			High		
	Source			*Very High*		

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.

Appendix D

A Step-by-Step Approach to Developing Conservation Strategies

Conservation Strategies
Instructions

Use the attached *Summary of Strategies Worksheet* (refer to the *Illustrative Example*); or use the analogous automated worksheet on the Summary sheet of the Microsoft Excel workbook entitled *Site Conservation/Measures of Conservation Success Workbook*.

IDENTIFY CRITICAL THREATS AND PERSISTENT STRESSES.

Conservation strategies should be developed to address those active sources of stress with an Overall Threat rank of "Very High" or "High" (i.e., the critical threats), and for "Very High" ranked persistent stresses whose associated historical sources have an Overall Threat rank of "Very High" or "High".

Critical threats can be identified directly from the Threat Summary Worksheet for Active Sources (see Appendix A).

Persistent stresses can be identified in two steps:

- On the Threat Summary Worksheet for Historical Sources, identify historical sources that have a "Very High" or "High" Overall Threat ranking (see Appendix A).
- Using the Sources of Stress worksheets you have developed for each target (see Appendix A), trace these historical sources back to the "Very High" and "High" ranked stresses they have caused to each individual target. These stresses are the persistent stresses.

DEVELOP A LIST OF POTENTIAL STRATEGIES.

For each critical threat, devise a list of potential threat abatement strategies to evaluate. For each persistent stress, devise a list of potential restor-ation strategies to evaluate. State each threat abatement and restoration strategy as precisely as possible. For example, "control residential development" is too broad. "Secure an improved local development ordinance to limit density to agricultural areas" is more focused. Ultimately, you want to select **up to sixteen** conservation strategies to rank

RANK THE POTENTIAL STRATEGIES.

Rank each conservation strategy you identified according to the following factors, as described in Chapter VII of the handbook.

Benefits

- Abatement of either Critical Threats or Persistent Stresses
- Leverage

Probability of Success & Feasibility

- Lead individual and institution
- Ease and lack of complexity

Costs of Implementation

- Commitment of limited discretionary resources

The attached *Strategy Ranking Guidelines* provide a set of benchmarks and worksheet templates for ranking all of the six indicators except Abatement of Threats/Stresses, and rules for combining the ranks within each of the three factors—benefits, feasibility and probability of success, and costs of implementation. The set of rules for determining a strategy ranking, as a function of the three factors, is also provided in table form. (*Note: the benefits, feasibility, cost, and overall strategy rank, are computed automatically in the Summary of Strategies Worksheet on the Summary sheet of the Excel workbook.*)

Tables for ranking the restoration and threat abatement benefits of the strategies are found in the individual Stresses-Sources-Strategies worksheets. The tables are entitled "Strategies for Threat Abatement and Restoration" and are found below the Source of Stress table. Type in the first strategy in the first row. In the next column to the right, select the source at which the strategy is directed. If the strategy is directed at more than one source, copy the strategy to a new row and enter the next source. The worksheet will automatically pull-down the threat ranking for each stress-source combination when you enter the source from the pull-down list of selected sources. In the box to the right of the threat ranking, indicate if the strategy will reduce that ranking by one full rank or more. Continue this process for all the strategies developed to address Critical Threats and Persistent Stresses.

Ranking the Abatement of Critical Threats and Persistent Stresses indicator is best accomplished using the *Strategies for Threat Abatement and Restoration Table* in the Excel spreadsheet. *Note: Analogous manual instructions and lookup tables are not provided.*

Strategy Ranking Guidelines—BENEFITS

Abatement of Critical Threats

Use the *Strategies Worksheets* found on each individual target sheet of the Excel workbook entitled "Site Conservation/Measures of Success Workbook" to determine the Threat Abatement benefit of a threat abatement strategy.

Abatement of Persistent Stresses

Use the *Strategies Worksheets* found on each individual target sheet of the Excel workbook entitled "Site Conservation/Measures of Success Workbook" to determine the Persistent Stress Abatement benefit of a restoration strategy.

Note: a strategy can have either a threat abatement benefit or a persistent stress abatement benefit, not both.

Leverage — *Estimate any leverage towards* other *high-impact strategies.*	
Very High	Immediate, visible, tangible results and high leverage towards another high-impact strategy
High	Immediate, visible, tangible results or high leverage towards another high-impact strategy
Medium	Moderate leverage
Low	No apparent leverage

Overall Benefits Ranking Chart

↓ *LEVERAGE*	***CRITICAL THREAT/PERSISTENT STRESS ABATEMENT***			
	Very High	**High**	**Medium**	**Low**
Very High	Very High	Very High	High	Medium
High	Very High	High	Medium	Medium
Medium	Very High	High	Medium	Low
Low	Very High	High	Medium	Low

Strategy Ranking Guidelines—FEASIBILITY

Lead Individual/Institution	
Very High	A lead individual ("champion") with sufficient time, proven talent, substantial relevant experience and institutional support is available and committed to lead implementation of the strategy
High	An individual with sufficient time, promising talent, some relevant experience and institutional support is available and committed to lead implementation of the strategy
Medium	An individual with promising talent and sufficient time is available, but lacks relevant experience or institutional support
Low	No lead individual currently available

Ease/Lack of Complexity	
Very High	Implementing the strategy is very straightforward; this type of strategy has been done often before
High	Implementing the strategy is relatively straightforward, but not certain; this type of strategy has been done before
Medium	Implementing the strategy involves a fair number of complexities, hurdles andor uncertainties; this type of strategy has rarely been done before
Low	Implementing the strategy involves many complexities, hurdles and/or uncertainties; this type of strategy has never been done before

Overall Feasibility Ranking Chart

↓ ***EASE***	***LEAD INDIVIDUAL/INSTITUTION***			
	Very High	**High**	**Medium**	**Low**
Very High	Very High	High	High	Medium
High	High	High	Medium	Medium
Medium	High	Medium	Medium	Low
Low	Medium	Medium	Low	Low

Strategy Ranking Guidelines—COSTS

Discretionary TNC Dollars	
Very High	Total cost of implementing the strategy—including staff time—in unrestricted or discretionary TNC dollars (i.e., dollars that might be applied to other purposes) is *$1,000,000 or more*
High	Total cost of implementing the strategy—including staff time—in unrestricted or discretionary TNC dollars (i.e., dollars that might be applied to other purposes) is *$100,000 or more*
Medium	Total cost of implementing the strategy—including staff time—in unrestricted or discretionary TNC dollars (i.e., dollars that might be applied to other purposes) is *$10,000 or more*
Low	Total cost of implementing the strategy—including stafftime—in unrestricted or discretionary TNC dollars (i.e., dollars that might be applied to other purposes) is *$1,000 or more*

COST RANKING RULES:

Use the score above.

Overall Strategy Ranking Table

Benefits	Probability/ Feasibility	Costs	Strategy Rank
Very High	Very High	Low	*Very High*
		Medium	*Very High*
		High	*Very High*
		Very High	*Very High*
	High	Low	*Very High*
		Medium	*Very High*
		High	*Very High*
		Very High	*High*
	Medium	Low	*Very High*
		Medium	*Very High*
		High	*High*
		Very High	*High*
	Low	Low	*Very High*
		Medium	*High*
		High	*Medium*
		Very High	*Medium*
High	Very High	Low	*Very High*
		Medium	*Very High*
		High	*High*
		Very High	*High*
	High	Low	*Very High*
		Medium	*High*
		High	*High*
		Very High	*Medium*
	Medium	Low	*Very High*
		Medium	*High*
		High	*Medium*
		Very High	*Medium*
	Low	Low	*High*
		Medium	*Medium*
		High	*Low*
		Very High	*Low*

(table continued on facing page)

Overall Strategy Ranking Table (continued)

Benefits	Probability/ Feasibility	Costs	Strategy Rank
Medium	Very High	Low	*Very High*
		Medium	*High*
		High	*Medium*
		Very High	*Medium*
	High	Low	*High*
		Medium	*Medium*
		High	*Medium*
		Very High	*Low*
	Medium	Low	*High*
		Medium	*Medium*
		High	*Low*
		Very High	*Low*
	Low	Low	*Medium*
		Medium	*Low*
		High	—
		Very High	—
Low	Very High	Low	*High*
		Medium	*Medium*
		High	*Low*
		Very High	*Low*
	High	Low	*Medium*
		Medium	*Low*
		High	*Low*
		Very High	—
	Medium	Low	*Medium*
		Medium	*Low*
		High	—
		Very High	—
	Low	Low	*Low*
		Medium	—
		High	—
		Very High	—

Summary of Strategies Worksheet

Site _____

Strategies	Benefits				Feasibility			Costs	Overall
	Threat Abatement Rank	Persistent Stress Abatement Rank	Leverage	OVERALL BENEFITS	Lead Individual/ Institution	Ease of Implementation	OVERALL FEASIBILITY	OVERALL COST (TNC $)	OVERALL STRATEGY RANK

Summary of Strategies Worksheet—Illustrative Example

Site *Agate Desert, OR*

Strategies	Benefits				Feasibility			Costs	Overall
	Threat Abatement Rank	Persistent Stress Abatement Rank	Leverage	OVERALL BENEFITS	Lead Individual/ Institution	Ease of Implementation	OVERALL FEASIBILITY	OVERALL COST (TNC $)	OVERALL STRATEGY RANK
Guide the Wetland Conservation Plan	Very High	—	Very High	***Very High***	Medium	Medium	***Medium***	***Medium***	**Very High**
Secure title, easement, and management agreements	Very High	—	High	***Very High***	Very High	High	***High***	***Very High***	**High**
Develop landowner agreements with ODFW for habitat protection tax exemption	High	—	Medium	***High***	Medium	High	***Medium***	***Medium***	**High**
Develop, demonstrate, and encourage adoption of BMP's for range	High	—	Medium	***High***	Low	Medium	***Low***	***Medium***	**Medium**
Develop "grass bank", if feasible	High	—	Medium	***High***	Low	Medium	***Low***	***Medium***	**Medium**
Develop and implement comprehensive restoration plan	Medium	—	High	***Medium***	High	Medium	***Medium***	***Medium***	**Medium**
Develop and implement comprehensive and integrated weed management plan	Medium	—	Low	***Medium***	High	Medium	***Medium***	***Medium***	**Medium**
Develop and implement comprehensive fire management plan	Medium	—	Low	***Medium***	High	Medium	***Medium***	***Medium***	**Medium**

Appendix E

A Step-by-Step Approach to Assessing Conservation Capacity

Conservation Capacity
Instructions

Use the attached *Capacity Scorecard* (refer to the *Illustrative Example*); or use the analogous automated worksheet on the Capacity sheet of the Microsoft Excel workbook entitled *Site Conservation/Measures of Conservation Success Workbook*.

VERIFY THE TYPE OF SITE.

Conservation Capacity is assessed only at sites where the Conservancy is playing (or will play) a meaningful role, i.e., action sites. Action sites fall into three categories, as described in Chapter VIII (*Measuring Conservation Success*):

- Conservancy-led projects
- Joint ventures with partners
- Partner-led projects

ASSESS THE CAPACITY INDICATORS.

For those sites that meet the above criteria, score each capacity indicator on a scale of 1.0 to 4.0. The attached Capacity Assessment Guidelines provide a draft set of benchmarks for scoring the indicators.

ASSIGN OVERALL CAPACITY.

For each of the three capacity success factors, calculate the average score of the associated indicators. The overall average score is then calculated as the simple average of the three average success factor scores. Assign the Overall Capacity for the site as "Very High", "High", "Medium" or "Low" according to the following grading scale for the overall average score:

>= 3.5	Very High
3.0 – 3.4	High
2.0 – 2.9	Medium
< 2.0	Low

(Note: the Capacity score and rank, based on the assessment of the seven capacity indicators, is computed automatically in the Capacity Scorecard *on the Capacity sheet of the of the Excel workbook.)*

Capacity Scorecard

Site _____

Factor	Score
Project Leadership and Support	
Focused Staff Responsibility for Action Site	
Conservation Manager or Mentor	
Project Support Team	
Project Leadership and Support	
Strategic Approach	
Understanding/Application of TNC's Five "S's"	
Iterative, Adaptive Approach to Developing Strategies	
Strategic Approach	
Funding and Sustainability	
Start-Up or Short-Term Funding	
Sustainable Support	
Funding	
OVERALL AVERAGE	

OVERALL CAPACITY _____

Assign the Overall Capacity for the site as "Very High", "High", "Medium" or "Low" according to the following grading scale for the overall average score:

>= 3.5	Very High
3.0 – 3.4	High
2.25 – 2.9	Medium
< 2.0	Low

Capacity Scorecard—Illustrative Example

Site *Agate Desert, OR*

Factor	Score
Project Leadership and Support	
Focused Staff Responsibility for Action Site	3
Conservation Manager or Mentor	3
Project Support Team	2
Project Leadership and Support	*2.7*
Strategic Approach	
Understanding/Application of TNC's Five "S's"	4
Iterative, Adaptive Approach to Developing Strategies	N/A
Strategic Approach	*4.0*
Funding and Sustainability	
Start-Up or Short-Term Funding	3
Sustainable Support	3
Funding	*3.0*
OVERALL AVERAGE	**3.0**

OVERALL CAPACITY *High*

Assign the Overall Capacity for the site as "Very High", "High", "Medium" or "Low" according to the following grading scale for the overall average score:

>= 3.5	Very High
3.0 – 3.4	High
2.0 – 2.9	Medium
< 2.0	Low

Capacity Assessment Guidelines

Project Leadership and Support

Focused Staff Responsibility for Action Sites	
4	A staff member has (1) clearly assigned responsibility, authority, and accountability for conserving the site, (2) adequate experience, and (3) sufficient time to focus on developing and implementing conservation strategies at the site.
3	Staff member has any two, but not all three, elements of focused staff responsibility (responsibility, experience, time)
2	Staff member has no more than one of the three elements of focused staff responsibility (responsibility, experience, time)
1	No staff member with designated job responsibility for site conservation.

Conservation Manager or Mentor — *Involvement by experienced mentor or manager with proven results in conserving other sites that have a similar level of complexity—i.e., developing and implementing successful strategies to abate threats.*	
4	The project has regular, sufficient, ongoing, hands-on involvement by an experienced conservation manager or mentor (i.e., at least 5 years experience **and** proven results in conserving sites with a similar level of complexity).
3	The project has regular access to and advice and counsel from an experienced manager or mentor (i.e., at least 5 years experience **and** proven results in conserving sites with a similar level of complexity).
2	The project has regular access to and advice and counsel from a less-experienced conservation manager or mentor (i.e., less than 5 years experience and some initial promising results in conserving sites with a similar level of complexity).
1	The project does not have access, or has only sporadic access, to a conservation manager or mentor.

Project Support Team — *e.g., conservation science, protection, land and water management, applied research, government relations/public funding, development, operations*	
4	The project receives regular, high-level assistance from a full-service, experienced support team (e.g., on-site staff, state, country, international program, or partner organization staff).
3	The project receives assistance from a support team—but regular, high-level assistance is not available in one important functional area needed for successful strategy implementation.
2	The project receives assistance from a support team—but regular, high-level assistance is not available in two important functional areas needed for successful strategy implementation.
1	The project receives insufficient assistance in several functional areas.

Strategic Approach to the Project

Understanding/Application of the Five-S framework (systems, stresses, sources, strategies, success)	
4	Staff project director and multidisciplinary team have completed a thorough assessment of the five "S's" and developed a sufficiently documented site conservation plan and appropriate site maps.
3	Staff project director and multidisciplinary team have applied a "rapid" assessment of the five "S's" through the Efroymson Fellowship Program or otherwise, with preliminary or incomplete documentation and/or with insufficient site maps.
2	Project staff have participated in a site conservation planning meeting or other effort, but have not worked with multidisciplinary team to complete a rapid Five-S assessment or site conservation plan.
1	Project staff has not yet participated in strategic planning.

Iterative, Adaptive Approach to Developing and Implementing Key Conservation Strategies *(Note: This factor is not applicable to a new action site during its first year)*	
4	Key components of ecological systems and threat status are being monitored **and** multidisciplinary project team meets regularly (e.g. quarterly, biannually, or annually) to assess progress, evaluate results, review & test strategic hypotheses, and make necessary strategic adjustments.
3	Key components of ecological systems and threat status are being monitored **and** multidisciplinary project team has met within past two years to assess progress, evaluate results, review strategic hypotheses and make necessary strategic adjustments.
2	Haphazard monitoring of ecological systems and threat status **or** staff project director has met informally with others to assess progress and to re-assess the strategic plan (systems, stresses, sources and strategies).
1	Key components of ecological systems and threat status are not being monitored **or** no review or update of strategic plan.

Project Funding and Sustainability

Start-Up or Short-Term Funding — *Adequacy and predictability for operations and programs*	
4	Funding has been secured, pledged or is highly probable for core operations for at least two years, as well as major private or public funds to *implement* key conservation strategies.
3	Funding has been secured, pledged, or is highly probable for core operations for at least two years, as well as private/public funds to *develop and launch* key conservation strategies.
2	Funding has been secured or pledged for core operations for at least one year.
1	Funding has not been secured or pledged for core operations for one year.

Sustainable Support — *Development of a base of long-term funding, community support and institutional partners that will ensure continuity of strategy implementation at the site*	
4	The project has sufficiently developed a mix of long-term funding (broad donor base, endowment, or predictable funding), strong community support, and strong institutional partners.
3	The project has sufficiently developed two elements of sustainable support (funding, community support, or partners).
2	The project has sufficiently developed one element of sustainable support (funding, community support, or partners).
1	The project has none of the elements of sustainable support sufficiently developed.