ESCALANTE RIVER WATERSHED PARTNERSHIP

TEN-YEAR ACTION PLAN

Escalante River near Utah Hwy 12, © Tim Palmer

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[Appendices 7 and 8 are not included in this document because they were original static versions that were soon obsolete.]

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Introduction

The Escalante River is one of the last free-flowing small rivers in the American Southwest. Its watershed covers about 1.3 million acres in south-central Utah, within central Garfield and northeastern Kane Counties. The river arises on the southern slopes of the Aquarius Plateau and Boulder Mountain as a series of small streams that gradually merge, and then flows about 90 miles southeast through slickrock wilderness to where it ends in the waters of Lake Powell.

Despite its relative isolation and low density of permanent residents, the Escalante River watershed is subject to several concerns that may adversely affect its general "health." These concerns are listed below.

- At present, the greatest threat to the river and its associated riparian communities is the invasion and spread of noxious non-native plants, principally Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix ramosissima*). Other invasive exotics occur in surrounding areas of southern Utah that could ultimately invade the river corridor, especially Russian knapweed (*Centaurea repens*) and Ravenna grass (*Saccharum ravennae*). Despite extensive control efforts over the last 10 years by the National Park Service (NPS) and Bureau of Land Management (BLM), Russian olive is still an abundant species in portions of the watershed, and continues to re-invade previously cleared areas. In order to attempt eradication of Russian olive, a larger coordinated effort among the various land management agencies and private landowners and other interested groups would be needed.

- The release and spread of the tamarisk leaf beetle (*Diorhabda elongata*) is likely to alter riparian community dynamics significantly along the river, and may also increase fire frequency in such habitats.

- Water is scarce in the Southwest. Although it is largely undeveloped at present, the Escalante River and its tributaries remain subject to future water developments as human populations increase in the watershed's communities. Among potential new developments are additional small power plants such as the one now operating on Boulder Creek north of the town of Boulder, construction of small earthen dams on tributaries, and increased groundwater extraction for municipal/residential use, agricultural use, and energy development.

- The Escalante River watershed is one of the premier backcountry destinations in the west for hikers. Recreation has been increasing steadily since the establishment of the Grand Staircase-Escalante National Monument in 1996. Many more backcountry hikers, day users, and private commercial recreation companies now visit and operate in the watershed.

- Inappropriate wildlife introductions, such as exotic aquatic species, threaten the existence of the declining native fish species in the Escalante River, including Colorado River cutthroat trout, flannelmouth sucker, bluehead sucker, roundtail chub, and speckled dace.

- Changing ecological conditions in the higher portions of the watershed on Boulder Mountain are cause for concern. Recent tree die-offs from beetle kills and disease, loss of aspen, and drier conditions are affecting both water quality and quantity. Tree die-offs may be related to

the larger pattern of increased tree mortality in the western states resulting from warmer conditions, reduced snowpacks and earlier snow melting (Breshears et al. 2005; Westerling et al. 2006).

- Finally, predictions of 30-50% less water by the end of the century in the Colorado River Basin, which includes the Escalante watershed, would greatly aggravate existing concerns about water quantity and quality in the watershed (Cook et al. 2004).

Prompted by these concerns, a proposal was submitted to the National Park Foundation to conduct a workshop of diverse stakeholders who shared the vision of restoring and maintaining a relatively intact and natural Escalante River and its associated watershed. This workshop was held on 12 June 2009. It attracted a wide group of interested stakeholders, including private citizens, local outfitters, city and county government representatives, the State of Utah, and several federal agencies. The workshop had three primary goals:

1. Identify issues and concerns most important to the group.

2. Determine the level of interest for moving forward with an action plan to address the issues, concerns and opportunities.

3. Decide if an organization should be formed to help further restoration and collaboration of the natural, physical and cultural environment in the watershed.

The workshop was successful in all three areas. With respect to the third goal, workshop participants agreed to form a partnership, named the Escalante River Watershed Partnership (ERWP), to further the collaborative process and to integrate funding, skills, resources and needs across the wide representation of stakeholders. The fundamental purpose of the ERWP is expressed in the following Mission Statement:

> *Restore and maintain the natural ecological conditions of the Escalante River and its watershed and involve local communities in promoting and implementing sustainable land and water use practices.*

Further work on the second goal (above) gathered the accumulated knowledge of the 20 people who attended the workshop into an Action Plan for the ERWP, dated 20 September 2009. This initial document listed visions and goals of the ERWP in such subject areas as Partnership function, education/outreach, funding, and control of woody-invasives. This document remained as an unfinished work-in-progress for several months, until it was deemed best to step back and re-design a more-comprehensive Action Plan that addressed the broader array of concerns listed in the bullet points above. Accordingly, the ERWP formed an Action Plan Committee to implement this more-comprehensive approach. The purpose and members of this Committee appear in the text box near the top of the next page.

The Action Plan Committee first met in early March 2010, and this current Action Plan document is the result of the Committee's work over the succeeding 1½ years. This Action Plan serves not only as a guiding document and blueprint for the ERWP as a whole, but also as the

basis for other ERWP Committees (Science, Streams, Headwaters, Woody Invasives, Education & Outreach, Funding) to develop and implement their annual plans of work.

Purpose and members of the ERWP Action Plan Committee

Committee Purpose: Develop and ratify a *guiding document* that will serve the Partnership as the blueprint for short and long term goals to restore and maintain the natural ecological conditions of the Escalante River and its watershed and involve local communities in promoting and implementing sustainable land and water use practices.

Committee Members: John Spence (lead), Kim Anderson, Rhett Boswell, Dennis Bramble, Jim Catlin, Kim Crumbo, Terry DeLay, Walt Fertig, Mike Golden, Amber Hughes, Rob MacWhorter, Mary O'Brien, Curtis Oberhansly, Tim Peterson, Mike Scott, Brooke Shakespeare, Carolyn Shelton, Joel Tuhy, Linda Whitham, Mindy Wheeler.

Description of the Area

The Escalante River is a tributary of the Colorado River, and was the last river of its size to be discovered in the 48 contiguous United States. It is formed by the merging of North and Birch Creeks near the town of Escalante in Garfield County. The river flows southeast for approximately 90 miles (145 km), gathering the waters of other tributaries along the way, before joining Lake Powell in Kane County (Figure 1).

The headwaters of the Escalante River drain from the forested highlands of the Aquarius Plateau and Boulder Mountain, administered by the Dixie National Forest. Middle and lower reaches of the Escalante River flow through more-arid semi-desert lands administered by the Bureau of Land Management (Grand Staircase-Escalante National Monument) and National Park Service (Glen Canyon National Recreation Area). Blocks of private land surround the communities of Escalante and Boulder in valleys about where the upper forested lands transition to semi-desert lands. The lowest section of the river, southeast of Coyote Gulch, is now beneath the surface of Lake Powell.

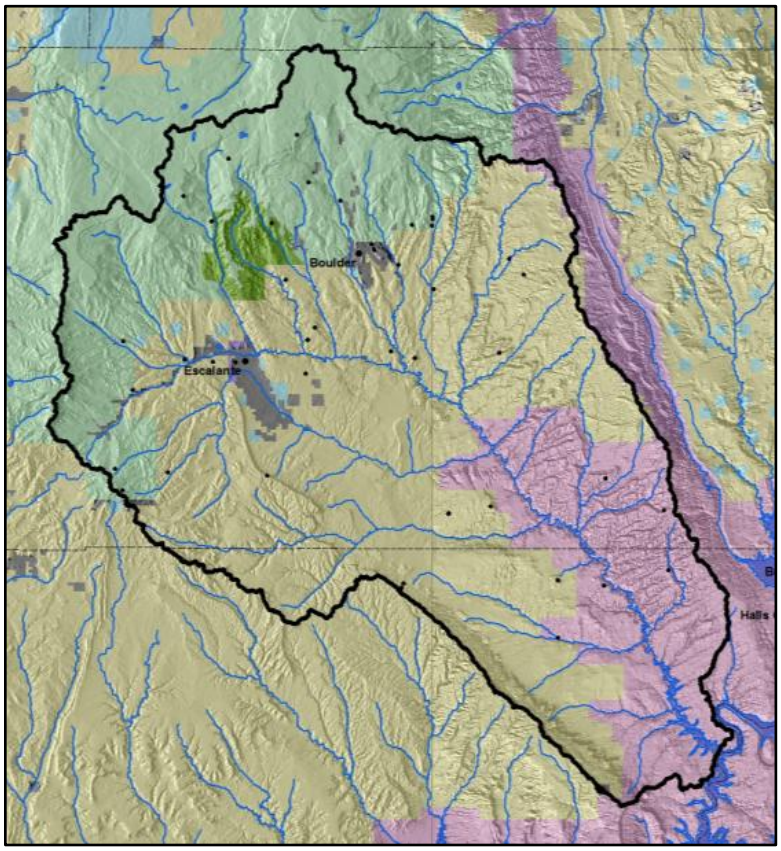

Figure 1. Escalante River watershed in south-central Utah.

The watershed area within the black line in Figure 1 covers about 1.3 million acres, or slightly more than 2,000 square miles. The watershed boundaries correspond with readily-defined regional topographic features. The north and northwest margins are the highlands of Boulder Mountain, Aquarius Plateau and Table Cliff Plateau. The southwestern margin is formed by the eastern escarpment of the Kaiparowits Plateau, known as Fiftymile Mountain. Between the Table Cliff and Kaiparowits Plateaus, the boundary follows ridgelines at the heads of Upper Valley Creek and Alvey Wash. On the east, the Waterpocket Fold forms a major topographic feature from Boulder Mountain on the north down to Lake Powell on the south. The terminus of the Escalante River is the body of Lake Powell, which reaches an elevation of 3,700 feet at full pool.

The geology of the watershed varies widely, with volcanic rocks dominant on Boulder Mountain and the Aquarius Plateau, and sandstones of the Glen Canyon Group (Navajo Sandstone, Kayenta Formation, Wingate Sandstone) from about 7,500 feet elevation down toward Lake Powell. Some areas in the lower watershed have extensive outcrops of the Chinle Formation (Doelling et al. 2003).

Much of the Escalante River's middle and lower course is through sinuous sandstone gorges. For most of the year it is a small stream, easily waded. During spring runoff or after major storm events, however, the river can become a raging, muddy torrent ten to one hundred times larger (Figure 2).

The system of the river and its tributaries is only moderately developed, with water diversions by the towns of Escalante and Boulder, some local agriculture, a small hydroelectric power plant (owned by Garkane Power) on Boulder Creek near Boulder, and one small dam (Wide Hollow Reservoir) on a tributary near Escalante. Thus flows are fairly natural, albeit with some reduction in base flow. The overall reduction in base flows with these developments and withdrawals for agriculture has not yet been determined.

Figure 2. The Escalante River in flood, October 2004 (John Spence/NPS).

The Escalante River watershed contains both montane and lowland riparian woodlands and shrublands. At lower elevations, gallery forests of Gooddings willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*), and shrub communities of coyote willow (*Salix*

exigua), are both common (Irvine and West 1979). These riparian habitats support a high diversity of migratory birds including the Southwestern willow flycatcher (listed endangered), possible Yellow-billed cuckoo (federal candidate for listing), Gray vireo and Lucy's warbler. Navajo Sandstone canyons have created a vast network of springs and hanging gardens which support a range of aquatic plants and animals, amphibians and reptiles. Adjacent uplands include extensive areas of barren slickrock, arid and semi-arid shrub communities, and pinyon-juniper (*Pinus edulis-Juniperus osteosperma*) woodlands.

Montane riparian habitats (>7,000 feet elevation) typically include stands of narrowleaf cottonwood (*Populus angustifolia*), a number of different willows (*Salix* spp.), river birch (*Betula occidentalis*), alder (*Alnus tenuifolia*), blue spruce (*Picea pungens*) and wild rose (*Rosa woodsii*) (Padgett et al. 1989). Adjacent uplands in the montane zone include a diverse array of plant communities, including aspen (*Populus tremuloides*), mixed conifer (*Pseudotsuga menziesii-Abies concolor-Pinus ponderosa*), Ponderosa pine (*Pinus ponderosa*), and subalpine spruce-fir (*Abies lasiocarpa-Picea engelmannii*) forests. Deep snowpacks often persist on the highest elevations of these bounding plateaus well into spring, and provide the water to maintain the many springs and creeks that merge into the Escalante River.

Some higher elevation streams in the watershed support remnant populations of the Colorado River cutthroat trout, a Conservation Agreement Species. The lower mainstem of the Escalante River supports three warmwater Conservation Agreement fish species: bluehead sucker, flannelmouth sucker, and roundtail chub. Surprisingly little work has been done documenting the biodiversity of the watershed to date, and it is likely that additional discoveries will be made as more biological surveys are completed (e.g., Fertig et al. 2009).

Some information exists for other wildlife in the watershed, primarily mammals, birds, reptiles, and amphibians (Atwood et al. 1980; Flinders et al. 2002; Oliver et al. 2003; Spence et al. 2009). Recent plant checklists have also been completed for the Grand Staircase-Escalante NM and Glen Canyon NRA (Welsh and Atwood 2002; Fertig 2005; Hill 2006). Relatively little is known about insects, other arthropods, and cryptobiotic life forms (Fertig et al. 2009).

The watershed contains two small communities, Escalante and Boulder, where settlement began in 1875 and 1889, respectively. 2010 census figures show the populations of Escalante and Boulder to be 797 and 226, respectively. Principal economic activities in the past included agriculture, ranching, and logging, with lesser amounts of recreation. In recent years, recreation has become a larger portion of the economic sector in these communities and their surrounding counties.

Methods

At its first meeting in early March 2010, the Action Plan Committee sought a systematic and comprehensive process to develop an Action Plan that would:

1. Address the various concerns listed earlier in the **Introduction** section; and

2. Identify specific actions that, when fully implemented, would achieve the Partnership's mission to "*Restore and maintain the natural ecological conditions of the Escalante River and its watershed and involve local communities in promoting and implementing sustainable land and water use practices.*"

CAP Process

For these two purposes, the Committee decided to adopt a planning procedure developed by The Nature Conservancy known as **Conservation Action Planning (CAP)**. CAP is a relatively fine scale of planning that is explicitly designed to identify specific "things to do" in order to achieve a particular purpose (in this case the mission of ERWP). The fundamental components of the CAP process are shown in the box below:

Conservation Action Planning (CAP)
Components / Steps:

1. **SELECT key features within the project area that are the "targets" to be restored or maintained. Within the Escalante River watershed, these targets took the form of particular habitats, several of which had imbedded species of concern.**

2. **ASSESS the integrity or "health" of selected habitats and species of concern.**

3. **IDENTIFY factors and activities ("threats") that are adversely affecting or inhibiting the health of the selected habitats and species of concern.**

4. **DEVELOP strategies and actions with stakeholders to abate impacts, and thus restore or maintain desired levels of health, of selected habitats and species of concern.**

Information gathered or created during each of these steps was entered in a TNC-developed workbook based in Microsoft Excel – the so-called "CAP Workbook". Beyond just storing the information, the CAP Workbook establishes linkages among the individual components (i.e. Targets ↔ Health ↔ Threats ↔ Strategies), and applies formulas to rank the components in various ways. Also, various *ad hoc* supporting files were created to accompany and expand upon certain components of the formal CAP Workbook.

The four steps of the CAP process are described in more detail in the following subsections.

1. Selection of Targets: particular habitats and imbedded species of concern that are to be restored or maintained.

The ERWP Mission Statement aims to "*Restore and maintain the natural ecological conditions of the Escalante River and its watershed...*" The term "natural ecological conditions" is rather vague, and poorly-suited as a specific measurable endpoint toward which concrete actions are to be directed.

Therefore, following the guidance of the CAP process, the Action Plan Committee identified and selected seven specific types of habitats in the watershed, several of which support characteristic species, that collectively represent the "natural ecological conditions" of the ERWP Mission. These habitats and imbedded species are the tangible, measurable manifestations – the currency, so to speak – of the "natural ecological conditions" that the ERWP seeks to restore and maintain.

2. Assess the integrity or "health" of selected habitats and species of concern.

The CAP Workbook assesses integrity or health status, both current and desired, of habitats and species using a feature known as Integrity Tables (a.k.a. Viability Tables). Integrity Tables have three primary components:

- Key Ecological Attributes – These are factors of abundance, environment, life history, etc. that are most crucial to the ability of the habitat or species to persist over long periods of time. Attributes are critical aspects of the biology or ecology that, if missing or altered, would lead to the loss of the habitat or species over time.
- Indicators – These are the things that are *measured* (i.e. they must be *measurable*) to represent the Key Ecological Attributes. The set of Key Attributes and their Indicators collectively captures information about the essential *functioning* of the selected habitats and species.
- Indicator Rating Classes – These classes divide the range of possible values for each Indicator into ecologically-meaningful segments. Four rating classes are typically defined for each Indicator, labeled as Poor, Fair, Good, and Very Good. In general, the threshold that defines "Integrity" for each Attribute/Indicator is the boundary between the Fair and Good classes.

The development of credible Integrity Tables in a CAP Workbook is not a trivial exercise. It is best done – achieves most reliable results – with input from people who are familiar with the biology/ecology of the habitats and species in question. The Action Plan Committee relied on specific knowledge possessed by some Committee members for several habitats, and consulted with external specialists where the Committee did not have such knowledge in-house.

3. Identify factors and activities ("threats") that are adversely affecting or inhibiting the health of the selected habitats and species of concern.

Threats are human actions or natural processes that push Key Ecological Attributes (as measured by their Indicators) of habitats or species "outside" of some defined level of health. In the context of an Integrity Table, threats are forces or causes that work in opposition to the sustaining of the Key Ecological Attributes. In a sense, threats are the "anti-attributes" for a habitat or species.

It is important to identify those threats that have the strongest, closest links with the Key Ecological Attributes that they affect. By so doing, strategies and actions taken to abate threats (see fourth sub-section below) should have maximum effectiveness in actually enhancing the integrity – i.e. improving the "health" – of the habitats or species.

A CAP process, such as this one for the Escalante River watershed, will usually assign names to threats on an area-specific, *ad hoc* basis. There is no prohibition against doing this. However, because other CAP processes are ongoing or completed elsewhere in the region, there is value in attempting to achieve a good degree of comparability across the components of these various CAP Workbooks. Toward this end, the Action Plan Committee assigned names to threats using a more-or-less standardized list or "taxonomy" of Threats that has been developed for Utah. The most recent working version of this Master List of Threats for Utah appears in Appendix 1.

The CAP Workbook contains a system to rank the *magnitude* of a threat, based on factors known as Scope, Severity, and Irreversibility. Definitions of these factors, and the rules for assigning ratings to them, appear in Appendix 2. The Action Plan Committee used these rules as best as possible to rate the various threats that they had identified and named in the CAP Workbook. Internal formulas within the Workbook automatically combine the individual ratings assigned to Scope, Severity, and Irreversibility into a single integrated ranking of Very High, High, Medium, or Low for each threat.

The naming and ranking of relevant threats in a CAP Workbook is also not a trivial exercise. It is best done via discussion among both: (1) habitat/species specialists, and (2) partners and stakeholders who are conversant with the breadth of land uses and resource management issues that affect those habitats and species. Again, the Action Plan Committee relied on such knowledge from both Committee members and external sources.

4. Develop strategies and actions with stakeholders to abate impacts, and thus restore or maintain desired levels of health, of selected habitats and species of concern.

This step represents the crux of the process, the point toward which the prior three steps are aimed – because if habitats and imbedded species are to be conserved in the Escalante River watershed, then the ERWP and/or its members must ***do things***, not merely plan indefinitely, no matter how sophisticated. As a general principle, actions are limited only by the creativity of their conceivers, and by the mandates and capacity of those who must implement them.

Therefore, once the threats to habitats and species were properly identified, the Action Plan Committee identified strategies and actions* to abate or diminish the adverse effects of those threats. Such strategies and actions covered a broad range, from physical on-the-ground treatment projects to agency management changes to higher-level policy changes.

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* Technically the CAP Workbook uses the terms Strategic Action and Action Step for these two levels (coarser and finer) of "things to do." For simplicity, the narrative description here refers to these two levels respectively as strategies and actions.

The structure of the CAP Workbook added a wrinkle into the Committee's identification of strategies and actions: the Workbook requires that strategies/actions be entered under what it terms Objectives. In other words, the Workbook first calls for a planning team (the Action Plan Committee) to state specific desired endpoints in terms of habitats' health or reduced threats. These desired endpoints – the Objectives – then serve as the guides for identifying what to do (strategies/actions) to reach those endpoints. This is relevant to explain here because in the **Results** section that follows, strategies and actions are organized under the headings of nine specific Objectives.

The CAP Workbook contains a system to rank strategies and actions, based on factors known as Benefit, Feasibility, and Cost. Definitions of these factors, and the rules for assigning ratings to them, appear in Appendix 3. The Action Plan Committee used these rules as best as possible to rate the various strategies that they had identified in the CAP Workbook. Internal formulas within the Workbook automatically combine the individual ratings assigned to Benefit, Feasibility, and Cost into a single overall ranking of Very High, High, Medium, or Low for each strategy/action.

The ranking of strategies in a CAP Workbook is not only non-trivial, but a convoluted and at-times confusing exercise on which the Action Plan Committee spent considerable time and energy. Even though the procedure produces a single Overall Rank (VH, H, M, L) for each strategy, the interplay among the Benefit, Feasibility, and Cost components creates a very large number of ways that (for example) a High ranking could be achieved. Thus the variability within each Rank class (VH, H, M, L) is so great as to make them not very useful as a way to compare and prioritize strategies.

Framework for Action Plan

Upon working through all four steps of the CAP process described above, the Action Plan Committee produced a list of 39 Strategic Actions, each with one or more subsidiary Action Steps, all organized under nine Objectives. While this body of information makes for an impressive-looking table, it was not yet what the Committee deemed to be a genuine Action Plan. To use an analogy from a bakery: the list of Objectives, Strategic Actions and Action Steps was like the list of ingredients for a cake, whereas an Action Plan would be the cake itself. The Committee thus devised a procedure, apart from the CAP Workbook, to convert the long list of "things to do" into an Action Plan – in other words, create a recipe and bake a cake from the ingredients at-hand.

In practical terms, this final, post-CAP step considered such things as when various strategies and actions would be done, who would lead and participate in doing them, how much the cost would be and where needed resources would come from. To capture such information, a new spreadsheet was created and named the **Framework for Action Plan**.

In this new **Framework** spreadsheet, the rows were the existing "ingredients" (Objectives, Strategic Actions and Action Steps), with columns identified for:

- the when: **Timeline** (**Year Begin**, **Year End**);

- the who: **Responsible Parties** (**Lead**, **Others**); and
- the how much: **Funding Need, Sources**.

Columns were also included to provide a brief narrative picture of what progress (**Benchmarks**) and final results (**Description of Endpoint**) would look like, as a way for the ERWP to keep its "eyes on the prize."

The Action Plan Committee distributed blank copies of the **Framework for Action Plan** to the ERWP's other Committees – Science, Streams, Headwaters, Woody Invasives, Education & Outreach, Funding – requesting each Committee to do two things:

1. Refine the wording of the existing strategies/actions under their purview, and

2. For those strategies/actions, fill in the blanks of the new columns – **Timeline, Responsible Parties**, **Funding**, etc.

A document with guidelines to the Committees for doing this task appears in Appendix 4.

A small subset of the Action Plan Committee then compiled all the responses, reconciled a few inconsistencies, and produced the current working version of the **Framework for Action Plan**. This **Framework** spreadsheet is the closest thing to a genuine Action Plan that the Committee will produce. It is intended to exist in two different forms:

1. A static table as a PDF or MS Word file (or both), which can readily be printed on large paper but cannot readily be manipulated or updated. As the years pass and the **Framework** requires updating, ultimately this static form will become little more than a dust-magnet.
2. An electronic Excel spreadsheet file, which can readily be manipulated and updated, but has purposely been constructed *not to be printable*. This Excel form is engineered to be easily searchable using functions such as filter, sort, etc. For example, as the ERWP Science Committee begins to prepare its annual plan of work for 2012, members can use the Excel filter function to show all (and only) the strategies/actions planned to begin in 2012 for which the Science Committee is identified as having Lead responsibility.

Having now produced this document and its centerpiece – the **Framework for Action Plan** – the Action Plan Committee will greatly scale back as the ERWP's other Committees ramp up their work on the strategies and actions that the **Framework** identifies. The Action Plan Committee will not disband, but will remain dormant and available for small refinements to the **Framework** on an irregular as-needed basis, and for larger reviews/revisions of the **Framework** on a longer periodic basis.

Results and Discussion

CAP Process

1. Selection of Targets: particular habitats and imbedded species of concern that are to be restored or maintained.

The Action Plan Committee selected seven specific types of habitats in the Escalante River watershed on which to focus the CAP process. Effective conservation of these habitats, within the context of legal and valid human uses of the area's lands and waters, would substantially achieve the ERWP Mission to "*Restore and maintain the natural ecological conditions of the Escalante River and its watershed and involve local communities in promoting and implementing sustainable land and water use practices.*" These seven habitats are listed and briefly described below:

Lowland Riparian: Habitats along the margins of streams that have surface or subsurface flow much of the year, below 7,000 feet elevation (roughly the elevation of Boulder).

Montane Riparian: Habitats along the margins of streams that have surface or subsurface flow much of the year, above 7,000 feet elevation.

Cold Water Lotic: The flowing water itself of streams – as distinct from streamside riparian habitats – above 7,000 feet elevation. Colorado River cutthroat trout is a Conservation Agreement fish species that occurs in some coldwater streams of the watershed.

Warm Water Lotic: The flowing water itself of streams below 7,000 feet elevation. Three fish Conservation Agreement species occur in some warmwater streams of the watershed: bluehead sucker, flannelmouth sucker, and roundtail chub.

Aspen: Forested habitats at montane and subalpine elevations where aspen is present and usually dominant. Expressions of this habitat are variable over space and through time, and range from pure aspen stands to stands with varying amounts of conifers: chiefly Douglas-fir, white fir, subalpine fir, and Engelmann spruce.

Lowland Springs: Habitats generally along the sides or in the bottoms of sandstone canyons below about 7,000 feet elevation, where water surfaces from underground aquifers. Examples known as hanging gardens occur along the sides of canyons at interface zones where water-holding rocks overlie impervious rocks (e.g. Navajo Sandstone over Kayenta Formation).

Montane Wet Meadows: A diverse collection of moist- and wet-site habitats above 7,000 feet elevation that are not specifically associated with flowing streams. Examples include topographic low-points that may or may not have central ponds, and locations where water surfaces from underground aquifers.

2. Assess the integrity or "health" of selected habitats and species of concern.

Contents of the CAP Workbook's Integrity Table for each of the seven habitats are presented in Appendix 5. This large table is included mainly for illustrative purposes, because it is basically a "snapshot" from the CAP Workbook. In order to take advantage of the full functionality of these

Intergity Tables, such as using the Wizards, or viewing comments associated with cells (shown by turquoise shading), it is necessary to access them within the CAP Workbook itself. Some habitats, such as Montane Wet Meadows, still have refinements or additions awaiting entry into their appropriate part of the Table. As an Excel file, the CAP Workbook is a "living" product that is intended to be updated as new or better information becomes available. For now, the end result of this whole process – the **Framework for Action Plan** itself – is based on the contents of the Integrity Tables as they currently exist (October 2011). If future revisions to Integrity Tables "ripple" through and beyond the CAP Workbook to the point where the **Framework** also requires adjustment, that can readily be done because the Excel-based **Framework** is likewise a "living" product.

3. Identify factors and activities ("threats") that are adversely affecting or inhibiting the health of the selected habitats and species of concern.

A summary table of threats-by-habitat, showing results of the multi-factor threat ranking procedure, is presented in Appendix 6. Again, this table is included mainly for illustrative purposes. It does not show the ratings of the individual factors (Scope, Severity, Irreversibility), nor does it contain the various functionalities of the summary table within the CAP Workbook itself.

4. Develop strategies and actions with stakeholders to abate impacts, and thus restore or maintain desired levels of health, of selected habitats and species of concern.

The most recent working list of Strategic Actions and Action Steps, organized under nine Objectives, appears in Appendix 7. This list reflects the refinements to wording that were done by the ERWP's other Committees, as mentioned earlier on page 10.

The summary table of Strategic Actions that shows results of the complicated multi-factor ranking procedure is not presented in or with this document, for three main reasons:

1. The ranking was done only for Strategic Actions, not their subsidiary Action Steps.
2. As mentioned earlier (page 9), the interplay among the separate rating components causes a large amount of variability within each Rank class (VH, H, M, L), to the point that the resulting single Overall Rank value for each Strategic Action is not very useful as a way to compare among and prioritize the Strategic Actions.
3. Most importantly, the Strategic Actions that were ranked by the Committee were the "older" set prior to the refined wording that they now have (as in Appendix 7).

Framework for Action Plan

The large table representing the current working version of the **Framework for Action Plan** appears in Appendix 8. This is the static version described at the bottom of page 10 that can readily be printed on large paper (11 x 17 in this case), but cannot readily be manipulated or updated.

The electronic version of the **Framework**, designed to be manipulated and updated but not printed, is an Excel file named **Framework for Action Plan Expanded 2011-10-31.xlsx**. The Action Plan Committee remains available to update or revise this **Framework** file on an *ad hoc* basis as the need may arise. The Committee also believes that a more-comprehensive review of the **Framework** file would be useful on a periodic basis, perhaps at annual or two-year intervals, but such a recurring schedule has not yet been made formal.

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APPENDIX 1. Working Master List of Threats for Utah, 6/17/2009.

Based on: IUCN-CMP Unified Classification of Direct Threats, ver 1.0, 1 June 2006.
= TNC Common Taxonomy of Threats (Sources) from CAP Workbook v5a 11/19/2008.

IUCN-CMP L1 Code	IUCN-CMP L2 Code	TNC CAP Code	UTAH L3 Code	Level 1 IUCN-CMP Threat Level 2 IUCN-CMP Threat Level 3 Utah-Specific Threat
1				**Residential & Commercial Development** Threats from human settlements or other non-agricultural land uses with a substantial footprint
	1.1	T10.10		Development-Residential
	1.2	T10.20		Development-Industrial/Commercial
			1.2.1	Expansion of Military Installations
			1.2.2	Landfill Operation
			1.2.3	Power Generation
	1.3	T10.30		Development-Tourism/Recreational
2				**Agriculture & Aquaculture** Threats from farming and ranching as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture
	2.1	T20.10		Agricultural Development & Practices
	2.2	T20.30		Wood & Pulp Plantations
	2.3	T20.40		Livestock Farming & Ranching
			2.3.1	Improper Grazing-Livestock
			2.3.2	Livestock Feedlot
			2.3.3	Water Developments for Livestock
	2.4	T20.50		Marine & Freshwater Aquaculture
3				**Energy Production & Mining** Threats from production of non-biological resources
	3.1	T30.10		Oil & Gas Drilling
	3.2	T30.20		Mining & Quarrying
			3.2.1	Hardrock Minerals
			3.2.2	Sand & Gravel (Disposables)
			3.2.3	Oil Shale
	3.3	T30.30		Renewable Energy
			3.3.1	Geothermal Development
			3.3.2	Solar Power Facilities
			3.3.3	Wind Power Facilities
			3.3.4	Hydro Power Facilities
4				**Transportation & Service Corridors** Threats from long narrow transport corridors and the vehicles that use them including associated wildlife mortality
	4.1	T40.10		Roads & Railroads
			4.1.1	Roads-Transportation Network
			4.1.2	Roads-Energy Development
			4.1.3	Railroads
	4.2	T40.20		Utility & Service Lines
			4.2.1	Utility Lines/Towers-Power&Communication
			4.2.2	Pipelines/Powerlines-Energy Development
	4.3	T40.30		Shipping Lanes
	4.4	T40.40		Flight Paths
5				**Biological Resource Use** Threats from consumptive use of "wild" biological resources including both deliberate and unintentional harvesting effects; also persecution or control of specific species
	5.1	T50.10		Hunting & Collecting Terrestrial Animals
			5.1.1	Harvest-Unregulated/Illegal
			5.1.2	Collection-Commercial/Excessive
			5.1.3	Poisoning
	5.2	T50.20		Gathering Terrestrial Plants
			5.2.1	Collection-Commercial/Excessive
	5.3	T50.30		Logging & Wood Harvesting
			5.3.1	Improper Forest Management
			5.3.2	Woodcutting for Fuel/Posts
	5.4	T50.40		Fishing & Harvesting Aquatic Resources
6				**Human Intrusions & Disturbance** Threats from human activities that alter, destroy and disturb habitats and species associated with non-consumptive uses of biological resources
	6.1	T60.10		Recreational Activities
			6.1.1	Motorized Recreation
			6.1.2	Camping (dispersed)
			6.1.3	Cave/Mine Exploration
			6.1.4	Hiking/Foot Travel
			6.1.5	Low-Level Aircraft Flights
			6.1.6	Mountain Biking
			6.1.7	Pack/Saddle Stock
			6.1.8	River Rafting
			6.1.9	Rock Climbing
			6.1.10	Skiing
			6.1.11	Snowmobiling
	6.2	T60.20		Military Training and Operations
	6.3	T60.30		Work & Other Activities
			6.3.1	Low-Level Aircraft Flights
			6.3.2	Motorized Travel

APPENDIX 1. Working Master List of Threats for Utah, 6/17/2009.

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IUCN-CMP L1 Code	IUCN-CMP L2 Code	TNC CAP Code	UTAH L3 Code	Level 1 IUCN-CMP Threat Level 2 IUCN-CMP Threat Level 3 Utah-Specific Threat
7				**Natural System Modifications** Threats from actions that convert or degrade habitat in service of "managing" natural or semi-natural systems, often to improve human welfare
	7.1	T70.10		Fire & Fire Suppression
			7.1.1	Fire Suppression
			7.1.2	Fire-Increased Freq & Intensity
	7.2	T70.20		Dams & Water Management/Use
			7.2.1	Presence of Dams/Diversions
			7.2.2	Dam/Reservoir Operation
			7.2.3	Dam Safety
			7.2.4	Channelization/Bank Alteration
			7.2.5	Groundwater Pumping
			7.2.6	Spring Capping
			7.2.7	Agricultural/Municipal/Industrial Water Usage
			7.2.8	Water Allocation Policies
			7.2.9	Salinity Alteration (of water)
			7.2.10	Sediment Loading (of water)
			7.2.11	Diking/Pumping-specific to GSL
	7.3	T70.30		Other Ecosystem Modifications
			7.3.1	Brush Eradication/Veg Treatments
			7.3.2	Seeding Nonnative Plants
			7.3.3	Rip-rap/Other Streambank Stabilization
			7.3.4	Water Developments for Wildlife
			7.3.5	Mine Closures
8				**Invasive & Other Problematic Species & Genes** Threats from non-native and native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance
	8.1	T80.10		Invasive Non-Native/Alien Species
			8.1.1	Invasive Animal Species-Nonnative
			8.1.2	Invasive Plant Species-Nonnative
			8.1.3	Improper Grazing-Wild Horses
			8.1.4	Feral Ungulates
			8.1.5	Domestic/Feral Pets
			8.1.6	Insects and Pathogens-Alien Organisms
			8.1.7	Hybridization-With Nonnative Spp
			8.1.8	Excess Predation-By Nonnative Spp
			8.1.9	Competition-From Nonnative Spp
	8.2	T80.20		Problematic Native Species
			8.2.1	Invasive Animal Species-Native
			8.2.2	Invasive Plant Species-Native
			8.2.3	Improper Grazing-Wildlife
			8.2.4	Pinyon-Juniper Encroachment
			8.2.5	Insects and Pathogens-Endemic Organisms
			8.2.6	Hybridization-With Native Spp
			8.2.7	Excess Predation-By Native Spp
			8.2.8	Competition-From Native Spp
			8.2.9	Nest Parasitism
	8.3	T80.30		Introduced Genetic Material
9				**Pollution** Threats from introduction of exotic and/or excess materials or energy from point & nonpoint sources
	9.1	T91.10		Household Sewage & Urban Waste Water
	9.2	T91.20		Industrial & Military Effluents
			9.2.1	Heavy Metal Deposition
	9.3	T91.30		Agricultural & Forestry Effluents
			9.3.1	Agricultural Pollution
			9.3.2	Soil Erosion/Loss
	9.4	T90.30		Garbage & Solid Waste
	9.5	T91.50		Air-Borne Pollutants
			9.5.1	Atmospheric Deposition
			9.5.2	Soil Movement/Deposition
	9.6	T91.60		Excess Energy
			9.6.1	Noise Pollution
			9.6.2	Thermal Alteration (of water)
10				**Geological Events** Threats from catastrophic geological events
	10.1	T100.10		Volcanoes
	10.2	T100.20		Earthquakes/Tsunamis
	10.3	T100.30		Avalanches/Landslides
11				**Climate Change & Severe Weather** Threats from long-term climatic changes which may be linked to global warming and other severe climatic/weather events that are outside of the natural range of variation, or potentially can wipe out a vulnerable species or habitat
	11.1	T110.10		Habitat Shifting & Alteration
	11.2	T110.20		Droughts
	11.3	T110.30		Temperature Extremes
	11.4	T110.40		Storms & Flooding

APPENDIX 2

Rules for applying factors of Scope, Severity and Irreversibility to the ranking of Threats.

Scope	**Very High**	70%-100% of target's extent within site is affected by Threat
	High	50%-70% of target's extent within site is affected by Threat
	Medium	30%-50% of target's extent within site is affected by Threat
	Low	10%-30% of target's extent within site is affected by Threat
	N/A	<10% of target's extent within site is affected by Threat **THREAT DOES NOT APPLY TO TARGET**

Severity	**Very High**	Where threat happens, target is likely to be destroyed or eliminated **CATASTROPHIC**
	High	Where threat happens, target is likely to be seriously degraded **DAMAGING**
	Medium	Where threat happens, target is likely to be moderately degraded **TROUBLING**
	Low	Where threat happens, target is likely to be slightly impaired **ANNOYING**
	N/A	Threat has minimal or no affect on target **THREAT DOES NOT APPLY TO TARGET**

Irreversibility	**Very High**	Not reversible
	High	Reversible but not practically affordable
	Medium	Reversible with a reasonable commitment of resources
	Low	Easily reversible at low cost
	N/A	N/A

Severity can apply to past events (legacies) or to future threats.

Irreversibility is defined as the worse of:

the ability to remove (ameliorate) the Threat itself; or

the ability of the target to bounce back (resilience).

APPENDIX 3
Rules for applying classes of Benefit, Feasibility, and Cost to the ranking of Strategies.

Strategy Ranking Factor: BENEFIT
Five sub-factors: Contribution, Duration, Leverage, Threat Abatement, Viability Enhancement

Contribution

The degree to which the proposed strategic action, if successfully implemented, will contribute to the achievement of the Objective(s):

Very High: The strategic action, **in itself**, achieves one or more objectives.

High: The strategic action makes a **substantial contribution** towards achieving one or more objectives, but is not by itself sufficient.

Medium: The strategic action makes an **important contribution** towards achieving one or more objectives.

Low: The strategic action makes a **relatively small contribution** towards achieving one or more objectives.

Duration

The degree, to which the proposed strategy, if successfully implemented, is likely to secure a long-lasting outcome.

Very High: The strategy, if successfully implemented, is likely to achieve an **enduring, long-lasting outcome** (e.g. acquisition of fee interest in land; an ongoing management practice; a very secure public policy).

High: The strategy, if successfully implemented, is likely to achieve an outcome with a **relatively long (e.g. 10 year) duration** (e.g. partial interest in land; solid but potentially vulnerable public policy change).

Medium: The strategy, if successfully implemented, is likely to achieve an outcome of **moderate duration (e.g. 3 year** management agreement).

Low: The strategy is likely to achieve an outcome with a **very short duration (e.g. handshake agreement;** 1 year management plan; stopgap policy).

Leverage

Estimate any leverage towards other high-impact strategies (Default = Low).

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.

Threat Abatement: Automatically calculated by Workbook

Viability Enhancement: Automatically calculated by Workbook

APPENDIX 3
Rules for applying classes of Benefit, Feasibility, and Cost to the ranking of Strategies.

Strategy Ranking Factor: FEASIBILITY
Three sub-factors: Lead Individual/Institution, Ease of Implementation, Ability to Motivate Key Constituencies

Lead Individual / Institution

Very High: A lead individual ("**champion**") with sufficient time, proven talent, substantial relevant experience and institutional support is reasonably available and committed to lead implementation of the strategy.

High: An individual with sufficient time, promising talent, some relevant experience and institutional support is reasonably available and **committed to lead** implementation of the strategy.

Medium: An individual with promising talent and sufficient time is **reasonably available**, but lacks relevant experience or institutional support.

Low: **No lead** individual currently available.

Ease of Implementation

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 and/or 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

Ability to Motivate Key Constituencies

To what degree are the key constituencies (e.g. landowners, public officials, interest groups) whose involvement is critical to implementing the strategic action well understood, and the strategic action is likely to appeal to their key motives.

Very High: The **key constituencies** and their motives **are well understood** and the strategic action **is likely to** appeal to their key motives.

High: The **key constituencies are well understood** and the strategic action **may** appeal to their key motives.

Medium: The **key constituencies are somewhat understood** and the strategic action may appeal to their key motives.

Low: The **key constituencies are not well understood** and it is uncertain whether the strategic action will appeal to their key motives.

APPENDIX 3
Rules for applying classes of Benefit, Feasibility, and Cost to the ranking of Strategies.

Strategy Ranking Factor: COST

Very High: $1,000,000 or more.

High: $100,000 or more.

Medium: $10,000 or more.

Low: $1,000 or more.

APPENDIX 4

Guidelines for Committees to fill in the **Framework for Action Plan** spreadsheet file.

Re-Wording Strategies / Adding Action Steps

At the outset, it is very important for each Committee to:

- review their selected or assigned Strategies as they are currently written, and then
- re-word the Strategies, **or** add subsidiary Action Steps, so that each "thing-to-do" is at the "right" level of specificity....
  - for the geographic scope of the undertaking (Escalante River Watershed), and
  - for the Action Plan to be a readable and usable product.

For example, the two Strategies shown in the box below are about at the extremes of the specificity range within the whole set:

Broad/coarse		Narrow/fine
Restore ecosystem processes that will benefit coldwater and warmwater lotic habitats and their native fishes.		Implement barrier at Lake Powell to prevent non-native fishes coming up from the Lake.

As has been noted multiple times, the Strategy on the left basically restates the Mission of the Partnership, and could use some re-wording to make it more specific – **or** (maybe better) it needs a series of subsidiary Action Steps to pull out the desired greater detail. The Strategy on the right may be okay as-is, or it could be reduced to an Action Step beneath another more broadly-stated Strategy of similar type (probably under the same Objective).

Two guidelines for Committees to follow if they re-word Strategies are:

1. Aim for parallel language structure, where:
   - Strategies and action steps are like verbs (i.e. processes, doing). **For example** – the broad/ coarse Strategy in the box above is phrased in terms of doing something: "*Restore* ecosystem processes that will benefit coldwater and warmwater lotic habitats and their native fishes."
   - Objectives, benchmarks, and endpoints are like nouns (i.e. states, being). **For example** – Objective 3 is a description of what a desired state or endpoint looks like: "The native fish community *is* mostly intact and self-sustaining with few if any non-native species."
2. Do not:
   - change the meaning or concept of any Strategy, so as not to deviate from what the Partnership approved in Richfield on January 25.
   - introduce language that could be considered as inflammatory (though Action Plan Committee review of draft Action Plan products would likely catch potential instances of this).

Further, a suggestion was made at the January 25 Partnership meeting that Strategies would be most widely acceptable or palatable when couched in terms such as *understand..., learn why..., provide information to...*, etc. This may be true, but if applied across-the-board this approach would seem to diminish the role and effectiveness of the Partnership as a proactive force working directly to achieve its own Mission statement. The Action Plan Committee may need to consider the tradeoffs between palatability and potency, and work with Committees as needed to re-word Strategies and/or add Action Steps accordingly.

For Strategies being worked on by two or more Committees, it will be necessary for both (all) of those Committees to collaborate on the re-wording (or adding of Action Steps) so as not to create different versions that are carried forward into subsequent analyses (see next Section).

APPENDIX 4

Guidelines for Committees to fill in the **Framework for Action Plan** spreadsheet file.

Analyzing Strategies and Action Steps (in "Framework for Action Plan" Spreadsheet File)

The main task for this step is to fill in the columns (e.g. Timeline, Responsible Parties, Funding, etc.) for each Strategy in the **Framework for Action Plan** Excel spreadsheet file. A bit of background explanation may be useful. We have said many times that a compilation of Strategies and Action Steps is just a list of ingredients, not a genuine Action Plan. An Action Plan puts together the various ingredients in such a way that – when the Plan is followed successfully – the desired endpoint (in this case the Mission of the Partnership) is achieved and maintained. Therefore an Action Plan considers such things as when various strategies and actions will be done, who will lead and participate in doing them, how much the cost will be and where needed resources will come from, etc.

One "action plan" precedent that is simple and readily understandable appears in Recovery Plans for listed plant species written by the U.S. Fish and Wildlife Service. The table at the top of the next page is copied from a Recovery Plan for two listed species of *Pediocactus* in Utah, and shows what needs to be done, by whom, when, and for how much, in order to achieve the desired endpoint (recover and de-list the two species of cacti).

Using this Recovery Plan table as a guide, Action Plan Committee members on the February 9 conference call approved the column headings of the **021811** version of the **Framework for Action Plan** file. The "analysis" column headings from this latest-version spreadsheet file are shown on the bottom of the next page. Guidelines, or thoughts and comments, on the "analysis" column headings are provided in the paragraphs below.

The columns for **Timeline** (**Year Begin**, **Year End**), **Responsible Parties** (**Lead**, **Others**), and **Funding: Need, Sources** seem fairly self-explanatory, and further guidelines for them are not offered here.

The **Description of Endpoint** and **Benchmarks** columns are not really part of the *when*/*who*/*how much* exercise. Rather, these two columns are believed to be worth defining and stating as explicit ways to keep the Partnership's "eyes on the prize." In other words, **Description of Endpoint** and **Benchmarks** are desired "states" (nouns), both at the end and along the way, for each of the Strategies and Action Steps (verbs).

Note that the **Description of Endpoint** is not necessarily the same as the Objective(s) under which a Strategy is listed. Rather, the Endpoint is meant to be specific to the particular Strategy (or Action Step), and thus would likely be defined more-narrowly than the parent Objective(s).

Again, for Strategies being worked on by two or more Committees, it will be necessary for both (all) of those Committees to collaborate on the filling in of "analysis" cells, so as not to create different, divergent versions of the spreadsheet.

Final tip: One cause of difficulty in filling in blank "analysis" cells for a Strategy might be that it is still being stated too broadly, not specifically enough. If this seems to be the case, then return to the top of this document and try re-wording the Strategy or adding Action Steps.

APPENDIX 4

Example of "analysis" leading to an Action Plan: Implementation Table from USFWS Recovery Plan for two federally-listed species of *Pediocactus* in Utah.

Utah Pediocactus Recovery Implementation Schedule

Priority	Task	Task Description	Task Duration	Responsible Party			Cost			Comments
				FWS						
				Region	Program	Other	FY-01	FY-02	FY-03	
1	1.1	Enforce collecting prohibitions	ongoing	6	LE	BLM, NPS				Continuing federal program activity
1	1.2	Protect from international and interstate trade	ongoing	9	LE					Continuing federal program activity
1	1.3	Protect nonfederal populations	ongoing	6	ES	UT				Continuing federal program activity
1	1.4	Provide legitimate source of specimens	ongoing	6	ES	CPC				Continuing federal program activity
1	2.1	Control mineral development activities	ongoing	6	ES	BLM, NPS				Continuing federal program activity
1	2.2	Control recreational and grazing impacts	ongoing	6	ES	BLM, NPS				Continuing federal program activity
2	3.1	Inventory P. despainii habitat	3 years	6	ES	BLM, UT	5,000	5,000	5,000	
2	3.2	Inventory P. winkleri habitat	3 years	6	ES	BLM, NPS, UT	5,000	5,000	5,000	
2	4.1	Monitor P. despainii population	10 years	6	ES	BLM	5,000	2,000	2,000	
2	4.2	Monitor P. winkleri population	10 years	6	ES	BLM, NPS	5,000	2,000	2,000	
2	4.3	Determine relationship of P. winkleri and P. despainii	2 years	6	ES	BLM, NPS	8,000	8,000		
2	5.1	Land management designations for P. despainii	3 years	6	ES	NPS				To be incorporated in federal agency land use plans during periodic revisions.
2	5.2	Land management designations for P. winkleri	3 years	6	ES	BLM, NPS				To be incorporated in federal agency land use plans during periodic revisions.
3	6	Propagate P. despainii and P. winkleri plants	ongoing	6	ES	CPC	5,000	2,000	2,000	
3	7	Develop public awareness for P. despainii and P. winkleri	ongoing	6	ES	BLM, NPS, UT	5,000	1,000	1,000	

"Analysis" we are asking ERWP Committees to do for Strategies and Action Steps in their purview: Column headings from the **Framework for Action Plan** spreadsheet file.

Timeline		Responsible Parties				
Year Begin	Year End	Lead	Others	Funding: Need, Sources	Description of Endpoint "What does success look like?"	Benchmarks "What does progress look like?"

APPENDIX 5
CAP Assessment of Target Integrity

#	Conservation Targets	Category	Key Attribute	Indicator	Indicator Ratings Bold = Current / *Italics = Desired* Poor	Fair	Good	Very Good	Current Rating	Desired Rating
1	Lowland Riparian	Landscape Context	Connectivity between stream reaches	Percent of relevant reaches connected to each other by riparian vegetation (i.e., along mainstem)	0-25% of relevant reaches connected to each other (little or no connectivity)	25-50% of relevant reaches connected to each other	**50-75% of relevant reaches connected to each other**	>75% of relevant reaches connected to each other (major or complete connectivity)	Good	Good
		Condition	Connection with floodplain/channel incision	Riparian vegetation connected to floodplain or not	Historical incision high and/or >50% of riparian vegetation not connected to current floodplain	**Historical incision moderate and/or 25-50% of riparian vegetation connected to current floodplain**	Historical incision low and/or 10-25% of riparian vegetation connected to current floodplain	Historical incision minor to none and/or >90% riparian vegetation connected to current hydrology	Fair	Good
			Vegetation composition	Percentage of riparian cover that is native versus non-native	**0-50% native**	50-75% native	75-90% native	> 90% native	Poor	Good
			Vegetation composition	Percentage of riparian cover versus or upland	0-25% riparian	**25-50% riparian**	50-75% riparian	>75% riparian	Fair	Good
			Vegetation vertical structure	Number of structural layers present:herbaceous layer; low shrub (<2m); tall shrub/sapling tree(2-8m); tall tree (8+m)	Either 0-1 layer present OR greatly reduced and simplified structure from historical conditions with loss of 1 or more layers	Either 2 layers present OR moderately reduced and simplified structure from historical conditions with loss of >50% or 1 or more layers	**Either 3 layers present OR only slightly reduced structure from historical conditions with loss of <50% of one layer**	Either 4 layers present OR complete structure from historical conditions present, no loss of layers or cover	Good	Good
			Woody native riparian vegetation demography	Number of size classes present	0-1 size classes	2 size classes	**3 or more size classes, with some spotty or low representation**	3 or more size classes, balanced and robust representation	Good	Good
2	Montane Riparian	Condition	Connection with floodplain/channel incision	Riparian vegetation connected to floodplain or not	Incision high and/or 50% of riparian vegetation not connected to current floodplain such that seedlings could survive	Incision moderate and/or 50-75% of riparian vegetation connected to current floodplain such that seedlings could survive	**Incision low and or 75-90% of riparian vegetation connected to current floodplain such that seedlings could survive**	Incision minor to none and or >90% of riparian vegetation connected to current floodplain such that seedlings could survive	Good	Good
			Ground cover	Percent bare soil	>50% bare soil	**20-50% bare soil**	10-20% bare soil	>90% ground cover	Fair	Good
			Vegetation composition	Herbaceous vegetation cover	>50% non-natives, and native increasers	**25-50% non-natives, and native increasers**	10-25% non- natives, and native increasers	< 10% non-natives, and native increasers	Fair	Good
			Woody palatable native riparian vegetation demography	Number of height (size) classes present: low < 1m; medum 1-2m; high > 2m	Height of approximately 90% of a palatable woody native riparian vegetation species is either >2m or <1m	**Moderately divergent height classes within woody native riparian vegetation species with >50% of plants <1m or >2m**	3 size classes present with moderately similar representation of at least 25% in each height class although some over-representation of one class present or one class reduced	Mixed height structure, approximately 30% or more in each height class	Fair	Good
3	Cold Water Lotic	Landscape Context	Upland disturbance and degradation	Amount of disturbance or alteration of surrounding lands	Surrounding lands highly disturbed, extensive sediment input	Surrounding lands significantly altered, impacting ecosystem processes	Some modification to surrounding lands, but maintain ecosystem function	Surrounding lands are natural habitat with native vegetation intact		
		Condition	Biological community	Aquatic Invasive Species (non-fish)	Monoculture or dominated by non-native species	Non-native species common	**Low occurrence of non-native species**	Native community intact and stable	Good	
			Biological community	Benthic macroinvertebrates	UTDEQ predictive model score < 0.74	UTDEQ predictive model score 0.74-0.83	UTDEQ predictive model score 0.84-0.94 AND 1.06-1.17	UTDEQ predictive model score 0.95-1.05		

APPENDIX 5
CAP Assessment of Target Integrity

#	Conservation Targets	Category	Key Attribute	Indicator	Indicator Ratings Poor **Bold = Current**	Fair	Good *Italics = Desired*	Very Good	Current Rating	Desired Rating
3	Cold Water Lotic (cont'd)	Condition	Biological community	Fish community	No self-sustaining fish populations or resident trout population with average biomass less than average for Southern Utah trout streams (56kg/ha)	Self-sustaining nonnative resident trout population dominant but average resident trout biomass near the average for Southern Utah trout streams (56kg/ha	**Mixed community of self-sustaining native CRCT , nonnative resident trout, and native non-game fish or a nonnative resident trout community with a combined average trout biomass >112 kg/ha**	Native CRCT and any associated non-game species present and self-sustaining with trout biomass near or above the average for Southern Utah trout streams (56kg/ha)	Good	
			Floodplain connectivity (lateral inundation)	Floodplain inundation	Floodplain inundation rare, average of <1 very 10+ years	Floodplain inundation uncommon, average of 1 event every 5 years	Floodplain inundation fairly common, average of 2 events every 5 years	Floodplain inundation and hydrograph in historical range OR typically on average of 3 or more events every 5 years.		
			Stream physical structure	Natural pool/riffle structure and appropriate habitats and coarse debris	Physical structure simple, with near complete loss of most historical structure and habitats, often with high sediment input and loss of coarse debris	Physical structure reduced from historical conditions, with partial loss of historical structure and habitats, often with some sediment input or loss of coarse debris	Physical structure relatively intact, with some loss of historical conditions, with partial loss of historical structure and habitats, but little evidence of sediment input and limited loss of coarse debris	Historical physical structure and aquatic habitats intact, with adequate coarse debris, pools and riffles and other key habitats present		
			Water quality	DO, N, P, temperature, conductivity, pH, turbidity, TDS	Highly altered from expected values - not suitable to aquatic life native to the system	Altered from expected values and may be harmful to aquatic life with other stressors	**Altered from expected values, but not harmful to aquatic life**	Within the range of expected values	Good	
		Size	Base flow	CFS of summer flow, relative to stream order	Dry 0% - 60% of natural flow	60% - 80% of natural flow	**80%-90% of natural flow**	Natural hydrograph	Good	
4	Warm Water Lotic	Landscape Context	Upland disturbance and degradation	Amount of disturbance or alteration of surrounding lands	Surrounding lands highly disturbed, extensive sediment input	**Surrounding lands significantly altered, impacting ecosystem processes**	Some modification to surrounding lands, but maintain ecosystem function	Surrounding lands are natural habitat with native vegetation intact	Fair	Good
		Condition	Biological community	Aquatic Invasive Species (non-fish)	Monoculture or dominated by non-native species	Non-native species common	**Low occurrence of non-native species**	Native community intact and stable	Good	Good
			Biological community	Benthic macroinvertebrates	UTDEQ predictive model score < 0.74	UTDEQ predictive model score 0.74-0.83	**UTDEQ predictive model score 0.84-0.94 AND 1.06-1.17**	UTDEQ predictive model score 0.95-1.05	Good	Good
			Biological community	Fish community	Non-native species dominate the community, few if any native species self-sustaining	**Non-native species common, recruitment reduced for most or all native species**	Native fish community mostly intact and self-sustaining. Few if any nonnative species	Native fish community completely intact and self-sustaining. Nonnative species absent or occurring in low densities.	Fair	Good
			Floodplain connectivity (lateral inundation)	Floodplain inundation	Floodplain inundation rare, average of <1 very 10+ years	**Floodplain inundation uncommon, average of 1 event every 5 years**	Floodplain inundation fairly common, average of 2 events every 5 years	Floodplain inundation and hydrograph in historical range OR typically on average of 3 or more events every 5 years.	Fair	Good

APPENDIX 5
CAP Assessment of Target Integrity

#	Conservation Targets	Category	Key Attribute	Indicator	Indicator Ratings Poor **Bold = Current**	Fair *Italics = Desired*	Good	Very Good	Current Rating	Desired Rating
4	Warm Water Lotic (cont'd)		Stream physical structure	Natural pool/riffle structure and appropriate habitats and coarse debris	Physical structure simple, with near complete loss of most historical structure and habitats, often with high sediment input and loss of coarse debris	**Physical structure reduced from historical conditions, with partial loss of historical structure and habitats, often with some sediment input or loss of coarse debris**	Physical structure relatively intact, with some loss of historical conditions, with partial loss of historical structure and habitats, but little evidence of sediment input and limited loss of coarse debris	Historical physical structure and aquatic habitats intact, with adequate coarse debris, pools and riffles and other key habitats present	Fair	Good
			Water quality	DO, N, P, temperature, conductivity, pH, turbidity, TDS	Highly altered from expected values - not suitable to aquatic life native to the system	**Altered from expected values and may be harmful to aquatic life with other stressors**	Altered from expected values, but not harmful to aquatic life	Within the range of expected values	Fair	Good
		Size	Base flow	CFS of summer flow, relative to stream order	Dry 0% - 60% of natural flow	**60% - 80% of natural flow**	80%-90% of natural flow	Natural hydrograph	Fair	Fair
5	Aspen	Condition	Encroachment by conifers (Douglas-fir, white fir, subalpine fir, spruce)	Relative canopy cover of conifers	>50%	**25-50%**	10-25%	<10%	Fair	Good
			Herbivory on Aspen regeneration	Percent of aspen stems 0-5 feet tall with terminal utilization	>40%	**20-40%**	5-20%	<5%	Fair	Good
			Understory species composition	Native plant species		Native understory grass, forb, and/or shrub layers are sparse or absent	**Native understory grass, forb, and/or shrub layers are diverse and reproducing**		Good	Very Good
6	Lowland Springs	Condition	Aquatic biota	Non-native aquatic species	Native aquatic species extirpated OR at immediate risk of extirpation due to non-native aquatic species	**Native aquatic species declining due to non-native aquatic species**	Non-native species may be present but native aquatic species population stable	Non-native species absent, native aquatic species populations stable or increasing	Fair	Fair
			Physical integrity	Degree of physical alteration or disturbance	Physically altered to the extent that natural physical characteristics no longer exist or can be observed	Retains some elements of natural physical characteristics, moderate alteration or disturbance	**All natural physical characteristics are represented to a substantial degree although some departures are evident**	All natural physical characteristics are represented and intact, undisturbed	Good	Good
			Spring plant species composition, cover, and recruitment	Exotic plant species presence and cover	Invasive exotic species dominate spring;>50% of total cover and increasing AND greatly reduced or no recruitment of native species	Invasive exotic species common, 10-25% of total cover AND increasing AND reduced and declining recruitment of native species	**Invasive species uncommon to rare; <10% of total cover AND recruitment of native species AND all age classes represented over a sufficient area to maintain natural spring ecosystem**	Invasive exotic species absent or very rare; native species recruitment AND age structure within natural variation.	Good	Good
			Water quantity	Surface discharge	Existing discharge greatly reduced by >50%, insufficient to maintain natural spring ecosystem with many obligate spring species lost	Existing discharge reduced by >25%, sufficient to maintain some of the natural spring ecosystem at a reduced quality with some losses to obligate spring native biota	**Existing discharge is near historic rates and natural variability, with reductions <25%; sufficient to maintain most of the natural spring ecosystem with only minor losses to obligate spring native biota**	Existing discharge is within historic rates and natural variability, with reductions <10%; sufficient to maintain intact natural spring ecosystem	Good	Good

APPENDIX 5
CAP Assessment of Target Integrity

#	Conservation Targets	Category	Key Attribute	Indicator	Indicator Ratings **Bold = Current** *Italics = Desired* Poor	Fair	Good	Very Good	Current Rating	Desired Rating
7	Montane Wet Meadows	Condition	Disturbance regime	Amount of bare ground	Bare ground patches strongly connected, predominant, >40% of wetland	Bare ground patches somewhat connected, fairly common, 20-40% of wetland	**Bare ground patches small, uncommon, not connected, <20% of wetland**	Within natural range with bare ground limited to small patches and not connected, <10% of wetland	Good	Good
			Disturbance regime	Compaction/drying of hummocks	Hummocking common, of distinct elevation above surrounding wet meadow	**Hummocking present in wettest portions of wet meadow**	Hummocking rare and of slight elevation from surrounding wet meadow	Hummocking absent	Fair	Good
			Species composition	Herbaceous vegetation cover	>50% non-natives, and native increasers	**25-50% non-natives, and native increasers**	10-25% non-natives, and native increasers	<10% non-natives, and native increasers	Fair	Good
		Size	Areal extent of wetland	Area of wet meadow habitat if earlier areal extent known	Greatly reduced from historic extent; loss of >50% of total areal extent of wetland	**Moderately reduced from historic extent; 25-50% loss in areal extent**	Somewhat reduced from historic extent; <25% loss in areal extent	No or minimal reductions from historic extent, <10% loss in area extent	Fair	Good

APPENDIX 6
CAP Summary of Threats

Threats Across Targets		Lowland Riparian	Montane Riparian	Cold Water Lotic	Warm Water Lotic	Aspen	Lowland Springs	Montane Wet Meadows	Overall Threat Rank
Project-specific threats		1	2	3	4	5	6	7	
1	Agricultural pollution				Medium				Low
2	Camping (dispersed)	Medium	Low	Low	Medium	Low	High		Medium
3	Channelization/bank alteration				Medium				Low
4	Climate change	Medium	Medium	Medium	Medium	Medium	Medium	High	High
5	Collection-commercial/excessive	Low		High					Medium
6	Dams and diversions	Low		Medium	Low				Low
7	Fire suppression					High			Medium
8	Fire-increased frequency and intensity	Medium		Low					Low
9	Groundwater pumping	Low		Low	Low		Low	Medium	Low
10	Improper forest management			Medium					Low
11	Inappropriate use of pack/saddle stock	Low							Low
12	Insects and Pathogens - indigenous	High							Medium
13	Insects and pathogens-alien organisms	High							Medium
14	Introduced river otters				Medium				Low
15	Invasive animal species-non-native			High	High		Medium		High
16	Invasive plant species non-native	High	Medium			Low	Medium	Low	Medium
17	Livestock grazing	Low	Medium	High	Low	Medium	Low	Medium	Medium
18	Motorized recreation		Low	High				Low	Medium
19	Poisoning			Low					Low
20	Rock climbing	Low							Low
21	Spring capping						Low		Low
22	Water allocation policies			Low	Low				Low
23	Wildlife grazing		Medium			Medium		Low	Medium
	Threat Status for Targets and Project	High	Medium	High	High	Medium	Medium	Medium	High