revised 11/22/00

Goal 9. Riparian Management Objectives

I'd like you to at least consider a discussion on the utility of targets for any resource in a climate-driven, disturbance adapted system whose regional environment is in flux. If riparian areas are driven by water availability and inundation which are themselves driven by lake inflows and tributary inputs, and if the normal status of riparian areas in arid landscapes is somewhere in a disturbance/recovery trajectory, and if conditions such as exotic species and updrainage development are changing in ways that work against stability, I wonder just what kind of meaning specific management targets have.

I'd like to suggest that in our all-investigators symposium next February all parties come prepared to spend a day arguing for or against the use of specific targets. If we're convinced that targets are, in fact, a useful concept, then we can proceed to what *types* of targets (means, ranges, variances) make the most sense in this system

Mike Kearsley 10/25/00
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Here are some points of discussion to consider regarding riparian vegetation. These can be considered to be concerns for both natural resource and cultural resource values (both of which I work with).

1. Maintain status quo or increase riparian vegetation 10-20%

2. Increase area of suitable habitat for development of marsh vegetation 10-20%

3. Periodic floods of 45K are beneficial in cleaning out and renewing riparian habitats. Sustained flows of 21K to 30K are potentially harmful to the Goodding willow at Granite Park (RM 209L), which is a cultural and historic resource of great concern to Hualapai and Southern Paiute tribes.

4. Floods should be carried out at a time of year when willow, not tamarisk, seeds will be deposited in refreshed habitat.

5. There should be diligent monitoring and quick response treatment for noxious invasive plants in riparian vegetation (I don't know how to quantify this).

6. Treatment plans should be developed, and feasibility studies for control, should be developed for noxious invasives already present (again, I need help in putting target numbers to this).

I have not reviewed the management plans in developing these guidelines, so I do not know if there is any conflict. I will do so prior to any meeting.

Art Phillips 11/16/00
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Goal 9, in light of Goal 13, involves whole-ecosystem management, and may be best addressed though the following objectives:
(1) Undertake a comprehensive analysis of ecosystem structure, interactions and management, as noted above. The present ecosystem conceptual model concerns fisheries on a reach-based approach, and not terrestrial resources or processes. This model provides useful input, but is inadequate for framing the overall ecosystem. With a comprehensive ecosystem model, including information gaps, it will be possible to prioritize management activities. The model should be updated periodically.
(2) A comprehensive inventory of existing species and their distributions and population status is warranted. The AMWG has poor to no data on the biodiversity of fungi, invertebrates, herpetofauna, and mammals, their distribution and habitat requirements. This inventory will, of necessity, require some time to compile, as rare invertebrates will be difficult to detect.
(3) Continued monitoring of vegetation and avifauna is warranted, but should be placed in the context of needed information and the recommendations of the Biological PEP.
(4) A system-wide vegetation map is required to identify riparian habitat, and such a map should be updated periodically. Of course, this means that detailed topographic coverage should be developed for the entire system.
(5) Additional monitoring, research and restoration should be considered following review of the results of the model and inventory (MO's 1 and 2 in this Goal). Otter, muskrat, zebra-tailed lizard and possibly prairie falcon should be considered for restoration actions, as well as SWWF.
(6) The recommendations of the Biological PEP should be followed.

Larry Stevens 11/18/00
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1) Any suggested targets should be couched in terms of ranges, trends and variances. The AMWG recognizes explicitly that the riparian corridor of Grand Canyon is a managed ecosystem, an artificial system controlled by releases from Glen Canyon Dam. So too, should there be an explicit institutional recognition that, like all southwestern riparian systems, it is most healthy when it is dynamic and variable in both space and time. It is a "disclimax" in the same way that other riparian areas are, but influenced by recreational and hydropower factors, rather than spring flooding.

2) Targets should be based on historical measurements and estimates. For example, Ohmart (1982) used the vegetation maps from aerial photos of Phillips et al. (1977) to derive the following estimates for all vegetation between Lees Ferry and Grand Wash Cliffs:

Cover type	Area (ha)
Sparse tamarisk:	118
Dense tamarisk:	793
Acacia/Mesquite:	607
Arrowweed:	54
Mixed Riparian Scrub	111

Riparian Tree	7
Marsh	17
Total:	1707

3) Target ranges should likewise be based on historical behavior of the system. Given that there have been studies of impacts of floods of 45 kcfs and 94 kcfs, there exists some data on the behavior of the system under the range of potential flows. Ranges in total marsh patch area from studies such as Stevens et al. (1995) could be used to develop some initial estimates for ranges: their numbers show as much as 60% changes in marsh patch area in the post establishment period ('73 - 90). Thus a change from 5 ha to 2 ha should not be completely unacceptable so long as there is a commitment to post-impact trends towards the long-term average. Other ranges described in the literature include the losses of new high water zone vegetation in the system during the 1983 high flows:

Pucherelli 1986:	40% new high water zone vegetation
Brian1987:	55% new high water zone vegetation
	35% woody new high water zone vegetation
	90% "beach" type vegetation
Stevens and Waring 1985	50% of vegetation < 40 kcfs
	26% of vegetation between 40 - 60 kcfs
	17% of vegetation between 60 - 85 kcfs

Again, it cannot be emphasized too strongly that a commitment by **ALL** parties that post-impact trends should be in the direction of long-term means.

4) Targets for composition of the riparian corridor, most easily couched in terms of plant assemblage types ("associations", "communities"), should also be based on historical ranges. Until a more complete functional understanding of the riparian community is available, there should be an effort to maintain the spatial diversity in the system. The estimates by Ohmart (1982: list above), Sogge et al (1998), and Kearsley (2000: below) provide ranges:

Type (per Sogge)	Percent
Arrowweed	6.76
Arrow / Baccharis	0.01
Arrow / Bacch / Tam	1.10
Arrow / Tam	1.33
Arrow / Willow	1.52
Baccharis	0.25
Baccharis / Mesquite	0.01
Bacch / Mesq / Tam	0.12
Bacch / Tam	1.61
Bacch / Tam / willow	8.00
Bacch / Willow	1.83
Equisetum / Edge	10.75
Grass	0.65
Mesquite	0.20
Mesquite / Tam	0.01
Phragmites / Typha	5.89
Tamarisk	27.51
Tam / Willow	6.93

Willow	7.82

The list above is based on 330 random samples of riverside vegetation. This is not a complete list (very rare types have been excluded for brevity). Similar data in Sogge et al (1998) can be applied to nesting bird habitat. These numbers should be understood as occurring within a range of acceptable.

Mike Kearsley 11/21/00
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