

ASSESSING THE CONDITION OF RIPARIAN-WETLAND AREAS

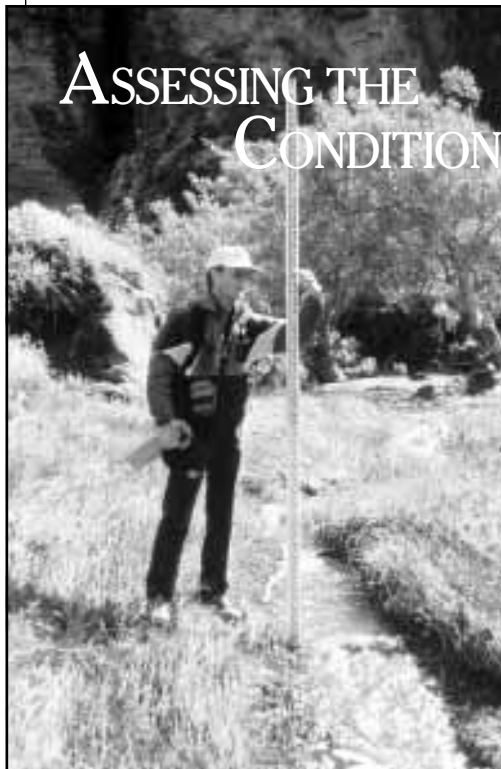


Figure 1. Cañada Lobos (Channel Islands National Park, California), located within a cattle enclosure, is a properly functioning wetland. The area features diverse and vigorous plant life that protects the stream banks from erosion and improves water quality.

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THE MANY BENEFITS OF maintaining healthy riparian-wetland systems have been well documented in the natural resources literature. Healthy riparian systems improve water quality primarily by decreasing sediment transport, rebuilding and replenishing floodplains, reducing streambank erosion, retaining soil moisture, and supporting the development of diverse flora and fauna communities. Riparian areas are also magnets for many competing uses that can conflict with resource protection. Domestic livestock congregate in riparian-wetland areas for forage, water, and shade; streams are dammed or diverted for various uses; and visitors utilize riparian areas for fishing, hiking, boating, and other recreational pursuits.

In order to properly manage these important resources, park managers must be able to assess riparian-wetland conditions and take steps to resolve any problems. All too often, however, when asked to assess the condition or overall health of our riparian areas, we natural resource managers are at a loss to respond with much more than, "they look OK to me," or, "they look terrible," without a strong rationale for either conclusion. Given our critical role in the conservation of soil, wa-

ter, vegetation, and wildlife resources, it is essential that we have proper tools to evaluate the health of the riparian systems under our stewardship, especially when multiple competing uses are present.

THE PROCESS

A riparian-wetland assessment tool developed recently by the Bureau of Land Management (BLM) was used by the Water Resources Division staff of the Natural Resource Program Center in 1995 to evaluate riparian conditions in two national parks. This method, called the "Process for Assessing Proper Functioning Condition," is keyed to an interdisciplinary team assessment of riparian area "functionality" rather than a costly, intensive data collection effort. The goal is rapid assessment, which can be applied over large areas relatively quickly. It may be used as a "triage method" that can help separate areas that are functioning well from those in need of more intensive evaluation and management.

The *functioning condition* of a riparian area refers to the stability of the physical system, which in turn is dictated by the interaction of geology, soil, water, and vegetation. A healthy or stable riparian-wetland area is in dynamic equilibrium with its streamflow forces and channel processes. In a healthy system, the chan-

nel adjusts in slope and form to handle larger runoff events with limited perturbation of the channel and associated riparian-wetland plant communities.

Important to note is that evaluation of functional condition is not simply an assessment of the ecological status or seral stage of the vegetation community. Rather, evaluation is based upon the concept that in order to manage for such things as potential natural vegetative communities, the basic elements of physical habitat must first be in place and functioning properly. For example, a system recovering from a recent fire can be in an early successional stage but it may still be in properly functioning condition.

Based on assessments of hydrologic, vegetative, and erosional elements (see the checklist in table 1) of the riparian area, the method assigns one of the following functionality ratings to a riparian-wetland area:

PROPER FUNCTIONING CONDITION

Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris are present to: (1) dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; (2) filter sediment, capture bedload (see the definition for *bedload* at the bottom of the middle column on page 10), and aid floodplain development; (3) improve floodwater retention and groundwater recharge; (4) develop root masses that stabilize stream banks against cutting action; (5) develop diverse ponding and channel characteristics to provide habitat and the water depths, durations temperature regimes, and substrates necessary for fish production, waterfowl breeding, and other uses; and (6) support greater biodiversity. Similar factors are assessed when evaluating *lentic* (standing water) wetland areas as explained in USDI-Bureau of Land Management (1994).

FUNCTIONAL-AT RISK

These riparian-wetland areas are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation. For example, a stream reach whose upper watershed is being overgrazed may have the attributes of a properly functioning system, but it may be poised to suffer severe erosion in a future large storm due to artificially increased runoff upstream.

NONFUNCTIONAL

Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as already described, are nonfunctional. The absence of certain physical attributes such as a floodplain where one should exist are indicators of nonfunctioning conditions.

RIPARIAN FUNCTIONALITY IN THE NATIONAL PARKS

In 1995, staff from the Water Resources Division, in cooperation with the BLM and staffs of Channel Islands National Park, California, and Great Basin National Park, Nevada, used the process for assessing proper functioning condition to evaluate the functionality of riparian areas on Santa Rosa Island in Channel Islands and the Lehman, Snake, and Baker Creek drainages in Great Basin. These parks provided an ideal testing ground for the assessment process in that they represent differing physiographic and climatic provinces (Southern California coastal zone at Santa Rosa Island vs. the montaine basin-range province at Great Basin). In addition, both parks are grazed by domestic cattle. Santa Rosa Island is subject to continuous year-long grazing, while a seasonal rest-rotation grazing sys-

tem is employed at Great Basin. Riparian functionality in both parks was assessed by an interdisciplinary team consisting of a hydrologist-geomorphologist, botanist, water quality specialist, wetland scientist, and a range management specialist. Examples of "properly functioning condi-

SANTA ROSA ISLAND—CAÑADA LOBOS (WOLF CANYON)

DIAGNOSIS—PROPERLY FUNCTIONING CONDITION

Cañada Lobos (figure 1), located within a cattle enclosure, represents a riparian-wetland area that was rated to be in "proper functioning condition" by the interdisciplinary team. The riparian area contains a diverse and vigorous herbaceous and woody vegetative community that protects the banks by dissipating stream energy associated with flood flows, thereby reducing erosion and improving water quality. The herbaceous plant community, consisting primarily of Mexican rush and saltgrass, has developed root masses that have stabilized the stream vertically and horizontally, filtered sediment, and captured and retained bedloads that aid floodplain development. The process has created diverse channel characteristics and promotes greater biodiversity.

SANTA ROSA ISLAND—WINDMILL CANYON

DIAGNOSIS—FUNCTIONAL-AT RISK

This segment of Windmill Canyon (figure 2, page 24) is grazed by horses but not cattle. The establishment of willow provides the capability to dissipate some stream energies and trap sediment that aids in floodplain development and improves floodwater retention. However, in spite of the presence of some attributes of functionality, this segment was rated as "functional-at risk" because certain vegetative and hydrologic attributes make it susceptible to degradation. For example, herbaceous bank cover is completely lacking, thus making the bank more susceptible to erosion and lateral cutting. The trans-

TABLE 1. HYDROLOGIC, VEGETATIVE, AND EROSIONAL ATTRIBUTES THAT ARE EVALUATED FOR RIPARIAN-WETLAND FUNCTIONALITY

Hydrologic

- Floodplain inundated in "relatively frequent" events (1-3 years)
- Active-stable beaver dams
- Sinuosity, width-depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
- Riparian zone is widening
- Upland watershed not contributing to riparian degradation

Vegetative

- Diverse age structure of vegetation
- Diverse composition of vegetation
- Species present indicate maintenance of riparian soil moisture characteristics
- Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
- Riparian plants exhibit high vigor
- Adequate vegetative cover present to protect banks and dissipate energy during high flows
- Plant communities in the riparian area are an adequate source of coarse and large woody debris

Erosion Deposition

- Floodplain and channel characteristics (i.e., rocks, coarse and large woody debris) adequate to dissipate energy
- Point bars are revegetating
- Lateral stream movement is associated with natural sinuosity
- System is vertically stable
- Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

tion," "functional-at risk," and "nonfunctional" riparian areas in these parks follow.

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port of large quantities of bed and suspended sediment loads to the segment from unprotected upper watersheds also prevents this stream segment from obtaining full proper functionality.



Figure 2. Windmill Canyon (Channel Islands) is a functional-at risk stream. Vegetative bank cover is lacking, but the presence of willows allows for some ability to dissipate stream energies.

SANTA ROSA ISLAND—OLD RANCH CANYON

DIAGNOSIS—NONFUNCTIONAL

Old Ranch Canyon (figure 3), subject to continuous year-long cattle grazing, is a “nonfunctional” riparian-wetland area. Neither adequate vegetation nor appropriate landform is present to dissipate stream energies associated with high flows. During floods, the stream channel migrates, erosion continues, sediment is not filtered, water quality is altered, and floodwater retention and groundwater recharge are limited. The channel is not providing ponding or channel characteristics that provide habitat conditions necessary for enhancing biodiversity.

GREAT BASIN NATIONAL PARK—LOWER SNAKE CREEK

DIAGNOSIS—FUNCTIONAL-AT RISK

Karst geology, hydrology, and diversion by humans are important features that dictate the “functional-at risk” rating for this riparian reach. Prior to diversion, upper Snake Creek lost almost all of its flow to the karstic aquifer that underlies downstream portions of the creek. In order to

“harvest” additional water from the drainage, local irrigators constructed a pipeline to divert water from upper Snake Creek, bypass the karst area, and then release it to lower Snake Creek for transport to their land. The diversion has most likely impacted the lower reach by increasing flood flows in a channel that had evolved in response to smaller flows. Figure 4 shows one of several headcuts observed in lower Snake Creek that,

team, it may not be suitable for all riparian areas. This is a qualitative process that has been developed from more strenuous quantitative monitoring procedures that are documented in the BLM Ecological Site Inventory (ESI) methodology. In some cases, the more expensive and time consuming ESI procedure must be used to determine riparian functionality.

REFERENCES

- National Park Service. 1995. **DRAFT** Santa Rosa Island Federal Interagency Riparian Assessment and Recommendations for Achieving Water Quality Management Goals. Water Resources Division Technical Report Series. Ft. Collins, CO.
- USDI-Bureau of Land Management. 1993. Riparian Area Management—Process for Assessing Proper Functioning Condition. BLM Technical Reference TR 1737-9. Denver, CO.
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Figure 3. Old Ranch Canyon (Channel Islands) is a nonfunctional riparian-wetland area. It has neither adequate vegetation nor appropriate landform to dissipate stream energies.

though temporarily stabilized by woody debris, could continue cutting in response to large flows. The headcuts are lowering the base level of the channel by 2-3 feet in some areas. As a result, woody and herbaceous riparian-wetland vegetation in these segments are in a downward trend.

CONCLUSIONS

The process for assessing proper functioning condition is an assessment tool that can be used to rapidly evaluate and categorize the functional condition of riparian-wetland areas. When applied by an experienced interdisciplinary team, riparian areas that are in danger of losing functionality can be identified and management prescriptions can be developed and applied. While the assessment process is a valuable tool in the hands of an experienced interdisciplinary

Figure 4. Lower Snake Creek (Great Basin) is a functional-at risk stream. Woody debris has temporarily stabilized the stream, but erosion is still possible during large flows.



Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas. BLM Technical Reference TR 1737-11. Denver, CO.

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