TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

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BIOLOGIC (Beaver) Non-Structural Alternative Treatment for Eroding Riparian (Stream) Ecosystem

The use of beavers to aid in revitalizing and stabilizing degraded riparian habitats appears to be a valuable tool in riparian habitat management. Although this technique is not a cure-all, it does appear to be a promising method, applicable in many western stream situations. In several beaver release trials in Wyoming, riparian habitat has improved significantly due to beaver activity. Coupled with rest from livestock grazing, which provides for accelerated willow regrowth, the riparian system has become self-supporting in only two or three years. (Apple, Smith, etal, 1984.)

The process, stated simply and briefly, is this: beaver activity typically reduces the ability of the stream to transport sediment by reducing the effective slope of the stream channel. A series of beaver dams/ponds step down the flow velocities, thereby reducing the erosion potential of the moving water. The carrying power of the stream is reduced, leading to accelerated deposition rather than erosion. The elevated water table that results locally from the activity of the beavers, leads to an extended period of time through the season, when subsurface water is in storage along the banks of the stream, and available for vegetative development. The ultimate objective is to vegetatively stabilize the beaver dam and the soil that is deposited behind the dam thereby re-establishing and stabilizing the riparian community. (Apple 1984.)

Wyoming studies (Apple 1984) showed that it is not always necessary to relocate beavers to take advantage of their activities. If beavers are attempting to colonize an area which hasn't had beaver activity for a number of years, their efforts can be aided by providing them with aspen or other more stable materials (riprap) to reinforce and strengthen their dams. Without reinforcement, beaver dams have a high washout rate during spring runoff. To conserve effort and save time, aspen or other more stable materials should be delivered to or placed on the dam after beaver activity has commenced, unless you are planning to relocate beavers to a new location. Then aspen may help persuade the animal(s) to stay at or near the site long enough to build a dam. Monitoring beaver activity and then providing supplemental building materials can effectively initiate riparian habitat improvement.

A number of techniques might be worth considering when the relocation of beavers is anticipated. Because most dam-building activity does not begin until late summer or early fall, live-trapping and relocating of beaver, or providing aspen or other reinforcement should be done at this time. Providing aspen or other means of reinforcing beaver dams is also most effective when done while the dam is in early stages of construction. When using aspen, place the trees on the bank near the active beaver dam, rather than in the water. Wyoming experience indicates that beavers more readily use aspen when it is on dry land. Their experience also indicates that in most cases, beavers accept artificial reinforcement, such as net wire or a layer of truck tires, and will continue to build available materials into the structure of the dam. Fortunately, they are very adaptable animals.

Improving or restoring riparian habitat is not an easy task. The use of beaver to help accomplish this end is not a panacea, and may not be applicable in all situations. However, a beaver management program designed to solve a specific habitat problem should be considered in any riparian habitat management strategy. (Apple 1984.)

The need for a riparian habitat management strategy is illustrated by the fact that 70-90% of all natural riparian ecosystems in the U.S. have been damaged or destroyed by man's activities (CEQ, 1978).

Riparian Ecosystems in the West suffer from Profound Ecological Breakdown due to the Effects of Human Settlement, Which has Devastated the Intricate Balance of Nature. (Michelmore 1984). Some of the reasons for this ecological breakdown are as follows:

1. Began with trappers in the 1820's.
2. Livestock grazing (late 1800's).
3. Extensive logging (late 1800's).
4. Agriculture and road construction (early 1900's).
5. Surface mining, gas and oil exploration (today).

Beaver is Pivotal to the Riparian Ecosystem (Michelmore 1984). Beaver ponds and dams provide:

1. Interruption of spring runoff.
2. Slows stream flows by decreasing gradient.
3. Traps silt and sediment (up to 90% of load).
4. Reduces streambank erosion.
5. Reduces channel degradation.
6. Raises water tables in adjacent land.
7. Increases production of succulent vegetation. Grass and willow production increased 10 times over adjacent uplands.
8. Reduces soil compaction in adjacent meadows.

Willows increase with beaver ponds and provide: (Smith, B. H., 1980.)

1. Physical stability to riparian ecosystem root systems helps maintain streambank stability.

2. Biologic diversity of riparian ecosystems:

   a. Good fishery is dependent upon willow community.
   b. Good willow community dependent upon good grazing management.

3. One of the principal sources of browse on many western mountain ranges. Most important as late summer feed, increases in palatability as the season advances. (Martin, Zin and Nelson, 1951.)

4. An indicator of riparian ecosystem condition or trend.

I. Biologic Beaver Management in Riparian Systems

A. Beaver as a Nuisance

1. Problems

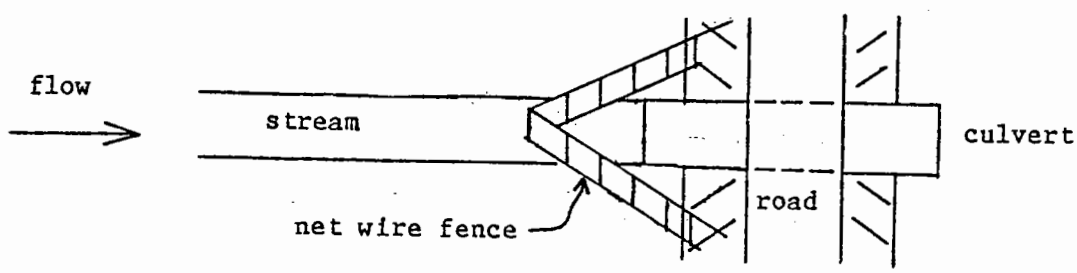
   a. Dam up irrigation structures.
   b. Dam up road culverts.
   c. Flood pastures and other fields.
   d. Flood roads.
   e. Abandoned dams collapse and cause stream cutting and downstream sediment deposits.

2. Nuisance Relief.

   a. Live trap, kill, trap or shoot nuisance beaver. First obtain permit from Idaho Fish and Game Department.

   b. Tree repellants for rabbits and deer work well for beaver. Soak burlap bag in repellent, hang above (4-6") structure to be protected.

   c. Construct net wire fence in front of culvert or irrigation structure. See diagram.



Beaver will dam along fence but water will spill over dams and through culvert.

II. Transplanting or Encouraging Beaver Into an Area.

A. Factors to Consider Before Using Beaver for Riparian Habitat Rehabilitation.

1. Soils, i.e. bank stability. Will a dam stay in place?

2. Stream flows, i.e. can beaver dams hold under spring flows? Is there room to spread floodwater across the floodplain if or when channel flow level is raised?

3. Stream gradient - Avoid Drainages in Excess of 15%. (Williams, R. M., 1965.)

4. Land form - valley bottom (flood plain) must be present.

5. Adjacent land uses - possible conflicts.

6. Food and material (dam) source - willows are very important as a food source, aspen is an excellent dam material.

7. Behavior (beaver). See next section.

8. Biology. See Section III.

NOTE: Beaver are adaptive and opportunists, but, each stream system is unique and dynamic. Beaver behavior cannot be predicted for every situation.

B. Seek to Obtain Approval of Your Neighbors.

1. Private individuals as well as agencies.

2. Consult with Idaho Department of Fish and Game.

a. May have ready source of nuisance beaver.
b. Will loan live traps.
c. Obtain necessary permits.

C. Management and Beaver Behavior.

1. Transplant beaver during the late summer or early fall (Aug.-Oct.).

a. This is principal dam building period for beaver - will build close to release site.
b. Are less likely to migrate.

2. Transplant 3-5 beaver to a site.

a. Less likely to migrate.
b. Build larger and stronger dams.

3. Supply structurally sound building material (when dam building is in progress) if needed. (Aspen is the best material for a dam as the bark is a food source.)

   a. Aspen, up to 5 inch diameter, 4-8 foot lengths.
   b. Place aspen next to stream, not in it.
   c. Beaver will travel 200-300 yards for food materials up adjacent side slopes. Typically can't carry larger stems back to stream.

4. Reinforce the dam where possible with net (hog) wire or a tire blanket - anchor material to banks.

   Beaver will readily accept this material and incorporate it into the dam.

D. Grazing Management.

A high degree of diversity within the riparian vegetative community is a basic requirement for maintaining a stable stream ecosystem (B. H. Smith 1982.)

1. Grazing system in use or planned must provide the necessary rest for the area to complement type of plants to be rehabilitated (initial beaver introduction). Rest 2-5 years if possible, depending upon initial condition of riparian area. High energy electric fences have worked well for this purpose.

2. When grazing returns, use a planned grazing system. Avoid fall grazing the first year if possible.

E. Other Management Principles.

1. Beaver cycle.

   New dam → Trout Pond → Marsh → Wet Meadow →
   Aspen Regeneration. Beaver abandon site during marsh period.

2. Cycling period.

   Normal cycling period from a new dam to a wet meadow is usually 30-50 years in aspen types. The upstream erosion rate is the key - with accelerated erosion, this period will be reduced.

   In willow supported riparian habitat, beaver cycles are short, (if sediment load is high), approximately 5 years, dams are typically small, short-lived and support trout only 2-3 years. Beaver activity stimulates willow growth.

III. Beaver Biology.

Large dark brown rodent weighing 30-70 pounds (average 40 pounds) with a broad, flat, scale-covered tail. The eyes and ears are relatively small and nearly hidden in the fur. Hind feet are large and webbed.

Mate for life, will remate. First breed at age 2.5 years in early January. They are known to breed to age 12 to 16 years.

Kits average 3-4 per litter; are usually born in June. Young stay with parents until 2 years of age. At that time, they are usually driven away from the pond to form new colonies.

Dam building usually occurs during August through early October. Maintenance occurs constantly. August through early October is also the peak period for cutting woody material for a winter food cache.

Food - beaver eat succulent bark at a rate of 20 ounces/day for an adult. During spring and summer, beaver will eat grass, forbs, sedges and other aquatic and riparian plants. They prefer willow and aspen, will also eat alder, dogwood and cottonwood. Willows will increase under beaver use. Aspen does not replace itself under beaver use.

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