A Feasibility Study to Assess the Plausibility of Reintroducing the American Beaver Back on the University of Idaho, Experimental Forest.

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An Undergraduate Directed Study

Under Dr. Jim Peek

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Abstract - The objective of this study was to determine the feasibility of reintroducing beaver, *Caster canadensis*, back onto the Experimental Forest and to suggest ways to improve the probability of a successful introduction. The absence of heavy beaver activity in these drainages over the years could explain why succession has been allowed to progress to later stages. Evergreens have established themselves along major portions of the streams blocking sunlight needed by the less shade tolerant hardwood species. In limited areas where evergreen density was low and suitable hardwood species were found fresh beaver activity was also found. Evidence of past beaver activity throughout some of the streams, even in areas with substantial evergreen growth, helps suggest that succession has occurred in areas that once supported beaver populations, but now are unable to support such populations.

INTRODUCTION

American Beaver, *Caster canadensis*, are thought to have once been an important part of the ecosystem on the University of Idaho, Experimental Forest. There are portions of four major stream drainages within the Experimental Forest. It had been perceived prior to this study that beaver were currently not populating those four drainages. Interest in reintroducing beaver back into those drainages has been growing based on expected ecological benefits they provide for the riparian area, and the esthetics of creating what is thought to be pre-settlement conditions for the streams.

This study was conducted to determine the feasibility of a successful reintroduction of the American Beaver back onto the University of Idaho, Experimental Forest. There were four drainages on the Experimental Forest that were considered: Big Meadow Creek, Flat Creek, East Hatter Creek, and West Hatter Creek. Beaver have four major habitat requirements that must be met before they will colonize an area: 1) presence of a permanent water source, 2) presence of at least one or more essential food items, 3) necessary stream gradient and volume, and 4) low frequency and severity of floods (Rawley 1954). It was also suggested by Howard and Larson (1985) that bank steepness will also be an influential factor for beaver colonizing an area.

If beaver were once able to colonize the four drainages of the Experimental Forest, but now are unable to do so then at least one of those four requirements must have changed. The most likely to have shown the greatest changed over time, food availability, became the focus of this study. Though the other three requirements are important considerations they are unlikely to have changed to the extent of excluding beaver from the drainages, so therefore were disregarded for the purposes of this study.

Food preferences of beaver have a wide range and their rate of use is shown to depend on the season (Svendsen 1980). Beaver will eat many types of hardwood species like aspen, *Populus tremuloides*, willow, *Salix* spp., and alder, *Alnus incana,* (Svendsen 1980). It has also been shown that beaver willingly eat various softwood species, including pines, firs, and spruces even when not experiencing starvation (Scheffer 1941). The study conducted by Svendsen (1980) also shows grasses to be an important summer food source, but could be substituted with tree bark if not present.

The longevity of beaver colonies in a specific area is directly related to the quantity of food resource available and the ability of that food resource to perpetuate itself with constant utilization by beaver (Scheffer 1941, and Townsend 1953). The dispersal tendencies of young opposed to the territoriality of adults in the presence of self perpetuating food resources is the mechanism behind maintaining permanent beaver colonies in an area (Townsend 1953, and Leege 1968). This dispersive social structure for beaver colonies allows for full utilization potential of an area to be reached (Slough and Sadleir 1977). The full utilization potential referred to by Slough and Sadleir (1977) suggests that through the dispersal of the juveniles, all habitats capable of supporting beaver will be found and utilized. These newly filled habitats by dispersing individuals can arise from regeneration of food items on recently vacated colony sights, from the process of succession after fire, or logging practices (Slough and Sadleir 1977).

METHODS

All four drainages were walked monitoring for the presence of food items preferred by beaver. The primary food items were determined to be aspen (*Populus* spp.), willow (*Salix* spp.), birch (*Betula* ssp.), alder (*Alnus incana*), and redosier dogwood (*Cornus stolonifer*) from Scheffer (1941) and Townsend (1953). Areas that contained sizeable food quantities within the designated reach were measured for approximate area. The measuring process was conducted by pacing (1 pace = 0.635 meters) the length and width of the site that included the food source. This allowed for a crude approximation to total food containing area of each site. Though density of food species is important this study was of a qualitative approach not quantitative. If calculating carrying capacity was our objective the densities would be more relevant (Howard and Larson 1985).

The general characteristics including tree species in close proximity of the riparian, bank steepness, and other miscellaneous characters specific to each site were recorded. Evidence showing past and/or present sign of beaver activity in each study site was also recorded.

RESULTS

Big Meadow Creek Unit - Big Meadow Creek is a narrow, wondering stream with a mix of steep and shallow banks. The riparian area showed clumped densities of a diversity of tree species (Figure 4). The most predominant hardwood species identified was thin-leafed alder, but instances of redosier dogwood and Scouler's willow also occurred. Ponderosa pine was the primary softwood species. A public camp ground is located on the east bank, and a restricted road parallels the upper portions of the reach.

The survey showed Big Meadow creek to have three sections containing viable food resources. The first section was at the down stream boundary of the experimental forest and extended upstream approximately 307 m with an average width of 13 m. The area of section 1

was about 4000 m^2. The second section was upstream from section 1 and was smaller with an area of 726 m^2. The last section was upstream farther and was 5162 m^2. The combined total area for Big Meadow Creek that contains substantial food item quantities was near 10,000 m^2 (Figure 1).

Figure 1. The Dimensions and total area in meters squared of food containing sections for Big Meadow Creek in a downstream to upstream order.

Section	Pace dimensions (length * width)	Converted Dimensions (1 pace = .635 m)	Total Area (m^2)
1	484 * 20	307 * 13	3991
2	52 * 35	33 * 22	726
3	280 * 45	178 * 29	5162
			9879

Extensive fresh beaver activity was recorded in section 1. The culvert beneath the entrance road at the Experimental Forest boundary was blocked by sticks with obvious beaver tooth marks on the ends causing water to flood over the road. Another recently constructed dam was located 50 m upstream from the dammed culvert. Numerous occasions of beaver exploiting thin-leafed alder was found throughout section 1. Also in section 1, Four ponderosa pines and limited amounts of redosier dogwood were cut down and stripped of bark. In section 2 thin-leafed alder was again exploited heavily, and a small group of Scouler's willow was utilized. Section 3 showed many instances of past use by beaver, but no current activity was observed. A partially cut cottonwood and rocky mountain maple accompanied with many small stumps of alder were examples of plant species taken by beaver in past years.

Flat Creek Unit - Flat Creek is a narrow, wondering stream with shallow banks. The stream gradient was small allowing for low water velocities. Flat creek was separated into an upper portion and a lower portion by highway 12 and a railroad crossing. In the upper reach,

riparian areas were heavily shaded by a thick evergreen canopy even though the evergreens were of low densities relative to trees per acre. Thin-leafed alder was very consistent near the bank with intermittent patches of redosier dogwood (Figure 4). The primary softwood component was grand fir, but Engleman spruce, and subalpine fir were also common. A public road parallels the stream along approximately half the reach surveyed. A personal residence was located at the top of the upstream portion. The lower portion down stream from the road and railroad crossing showed slight differences in its general characteristics. Evergreen canopy was noticeably less, the dogwood component was larger, and lodgepole pine was more prevalent.

The banks of the stream channel supported numerous short belts of thin-leafed alder with few occurrences of redosier dogwood in the upstream portion. The Downstream portion was one continuous thin belt of alder and dogwood 267 m long by an average width of 8 m wide (total area = 2136 m^2). The upstream portion consisted of eight different sections. The average area for the eight sections was 794 m^2, and their combined area was 6351 m^2 (Figure 2).

Fresh beaver activity was common throughout both the upper and the lower portions of Flat Creek. Several instances of grand fir saplings being cut and stripped of bark were recorded in both up and downstream portions. In the downstream portion thin-leafed alder and lodgepole pine were also freshly taken by beaver. Past cuttings from beaver were found in areas throughout the entire reach, however the majority were found in the downstream portion. Approximately 100 meters downstream from the Experimental Forest boundary was an abandoned beaver lodge. On a small tributary to Flat Creek, 20 meters downstream from the old lodge, an active beaver dam was found. The pond covered a huge expanse. An investigation of this area showed extensive use of grand fir by beaver here also. Willows were found in areas of the pond and were not used heavily. The back reach of the pond fell 12 cm short of the boundary of the Experimental Forest.

Figure 2. The Dimensions and total area in meters squared of food containing sections for Flat Creek in a downstream to upstream order.

Section	Pace dimensions (length * width)	Converted Dimensions (1 pace = .635 m)	Total Area (m^2)
1	420 * 12	267 * 8	2136
2	121 * 19	77 * 12	922
3	182 * 10	116 * 6	696
4	72 * 5	46 * 3	138
5	174 * 9	110 * 6	660
6	276 * 13	175 * 8	1400
7	147 * 8	93 * 5	465
8	157 * 17	100 * 11	1100
9	153 * 15	97 * 10	970
			8487

East Hatter Creek Unit - East Hatter Creek was a small stream with deep cut banks and near vertical sides. The stream channel held large amounts for woody debris primarily from fallen trees due to bank erosion. Only limited amounts of softwood species were present. The reach was dominated by a variety of softwood species (Figure 4). The survey of East Hatter Creek showed a few occurrences of thin-leafed alder, but the total hardwood component was too small to warrant measuring the area of the food resource. Sign of past or present beaver activity was not found in any portion of the East Hatter Creek unit.

West Hatter Creek Unit - West Hatter Creek was small and narrow. The banks were generally low and shallow. The riparian zone was thin, but well established with abundant thin-leafed alder and a small portion of redosier dogwood (Figure 4). The majority of the alder and dogwood was rooted in the stream channel or on the bank edge and rarely extended past that. The softwood component was significantly large on the southwest bank and moderate on the

northeast bank. Canopy cover was minimal. Sign of past or present beaver activity was not found.

The survey of West Hatter Creek showed one long thin belt of food species. The belt measured 800 m long by 5 m wide and started at the north boundary of the unit. The total area calculated to 4000 m^2 (Figure 3).

.Figure 3. The Dimensions and total area in meters squared of food containing sections for West Hatter Creek in a downstream to upstream order.

Section	Pace dimensions (length * width)	Converted Dimensions (1 pace = .635 m)	Total Area (m^2)
1	1259 * 8	800 * 5	4000

Figure 4. Percent composition for food item species' near stream approximated by visual observations.

	Thin-leafed Alder	**Red Osier Dogwood**	**Scouler's Willow**	**Rocky Mountain Maple**	**Pines and Other Trees**
Big Meadow Creek	75%	2%	2%	1%	20%
Flat Creek	55%	3%	0%	0%	42%
East Hatter Creek	3%	0%	0%	0%	97%
West Hatter Creek	49%	1%	0%	0%	50%

DISCUSSION

Natural dispersal tendencies and tendencies of dispersal after release into a new area both negatively influence the feasibility recommendation to physically reintroduce beaver back onto the Experimental Forest. Two of the four waterways, Big Meadow Creek and Flat Creek, exhibited past and present beaver sign showing beaver can reach the study area naturally. Beaver would stay and colonize the streams if suitable conditions existed there (Slough and Sadleir 1977). Knudsen and Hale (1965) suggest transplanting is not cost effective. They monitored movements of 200 recently transplanted beaver and found only 18% stayed within a mile of the

release site. The other 82% dispersed an average of 4.6 miles from the release site. Similar findings were found in a study done by Scheffer (1941) where 54 % of 187 transplanted beaver relocated, on average, 5.3 miles from their release site. I suggest that physically transplanting beaver onto the Experimental Forest land is not feasible. It has been proven by past and present activity of beaver in the drainages that they are cable of finding the area naturally and there is a significantly low success rate for beaver colonizing the specific area transplanted.

A more feasible path to establishing a resident beaver population on the Experimental Forest would be to create suitable habitat in the designated areas. Slough and Sadleir (1977) say for resident populations of beaver to occur in an area there must be self-perpetuating food resources and maintainable habitat conditions. If suitable conditions can be created beaver will naturally repopulate the areas.

RECOMMENDATIONS

Big Meadow Creek - Big Meadow Creek had the most variety of food items in its area (Figure 4). The total area for the site was near 10,000 square meters. Only 4700 square meters was currently being used by beaver. Because beaver are not consistently present at the Big Meadow Creek site the food is not considered to be self-perpetuating (Slough and Sadleir 1977; and Townsend 1953). Relatively little alteration would need to take place to create a maintainable habitat for beaver here. Selective thinning of undesirable underbrush (not complete removal) would allow less competition for resources for desirable species. Plantings of willow and other species might be considered to provide needed diversity for food resources (Scheffer 1941).

Flat Creek - Flat Creek had little variety of food species (Figure 4) and a dense canopy. Beaver had recently dispersed through this area and were eating grand fir and lodgepole pine which are not considered critical foods for beaver but only because they can not perpetuate

themselves (Scheffer). To help provide a better food resource the softwoods in the proximal area of the stream would need to be thinned allowing for the less shade tolerant hardwood species to regenerate (slough and Sadleir 1977). A variety of plant species like that suggested for Big Meadow Creek would need to be established after the thinning. This site should repopulate easily considering the close proximity of an active beaver pond just past the Experimental Forest boundary.

East Hatter Creek - I have determined that habitat alterations to East Hatter Creek would not be a feasible means to re establish beaver there. The banks are extremely deep at near 90 degree angles. The banks would have to be removed requiring massive work efforts and massive earth removal. The result would be severe sedimentation to the stream bed greatly effecting the water quality. To bring machinery to the site a new road would need to be constructed and permission to cross private property with that road would need to be obtained.

West Hatter Creek - There was no old or recent beaver sign located at this site. There was no variability in the food resources at this site (Figure 4), and total area containing food resources was 4000 m^2. Some removal of the pine component would need to occur, especially on the southwest bank. Those areas would need to be replanted with a variety of plant species like that discussed for Big Meadow Creek. Some thin-leafed alder may need to be removed to allow for more diversity and lessen the competition for resources near the creek.

SUMMARY

- Beaver presently occur in two of four streams on the Experimental Forest.
- Beaver need an abundant, maintainable food resource composed of a variety of species.
- A substantial variety of food resources is not present on the Experimental Forest, but where limited variety was found beaver were also found.
- Beaver find all areas capable of supporting beaver when the population is in carrying capacity.
- Physically transplanting beaver on the Experimental Forest is not feasible.
- Habitat creation is the most feasible method to reestablish permanent beaver colonies back on the entire Experimental Forest.

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