2006 Cottonwood and Riparian Zone Enhancement Project – Summary Report

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Bow River Chapter

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Introduction

Riparian Habitat, as defined by Gillilan and Brown (1997), is the area immediately adjacent to flowing and standing water bodies such as rivers, lakes and sloughs. Cottonwood trees (*Populus spp*.) and willow trees (*Salix spp*.) are characteristic of the riparian areas that skirt the river and stream valleys of southern Alberta. These groves support a disproportionate level of biodiversity compared to neighboring uplands (Gillilan and Brown, 1997), providing food and shelter for various species of animals, fish and insects.

Riparian zones also help to protect and purify water resources by creating shade that regulates water temperature and climate (McClusky et al., 1983). The extensive root systems of cottonwoods prevents sloughing and removes excess sediments and nutrients from the water system (Gillilan and Brown, 1997), while trees that have fallen into the watercourse create important water structures such as pools and riffles that help to control channel stability, stream bank stability and gradient (Platts and Rinne, 1985).

As well as the many ecological advantages created by riparian zones, these areas are also popular recreational areas. Enjoyed by hikers, fishermen and other outdoor enthusiasts these zones tend to remain busy all year round.

Despite the obvious advantages offered by the existence of healthy riparian zones, these areas remained threatened for several reasons. The Cottonwood and Riparian Zone Project has worked since 2000 to address some of these threats, particularly that of beaver grazing. The removal of many cottonwood groves for urban and agricultural development coupled with a decrease in the number of beaver predators found in the wild has led to a disproportionate concentration of beavers in what groves remain. While beavers are a natural part of the environment, too much beaver grazing can remove valuable forest cover, causing sloughing of streambanks, a reduction in water velocity and siltation and changes in water chemistry upstream of beaver activity (Christensen et al., 1961).

The Cottonwood Project has worked to protect remaining cottonwood groves from this overgrazing by wrapping tree bases in a wire mesh, a method that has proven highly effective in areas wrapped thus far. However, the greatest threat to the continued vitality of riparian zones lies beyond the scope of this project, as it involves the reproductive cycle of the tree itself.

While there are three species of cottonwood trees found in southern Alberta (Western Plains, Narrowleafed and Balsaam) these trees all reproduce in the same manner. Cottonwoods tend to grow almost exclusively on the relatively flat flood plains surrounding major rivers and streams as their reproduction depends largely on ice scouring and spring flood conditions. During spring flooding, water flows carry seeds downriver and then deposit them when waters begin to recede. The seeds can be carried for miles downriver, increasing the genetic diversity found in cottonwood groves throughout the zone. Receding flood waters also leave fresh alluvium deposits along flood plains and banks, creating an ideal environment for seed germination. The exposed soil created by ice scouring is also essential, as young cottonwood seedlings do no compete well with overtopping vegetation. As seeds remain viable for only one to two weeks, it is essential that these factors be in place to ensure the continued growth of new saplings (USDA Forest Service, 2005).

In recent years the ability of Cottonwood trees to reproduce sexually has been greatly reduced by the drought-like conditions that have been maintained in the Bow River Basin. While these conditions are partially due to the hot, dry weather systems Alberta has experienced through most of the last decade, there has also been an abrupt reduction in the flow of river water due to the operation of dams upstream. This has affected the seasonal cycle of Cottonwood reproduction while also lowering the depth of the water table found in riparian zones (Mahoney, 1995). Because of this most reproduction in recent years has been asexual, particularly in the forms of suckering and coppicing. While this method of reproduction is capable of *maintaining* the groves founds along river, in the long term it could lead to diminished genetic diversity in new growth, reducing the trees' ability to respond to disease or other changes in their environment (Rood and Bradley, 1993).

The early summer of 2005 saw these conditions radically change however as flood water along all major rivers and tributaries in southern Alberta reached unprecedented levels. Heavier than usual precipitation in the southwestern mountainous regions of the province created dangerously high water levels throughout mid to late June in the Red Deer River basin, the South Saskatchewan River basin, the Oldman River basin and the Bow River basin. Different storm systems moving through the region between June 1 and June 19 dumped anywhere from 170 to 510 mm of precipitation in some areas, causing the Bow River to peak on three separate occasions (Alberta Government, Precipitation, 2005). At these times, the river flow at Carseland Dam on the Bow River was over 1000 m^3/s, as compared to average historical flows of only 200 to 300 m^3/s in the same month (Alberta Government, Bow River, 2005).

The floods caused massive damage to buildings and roadways across the region. Albertan insurers estimated that they would need to pay out a total of $217.5 million in flood-related claims, while uninsurable losses could amount to as much as $100 million to $200 million. If total estimates are correct, these floods could become Alberta's most expensive natural disaster to date (Gauntlett, 2005).

The flood damage created new challenges for the Cottonwood project as well. Many areas were difficult to get to as spillways had washed away entrance roads and bridges. Large accumulations of flood debris also made the wrapping of trees in some areas impossible, while extra care had to be taken along weakened riverbanks and streambeds.

Despite this, the benefits of the flood to the Bow River and surrounding areas were understood by all crew members. The large deposits of silt and gravel left behind by the flood would create perfect conditions for the germination of new cottonwood seedlings, while new spawning habitat was created along the river and its tributaries. In order to maintain the vitality and health of riparian zones and thus the continuance of programs such as the Cottonwood Project, these natural occurrences need to take place every year, rather than infrequently as has been the case.

Executive Summary

Methods

A. Tree Wrapping

Cottonwood Trees were wrapped along waterfronts and side channels within a zone of approximately 20 m from the water's edge. While a 20 m distance was used as a benchmark, discretion was used in judging whether a distance greater than 20 m should be wrapped. Factors such as past beaver activity and whether low lying areas were prone to flooding were taken into consideration while determining what distance inland trees should be wrapped.

The wire used to wrap the trees was 48"X 112 ½′ Stucco mesh and was significantly heavier and more durable than the poultry mesh used in the past. This wire will provide many benefits to future projects such as increased resiliency to damage caused by flooding and ice flows; causing no damage to the vascular system of wrapped trees since stapling is not necessary and adjustments to the wire can easily be made to allow for additional growth. Flood damage from 2005 illustrated how easily the poultry mesh can be damaged as many areas along the Bow River required rewrapping because of wire damage caused by the flood.

Trees were wrapped leaving room for approximately 3-5 years growth. A rigid "tube" was created around the tree and wire ends were overlapped and twisted together. Approximately 15-20 cm of extra wire was used in the overlap section so that in future years these pieces can be expanded rather than requiring complete replacement.

Based on past reports, tree wrapping methods have varied particularly as the wire of choice has changed from poultry wire to stucco mesh wire. As new crew leaders come and go it is to be expected that each leader will implement some new variation to the wrapping methodology.

B. Weed Picking

Weeds generally originate in, but are not limited to, areas of human activity such as boat launches and areas of natural or unnatural disturbances, such as sloughing or road sides. It has been found that targeting one weed species at a time is the most efficient and effective way to deal with an infestation. Restricted weeds were targeted first, then noxious weeds in order of abundance and locale. Weeds were bagged on site then removed by truck for disposal.

C. Garbage Picking

The higher than usual flood waters experienced this year caused significant damage to most boat launches, parking lots and parks found along the waterway. The Cottonwood Crew attempted to mitigate some of this damage by collecting debris and garbage carried by the water in areas where it was needed. The crew would spread out and proceed in a line, bagging the garbage on site and then removing by truck for disposal.

Results

Pre-Cottonwood Project Wrapping

June 22 – Float

During the afternoon of June 22, Dave and Rob from Fish Tales and I floated down the Bow River to wrap cottonwood trees. The focuses of our efforts were on islands due to their limited access to the Cottonwood Crew. The first site we visited was an island adjacent to a Burnco pit (NW-12-24-29-W4). Approximately 15 trees were wrapped and 2 rolls of poultry wire was used (50 feet in total).

The second site we visited was adjacent to Bob Kambeitz's and the Buffalo Bones site (old buffalo bone dumping site) (SW-2-22-28-W4). Approximately 20 trees were wrapped and 20 trees that were previously wrapped were checked and loose/damaged wire was fixed. In total 3 rolls of poultry wire was used (75 feet in total).

Additional island sites were noted and are listed in appendix _____.

Week 1 (June 30)

June 30 – Administration Day

Crew members signed necessary paperwork, given the Cottonwood Project 2006 apparel and were informed of the goals for the upcoming field season.

Week 2 (July 4 – July 7)

July 4 – Legacy Island

Ron Barthalow met us at Legacy Island and provided the crew with weed identification manuals and gave a brief talk regarding identifying scentless chamomile and other noxious weed species. For the remainder of the morning the crew picked weeds on the west side of Legacy Island and collected 26 garbage bags of scentless chamomile. Ron asked us to focus our efforts on scentless chamomile as it was of greatest concern.

During the afternoon the crew began wrapping trees on the eastern portion of Legacy Island. In total 83 trees were wrapped and $3^{1/2}$ rolls of stucco wire was used. Most trees had been previously wrapped but the 2005 flooding had either damaged the old wire or deposited enough sediment to significantly reduce the area the wire was covering. Sediment deposition in some sites resulted in only two feet of tree trunk being protected. All trees with damaged, tight fitting and covered wire were rewrapped.

July 5 – Legacy Island

Wrapping occurred on the eastern portion of Legacy Island. Most trees needed to be rewrapped because of flood damage. In total the crew wrapped approximately 180 trees and used $7^{1/2}$ rolls of stucco wire. Because of the possibility of flooding in the future (thus increasing access to trees for beavers) trees were wrapped further in than the 20m buffer recommended in past reports.

July 6 – Legacy Island

Wrapping continued on the eastern portion of Legacy Island. Approximately 150 trees were wrapped and $6^{1/2}$ rolls of stucco wire were used. During the afternoon there were only 5 members of the crew present as Laura had to leave early.

July 7 – Legacy Island

Wrapping occurred along the north eastern portion of Legacy Island (near the side channel of the Bow River). There had been a significant amount of debris, including trees and sediment, deposited during the 2005 floods. As a result, wrapping trees in this area was difficult as it was difficult to access the entire trunk of many trees because of debris jams that were present. The crew did its best to remove these debris jams where possible, but when the debris jams could not be removed old wire was cut away to the greatest extent possible and the exposed portion of the trunk was wrapped. This generally resulted in the upper portion of the trunk being wrapped fully while the remaining wire was shaped around the remaining portion of the tree to deter beaver grazing.

In total, approximately 125 trees were wrapped and $5^{1/2}$ rolls of stucco wire were used. There was a noticeable amount of new woody species growth along the north eastern portion of the island. Trees that were approximately 4 feet in height or greater were included in our wrapping efforts. The new growth should be monitored for wrapping in the future as it is important to protect these new recruits.

Week 3 (July 10 – July 14)

July 10 – Legacy Island, D. Foster & Allan Smith

Wrapping occurred along the west side of Legacy Island and extended onto a portion of Allan Smith's (Bow River Resort) and George Foster's properties. Again, the majority of trees in these areas were difficult to wrap due to debris jams and flood debris. Trees were only re-wrapped if the existing wire was either damaged, covered by siltation or was too tight on the tree. In total, approximately 145 trees were wrapped using $5^{1/2}$ rolls of stucco wire. Accumulated wire that had been removed from previously wrapped trees was taken to the Carsland Waste Transfer Site.

Note:

Hours for the Carsland Waste Transfer Site are as follows: Monday - 12pm-8pm, Tuesday - 9am-5am, Wednesday - 9am-5am, Thursday - CLOSED, Friday - CLOSED, Saturday - 9am-5pm. The waste transfer site is located just south of Carsland on the Johnson's Island road.

July 11– F. Groenveld, Legacy Island, D. Foster & Allan Smith

Wrapping occurred on Flores Groenveld's property (across from Legacy Island) and continued on the western portion of Legacy Island, Allan Smith's and George Foster's properties. The Groenveld property contained mainly large mature trees (>3m in diameter). Despite their large size, a few of these trees had been damaged by beaver grazing and indicates that even large trees should be wrapped to prevent beaver grazing. The Groenveld's have since contacted TUC to express their pleasure with the work that the 2006 Cottonwood Crew had done on their property. Approximately 80 trees were wrapped on the Groenveld property and another 50 were wrapped on Legacy Island, Allan Smith's and George Foster's properties. In total 130 trees were wrapped and 8 rolls of stucco wire was used. There were only 5 members of the crew in the afternoon as Laura had an appointment.

July 12 – Albertina Farms

Wrapping occurred along the eastern portion of the Albertina Farms' property. This site had been previously wrapped in 2003 so re-wrapping only occurred as required. In total, approximately 143 trees were wrapped using $6^{1/2}$ rolls of stucco wire.

July 13 – Albertina Farms

Wrapping continued along the eastern portion of the Albertina Farms' property. In total, approximately 126 trees were wrapped using $5^{1/2}$ rolls of stucco wire.

July 14 – Stampede – half day

No wrapping was completed today due to the half day. Instead, accumulated wire that had been removed from previously wrapped trees was collected at Albertina Farms, Allan Smith's, George Foster's and Legacy Island. The work truck was also taken to a service station and was cleaned out and vacuumed.

Week 4 (July 17 – July 21)

July 17 – Albertina Farms

Wrapping continued along the eastern portion of Albertina Farm's property and progressed towards the confluence of the Bow and Highwood Rivers. In total, approximately 155 trees were wrapped using 7 rolls of stucco wire.

July 18 – Quirk Creek outing – half day

No wrapping was completed due to the half day. Instead, the crew picked weeds along the eastern portion of Legacy Island. Once again removing scentless chamomile was the focus of our efforts. In total, 25 bags of weeds were removed. The work truck was also taken to a service station and was cleaned and vacuumed.

July 19 – Albertina Farms

Wrapping occurred along the western portion of Albertina Farm's property and ended on the Highwood River approximately 100m upstream of the Bow and Highwood River confluence. In total, approximately 145 trees were wrapped using 7 rolls of stucco wire.

July 20 – Mchugh, Thomson & Dugdale properties

Wrapping occurred on the eastern portion of the Mchugh property and progressed downstream towards Richard Dugdale's property (towards Mckinnon's Flats). Flooding in 2005 removed the pathway the once permitted vehicle access to Richard Dugdale's property. As a result, wire could not be driven to any of the wrapping sites at these locations. Wire was carried to all locations from where the work truck was parked, which resulted in the wire being carried up to 2 km by the end of our work at these sites. There is an Island adjacent to the Dugdale property that needs to be wrapped. However, the amount of effort that is required by the crew to transport wire to this location does not make it feasible to wrap unless vehicle access is created. It does appear that off-road vehicles have been accessing these areas; however, they are being driven through stands of willow and would have damaged the work truck had I attempted this route as well.

In total, approximately 148 trees were wrapped using 7 rolls of wire. There were several trees fallen by beavers on the eastern portion of the Mchugh property. Also, as we progressed downstream debris jams once again began to impede our wrapping efforts. There were only 5 crew members present today as one member was missing due to illness.

July 21 – Mchugh, Thomson & Dugdale properties

Wrapping occurred on the eastern portion of the Mchugh property and approximately 105 trees were wrapped using 5 rolls of stucco wire. Another crew member was absent today due to illness and while working another became ill due to the heat.

Week 5 (July 24 – July 28)

July 24 – Mchugh, Thomson & Dugdale properties

I received a message this morning from Brittany informing me that neither Brittany nor Laura would be finishing their work term for the Cottonwood Project due to a personal issue. (***SHOULD I INCLUDE THAT THIS WAS A RESULT OF A FRIENDS DEATH AND WAS USED AS AN EXCUSE TO GO ON VACATION?***)

Wrapping occurred along the eastern portion of the Mchugh property and the western portion of the Dugdale property. In total, approximately 155 trees were wrapped using $6^{1/2}$ rolls of stucco wire.

July 25 – Mchugh, Thomson & Dugdale properties

Wrapping occurred along the Dugdale property and followed the back channel of the Bow River. In total, approximately 142 trees were wrapped using $6^{1/2}$ rolls of stucco wire.

July 26 – Bow River Float

To reward the Cottonwood Crew for all their hard work I organized a float down the Bow River. The trip began at Policeman's Flats and ended at Mckinnon's Flats. No wrapping occurred, but I had the crew assist me with acquiring information about beaver grazing. Specifically, we gathered data to investigate what size of trees were being targeted by beavers and what distance beavers were traveling inland to harvest trees. The main reason for this endeavor was to gather meaningful data to assist in future Cottonwood Project methodology. Generally, passed projects have focused on wrapping a 20 m "buffer zone" of trees. I wanted to determine how far beavers were traveling inland from the shoreline and from tree line to harvest trees. Please find the results of this study can be found below.

Overall, I believe the Cottonwood Crew enjoyed this opportunity to experience the beauty of the Bow River and developed a greater appreciation for this river and were able have a greater understanding for the purpose of the Cottonwood Project. I feel that the float was a great success and should be considered again next year so long as the crew's work warrants it.

July 27 – Legacy Island and G. Foster

This was the last day of tree wrapping for the project. Wrapping occurred along the backchannel of the Bow River and George Foster's property. The remainder of the

property contained several large debris jams that made wrapping very difficult. Only trees that required re-wrapping were wrapped. I consider both Legacy Island and George Foster's property to be completely wrapped, but should be checked in 3 years to monitor this years' and previous year's wrappings.

In total, approximately 130 trees were wrapped using 5 rolls of stucco wire. Accumulated wire was stored and disposed of following the completion of the Cottonwood Project.

July 28 – Legacy Island/Project wrap-up

Several complaints had been made regarding the condition of the Legacy Island boat launch area due to the deposition of sediment during this year's high water. The Cottonwood Crew spent the morning redistributing the deposited sediment around the launch area to smooth out ruts and uneven ground that had been causing problems for vehicles with low ground clearance. Based on feedback from folks using the site, everyone was happy with the work the crew had done on the boat launch. I checked the condition of the boat launch on July 31, 2006 while I was removing the accumulated wire and the boat launch was holding up well. However, it is likely that sediment will once again be deposited during next years high water period reversing the work completed on the boat launch area.

After completing work on the boat launch the crew returned to the office where they completed their evaluations of the project and of the Cottonwood Crew Leader. Once finished, the crew and I cleaned out and vacuumed the work truck.

Recommendations

Summary

Conclusion

Literature Cited

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Appendices

A. Summary of Project Expenses

Item	Place of Purchase	Date	Cost	Quantity	Subtotal	GST	Total
Salaries - Crew	Trout Unlimited	--	$10.00	699	--	--	**$6,990.00**
Salary - Crew Leader	Trout Unlimited	--	$14.00	320	--	--	**$4,480.00**
48" x 112 1/2' Stucco Mesh	Home Depot	--	$64.97	91	$5,912.27	$354.74	**$6,267.01**
Gas	--	--	--	--	814.839	52.011	**$866.85**
Work Gloves	Home Depot	July 4, 2006	/	10	86.71	5.2	**$91.91**
Use of Personal Vehicle to Check Sites (410 km @ .42/km)	--	June 28 & 29, 2006	$.42/km	410 km	--	--	**$172.20**
Slurpies for Crew	Mac's	July 5, 2006	--	6	6.24	0.37	**$6.61**
Slurpies for Crew	CO-OP	July 18, 2006	--	6	6.54	0.39	**$6.93**
Bug Spray	Wal-Mart	July 5, 2006	$7.67	4	30.68	1.84	**$32.52**
Bug Spray	CO-OP	July 7,2006	$7.99	2	15.98	0.96	**$16.94**
Bug Spray	CO-OP	July 14, 2006	$8.99	4	35.96	2.16	**$38.12**
Bug Spray	CO-OP	July 27, 2006	$7.49	2	14.98	0.9	**$15.88**
Wire Cutters	Wal-Mart	July 5, 2006	--	3	45.94	2.93	**$48.70**
Wire Cutters	Home Depot	July 19, 2006	$17.98	1	17.98	1.08	**$19.06**
Truck Cleaning Supplies	CO-OP	July 7, 2006	$8.39	1	8.39	0.5	**$8.89**
Truck Cleaning Supplies	CO-OP	July 28, 2006	$8.39	2	16.78	1.01	**$17.79**
Vacuuming	CO-OP		$2.00	3	6		**$6.00**
Raft rental (2 PFDs, oar rig and oars, pump and 6 person raft)	University of Calgary	July 26, 2006	$61.00	1	61	3.66	**$64.66**
						Total:	**$19,150.07**

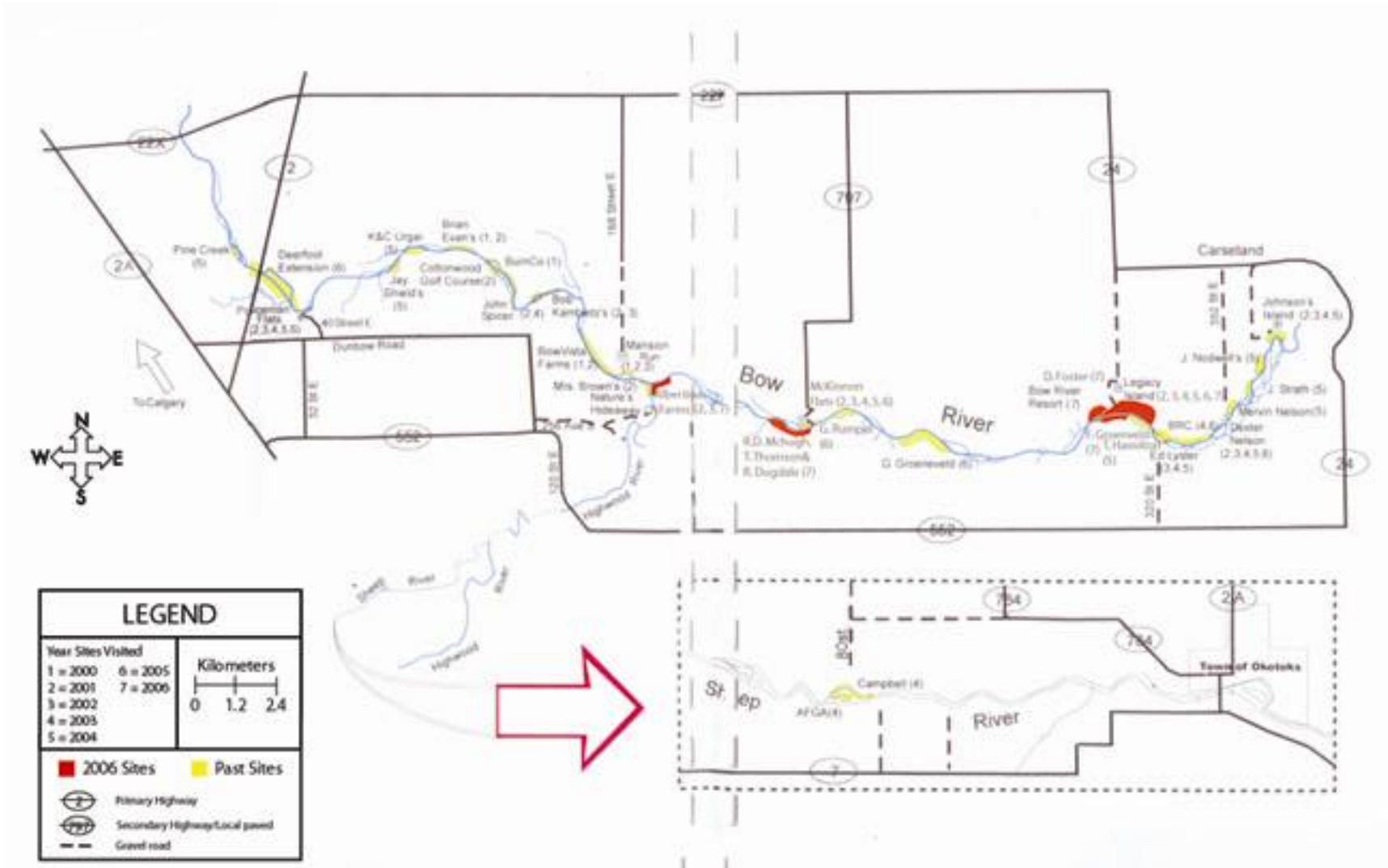

Figure 1 2000-2006 Cottonwood Sites