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AN ADAPTIVE APPROACH TO CHANNEL MANAGEMENT ON THE PLATTE RIVER

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Abstract: The mission of the Platte River Whooping Crane Maintenance Trust is to protect and manage habitat in the Platte valley for whooping cranes, sandhill cranes, and other migratory birds. The plan for meeting this mission calls for the creation and maintenance of eleven habitat complexes distributed through the central Platte valley. Each habitat complex is intended to consist of 1,000 ha of wet meadows and adjacent roost habitat of open, unvegetated river channel. Reduced flows in the river have caused its channel to narrow with banks that are often heavily wooded. Formerly mobile sand bars have stabilized and support dense stands of willow (*Salix* spp.) and cottonwood (*Populus deltoides*) trees. This new type of habitat is unsuitable for roosting sandhill and whooping cranes. As a consequence, the Trust has spent the last 20+ years developing and refining manual techniques for restoring and maintaining open channel habitat. The most effective technique developed to date involves mechanically clearing woody vegetation from islands and accretion ground, followed by (often) annual disking of the sites to prevent reestablishment of vegetation. Currently, approximately 80 km of river channel are managed this way.

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At the time of settlement by white people, the Platte River was characterized by having several wide braided channels with wet meadows (grassland/wetland complexes) adjacent to and between the channels. Trees were sparse and present as scattered clumps along some of the river banks (Kellogg 1905). However, over the past century the central Platte River valley has undergone a substantial transformation. Numerous dams and water diversions in Wyoming, Colorado, and western Nebraska have significantly reduced natural flows and sediment discharge. Peak discharge has declined nearly 70% and the river channel is only 10-70% of its 1865 width (O'Brien and Currier 1987). Nearly annual spring floods, combined with heavy sediment loads, scoured away any vegetation that had established the previous summer. Reductions in flows, and the trapping of sediment behind upstream dams, have dramatically altered the character of the central Platte River. Once wide and treeless channels have now been transformed to multiple narrow channels with woody vegetation succeeding on stabilized sandbars (MacDonald and Sidle 1992). Sidle et al. (1989) concluded that 80% or more of the pre-development channel area had filled with trees between North Platte and Kearney. Substantial channel narrowing had also occurred in the downstream reach between Kearney and Chapman. However, some open channel habitat remains in this reach (Currier et al. 1985, Johnson 1994).

Sandhill cranes (*Grus canadensis*), and whooping cranes (*G. americana*), prefer to roost in wide (> 200m), open channels (Fig. 1) with shallow sandbars (Krapu et al. 1984, Davis 2001). Not surprisingly, Faanes and LeValley (1993) documented a

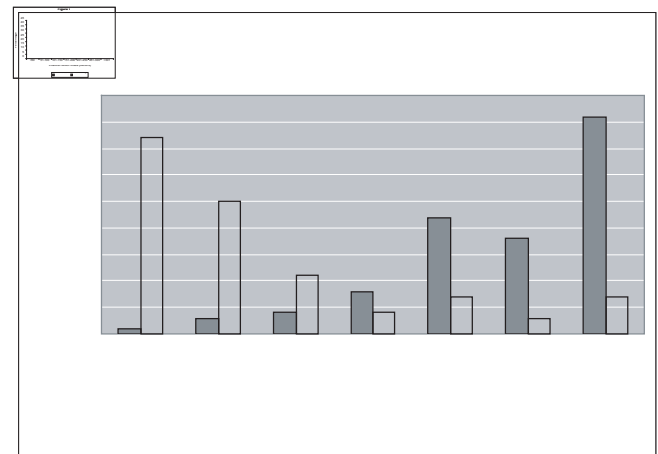


Fig. 1. Width of channel areas used by roosting sandhill cranes in the Platte River, Nebraska. Modified from Davis 2001.

significant shift in sandhill crane distribution in response to the changes in river channel habitat. In 1957, approximately 60% of cranes were roosting in the Lexington to Kearney reach, but by 1989, only 5% were using that area. Over the same time period, crane use of the Kearney to Chapman reach increased from 9% to 80% of the population. Whooping crane use of the river appears to have followed a similar pattern.

Since river flows appear to be inadequate to maintain the channel in the wide-open condition preferred by cranes as roosting habitat, the Platte River Whooping Crane Maintenance Trust ("the Trust") has implemented a variety of manual efforts to maintain and restore that type of habitat conditions. The first efforts were initiated over 20 years ago and our techniques have continued to evolve since then.

* deceased

STUDY AREA

The “Big Bend” reach of the central Platte River valley (the 130 kilometer reach from Overton to Chapman, NE) has hemispherical significance as a staging area for migratory birds. The region is best known for the nearly one-half million sandhill cranes and several million ducks and geese that migrate annually through the region (Sidle et al. 1993). In total, approximately 300 species of birds use the woodlands, wet meadows, and river channel in the valley (Currier et al. 1985). The Platte River Whooping Crane Maintenance Trust was created in 1979 with the mission of acquiring and managing habitat for migratory birds, whooping cranes in particular, in the central Platte valley. The habitat plan developed by the Trust calls for the protection of habitat “complexes” in each of the eleven bridge segments between Overton and Chapman. Each habitat complex is supposed to consist of at least 1000 ha of native wet meadow centered around suitable roosting habitat for cranes in the river channel itself. To date, we have acquired and protected over 4000 ha of habitat. The Nature Conservancy, National Audubon Society, Nebraska Game & Parks Commission, and U.S. Fish and Wildlife Service own an additional 2400 ha.

RESULTS AND DISCUSSION

The First Efforts: 1981-1986

From the earliest days of the Trust’s existence, we recognized that the channel of the Platte River was in a degraded condition as roost habitat for cranes. The ultimate cause of the degradation, reduced flows due to upstream dams and diversions, was beyond our ability to correct. We therefore, began looking for alternative methods to restore and maintain wide, unvegetated channel habitat.

The initial experiments on manual control of vegetation in the channel were conducted on the Trust’s Mormon Island Crane Meadows property (MICM). At the time, the MICM habitat complex consisted of approximately 700 ha of native grassland adjacent to 14.4 km of river channel. Three separate channels run through or past MICM. The largest channel, locally referred to as the “main channel”, was 200-300 m wide and served as an important sandhill crane roost site. However, even this channel had suffered significant tree encroachment along its banks and many formerly mobile sandbars had been stabilized by perennial vegetation.

Starting in 1981, we began experimenting with methods for removing the vegetation from islands. Initially, we used two conventional farm tractors, working in concert. The first tractor mounted a 5 ft-wide brush hog mower used to chop down herbaceous vegetation, brush, and small trees. Once the vegetation was mowed, the second tractor, pulling a standard, 12 ft-wide farm disk, would work over the area until it was reduced to bare sand. It was hoped that this treatment would destabilize the islands enough that, when high spring flows did occur, they

would become mobilized. This is exactly what happened during the 1983-84 flood event. Unfortunately, such events have only occurred twice (1983-84 and 1995) in the past quarter of a century. We discovered that in other years, particularly drought years, vegetation would encroach back to the active river channel, requiring regular maintenance work to keep the channel open.

During this time, we also experimented with non-mechanical methods of controlling vegetation, primarily in the form of glyphosate herbicides. The herbicide treatments were effective at killing the vegetation, but they left standing dead material that still needed to be cleared. The herbicide treatments also failed to provide any additional residual control compared to mechanical treatments alone. Consequently, the additional expense and effort involved in herbicide treatments were deemed unjustified and they were discontinued by the late 1980’s.

Refining the Techniques: 1987-1996

Although it was possible to conduct clearing operations with farm tractors, there were many drawbacks. Tractors were not suited to working in the river. They lacked the mobility needed to negotiate the channel and frequently became stuck. The rough terrain and ubiquitous sand caused extreme wear and tear on the equipment resulting in frequent breakdowns. Partly as a result, we were only able to manage 16 km of river channel from 1981 through 1986, primarily limited to MICM.

The first specialized piece of equipment we acquired was a Kershaw Klearway (Fig. 2), a vehicle originally designed to clear trees and brush from railroad right-of-ways. The Klearway is an articulated, 4-wheel drive vehicle capable of operating in water over 1 m deep. It has 2 large flywheels, each with heavy-duty cutting blades, mounted on its front end and can rapidly mow down brush and small (up to 20 cm in diameter) trees. We also custom-built a disk that was larger, more durable, and more disruptive than standard farm disks and began experimenting with vehicles to pull it, including a Steiger articulated 4-wheel drive tractor and Caterpillar D9 bulldozer, before finally settling on a Caterpillar Challenger rubber-tracked tractor (Fig. 3). With this equipment, we were able to expand our clearing activities to an additional 13 km of river channel, including land owned by The Nature Conservancy and National Audubon Society.

During this period, it became increasingly apparent that, while islands within the river channel could usually be converted back to mobilized sandbars through clearing, accretion ground (areas where the banks of the river have encroached into formerly active channel) often could not be. In some cases, areas of accretion land were left undisturbed as habitat for woodland birds, particularly neotropical migrants. Generally, though, it was undesirable to leave these woodlands intact as the visual obstruction they present seems to discourage cranes from roosting in the adjacent channel. If some accretion land couldn’t be returned to active channel habitat, perhaps it could



Fig. 2. Kershaw used for clearing woody vegetation in the Platte River, Nebraska by the Platte River Whooping Crane Maintenance Trust, Inc.



Fig. 3. Caterpillar Challenger rubber-tracked tractor used to maintain open stretches of the Platte River in Nebraska by the Platte River Whooping Crane Maintenance Trust, Inc.

be converted to wet meadow habitat? Early attempts at creating new wet meadows from wooded accretion land consisted of simply clearing the trees from an area and allowing it to naturally revegetate. While these areas did develop into a type of habitat similar to native wet meadows, they weren't exactly what we had hoped for. Re-sprouting trees and shrubs were typically abundant and difficult to control. We learned that it was critical to completely kill existing trees and shrubs, including the use of herbicides if necessary, during the initial clearing activity. More recent work on accretion land also included excavation of sloughs and overseeding of the sites with high diversity prairie/wetland seed mixtures after the removal of woody vegetation.

Expansion to Private Lands: 1997-2002

By 1996, most of the suitable areas of channel habitat owned by conservation groups were under active management. The majority of sandhill cranes were roosting on those areas (Davis 2001) and many whooping crane sitings occurred there as well. However, conservation groups own only a small proportion of channel habitat in the Platte Valley. Most of it is held by private landowners who farm the adjacent land. Many of these people, having seen the effects of clearing, were interested in having their land cleared as well, albeit for somewhat different reasons than those of the Trust. Generally, landowners along the central Platte either hunt waterfowl or lease their land for that purpose. Geese, and several species of ducks, appear to be as attracted to cleared areas as the cranes.

By this time, 68% of sandhill cranes were roosting in cleared areas (Davis 2001) and we were concerned about concentrating too many cranes on too few areas by limiting our clearing activities to conservation lands. We were also well aware that the conservation groups didn't, and possibly never would, control enough river channel habitat to adequately provide for the needs of roosting cranes. With the significant involvement of the U.S. Fish & Wildlife Service's Private Lands Program, clearing activity was expanded to private lands.

Demand for clearing proved to be high. By 2002, over 50 landowners had signed agreements allowing us to clear nearly 40 additional km of river channel. The workload quickly reached a point where it was beyond our ability to do it all ourselves and we began subcontracting out much of the work. In fact, a small industry grew up in the central Platte Valley around river clearing, ranging from contractors with bulldozers removing large trees and excavating sloughs to those with Challengers conducting annual maintenance (disking).

In all, we are now actively managing approximately 80 km of river channel in the Central Platte Valley with the potential to expand even further.

CONCLUSIONS

The Trust, in partnership with the U.S. Fish & Wildlife Service, The Nature Conservancy, Audubon Society, Nebraska

Game & Parks Commission, and over 50 private landowners, is actively managing substantial portions of the Platte River channel. Mechanical clearing has been an expensive and often difficult undertaking, but it has been successful at restoring and maintaining the wide, open-channel habitat preferred by cranes. Although clearing can destabilize islands and, to a lesser extent, accretion ground, it requires high flows in the river to restructure the riverbed and maintain its open character. In two decades, we have moved closer to our habitat goals, but we still are using experimentation, research, and monitoring to understand the habitat, how it responds to our treatments, and how it meets the needs of cranes and other migratory birds.

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