IN PRESS: PROC. 1988 CRANE WORKSHOP

UNOBSTRUCTED VISIBILITY AT WHOOPING CRANE ROOST SITES ON THE PLATTE RIVER IN NEBRASKA

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ABSTRACT: Unobstructed visibility is an important component of whooping crane roosting habitat. Recent habitat modeling efforts suggest that unobstructed horizontal visibility is suitable at a minimum of 1,100 feet. Unobstructed upstream and downstream visibility is also an important part of whooping crane roosting habitat, but quantification of that parameter has not been reported previously, or incorporated into species models. Data from the Platte River suggest that a minimum of 2,400 feet of unobstructed upstream and downstream visibility is needed at whooping crane roost sites.

Increased development of water resources in the Platte River ecosystem has prompted the creation of habitat models that quantify parameters of the biology of migratory birds and endangered species occupying the river. Habitat characters associated with sandhill cranes (**Grus canadensis**) have been modeled for several years (Armbruster and Farmer 1981 Currier et al. 1985 Currier and Ziewitz 1987), but development of endangered

species models has been a recent advance (Shenk and Armbruster 1986 Ziewitz 1986).

An important aspect of the ecology of whooping cranes (**Grus americana**) using roosts along their migration route, is the amount of unobstructed visibility of their surroundings that the roost sites provide. Johnson and Temple (1980) reported that throughout the whooping cranes' range, unobstructed bank to bank visibility at riverine roost sites was at least 654 feet. Lingle et al. (1984) reported that a Platte River roost site near Prosser, Nebraska, possessed an unobstructed bank to bank distance of 1,146 feet. Subsequent analyses of unobstructed channel width at whooping crane roosts studied through the spring 1987 migration period have ranged from 699 to 1,207 feet (U.S. Fish and Wildl. Serv., unpubl. data).

Previous modeling attempts have emphasized the importance of cross-stream (horizontal) visibility, at the apparent expense of upstream and downstream (vertical) visibility (Shenk and Armbruster 1986, Ziewitz 1986). The fault with this approach is that, in theory, any given point on the river that has 1,100 feet of unobstructed horizontal visibility could be classified as "most suitable" even though at that point there may be only three feet of unobstructed upstream and downstream visibility. Our knowledge of whooping crane ecology indicates that such a site would not provide roost habitat.

In this report I quantify the extent of upstream and downstream vertical visibility at known whooping crane roost sites in the Big Bend reach of the Platte River. My objective is to provide a basis for this parameter in future modeling efforts.

I appreciate the helpful comments provided by D.B. Bowman, J.B. Brabander, P.J. Currier, B.L. Elder, J.C. Lewis, and J.G. Sidle. G.R. Lingle has continually provided stimulating discussions about whooping cranes and their habitats.

STUDY AREA AND METHODS

The Big Bend reach of the Platte River is a regular stop-over site for whooping cranes on migration. The physical character and ecology of the river system have been described in detail previously (Frith 1974, USFWS 1981, Currier et al. 1985). Shrinkage of the river channels (Williams 1978), encroachment by woody vegetation on wet meadows and sandbars (Currier 1982), and drainage and conversion of native grasslands and wet meadows to croplands (Currier et al. 1985) along the Platte River in the last 100 years have greatly reduced the availability of suitable crane roosting and foraging habitat. Channel narrowing and vegetative encroachment have had the greatest impact on the availability of roosting habitat for both whooping cranes and sandhill cranes.

Since 1983, (Lingle et al. 1984) riverine roost sites occupied by whooping cranes have been located and characterized within the Big Bend reach. The characterizations include a profile of the river channel and measurements of the distance from the roost site to visual obstructions and disturbances. For this paper, I examined the data concerning upstream and downstream visibility.

RESULTS

Among the nine nocturnal roost sites evaluated in this study, the mean unobstructed vertical distance (measured both upstream and downstream) was 3,278 feet (range 1,050 - 5,280) (Table 1). Total vertical distance (measured between the upstream to downstream obstructions) was a minimum of 2,400 feet, a maximum of 10,560 feet, and averaged 6,373 feet.

DISCUSSION

The management plan by the Platte River Whooping Crane Habitat Trust for the Big Bend reach of the Platte River (Currier et al. 1985) proposes that to effectively manage riverine habitats for endangered species, each river segment bounded by a highway bridge between Lexington and Chapman, Nebraska, should contain a water-filled channel, with a minimum water width of 500

feet that is two miles long, and about 3,000 feet wide which is free of any woody vegetative encroachment. The cross-channel width should include 500 feet of water-filled roosting site, and a 1/2 mile (2,640 foot) wide buffer of open area surrounding the roost.

Available data suggest that minimum widths of whooping crane roost sites in the Platte River vary considerably. A question logically asked from these data is: "Why are whooping cranes able to occupy habitat that in one dimension (bank to bank) may be relatively narrow and finite, but in the other dimension (up- and downstream visibility) appears to require considerable length?" Indeed, both the Shenk and Armbruster (1986) and Ziewitz (1986) whooping crane models suggest that increasing river channel width contributes to increasing value as suitable habitat. Implicitly, then, the wider a channel is, the more valuable the site is as roosting habitat; a 5,000 foot wide channel is, for example, "more" suitable than a 1,000 foot wide channel.

Because current-day habitat conditions on the Platte River are largely unsuitable, the above scenario does not exist. Currier et al. (1985) and Williams (1978) have demonstrated that reduced peak and mean annual flows in the Platte River have contributed to a 65 to 79% reduction in channel width in many areas of the river. Implicitly, then, few areas of channel in the Big Bend reach may be wider than the 1,100 feet considered

most suitable in existing models. Available data suggest that whooping cranes are selecting reaches of the Platte River supporting the greatest available unobstructed width and length when choosing a roost site.

We do not know with certainty the minimum distance of unobstructed view that a bird species can tolerate before the site is unsuitable to them. To understand this concept, knowledge of a species home range is necessary. Size of a species' home range varies primarily with the bulk of the animal; the larger the animal, the larger its home range and vice versa (Welty 1982). Because of the importance of all the habitats required to meet a species' life requisities, it is unsound biologically to state that only the area where, say, an animal roosts is important to a species. Avian ecologists refer to this concept as minimum viable area, or the smallest amount of area that must be maintained in order to support a viable population of a particular species.

I believe the same concept holds true for whooping cranes occupying the Platte River. The area of night roosts occupied by whooping cranes appears to be no less than 700 feet wide with a minimum of 2,400 feet of unobstructed view upstream and downstream. To merely state that a unit of habitat with these dimensions placed somewhere within the Big Bend reach of the Platte River will provide the required amount of suitable

roosting habitat is biologically unsound. Only provision of suitable habitat within the home range of the species will fulfill its life requisites.

Given the ability of animals to select a preferred site from an array of available and potentially usable sites (Johnson 1980), I suggest that to adequately meet the needs of whooping cranes roosting on the Platte River, it is not sufficient to provide an area of land with dimensions of, say, 700 by 2,000 feet (about 32 acres). Certainly, if the home range requirements of the species while on migration were better understood, we would be in a better position to state the minimum area that could be cleared of encroaching vegetation to provide roosting habitat. Currently, however, whooping cranes may be selecting 700 x 2,000 foot sections of river out of areas that are 700 feet wide but, for example, 15,000 feet long. Quite simply, the available data do not suggest that to merely provide a finite area with unobstructed visibility will fully satisfy the life requisites of whooping cranes on the Platte River.

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Table 1. Length of unobstructed view upstream and downstream from whooping crane roost sites in the Platte River, Nebraska.

Date	Location	Unobstructed Length	Source
10/28/83	Prosser	1,146 feet	Lingle et al. 1984
10/21/85	Audubon	1,050 feet upstream	Lingle et al. 1986
		1,350 feet downstream	
11/05/86	Kearney	1,200 feet upstream	This study
		1,600 feet downstream	
03/22/87	Gibbon	> 1 mile up	This study
		> 1 mile down	
04/08/87	Gibbon	> 1 mile up	This study
		> 1 mile down	

04/10/87	Gibbon	> 1 mile up	This study
		> 1 mile down	
04/11/87	Audubon	1,050 feet upstream	This study
		1,350 feet downstream	
4/12/87	Gibbon	> 1 mile up	This study
		> 1 mile down	
10/22/87	Gibbon	4,000 feet upstream	This study
		2,000 feet downstream	