

STOCK TANK LADDERS FROM ROCKY MOUNTAIN BIRD OBSERVATORY

Ranching operations play a vital role in the rural economy and landscape, as well as being very important for wildlife conservation. In shortgrass prairie, where permanent water is a rare occurrence, stock watering facilities, mainly in the form of metal or rubber tanks, provide water sources for both livestock and wildlife. RMBO's Nebraska Prairie Partners program, in cooperation with the Nebraska Game and Parks Commission, is providing wildlife escape ladders for stock tanks on private ranches to provide an escape route for birds and other wildlife that become trapped in the water while trying to obtain a drink. Nebraska Prairie Partners has had numerous reports from private landowners in several states of various bird species drowning in stock tanks, including Ferruginous Hawk, Sharp-tailed Grouse, Burrowing Owls, and Western Meadowlarks. The stock tank ladders not only benefit species directly by reducing drowning occurrences, but the ladders are also an effective tool for increasing water quality.

The U.S. Forest Service (USFS) uses wildlife escape ladders (Figure 1) and notices decreases in the occurrence of drowned mammals (personal communication). The USFS ladder has open sides which may result in birds swimming the perimeter of the tank not finding the ramp. RMBO, with the help of private landowners, has created a new ladder design that incorporates expanded metal ramps on all sides, like an inverted half-cone (Figure 2). This design is intended to be more beneficial because animals swimming the edge of the tank will be more likely to find the ladder and escape. The ladders can be coated with industrial paint to minimize rusting.



Figure 1: The USFS stock tank ladder design appears to reduce wildlife drowning, but birds and other wildlife swimming the tank edge may go under the ladder and be unable to escape.



Figure 2: RMBO stock tank ladder design. Inverted half-cone shape allows for escape from all sides.

Stock tank ladders are a simple tool to help with wildlife conservation and to enhance water quality within stock tanks. We look forward to working with you to get stock tank ladders installed on your lands.

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ROCKY MOUNTAIN BIRD OBSERVATORY
Conserving birds of the Rocky Mountains and Great Plains

Results from Various Stock Tank Ladder Analyses

Logistic Regression Analysis

During the 2006 field season we systematically selected (every other one received one with no prior knowledge of area) our sample of stock tanks that received wildlife escape ladders, and collected data on a whole suite of variables in the tank area. In total we had 31 tanks (tank complexes) that received our wildlife escape ladders, whereas a total of 33 tanks did not receive escape ladders and were treated as our control tanks. The local producer was then given a log to keep track of all bird drownings (including species if known from our Pocket Guide) during their routine tank checks that usually occurred at least once a week during the field season. Because there was some variability in the number of times that different tanks were checked, a variable correcting for effort was included in every model, so that any observed differences could not be attributed to different efforts put forth by local landowners. Average drownings in tanks without ladders was 1.06 birds/tank, while the average drowning rate in tanks with ladders was 0.16 birds/tank. While mass drownings were recorded at multiple tanks (ranged from 0 birds to 10 birds in tanks), for the purpose of the logistic regression analysis drowning at tanks was recorded as either no drownings occurred (0) or drownings were observed (1). “Ladder” presence was kept track of along with “Other” wildlife escape devices such as boards or fence posts thrown in by the local landowner, and the “Tankwater” variable, or distance between the tank edge and waterline when the tank is full, was carefully recorded for inclusion in models.

The association of ladder presence was negatively correlated with bird drownings, meaning ladder presence was associated with fewer bird drownings, whereas the presence of other escape devices was positively correlated with drowning events. Tankwater also had a strong positive correlation with bird drownings, where the greater the distance between the waterline and top of the tank corresponded with increased drownings.

Results for the models tested are found in Table 1, where the model that included tank ladder and the tankwater variable was the best fit for the data collected. Other variables with a better score than the null model included both aforementioned variables included individually, and a model with other escape devices and tankwater. These results suggest that tanks with an increased distance between the waterline and tank edge are susceptible to drowning events, whereas the presence of wildlife escape ladders is beneficial in preventing these drownings regardless of the distance between the tank edge and waterline. While most landowners throw boards and other floating objects in stock tanks to help prevent wildlife from drowning, our results indicate that these actions may have a reverse effect where these other devices increase drownings and may make stock tanks a sink for populations, as birds apparently are unable to use them to escape, and may provide an unstable structure on which birds can land before becoming inundated. However, the presence of other escape devices was not a very good fit for our drowning data, and any indication that they may make these tanks sinks is speculation. Overall, the strongest variable in accounting for the variation observed in our 2006 data is the tankwater variable, where the combined weights for models that included tankwater (n=4) was 0.612. The other two variables in sequential importance were ladder (n=4) at 0.5116, and finally other devices (n=4) at 0.360. These results demonstrate that there are tank variables that can make certain tanks more prone to avian drownings, but it also demonstrates that there are avenues that we can pursue that will minimize any potential impacts of large-scale drownings on regional bird populations.

Table 1. Hypothesized models, AIC scores, delta AIC scores, and model weights for bird drownings in stock tanks during the 2006 field season.

Model	k	AIC	d.AIC	w.AIC
Effort + Ladder + Tankwater	4	52.305	0	0.232
Effort + Tankwater	3	52.893	0.588	0.173
Effort + Ladder	3	53.378	1.073	0.136
Effort + Other + Tankwater	4	53.603	1.298	0.121
Null	1	53.98	1.675	0.1
Effort + Other	3	54.105	1.8	0.094
Effort + Ladder + Other + Tankwater	5	54.277	1.972	0.086
Effort + Ladder + Other	4	55.079	2.774	0.058



Cost-Benefit Analysis for Wildlife Escape Ladders in the Panhandle

Birds drowning in stock tanks have been a problem since artificial watering sources began being utilized across the grasslands of North America. Since 2006 we have observed a large suite of different passerines, raptors, and other birds, including Western Meadowlarks, Horned Larks, Mountain Bluebirds, Ferruginous Hawks, Red Crossbills, Lark Buntings, Townsend's Solitaire, Brown-headed Cowbirds, and several other species drowned in stock tanks. Western Meadowlark was the predominant species found drowned in stock tanks during our study, but during a time in which declining population trends for even the most common prairie birds are being observed, it is quintessential that measures be taken to reduce the severity of any impacts that we may accidentally be inflicting on our native fauna. Therefore, the Nebraska Prairie Partners conducted the large-scale experiment on bird drowning in stock tanks and the efficacy of wildlife escape ladders in preventing the drowning of wildlife that was mentioned in the previous section.



Drowned adult Red-tailed Hawk

However, funds for maintaining this native biodiversity are also at a premium, and precautions must be taken to ensure that money allocated to benefit conservation efforts must yield optimal results. In total it costs approximately \$10 total per ladder for buying materials, and cutting and bending the ladders before installation. We also expect that the average ladder will last between 5-6 years. Currently, we have almost 300 ladders installed in tanks throughout the panhandle, and an additional 500 ladders are being constructed with Nebraska Environmental Trust funds for installation in priority, at-risk tanks throughout the panhandle, for a total of 800 ladders come spring 2008.

Our average number of birds drowned per tank without ladders (1.06) was almost seven fold higher than tanks with ladders installed, and the number of tanks without ladders where drowning was observed was again almost 3.5 fold higher than when ladders were present in tanks. With almost 8,150 sections of native rangeland in the panhandle, approximately one tank per section of rangeland (personal communication with Larry Snyder about Kimball Grasslands BUL), and losing one bird per tank on average we would lose a total of 48,900 birds to accidental drowning in stock tanks over the life of an escape ladder. If funds were provided to NPP so that 1,200 ladders could be placed throughout priority, at-risk tanks in panhandle BUL's, we could conservatively say that we would save at the minimum 7,200 birds from drowning during the life of a ladder, or roughly two birds per ladder. This is a conservative estimate since drowning appeared to be a localized phenomenon where some tanks experienced large drowning events and others had none, but were treated as the same in this analysis. Targeted installation of the most at-risk tanks in Nebraska's most biologically significant areas would therefore increase the number and relative importance of bird species being saved from drowning in stock tanks.

