TECHNICAL NOTE

Design Technical Note SD2013-1 **August 2013**

Watering Facility Design Criteria for Wildlife Escape Structures

This technical note provides approved designs for wildlife escape structures in watering facilities that will meet Conservation Practice Standard (CPS) Watering Facility (614).

Background

Watering tanks, troughs, and ponds maintained for livestock often double as watering sites for a broad array of wildlife. Animals of many species occasionally drown while attempting to drink or bathe in these structures, particularly when natural watering sites are limited or water levels in tanks are low and escape structures are absent or inadequate. To reduce the risk of wildlife drowning in trough/tanks, NRCS CPS Watering Facility (614) requires installation of wildlife escape structures in these facilities.

Design Criteria

The ability of wildlife to safely access water trough/tanks is largely determined by the size, shape, and height of the trough/tank, the water level, and presence of obstructions over and adjacent to the water surface. Wildlife escape structures will be designed based upon the general criteria of: linear length of the tank perimeter, tank configuration (rectangle, oval, round), suitable construction materials for ramps, fencing and bracing methods, and water level maintenance.

Criteria 1. Linear Length of Tank Perimeter

Because many birds and small mammals tire quickly while swimming, larger troughs/tanks should have at least 1 escape structure placed every 30 linear feet along the perimeter. This is interpreted to mean that any bird, small mammal, or reptiles falling at the most remote point in the tank will have to swim no more than 30 linear feet to reach an escape structure.

- In narrow (three feet wide or less), rectangular or oval troughs/tanks, escape structures should be placed at the end(s) of the trough/tank so they minimize interference with bats and birds swooping in to drink;
- **Table 1. Number of Escape Ramps Required Based on Round Tank Diameter.**

Tank Diameter	Number of Escape Structures
≤18 feet	1
20 – 28 feet	2
30 – 36 feet	3
≥38 feet	4

Criteria 2. Escape Ramp Design Features

Effective wildlife escape structures are easy and inexpensive to build and can virtually eliminate wildlife mortality in water troughs/tanks. Several basic principles should guide the design and installation of all wildlife escape structures. An effective escape device should:

- Extend down into the water, flush with the inside wall of the trough/tank so animals swimming along the perimeter will find the structure, rather than becoming trapped behind or beneath it or missing it entirely;
- Reach to the bottom of the trough/tank, so it will be effective even if water levels drop sharply;
- Be firmly secured to the trough/tank rim so it will not be knocked loose by livestock or other animals;
- Be built of grip-able, long lasting materials, such painted or coated metal grating, roughened fiberglass, concrete, rock and mortar, or high strength plastic composites;
- Have a slope no steeper than 45 degrees so animals can climb out without slipping back into the water;
- Rubber tire tanks have special considerations for wildlife escape structures. Escape structures for tire trough/tanks must be individually tailored to fit each trough/tank;
- Escape structures should be located to cause minimal interference with livestock;
- Escape structures should be located so there is no interference with tank/pipeline appurtenances.

Criteria 3. Suitable Materials for Ramps

The choice of materials is typically based on the type of trough/tank, cost, availability, weight, surface roughness, personal familiarity, and the number of escape structures needed.

- One of the most economical and easily constructed wildlife escape structures is made of expanded-metal grating, which is especially well-suited to round and rectangular metal trough/tanks that are no more than four feet deep;
- Thirteen or 11 gauge expanded metal with ½ inch mesh is highly recommended;
- Concrete or rocks and mortar wildlife escape ramps can be very effective, too. Like other wildlife escape structures, rock – mortar or concrete ramps should meet the interior sides of the trough/tank to intercept animals swimming along the perimeter and should have a maximum slope of 45 degrees;
- Fiberglass escape structures are normally used only in fiberglass trough/tanks. Some manufacturers offer escape structures designed for their product;
- Lumber substitutes, including wood-and-plastic composites also provide options for wildlife escape structures.

Criteria 4. Bracing and Anchoring Methods

- Securely anchor the escape structure to the trough/tank as shown in Job Plan 13.1 (Rev. 8/13) (located at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/sd/technical/engineering/?cid=nrcs141p2_036582) or per manufacturer recommendations.
- For fiberglass trough/tanks provide rubber washers/grommets on all bolts to protect the fiberglass from cracking.

Criteria 5. Water Level Maintenance

Fluctuating water levels in watering facilities are also a hazard to wildlife.

- If near-full water levels are maintained, placing standard escape structures in accordance with Table 1 along the tank perimeter should provide adequate escape routes;
- Where water levels fluctuate widely, the escape structure should reach from the rim to the bottom of the tank;
- If water levels in tanks will not be maintained when livestock are not using the pasture consider draining the tank(s) completely.

References:

Rocky Mountain Bird Observatory (RMBO) – www.rmbo.org/

Bat Conservation International – www.batcon.org

Water for Wildlife – A Handbook for Ranchers and Range Managers – http://www.batcon.org/pdfs/water/bciwaterforwildlife.pdf