**NATURAL RESOURCES CONSERVATION SERVICE**

**CONSERVATION PRACTICE STANDARD**

# SHALLOW WATER DEVELOPMENT AND MANAGEMENT

**(Ac.)**

**CODE 646**

## DEFINITION

The inundation of lands to provide habitat for fish and/or wildlife.

## PURPOSE

To provide habitat for wildlife such as shorebirds, waterfowl, wading birds, mammals, fish, reptiles, amphibians and other species that require shallow water for at least a part of their life cycle.

## CONDITIONS WHERE PRACTICE APPLIES

This practice applies on land where water can be impounded or regulated by diking, excavating, ditching, and/or flooding. Optimum sites typically occur on 2 percent or less slopes where the majority of the area develops acceptable water depths within reasonable economic constraints.

This practice applies on floodplains that can provide refuge for native fish during high-flow periods (larger primary floodplains with long duration spring flooding).

This practice does not apply to:

- Watering Facility (614) intended to provide wildlife water;
- Wetland Restoration (657) intended to rehabilitate a degraded wetland where the soils, hydrology, and vegetation community are returned to a close approximation of the original conditions;
- Wetland Enhancement (659) intended for modification of an existing wetland where specific attributes are targeted by management objectives, possibly at the expense of other attributes, or the rehabilitation of a degraded wetland where the result is a wetland that is different than what previously existed on the site;
- Wetland Construction (656) intended to treat point and non-point sources of water pollution;
- Wetland Creation (658) for creating a wetland on a site which historically was not a wetland; or
- Fish Pond Management (399).

## CRITERIA

**This conservation practice is exempt from receiving coverage under TDEC's (Tennessee Department of Environment and Conservation) ARAP permits as long as NRCS provides technical or financial assistance for this conservation practice. This exemption allows this conservation practice to be installed adjacent to streams and/or wetlands, and for the outlet of the structure to be placed down through the stream channel bank and into the closest edge of the stream channel. The TDEC ARAP exemption does not change the permitting requirements for the U.S. Army Corps of Engineers permits (404), the Tennessee Valley Authority (TVA) permits (26a – if located within the Tennessee River drainage area), or any permits that may be required by local units of government.**

**The exception to the TDEC ARAP exemption described in the previous paragraph is where the conservation practice is planned to impound the stream, place fill material in a wetland, provide drainage for a wetland, or directly impact a stream channel and/or a wetland. If this conservation practice is planned on a stream or in a wetland, then it is no longer exempt from the ARAP process. If planned on a stream or in a wetland, these conservation practices are required to**

**apply for and receive U.S. Army Corps of Engineers permits (404), TDEC permits (ARAP), TVA permits (26a – if located within the Tennessee River drainage area), and any permits that may be required by local units of government. All conditions listed within the permits shall be followed during the installation of the practice.**

Site must be free of hazardous materials.

Soils must have low permeability (less than 0.6 inches per hour) or seasonal high-water table to inhibit subsurface drainage and allow for maintenance of proper water levels.

Adequate water supply must be available for flooding the area during periods of planned inundation.

Shallow water impoundments require an adequate water supply for re-flooding. Potential water supplies include floodwaters, upland runoff, or a pumped source.

A water control structure is required when water levels will be managed.

Maintenance of water levels between 1 to 24 inches in depth over the majority of the area during periods of planned inundation is required. An exception to this criterion is made for floodplains connected to stream channels where water depths up to several feet provide habitat for native fish during periods of inundation associated with high stream flows.

Plan and develop a point of access to facilitate management activity where active management is planned (such as disking or water level management).

Control invasive plant species and federally/state listed noxious and nuisance species on the site.

Use, remove, or modify existing drainage systems as needed to achieve the intended purpose.

Obtain all necessary local, state, and federal permits. Required permits for construction activities may include U.S. Army Corps of Engineers 404 permit, Tennessee Department of Environment and Conservation permits, and/or Tennessee Valley Authority 26A permit.

Use, as appropriate, facilitating conservation practice standards and specifications, including Dike (356), Pumping Plant for Water Control (533), and Structure for Water Control (587). Refer to Chapter 6 of the National Engineering Handbook, “Structures,” for additional design information.

Incorporate micro- and macrotopography features for variable bottom contours to ensure varying water depths.

**Criteria for Waterfowl Habitat**

Design areas planned to provide waterfowl feeding and resting habitat to facilitate gradual flooding of areas containing food plants to an average depth of 6 to 10 inches.

Flood areas containing food plants during seasonal periods of waterfowl use, which may include September – October, but must include November – March.

Flood areas that contain emergent shrub vegetation adjacent to streams and lakes to provide cover for wood duck broods, March – July.

**Criteria for Shorebird Habitat**

Areas planned to provide shorebird habitat shall have exposed mudflats and areas with 1 to 6 inches of water during seasonal periods of shorebird use.

**Criteria for Amphibian Habitat**

Plan inundation to last throughout the local breeding period of at least one endemic amphibian species.

Surrounding upland habitat shall be of sufficient quality and quantity to support the complete lifecycle requirements of at least one endemic amphibian species.

For most salamanders, the site should be forested with litter and shade.

Design structures to prevent fish access to areas planned for amphibian breeding habitat.

**Criteria for Off-stream Stream Fish Habitat**

Design water control to prevent native fish from being trapped as water recedes.

**Criteria Applicable to Provide Off-site Water Quality Benefits**

Shallow-water areas subject to adjacent areas contributing excessive sediment, nutrients, animal wastes, or other potential contaminants shall have a minimum 20-foot buffer of native vegetation established and maintained at densities adequate to provide the necessary filtering. Refer to the standard for Filter Strip

(393) for possible mixtures and recommended seeding rates.

Dewater slowly shallow water areas within cropland fields or receiving direct runoff from cropland to retain trapped sediments and facilitate nutrient and pesticide removal.

**CONSIDERATIONS**

**This practice and/or associated practices may include placement of fill material, the clearing of trees, and/or the construction of ditches or subsurface drainage pipes in low lying and floodplain type situations. The placement of fill material, the clearing of trees, and/or the installation of new ditches or drainage tiles in areas that are potentially wetlands may be a violation of the Swampbuster portion of the Food Security Act, the Clean Water Act, and the Tennessee State Water Quality Control Act. All of these areas should be evaluated for wetland potential thoroughly prior to implementation of this practice and/or other associated practices.**

**All Areas**

Water volume, rates of runoff, infiltration, evaporation and transpiration will affect performance of the practice.

When multiple areas are available, adopt a variety of flood-up and drawdown strategies for maximum habitat diversity.

Nearly level sites allow for larger units while keeping planned water depths within the optimum range over most of the unit.

Where impoundments are developed, shorelines with irregular shapes and varying side slopes from 9:1 to 20:1 along water surface margins may increase habitat diversity.

Consider how the timing of flooding and drawdown, as well as the type of drawdown, will affect moist-soil plant species composition.

Nutrient and pesticide residues may affect plant species composition and the site's capability to grow desirable plants.

Consider effects on nearby wetlands and other vegetation communities.

Consider movement of dissolved and suspended substances to downstream surface waters and groundwater.

The practice may affect downstream flows, or aquifers that would affect other water uses or users.

Consider disease vectors, such as mosquitoes.

The practice may function as a link in a corridor that increases the site's use and colonization by wetland flora and fauna.

The composition and extent of surrounding upland vegetation may influence this practice's habitat functions.

Installation of vegetated buffers on surrounding uplands may improve water quality in the shallow-water area.

The practice may raise downstream water temperature, causing detrimental impacts to associated aquatic and terrestrial communities.

Soil disturbance may increase the probability of invasion by unwanted plant species.

Added water depth and duration may be used as a method to control unwanted vegetation, especially upland woody species.

Exclude livestock from the area except for periodic planned vegetation management as directed and approved by NRCS biologist.

Avoid constructing large levees that would either prevent the recharge of or permanently inundate adjacent wetlands.

Levee construction in floodplains may eliminate flood storage and increase flooding on adjacent lands. Compensate by downsizing levee heights and locating levees higher in the floodplain. Refer to Executive Order 11888 and Section 190 of the General Manual on floodplain management for all new levee construction in floodplains.

Buffers should consist of plant communities beneficial to wildlife and capable of removing potential contaminants. Plan practices, such as Filter Strip (393) and/or Field Border (386), to establish a suitable buffer from the adjacent land use. Where practical and desired, widen the buffer to meet the needs of targeted terrestrial wildlife species.

Buffers associated with pool areas considered adequate for breeding amphibians should have a width of at least 500 feet and when possible, maintain connection (unbroken terrestrial corridor) with nearby streams and forests.

Amphibian breeding ponds are shallow areas above seasonal floodplains consistently holding water from winter to mid-summer and dried completely by fall in most years to remain fish free.

Consider applicable baiting laws when manipulating vegetation on areas scheduled for sport hunting.

Limit human disturbance during peak waterfowl and shorebird use. On larger areas where sport hunting is planned, consider setting aside a designated sanctuary from hunting. Avoid hunting after noon or limit hunting to no more than two days per week.

**Agricultural Fields**

When flooding crop residues and waste grain where water supplies are readily available, consider flooding in periodic increments (preferably 4-6 inches) to extend the availability of food.

**TABLE 1.**

| APPROXIMATE DETERIORATION RATES OF SELECT SEEDS AFTER 90 DAYS OF FLOODING | |
|---|---|
| Soybean | 86 percent |
| Barnyardgrass (Wild Millet) | 57 percent |
| Corn | 50 percent |
| Buckwheat | 45 percent |
| Grain Sorghum | 42 percent |
| Pennsylvania smartweed | 21 percent |
| Cultivated Rice | 19 percent |
| Water Oak Acorns | 4 percent |
| Horned Beakrush | 2 percent |

Consider crop treatments that enhance food availability. General recommendations are:

1. Millets – Leave unharvested and flood gradually. Millets best suited to flooding in order of preference are (1) Japanese millet (*Echinocloa crusgalli* var. *frumentacea*); (2) white proso millet (*Panicum miliaceum*); (3) German millet (*Setaria italica*); and (4) browntop millet (*Panicum ramosum*).
2. Rice – Do not disk harvested fields before flooding.
3. Soybeans – Avoid flooding fields. Soybeans decompose rapidly and can plug digestive tracts of waterfowl.
4. Corn, grain sorghum – Corn and grain sorghum should be flooded in November for optimum waterfowl benefits.

For shorebirds, Consider drawing water down from flooded fields at the rate of 1-2 inches per week beginning in March to benefit early migrants. For wildlife in general, dewater in 6-inch increments, holding water for several weeks between the dewatering phases to concentrate aquatic insect food sources. When practical, adjust the rate of drawdown based on the type and planting date of the next scheduled crop.

**Moist Soil Areas**

**Flooding**

To ensure foods are available over a longer period of time for dabbling ducks and other species, flood impoundments gradually. Consider gradually flooding in response to desired plant growth. Do not begin flooding before the desired plants reach a height of at least 6 inches. Raise water levels slowly, maintaining about one-third the height of the plants until the desired depth is reached.

Fall flooding may also be timed to the arrival of early migratory species. For early migratory waterfowl, begin flooding in mid-August and shallowly flood about 10 percent of the area. After October 1, begin increasing water levels in 6-inch increments, until the entire area is flooded by December 15. For fall migrating shorebirds, the critical period for having areas flooded in the Mississippi Alluvial Valley is from July 15 to September 30.

Consider the species' flooding tolerances and composition of seed in the soil at the site. Millets, grasses, and smartweeds should not be completely submerged for more than three days during establishment (growth phase).

For shorebird habitat, consider disking the shallower parts of the area where full floodwater depths would range from 4-12 inches in late summer. This will increase detritus (decaying organic matter) levels for aquatic insects and may create open-water areas in dense stands of emergent vegetation.

**Drawdown**

Consider the type of drawdown on plant species composition. Rapid drawdowns (generally four days or less) encourage extensive stands of fewer plant species and more perennials. Slower drawdowns (generally

two weeks or longer) encourage greater diversity of plants and hold wildlife longer.

Consider the effects of timing the drawdown. Early spring drawdowns may be timed to shorebird migration (April to May) or scheduled for manipulation of the plant composition of the site. Early-season drawdowns typically result in higher seed production, whereas mid- to late-season drawdowns typically result in a better variety of preferred plants. For this reason, when multiple areas are available, adopt a variety of drawdown strategies for maximum habitat diversity. **Table 2** provides a general guide of native plant responses to different drawdown dates.

**TABLE 2.**
**COMMON MOIST-SOIL PLANTS TYPICALLY FAVORED BY DRAWDOWN PERIODS UNDER NORMAL GROWING-SEASON MOISTURE CONDITIONS**

**EARLY SEASON**
(drawdown completed within first 45 days of the growing season):

| | |
|---|---|
| barnyardgrass | yellow nutsedge |
| smartweeds | asters |

**MID-SEASON**
(drawdown after first 45 days of growing season and before July 1):

| | |
|---|---|
| crabgrasses | panicgrasses |
| wild millet | curly dock |
| cocklebur | sticktights |

**LATE SEASON**
(drawdown completed after July 1):

| | |
|---|---|
| sprangletop | crabgrasses |
| sticktights | |

Maintaining some semi-permanent and permanent shallow water on the site for several years to develop submergent vegetation and associated aquatic insects. Where drawdown capabilities exist for these deep pools, consider a drawdown once every 3-10 years, increasing the time between drawdowns for larger systems. This will reduce organic matter (muck) buildup and remove fish that would depredate amphibians.

**PLANS AND SPECIFICATIONS**
Plans and specifications for installing structures for water control shall comply with this standard and prescribe the requirements for applying the practice to achieve its intended purpose.

Develop and record site-specific plans using approved specifications sheets, job sheets, narrative documentation in the conservation plan, or other acceptable documentation. Specifications shall be reviewed and approved by a person with appropriate training in the design and implementation of shallow-water areas to benefit fish and wildlife.

The planner should work closely with the NRCS area biologist, area engineer, and/or other wetland specialists in developing site-specific plans and specifications.

**OPERATION AND MAINTENANCE**
The following actions shall be carried out to ensure this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Waterfowl and shorebird feeding and resting areas that can be hydrologically controlled or have natural dry periods should be burned or disked every 3-5 years to set back succession and control undesirable plants. Burning and disking shall be scheduled to encourage desirable plants.

Common undesirable plants in Tennessee may aggressively dominate sites and provide poor structure and food value for wildlife. These include black willow (*Salix nigra*), annual sumpweed (*Iva annua*), common cocklebur (*Xanthium strumarium*), cattails (*Typha spp*.), American lotus (*Nelumbo lutea*), reed canarygrass (*Phalaris arundinacea*) and common reed (*Phragmites australis*). Disking should control these plants and boost more annuals, which may increase the production of more seeds for waterfowl consumption. Cocklebur should be disked before seed set and will need additional treatments for control. Disking cocklebur encourages seed germination.

Avoid annual disturbance where it may encourage aggressive plants while reducing beneficial plants. Avoid extended years of no disturbance, which may allow dominance of undesirable plants.

Provide methods, frequency, timing, and duration of maintenance treatments

Consider the effects of residual herbicides.

A list of possible treatments for the control of select undesirable vegetation is provided below as a guide. Selected maintenance strategies shall be provided when needed.

| Weed | Possible Treatment |
|---|---|
| Cattails | Where possible, Mow late summer and flood deep over winter, or treat with an approved herbicide. |
| Willows | Spray foliage or cut and spray stump with approved herbicide. |
| Cocklebur | Disk in summer and/or treat with approved herbicide. |

Implement biological control of undesirable plant species and pests (e.g. using predator or parasitic species) where available and feasible.

All artificial structure sites shall have an adequate permanent protective vegetative cover maintained for the life of the practice.

Whenever possible, select plant species that will both protect the structure and provide additional wildlife benefits.

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