

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**SHALLOW WATER DEVELOPMENT AND MANAGEMENT**

(Ac.)

**CODE 646**

**DEFINITION**

The intentional 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**

On lands where water can be impounded or regulated by diking, excavating, ditching, and/or flooding.

On floodplain areas connected to streams or rivers that provide refuge habitats for native fish during high flow periods.

This practice does not apply to:

- Wildlife Watering Facility (648) intended to provide watering places for wildlife;
- Wetland Restoration (657) intended to rehabilitate a degraded wetland where the soils, hydrology, vegetation community, and biological habitat 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**

***The planner shall work closely with the staff state biologist, WV Division of Natural Resources and US Fish and Wildlife Service personnel as appropriate.***

***A soils investigation shall be performed to determine conditions such as: seepage, suitability for construction, adequacy of water supply and the ability to support the desired plant community where applicable.***

***At a minimum, soils should have a moderately slow permeability or a seasonal high water table and have the ability to maintain the planned water levels throughout the specified inundation period(s).***

Site must be free of hazardous materials.

***At least 75% of the site shall consist of water 18 inches or less in depth during periods of inundation.*** An exception to this criterion is made for floodplain habitats connected to stream channels where water depths of up to 6 feet provide habitat for native fish species that use these habitats during periods of inundation associated with high

**NRCS, NHCP  
August 2005**

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

**NRCS, WV  
January 2006**

stream flows. **Consult the NRCS staff biologist or WV Division of Natural Resources Fisheries biologist to determine applicability.**

**Shallow water impoundments require an adequate water supply for filling and re-flooding the site. An adequate method for dewatering the impoundment is required for planned drawdowns.**

**Sites that have a natural water regime adequate to fulfill the purpose(s) of this standard should be utilized. Water levels will rise and fall seasonally in response to varying natural conditions. If necessary, water control structures shall be designed on an individual basis or NRCS standard drawings will be modified to meet site conditions and functional requirements. These engineering components shall be a part of an overall conservation plan for the site.**

**Where possible, existing and natural drainage systems will be utilized, removed or modified as needed to achieve the intended purpose.**

**Existing wetlands shall be preserved or protected from manipulation or utilized in a manner consistent with their natural functions and values.**

**Vegetative cover shall be established on any areas requiring disturbance during construction. In some instances it may be necessary to utilize temporary vegetation until permanent vegetation can be established. Refer to Critical Area Seeding (342) for seedbed preparation and seeding rates for permanent and temporary mixes. Note: no variety of tall fescue or reed canarygrass shall be utilized in implementing this practice.**

**Noxious and aggressive species (Purple Loosestrife, phragmites, reed canarygrass, etc.) shall be controlled by chemical, biological or mechanical means as practical and necessary.**

Where active habitat management is planned (such as disking or water level management) a

point of access will be planned and developed to facilitate management activity.

**Any use of chemicals shall be done in accordance with product labels, manufacturers' recommendations and all federal, state and local regulations.**

**The WV Conservation Practice Standards for (356) Dike, (533) Pumping Plant for Water Control and (587) Structure for Water Control will be used as appropriate. Embankments associated spillways, and shallow excavations shall be designed according to the criteria in the WV Conservation Practice Standard (378) Pond.**

Structures installed to develop and maintain shallow water areas shall be designed and installed to meet NRCS standards for the particular structure and type of construction. **Water control structures and drainage modifications shall comply with all local, state and federal regulations. Refer to the Engineering Field Handbook for additional design information.**

#### **CRITERIA FOR WATERFOWL HABITAT**

Areas planned to provide waterfowl feeding and resting habitat shall be designed to facilitate gradual flooding of areas containing food plants to an average depth of 6 to 10 inches. <sup>(1)</sup>

**Refer to the appendix of this standard, Figure 1 and Table 3, for preferred water depths of waterfowl commonly associated with moist-soil habitats.**

Areas containing food plants shall be flooded during seasonal periods of waterfowl use.

**If geese are anticipated to be a nuisance, no nesting islands shall be constructed**

**The WV conservation practices standards (590) Nutrient Management, (595) Pest Management and (329) Residue Management shall be planned and applied to all flooded cropland in order to minimize environmental risks and increase invertebrate foods for waterfowl.**

### Grain and Seed Crops

*The timing of supplemental planting of vegetation shall be done to have the food source available at the desired times.*

*Annual crops for wildlife may be planted in or adjacent to the pool area. Plantings may be established by means of conventional farming equipment or by broadcasting seed on exposed soil after drawdown.*

*Utilize those species which are tolerant to site conditions and are beneficial to the targeted wildlife specie(s). Refer to Critical Area Seeding (342), 644 Wetland Wildlife Habitat Management and/or the NRCS state staff biologist for species selection, soil-site adaptations, depth, drainage requirements and seeding rates.*

### Herbaceous Vegetative Communities

- *Where feasible, natural invasion should be utilized to establish herbaceous vegetation in the pool area. These communities may be manipulated by mowing, disking or other methods to encourage early successional plant species. Refer to WV Conservation Practice Standard (647) Early Successional Habitat Development/Management.*
- *Vegetative manipulation should occur no more frequently than once every 2-3 years; or when the site requires maintenance due to encroachment from invasive, woody or other undesirable species.*
- *Manipulation and maintenance should occur when the pool area is sufficiently dry to support equipment and when wildlife use of the area is lower.*

### CRITERIA FOR SHOREBIRD HABITAT

Areas planned to provide shorebird habitat shall have exposed mudflats and areas with 1 to 4 inches of water during seasonal periods of shorebird use. <sup>(2)</sup>

### CRITERIA FOR AMPHIBIAN HABITAT

*The timing and duration of flooding are important factors that dictate which amphibians will use a particular area. Amphibian species are extremely variable in their habitat requirements. Most breeding occurs from May through August, with eggs hatching anywhere from 4 to 20 days later. Complete metamorphosis may take an additional 7 weeks to 3 months. Some species may need as much as a year to develop, with a few species overwintering as tadpoles, requiring permanent water.*

Inundation shall be planned to last throughout the local breeding period of at least one endemic amphibian species. *Refer to the appendix of this standard, Table 2, for lifecycles of some selected anurans. Consult the state staff biologist for species other than those listed*

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

Structures shall be designed to prevent fish access to areas planned for amphibian breeding habitat <sup>(3)</sup>.

### CRITERIA FOR OFF-STREAM STREAM FISH HABITAT

Water control structures shall be designed to prevent native fish from being trapped as water recedes.

### CONSIDERATIONS

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

*Consider slow drawdowns as opposed to a fast drop in water levels.* The timing of flooding and drawdown, as well as the type, will affect moist soil plant species composition.

*Consider the seedbank present in the soil at the site and adjacent to the site.*

**Consider affects on wetlands or wildlife habitats that would be associated with this practice.**

**Consider gradually flooding impoundments in fall and winter in increments of 3 - 4 inches until the desired depth is achieved. Refer to the appendix of this standard for information on timing of drawdowns.**

**Consider site conditions with respect to cost, disturbance and feasibility.** Soil disturbance may increase the probability of invasion by unwanted plant species.

**Consider size and distribution of shallow water areas.** Nearly level sites will allow for larger units while keeping planned water depths within the optimum range over most of the unit.

**Consider utilizing or constructing sites that provide irregular shorelines as opposed to round or rectangular shapes.** 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 maximizing variation of depths within a site to benefit several species and provide a more diverse plant community. Refer to the appendix of this standard.**

**Consider upstream and adjacent landuses.**

**Consider supplementing sites with the use of artificial nesting structures.**

**Consider potential problems with nuisance geese populations.**

**Consider potential damage to structures from muskrat and beaver.**

**Stop-log and flashboard risers are the type of water control structures are highly recommended over "screw" gates. However, any type of structure that allows managers to drawdown water levels in incremental portions will be adequate. These allow managers to have greater control over water levels and manipulate them in a greater range of increments.**

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

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 habitat corridor that aids the site's use and colonization by wetland flora and fauna.

Consider the extent of surrounding upland vegetation which may influence this practice's habitat functions.

Consider installing vegetated buffers on surrounding uplands that may improve water quality in the shallow water area.

Consider tolerance of plants to flooding and salinity, as well as the composition of seed in the soil.

Consider effects on nearby wetlands, or water-related fish and wildlife habitats.

**Consider the ability of this practice to raise downstream water temperature, causing detrimental impacts to associated aquatic and terrestrial communities.**

Added water depth and duration may be used as a method to control unwanted vegetation.

Biological control of undesirable plant species and pests (e.g., using predator or parasitic species) may be the least damaging alternative for pest control.

Human and livestock activities in and surrounding the practice may disturb wildlife, thereby decreasing habitat suitability and function. Vegetative screens, fences, or gates are means of reducing unwanted disturbance.

**Consider leaving a depression area 20 feet in diameter within the pool that is not subject to drainage for amphibian habitat.**

**The optimum size of a management unit is between 5 and 100 acres. Smaller areas**

**may not be able to produce all the necessary lifecycle requirements in sufficient quantities. Ideally there should be 5 - 7 management units within a 10 mile radius.**

**Consider the surrounding habitat and the connections to the management units. Provide connectivity, diversity and interspersions where possible.**

## **PLANS AND SPECIFICATIONS**

Plans and Specifications for installing structures for water control shall be in keeping with this standard and shall prescribe the requirements for applying the practice to achieve its intended purpose.

Specifications shall be recorded 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.

**At a minimum specifications will identify the following:**

- **targeted specie(s) listing goals and objectives;**
- **soils investigation including drainage class and soil type;**
- **vegetative species planted, methods, seeding dates and rates;**
- **methods and dates of hydrologic and vegetative manipulation;**
- **design of any necessary component structures; and**
- **any required applicable permits and conditional requirements to include the WVCPA-052 or similar environmental evaluation documentation**

## **OPERATION AND MAINTENANCE**

The following actions shall be carried out to ensure that 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 disturbed at **suitable regular intervals** to set back succession and control the growth of undesirable plants. Such disturbance shall be scheduled to encourage desirable habitat plants.

Any use of fertilizers, mechanical treatments, pesticides, chemicals or other treatment shall not compromise the capability of the practice to provide habitat for the target species.

**A maintenance plan shall be developed for each site. At a minimum the plan shall contain the following as applicable:**

- **timing of flooding and drawdowns**
- **methods of vegetative maintenance**
- **schedule of vegetative maintenance**
- **and any required maintenance of water control structures and their components.**

## **REFERENCES**

- (1) Smith, Loren M. and Roger L. Pederson. 1989. Habitat management for migrating and wintering waterfowl in North America. Texas Tech University Press, 574 pp.
- (2) Helmers, Doug. 1992. Shorebird Management Manual. Western Hemisphere Shorebird Reserve Network, Manomet, MA 58 pp.
- (3) Kingsbury, Bruce & Joanne Gibson, 2002. *Habitat Management Guidelines for Amphibians and Reptiles of the Midwest*. Partners in Amphibian & Reptile Conservation, Ft Wayne IN, 57 pp.

Ringleman, James K., 1990. Managing Agricultural Foods for Waterfowl, 13.4.3., Fish and Wildlife Leaflet 13, Waterfowl

Management Handbook, US Fish and Wildlife Service, Washington DC.

Fredrickson, L.H., 1991. Strategies for Water Level Manipulations in Moist-soil Systems, 13.4.6, Gaylord Memorial Laboratory, School of Natural Resources, University of Missouri-Columbia., Puxico, MO.

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Knutson, M. G., Sauer, J.R., Olsen, D. A., Mossman, M. J., Hemesath, L. M., and Lannoo, M. J. 2000. *Landscape Associations of Frogs and Toad Species in Iowa and Wisconsin, USA*. Journal of the Iowa Academy of Science 107: in press. (See Table 2)

Green, N.B., and Pauley, T.K., *Amphibians and Reptiles in West Virginia*, 1987. University of Pittsburgh Press. Pittsburgh, PA (See Table 3)

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## Appendix

### Response to Timing of Drawdowns

Slow drawdowns are always recommended to enhance the duration and diversity of bird use. Creating a situation in which the optimum foraging depths are available for the longest period provides for the efficient use of food resources, particularly invertebrate resources supplying protein rich foods. Partial drawdowns well in advance of the growing season (late winter) tend to benefit early migrating waterfowl, especially mallards and pintails. Early-spring to mid-spring drawdowns provide resources for late migrants such as shovelers, teals, rails, and bitterns. Mid and late season drawdowns provide food for breeding waders and waterfowl broods. These later drawdowns should be timed to coincide with the peak hatch of water birds and should continue during the early growth of nestlings or early brood development.

Early season drawdowns are considered to occur within the first 45 days of the growing season. Late season drawdowns occur in the latter 90 days of the growing season.

**Table 1.** Comparison of plant, invertebrate, bird, and abiotic responses to rate and date of drawdown among wet and dry years (modified from Fredrickson, L. H. 1991).

PLANTS		DRAWDOWN RATE	
		FAST <sup>a</sup>	SLOW <sup>b</sup>
GERMINATION PERIOD OF IDEAL CONDITIONS		SHORT	LONG
ROOT DEVELOPMENT	WET YEAR	GOOD	EXCELLENT
	DRY YEAR	POOR	EXCELLENT
SEED PRODUCTION	EARLY SEASON	GOOD	EXCELLENT
	MID-LATE SEASON	NOT RECOMMENDED	EXCELLENT
	WET YEAR	GOOD	GOOD
	DROUGHT YEAR	POOR	GOOD
COCKLEBUR PRODUCTION		EXCELLENT POTENTIAL	REDUCED POTENTIAL
INVERTEBRATE AVAILABILITY	EARLY SEASON	GOOD	EXCELLENT
	MID-LATE SEASON	POOR	GOOD
	PERIOD OF AVAILABILITY	SHORT	LONG
BIRD USE	EARLY SEASON	GOOD	EXCELLENT
	MID-LATE SEASON	POOR	GOOD
NUTRIENT EXPORT		HIGH	LOW

<sup>a</sup> Less than 4 days.

<sup>b</sup> Greater than 2 weeks.

**Table 2** (modified from Knutson et. al.) This is an example of the diversity in preferred breeding periods and guild associations.<sup>1</sup>

COMMON NAME	SCIENTIFIC NAME	BREEDING PERIOD	BREEDING <sup>2</sup>		NON-BREEDING <sup>3</sup>			HIBERNATION <sup>4</sup>		
			PERM WATER	TEMP WATER	WATER	FOREST/LITTER	OPEN	WATER	FOREST/LITTER	GROUND
Wood frog	<i>Rana sylvatica</i>	Mar – Apr	N	Y	N	Y	N	N	Y	N
Chorus frog	<i>Pseudacris triseriata</i>	Mar – May	N	Y	N	Y	Y	N	Y	N
N. Spring peeper	<i>Pseudacris crucifer</i>	mid Feb – July	N	Y	N	Y	N	N	Y	N
N. leopard frog	<i>Rana pipiens</i>	Apr – June	Y	Y	Y	N	Y	Y	N	N
Pickerel frog	<i>Rana palustris</i>	Apr – mid June	Y	N	Y	Y	Y	Y	N	N
American toad	<i>Bufo americanus</i>	Apr – June	Y	Y	N	Y	Y	N	Y	N
Eastern gray treefrog	<i>Hyla versicolor</i>	May – Aug	Y	Y	N	Y	N	N	Y	N
Cope's gray treefrog	<i>Hyla chrysoscelis</i>	May – Aug	Y	Y	N	Y	Y	N	Y	N
Cricket frog	<i>Acris crepitans</i>	May	Y	N	Y	N	N	N	Y	N
Green frog	<i>Rana clamitans</i>	mid May – July	Y	N	Y	N	N	Y	N	N
Bullfrog	<i>Rana catesbeiana</i>	May – July	Y	N	Y	N	N	Y	N	N
Fowler's Toad	<i>Bufo woodhouseii fowleri</i>	Mar - Aug	N	Y	N	N	Y	N	N	Y

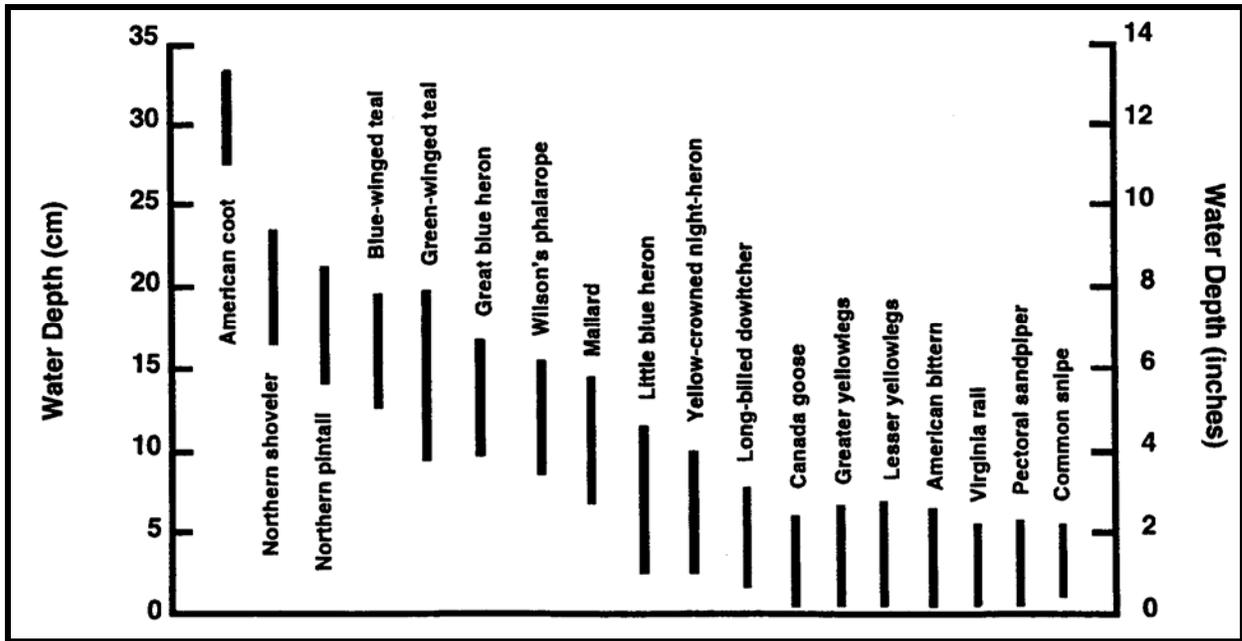
<sup>1</sup> Species that can successfully survive or reproduce in a habitat during the identified life-history phase are identified with a Y; those that do not with an N.

<sup>2</sup> Will breed in permanent water or temporary (ephemeral) ponds.

<sup>3</sup> Active, nonbreeding portion of the year is spent in the water or along the water edges, in trees or forest litter, or in open, nonforested habitats (grasslands).

<sup>4</sup> Hibernation or aestivation period is spent in or near water, in forest litter, or underground.

**Figure 1.** Preferred water depths for wetland birds commonly associated with moist-soil habitats (after Fredrickson, L. H., 1991).



**Table 3.** Water foraging depths and vegetative characteristics at foraging sites of some North American waterfowl. (after Fredrickson, L. H., 1991)

SPECIES	WATER DEPTH	VEGETATIVE STRUCTURE
Canada geese	dry, mudflat, <10 inches	Short herbaceous, rank seed-producing annuals
Northern pintail	<10 inches	Open water with short sparse vegetation
Mallard	<10 inches	Small openings, tolerate robust vegetation
Ring-necked duck	>10 inches	Scattered, robust emergents
Lesser scaup	>10 inches	Open water, scattered submergents