

Birds

American bittern

General information

The American bittern is a medium-sized heron typically found in dense emergent vegetation in moderately shallow freshwater wetlands. This migratory bird may be found near the coasts during winter. It is rarely seen except when flying. It moves slowly through vegetation stalking food and is well camouflaged with brown and white streaks. American bitterns occasionally use adjacent upland grasslands for nesting and foraging. Larger semi-permanent wetland complexes are favored over small, isolated wetlands.

Habitat requirements

Diet: fish, amphibians, snakes, insects, and crustaceans

Water: obtained from food

Cover: dense emergent wetland vegetation, such as reeds, cattails, or sedges; nest is built in dense cover a few inches above shallow water; water depth should be maintained at less than 2 inches throughout the year

Wildlife management practices

Control Nonnative Invasive Vegetation: is necessary when nonnative invasive vegetation begins to outcompete native vegetation, limit food abundance, or alter the hydrology of a wetland favoring dryer land.

Livestock Management: livestock should be excluded from wetlands managed for bitterns

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Periodic Prescribed Fire, Disking,* and *Herbicides* may be used to maintain appropriate vegetation structure. However, disturbance should be infrequent (2-5 years) because bitterns prefer dense cover.

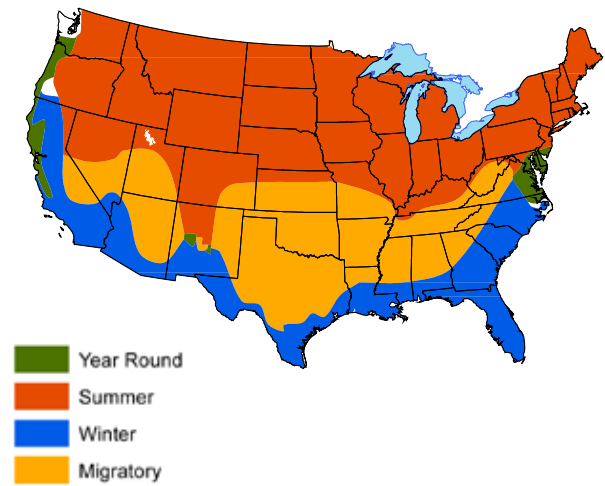
Water Control Structures: should be installed when wetlands do not have control structures to maintain appropriate water depths. Drawdowns can be conducted to favor appropriate vegetation. Drawdowns should be conducted slowly and after the breeding season (mid-August or later).

Water Developments for Wildlife: shallow wetlands can be constructed if habitat is not present

Wildlife or Fish Survey: bitterns are typically surveyed by listening for calls. Also, ropes can be dragged across the vegetation between two or more observers to flush the birds.



Sallie Gentry



Canada goose

General information

The breeding range of the Canada goose extends across the northern half of the U.S. across Canada and Alaska. Although an increasing number of Canada geese winter in Canada, the majority fly south to southern areas of the U.S. and Mexico. Many southern areas of the U.S. have year-round resident populations of Canada geese, which is not reflected on the map below. Canada geese nest and rear young in wetlands with relatively sparse to dense emergent aquatic vegetation. Riparian areas and wetlands containing 20 percent tall emergent aquatic vegetation and 80 percent open water are usually preferred areas for Canada geese.

Habitat requirements

Diet: variety of forbs and grasses, grains, and some aquatic insects

Water: relatively open water wetlands, ponds, and lakes are used for brood rearing, feeding, and loafing

Cover: nest in a variety of places, such as mats of bulrushes, tops of muskrat houses, and most of all, in relatively thick cover on islands, usually within 200 feet of the water's edge

Wildlife management practices

Control Nonnative Invasive Vegetation: applies to both uplands and wetlands; nonnative invasive vegetation can degrade nesting cover in uplands and make wetlands unattractive to Canada geese

Leave Crop Unharvested: to provide additional food during winter

Livestock Management: proper grazing can maintain lush vegetation for foraging Canada geese; restricting livestock grazing from areas where geese may nest can increase nesting success

Plant Food Plots: both forage (green growing wheat) and grain (corn) food plots can provide additional food where food is limited

Plant Native Grasses and Forbs: to provide nesting cover where limiting

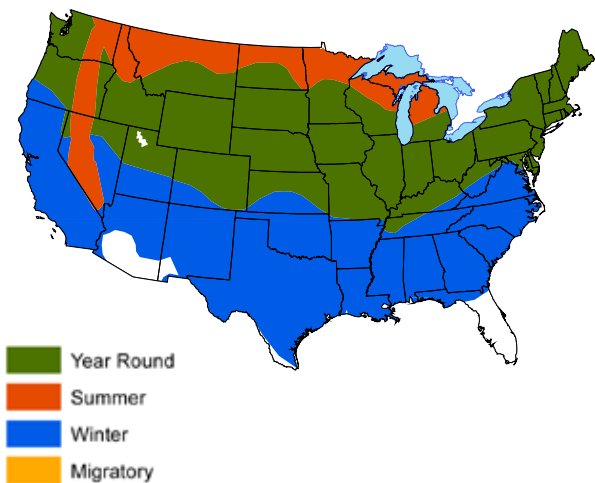
Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* and *Herbicide Applications* set back succession in cattail-choked wetlands and stimulate lush vegetation in uplands where geese may feed; *Chainsawing* and *Dozer-clearing* can create more early succession for nesting cover near wetlands

Tillage Management: fall tillage in grain crops can be delayed until spring to provide supplemental food source



Ryan Hagerly



Water Control Structures: allow water level manipulation to maintain 80 percent open water and 20 percent emergent vegetation

Water Developments for Wildlife: can be used to temporarily flood fields for feeding and raising broods

Wildlife Damage Management: may be needed where Canada geese damage lawns, golf courses, and crop fields, and other areas in cities and suburban areas

Wildlife or Fish Survey: broods counts and visual surveys can provide estimates of goose abundance

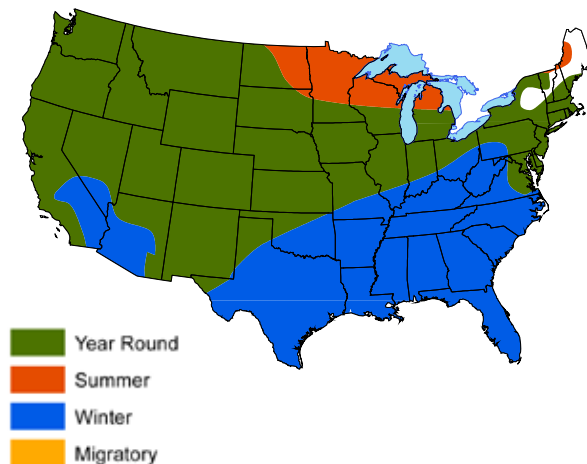
Mallard

General information

The mallard is a migratory waterfowl with one of the most extensive breeding ranges of any duck in North America, extending across the northern one-third of the U.S., and up to the Bering Sea. Mallards winter south of Canada, throughout the U.S. and south to Central America. Mallards nest in tall grasses and forbs or in shrubby cover. They need open water with associated emergent aquatic vegetation to raise young. They may be found in any type of wetland with standing water and also use various upland vegetation types for foraging, especially harvested grain fields. Mallards are dabbling ducks, which means they feed at or near the surface of the water by filtering food items, such as invertebrates, seeds, and other plant material. Dabbling ducks are often seen tipping upside down in the water to reach food at the bottom of a wetland. Unlike diving ducks, they feed in much shallower water and do not dive to obtain food. Mallards have become a nuisance in some areas, particularly urban and suburban parks with ponds where they are fed. Mallards may breed with domestic ducks and with other wild duck species, especially the American black duck.



Donna Dewhurst



Habitat requirements

Diet: aquatic plants, insects and other invertebrates, hard mast (especially acorns), grains and other seed are primary components in the diet; ducklings eat mostly aquatic insects

Water: see cover requirements below

Cover: nest in grass and forbs and sometimes in shrub cover, preferably within one-half mile of a wetland that provides open water with some emergent aquatic vegetation; brooding cover is open water with considerable emergent aquatic vegetation for protection from predators; ideally, wetlands have a minimum of 50 percent open water and 10 to 20 percent emergent vegetation; in wintering areas, mallards often loaf on more open water, such as warm-water sloughs, streams, rivers, and flooded fields

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive species, such as purple loosestrife, water hyacinth, parrotfeather, hydrilla, and reed canarygrass, begin to reduce habitat quality for mallards

Delay Crop Harvest: (in some ecoregions) hay and crop harvest adjacent to wetlands should be conducted after nesting season

Forest Management: (in some ecoregions) *Forest Stand Improvement* can favor mast-producing species, especially oaks, in bottomland hardwoods that can be flooded to increase mast production

Leave Crop Unharvested: unharvested grains, such as corn, to provide a winter food source; this does not apply

to hay forages or soybeans

Livestock Management: livestock should be excluded from nesting areas

Plant Food Plots: shallowly flooded grain plots can provide an important food source for migrating and wintering mallards

Plant Native Grasses and Forbs: (in some ecoregions) where nesting cover is limiting and planting is necessary to increase coverage of native grasses and forbs

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* should be used to rejuvenate dense vegetation in nesting areas and to increase or maintain proper water and vegetation interspersions in emergent wetlands that become dry in summer; *Disking* emergent wetlands and fields that will be flooded later will stimulate annual grasses and forbs that are important food plants; *Herbicide Applications* can be used to control unwanted woody species; *Chainsawing* can be used to create openings in bottomland forests that can be flooded

Tillage Management: eliminating fall tillage can provide waste grain in the winter

Water Control Structures: should be used to control water level in wetlands managed for mallards and other wildlife

Water Developments for Wildlife: shallow impoundments can be used to flood grain fields and bottomland hardwoods in winter to provide a valuable food source and loafing areas

Wildlife or Fish Survey: aerial surveys are commonly used to estimate trends in the mallard population

Northern pintail

General information

The northern pintail is a large dabbling duck that ranges from 23 to 30 inches in length. Both sexes have blue-gray bills and gray legs and feet. The drake has a thin white stripe running from the back of its chocolate-brown head down its neck to a mostly white undercarriage. He also has gray, brown, and black patterning on his back and sides and long central tail feathers, which give the species its name. The northern pintail female appears to have drab brown feathers, much like those of other female dabbling ducks. Hens make a coarse quack, whereas drakes make a flute-like whistle. Northern pintails prefer open wetlands. They nest on the ground, and nests are hidden among vegetation in a dry location. Nest construction is a simple shallow scrape in the ground lined with plant material and down.

Habitat requirements

Diet: aquatic plant seeds and rhizomes; grain and other seeds found in fields; aquatic insects, mollusks and crustaceans

Water: water is obtained through diet

Cover: open freshwater wetlands and intertidal marshes

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative aquatic weeds reduce or limit space for foraging or loafing, or when nonnative invasive plants degrade quality of nesting cover

Leave Crop Unharvested: to provide additional food for migrating and wintering pintails

Livestock Management: livestock should be excluded from nesting areas, from wetlands managed for waterfowl, and from food plots

Plant Food Plots: shallowly flooded grain food plots can provide a beneficial food source for migrating and wintering northern pintails

Plant Native Grasses and Forbs: where nesting cover is limiting and planting is necessary

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* should be used to maintain and rejuvenate nesting cover and maintain proper water and vegetation interspersions in wetlands; *Chainsawing*, *Dozer-clearing*, and *Root-plowing* may be used to clear trees where needed

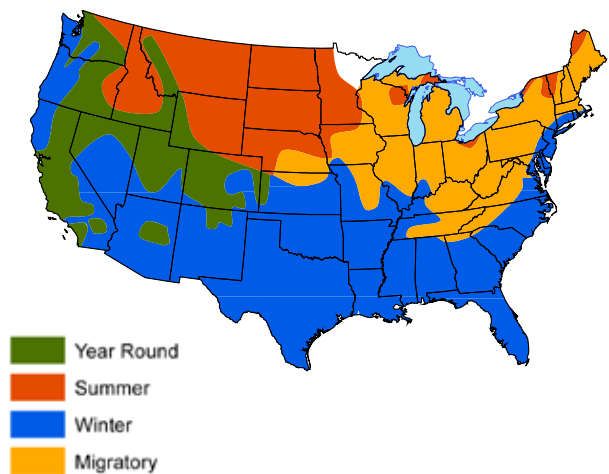
Tillage Management: eliminating fall tillage can provide waste grain in the winter

Water Control Structures: should be installed if not present in managed wetlands to manipulate water levels

Water Developments for Wildlife: shallow impoundments can flood fields and provide important



Dave Menke



foraging and loafing areas for migrating and wintering northern pintails

Wildlife or Fish Survey: observation counts and aerial surveys are used to estimate population trends

Redhead

General information

Redheads are diving ducks found across the U.S. and Mexico. They winter in southern areas of the U.S. and into Mexico. Redheads use open-water wetlands (especially for loafing) as well as those with a mosaic of open water with floating islands of organic material and some emergent vegetation. Redheads do not build nests, but instead use old nests of other ducks and wetland birds that are above water or very near the shore in dense emergent vegetation providing concealment. Like other waterfowl, chicks are precocial. That is, they are feathered with down and are able to swim about and forage upon hatching.

Habitat requirements

Diet: chicks primarily eat aquatic invertebrates (mollusks, snails, crustaceans) during late spring and early summer; during the rest of the year, redheads eat aquatic plants, such as pondweeds, muskgrass, bulrush seeds, wild celery, water lily seeds, and coontail

Water: obtained in diet

Cover: during spring and summer, dense emergent vegetation for nesting; open-water wetlands are used for loafing and foraging; wetlands with a mosaic of open water with submerged and emergent aquatic vegetation are used for foraging

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive aquatic vegetation begins to reduce habitat quality for redheads; this is most common when mats of nonnative species begin to form over the water surface and limit diving and foraging by redheads

Livestock Management: livestock should be excluded from wetlands managed for redheads during the nesting season to prevent deterioration of nesting cover

Repair Spillway/Levee: if not functioning properly

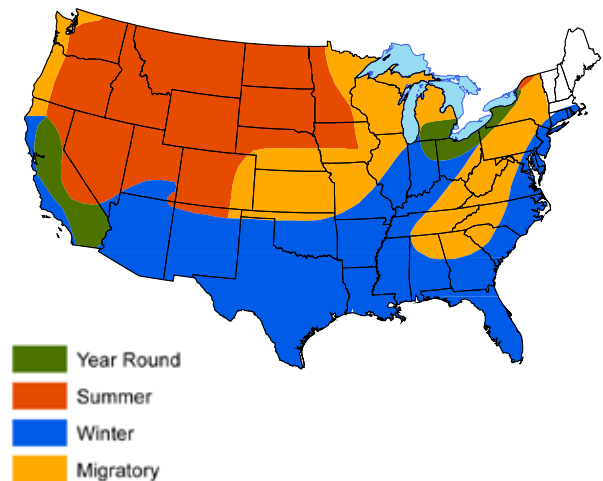
Set-back Succession: *Prescribed Fire* is recommended to rejuvenate vegetation when wetlands dry sufficiently to burn (most common in ephemeral wetlands or impoundments where water levels can be manipulated); *Chainsawing* may be used to clear trees where needed

Water Control Structures: should be installed in dams or levees if not present to enable water level manipulation and promote growth of tall emergent aquatic vegetation adjacent to wetlands with an abundance of floating and submerged aquatic vegetation (3 feet to 5 feet deep)

Water Developments for Wildlife: shallow impoundments may be constructed to temporarily flood areas dominated by tall emergent aquatic vegetation during the nesting season



Donna Dewhurst



Wildlife or Fish Survey: observation surveys and aerial surveys are most often used to estimate population trends

Spotted sandpiper

General information

Spotted sandpipers are medium-sized shorebirds that occur all across North America. During the breeding season, they have pale breasts with brown spots, hence the name. They are found in very shallow water areas and along mudflats where they search for freshwater invertebrates and other foods. They are active foragers and walk in meandering paths, darting for prey. Nests are placed in a small depression on the ground, often under a canopy of vegetation, and lined with fine grasses. Spotted sandpipers exhibit an unusual breeding strategy where the female establishes and defends her territory and may breed with several males. The male incubates the eggs and takes care of the nestlings.

Habitat requirements

Diet: flies and their aquatic larvae (midges),

grasshoppers, beetles, worms, snails, small crustaceans

Water: acquire necessary water while foraging and from diet

Cover: shallow, freshwater wetlands and mudflats; sometimes dense herbaceous vegetation for nesting

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to reduce habitat quality for spotted sandpipers

Livestock Management: should not allow overgrazing to limit herbaceous vegetation that is used for nesting; livestock may be excluded from areas managed for spotted sandpipers

Plant Native Warm-Season Grasses: where groundcover is lacking and planting is necessary

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* is recommended to rejuvenate herbaceous groundcover around wetlands for nesting cover

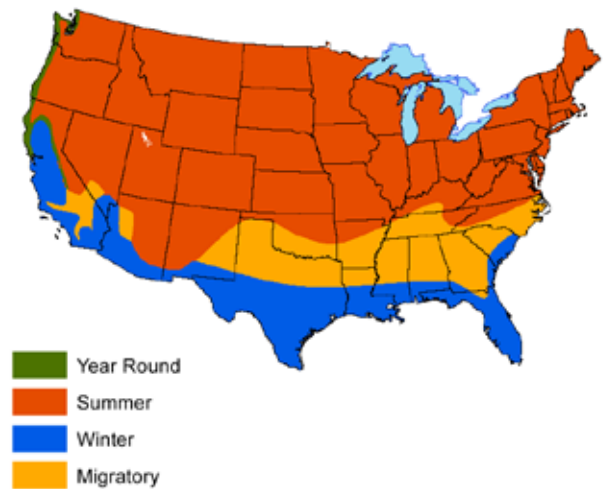
Water Control Structures: should be installed if one is not present in a wetland that has a dam or levee to allow the water level to be manipulated

Water Developments for Wildlife: small impoundments and ponds may be constructed if habitat is limiting

Wildlife or Fish Survey: observation counts are used to estimate population trends



Beedie Savage



Virginia rail

General information

The Virginia rail is a gamebird of freshwater marshes, but occasionally occurs in saltwater marshes. It prefers to stay hidden in moderately dense emergent vegetation and is more often heard than seen. If wetland vegetation becomes too thick, Virginia rails will not be as abundant. Virginia rails may be found in wetlands of all sizes, but prefer hemi-marsh, which is represented by scattered patches of emergent vegetation with small openings of open water at about a 50:50 ratio. Periodic water level manipulation should be used to favor annual wetland plants and avoid a monoculture of perennial wetland vegetation. Shallow water depths (generally less than 1 foot) are required. Virginia rails will flee quickly on the ground through vegetation if approached and will fly rarely. They typically inhabit shallow water areas and can swim under water if attacked. Virginia rails are migratory and can travel great distances. The Virginia rail is known to build dummy nests around the vicinity of their actual nests.

Habitat requirements

Diet: insects, aquatic invertebrates, snails, small fish, and small amphibians; some seeds and plant material in fall and winter

Water: obtained from food

Cover: moderately dense wetland vegetation, such as cattails, sedges, rushes, smartweeds, and other plants are used for cover; nests are woven into vegetation over shallow water and may have a canopy over them

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to limit open water or otherwise reduce habitat quality for Virginia rail

Livestock Management: livestock should be excluded from wetlands managed for Virginia rail

Repair Spillway/Levee: if not functioning properly

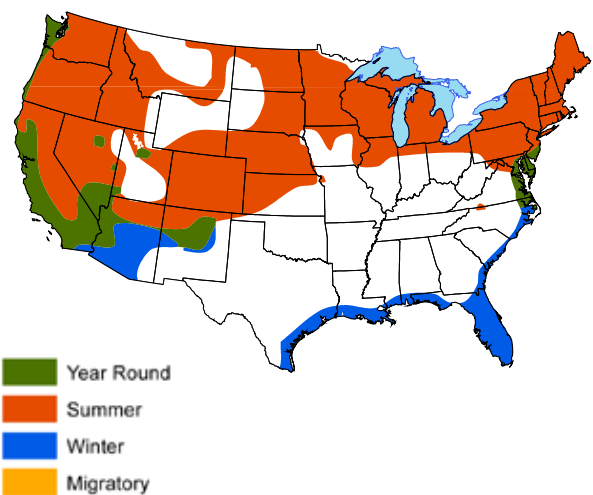
Set-back Succession: *Prescribed Fire*, *Disking*, and *Herbicide Applications* may be used in wetlands dominated by very dense perennial vegetation to encourage a hemi-marsh consisting of openings and annual plants; *Chainsawing* and *Herbicide Applications* may be used to reduce tree cover and create more open marsh

Water Control Structures: should be installed if not present in dikes to allow periodic water drawdowns to maintain a hemi-marsh structure and the appropriate shallow water required by Virginia rails

Water Developments for Wildlife: shallow impoundments can be constructed to provide habitat



Dave Menke



Wildlife or Fish Survey: Call counts are most often used to estimate population trends; playing a tape of their call increases the chance of hearing rails; also, ropes can be dragged across vegetation between two or more observers to flush birds during observation counts

Wilson's snipe

General information

Named after ornithologist Alexander Wilson, the Wilson's snipe is a ground-dwelling, migratory shorebird of North, Central, and South America that uses a variety of wetlands and riparian areas, especially where mudflats or sandbars are present. They breed, nest, and raise their broods during summer in their northern range and migrate to their southern range in the fall and winter. There are resident populations in the Pacific northwestern United States. High-quality Wilson's snipe habitat will have a marshy area with low herbaceous vegetation, and sparse shrubs, with a mudflat or sandbar nearby. Nests are constructed of grass bowls placed on the ground in herbaceous vegetation near water.



David Ward

Habitat requirements

Diet: invertebrates (insects and larvae)

Water: obtained through diet

Cover: bogs, fens, swamps, and marshy, vegetated edges of ponds, rivers, and streams are used for courtship and nesting; areas with moist soil or mud for insect probing (such as wet fields, marshy edges of water bodies, and exposed muddy banks or sandbars) are used for foraging

Wildlife management practices

Control Nonnative Invasive Vegetation: may be necessary if nonnative plants are degrading habitat

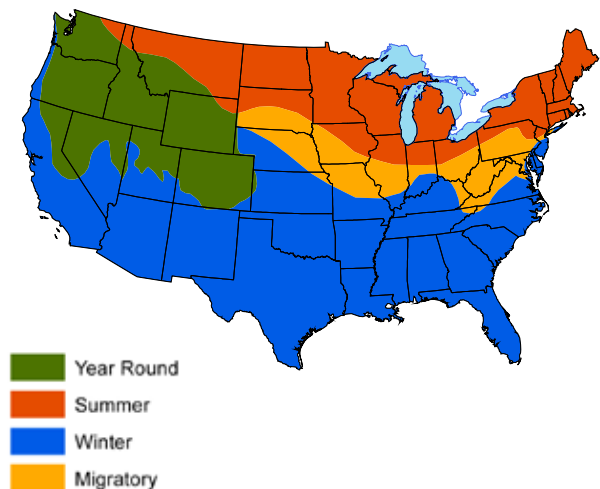
Livestock Management: should not allow overgrazing to limit herbaceous vegetation adjacent to wetlands that is used for nesting; livestock access to wetlands should be restricted

Set-back Succession: *Disking* and *Herbicide Applications* can provide bare ground; *Prescribed Fire* can maintain herbaceous groundcover; *Chaining* can reduce excessive shrub cover; *Chainsawing*, *Dozer-clearing*, *Root-plowing*, and *Herbicide Applications* may be used to remove trees and create wetland openings

Water Control Structures: should be installed in levees if not present to allow manipulation of water levels, expose mudflats, and encourage aquatic vegetation

Water Developments for Wildlife: shallow impoundments should be created where topography allows, providing increased feeding areas for snipe

Wildlife or Fish Survey: flush counts, hunter harvest data, and breeding bird survey data are used to estimate population trends



Mammals

American beaver

General information

Beavers occur throughout most of North America. They are found in various wetlands that have permanent water with a variety of shrubs and trees adjacent to the water. Beavers build dams from tree branches, shrubs, and mud to form ponds that stabilize water levels, slow water movement, and provide shelter beneath the ice in winter. Beavers also build lodges from sticks and mud and dig burrows in banks of streams and rivers. Beavers eat the inner bark of shrubs and trees and store cuttings in caches (piles of branches) for use during winter. The ecological benefits provided by beavers cannot be overstated. Beavers are responsible for creating habitat for many species of birds, mammals, reptiles, amphibians, fish, and invertebrates. Without beavers, the distribution and abundance of many freshwater wetland-associated species would decline dramatically. Unfortunately, beavers were once such a valuable fur resource that trapping led to their extirpation in many parts of their former range. Today, beavers have rebounded with help from wildlife agency regulations and a lack of available fur market. In some areas, beavers have become a nuisance, as they cut down trees and dam ditches and streams in undesirable places. Their dams often flood crops, destabilize road edges, and kill trees. When beavers construct dams in places that cause problems, removal of the beaver is usually the best solution. If the dam is destroyed and the beavers remain, they will build the dam again.

Habitat requirements

Diet: primarily bark from shrubs and trees; also some forbs and grasses

Water: prefer slow moving or still water at least 5 feet deep (to allow movement under water)

Cover: bottomland riparian areas that can be dammed to provide still water with sufficient depth

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to reduce habitat quality for American beaver

Livestock Management: should prevent livestock access to riparian areas and other wetlands where beaver is a focal species to prevent foraging on shrubs and young trees; this may include developing livestock watering facilities in upland areas beaver may use and maintain good water quality

Plant Shrubs: where beavers are desired, but not present, deciduous shrubs may be planted along riparian areas



Steve Hersey



where there are few trees or shrubs to make the area more attractive to beavers

Plant Trees: where beavers are desired but not present, deciduous trees may be planted along riparian areas where there are few trees or shrubs to make the area more attractive to beavers

Water Control Structures: a Clemson Beaver Pond Leveler or similar device can be installed in beaver dams to maintain water levels

Decrease Harvest: may be necessary where an increased beaver population is desired and trapping pressure has limited growth

Increase Harvest: where populations can sustain additional trapping pressure for recreation and/or where populations need to be lowered

Wildlife Damage Management: should be implemented where beavers are causing problems for landowners, such as flooding timber, crops, roads, and other areas

Wildlife or Fish Survey: presence and extent of beaver activity (dams, evidence of cutting shrubs and trees) and trapper harvest data are used to estimate population trends over time

Common muskrat

General information

Muskrats are large rodents found throughout the U.S., especially in shallow marshes with abundant cattails. They are mainly nocturnal and need water at least 4 feet deep or flowing water that allows free movement under ice during winter. Muskrats prefer water 1 to 2 feet deep during summer, with about 20 percent of the wetland open water, free of emergent aquatic vegetation. Muskrats build lodges of cattails or other herbaceous vegetation, but do not use sticks or limbs. They sometimes nest in a bank burrow along a waterway. Burrowing and denning activities can cause problems in flooded agricultural areas, such as rice fields and waterfowl management areas.

Habitat requirements

Diet: roots, tubers, and green shoots of emergent aquatic vegetation, such as cattails and bulrushes

Water: necessary water obtained from diet

Cover: primarily shallow-water wetlands with a mixture of open water and emergent aquatic vegetation; den in lodges built from cattails and bulrushes; loaf on floating logs or tops of lodges

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive aquatic vegetation is competing with the native aquatic plant community and reduce habitat quality for common muskrat

Livestock Management: livestock should be restricted from riparian areas and other wetlands; this may require development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* is recommended to rejuvenate old, decadent wetland vegetation

Water Control Structures: should be installed if not present in levees or dams to control water levels and allow cattails and bulrushes to grow

Water Developments for Wildlife: small impoundments can be built in low-lying areas to provide habitat

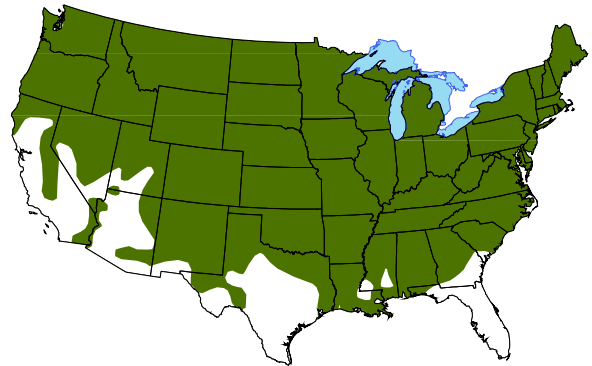
Decrease Harvest: when trapping efforts have reduced population below desirable levels

Increase Harvest: when populations can sustain additional trapping or where populations need to be lowered

Wildlife Damage Management: may be necessary when muskrats damage dikes in agricultural areas and waterfowl management areas; populations are typically reduced by trapping



Bo Zaremba



Wildlife or Fish Survey: observation surveys, track counts, and presence of lodges are used to estimate population trends

Mink

General information

Mink occur in Alaska, Canada, and across most of the U.S. They are mainly nocturnal and are found along stream banks, riverbanks, and edges of a variety of wetlands. Mink are strictly carnivorous. Most prey is found in close association with dense vegetation along wetland edges and other riparian areas. Availability of den sites is considered a key factor in how mink use an area. Areas with lots of trees and shrubs and limited livestock grazing near riparian areas usually have more den sites. Mink can eat significant numbers of upland nesting waterfowl or gamebirds, especially in areas where nesting cover is limited.



Bo Zarembo

Habitat requirements

Diet: rabbits, mice, muskrats, crayfish, snakes, and birds

Water: necessary water probably obtained through diet

Cover: closely associated with water; riparian areas and wetland edges; dens often located under log jams and tree roots, old muskrat burrows, and rock piles

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to reduce habitat quality for mink and their prey

Livestock Management: livestock should be excluded from wetlands and riparian areas where mink is a focal species; this may include development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* is recommended to rejuvenate old decadent wetland vegetation that can improve habitat for prey

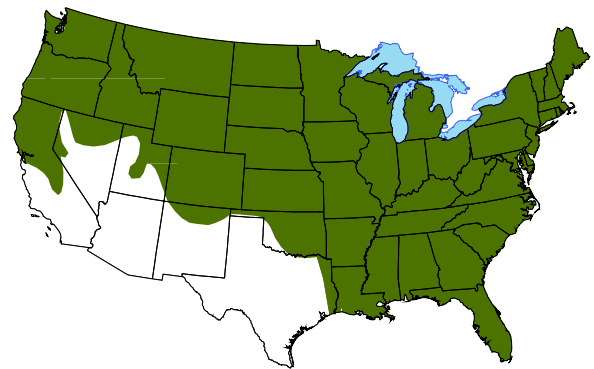
Water Control Structures: are necessary to regulate water level and manipulate growth of emergent aquatic vegetation adjacent to an impoundment

Water Developments for Wildlife: shallow impoundments can be developed to increase habitat where needed

Decrease Harvest: may be necessary when trapping pressure is limiting population and an increase in population is desired

Increase Harvest: where populations can sustain additional trapping pressure, and when mink have been identified limiting upland nesting waterfowl or gamebirds

Wildlife Damage Management: mink may occasionally kill domestic poultry, but this is rare and localized. Trapping and exclusion are effective methods to reduce damage.



Wildlife or Fish Survey: track counts and trapper harvest data are often used to estimate population trends

Raccoon

General information

Raccoons are very common throughout most of the U.S., except in certain parts of the Rocky Mountains, Nevada, Utah, and Arizona. Raccoons are found in a variety of vegetation types, but are usually most abundant near riparian areas and wetlands. They also are found in urban areas. Raccoons den in hollow trees, in burrows under stumps or brush piles, or in chimneys, attics, and crawl spaces of houses and buildings. They are omnivorous and eat a wide variety of foods. Raccoons can become pests in urban areas and in wetlands (depredating waterfowl nests). Raccoons also have been identified as major predators on gamebird nests and young gamebirds.

Habitat requirements

Diet: crayfish, birds, eggs, small mammals, insects, lizards, snakes, worms, fish, carrion, grains, seeds, hard and soft mast, and foods prepared for human and pet consumption

Water: require water frequently during warm seasons

Cover: riparian areas, bottomland hardwoods, and along other wetlands; natural tree cavities are used for denning and daytime loafing; raccoons also den in ground burrows under stumps, brush piles, junk piles, old abandoned buildings, and rocky cliffs and ledges

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to reduce habitat quality for raccoon

Create Snags: where denning sites are limited

Edge Feathering: to increase usable space for prey around fields

Field Borders: to increase usable space for prey around fields

Forest Management: *Forest Regeneration (Clearcut, Shelterwood, Seed-tree, Group Selection, Single-tree Selection)* and *Forest Stand Improvement* can stimulate soft mast production and cover for prey

Leave Crop Unharvested: especially cornfields adjacent to bottomland hardwoods and riparian areas

Livestock Management: livestock should be excluded from riparian areas and other wetlands; this may include development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas

Plant Food Plots: annual grain food plots, especially corn, may be planted where food is limiting and where an increase in raccoon population is desired (this situation is exceptionally rare)

Plant Shrubs: where soft mast is lacking and to provide corridors across large open areas

Plant Trees: in riparian areas and adjacent to wetlands where few trees are present to maintain riparian corridors; maintain approximately 50 percent deciduous forest cover; also in large open areas where there are few



Dave Menke



trees

Repair Spillway/Levee: if not functioning properly

Set-back Succession: *Prescribed Fire* is recommended to rejuvenate old decadent wetland vegetation; *Prescribed Fire* and *Disking* can maintain herbaceous openings; *Prescribed Fire*, *Herbicide Applications*, and *Chaining* are recommended to rejuvenate decadent shrub cover

Tillage Management: eliminate fall tillage of grain crop residue adjacent to cover to make waste grain available as an additional food source

Water Control Structures: should be installed in existing dikes, dams, or levees if not present, and if needed, to control water levels and provide water less than 2 feet deep and stimulate emergent vegetation and enhance habitat for prey

Water Developments for Wildlife: shallow impoundments can provide a water source and additional habitat for various prey species

Decrease Harvest: if hunting pressure is limiting population growth where an increase is desired (this situation is rare)

Increase Harvest: where populations can sustain additional hunting or trapping pressure for recreation and where populations need to be lowered for various reasons

Wildlife Damage Management: is often necessary when raccoons get into garbage cans, occupy residences or buildings, or prey upon poultry; exclusion is cost-effective; cultural modification, such as using wildlife-proof trash cans, is effective; trap and kill is most effective for problem raccoons

Wildlife or Fish Survey: track counts, camera surveys, and trapper harvest data may be used to monitor population trends

River otter

General information

The river otter is a brownish black semi-aquatic mammal that is a member of the weasel family. River otters are highly social and the group is called a family, which consists of an adult female and her offspring. Adult males form social groups separate from the families except during the breeding season. Adults typically weigh 15 to 25 pounds and are well equipped for aquatic life with short fur, short powerful legs, webbed toes, and long tapered tails. River otters are superb swimmers and divers and can remain underwater for several minutes. They are active year-round, but are mostly nocturnal during spring, summer, and fall. River otters live in a holt, which is a den constructed of burrows of other mammals. They also den along undercut riverbanks, hollow logs near or in the water, rock formations, and flooded debris that provide protection and seclusion with easy access to water. Urbanization and pollution have decreased the range of river otters.

Habitat requirements

Diet: primarily fish, but they also will feed extensively on aquatic insects and crayfish; small mammals and amphibians are eaten occasionally

Water: largely obtained from their diet; clean water is essential for fish populations

Cover: riparian areas along creeks and rivers, as well as freshwater lakes, inland wetlands, coastal shorelines, marshes, and estuaries

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive aquatic vegetation begins to reduce habitat quality for prey

Livestock Management: livestock should be excluded from forests managed for river otter

Repair Spillway/Levee: if not functioning properly

Water Control Structures: should be installed in levees and dams if not present to manage water levels in impoundments and influence habitat for river otters and prey

Water Developments for Wildlife: impoundments may be created adjacent to riparian areas where additional habitat for river otters is desired

Decrease Harvest: may be necessary if trapping has been excessive and an increase in population is desired

Increase Harvest: may be required if predation is limiting populations of various prey species or when a reduction in population is desired

Wildlife Damage Management: is necessary when recreational or commercial fisheries are being threatened by river otters



Jim Leopold



Wildlife or Fish Survey: track surveys, latrine site surveys, bridge surveys (for latrines), trapper harvest data, and camera surveys can be used to monitor populations

Eastern snapping turtle

General information

The eastern snapping turtle is found across much of the U.S. east of the Rocky Mountains. It occurs in most permanent bodies of water, but prefers soft mud-bottomed ponds, lakes, and slow streams with dense vegetation. It is one of the more aquatic freshwater turtles and spends most of its time lying on the bottom of deep pools or buried in the mud in shallow water with only its eyes and nostrils breaking the surface of the water. The primary nesting season is May-June with the female digging a hole and laying about 30 eggs. Eastern snapping turtles are omnivorous and will consume relatively large invertebrate and small vertebrate prey. If approached, snapping turtles will turn to face the potential predator, lunge forward, and strike quickly with powerful beaked jaws. Eastern snapping turtles grow slowly, but can attain very large sizes (>50 lbs.) They have heavy muscular legs and are often harvested for human consumption.

Habitat requirements

Diet: insects, crayfish, clams, earthworms, fish, frogs, toads, salamanders, snakes, small turtles, birds, and small mammals; also consumes various aquatic plant species

Water: requires permanent bodies of water; obtains water from food

Cover: permanent water bodies with muddy bottoms and thick vegetation; hides underwater beneath submerged stumps, roots, brush, and buried in the mud

Wildlife management practices

Livestock Management: livestock should be excluded from riparian areas and other wetlands; this may include development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas

Repair Spillway/Levee: if not functioning properly

Water Control Structure: should be installed in existing levee or dam if one is not present to manipulate water levels as needed

Water Development for Wildlife: ponds and impoundments may be built when permanent bodies of water are not available

Decrease Harvest: may be necessary when harvest pressure limits population growth

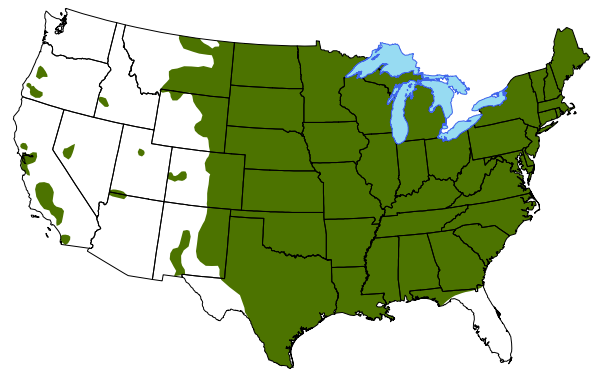
Increase Harvest: where populations can sustain additional harvest pressure and if the turtles are limiting other desirable species

Wildlife Damage Management: may be necessary if turtles are found in fish hatcheries

Wildlife or Fish Survey: hoop net traps are used to estimate population trends



Chelsi Hornbaker



Amphibians

American bullfrog

General information

American Bullfrogs are relatively large frogs that inhabit permanent bodies of standing or slow-moving water. The American bullfrog's native range extends from the Atlantic Coast to eastern Colorado and eastern Mexico, and from southern Colorado to northeastern Mexico. Bullfrogs are not native west of the Rocky Mountains, but have been successfully introduced in many areas. Bullfrog tadpoles require two years to metamorphose. They prefer shorelines with dense vegetation adjacent to shallow open water dominated by floating and submerged aquatic vegetation. All habitat requirements are usually found in and around a single pond.

Habitat requirements

Diet: insects, crayfish, other frogs, reptiles, snails, fish, and occasionally small mammals and birds

Water: stable water levels are necessary for hibernation and egg development; water levels should be maintained at a constant level

Cover: dense, emergent aquatic and upland herbaceous vegetation adjacent to water for hiding and foraging

Wildlife management practices

Livestock Management: livestock should be excluded from ponds managed for bullfrog; livestock watering facilities should be developed away from pond

Repair Spillway/Levee: if not functioning properly

Water Control Structures: should be installed if none are present in existing dams and levees so water depth can be managed as appropriate

Water Developments for Wildlife: ponds and shallow impoundments can be provided where habitat for bullfrogs is absent or insufficient for desired population

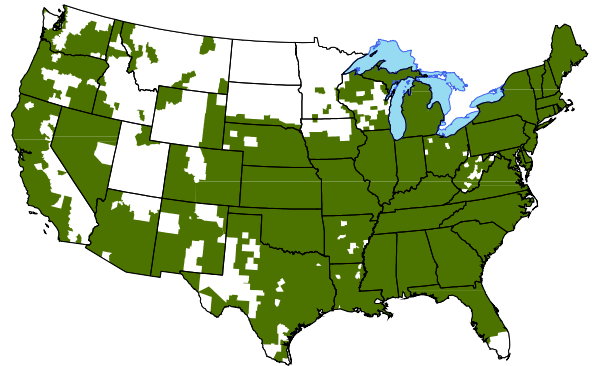
Decrease Harvest: if current hunting pressure is causing population to decline and population growth is desired

Increase Harvest: where populations can sustain additional harvest pressure for hunting recreation

Wildlife or Fish Survey: call counts are used to estimate population trends



Bill Buchanan



Crawfish frog

General information

Crawfish frogs occur from Indiana south to Louisiana, and from eastern Kansas south to the Texas coast. Crawfish frogs are found in a variety of vegetation types ranging from damp wooded valleys, open brushy fields, to tallgrass prairies. Populations are often associated with major river floodplains. Areas with shallow soils and intensive agriculture are avoided. Crawfish frogs are largely fossorial and spend the non-breeding season in crayfish burrows. Adults make annual migrations to temporary, fishless ponds to breed. Eggs hatch within 3-4 days, but tadpoles may take 2 months to transform.



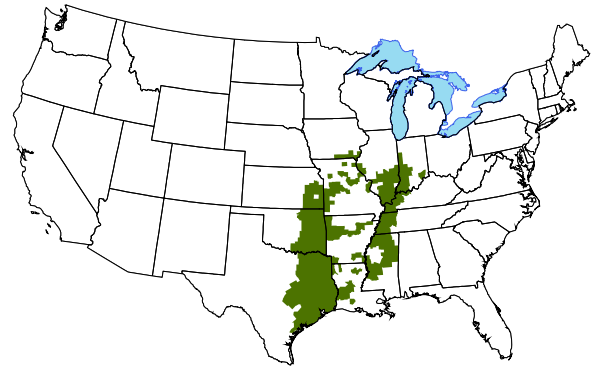
Rick Fridell

Habitat requirements

Diet: adults eat beetles, spiders, crickets, ants, millipedes, and small crayfish; tadpoles filter feed on phytoplankton

Water: breed in ephemeral, fishless ponds with grassy margins

Cover: adults require low, wet areas, including moist meadows, prairies, woodlands, and brushy fields; burrows are required; crayfish burrows are preferred, but any burrow may be used as long as it reaches the water table; tadpoles require ponds that contain some algae, pondweed, and other vegetation to provide food and shelter



Wildlife management practices

Conservation Easement: can protect critical habitat for this declining species

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to reduce habitat quality for crawfish frogs

Livestock Management: livestock should be excluded from ponds that may be used as breeding ponds for crawfish frogs; livestock watering facilities should be developed away from pond

Plant Native Grasses and Forbs: may be necessary to convert fields currently in row-crop agriculture to crawfish frog habitat

Plant Shrubs: in fields that are currently in row-crop agriculture to convert them to crawfish frog habitat, or in large open areas that need additional cover

Water Control Structures: should be installed if not present in ponds with levees that are managed for crawfish frogs to enable the pond to be drained, especially if fish are present

Water Developments for Wildlife: small, fishless ponds and impoundments may be created if additional breeding ponds are needed

Wildlife or Fish Survey: call counts are used to estimate population trends

Tiger salamander

General information

The tiger salamander is a wide-ranging species occurring throughout the Great Plains and much of the eastern U.S. (it is absent from the Appalachian mountain regions). It is one of the largest terrestrial salamanders in North America with adults attaining more than one foot in length. Adults inhabit a wide array of vegetation types including bottomland deciduous forests, conifer forests, woodlands, fallow fields, grasslands, meadows, brushy areas, semideserts, and deserts. Free-standing water must be present for breeding. Adults are terrestrial, but make annual, spring migrations to ephemeral (temporary) ponds to breed. Ephemeral ponds contain water during only a portion of the year. The breeding season is short and eggs develop rapidly. Larvae are top predators in fishless ponds. They often grow quickly and can reach 4-6 inches in length before transforming in late summer.

Habitat requirements

Diet: adults eat worms, snails, insects, and slugs; larvae eat a wide variety of aquatic organisms, including invertebrates and other amphibian eggs and larvae

Water: ephemeral or semi-permanent ponds are necessary for reproduction; ponds should be fishless if successful reproduction is to occur

Cover: adult tiger salamanders live underground in burrows for most of the year; deep leaf litter and large amounts of downed woody debris are most desirable

Wildlife management practices

Control Nonnative Invasive Vegetation: when nonnative invasive vegetation begins to reduce habitat quality for tiger salamanders

Livestock Management: should prevent overgrazing where tiger salamander is a focal species; livestock should be excluded from ponds that may be used as breeding ponds for tiger salamanders; livestock watering facilities should be developed away from pond

Plant Native Grasses and Forbs: when converting fields that are currently in row-crop agriculture to tiger salamander habitat

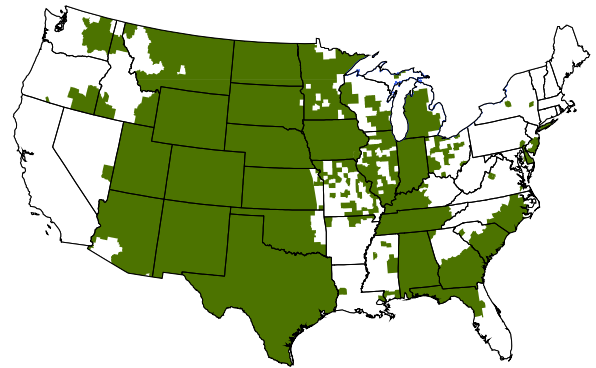
Plant Shrubs: when converting fields that are currently in row-crop agriculture to tiger salamander habitat, or in relatively large open areas that need additional cover

Plant Trees: where additional forest cover is needed

Water Control Structures: should be installed if not present in ponds or impoundments with levees that are managed for tiger salamanders to enable the pond to be drained, especially if fish are present



Gary M. Stolz



Water Developments for Wildlife: small, fishless ponds or impoundments may be created if additional breeding ponds are needed

Wildlife or Fish Survey: cover boards and pitfall traps along drift fences are used to estimate population trends

Fish

Bluegill

General information

The bluegill is one of the most abundant Sunfish species. It thrives in a variety of conditions, ranging from freshwater lakes, ponds, and slow moving streams, to brackish waters of coastal areas. The bluegill's native range is the eastern U.S. from southern Canada to Florida and Texas, but they have been successfully introduced throughout the U.S.

Habitat requirements

Diet: a variety of zooplankton (microscopic animal life) during the first few months of life, progressing to insects and their larvae, eggs, earthworms, tadpoles, small minnows, and crayfish

Water: basic requirements include dissolved oxygen (minimum of 4 parts per million); pH between 6.5 and 9.0; and water temperature should reach at least 70 F during summer (one foot below surface in the shade)

Cover: aquatic environments with submerged rocks, woody debris, and aquatic vegetation where small fish (prey) hide

Wildlife management practices

Livestock Management: livestock should either be excluded from fish ponds or only allowed access to a small part of the fish pond; livestock watering facilities should be developed away from the fish pond

Repair Spillway/Levee: if not functioning properly

Water Control Structures: should be installed if none are present so water depth can be controlled

Decrease Harvest: refer to **Wildlife Management Practices** on page 240 for specifics on fish harvest

Increase Harvest: refer to **Wildlife Management Practices** on page 241 for specifics on fish harvest

Wildlife or Fish Survey: fishing records, seining, and electro-shocking are used to survey bluegill populations

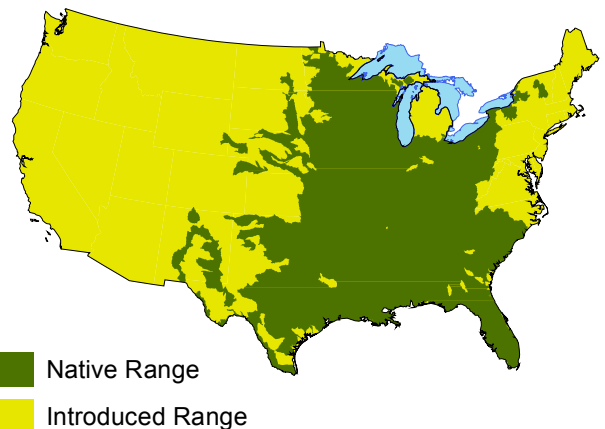
Construct Fish Pond: where no suitable water source is present or where an existing fish pond needs extensive repair, especially to the dike or dam

Control Aquatic Vegetation: when necessary to discourage undesirable aquatic vegetation

Fertilize/Lime Fish Pond: fertilize to promote phytoplankton growth when visibility is more than 18 inches below the water surface; add agricultural limestone to increase soil pH if total alkalinity is below 20 ppm



Eric Engbretson



Reduce Turbidity in Fish Pond: by reseeding watershed if soil is eroding into the pond and causing muddy water, by preventing livestock from entering pond, by eliminating bottom-feeding fish, or by reducing suspension of negatively charged clay particles

Restock Fish Pond: if the population is too far out of balance to correct via seining or fishing or if undesirable species are present

Largemouth bass

General information

Largemouth bass are not really bass but members of the Sunfish family. Largemouth bass are the most popular freshwater sportfish in states where they are found. They can be found in freshwater lakes, rivers, large streams, farm ponds, and brackish marshes. Their native range includes most of the eastern U.S., but largemouth bass have been stocked all over the country successfully.

Habitat requirements

Diet: young bass eat insects and other invertebrates (worms, crayfish, and zooplankton); adults eat small fish, such as bluegill, and a variety of minnows, as well as tadpoles, crayfish, and even ducklings

Cover: aquatic environments with submerged rocks, woody debris, and aquatic vegetation where small fish (prey) hide

Water: basic requirements include dissolved oxygen (minimum of 4 parts per million); pH should range between 6.5 and 9.0; water temperature should reach at least 70 F during summer (one foot below surface in shade)

Wildlife management practices

Livestock Management: livestock should either be excluded from fish ponds or only allowed access to a small part of the fish pond; livestock watering facilities should be developed away from the fish pond

Repair Spillway/Levee: if not functioning properly

Water Control Structures: should be installed if none are present so water depth can be controlled

Decrease Harvest: refer to **Wildlife Management Practices** on page 240 for specifics on fish harvest

Increase Harvest: refer to **Wildlife Management Practices** on page 241 for specifics on fish harvest

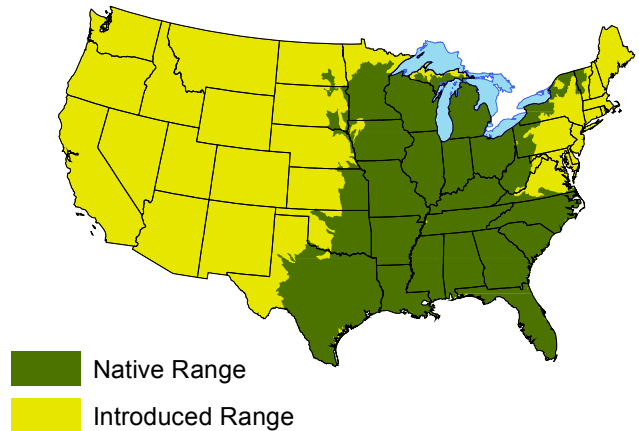
Wildlife or Fish Survey: fishing records, seining, and electro-shocking are used to survey largemouth bass populations

Construct Fish Pond: where no suitable water source is present or where an existing fish pond needs extensive repair, especially to the dike or dam

Control Aquatic Vegetation: when necessary to discourage undesirable aquatic vegetation

Fertilize/Lime Fish Pond: fertilize to promote phytoplankton growth when visibility is more than 18 inches below the water surface; add agricultural limestone to increase soil pH if total alkalinity is below 20 ppm

Reduce Turbidity in Fish Pond: by reseeding watershed if soil is eroding into the pond and causing muddy water, by preventing livestock from entering pond, by eliminating bottom-feeding fish, or by reducing suspension of negatively charged clay particles



Restock Fish Pond: if the population is too far out of balance to correct via seining or fishing or if undesirable species are present