Essential Physical and Biological Features of Critical Habitat - USFWS Region 3

Background

Critical habitat includes the specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection. When U.S. Fish and Wildlife Service (Service) proposes and then designates critical habitat for a species in the Federal Register it describes the location and boundaries of the critical habitat and its essential physical and biological features (PBF). PBFs may include:

- space for individual and population growth and for normal behavior;
- cover or shelter;
- food, water, air, light, minerals, or other nutritional or physiological requirements;
- sites for breeding and rearing offspring; and
- habitats that are protected from disturbances or are representative of the historical geographical and ecological distributions of a species.

PBFs and Section 7

Under section 7(a)(2) of the Endangered Species Act, federal agencies must ensure that their actions do not destroy or adversely modify critical habitat. PBFs provide a basis on which agencies and the Service may evaluate how actions are likely to affect critical habitat.

Physical and Biological Features vs. Primary Constituent Elements

Older critical habitat rules used the term *primary constituent elements* (PCEs) or just *constituent elements* instead of *physical and biological features.* For section 7 purposes these terms are applied identically. Some old critical habitat rules do not describe either PBFs or PCEs. In those cases, the Service will have to articulate PBFs to provide a basis for section 7 analyses.

PBFs for Critical Habitat in USFWS Region 3

To facilitate access to the PBFs for critical habitat that the Service has proposed or designated in USFWS Region 3, we have excerpted them from the relevant rules below. PBFs for these and other species may also be found in the Code of Federal Regulations, Title 50, §17.95 (fish and wildlife), §17.96 (plants), 17.97 – (15 vernal pool species in California and southern Oregon); and §17.99 (plants on the Hawaiian Islands). For most of the critical habitat designations below, we also provide the most recent Federal Register reference. The Federal Register publications typically provide extensive details about each rule, in addition to the rule itself. Federal Register publications for old designations – e.g., Indiana bat – do not contain much information in addition to the rule itself.

Canada lynx (Lynx canadensis)

Federal Register Vol. 79, pp. 54782- 54846, September 12, 2014

The primary constituent element for the Canada lynx is boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:

(i) Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface;

(ii) Winter conditions that provide and maintain deep fluffy snow for extended periods of time;

(iii) Sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and

(iv) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

Dakota Skipper (Hesperia dacotae)

Federal Register Vol. 80, pp. 59248-59384, October 1, 2015

(1) Primary Constituent Element 1—Wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs on near-shore glacial lake soil deposits or high-quality dry-mesic remnant untilled prairie on rolling terrain consisting of gravelly glacial moraine soil deposits, containing:

   a. A predominance of native grasses and native flowering forbs,
   b. Glacial soils that provide the soil surface or near surface (between soil surface and 2 cm depth) micro-climate conditions conducive to Dakota skipper larval survival and native prairie vegetation,
   c. If present, trees or large shrub cover of less than 5 percent of area in dry prairies and less than 25 percent in wet mesic prairies; and
   d. If present, nonnative invasive plant species occurring in less than 5 percent of area.

(2) Primary Constituent Element 2—Native grasses and native flowering forbs for larval and adult food and shelter, specifically:

   a. At least one of the following native grasses to provide larval food and shelter sources during Dakota skipper larval stages: Prairie dropseed *(Sporobolus heterolepis)* or little bluestem *(Schizachyrium scoparium);* and
   b. One or more of the following forbs in bloom to provide nectar and water sources during the Dakota skipper flight period: Purple coneflower *(Echinacea angustifolia),* bluebell bellflower*(Campanula rotundifolia),* white prairie clover (*Dalea candida),* upright prairie coneflower *(Ratibida columnifera),* fleabane *(Erigeron* spp.), blanket flower *(Gaillardia* spp.), black-eyed Susan*(Rudbeckia hirta),* yellow sun drops *(Calylophus serrulatus),* prairie milkvetch *(Astragalus adsurgens),* or common gaillardia *(Gaillardia aristata)*.

(3) Primary Constituent Element 3—Dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality remnant prairie (as defined in Primary Constituent Element 1) that connects high-quality wet- mesic to dry tallgrass prairies or moist meadow habitats. Dispersal grassland habitat consists of undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

Gray wolf (Canis lupus) – Minnesota Only

Federal Register Vol. 43, pp. 9607-9615, March 9, 1978

In this critical habitat rule, the Service did not describe PBFs. If you are assessing an action that may affect gray wolf critical habitat, work with the Minnesota-Wisconsin Ecological Services field office to identify PBFs to facilitate the analysis.

Hines emerald dragonfly (Somatochlora hineana)

Federal Register Vol. 75, pp. 21394-21453, April 23, 2010

The primary constituent elements of critical habitat for the Hine's emerald dragonfly are:

(1) For egg deposition and larval growth and development:
    a. Organic soils (histosols, or with organic surface horizon) overlying calcareous substrate (predominantly dolomite and limestone bedrock);
    b. Calcareous water from intermittent seeps and springs and associated shallow, small, slow-flowing streamlet channels, rivulets, and/or sheet flow within fens;
    c. Emergent herbaceous and woody vegetation for emergence facilitation and refugia;
    d. Occupied burrows maintained by crayfish for refugia; and
    e. Prey base of aquatic macroinvertebrates, including mayflies, aquatic isopods, caddisflies, midge larvae, and aquatic worms.
(2) For adult foraging, reproduction, dispersal, and refugia necessary for roosting, for resting, for adult females to escape from male harassment, and for predator avoidance (especially during the vulnerable teneral stage):
(3) Natural plant communities near the breeding/larval habitat which may include fen, marsh, sedge meadow, dolomite prairie, and the fringe (up to 328 ft (100 m)) of bordering shrubby and forested areas with open corridors for movement and dispersal; and
(4) Prey base of small, flying insect species (e.g., dipterans).

Indiana bat (Myotis sodalis)

In this critical habitat rule, the Service did not describe PBFs. If you are assessing an action that may affect Indiana bat critical habitat, work with the Ecological Services field office for the affected area to identify PBFs to facilitate the analysis.

Neosho Mucket (Lampsilis rafinesqueana)

Primary constituent elements of the physical or biological features essential to the conservation of the Neosho mucket consist of five components:

(i) Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).

(ii) A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

(iii) Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.

(iv) The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the Neosho mucket.

Suitable fish hosts for Neosho mucket glochidia include smallmouth bass (***Micropterus dolomieu***), largemouth bass (*Micropterus salmoides*), and spotted bass (*Micropterus punctulatus*).

(v) Competitive or predaceous invasive (nonnative) species in quantities low enough to have minimal effect on survival of freshwater mussels.

Niangua Darter (Etheostoma nianguae)

Constituent elements (emphasis added), for all areas designated as critical habitat, consist of medium-sized creeks with silt-free pools and riffles and moderately clear water draining hilly areas underlain by chert and dolomite. Water ranges from 8 to 46 inches in depth over gravel with scattered rubble.

Piping Plover (Charadrius melodus), Great Lakes Breeding Population

i. The primary constituent elements required to sustain the Great Lakes breeding population of the piping plover are found on Great Lakes islands and mainland shorelines that support open, sparsely vegetated sandy habitats, such as sand spits or sand beaches, that are associated with wide, unforested systems of dunes and inter-dune wetlands. In order for habitat to be physically and biologically suitable for piping plovers, it must have a total shoreline length of at least 0.2 km (0.12 mi) of gently sloping, sparsely vegetated (less than 50 percent herbaceous and low woody cover) sand beach with a total beach area of at least 2 hectares (ha) (5 acres (ac)) and a low level of disturbance from human activities and from domestic animals. As the nesting season progresses, the level of disturbance tolerated by piping plovers increases. A lower level of disturbance is required at the beginning of the nesting period during nest site selection, egg laying, and incubation. Beach activities that may be associated with a high level of disturbance include, but are not limited to, walking pets off leash, loud noise, driving ATVs, or significantly increased human presence. The level of disturbance is relative to the proximity to the nest, intensity, and frequency of these and other similar activities.

ii. Appropriately sized sites must also have areas of at least 50 meters (m) (164 feet (ft)) in length where the beach width is more than 7 m (23 ft), there is protective cover for nests and chicks, and the distance to the treeline (from the normal high water line to where the forest begins) is more than 50 m (164 ft). Beach width is defined as the distance from the normal high water line to the foredune (a low barrier dune ridge immediately inland from the beach) edge, or to the sand/vegetation boundary in areas where the foredune is absent. The beach width may be narrower than 7 m (23 ft) if appropriate sand and cobble areas of at least 7 m (23 ft) exist between the dune and the treeline. Protective cover for nests and chicks consists of small patches of herbaceous vegetation, cobble (stones larger than 1 cm (0.4 inches (in)) diameter), gravel (stones smaller than 1 cm (0.4 in) diameter), or debris such as driftwood, wrack, root masses, or dead shrubs.

iii. The dynamic ecological processes that create and maintain piping plover habitat are also important primary constituent elements. These geologically dynamic lakeside regions are controlled by processes of erosion, accretion, plant succession, and lake-level fluctuations. The integrity of the habitat components depends upon regular sediment transport processes, as well as episodic, high-magnitude storm events. By their nature, Great Lakes shorelines are in a constant state of change; habitat features may disappear, or be created nearby. The critical habitat boundaries reflect these natural processes and the dynamic character of Great Lakes shorelines.

Piping Plover (Charadrius melodus), Northern Great Plains Breeding Population

The one overriding primary constituent element (biological) required to sustain the northern Great Plains breeding population of piping plovers that must be present at all sites is the dynamic ecological processes that create and maintain piping plover habitat. Without this biological process the physical component of the primary constituent elements would not be able to develop. These processes develop a mosaic of habitats on the landscape that provide the essential combination of prey, forage, nesting, brooding and chick-rearing areas. The annual, seasonal, daily, and even hourly availability of the habitat patches is dependent on local weather, hydrological conditions and cycles, and geological processes. The biological primary constituent element, i.e., dynamic ecological processes, creates different physical primary constituent elements on the landscape. These physical primary constituent elements exist on different habitat types found in the northern Great Plains, including mixosaline to hypersaline wetlands (Cowardin et al. 1979), rivers, reservoirs, and inland lakes. These habitat types or physical primary constituent elements that sustain the northern Great Plains breeding population of piping plovers are described as follows:

i. On prairie alkali lakes and wetlands, the physical primary constituent elements include -

> **(1)** shallow, seasonally to permanently flooded, mixosaline to hypersaline wetlands with sandy to gravelly, sparsely vegetated beaches, salt-encrusted mud flats, and/or gravelly salt flats; (2) springs and fens along edges of alkali lakes and wetlands; and (3) adjacent uplands 200 ft (61 m) above the high water mark of the alkali lake or wetland.

ii. On rivers the physical primary constituent elements include - sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river.

iii. On reservoirs the physical primary constituent elements include - sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water bodies.

iv. On inland lakes (Lake of the Woods) the physical primary constituent elements include - sparsely vegetated and windswept sandy to gravelly islands, beaches, and peninsulas, and their interface with the water body.

Poweshiek Skipperling (Oarisma poweshiek)

(1) Primary Constituent Element 1—Wet-mesic to dry tallgrass remnant untilled prairies or remnant moist meadows containing:

> a. A predominance of native grasses and native flowering forbs;
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> b. Undisturbed (untilled) glacial soil types including, but not limited to, loam, sandy loam, loamy sand, gravel, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek skipperling larval survival and native prairie vegetation;
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> c. If present, depression wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fired.
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> d. If present, trees or large shrub coverless than 5 percent of area in dry prairies and less than 25 percent in wet mesic prairies and prairie fens; and,
>
> e. If present, nonnative invasive plant species occurring in less than 5 percent of the area.

(2) Primary Constituent Element 2—Prairie fen habitats containing:

> a. A predominance of native grasses and native flowering forbs;

b. Undisturbed (untilled) glacial soil types including, but not limited to, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek skipperling larval survival and native prairie vegetation;

c. Depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fired;

d. Hydraulic features necessary to maintain prairie fen groundwater flow and prairie fen plant communities;

e. If present, trees or large shrub coverless than 25 percent of the unit; and,

f. If present, nonnative invasive plant species occurring in less than 5 percent of area.

(3) Primary Constituent Element 3—Native grasses and native flowering forbs for larval and adult food and shelter, specifically:

a. At least one of the following native grasses available to provide larval food and shelter sources during Poweshiek skipperling larval stages: Prairie dropseed *(Sporobolus heterolepis),* little bluestem *(Schizachyrium scoparium),* sideoats grama *(Bouteloua curtipendula),* or mat muhly *(Muhlenbergia richardsonis);* and,

b. At least one of the following forbs in bloom to provide nectar and water sources during the Poweshiek skipperling flight period: Purple coneflower *(Echinacea angustifolia),* black-eyed Susan *(Rudbeckia hirta),* smooth ox-eye *(Heliopsis helianthoides),* stiff tickseed *(Coreopsis palmata),* palespike lobelia *(Lobelia spicata),* sticky tofieldia *(Triantha glutinosa),* or shrubby cinquefoil *(Dasiphora fruticosa ssp. floribunda).*

(4) Primary Constituent Element 4—Dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality remnant prairie (as defined in Primary Constituent Element 1) that connects high quality wet-mesic to dry tallgrass prairies, moist meadows, or prairie fen habitats. Dispersal grassland habitat consists of the following physical characteristics appropriate for supporting Poweshiek skipperling dispersal: Undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

Rabbitsfoot (Theliderma cylindrica)

Primary Constituent Element 1— Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as, stable riffles, sometimes with runs, and mid–channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).

Primary Constituent Element 2— A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

Primary Constituent Element 3— Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.

Primary Constituent Element 4— The presence and abundance (currently unknown) of fish hosts necessary for recruitment of the rabbitsfoot. The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek will serve as an indication of appropriate presence and abundance of fish hosts until appropriate host fish can be identified.

Primary Constituent Element 5— Either no competitive or predaceous invasive (nonnative) species, or such species in quantities low enough to have minimal effect on survival of freshwater mussels.

Short's Bladderpod (Physaria globosa)

The primary constituent elements of the physical or biological features essential to the conservation of Short's bladderpod consist of three components:

(i) Bedrock formations and outcrops of calcareous limestone, sometimes with interbedded shale or siltstone, in close proximity to the mainstem or tributaries of the Kentucky and Cumberland rivers. These outcrop sites or areas of suitable bedrock geology should be located on steeply sloped hillsides or bluffs, typically on south- to west-facing aspects.

(ii) Shallow or rocky, well-drained soils formed from the weathering of underlying calcareous bedrock formations, which are undisturbed or subjected to minimal disturbance, so as to retain habitat for ground-nesting pollinators and potential for maintenance of a soil seed bank.

(iii) Forest communities with low levels of canopy closure or openings in the canopy to provide adequate sunlight for individual and population growth. Invasive, nonnative plants must be absent or present in sufficiently low numbers not to inhibit growth or reproduction of Short's bladderpod.

Topeka shiner (Notropis topeka)

The primary constituent elements include, but are not limited to, those habitat components that are essential for the primary biological needs of foraging, sheltering, and reproduction. These elements include the following for Topeka shiner—(1) Streams most often with permanent flow, but that can become intermittent during dry periods; (2) Side channel pools and oxbows either seasonally connected to a stream or maintained by groundwater inputs, at a surface elevation equal to or lower than the bankfull discharge stream elevation. The bankfull discharge is the flow at which water begins leaving the channel and flowing into the floodplain; this level is generally attained every 1 to 2 years. Bankfull discharge, while a function of the size of the stream, is a fairly constant feature related to the formation, maintenance, and dimensions of the stream channel; (3) Streams and side channel pools with water quality necessary for unimpaired behavior, growth, and viability of all life stages. (The water quality components include—temperature, turbidity, conductivity, salinity, dissolved oxygen, pH, chemical contaminants, and other chemical characteristics); (4) Living and spawning areas for adult Topeka shiner with pools or runs with water velocities less than 0.5 meters/second (approx. 20 inches/second) and depths ranging from 0.1-2.0 meters (approx. 4-80 inches); (5) Living areas for juvenile Topeka shiner with water velocities less than 0.5 meters/second (approx. 20 inches/second) with depths less than 0.25 meters (approx. 10 inches) and moderate amounts of instream aquatic cover, such as woody debris, overhanging terrestrial vegetation, and aquatic plants; (6) Sand, gravel, cobble, and silt substrates with amounts of fine sediment and substrate embeddedness that allows for nest building and maintenance of

nests and eggs by native Lepomis sunfishes (green sunfish, orangespotted sunfish, longear sunfish) and Topeka shiner as necessary for reproduction, unimpaired behavior, growth, and viability of all life stages; (7) An adequate terrestrial, semiaquatic, and aquatic invertebrate food base that allows for unimpaired growth, reproduction, and survival of all life stages; (8) A hydrologic regime capable of forming, maintaining, or restoring the flow periodicity, channel morphology, fish community composition, off-channel habitats, and habitat components described in the other primary constituent elements; and (9) Few or no nonnative predatory or competitive nonnative species present.

Tumbling Creek Cavesnail (Antrobia culveri)

The primary constituent elements of critical habitat for the Tumbling Creek cavesnail are:

(i) Geomorphically stable stream bottoms and banks (stable horizontal dimension and vertical profile) in order to maintain bottom features (riffles, runs, and pools) and transition zones between bottom features; to continue appropriate habitat to maintain essential riffles, runs, and pools; to promote connectivity between Tumbling Creek and its tributaries and associated springs; and to maintain gene flow throughout the population;

(ii) Instream flow regime with an average daily discharge between 0.07 and 150 cubic feet per second (cfs), inclusive of both surface runoff and groundwater sources (springs and seepages);

(iii) Water quality with temperature between 55-62 °F (12.78-16.67°C), dissolved oxygen 4.5 milligrams or greater per liter, and turbidity of an average monthly reading of no more than 200 Nephelometric Turbidity Units (NTU; units used to measure sediment discharge) for a duration not to exceed 4 hours;

(iv) Bottom substrates consisting of fine gravel with coarse gravel or cobble, or bedrock with sand and gravel, with low amounts of fine sand and sediments within the interstitial spaces of the substrates; and

(v) Energy input from guano that originates mainly from gray bats that roost in the cave; guano is essential in the development of biofilm (the organic coating and bacterial layer that covers rocks in the cave stream) that cavesnails use for food.