

information available to these planning efforts calls for a different outcome.

Methods Used To Identify Proposed Critical Habitat for 11 Mussel Species

As required by section 4(b)(2) of the Act and implementing regulations (50 CFR 424.12), we used the best scientific and commercial information available to determine critical habitat areas that contain the physical and biological features that are essential for the conservation of the Coosa moccasinshell, southern clubshell, dark pigtoe, southern pigtoe, ovate clubshell, triangular kidneyshell, southern acornshell, upland combshell, fine-lined pocketbook, orange-nacre mucket, and Alabama moccasinshell. We reviewed the available information pertaining to the historic and current distributions, life histories, host fishes, and habitats of, and threats to these species. The information used in the preparation of this proposed designation includes: Our own site-specific species and habitat information; unpublished survey reports, notes, and communications with other qualified biologists or experts; peer reviewed scientific publications; the final listing rule for 11 mussels in the Mobile River Basin (58 FR 14330); and the Mobile River Basin Aquatic Ecosystem Recovery Plan (U.S. Fish and Wildlife Service, 2000). In determining the areas that are essential to the conservation of the 11 mussels we considered all streams currently or historically known to be occupied by one or more of the species (see "Taxonomy, Life History, and Distribution" above). It is likely that other occupied stream or stream segments exist that may be essential to the survival and conservation of these mussels, but we do not currently know where these are, and therefore cannot include them in this proposed critical habitat designation.

Primary Constituent Elements

In accordance with sections 3(5)(A)(i) and 4(b)(1)(A) of the Act and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, we are required to base critical habitat determinations on the best scientific data available and to focus on those physical and biological features (primary constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection. Such requirements include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or

shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species.

Based on the best available information, primary constituent elements essential for the conservation of these 11 mussel species include the following:

1. Geomorphically stable stream and river channels and banks;
2. A flow regime (*i.e.*, the magnitude, frequency, duration, and seasonality of discharge over time) necessary for normal behavior, growth, and survival of all life stages of mussels and their fish hosts in the river environment;
3. Water quality, including temperature, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
4. Sand, gravel, and/or cobble substrates with low to moderate amounts of fine sediment, low amounts of attached filamentous algae, and other physical and chemical characteristics necessary for normal behavior, growth, and viability of all life stages;
5. Fish hosts with adequate living, foraging, and spawning areas for them; and,
6. Few or no competitive nonnative species present.

In considering and identifying primary constituent elements, we have taken into account the dynamic nature of riverine systems. We recognize that riparian areas and floodplains are integral parts of the stream ecosystem, important in maintaining channel geomorphology, and providing nutrient input, and buffering from sediments and pollution; and that side channel and backwater habitats may be important in the life cycle of fish that serve as hosts for mussel larvae.

Analysis Used To Delineate Critical Habitat

Currently, the greatest general threat to the survival and recovery of these 11 Mobile River Basin mussel species is the small size, extent, and isolation of their remaining populations. With the exception of the dark pigtoe, which is believed to be naturally restricted to streams and rivers in the Black Warrior drainage, these mussel species were once widespread in the Basin, found in a continuum of small streams to large rivers in 2 or more major drainages. As discussed under the "Summary of Decline and Threats to Surviving Populations," and the Mobile River Basin Aquatic Ecosystem Recovery Plan

(U.S. Fish and Wildlife Service 2000), 30 major dams were constructed in the Basin during the 20th century. These dams and their impounded waters present physical barriers to the natural dispersal of mussels (they prevent emigration (dispersal) of host fishes), and effectively isolate surviving mussel populations in limited portions of the Basin's major drainages. Small isolated aquatic populations are subject to natural random events (droughts, floods), and to changes in human activities and land use practices (urbanization, industrialization, mining, certain agricultural activities and practices, etc.), that may severely impact aquatic habitats (Neves *et al.* 1997). Without avenues of emigration to less affected watersheds, mussel populations gradually disappear where land use activities result in deterioration of aquatic habitats. Local random events, and changes in human activities within the Basin's unimpounded watersheds are believed to have caused or contributed to the disappearance of mollusks from significant portions of isolated stream habitats, resulting in the extinction of as many as 13 mussels, as well as a number of freshwater snail species (U.S. Fish and Wildlife Service 2000).

Most of the 11 mussel species considered in this proposed designation are currently represented by one or more small, restricted, and isolated populations. These surviving populations have been isolated from one another by dams and impounded reaches for 20 to 50 years, and remain vulnerable to the progressive degradation of their habitats from land surface runoff or random natural events such as droughts. In many of these surviving populations, there is also evidence of local population decline during the same time period (*e.g.*, Evans 2001, Hartfield and Jones 1990, Williams and Hughes, 1998, McGregor *et al.* 2000).

The Mobile River Basin Aquatic Ecosystem Recovery Plan (U.S. Fish and Wildlife Service 2000), recognized the complexity of conserving the Basin's imperiled species, and considered that downlisting or delisting these 11 mussels was unlikely in the foreseeable future because of the extent of their decline, the fragmentation and isolation of their habitats, and continuing impacts upon their habitats. Compounding these problems is a lack of information on specific habitat and life history requirements of these species, or on the physical threats that confront them (*e.g.*, sediment, nutrient, and other pollutant sensitivities, etc.). Threats compounded by habitat fragmentation and isolation