Dated: August 26, 2008.

Michael K. Buckley,

Deputy Assistant Administrator for Mitigation, Department of Homeland Security, Federal Emergency Management Agency.

[FR Doc. E8–20823 Filed 9–8–08; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R6–ES–2008–0023; 1111 FY07 MO–B2]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Bonneville Cutthroat Trout as Threatened or Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of a 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce our 12-month finding on a petition to list the Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) as a threatened subspecies throughout its range in the United States, pursuant to the Endangered Species Act of 1973, as amended (Act). After a thorough review of all available scientific and commercial information, we find that listing the Bonneville cutthroat trout as either threatened or endangered is not warranted at this time. We ask the public to continue to submit to us any new information that becomes available concerning the status of or threats to the subspecies. This information will help us to monitor and encourage the conservation of the subspecies.

DATES: The finding in this document was made on September 9, 2008.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov.* Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Utah Ecological Services Office, 2369 West Orton Circle, Suite 50, West Valley City, Utah 84119; telephone (801) 975–3330. Please submit any new information, materials, comments, or questions concerning this finding to the above address or via electronic mail (e-mail) at *paul_abate@fws.gov*.

FOR FURTHER INFORMATION CONTACT: Larry Crist, Field Supervisor, U.S. Fish and Wildlife Service, Utah Ecological Services Office (see **ADDRESSES** section). If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the List of Endangered and Threatened Species that contains substantial scientific and commercial information that listing may be warranted, we make a finding within 12 months of the date of receipt of the petition on whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are threatened or endangered, and expeditious progress is being made to add or remove qualified species from the List of Endangered and Threatened Species. Section 4(b)(3)(C) of the Act requires that a petition for which the requested action is found to be warranted but precluded be treated as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. Such 12-month findings must be published in the **Federal Register**.

Previous Federal Actions

On February 26, 1998, we received a petition, dated February 5, 1998, from the Biodiversity Legal Foundation requesting that the Service list the Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) (BCT) as threatened in U.S. river and lake ecosystems where it continues to exist, and to designate its occupied habitat as critical habitat within a reasonable period of time following the listing. On December 8, 1998, we published a 90-day petition finding for the BCT in the **Federal Register** (63 FR 67640). We found that the petition presented substantial information indicating that the subspecies may be warranted for listing under the Act, and initiated a review of the subspecies' status within its historic range.

In the 1998 90-day finding, we solicited additional data, comments, and suggestions from the public, other governmental agencies, the scientific community, industry, and other interested parties concerning the status of the BCT throughout its range. The comment period for submission of additional information ended on January 7, 1999, but was reopened (64 FR 2167) during January 13 through February 12, 1999. We published a 12-month finding in the **Federal Register** on October 9, 2001 (66 FR 51362), and documented that the BCT was not warranted for listing under the Act because it was neither endangered nor likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

On February 17, 2005, we were sued by the Center for Biological Diversity, and others, on the merits of the 12-month finding. On March 7, 2007, the District Court of Colorado dismissed the lawsuit after determining that Plaintiffs failed to demonstrate the not warranted finding was arbitrary, capricious, or contrary to law. The Plaintiffs appealed to the 10th Circuit Court of Appeals on May 4, 2007.

On March 16, 2007, in the interim between the lawsuit dismissal and appeal, the Solicitor of the Department of the Interior issued a formal opinion regarding the legal interpretation of the term ''significant portion of the range'' of a species (DOI 2007). The opinion provides guidance on analysis intended to determine whether a species is in danger of extinction throughout a significant portion of its range when it is not in danger of extinction throughout its entire current range. Because this opinion was pertinent to the BCT decision, we withdrew the 2001 12-month finding for BCT (USFWS 2007, entire), and initiated a new status review to include significant portion of the range analysis. We published a notice in the **Federal Register** (73 FR 7236) announcing the opening of a comment period from February 7 through April 7, 2008. The notice specified that the new status review would include consideration and analysis of all information previously submitted, and any new information provided regarding the status of the BCT.

Species Biology

The BCT is native to the Bonneville basin, and is 1 of 14 subspecies of cutthroat trout recognized by Behnke (1992, pp. 3–21, 132–138) that are native to interior regions of western North America. BCT generally have large, evenly distributed spots, but a high degree of intra-basin variation exists. BCT tend to develop large, pronounced spots that are evenly distributed on the sides of the body rather than concentrated posteriorly as in the Yellowstone cutthroat trout (*Oncorhynchus clarkii bouveri*) subspecies. Coloration in BCT is generally dull compared to other cutthroat subspecies; however, coloration can vary depending on environmental conditions and local genetic composition (Behnke 1992, pp. 132–138).

Vertebrae typically number 62–63, slightly higher than in other subspecies. Scales in lateral series average 150–170. BCT average between 16–21 gill rakers, with a mean of 18–19, except the Snake Valley type, which have 18–24 (mean, 20–22). Another important characteristic of all cutthroat subspecies is the presence of basibranchial teeth, which are absent in rainbow trout (Behnke 1992, p. 132). Numbers of basibranchial teeth provide information about subspecies derivation and relatedness. The Snake Valley type have profuse basibranchial teeth, averaging 20–28, while most other BCT average 5–10 (Behnke 1992, p. 132).

Life strategies exhibited by BCT include stream resident (occupy home ranges entirely within relatively short reaches of streams), fluvial (migrate as adults from larger streams or rivers to smaller streams to reproduce), adfluvial (migrate, sometimes many kilometers, as mature adults from lakes to inlet or outlet streams to spawn), and lacustrine (lake) forms. The life strategy that a particular BCT population exhibits likely depends on a combination of environmental conditions and genetic plasticity of inherited traits. Very little information is available to suggest the extent of plasticity and what environmental characteristics may cue a successful shift in life strategy. Most information is based on the success or failure of transplants of various life forms among different aquatic ecosystems. Furthermore, evidence suggests that BCT populations within a single stream can comprise multiple life history strategies (resident, fluvial, adfluvial), and that individuals may use mainstem rivers to move between and among drainages where they are not fragmented by water diversions or barriers (Kershner *et al.* 1997, entire).

May *et al.* (1978, p. 19) found that male BCT sexually matured at age 2 while females matured at 3 years of age. However, Bear Lake BCT were reported to mature much later, with adults normally beginning to mature at 5 years of age but not spawning until age 10 (Neilson and Lentsch 1988, p. 131). Both the age at maturity and the annual timing of spawning vary geographically with elevation, temperature, and life history strategy (Behnke 1992, p. 136; Kershner 1995, pp. 28–30). Lake resident trout may begin spawning at 2 years and usually continue throughout their lives, while adfluvial individuals may not spawn for several years (Kershner 1995, pp. 28–30). Annual spawning of BCT usually occurs during the spring and early summer at higher elevations at temperatures ranging from 4–10 °C (May *et al.* 1978, p. 19). May *et al.* (1978, p. 19) reported BCT spawning in Birch Creek, Utah, beginning in May and continuing into June. BCT in Bear Lake began spawning in late April and completed spawning in June (Nielson and Lentsch 1988, p. 131). The wild broodstock at Manning Meadow Reservoir (9,500 feet elevation) spawn from late June to early July (Hepworth and Ottenbacher 1997, p. 1). In Lake Alice, Wyoming, fish were predicted to spawn from late May until mid-June (Binns 1981, p. 47).

Fecundity of cutthroat is typically 1,200–3,200 eggs per kilogram (kg) (2.2 pounds (lbs)) of body weight (Behnke 1992, p. 33). In Birch Creek, a 147 millimeters (mm) (5.8 inches (in)) BCT female produced 99 eggs, a 158 mm (5.8 in) female produced 60 eggs and a 176 mm (6.9 in) female produced 176 eggs (May *et al.* 1978, p. 19). Whereas in Raymond Creek, Wyoming, 3 females ranging from 124 to 246 mm (4.9 to 9.7 in) averaged 165 eggs (Binns 1981, p. 48). Evidence suggests fecundity of lake-dwelling BCT is greater. Fecundity of females in Lake Alice averaged 474 eggs/female (Binns 1981, p. 48), while females in Manning Meadow, Utah, averaged 994 eggs/female (D. Hepworth, Utah Division of Wildlife Resources, unpubl. data). Incubation times for wild BCT have not been verified, but Platts (1957, p. 10) suggested eggs hatch and fry begin to emerge approximately 45 days after spawning, depending on temperature.

Larvae typically emerge in mid-to-late summer, depending on spawning times. Once emerged, larvae or fry, as they are commonly called, are poor swimmers and typically migrate to stream margins. Adfluvial BCT spend 1 or 2 years in streams before migrating to the Lake (Nielson and Lentsch 1988, p. 131).

Growth of resident BCT is highly dependent on stream productivity. In general, growth of trout tends to be slower in high-elevation headwater drainages than in lacustrine environments, but this likely depends on temperatures and food base. In Birch Creek, Utah, age 1 fish averaged 84 mm (3.3 in), age 2 fish averaged 119 mm (4.7 in), age 3 fish averaged 158 mm (6.2 in), and age 4 fish averaged 197 mm (7.8 in) in length (May *et al.* 1978, p. 17). Growth in two Wyoming streams was faster, and age 4 fish averaged 282 to 320 mm (11.1 to 12.6 in) in length (Binns 1981, p. 44). In contrast, BCT in Bear Lake grow to an average size of 560 mm (22.0 in) and 2 kg (4.4 lbs) (Nielson and Lentsch 1988, p. 131). Historic accounts of BCT in Utah Lake suggest fish may have reached a meter in length (Notes from Yarrow and Henshaw in 1872 as described by Tanner 1936). Platts (1957, p. 10) reported that some BCT taken from Utah Lake a century ago attained weights of over 11.3 kg (25 lbs).

Little is known about feeding habits of BCT. In general, BCT trout are insectivorous, especially in stream habitats. Both terrestrial and aquatic insects appear to be important to their diet (May *et al.* 1978, pp. 7–10; Binns 1981, p. 48). In Birch Creek, May *et al.* (1978, pp. 9–10) reported BCT diets were diverse in summer, while in the fall in Trout Creek, Utah, their diet consisted primarily of terrestrial insects. Dipterans and debris were the dominant food items for immature trout, while terrestrial insects were the dominant prey for mature individuals. BCT may display more plasticity in feeding habits depending on the system or specific population characteristics. Little information has been collected on BCT to understand the extent of feeding shifts of BCT. Platts (1957, p. 4) suggested that cutthroat do not need to feed on fish to attain large sizes but will do so where insects are not abundant.

Interactions With Nonnative Fish

BCT may or may not persist when nonnative trout are stocked into BCT waters. The actual mechanism that dictates the survivorship of BCT in the presence of nonnatives is unknown, but the recent discovery that numerous BCT populations have persisted for decades in the presence of rainbow trout (*Oncorhynchus mykiss*), Yellowstone cutthroat trout, and other nonnatives suggests BCT is not always displaced by nonnatives as previously thought. However, BCT can hybridize with rainbow trout and Yellowstone cutthroats in some situations and be displaced by the superior competitor, brook trout (*Salvelinus fontinalis*). The degree of hybridization appears to vary with the persistence of the stocked fish and also with habitat conditions as does the level of competition with brook trout.

Benhke (1992, p. 107) reported that BCT native to the Bear River drainage adapted to the harsh and fluctuating environments of desert basin streams, remaining the dominant trout today in many streams where nonnative trout were introduced. This seems to be a fairly unique trait of BCT compared to other cutthroat subspecies. There is still no specific rationale as to why BCT would persist better than other desert cutthroat subspecies, yet something in its unique genetic composition seems to allow BCT to persist where other cutthroat subspecies have been found to be displaced.

For example, Bear Lake BCT, probably due to the unique environmental conditions in which they developed, have resisted hybridization with and replacement by nonnative trout. Yellowstone cutthroat trout, Yellowstone cutthroat rainbow trout hybrids, and rainbow trout were consistently stocked into Bear Lake for decades. Benhke (1992, p.137) examined specimens from Bear Lake and compared these to museum specimens from the lake and with cutthroat trout from the Bear River drainage and found no evidence of hybridization among their taxonomic characters. Nielson and Lentsch (1988, p.130) similarly reported that, after examining the DNA of 52 Bear Lake specimens, no rainbow trout alleles were observed in any fish.

Since the early 1990's, many additional remnant BCT populations have been found in streams that had been stocked with rainbow trout or Yellowstone cutthroat trout (Utah Division of Wildlife Resources, unpublished data). These BCT populations were assumed to be lost through hybridization until recent surveys found BCT present. Results of these surveys suggest BCT have retained much of their natural genetic integrity despite intensive nonnative stocking efforts.

Introduced brook trout have been stocked, legally and illegally, into some BCT waters. BCT do not hybridize with brook trout, but brook trout are thought to acquire resources better and reproduce and recruit more efficiently than BCT. The specific mechanism of how brook trout displace BCT is unknown, but greater fecundity, earlier maturity, and tolerance of higher densities gives brook trout an advantage over the native BCT (Griffith 1988, p. 105; Fausch 1989, pp. 307–312). The extent of threat to BCT from brook trout varies depending on environmental conditions of the stream. Although not considered the greatest threat to the persistence of BCT, competition from introduced brook trout can and has displaced native BCT populations.

Habitat Requirements

Trout, regardless of their evolutionary history, require 4 types of habitat during various stages of their life history: spawning habitat, nursery or rearing habitat, adult habitat, and overwintering habitat. Spawning gravels are required for spawning success and can be a limiting factor in high-gradient streams where the current carries off suitable spawning gravel (Behnke 1992, p. 25). Conversely, an even greater concern may be accumulation of fine sediments into interstitial spaces of spawning gravels, which prevents egg incubation and reduces larval survival. Such fines can become dominant in the sediments when poor land-use practices alter flow regimes, remove riparian vegetation, and/or degrade overall watershed conditions. These human-induced activities can aggravate already fragile soils and geology in vulnerable desert climates.

Little information is available on specific habitat requirements for BCT; however, there is a wealth of information on salmonid habitat conditions in general which appear to generally represent those of BCT (Pennak and Van Gerpen 1947, entire; Binns and Eiserman 1979, entire; Scarnecchia and Bergersen 1987, entire). For example, well-oxygenated water, cooler temperatures in general and a complexity of instream habitat structure, such as large woody debris and overhanging banks, are considered good trout habitat conditions. For various species, subspecies, and local forms, adaptations and tolerance of these conditions varies. BCT have also been found to survive and be fairly robust in what is considered marginal salmonid habitat conditions (e.g., turbid water, fine sediments, warmer temperatures, poor structural habitat). This may be because BCT have evolved in a desert environment where climate can cause fluctuations in water and sediment regimes and environmental condition (Behnke 1992, p. 107).

It was previously thought that with the exception of three lacustrine systems, Bear Lake (Utah and Idaho), Utah Lake, and Alice Lake (Wyoming), BCT were historically found in cool headwater streams throughout the Bonneville basin. However, more recent research and status and genetic surveys reveal BCT populations are found at high, moderate, and low elevations (within the range of elevations in the Bonneville Basin) in small headwater streams, such as those of the north slope of the western Uintas, to larger mainstem rivers, such as the Thomas Fork of the Bear River (UDWR, unpublished data).

Historic Habitat

BCT likely historically occupied all suitable habitats within the Pleistocene Lake Bonneville basin, which included portions of Idaho, Nevada, Utah, and Wyoming. The desiccation of ancient Lake Bonneville about 8,000 years ago likely fragmented the BCT into remaining streams and lakes throughout the basin, resulting in several slightly differentiated groups of BCT, including: (1) The Bear River basin; (2) the Bonneville basin proper, including the Wasatch Mountain and Sevier River drainages; and (3) the Snake Valley, an arm of ancient Lake Bonneville that was isolated during an earlier desiccation event (Behnke 1992, pp. 132–138). There is general consensus among the scientific community, including the Service, that all these groups represent the BCT subspecies (Shiozawa 2008, p. 1). For the purposes of this finding, all three groups are considered BCT.

The BCT Conservation Team, which includes biologists from Wyoming Game and Fish Department (WGFD), Utah Division of Wildlife Resources (UDWR), Nevada Division of Wildlife (NDOW), Idaho Department of Fish and Game (IDFG), Bureau of Land Management (BLM), U.S. Forest Service (USFS), the National Park Service (NPS), and the Service, completed a status report (May and Albeke 2005) that describes the rangewide status of BCT in the United States. The rangewide status report summarized the best available information on BCT (May and Albeke 2005, pp. i, 16, 103–104). The status report was peer reviewed by five recognized experts in the fields of fishery biology, conservation biology, and genetics. The peer reviewers found that the status report provided sound scientific data to use in this 12-month finding.

The 2001 finding on Bonneville Cutthroat Trout included 28,863 hectares (71,322 acres) of lake habitat (indicated as an adfluvial life history) (USFWS 2001, pp. 34, 44, 50, 75). The 2005 BCT rangewide status report relied on a protocol that was not designed to address lake populations; however, 8 lakes connected to occupied stream habitat were included as 412 stream kilometers (km) (256 stream miles (mi)) (May and Albeke 2005, pp. 107, 110, 120). Thus, throughout the remainder of the document, all occupied BCT habitat is reported as stream habitat and includes lake populations. These lake populations are an important component in conserving BCT, and some lakes are specifically designated to preserve genetically pure populations (Donaldson 2008, pp. 8–9).

The BCT Conservation Team's status report included an analysis of probable historic distribution (May and Albeke 2005, pp. 6, 16–19). Our understanding of BCT historic distribution is based on habitat thought to be occupied around 1800. The determination of occupation in this era was based on historic climactic conditions, stream channel gradient, barriers that would preclude fish, and expertise of fishery biologists familiar with each watershed. The analysis resulted in 10,876 (km) (6,758 mi) of stream habitat potentially occupied historically (May and Albeke 2005, pp. 6, 16–19). This analysis included estimated stream miles for historically occupied BCT lakes because the analysis protocol was not designed to address lake populations separately. The historically occupied habitat identified in each State included: Utah—7,916 km (4,919 mi) (73 percent); Idaho—1,854 km (1,152 mi) (17 percent); Wyoming—974 km (605 mi) (9 percent); and Nevada—132 km (82 mi) (1 percent) (May and Albeke 2005, pp. 6, 16–19). The United States is divided and sub-divided into successively smaller hydrologic units that are classified into four levels: regions, sub-regions, accounting units, and cataloging units. Fourth-level hydrologic unit codes (HUCs) in the Lake Bonneville Basin, including Pine Valley, Tule Valley, Pilot-Thousand Springs, Northern Great Salt Lake Desert, Lower Beaver, and Sevier Lake, were not included as historical habitats because they were judged unsuitable due to extreme conditions, because information on them prior to 1800 is unavailable, or because historical records indicate that they were devoid of fish.

Current Distribution

Current distribution of BCT is approximately 3,830 km (2,380 mi)—35 percent of the probable historically occupied stream miles (May and Albeke 2005, p. 19). Currently occupied habitat identified in each State includes Utah—2,438 km (1,515 mi) (64 percent); Idaho—869 km (540 mi) (23 percent); Wyoming—476 km (296 mi) (12 percent); and Nevada—47 km (29 mi) (1 percent) (May and Albeke 2005, p. 19).

The BCT is well distributed throughout its range in four watershed-based GMUs (see Figure 1; Table 1 below). In earlier assessments, five GMUs or GUs (geographic units) were identified as including current populations of BCT; however, we combined the Bear Lake and Bear River GMUs because they occur within one watershed, and our analysis was conducted by watershed (May and Albeke 2005, pp. 4–5). This reconfiguration of GMUs does not imply a reduction in the geographic area where BCT occur (May and Albeke 2005, pp. 2–5).

Within each GMU, streams were identified to the 4th-level hydrologic unit and assigned to a HUC. BCT occupy habitat in 22 of the 23 HUCs determined to likely have supported historical habitat. BCT also occupy habitat in three HUCs that are either partially or totally outside of the subspecies historic range (May and Albeke 2005, pp. 19–20); most of these populations were reintroduced into suitable habitat with no record of nonnative fish (Behnke 1992, pp. 134–135). The Bear River GMU has the greatest extent of currently occupied BCT habitat (2,010 km/1,249 mi), followed by the Northern Bonneville (1,532 km/952 mi), Southern Bonneville (187 km/116 mi), and the West Desert (101 km/63 mi).

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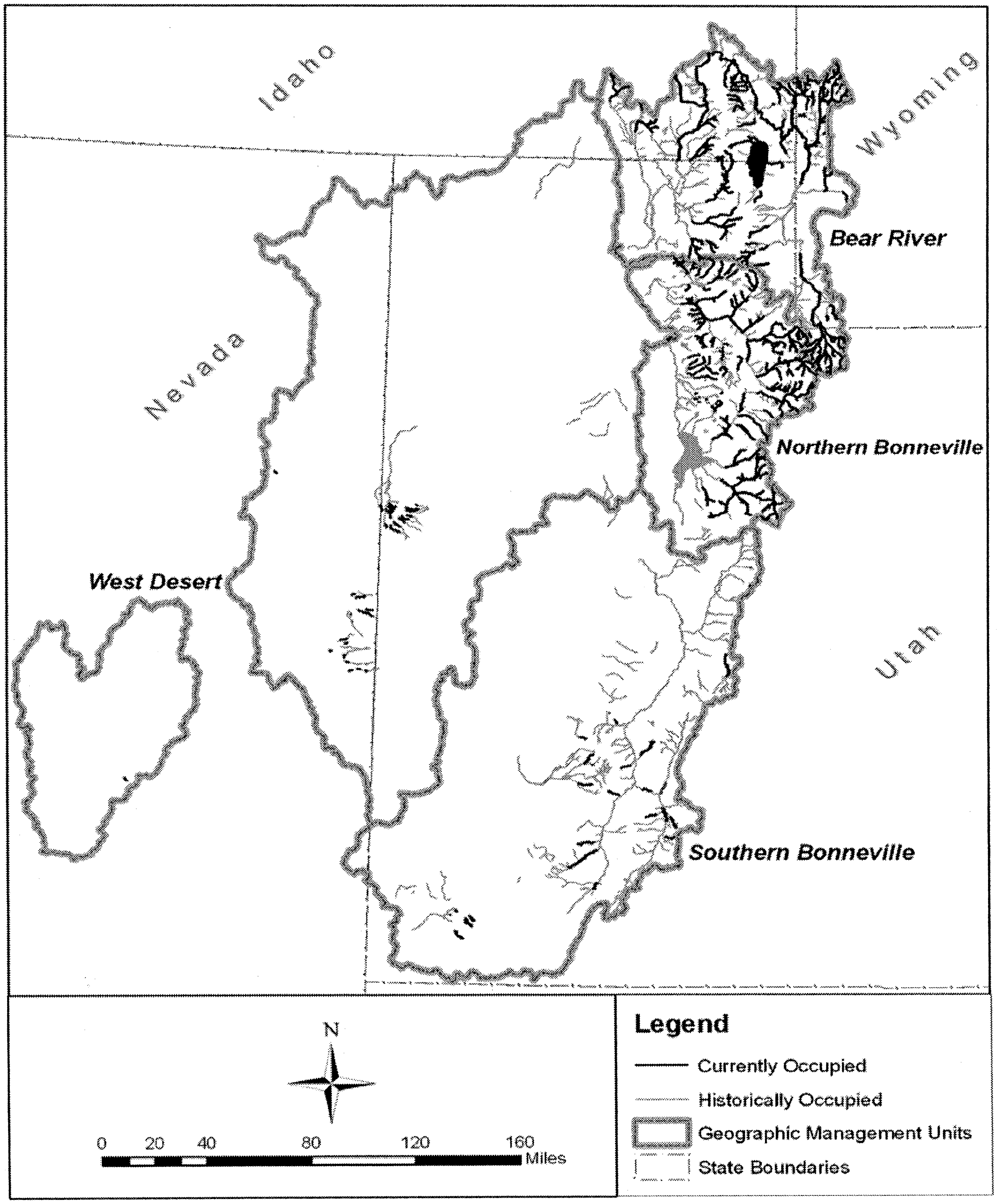

Figure 1. All BCT Populations

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TABLE 1—FROM MAY AND ALBEKE 2005, (P. 19), TABLE 21 (P. 34)

GMU name	Km (mi) currently occupied by BCT	Number of BCT conservation populations	Km (mi) occupied by BCT conservation populations
Bear River	2,010 (1,249)	33	1,753 (1,089)
Northern Bonneville	1,532 (952)	65	1,318 (819)
Southern Bonneville	187 (116)	21	145 (90)
West Desert	101 (63)	34	101 (63)
Totals	3,830 (2,380)	153	3,316 (2,061)

Hybridization

Hybridization is a concern for many cutthroat trout populations. An introgressed population results when a nonnative species or subspecies is introduced into or invades native cutthroat trout habitat, the two species then interbreed (i.e., hybridize), and the resulting hybrids survive and reproduce. If the hybrids backcross with one or both of the parental species, genetic introgression occurs. Continual introgression can eventually lead to the loss of genetic identity of one or both parent species, thus resulting in a ''hybrid swarm'' consisting entirely of individual fish that often contain variable proportions of genetic material from both of the parental species.

Our criteria for considering the potential impact of introgressed populations of BCT are consistent with a position paper, titled ''Genetic Considerations Associated with Cutthroat Trout Management,'' developed by the fish and wildlife agencies of the intermountain western States (UDWR 2000a, pp. 1–9). Signatories to the position paper include the IDFG, Montana Fish Wildlife and Parks, NDOW, New Mexico Game and Fish Department, UDWR, and WGFD. The document identified, for all subspecies of inland cutthroat trout, three tiers of natural populations for prioritizing conservation and management options under State fish and wildlife management authorities: (1) Core conservation populations composed of greater than 99 percent cutthroat trout genes; (2) conservation populations that generally ''have less than 10 percent introgression, but in which introgression may extend to a greater amount depending upon circumstances and the values and attributes to be preserved''; and (3) cutthroat trout sport fish populations that, ''at a minimum, meet a species'' phenotypic expression defined by morphological and meristic characteristics (counts of body parts) of cutthroat trout.''

The premise of the position paper on genetic considerations was that populations must conform, at a minimum, to the morphological and meristic characteristics of a particular cutthroat trout subspecies in order to be included in a State's conservation and management plan for that subspecies. Conservation populations of a cutthroat trout subspecies include fish believed to have uncommon or important genetic, behavioral, or ecological characteristics relative to other populations of the subspecies. Sport fish populations, conversely, while conforming morphologically (and meristically) to the scientific taxonomic description of the subspecies, do not meet the additional genetic criteria of conservation or core, and are managed for their value as sport fish rather than for conservation of the subspecies.

Following the State management agencies' position paper (UDWR 2000a, pp. 1–9), a ''core population'' is genetically unaltered (pure), and a ''conservation population'' is pure (a core population) or slightly introgressed (typically less than 10 percent) due to past hybridization, yet has attributes worthy of conservation. Therefore, conservation populations include both core populations (genetically pure) and populations that are less than 10 percent introgressed with rainbow trout or other subspecies of cutthroat trout (May and Albeke 2005, p. 71). The BCT rangewide status report (May and Albeke 2005, p. 31) identified 153 stream populations (3,316 km/2,061 mi) as conservation populations (see Table 1, above, and Figure 2). Of the 153 conservation populations, 73 (732 km/455 mi) are considered core populations containing genetically pure BCT.

We consider all core and conservation populations, as defined under the States' standards and as described by May and Albeke (2005, p. 31), for purposes of conducting this status review. Because the categories are nested (conservation populations include core populations), we refer to them collectively as ''BCT conservation populations'' in the remainder of this finding. Some of the data presented in May and Albeke (2005) pertains to all BCT populations (including sport fish) or habitat. Those areas of this document that do not specify ''conservation populations,'' therefore, are referring to all BCT populations. We conducted our analysis on conservation populations because we found that BCT with less than 10 percent introgression still express important behavioral, life history, or ecological adaptations of indigenous populations within the range of the subspecies, and remain valuable to the overall conservation and survival of the subspecies (Campton and Kaeding 2005, pp. 1323–1325). (See also Factor E, Hybridization with Nonnative Fishes.)

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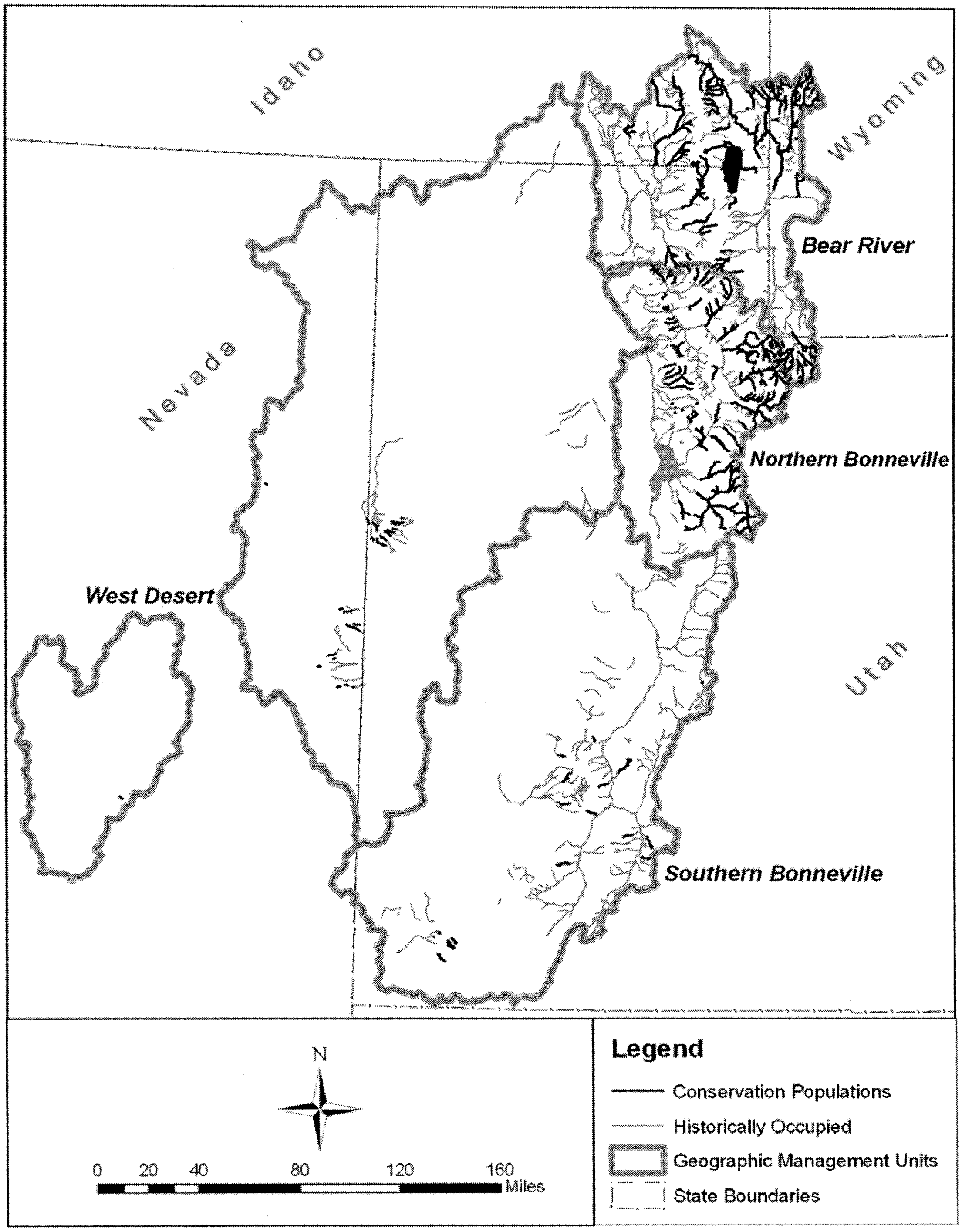

Figure 2. BCT Conservation Populations

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Conservation Populations

Designated BCT conservation populations exist throughout the subspecies' historic range (May and Albeke 2005, p. 31)—in all four States and in the four designated GMUs. BCT currently occupy some habitat in 22 of the 23 HUCs historically occupied, and BCT that meet the conservation population definition (less than 10 percent introgressed) exist in 19 of those HUCs. BCT conservation populations were also identified in two HUCs (Spring-Steptoe and Hot Creek-Railroad Valley) outside historic range, and three additional conservation populations were identified outside historical range within the Upper Virgin HUC. The majority of conservation populations (65) occur in the Northern Bonneville GMU occupying 1,318 km (819 mi). The remainder of BCT conservation populations are relatively equally distributed among the West Desert (34), Bear River (33), and Southern Bonneville (21) GMUs. These populations occupy 101 km (63 mi), 1,753 km (1089 mi), and 145 km (90 mi) respectively (May and Albeke 2005, p. 34).

The majority of BCT conservation populations (101; 66 percent) occur as isolated, non-networked populations (May and Albeke 2005, p. 34); 25 populations (16 percent) are weakly connected; 15 populations (10 percent) are moderately connected; and 12 populations (8 percent) have migratory forms and open migration corridors that make them strongly connected. The strongly connected populations occur in Utah, Idaho, and Wyoming in the Bear River Geographic Management Unit (GMU) and Northern Bonneville GMU (May and Albeke 2005, pp. 34, 107, 115, 117).

BCT Population Trend

BCT population trend and status can be interpreted from results of previous assessments conducted from the early 1970's through the present time. Hickman (1978, pp. 121–122) identified approximately 15 populations he considered ''pure'' occupying approximately 34 km (21 mi) of stream habitat. Duff (1988, pp. 121–127) reported 41 ''genetically pure'' BCT populations (39 stream populations) in association with 304 km (189 mi) of stream habitat. A draft Service status review that was never finalized reported 48 genetically pure BCT populations throughout the Bonneville Basin (USFWS 1993, pp. 1–62). Duff (1996, pp. 38–39) further refined his BCT population distribution reporting 81 genetically ''pure'' populations occupying 377 km (234 mi) of stream habitat. A Service status review found that BCT occupied a total of 1,372 km (852 mi) of stream habitat and 28,352 ha (70,059 acres) of lake habitat totaling 291 populations (USFWS 2001, pp. iv–v).

BCT assessments conducted between 1978 and 1996 generally counted populations that were thought to be genetically ''pure.'' The 2001 Service assessment determined the genetic status of each population but was more inclusive and counted management, conservation, and potential conservation populations (USFWS 2001, pp. viii–xi). The May and Albeke (2005) assessment assessed the genetic status of each BCT population and then categorized genetic status based on the criteria in the State's genetic position paper (UDWR 2000a, pp. 1–9).

Methods for tallying the number of individual BCT populations tended to vary by individual assessment, with earlier assessments tending to split tributary populations from mainstem river reaches. In contrast, methods used for the May and Albeke (2005, p. 64) assessment tended to group populations by higher order streams, thereby reducing the total count of populations. Thus, it is important to consider changes in the amount of occupied habitat when assessing population trends from different assessments rather than to simply rely on changes in number of populations. The number of known stream miles occupied by BCT conservation populations increased over time from 15 populations in 34 km (21 mi) of habitat in 1978 to 153 populations in 3,316 km (2,061 mi) in 2004. Some of the increase in BCT conservation populations and their habitat is the result of conservation actions such as the discovery of more populations in recent years; the expansion or restoration of populations; and the eligibility of populations for conservation status (through genetic testing) that were previously considered hybridized. Increases in the amount of BCT conservation population habitat is also due to the use of a more accurate GIS-based assessment method that incorporated the National Hydrography Dataset geodatabase (May and Albeke 2005, p. 2) and also the inclusion of lakes as river miles as used in the most recent assessment protocol (see above), although the increase due to the inclusion of lakes in the river mile calculation only accounts for an additional 412 km (256 mi) of stream habitat.

The BCT Conservation Team's most recent analysis of the number of BCT conservation populations and the extent of their habitat indicates that conservation populations have increased from 153 populations in 3,316 km (2,061 mi) in 2004 (May and Albeke 2005, p. 31), to 172 populations in 3,333 km (2,071 mi) in 2008 (Burnett 2008a, entire). This most recent evaluation of the BCT Conservation Team's database was cursory and was not performed for other population parameters discussed in May and Albeke (2005) (i.e., restoration activities, genetic status, population health and densities, etc.); however, it does indicate that the number of BCT conservation populations and their habitat continue to increase.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533), and implementing regulations at 50 CFR 424, set forth procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. In making this finding, we summarize information regarding the threats to the BCT in relation to the five factors provided in section 4(a)(1) of the Act.

In making this finding, we considered all scientific and commercial information that we received or acquired up to the publication of the 2001 12-month finding (66 FR 51362), and after publication of the notice initiating this finding (73 FR 7236; February 7, 2008). We relied primarily on published and peer-reviewed documentation for our conclusions, and most significantly, the rangewide status report competed by the BCT Conservation Team (May and Albeke 2005, entire).

Pursuant to section (4) of the Act, a species may be determined to be an endangered or threatened species on the basis of any of the following five factors: (A) Present or threatened destruction, modification, or curtailment of habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We evaluated whether threats to the BCT may affect its survival. Our evaluation of threats, based on the best scientific and commercial information available, is presented below.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Land use activities associated with each BCT conservation population were identified and documented in May and Albeke (2005, p. 52, Table 30), but the significance of the activities was not determined in relation to individual populations or to the conservation of the subspecies. Non-angling recreation (camping, hiking, ATV use, etc.) occurs in 69 percent of the conservation populations. Livestock grazing occurs in 58 percent of the conservation populations, roads in 69 percent, timber harvest in 20 percent, and dewatering in 30 percent. Hydroelectric plants, water storage, or flood control occurs in 20 percent of the conservation populations. A small percentage of populations have mining or nonnative fish stocking. Many populations have more than one land use occurring in the area.

A comprehensive assessment of the effects of land management practices on BCT does not exist. However, an evaluation of habitat quality was conducted for currently occupied habitat (May and Albeke 2005, p. 26). The evaluation considered both natural habitat features and human-caused disturbances. A stream ranked as ''excellent'' if it had ample pool habitat, low sediment levels, optimal temperatures, and quality riparian habitat. A ''good'' habitat quality rating indicated the presence of some less than ideal attributes, and ''fair'' indicated the presence of a greater number of less than ideal attributes. A ''poor'' habitat quality rating indicated the inferior conditions of most habitat attributes. Of total occupied habitat for all BCT populations, excellent habitat conditions occurred in approximately 196 km (122 mi) (5 percent); good conditions occurred in 1,801 km (1,119 mi) (47 percent); fair conditions occurred in 1,080 km (671 mi) (28 percent); poor conditions occurred in 628 km (390 mi) (16 percent), and unknown conditions occurred in 126 km (78 mi) (3.2 percent). The majority of occupied habitat (80 percent) is in fair, good, or excellent condition.

Livestock grazing occurs in 58 percent of the BCT populations. Livestock grazing became an acute problem for watershed health in the late 1880s through 1930s when grazing, particularly sheep grazing, was so extensive and ill-managed that widespread watershed damage occurred throughout many areas in the Bonneville Basin. In fact, at the turn of the century, sheep were crowding cattle out of many areas (Peterson and Speth 1980, p. 179). In the Wasatch Mountains east of Salt Lake City, Utah, over-grazing of sheep denuded mountain meadows, some to the extent that watersheds experienced massive soil loss, land-slides and severe erosional damage. In addition to resident sheep, Utah was at a geographical 'crossroads of the west' where hundreds of sheep were trailed to and from neighboring States (Peterson and Speth 1980, p. 179).

Overgrazing by sheep can be particularly damaging to overall watershed conditions. Sheep have been known to graze vegetation down to dirt and ''grub'' away at grass roots thereby damaging the soil mantle, which acts to hold water for plant uptake (Peterson and Speth 1980, p.180). The extensive watershed damage typical of over-grazing sheep in the early 20th century led to massive soil erosion, land slides, and flooding during heavy precipitation (Cottam 1947, pp. 23–29). Such events can completely eliminate local fish populations and undoubtedly affected local populations of BCT. For streams already fragmented from diversions or dewatering, such events could have led to local extirpation of BCT where no connected populations were available to recolonize streams after a catastrophic flood.

Although cattle grazing can affect watershed conditions as well, the greater concern for cattle grazing stems from direct stream impacts where cattle are permitted to dwell in or are trailed through stream channels and riparian areas. Without adequate management, cattle can trample and destroy instream habitat and stream banks. They forage on lush riparian vegetation, which leads to degraded stream conditions and changes in channel morphology. Trampling destroys undercut banks resulting in wider and shallower channel morphology. Where this occurs, BCT can be impacted by increased water temperatures, loss of habitat complexity, altered macroinvertebrate food-base, and increased deposition of fine sediment (Platts 1991, p.393; Belsky *et al.* 1999, p.420; Rinne 1999, p.14).

When livestock grazing is managed appropriately, it can occur in the vicinity of stream and riparian habitat, and habitat conditions that support fish populations can still be maintained (Fitch and Adams 1998, p. 197). The Western Watersheds Project, Inc. (Carter 2008, pp. 1–7) submitted information documenting grazing impacts in localized areas in the Bear River GMU. Much of the information documents range conditions relative to grazing allotment reauthorizations. The information and conclusions presented included the assumption that, if a land management activity occurred within the vicinity of a BCT population, it was adversely affecting the population. We recognize that overgrazing can cause adverse impacts to individual populations of BCT. However, only 16 percent of the occupied stream miles have poor habitat quality (May and Albeke 2005, p. 26). Specific information on grazing impacts to BCT habitat on a rangewide basis is not available. We found no information indicating that overgrazing significantly affects the rangewide status of BCT now, or will do so in the foreseeable future. Therefore, we conclude that overgrazing is not a significant threat to BCT.

Roads, timber harvest, and dewatering occur in the area of some BCT populations. Similar to water development and grazing, the greatest impacts from timber harvesting occurred from 1850 to 1950. Although timber harvesting still occurs on National Forest Lands and very limited private lands in the Bonneville Basin, and may have some detrimental impacts on streams and watersheds, timber harvesting standards have substantially improved, particularly regarding protection of streams and watershed condition, and the catastrophic destruction that occurred in the first 100 years of pioneer settlement no longer occurs.

Currently, timber harvesting affects BCT through the indirect effects of road building and deforestation. Road building is known to add fine sediment to streams where roads cross or follow stream channels. These fine sediments can fill interstitial spaces important for successful spawning and survival of eggs and larval fish as well as alter the macro-invertebrate food base (Williams and Mundie 1978, p.1032–1033). Deforestation can also add sediment input into streams where riparian buffers are not implemented. Loss of trees also increases water volume draining into stream channels, which can alter flow and sediment regimes or exacerbate catastrophic flooding during extreme precipitation events.

Within the Bonneville Basin, timber harvesting is fairly limited compared to other areas of the inland west, mainly because the arid climate is not conducive to extensive, lush forests. Timber harvest occurs in only 20 percent of BCT conservation population habitat (May and Albeke 2005, p. 52, Table 30). We found no information indicating that timber harvesting significantly affects the rangewide status of BCT now, or will do so in the foreseeable future. Therefore, we conclude that timber harvesting is not a significant threat to BCT.

Direct effects of water diversions and depletions (dewatering) on BCT occur where reaches are dewatered or made inaccessible by instream barriers. Secondary effects of water development may include higher water temperatures in summer months because of lower water volume and diminished riparian condition and altered instream and shoreline habitat, all of which can impact cutthroat trout spawning and populations (Clancy 1988, pp. 40–41). Dewatering occurs in only 30 percent of BCT conservation population habitat (May and Albeke 2005, p. 52, Table 30). Rates of habitat loss through water diversions and depletions were likely heaviest for the decades immediately after pioneer settlement, in the late 1800s, throughout the Bonneville Basin near locations of population growth. We found no information indicating that dewatering significantly affects the rangewide status of BCT now, or will do so in the foreseeable future. Therefore, we conclude that dewatering is not a significant threat to BCT.

Idaho and Nevada have no producing oil or gas wells in BCT areas. However, oil and gas development has been accelerating over the last several years in Utah and Wyoming. Oil and gas development could affect BCT through increased land disturbance from roads and pads that could cause water quality problems associated with increased sediment loads, and through leaks, spills, and discharge of produced water reaching BCT habitat (WGFD 2004, pp. 25–26). The BLM and Utah Division of Oil Gas and Mining provided information on locations of existing active and inactive wells and oil and gas leases on BLM, USFS, and other lands where BLM has jurisdiction over the subsurface mineral rights within the BCT range in Utah and Wyoming (BLM 2008a, entire; UDOGM 2008, entire). A well exists within 1.6 km (1 mi) or less of 26 BCT conservation populations (17 percent of all conservation populations). Of these 26 populations, 2 were near active or producing wells; the wells near the remaining 24 populations were non-producing and were shut-in, plugged and abandoned, or abandoned entirely for development. These non-producing wells have a greatly reduced likelihood of releasing oil and gas related contaminants into BCT habitat (BLM 2008b, entire). Relatively little overlap exists between oil and gas development sites and BCT conservation populations. BCT populations typically occur at higher elevations where minimal oil and gas activity exists. An analysis of potential future oil and gas development for the States of Wyoming and Utah indicates that the majority of leases occur outside the historic range of BCT (BLM 2008b, entire). Potential impacts to BCT resulting from oil and gas development on Federal land are typically assessed through the National Environmental Policy Act (NEPA) review process; as a result, future effects should be disclosed and effects to BCT will have to be taken into consideration due to the sensitive species management status of BCT on Federal land. Therefore, based on the best scientific and commercial information available, we conclude that dewatering is not a significant threat to BCT now, or in the foreseeable future.

Summary of Factor A

Land use practices, such as livestock grazing, road construction and maintenance, dewatering, and timber harvest, are occurring to some extent in most areas of occupied habitat. However, habitat quality ratings are fair, good, or excellent in 80 percent of BCT habitat throughout the current range of the subspecies. Approximately half of all BCT populations (49 percent) occur on Federal lands where land use regulations are in place to ensure ongoing maintenance of existing habitat (see Factor D). Restoration and conservation activities are occurring for at least 57 percent of the conservation populations.

We find that the presence alone of an activity within a stream segment containing a conservation population is not sufficient evidence to conclude that the population is threatened or that a certain land use activity affects all populations rangewide at a significant level. Additional parameters, such as magnitude of impacts, distribution and abundance of BCT populations, and population trends, lend to an overall status determination. Many species exist in managed landscapes; not all are significantly impacted by human-caused influences to the level of being considered threatened under the Act.

BCT conservation populations are well distributed in four GMUs, collectively forming a solid basis for persistence of BCT. These GMUs contain 19 of the 23 HUCs determined to have supported historical BCT habitat. In addition, BCT conservation populations currently occupy habitat in three HUCs that are either partially or totally outside the subspecies' historic range.

Based on the best scientific and commercial information available, we conclude that BCT is not now or in the foreseeable future, threatened by destruction, modification, or curtailment of its habitat or range to the extent that listing under the Act as a threatened or endangered species is warranted at this time.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

No commercial harvest of BCT currently occurs, so only recreational angling could potentially result in overutilization. Data show that angling occurs in 60 percent of BCT conservation populations (May and Albeke 2005, p. 52). Utah, Idaho, and Wyoming have special regulations providing protection against over-harvest of BCT. These special regulations include catch-and-release requirements, limited harvest, fishing closures, and tackle restrictions. In addition, the remote location of many BCT streams provides protection from heavy fishing pressure (NDOW 2006, p. S–28; Baker *et al.* 2008, p. 29; Donaldson 2008, p. 3).

The State of Idaho implements several fishing regulations to manage potential angler impacts in State waters. For most streams able to support larger fish, bag limits are 2 fish greater than or equal to 40 centimeters (cm) (16 in) in length. In smaller streams, where BCT typically do not exceed 30 cm (12 in), the general stream limit is 2 fish, and no size constraints exist. In other waters, seasonal angling restrictions or catch-and-release-only regulations are implemented (IDFG 2008, pp. 3, 19). In Utah, several fishing regulations protect native cutthroat trout from overutilization. The State reduced trout bag and possession limits from eight fish to four, and imposed short-term fishing closures to protect native cutthroat trout (Donaldson 2008, p. 3). Wyoming implements angling restrictions, such as size limits, reduced bag limits, and tackle restrictions to protect BCT populations (WGFD 2008, p. 8). Many of Nevada's BCT populations occur in remote areas, which provide protection from heavy fishing pressure (Baker *et al.* 2008, p. 29). None of the four States considers angling, under their current regulations, to be a threat to the subspecies.

Collection of BCT for scientific or educational purposes is controlled by strict State permitting processes that prevent excessive sampling throughout its range in Utah, Wyoming, Idaho, and Nevada. Collection of fish tissue for genetic sampling is conducted by nonlethal techniques (Rogers 2007, pp. 1–3).

Summary of Factor B

No commercial harvest of BCT currently occurs. Only recreational angling could potentially result in overutilization. However, Utah, Idaho, and Wyoming have special regulations providing protection against over-harvest of BCT. Also, in our 2001 12-month finding (66 FR 51362), we concluded that angler harvest did not pose a significant threat to the continued existence of BCT, and we know of no new information during development of this finding to change this conclusion. Collection of BCT for scientific or educational purposes is controlled by strict State permitting processes throughout the range of the subspecies. Therefore, we conclude that the best scientific and commercial information available indicates that overutilization for commercial, recreational, scientific, or educational purposes is not a significant threat to BCT now, or in the foreseeable future.

Factor C. Disease or Predation

Disease

The BCT Conservation Team evaluated disease in the BCT status report (May and Albeke 2005, pp. 11–12, 40–42). Diseases considered had the potential to cause significant impacts to population health and included, but were not limited to, whirling disease, infectious pancreatic necrosis virus, and furunculosis. The BCT Conservation Team assessed risks based on proximity of disease-causing pathogens and their accessibility to a population. The majority of the populations (63 percent) have limited risk because disease and pathogens are not known to exist in the watershed, or a barrier blocks upstream fish movement. In general, isolated populations have less risk of catastrophic diseases. Fourteen populations (9 percent) are currently known to be infected with one of the identified diseases (May and Albeke 2005, pp. 40–41).

In recent years, whirling disease has become of great concern to fishery managers in western States. Whirling disease is caused by the nonnative myxosporean parasite, *Myxobolus cerebralis.* This parasite was introduced to the United States from Europe in the 1950's and requires two separate host organisms to complete its life cycle. Its essential hosts are a salmonid fish and an aquatic worm, *Tubifex tubifex.* Juvenile, sub-adult, and adult life stages of BCT have been shown to be susceptible to whirling disease in the Logan River, and some Logan River study sites exhibit a downward trend in BCT abundance (Budy *et al.* 2005, pp. xi-xiii). Despite this, BCT in the Logan River demonstrate high growth and survival rates and are generally in relatively good health. Logan River tributaries are important refuges from whirling disease-infected areas in the Logan mainstem (Budy *et al.* 2005, pp. xi-xiii). *Tubifex tubifex* is most abundant in areas of high sedimentation, warmer water temperatures, and low dissolved oxygen. Most populations of BCT occur in cold water stream habitats at high elevations, where *Tubifex tubifex* is less likely to be abundant.

All four States have developed management activities to protect BCT populations from whirling disease. Though whirling disease is known to occur in some Nevada waters, it currently does not pose a threat to BCT populations because it occurs at low levels among BCT populations (NDOW 2006, pp. S27). Regardless, Nevada is in the process of formalizing protocols for BCT reintroductions and transplants relating to disease certification and broodstock management (NDOW 2006, pp. S27, S32). Idaho has outlined several strategies to protect BCT populations from the negative effects of disease. Strategies include monitoring fish populations for disease, prohibiting importation of fish and wildlife that carry disease risk, and ensuring that stocking, translocation, and propagation of fish do not contribute to the transmission or introduction of diseases (IDFG 2008, p. 14). Utah has some of the most stringent fish disease laws in the United States, which do not allow the stocking of fish that test positive for whirling disease (Donaldson 2008, pp. 4–5). UDWR is studying the effects of whirling disease in a portion of BCT occupied waters in Utah that have been infected (Donaldson 2008, p. 4). Wyoming has a policy of not stocking fish that test positive for *Myxobolus cerebralis* (WGFD 2008, p. 9).

Predation

Of the 153 conservation populations identified in the rangewide BCT status report, 97 (63 percent) had no interaction with nonnative fish and 56 (37 percent) were sympatric with nonnative fish (May and Albeke 2005, p. 31). All BCT conservation populations sympatric with nonnative fish are located in the Bear River and Northern Bonneville GMUs. In these GMUs, BCT can be replaced by nonnative trout, but the degree to which predation is a factor in this replacement has not been well documented (Holden *et al.* 1997, pp. 3–21). Although nonnative fish can have negative effects on BCT in localized areas due to predation, research in the Logan River drainage shows that it is possible for BCT populations to persist in the presence of predacious nonnative fish (Behnke 1992, p. 107; Budy *et al.* 2005, pp. xi-xiii).

Predation can affect BCT, mainly during early life stages, where other predaceous fish occupy the same area (UDWR 2000b, p. 48). Utah has implemented several management actions intended to alleviate potential predation of BCT by nonnative trout, including: nonnative removal/barrier installation projects; barring nonnative cutthroat stocking in conservation drainages; increasing angler harvest limits for brook trout in the Boulder and Uinta Mountains; and initiating fisheries research work (Donaldson 2008, pp. 5–7). Nevada has virtually eliminated threats to BCT from nonnative fish by utilizing barriers and nonnative removal restoration projects (Baker *et al.* 2008, pp. 3–5; NDOW 2006, p. S–27).

Similar to Utah, Idaho and Wyoming have enacted management actions intended to alleviate potential predation of BCT by nonnative trout. Idaho has discontinued stocking brook trout into native trout streams, increased the daily limit for brook trout from 6 to 25, and removed or suppressed nonnative trout species that compete with BCT (IDFG 2008, pp. 6–7). Wyoming is monitoring BCT populations to ensure that nonnative populations do not become established in new waters in the Bear River drainage, have ceased stocking nonnative trout in waters managed for BCT conservation populations, and have implemented nonnative removal/barrier installation projects to control nonnative fish in BCT habitat (Emmrich 2008, p. 2; WGFD 2008, p. 10).

Summary of Factor C

Only 14 (9 percent) BCT conservation populations are infected with a significant disease, and no additional populations are at high risk for infection (May and Albeke 2005, pp. 40–41). Therefore, we conclude that the best scientific and commercial information available indicates that neither whirling disease nor other disease organisms significantly threaten BCT now, or in the foreseeable future.

Predation by nonnative fish, the primary source of predation on young BCT, may have some effect on BCT populations in the Bear River and Northern Bonneville GMUs. However, 63 percent of conservation populations have no interactions with nonnative fish. Also, research shows that it is possible for BCT populations to persist in the presence of predacious nonnative fish (Behnke 1992, p. 107; Budy *et al.* 2005, pp. xi–xiii). State fish and wildlife agencies continue to implement management actions intended to alleviate potential predation of BCT by nonnative fish. At this time, we know of no information that indicates to us that predation significantly affects BCT now, or in the foreseeable future.

Factor D. Inadequacy of Existing Regulatory Mechanisms

The Act requires us to examine the adequacy of existing regulatory mechanisms with respect to extant threats that place the subspecies in danger of becoming either threatened or endangered. Regulatory mechanisms affecting BCT fall into three general categories: angling, land management, and water quantity.

Angling

The States of Utah, Idaho, Nevada, and Wyoming consider BCT a game species, and each State has specific regulations regarding catching BCT by angling. We concluded above that recreational angling is not a significant threat to BCT, now or in the foreseeable future (see Factor B).

Regulatory Mechanisms Involving Land Management

Numerous State and Federal laws and regulations help reduce adverse effects of land management activities on BCT. Most habitat in watersheds inhabited by BCT conservation populations is managed by Federal land management agencies, primarily the USFS and BLM, and to a limited extent the NPS. Federal laws that reduce impacts to BCT and their habitats include the Clean Water Act, Federal Land Policy and Management Act, National Forest Management Act, Wilderness Act, and National Environmental Policy Act. Approximately 49 percent of all occupied BCT habitat (including both sport fish and conservation populations) occurs on lands managed by Federal agencies, and the USFS manages the majority (May and Albeke 2005, p. 29). Of the 3,830 km (2,380 mi) of occupied habitat, 1,867 km (1,160 mi) are under Federal jurisdiction and the majority occur on National Forests (1,209 km (751 miles)) (May and Albeke 2005, p. 29); these figures include sport fish populations because figures for conservation populations alone are not available (see Table 2 below). BCT occur in a large geographic area within the following National Forests: Bridger-Teton, Caribou-Targhee, Dixie, Fishlake, Humboldt-Toiyabe, Uinta, and Wasatch-Cache. BCT occupy 11 km (7 mi) of land administered by the BLM, and 7 km (4.4 mi) managed by the NPS. Approximately 657 km (408 mi) of occupied BCT habitat occurs in wilderness areas managed by the USFS or BLM. Wilderness Areas and National Parks provide an extra level of protection for BCT because many land management activities are prohibited in them.

TABLE 2—BCT OCCUPIED LAND OWNERSHIP

[Numbers include areas occupied by both sport fish and conservation populations]

USFS	BLM	NPS	USFS and BLM Wilderness	Non-federal	Total
1,209 km (751 mi)	11 km (7 mi)	7 km (4.4 mi)	657 km (408 mi)	2,603 km (1,618 mi)	3,830 km (2,380 mi)

U.S. Forest Service

The USFS Sensitive Species Policy in Forest Manual 2670 outlines procedures for conserving sensitive species. The policy applies to projects implemented under the 1982 National Forest Management Act (NFMA). The range of the BCT is within USFS Region 4, where it is designated a sensitive species by the USFS, and where the Forests have Land and Resource Management Plans (LRMPs) developed under NFMA. The USFS has proposed a revision to NFMA in 2008; it is likely that, if the rule is finalized, LRMPs would be revised accordingly. The NFMA revision would result in more strategic and less prescriptive LRMPs that identify ecosystem-level desired conditions and provide management objectives and guidelines for meeting desired conditions (Forsgren 2008, pp. 1–2). The LRMPs might provide species-specific direction for special status species when broader, ecosystem-level desired conditions do not meet conservation requirements.

USFS Manuals and Handbooks codify the agency's policy, practices, and procedures and are sources of administrative direction for USFS employees. USFS Region 4 applies practices outlined in their Soil and Water Conservation Practices Handbook to BCT habitat (USFS 1988, pp. 1–71). This handbook states that the USFS will apply watershed conservation practices to sustain healthy soil, riparian, and aquatic systems. The handbook provides Management Measures with specific criteria for implementation. For example, Management Measure No. 11.01 states: ''The Northern and Intermountain Regions will manage watersheds to avoid irreversible effects on the soil resource and to produce water of quality and quantity sufficient to maintain beneficial uses in compliance with State Water Quality Standards.'' Irreversible effects include reduced natural woody debris, excess sediment production that could reduce fish habitat, water temperature and nutrient increases that could affect beneficial uses, and compacted or disturbed soils that could cause site productivity loss and increased soil erosion. USFS land management practices are intended to avoid these effects whenever possible, while also providing for multiple-use mandates; therefore, maintaining or enhancing BCT habitat is being considered in conjunction with other agency priorities. We determined that USFS BCT management policies are currently adequately reducing impacts to the species; we found no information indicating that threats would rise to a significant level in the foreseeable future.

Bureau of Land Management

The BCT is designated a sensitive species by the BLM in Utah, Wyoming, Nevada, and Idaho. BLM policy offers the same level of protection for sensitive species as for candidate species. The policy in BLM Manual 6840—Special Status Species Management (BLM 2001, pp. 06A3–.06C1), reads as follows: ''For candidate/sensitive species where lands administered by the BLM or BLM authorized actions have a significant effect on their status, manage the habitat to conserve the species by:

(a) Ensuring candidate/sensitive species are appropriately considered in land use plans.

(b) Developing, cooperating with, and implementing range-wide or site-specific management plans, conservation strategies, and assessments for candidate/sensitive species that include specific habitat and population management objectives designed for conservation, as well as management strategies necessary to meet those objectives.

(c) Ensuring that BLM activities affecting the habitat of candidate/sensitive species are carried out in a manner that is consistent with objectives for managing those species.

(d) Monitoring populations and habitats of candidate/sensitive species to determine whether management objectives are being met.''

BLM land management practices are intended to avoid negative effects to species whenever possible, while also providing for multiple-use mandates; therefore, maintaining or enhancing BCT habitat is being considered in conjunction with other agency priorities. We find that BLM BCT management policies are currently adequately reducing impacts to the species; we found no information indicating that threats would rise to a significant level in the foreseeable future.

National Park Service

When the Great Basin National Park (Park) was established in 1986, management of southern Snake Mountain Range streams was transferred from NDOW and the USFS to the NPS. The Park developed a Fisheries Management Plan in 1999 that included goals of reintroducing BCT into several area streams. In 1999, 40 km (24 mi) of stream habitat was unoccupied; due to restoration activities, 7 BCT conservation populations now exist in 20 km (12 mi) of streams in and near the Park (Baker *et al.* 2008, pp. ii, 1). The Park will conduct long-term monitoring on the BCT populations and habitat. Most BCT waters within the Park are in remote, high-elevation locations where angling pressure is very light (Baker *et al.* 2008, pp. ii, 1). Livestock grazing, timber harvest, mining, and development do not occur in Great Basin National Park. We find that NPS management policies are currently adequately reducing impacts to the species; we found no information indicating that threats would rise to a significant level in the foreseeable future.

Regulatory Mechanisms Involving Water Quantity

Utah and Nevada control the implementation of instream flow regulations in BCT habitat. In Utah, the recent legislative session passed an instream flow bill (HB 117) that should benefit BCT by allowing private entities, such as Trout Unlimited, to lease 10-year water easements for instream flows (Donaldson 2008, p. 3). Wyoming has approved instream flow rights on 17 stream segments encompassing 66 km (41 mi) of BCT habitat (WGFD 2008, p. 8). We find that regulatory mechanisms regarding water policy are currently adequately protecting the species; we found no information indicating that threats would rise to a significant level in the foreseeable future.

Conservation Actions

State and Federal agencies are implementing existing programs to restore and enhance BCT habitat. The majority of the 153 conservation populations (57 percent) have one or more restoration, conservation, or management activities either completed or currently being implemented within BCT habitat (May and Albeke 2005, p. 51). The WGFD adopted a Strategic Habitat Plan in 2001 (WGFD 2008, p. 6); under this Plan, habitat biologists work with landowners and land managers to manage habitat on a watershed scale to provide benefits to both terrestrial and aquatic wildlife resources. The States of Utah and Nevada have conservation agreements and conservation strategies involving review of BCT biology and monitoring of current subspecies status and potential threat factors (NDOW 2006, pp. 1 to S–26; UBCTCT 2008, pp. 1–23; UDWR 2008a, pp. 1–41). The State of Idaho has a Management Plan for Conservation of BCT in Idaho that provides conservation direction for BCT (Teuscher and Capurso 2007, pp. 1–84).

The States of Utah, Nevada, Wyoming, and Idaho, and the USFS, BLM, NPS, Service, Confederated Tribes of the Goshute Reservation, and Utah Reclamation Mitigation and Conservation Commission are signatories to a rangewide conservation agreement and strategy for BCT. This agreement was implemented to ensure the long-term survival of the subspecies through coordination of conservation efforts among the signatory agencies (UDWR 2000b, pp. 1–90).

Numerous conservation actions have been planned and implemented through State and Federal conservation and management plans. For example, the State of Utah (where the majority of BCT habitat and conservation populations exist) submitted two chronologies detailing BCT conservation efforts over two different time frames. BCT conservation actions were grouped from 1973–2001 (approximately 378 actions) and from 2001–2008 (approximately 355 actions); actions included, for example, population surveys and monitoring, genetic analysis, changes to angling regulations, broodstock development, fencing of stream habitat, establishment of conservation easements, nonnative fish removal and restocking with BCT, habitat surveys, stocking policy changes, and general habitat enhancement projects (UDWR 2008b, entire). These chronologies show that conservation actions were occurring prior to establishment of the State of Utah conservation programs in 2000, and that the number of conservation activities increased on a yearly basis (355 within 7 years) once these programs were enacted. Additionally, the BCT Conservation Team submitted information on State and Federal BCT conservation activities from 2001 through 2007 in Utah, Wyoming, Idaho, and Nevada; activities are similar to those of the State of Utah described above (BCTCT 2008, entire).

Under our Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE) (68 FR 15100; March 28, 2003), we typically evaluate conservation efforts by State and local governments, and other entities, that have been planned but not implemented, or implemented but have not yet demonstrated effectiveness, in order to determine which efforts meet the standard in PECE for contributing to our finding. The actions described above were not analyzed using the PECE standard because they were implemented prior to this review and their effectiveness has been demonstrated by the general increases in BCT population numbers (as discussed in the BCT Population Trend section). State and Federal agency participation in BCT conservation plans is voluntary; however, the States included in the range of the BCT have a demonstrated history of effective management of the species. State plans are typically in place indefinitely or have a term of agreement for 5–10 years with renewal provisions for a similar time period. The rangewide BCT conservation agreement was renewed in 2008 for 10 years, with the commitment that it would be extended for an additional 10 years upon expiration. The success of the conservation actions, as explained above, indicates that participating State and Federal agencies are committed to the conservation of BCT, and the renewal of the rangewide BCT agreement gives us a reasonable expectation that these efforts will continue in the foreseeable future.

Summary of Factor D

We assessed the potential threats of livestock grazing, timber harvest, roads, water management, mining, oil and gas developments, angling, disease, and predation with regard to magnitude of impacts to BCT, and to whether regulatory mechanisms are adequate.

We find that regulatory mechanisms related to land and fisheries management are currently sufficient for mitigating potential threats to BCT, and that the stable status of the species will continue in the foreseeable future. The best scientific and commercial information available indicates that existing regulatory mechanisms have maintained or improved the status of BCT to the extent that listing under the Act as a threatened or endangered species is not warranted.

Factor E. Other Natural or Manmade Factors Affecting the Species' Continued Existence

Climate Change

The Intergovernmental Panel on Climate Change (IPCC) has concluded that warming of climate is unequivocal (2007, p. 5), and that temperature increase is widespread over the globe and is greater at higher northern latitudes (IPCC 2007, p. 30). However, future changes in temperature and precipitation will vary regionally and locally, with some areas remaining unaffected or even decreasing in temperature (IPCC 2007, pp. 46–47). Changes in precipitation are less certain than in temperature; climate models project more frequent heavy precipitation events, separated by longer dry spells, especially in Utah and the western United States (GBRAC 2007, p. A1, 14–15; IPCC 2007, p. 15).

During the past decade, the average temperature in Utah, like that of much of the globe, was higher than observed during any comparable period of the past century (IPCC 2007, pp. 31–32). As discussed below, that increase in temperature, if permanent, does not constitute a significant threat to the BCT. The remaining question is whether possible future increases in temperature will constitute a threat. Over the next 20 years, climate models estimate that the Earth's average surface temperature will increase about 1.4 °C (0.8 °F). Climate change predictions based on continental-scale analysis are generally given ranking based on degree of certainty (IPCC 2007, p. 27; GBRAC 2007, pp. 3–11). Utah is projected to warm more than the global average (GBRAC 2007, pp. ES 2–3); however, levels of confidence in projections for local-scale areas are lower than for projections at global or continental scales, and are generally not given a degree of certainty ranking (GBRAC 2007, pp. 17–20). Clear and robust future trends have not been developed for Utah (GBRAC 2007, p. 2). We cannot make reliable predictions about the magnitude or timing of future temperature increases within the range of the BCT.

Based on the Utah Governor's Blue Ribbon Advisory Council on Climate Change (2007), which is a regional study, climate change will likely cause environmental changes in Utah, which could increase challenges for BCT rangewide. According to some research, climate change has already had or is predicted to have negative consequences on coldwater fisheries globally (Nakano *et al.* 1996, p. 711; Hari *et al.* 2006, p. 24), and in the Southwest and Rocky Mountains of North America (Keleher and Rahel 1996, p. 1; Rahel *et al.* 1996, pp. 101, 102, 113), through increases in ground- and surface-water temperatures. Rahel *et al.* (1996, p. 1116) and Keleher and Rahel (1996, p. 9) predicted that elevationally diverse regions such as the Rocky Mountains will experience warming stream temperatures that could restrict cold water species, such as cutthroat trout, to increasingly higher elevations, thus reducing the geographic range and occupied stream distance and increasing habitat fragmentation. Keleher and Rahel (1996, p. 5) calculated that in Wyoming a 1 °C (1.8 °F) increase in mean July air temperatures could decrease the length of streams inhabitable by salmonid fish by 8 percent; a 2 °C (3.6 °F) increase could cause a reduction of 14 percent, a 3 °C (5.4 °F) increase could cause a 21 percent decline, a 4 °C (7.2 °F) increase could cause a 31 percent reduction, and a 5 °C (9 °F) increase could cause a 43 percent reduction. In the Rocky Mountains, Keleher and Rahel (1996, p. 5) calculated similarly high reductions of 16.8, 35.6, 49.8, 62.0, and 71.8 percent with respective temperature increases of 1, 2, 3, 4, or 5 °C in July air temperatures. One study concluded that if warming air temperatures occur, it will likely cause numerous fundamental environmental changes, including increased stream and lake temperatures, increased evaporation rates, reduced annual snowpack, changes in river flows, and increases in disturbance events such as floods, drought, and fire (Williams *et al.* 2007, p. 2).

However, even if temperatures within the range of the BCT increased by the amounts considered in these studies, it would not put the species in danger of extinction. Bonneville cutthroat trout may be able to sustain viable populations at slightly warmer temperature conditions than other cutthroat trout subspecies. For example, Williams *et al.* (2007, p. 3) reported that less than 1 percent of the total distribution of westslope cutthroat trout and Colorado River cutthroat trout occurred in streams with an average July temperature greater than 22 °C (71.6 °F), but nearly 20 percent of the historical distribution of Bonneville cutthroat trout was associated with a mean July air temperature greater than 22 °C (71.6 °F). In addition, Bonneville cutthroat trout appeared to be thermally distributed bimodally, with two peaks. The warmer second peak occurred due to an extensive network of lower elevation, warmer valley bottoms that were historically occupied (Williams *et al.* 2007, p. 3). Bonneville cutthroat trout have adapted to a broad spectrum of habitat conditions throughout their range (Kershner 1995, p. 28).

Water temperature increases could result in a potential benefit to Bonneville cutthroat trout in localized areas. Cold summer water temperatures (mean July temperature of less than 7.8 °C (46 °F)) have been found as a limiting factor to recruitment of cutthroat trout in high-elevation streams (Harig and Fausch 2002, p. 545; Coleman and Fausch 2007, pp. 1238–1240). Therefore, although climate change is likely to increase water temperatures and result in a reduction in habitat quality for lower elevation streams, some higher elevation streams may become more suitable for BCT.

Declines in low-elevation mountain snowpack have been observed over the past several decades in the Pacific Northwest and California. However, no clear long-term snowpack trends are currently evident in Utah's mountains (Hamlet *et al.* 2005, p. 4560; GBRAC 2007, pp. A1, 1–2). Dates of peak snow accumulation and peak melt have also been trending earlier, but with the most notable differences occurring in coastal areas of the West that have warmer winter temperatures (Hamlet *et al.* 2005, p. 4560). Stewart *et al.* (2005, p. 1152) indicate that spring streamflow in the western United States during the last 5 decades has shifted so that the major peak now arrives 1 to 4 weeks earlier, resulting in declining fractions of flow in the spring and summer. However, streamflows in Utah and the Intermountain West do not show clear trends over the past 50 years (GBRAC 2007, p. A1, 10).

In another study, three elements of environmental change expected to affect Western cutthroat trout as a result of climate change (increased summer water temperatures, flood events, and wildfire) were modeled to determine where a particular subspecies is likely to be at greatest risk (Williams *et al.* 2007, pp. 2–5). The three elements were modeled individually, and then combined into a composite risk and modeled jointly. Modeling showed that 43 percent of sub-watersheds with existing BCT populations are at low or moderate risk from climate change, and 57 percent are at high risk. The modeling also evaluated BCT populations in regional areas. The composite analysis showed that cutthroat populations in most of the Bear River basin and the eastern portion of the Northern Bonneville basins are likely at low risk from climate change, while the West Desert, Southern Bonneville, and Northern Bonneville basins are in the moderate to high-risk range (Williams *et al.* 2007, p. 6).

A recent status review (73 FR 27899; May 14, 2008) for the Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*) provided a comprehensive review of potential global and regional climate change effects to that subspecies. The status review provided detailed information regarding the potential effects of temperature change, decreased stream flow, change in hydrograph, and increases in extreme events.

The Rio Grande cutthroat trout is native to the Rio Grande, Pecos, and Canadian River basins in New Mexico and Colorado (Behnke 2002, p. 219); the northern extent of this subspecies' range lies at a more southerly latitude than the range of the Bonneville cutthroat trout. Therefore, predictions of the effects of climate change are likely to differ to some extent between the subspecies. One of the effects of climate change is that salmonid species are likely to be restricted to increasingly higher elevations or to more northern latitudes (Meisner *et al.* 1988, p. 6; Regier and Meisner 1990, p.11; Keleher and Rahel 1996, p. 2; Nakano *et al.* 1996, pp. 716, 717; Rahel *et al.* 1996, p. 1122; Poff *et al.* 2002, p. 7; Rieman *et al.* 2007, p. 1558). Coldwater species occupying the southern distributions of their range, such as the Rio Grande cutthroat trout, are seen as more susceptible to extirpation as a consequence of global climate change (Poff *et al.* 2002, p. 8; Rieman *et al.* 2007, pp. 1552, 1553).

Because Rio Grande cutthroat trout primarily occupy high-elevation headwater tributaries, dispersal to new habitats is unlikely because they currently occupy the uppermost available habitat (73 FR 27899; May 14, 2008). In contrast, habitat for the Bonneville cutthroat trout is widely distributed and variable, ranging from high-elevation (3,500 m mean sea level) streams with coniferous and deciduous riparian trees to low-elevation (1,000 m mean sea level) streams in sage-steppe grasslands containing herbaceous riparian zones (Kerschner 1995; p. 28). BCT have adapted in order to survive in relatively warm water and marginal habitats, and migratory life forms historically grew to be quite large in lakes and large rivers. Some populations within the Bear River drainage in southern Idaho and northern Utah continue to exhibit the species' impressive range of life history strategies and habitat requirements, migrating seasonally between turbid, lower elevation mainstem rivers and cold, clear, high-elevation tributary streams (Trout Unlimited 2008, entire).

Climate change biological projections are based on effects models that have varying degrees of uncertainty (IPCC 2002, pp. 14–16). For example, Williams *et al.* (2007, p. 6), in their modeling of climate change and western trout, used a 3 °C temperature increase (projected for the U.S. Pacific Northwest in this century based on a 2004 University of Washington Climate Impacts Group). It is unknown when the predicted 3 °C raise in temperature might be realized. Questions also remain regarding the projected extent of climate change across regional areas, the timeframe for temperature and precipitation changes, and the overall response of fish populations. It is unclear how climate change will interact with other environmental stressors at regional levels (IPCC 2002, p. 15).

While climate change is likely to affect aquatic resources to some extent, including habitat utilized by BCT, at this time we find that these effects are not likely to cause significant long-term impacts to population viability. Current data indicate that the observed recent effects of climate change have had little significant impact on BCT population trends. BCT population trends show increasing numbers of conservation populations and increases in the amount of occupied river habitat, from 15 populations in 34 km (21 mi) of habitat in 1978, to 153 populations in 3,316 km (2,061 mi) in 2004 (May and Albeke 2005, p. 31; Hickman 1978, pp. 121–122). Therefore, although climate change may cause some level of long-term effects to aquatic habitat, we find that climate change is not currently a threat to BCT, which have adapted to a broad spectrum of habitat conditions. We also find that climate change is not likely to significantly threaten the species rangewide within the foreseeable future.

Fragmentation and Isolation of Small BCT Populations in Headwater Areas

The majority of BCT conservation populations (101; 66 percent) occur as isolated, non-networked populations (May and Albeke 2005, p. 34); 25 populations (16 percent) are weakly connected; 15 populations (10 percent) are moderately connected; and 12 populations (8 percent) have migratory forms and open migration corridors that make them strongly connected. The strongly connected populations occur in Utah, Idaho, and Wyoming in the Bear River and Northern Bonneville GMUs (May and Albeke 2005, pp. 34, 107, 115, 117).

Cutthroat metapopulations are defined as a collection of localized populations that are geographically distinct but genetically interconnected through natural movement of individual fish between populations (UDWR 2000a, p. 8). Metapopulations are important because they maintain genetic exchange and increase genetic diversity. They also provide individuals to repopulate stream segments where populations are lost due to stochastic environmental events. Metapopulations are important to the overall status of the subspecies, but they are at a higher risk for disease and invasion of nonnative fish because these elements can move into any connected populations even if they are introduced into a single localized area.

Problems associated with small, isolated cutthroat trout populations include increased risk of extirpation by catastrophic events and loss of genetic exchange. Isolated populations can also potentially be at risk of extirpation due to ongoing environmental forces causing changes in attributes such as habitat size, pool availability, or water temperatures. Several researchers have attempted to determine which environmental factors contribute to successful translocation efforts intended to augment isolated populations, and to integrate environmental factors into assessments of stream viability for cutthroat trout. Cold summer water temperature, narrow stream widths, and lack of deep pools can limit successful translocations of cutthroat trout (Harig and Fausch 2002, pp. 545–547). In high-elevation streams, cold summer water temperatures can delay spawning and lack of deep-water pools can limit overwinter survival. Modeling of these stream variables indicates that occupied stream length is an even better predictor of cutthroat trout abundance than stream temperatures; small increases in habitat length (e.g., by barrier removal or rewetting of a dewatered stream segment) can produce a disproportionately greater increase in fish abundance, increasing viability of isolated populations (Young *et al.* 2005, pp. 2405–2406).

A static model intended to describe the relationship between fish abundance and habitat is a tool for managers implementing cutthroat trout restoration projects (Hildebrand and Kershner 2000, pp. 515–518). The model is especially useful in evaluating potential installation of artificial barriers to protect from nonnative fish invasion. Modeling indicated that a stream length of 3 km (2 mi) is required to support a population of 1,000 fish; 8 km (5 mi) supports 2,500 fish; and 17 km (10 mi) supports 5,000 fish. The model is not applicable in all situations; it incorporates several assumptions specifying that it is most relevant to isolated populations in streams less than 7 meters wide, and that food availability and habitat quality affect the relationship between fish abundance and stream length occupied. The relevance of the model for reintroduction and restoration of BCT populations should be carefully assessed, as small, isolated cutthroat trout populations have persisted for many years, e.g., above waterfalls or in desert basins. Lack of habitat to sustain a large population does not necessarily mean that a population is destined to go extinct (Hilderbrand and Kershner 2000, p. 517). Specific criteria for viable population size has not been developed for BCT.

Small, isolated populations are at greater risk from stochastic events such as fire, floods, and drought. However, the widespread geographic distribution of BCT conservation populations in numerous individual populations mitigates the potential of future catastrophic natural events to affect a large proportion of the populations. It is unlikely that a sufficient number of populations would be lost to affect the overall status of the subspecies.

Fisheries management agencies have the ability to maintain or reestablish BCT populations in areas where they are partially impacted or lost to natural catastrophic events. While not to be relied on for species conservation, restoration and reintroduction can be employed as tools in specific cases. For example, wildfire can present an opportunity to eliminate nonnative fishes that occur in BCT habitat, after which reestablishment of BCT can occur. BCT populations have been established in burned-over streams previously only occupied by nonnative trout, including Leeds Creek and South Ash Creek in the Pine Valley Mountains, and Birch Creek, a tributary to the Sevier River (Ottenbacher 2008, entire).

Active programs are in place to restore metapopulations, where possible, within the historic range of BCT in Utah and Nevada (Donaldson 2008, pp. 9–10; NDOW 2006, p. S–8). All GMUs currently have networked populations (metapopulations), and the strongest and largest networks occur in the Bear River and Northern Bonneville GMUs (May and Albeke 2005, p. 34).

A population health evaluation was conducted for all BCT conservation populations, based on four health indicators: Temporal variability (based on stream length), population size, population production potential (growth and survival rates), and population connectivity (May and Albeke 2005, pp. 44–49). The health evaluation indicated that 91 conservation populations (59 percent) occur in stream reaches of less than 10 km (6 mi) (May and Albeke 2005, pp. 44–49). Approximately 38 conservation populations (25 percent) occupy stream reaches between 10 km (6 mi) and 31 km (19 mi), and 24 populations (16 percent) occupy stream reaches of 32 km (20 mi) or more. Conservation populations include: 32 percent with at least 2,000 adult BCT; 25 percent with between 500 and 2,000 adult BCT; 22 percent with between 50 and 500 adult BCT; and 21 percent with fewer than 50 adult BCT.

Most of the conservation populations (81 percent) were moderately healthy in terms of growth and survival (population production potential), based on habitat quality, presence of nonnative trout, disease risk, land uses, and recovery actions. Composite scores of conservation population general health included: 7 percent high; 39 percent moderately high; 37 percent moderately low; and 17 percent low (May and Albeke 2005, pp. 44–49). Low to moderately low composite scores (54 percent of BCT conservation populations) were primarily a result of the number of small, isolated populations. Even though most populations (66 percent) are small and isolated, these populations are found in a minority of the total BCT conservation population habitat; 70 percent of total habitat has BCT conservation populations that are moderately or strongly connected. As is explained below, these isolated populations have been incorporated into the BCT Conservation Team's conservation strategies and allow for BCT conservation populations that are less susceptible to introgression, disease, and competition from nonnative fish.

The BCT Conservation Team developed two conservation strategies for BCT conservation and management (May and Albeke 2005, p. iii). One strategy emphasizes isolated populations because they are less susceptible to introgression, disease, and competition from nonnative fish. In addition, multiple populations distributed throughout a watershed reduce risk because the simultaneous loss of all populations within the watershed is unlikely. The other strategy emphasizes preserving and restoring metapopulations to provide genetic exchange and allow for larger populations. Within the current range of BCT, and within each GMU, both isolated populations and metapopulations are present, providing for success of both conservation strategies.

The best available information indicates that, while most BCT conservation populations occur in small stream reaches (59 percent), most have moderately healthy growth and survival rates (54 percent). In addition, 70 percent of total habitat includes populations that are moderately or strongly connected. Therefore, we find that BCT conservation populations are adequately healthy and will remain so in the foreseeable future.

Nonnative Fishes

Introduced nonnative fish are a potential threat to native cutthroat subspecies (UDWR 2000a, pp. 1–9; May and Albeke 2005, pp. 21–24). We address this potential threat factor by breaking it into three components: (1) Management practices that included stocking of nonnative fish; (2) competition of nonnative fish with BCT; and (3) hybridization of BCT with nonnative fish. We summarize all three of these components together in the summary of Factor E because they are interrelated.

Fisheries Management

Since the late 1800s, early pioneers and fisheries managers have implemented fish stocking programs that introduced nonnative salmonids into lake and stream habitats of BCT. Brook trout were introduced into waters in Utah as early as 1875, rainbow trout in 1883, and brown trout (*Salmo trutta*) possibly as early as 1895 (Popov and Low 1950, pp. 49–57; Sigler and Miller 1963, pp. 29–54). It is unknown exactly when nonnative cutthroat were introduced; in 1899, 11,000 adults and yearling cutthroat trout were sent to the Fish and Game Warden in Salt Lake City (Ravenel 1900, pp. 35–118). This delivery may have included several subspecies, including Yellowstone cutthroat trout (Sigler and Miller 1963, pp. 29–54). The earliest stocking records indicate large numbers of young nonnative fish were stocked for decades into accessible waters in an effort to restore or sustain a high-quality fishery (Holden *et al.* 1997, pp. 2–1 to 2–13).

In 1915, nearly 2 million cutthroat and more than 7 million other trout were planted in Utah waters alone within the Bonneville Basin (Cope 1955, pp. 89–93). Of the cutthroat stocked in 1915, 100,000 were from Utah, and the remainder were collected from Bear Lake and other productive cutthroat populations and stocked into less productive or exploited systems. From 1915 to 1952, more than 100 million cutthroat were planted, comprising about one-third of the total stocking effort in Utah; approximately 45 percent were imported from Utah, almost exclusively from Yellowstone Lake (Cope 1955, pp. 89–93, as reported from biennial Utah State Fish and Game Commission reports 1915–1952). Comprehensive stocking records from the turn of the century for the Bonneville Basin in Nevada, Idaho, and Wyoming are not readily available because most of these peripheral areas of the Bonneville Basin are remote and inaccessible. However, it has been suggested that settlers moved fish among drainages in remote areas like the Snake Valley and the Pine Valley Mountains in the mid-to late-1800s (Miller and Alcorn 1946, pp. 173 193; Popov and Low 1950, pp. 38–39; Behnke 1992, pp. 134–135). Fish transplanting among and across drainages, without oversight, consent, or record-keeping, was likely common in remote pioneer settlements.

Although many nonnative species were once stocked throughout Utah, salmonid species, particularly rainbow trout, Yellowstone cutthroat trout, and brook trout, comprise the greatest potential threat to BCT. Rainbow and Yellowstone cutthroat trout can interbreed with BCT (Busack and Gall 1981, pp. 948–950; Weigel *et al.* 2002, pp. 397–401), and brook trout can be a competitor for food sources (Peterson *et al.* 2004, p. 769) (see next section on Competition). Rainbow trout were regularly stocked into most cold, clear-water stream systems and impoundments throughout the Bonneville Basin (Duff 1988, pp. 121–127; Holden *et al.* 1997, pp. 2–5 to 2–13). Rainbow trout were commonly stocked at accessible sites, which was not always successful in establishing wild populations (those that naturally reproduce and recruit in the wild). As a result, annual stocking was necessary to maintain a sustainable fishery. Heavy annual stocking has taken place in some streams for more than a century. In the past 30 years, stocking was modified to prevent introduction of nonnative salmonids into waters with known pure populations of BCT in Utah (Holden *et al.* 1997, pp. 2–13 to 2–22).

Because of the nearby source of fry in Yellowstone Lake, Yellowstone cutthroat trout were readily available for stocking. Yellowstone and other subspecies of cutthroat trout were stocked into streams to supplement the declining native fishery. In some cases, (e.g., Bear Lake) substantial records exist of annual stocking of Yellowstone cutthroat trout and other species. Despite this stocking, Yellowstone cutthroat trout did not necessarily become established in all waters into which they were stocked, and BCT in some areas have resisted hybridization with and replacement by nonnative trout (e.g., Bear Lake) (Behnke 1992, p 137). Genetic information is not currently sufficient to clearly discern Yellowstone cutthroat trout from BCT in the Bear River drainage because of their recent evolutionary divergence; however, morphological characteristics are distinctive between BCT and Yellowstone cutthroat trout and can be used to determine hybridization where it is suspected (Behnke 1992, pp. 132–138; Shiozawa 2008, p. 1).

State fish and wildlife agencies no longer stock nonnative trout in BCT habitat, and are implementing strategies to minimize impacts to BCT from nonnatives, such as installing fish barriers, removing nonnative fish, and increasing nonnative fish bag limits.

Competition From Nonnative Fish

Nonnative trout are known to compete with BCT (Behnke 1992, p. 54). Brown trout can successfully compete with BCT (Budy *et al.* 2005, pp. xi–xiii), and brook trout can displace cutthroat trout when they occur in the same habitat (Peterson *et al.* 2004, p. 769). Nonnative fish are sympatric with BCT within currently occupied habitat in the four GMUs (May and Albeke 2005, pp. 27–28). Currently occupied BCT habitat includes 37 percent (1,365 km/848 mi) without nonnative fish, and 63 percent (2,466 km/1,532 mi) with nonnative fish. The majority of habitat with nonnative fish is in the Bear River (1,398 km/869 mi) and Northern Bonneville (1,024 km/636 mi) GMUs. Only 45 km (28 mi) in the Southern Bonneville GMU have nonnative fish. No nonnative fish exist within the West Desert GMU in BCT conservation population habitat.

BCT conservation populations represent approximately 87 percent of currently occupied habitat (the other 13 percent includes sport fish) (May and Albeke 2005, p. 31). Of the 153 BCT conservation populations, 97 (63 percent) have no interaction with nonnative fish, and 56 (37 percent) are sympatric with nonnative fish (May and Albeke 2005, p. 31).

Natural and human-made barriers protect some BCT populations from competition with nonnative fish. Rangewide, barriers assist in protecting 35 BCT conservation populations occupying 480 km (298 mi) of stream (Burnett 2008b, pp. 1– Barriers help protect populations from nonnative fish invasion, but negative effects, such as blocking fish movement and fragmenting habitat, should be assessed and balanced before installing barriers. Therefore, this strategy for managing nonnative fish is not appropriate for all native cutthroat populations.

Hybridization With Nonnative Fishes

The scientific criteria for describing and formally recognizing taxonomic species of fish are based almost entirely on morphological characters (Behnke 1992, pp. 7–11). The advent of molecular genetic techniques in the mid-1960s added an additional set of biological markers that are used to distinguish species and subspecies of native trout in the western United States. Most genetic analyses on native cutthroat trout have confirmed the evolutionary distinctness among species and subspecies that had been described taxonomically on the basis of morphology (Behnke 1992, pp. 7–11).

Cutthroat trout populations that are less than 10 percent introgressed with nonnative species (or other cutthroat subspecies) retain morphological, behavioral, and ecological characteristics of their nonintrogressed ancestors (UDWR 2000a, pp. 1–9). Individuals of a particular cutthroat trout subspecies can possess nuclear genes from another taxon, detectable only by molecular genetic techniques, while still conforming morphologically, behaviorally, and ecologically to the scientific taxonomic description of the parental native species (Busack and Gall 1981, pp. 948–950; Weigel *et al.* 2002, pp. 397–401).

We do not consider populations or individual fish conforming morphologically to the scientific taxonomic description of BCT to be a hybridization threat to BCT. Although such individuals may have a low frequency of genes from another taxon (less than 10 percent), we have found no information indicating that such individuals express behavioral, ecological, or life-history characteristics differently than BCT native to a particular geographic area. The frequency of genes from other taxons will likely remain low in BCT populations for several reasons: (1) In some locations BCT likely can have an ecological advantage over nonnative fish because they have adapted over long time periods to their specific habitat; (2) stocking of nonnative trout in BCT habitat is no longer practiced by fish and wildlife agencies; and (3) 61 percent of BCT conservation populations are isolated by human-caused or natural barriers, protecting them from increasing numbers of nonnative trout (May and Albeke 2005, p. 37).

Some introgressed populations may be valuable to the overall conservation and survival of a species or subspecies (Campton and Kaeding 2005, pp. 1323–1324; USFWS 2003, pp. 46992–46993), because they can still express important behavioral, life history, or ecological adaptations of the indigenous population within a particular geographic area. BCT have evolved in varying environmental conditions in differing habitats across its range, and these conditions have likely influenced its behavioral and life history traits. For example, BCT with fluvial and adfluvial life-history strategies migrate up small streams to spawn, and BCT with a resident life-history strategy are able to conduct their entire life history (spawning, nursery/rearing, adult stage including overwintering) in headwater tributaries that provide all necessary life-history habitat types. Environmental conditions particular to a specific BCT population's ecological setting (e.g., latitude, elevation, temperature and precipitation regime) may allow for development of locally adapted traits that would justify preservation of a partially introgressed population. Maintaining unique life-history traits can outweigh the negative aspects of limited introgression. Thus, agencies should carefully evaluate the long-term conservation implications of strategies for managing introgressed BCT populations within the range of the BCT (USFWS 2003, pp. 46992–46993; Campton and Kaeding 2005, pp. 1323–1324), as different strategies may be appropriate for different populations.

No standards exist that define exact thresholds for acceptable levels of hybridization in cutthroat trout; however, we assessed all relevant scientific and commercial information available in order to arrive at generally applicable standards. These standards are applicable to other species of cutthroat trout we have assessed, including the Yellowstone (71 FR 8818, February 21, 2006) and Colorado River (72 FR 32589, June 13, 2007) cutthroat trout subspecies. Similar standards were applied to the Westslope cutthroat trout (WCT) (68 FR 46989, August 7, 2003); however, specific research was conducted indicating that WCT 20-percent introgressed with rainbow trout were indistinguishable morphologically from nonintrogressed WCT (Weigel *et al.* 2002, pp.397–401). Species-specific research comparing morphological characteristics to genetic introgression thresholds has not been conducted on other cutthroat subspecies; therefore, we used the more conservative threshold of 10 percent to define BCT conservation populations.

When BCT are sympatric with rainbow trout and nonnative subspecies of cutthroat trout, introgressed populations can occur, and because of this, researchers have studied the genetic status of BCT. These studies have measured levels of introgression in the BCT in targeted areas of its range, but have not, additionally, measured the morphological characteristics present at varying levels of introgression. The rangewide status report includes a summary of BCT genetic status (May and Albeke 2005, pp. 21–24).

Genetic testing was conducted in more than 784 km (487 mi) of BCT occupied habitats (20 percent of occupied habitat) (May and Albeke 2005, pp. 21–24). This research was conducted specifically in populations that appeared to be typical of the BCT phenotype; while results help elucidate the level of introgression in BCT, they cannot be used to summarize rangewide introgression levels. Test results showed no evidence of introgression in samples from 611 km (411 mi) of occupied habitat (17 percent of occupied habitat). An additional 1,215 km (755 mi) of occupied habitat (32 percent of occupied habitat) has populations suspected to be genetically unaltered, based on the absence of introduced hybridizing species and of stocking records for hybridizing species. The BCT Coordination Team has classified these as conservation populations. Hybridized fish occur in approximately 122 km (76 mi) of stream habitat (4 percent of occupied habitat). An additional 1,831 km (1,138 mi) of habitat (48 percent of occupied habitat) contains fish that are potentially hybridized, based on the presence of nonnative hybridizing species or records indicating past stocking of nonnative hybridizing species.

Researchers also assessed the genetic contamination risk, based on proximity and accessibility of rainbow trout and nonnative cutthroat trout, for the 153 BCT conservation populations (May and Albeke 2005, p. 37). A low genetic risk was found in BCT populations (94 populations; 61 percent) where a barrier provides complete blockage to upstream fish movement of introduced hybridizing species. A moderately low genetic risk was found in BCT populations greater than 10 km (6 mi) from hybridizing species or subspecies, and a moderately high risk was found in BCT populations within 10 km (6 mi) of hybridizing species or subspecies (27 populations; 18 percent). A high risk rating was found in BCT populations (32 populations; 21 percent) sympatric with hybridizing species in the same stream segment. Of the populations that were rated with low risk of genetic contamination, 87 (93 percent) were identified as being isolated populations.

Summary of Nonnative Fishes

Despite the presence of nonnative fish species sympatric with BCT, we find that stocking, competition, and hybridization do not pose significant threats to BCT, because: (1) In some locations BCT likely can have an ecological advantage over nonnative fish because they have adapted over long time periods to their habitat; (2) well-distributed core populations of BCT persist in streams with nonnative fish; (3) 61 percent of BCT populations are isolated from nonnative fish by natural or constructed barriers; and (4) stocking of nonnative fish no longer occurs in waters with BCT conservation populations. In addition, programs are being implemented to remove nonnative trout, through mechanical or chemical means, from BCT waters in all four States (NDOW 2006, p. S–22; IDFG 2008, pp. 9–10; Donaldson 2008, p. 5; WGFD 2008, p. 10). In Utah, between 2001 and 2007, nonnative fish removal was conducted on more than 80 km (50 mi) of BCT streams (Donaldson 2008, p. 5).

Groundwater Pumping

Multiple filings for groundwater withdrawal from both the carbonate-rock and alluvial aquifers in the Great Basin are currently in place within the historic range of BCT populations in the West Desert GMU. Southern Nevada Water Authority (SNWA) has applied to the BLM for issuance of rights-of-way to construct and operate a system of regional water supply and conveyance facilities. The project would include conveyance of up to 24,384 hectares per meter (ha-m) (200,000 acre-feet per year (ac-ft)) of groundwater—20,360 ha-m (167,000 ac-ft) by SNWA with the remaining capacity provided for Lincoln County Water District from six hydrographic basins (SNWA 2007, p. 1–1). The groundwater that SNWA intends to convey would be from both existing and future permitted water rights in hydrographic basins of the Great Salt Lake Desert Regional Flow System

(Nevada and Utah) and White River Flow System (Nevada).

SNWA's Groundwater Development (GWD) Project includes construction and operation of groundwater production wells, water conveyance facilities, and power facilities. The proposed production wells and facilities would be located on public lands managed by BLM in Nevada. No facilities are planned in Utah (SNWA 2007, p. 1–1).

The Nevada State Engineer issued a ruling on April 16, 2007, approving a major portion of the SNWA groundwater rights applications for the Spring Valley hydrographic basin. SNWA can pump 4,877 ha-m (40,000 ac-ft) annually from the basin, with the potential for an additional 2,438 ha-m (20,000 ac-ft) based on results of 10 years of monitoring that will be conducted for the initial pumping allocation (NSE 2007, p. 56). The Nevada State Engineer hearings on SNWA water rights applications in Snake Valley are projected for fall 2009. In addition to the water awarded to SNWA in Spring Valley, filings for 6251 ha-m (50,680 ac-ft) in Snake Valley are pending.

New, large-volume filings in the State of Utah include: Millville Irrigation Co.—15172 ha-m (123,000 ac-ft) in Wah Wah Valley; the Confederate Tribes of the Goshute Reservation—6168 ha-m (50,000 ac-ft) in Deep Creek Valley; Central Iron County Water Conservancy District—4564 ha-m (37,000 ac-ft) in Hamlin, Pine, and Wah Wah Valleys; private parties in Snake Valley—1294 ha-m (10,490 ac-ft); and the State of Utah School and Institutional Trust Lands—1105 ha-m (8960 ac-ft) in Snake Valley (UGS 2008, entire). We did not receive information detailing future plans for development on the filings of these Utah water rights.

The SNWA GWD Project is anticipated to be completed and may begin pumping in January 2014 (SNWA 2007, pp. 4–11). Prior to its completion, baseline data collection and research on biologic and hydrologic impacts will be completed and an intensive monitoring program will be put in place to monitor and mitigate for Project effects. At the present time, SNWA anticipates that ultimately between 110 and 200 groundwater production wells may be required for the GWD Project. However, the specific locations of these wells are dependent upon future rulings from the Nevada State Engineer, exploratory drilling results, agency agreements, and results of actual groundwater pumping. SNWA anticipates that it may take up to 20 years or more to site and install all of the groundwater production wells for the project (SNWA 2007, p. 2–1).

A great deal of uncertainty exists regarding the long-term effects of the groundwater pumping for aquifers and surface waters in the Great Basin. However, well locations will generally be sited in valley bottoms and be withdrawing water from deep carbonate and alluvial aquifers. BCT populations are generally located in headwater streams in the West Desert GMU, and it is anticipated that direct effects to BCT populations and their habitat will be minimal or nonexistent. Additionally, SNWA entered into a stipulation with the Department of the Interior regarding SNWA's GWD Project water withdrawals in the Spring Valley hydrographic basin. The goals of this stipulation include avoidance of any effects to water-dependent ecosystems within the boundaries of Great Basin National Park and avoidance of unreasonable adverse impacts to water-dependent ecosystems in the remainder of the project area. This will be accomplished through hydrologic and biologic monitoring, management, and mitigation plans designed to identify, avoid, and mitigate effects of groundwater withdrawal on dependent ecosystems (SNWA 2008, p. 15).

It has been hypothesized that water development in two areas of the GWD Project, the Spring Valley and Snake Valley Basins, could have indirect effects to BCT habitats in the West Desert GMU. Groundwater pumping could result in the lowering of valley water tables and spring discharge rates and result in drying and desiccation of wetland and riparian phreatophytic (deep rooted) vegetation. This could likely result in an increase in fire frequency in Great Basin valley floors that are adjacent to drainages that have BCT populations in headwater streams. Riparian vegetation in drainages of the Snake and Deep Creek ranges where BCT occur could become more susceptible to these fires. However, there is a great deal of uncertainty as to whether this scenario will occur or if it will have impacts to BCT as no information exists regarding what the actual effects of pumping would be to valley vegetation or fire frequency. At this time, we know of no information that indicates to us that groundwater pumping in the West Desert GMU is significantly affecting BCT now or into the foreseeable future.

Summary of Factor E

Despite the potential for increased risk to BCT populations resulting from future climate change, we found no scientific and commercial information leading us to conclude that climate change is currently a significant threat to BCT conservation populations, or will become so within the foreseeable future.

We assessed the potential risks to BCT conservation populations associated with fragmentation and isolation of small BCT conservation populations, including stochastic, catastrophic, natural events, and find that they do not now, nor will in the foreseeable future, significantly threaten the status of BCT to the extent that listing under the Act as a threatened or endangered species is warranted.

We assessed the potential threats posed by nonnative species, including historical stocking, competition, and introgressive hybridization with rainbow trout or other cutthroat subspecies. Nonnative fish species exist in 63 percent of occupied BCT habitat. However, 61 percent of BCT populations are isolated from nonnative fish by natural or constructed barriers, and stocking of nonnative fish no longer occurs in BCT waters. These factors, combined with the current distribution of conservation populations, indicate that nonnatives do not currently affect the status of BCT to the extent that listing under the Act as a threatened or endangered species is warranted. In addition, management practices focused on removing and preventing introduction of nonnative fish within BCT habitat, provide reasonable assurance that this potential threat factor will not increase within the foreseeable future.

Foreseeable Future

In the context of the Act, the term ''threatened species'' means any species (or subspecies or, for vertebrates, distinct population segments) that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The term ''endangered species'' means any species that is in danger of extinction throughout all or a significant portion of its range. The Act does not define the term foreseeable future; however, we consider it to be affected by the biological and demographic characteristics of the species, as well as our ability to predict or extrapolate the effects of threats facing the species in the future. Quantification of the time period corresponding to the foreseeable future is challenging because it necessitates making predictions about inherently dynamic political, legal, and social mechanisms that influence the degree and immediacy of potential threats to the species.

For the purpose of this finding, the ''foreseeable future'' is the period of time over which events or effects reasonably can or should be anticipated, or trends reasonably extrapolated, such that reliable predictions can be made concerning the status of the species in the future. Although we have found some threats to BCT are ongoing at low levels and that various localized areas may be affected by specific problem activities, as discussed in the Summary of Factors section, we did not find any information to suggest that threats will rise to levels that would significantly threaten BCT rangewide to the extent that the species would warrant listing under the Act.

Although we did not find any information to allow us to reliably predict that threats would increase significantly in the future, predicting and managing for the effects of potential future threats will be facilitated by the BCT conservation plans that are in place at the State and rangewide level (see Conservation Actions section under Factor D). Monitoring of BCT population numbers and habitat conditions is included in the State and rangewide conservation plans and any significant decreases in BCT populations or habitat conditions should be identified and effectively mitigated by using the methods developed in these conservation plans. State and Federal agency participation in BCT conservation plans is voluntary; however, State plans are typically in place indefinitely, or have a term of agreement for 5–10 years with renewal provisions for a similar time period. The rangewide BCT conservation agreement was renewed in 2008 for 10 years with the commitment that it would be extended for an additional 10 years upon expiration. In addition, the States within the range of the BCT have an established record of managing for the species (see Factor D). We find that the BCT conservation plans will be in place and operating for at least 20 years. We consider the status of the BCT to be reasonably predictable with established management practices in place because many of the threats to the species are effectively mitigated by these practices; outside the timeframe of the conservation plans, we are unable to make reliable predictions regarding the threats to the species and the effect of those threats on the status of the species. Therefore, the foreseeable future for BCT is 20 years with respect to most threats.

Our ability to predict the effects of future threats is limited to our knowledge of the timeframe of the threats potentially facing the BCT, and the conservation activities taking place to address them. We assessed activities that could potentially affect BCT populations under the Summary of Factors section. Livestock grazing was a concern in the early 1900's, but recent management practices appear to have reduced effects to watersheds, and these practices are expected to continue for at least 20 years. Road construction or maintenance, timber harvest, and water diversions and depletions are expected to be managed consistently within at least the next 20 years, and are not expected to result in a downward trend in BCT population status. The foreseeable future for oil and gas development is possibly shorter than for other threats (i.e., less than 20 years), because this threat is not specifically mitigated by conservation actions identified in the State conservation plans; however, oil and gas developments are mostly outside the historic range of the BCT, and are not creating a downward trend in population status. Recreational angling is currently regulated, and no downward trend in population status exists due to this activity. Disease in BCT is being mitigated through conservation actions that are expected to continue for at least the next 20 years. Factors related to the presence of nonnative fish species, such as predation, competition, and genetic introgression, are being mitigated through conservation actions that are expected to continue for at least the next 20 years.

Climate change projections are considered fairly robust for the current century on a continental scale, but, as discussed above, we cannot yet make reliable predictions as to the magnitude or timing of likely temperature increases within the range of the BCT. Therefore, for the purposes of analyzing the threat of climate change to the BCT, the future is only foreseeable to the extent of our determination that some additional temperature increase is likely. We cannot determine that the BCT will become endangered due to an unquantifiable amount of temperature increase, particularly given the BCT's apparent adaptability to a relatively broad spectrum of habitat conditions, although we recognize that it is possible that climate change will eventually have more significant impacts.

We have determined that the immediacy and magnitude of the above-mentioned threats will not significantly degrade the 80 percent of BCT habitat that is currently in fair to excellent condition within the next 20 years, in part due to regulatory mechanisms and management practices (no nonnative stocking, combined with nonnative removal programs) that have been implemented and shown to be effective by State and Federal management agencies, and that we have reasonable assurance will continue for at least the next 20 years.

Significant Portion of the Range

As required by the Act, we considered the five potential threat factors to assess whether the BCT is threatened or endangered throughout all or a significant portion of its range. When considering the listing status of a species, the first step in the analysis is to determine whether the species is in danger of extinction throughout all of its range. If this is the case, then we list the species in its entirety. For instance, if the threats to a species are directly acting on only a portion of its range, but they are at such a large scale that they place the entire species in danger of extinction, we would list the entire species.

Based on the best available scientific and commercial information available addressing BCT distribution and potential threats, especially the rangewide status report for BCT (May and Albeke 2005, entire), we find that the BCT is not likely to become endangered in the foreseeable future throughout all of its range.

On March 16, 2007, a formal opinion was issued by the Solicitor of the Department of the Interior, ''The Meaning of 'In Danger of Extinction Throughout All or a Significant Portion of Its Range' '' (DOI 2007). A portion of a species' range is significant if it is part of the current range of the species and is important to the conservation of the species because it contributes meaningfully to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species.

We evaluated the BCT throughout its current range to determine if any portion is likely to become threatened or endangered within the foreseeable future, and if so, whether that portion is important to the conservation of the species because it contributes meaningfully to the resiliency, representation, or redundancy of the species.

The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose in analyzing portions of the range that are not reasonably likely to be significant and threatened or endangered. To identify portions that warrant further consideration, we determine whether there is substantial information indicating that (i) the portions may be significant and (ii) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the range that are unimportant to the conservation of the species, such portions will not warrant further consideration.

If we identify portions of the range that warrant further consideration, we determine whether the species is threatened or endangered in any significant portion of its range. Depending on the biology of the species, its range, and the threats it faces, it may be more efficient to address the significance question first, or the status question first. If we determine that a portion of the range is not significant, we need not determine whether the species is threatened or endangered there; similarly, if we determine that the species is not threatened or endangered in a portion of its range, we need not conduct significance analysis.

The concepts of ''resiliency,'' redundancy,'' and ''representation'' are indicators of the conservation value of portions of the range. Resiliency of a species allows the species to recover from periodic disturbance. A species will likely be more resilient if large populations exist in high-quality habitat that is distributed throughout the range of the species in such a way as to capture the environmental variability found within the range of the species. It is likely that the larger size of a population will help contribute to the viability of the species overall. Therefore, a portion of the range of a species may make a meaningful contribution to the resiliency of the species if the area is relatively large and contains particularly high-quality habitat or if its location or characteristics make it less susceptible to certain threats than other portions of the range.

Redundancy of populations may be needed to provide a margin of safety for the species to withstand catastrophic events. This does not mean that any portion that provides redundancy is a significant portion of the range of a species. The idea is to conserve enough areas of the range such that random perturbations in the system act on only a few populations. Therefore, each area must be examined based on whether that area provides an increment of redundancy that is important to the conservation of the species.

Adequate representation insures that the species' adaptive capabilities are conserved. Specifically, the portion should be evaluated to see how it contributes to the genetic diversity of the species. The loss of genetically based diversity may substantially reduce the ability of the species to respond and adapt to future environmental changes. A peripheral population may contribute meaningfully to representation if there is evidence that it provides genetic diversity due to its location on the margin of the species' habitat requirements.

We assessed threats at the watershed-based GMU level, because standardized fish monitoring methods and BCT management methods are watershed based. The four GMUs are geographically and hydrologically distinct; they also delineate BCT populations in logical biogeographical and taxonomic subgroups. Based on the best available scientific and commercial information regarding the abundance of BCT, and our assessment of threats to the species, throughout its current range, we find that no individual GMU is likely to become threatened or endangered in the foreseeable future because threats are evenly distributed throughout the range of the species.

Further subdividing of BCT populations or habitat into smaller portions than GMUs would require unscientific methodology. In addition, smaller subdivisions of populations would not, individually, be significant to the subspecies. We find that areas smaller than the GMU would not meaningfully contribute to the resilience, redundancy, or representation of the BCT. Losses of habitat or species from areas smaller than the GMU level would not threaten the entire GMU, and a sufficient number of GMUs exist to ensure species redundancy and resiliency. No significant ecological differences exist at levels smaller than the GMUs to affect representation of the subspecies. Threats are similar in all four GMUs, and no individual GMU has threats of a magnitude that the subspecies is threatened or endangered within it. Therefore, we have determined that no significant portion of the BCT range is in danger of extinction or likely to become so within the foreseeable future.

Distinct Vertebrate Population Segment (DPS)

Pursuant to section 4(a)(1) of the Act, we must determine whether any species is an endangered species or a threatened species because of any of the threat factors identified therein. Section 3(15) of the Act defines ''species'' to include ''any species or subspecies of fish and wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature'' (16 U.S.C. 1532 (16)). To interpret and implement the distinct vertebrate population portion of the definition of a species under the Act and congressional guidance, the Service and the National Marine Fisheries Service (now the National Oceanic and Atmospheric Administration—Fisheries) published, on February 7, 1996, an interagency Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Act (DPS Policy; 61 FR 4722). The policy allows for more refined application of the Act that better reflects the conservation needs of the taxon being considered, and avoids the inclusion of entities that may not warrant protection under the Act.

Under our DPS policy, three elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for additions to the List of Endangered and Threatened Wildlife and Plants, reclassification, and removal from the List. They are: (1) Discreteness of the population segment in relation to the remainder of the taxon; (2) the significance of the population segment to the taxon to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing (i.e., whether the population segment is, when treated as if it were a species, endangered or threatened). Discreteness refers to the isolation of a population from other members of the species and we evaluate this based on specific criteria. If a population segment is considered discrete, we must consider whether the discrete segment is ''significant'' to the taxon to which it belongs by using the best available scientific information. If we determine that a population segment is discrete and significant, we then evaluate it for endangered or threatened status based on the Act's standards.

We assessed threats at the watershed-based GMU level, because standardized fish monitoring methods and BCT management methods are watershed based. The four GMUs are geographically and hydrologically distinct; they also delineate BCT populations in logical biogeographical and taxonomic subgroups. In addition, each GMU is significant to the continued existence of the species. However, based on the best available scientific and commercial information regarding the abundance of BCT, and our assessment of threats to the species, throughout its current range, we find that no individual GMU is likely to become threatened or endangered in the foreseeable future because threats are evenly distributed throughout the range of the species.

The four GMUs meet the first two criteria in the DPS policy, but the conservation status of each is stable. Further subdividing of BCT populations or habitat into smaller portions than GMUs would require unscientific methodology. In addition, while it is possible that smaller units would meet the discreteness criteria in the DPS policy, it is unlikely that any smaller area would be significant to the subspecies.

Finding

This status review includes substantial information that was not available at the time of the 2001 status review and 12-month finding (66 FR 51362), in particular, the information obtained from May and Albeke (2005). We requested a peer review of May and Albeke (2005); peer reviews were conducted by five recognized cutthroat trout experts who found that the document provided sound scientific data on the rangewide status of BCT.

Populations of BCT have been greatly reduced over the last 200 years, with much loss occurring in the late 19th and early 20th century (Behnke 1992, pp. 132–138). However, recent surveys have shown that the numbers of BCT populations have increased in the last 3 decades and the subspecies remains widely distributed throughout a large geographic area. We attribute the historic decline in the distribution of BCT to the introduction of nonnative sport fish into BCT habitat that began in the late 1800s. The wide distribution of rainbow trout and nonnative cutthroat trout caused problems through competition, hybridization, and predation. In some places, introduced fish expanded and colonized new habitat, and formed naturally reproducing populations that occupy the former, and in some cases current, range of BCT.

We found no evidence of continuing declines in the overall distribution or abundance of BCT during the last several decades. A substantial increase in the number of known populations has been documented (May and Albeke 2005, pp. 63–64), and habitat quality is good to excellent in over half (52 percent) of BCT habitat, and fair to excellent in 80 percent of BCT habitat. Management agencies have focused on the protection and restoration of conservation populations of BCT in all currently occupied watersheds. Additional focus is on habitat restoration activities and fisheries management actions designed to benefit BCT. Some recognized threats to BCT, such as excessive harvest by anglers and stocking of nonnative fishes, are now regulated or discontinued so that they no longer threaten the continued existence of BCT. Conservation actions have resulted in improved population levels in some areas (Ottenbacher 2008, entire).

At least 153 BCT conservation populations collectively occupy about 3,316 km (2,061 mi) of stream habitat in 22 watersheds (HUCs) in Utah, Idaho, Nevada, and Wyoming. These populations qualify as conservation populations of BCT under standards developed by the States that are consistent with our assessment of best available science. Conservation populations are distributed throughout the four GMUs within the historic range of the BCT. Of the 153 conservation populations identified by May and Albeke (2005, p. 31), about 71 (46 percent) are core populations comprised of nonintrogressed BCT (greater than 99 percent genetic purity).

Hybridization, mostly with nonnative rainbow trout and nonnative subspecies of cutthroat trout that have established self-sustaining populations in many areas in the range of BCT, has historically been an issue of management concern. However, current State management has greatly reduced opportunities for further genetic introgression. States continue to monitor introgression in BCT throughout its range. We find that the limited presence of genetic material from other fish species or subspecies (typically less than 10 percent) is not a threat to BCT conservation populations. Populations or individual fish with a low level of introgression are morphologically, ecologically, and behaviorally indistinguishable from nonintrogressed (i.e., pure) BCT. Slightly introgressed BCT populations, with low amounts of genetic introgression detectable only by molecular genetic methods (i.e., conservation populations), are an important component of BCT conservation. Genetically pure populations (71 core populations) are distributed throughout the current range of BCT. State and Federal agencies are implementing strategies and actions to protect BCT populations from invasion of nonnative species or subspecies that may interbreed with BCT.

Brook trout, brown trout, and rainbow trout compete with BCT where they are sympatric. Managers are monitoring competition from nonnative fish in BCT waters, and implementing ongoing management strategies and actions to curtail it. However, 1,365 km (848 mi) of habitat occupied by BCT conservation populations are free of nonnative trout.

The BCT persists as a widely distributed subspecies; 153 conservation populations exist throughout the historic range, and a metapopulation structure exists in each GMU. Nonintrogressed BCT core populations exist in habitats secure from nonnative trout and thus are protected from potential hybridization throughout the subspecies' historic range. Although distribution of BCT has been reduced from historic levels (the subspecies now occupies about 35 percent of historic habitat), the 2005 rangewide status report on BCT documented the continued existence of conservation populations throughout its current range, and that 80 percent of occupied habitat is in fair to excellent condition.

We have thoroughly assessed the current status of BCT, the mitigation of existing threats, and the existence of laws and regulations that minimize adverse effects of land management and other activities on BCT. We find that the magnitude and imminence of threats do not indicate that the subspecies is in danger of extinction, or likely to become endangered, throughout all or any significant portion of its range, within the foreseeable future. Therefore, we find that listing the BCT as a threatened or an endangered species under the Act is not warranted at this time.

References Cited

A complete list of all references cited herein is available upon request from the Utah Ecological Services Field Office (see **ADDRESSES** section).

Author

The primary author of this document is the staff of the U.S. Fish and Wildlife Service, Utah Ecological Services Field Office (see **ADDRESSES** section).

Authority: The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: August 29, 2008.

Kenneth Stansell,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. E8–20674 Filed 9–8–08; 8:45 am]

BILLING CODE 4310–55–P