address take associated with sediment, turbidity and pile-driving, we will use the amount of habitat affected as a surrogate. We anticipate that all adult and subadult bull trout in the immediate vicinity of in-stream Program activities and downstream 600 feet (i.e., the assumed extent of downstream sediment or pile-driving sound effects) from each of these activity sites, will be subject to take in the form of harm from direct exposure to the increased levels of suspended sediment, turbidity, and deposited sediment (resulting from relevant work types in Table 2 including, but not limited to, bank stabilization) or harassment from the sound effects associated with pile-driving. Incidental take of bull trout associated with project construction is only anticipated to occur during in-water work windows established by IDFG, the Department, and/or the Services. The Service expects no direct lethal take of bull trout associated with project construction activities and none is authorized. Conservation measures incorporated into the Program are expected to reduce the level of anticipated take.

If the incidental take anticipated by this document (i.e., harm or harassment to bull trout within the action area during the five years of Program implementation) is exceeded, all such activities will cease and the Agencies will immediately contact the Service to determine if consultation should be reinitiated. Authorized take will be exceeded (1) if any individual Program activity results in suspended sediment exposure (concentration and duration) or sound effect levels determined to have more than minor physiological effects to bull trout within 600 feet downstream of in-stream construction sites; (2) if there is more than 300 feet of bank stabilization (i.e., riprap or gabion baskets) work for any single project or if there are more than two such bank stabilization projects per 4th Field HUC per year; (3) if instream work occurs outside of agreed upon in-water work windows; or (4) if Program activities result in any bull trout mortality.

Bull trout present in the action area may be injured or killed in the process of collecting and removing fish prior to instream work. This take has already been anticipated and analyzed in the Service's Biological Opinion for Idaho Department of Fish and Game's Scientific Collecting Permit (Fish and Wildlife Service 2000), and will not be addressed in this Opinion.

4.6.2 Effect of the Take

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the bull trout across its range.

Anticipated take may be reduced because the project includes BMPs to avoid and reduce adverse effects. In addition, adverse effects will be short in duration and limited in scope. The probability that the proposed action will eliminate any local populations of bull trout is discountable. Local bull trout densities and distribution in the affected streams are not expected to be significantly altered.

4.6.3 Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of take on the bull trout.

1. Minimize the potential for disruption of bull trout habitat from project implementation.

2. Avoid impacts to bull trout spawning and early rearing areas.

4.6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1a. As needed during dewatering, the Agencies will identify for the contractor where pump water from the dewatered area will be disposed. All necessary measures (e.g., settling ponds) will be taken to ensure that no sediment from pump water will reach the stream.

1b. All erosion and sediment control measures will be maintained until construction is complete and disturbed areas are stabilized.

2. Ensure that no Program activities occur in bull trout spawning areas.

4.6.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (50 CFR 402.14 (i)(3)).

1. As part of the process for implementing the Program, the Department is required to provide appropriate post-Project Monitoring Forms to the Service within 45 days of project completion. The Department will also host an annual coordination meeting to review the projects implemented under the Program during the previous year.
2. Upon locating any dead, injured, or sick bull trout, or upon observing destruction of redds as a result of project activities such activities shall be terminated and notification must be made within 24 hours to the Service's Division of Law Enforcement at (208) 378-5333. Additional protection measures may be developed through discussions with the Service.
3. During project implementation, the Agencies shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for bull trout relative to the proposed activity.

4.7 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

1. To better assess sediment effects on bull trout from future instream projects, take suspended sediment samples at the turbidity monitoring stations established for the project. Although turbidity and suspended sediment concentration are correlated, the relationship varies between individual streams and watersheds. Measuring suspended sediment will assist in making stream-specific correlations between suspended sediment concentrations and turbidity.

2. Continue to promote recovery of bull trout in the action area by identifying habitat restoration opportunities and implementing these actions in the near-term.
3. Use native species for revegetating disturbed sites.
4. Restrict washout of concrete trucks and equipment to locations that will minimize the risk of introducing wastewater to bull trout habitat.

5. UTAH VALVATA SNAIL

5.1 Status of the Species

5.1.1 Listing Status

The Service listed the Utah valvata snail as endangered effective January 13, 1993 (57 FR 59244-59257, December 14, 1992). No critical habitat has been designated for this species. The Service also published a recovery plan for this species and four other Snake River snails (Fish and Wildlife Service 1995). The target recovery area for this species is from river mile (RM) 572 near Hagerman to RM 709, a few miles below American Falls Dam on the Snake River, and includes associated cold-water tributaries (Fish and Wildlife Service 1995, p. 30).

On July 16, 2009, the Service published a 12-month petition finding, proposing to remove the Utah valvata from the Federal List of Endangered and Threatened Wildlife (74 FR 34539-34548). As of the date of this Opinion, the Service has not published a final rule delisting the Utah valvata. The snail will remain listed as endangered until a final rule is published.

5.1.2 Reasons for Listing

Section 4 of the Act and regulations promulgated to implement the listing provisions of the Act (50 CFR part 424) set forth the procedures for adding species to the Federal list. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1) of the Act. Three of the five factors were found to apply to the Utah valvata snail: the present or threatened destruction, modification, or curtailment of its habitat or range; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

Primary factors found to be threatening the Utah valvata at the time of listing include hydroelectric dam development, water withdrawals for agriculture and small hydroelectric projects, peak loading of existing hydroelectric water projects, water pollution, and exotic species invasions (e.g., New Zealand mudsnail, *Potamopyrgus antipodarum*).

Our understanding of the Utah valvata habitat requirements, range, and threats has changed since the time of listing. From studies conducted since 1992, we now know that the species occurs over a much larger geographic range in the Snake River and is able to live in a variety of aquatic habitats and is not limited to cold, fastwater, or lotic habitats, or in perennial flowing waters associated with large spring complexes as previously believed. In addition, the proposed construction of six new hydropower facilities as discussed at the time of listing is no longer a threat. The Utah valvata is now known to occur in, and persist in, aquatic habitats influenced by dam operations (e.g., reservoirs, and at elevated water temperatures), and the species co-exists in

a variety of Snake River aquatic habitats with the invasive New Zealand mudsnail. We have determined that none of the existing or potential threats, either alone or in combination with others, are likely to cause the Utah valvata to become in danger of extinction within the foreseeable future throughout all or any significant portion of its range. The Utah valvata no longer requires the protection of the Act, and, therefore, we are proposing to remove it from the Federal List of Endangered and Threatened Wildlife (74 FR 34548).

5.1.3 Species Description

The shell of the Utah valvata reaches about 4 to 6 mm (0.2 in.) in height and width and is turbinate in shape. Adults have up to four whorls and the shell has a well developed umbilicus and a single raised ridge or carina that runs longitudinally along the body whorl and fades out before reaching the aperture (Walker 1902, p. 125). Empty shells are translucent to faded green or yellowish at their spire apex. Live snails appear grey to brown and are typically associated with sediment-containing aquatic habitats, including springs, rivers, lakes, and reservoirs.

5.1.4 Life History

The Utah valvata snail is univoltine (produces one group of eggs per year) with a lifespan of about 1 year. Reproduction and spawning occur asynchronously between March and October, depending on habitat, with the majority of young spawned between August and October (Cleland 1954, pp. 171-172; Bureau of Reclamation 2003, p. 7). Emergence of a new cohort follows approximately 2 weeks after oviposition (Cleland 1954, p. 170; Dillon 2000, p. 103), and senescent snails (i.e., those approximately 374 days old) die shortly after reproduction (Cleland 1954, pp. 170-171; Lysne and Koetsier 2006, p. 287).

Little is known of Utah valvata feeding habits. They have been described as detritivores (animals that feed on decomposing organic matter), ingesting diatoms, algae, and minute plant debris, and also grazing the aufwuchs (the algae, diatoms, protozoans, bacteria, and fungi that comprise the fine, slippery coating on plants and rocks in aquatic ecosystems) (Frest and Johannes 1992, p. 13-14).

At the time of listing in 1992, the best available data indicated that Utah valvata snails "characteristically require cold, fastwater, or lotic habitats …in deep pools adjacent to rapids or in perennial flowing waters associated with large spring complexes" (57 FR 59244, December 14, 1992). In numerous field studies conducted since then, the species has been collected at a wide range of depths, ranging from less than 3.2 feet (1 meter) (Stephenson and Bean 2003, pp. 98-99) to depths greater than 45 feet (14 meters) (Bureau of Reclamation 2003, p. 20), and at temperatures between 37.4 and 75.2 degrees Fahrenheit (F) (4 to 24 degrees Celsius (C)) (Lysne 2007, in litt.; Gregg 2006, in litt.).

Recent work conducted by the IDFG in the upper Snake River demonstrated that Utah valvata snail presence was positively correlated with water depth (up to 18.37 feet (5.6 meters)) and temperature (up to 63 degrees F (17.2 degrees C)) (Fields 2005, pp. 8-9). Utah valvata snail density was positively correlated with macrophyte (a water plant large enough to be observed with the unaided eye) coverage, water depth, and temperature (Fields 2006, p. 6). Similarly, Hinson (2006, pp. 28-29) analyzed available data from several studies conducted by the Bureau of Reclamation (2001-2004), Idaho Power Company (IPC) (1995-2002), IDFG, the Department (2003-2004) and others, and demonstrated a positive relationship between Utah valvata snail

presence and macrophytes, depth, and fine substrates. One study reported Utah valvata snails in organically enriched fine sediments with a heavy macrophyte community, downstream of an aquaculture facility (RM 588) (Hinson 2006, pp. 31-32). Survey data and information reported since the time of listing demonstrate that the Utah valvata snail is able to live in reservoirs, which were previously thought to be unsuitable for the species (Frest and Johannes 1992, pp. 13-14; Bureau of Reclamation 2002, pp. 8-9; Fields 2005, p. 16; Hinson 2006, pp. 23-33). We now know the Utah valvata snail persists in a variety of aquatic habitats, including cold-water springs, spring creeks and tributaries, the mainstem Snake River and associated tributary stream habitats, and reservoirs.

Alterations of the Snake River, including the construction of dams and reservoir habitats, have changed fluvial processes resulting in the reduced likelihood of naturally high river flows or rapid changes in flows, and the retention of fine sediments (Environmental Protection Agency 2002, pp. 4.30-4.31), which may also increase potential habitat for the species (e.g., Lake Walcott and American Falls Reservoirs). Utah valvata snail surveys conducted downstream from American Falls Dam (RM 714.1) to Minidoka Dam (RM 674.5), from 1997 and 2001-2007, consistently found Utah valvata snails on fine sediments within this 39-mile (62.9 km) river/reservoir reach of the Snake River (Bureau of Reclamation 1997, p. 4; Bureau of Reclamation 2003, p. 8; Bureau of Reclamation 2004, p. 5; Bureau of Reclamation 2005, p. 6; Bureau of Reclamation 2007, pp. 9-11; Fish and Wildlife Service 2005, p. 119). Surveys conducted downstream of Minidoka Dam (RM 674.5) to Lower Salmon Falls Dam (RM 573.0) have detected Utah valvata snails, including one record from the tailrace area of Minidoka Dam in 2001 (Fish and Wildlife Service 2005, p. 120).

In summary, based on available information, the Utah valvata snail is not as specialized in its habitat needs as we thought at the time of listing. In the Snake River, the species inhabits a diversity of aquatic habitats throughout its 255-mile (410 km) range, including cold-water springs, spring creeks and tributaries, mainstem and freeflowing waters, reservoirs, and impounded reaches. The species occurs on a variety of substrate types including both fine sediments and more coarse substrates in areas both with and without macrophytes. It has been collected at water depths ranging from less than 3.2 feet (1 meter) to greater than 45 feet (14 meters), and at water temperatures ranging from 37.4 to 75.2 degrees F (3 to 24 degrees C).

5.1.5 Population Dynamics

The species is univoltine with a life span of about one year. The reproductive potential of the Utah valvata is unknown, but egg masses with up to 12 eggs have been observed (Lysne, 2003, p. 80). Analysis of size classes in Lake Walcott suggests that these colonies reproduce between June and September (Bureau of Reclamation 2003, pp. 10-12).

The density of Utah valvata at occupied sites can vary greatly. For example, at one cold-water spring site at the Thousand Springs Preserve, the average density in 2003 was 197 snails/square meter (sq m) (ranging between 0 and 1,724 snails/sq m) (Stephenson et al. 2004, p. 23). In the mainstem Snake River between American Falls Reservoir and Minidoka Dam in 2002, Utah valvata densities averaged 91 snails/sq m (ranging from 0 to 1,188 snails per sq m), and in American Falls Reservoir densities averaged 50 snails/sq m (range unavailable) (Bureau of Reclamation 2003, p. 20). Above American Falls Reservoir in the mainstem Snake River, Utah

valvata densities at six sites averaged 117 snails/sq m (ranging from 0 to 1,716 snails/sq m) (Fields 2006, pp. 12-13).

Within reservoirs, the proportional occurrence of snails is relatively high. For all field studies and surveys, the highest proportions of samples where snails are present have been collected in lower Lake Walcott Reservoir (Bureau of Reclamation 2002, p. 5; Bureau of Reclamation 2003, p. 6). For sample years 2001 to 2006, the relative proportion of samples containing Utah valvata snails ranged from 40 (in 2004) to 62 (in 2002) percent of samples collected. Similarly, American Falls reservoir samples contain a high proportion of Utah valvata snails with 21 (in 2001) to 33 (in 2003) percent in collections between 2002 through 2004. Such high proportional occurrence in reservoirs is additional evidence that Utah valvata snails are not restricted to cold-water springs or their outflows.

5.1.6 Status and Distribution

The Utah valvata snail, or at least its closely related ancestors, has been described as ranging widely across the western United States and Canada as far back as the Jurassic Period, 199.6 +/- 0.6 to 145.5 +/- 4 million years ago (Taylor 1985a, p. 268). Fossils of the Utah valvata are known from Utah to California (Taylor 1985a, pp. 286-287). The Utah valvata was likely present in the ancestral Snake River as it flowed south from Idaho, through Nevada, and into northeastern California (Taylor 1985a, p. 303). The Snake River escaped to join the Columbia River Basin approximately 2 million years ago (Hershler and Liu 2004, pp. 927-928).

At the time of listing in 1992 (57 FR 59244, December 14, 1992) we reported the range of the Utah valvata as existing at a few springs and mainstem Snake River sites in the Hagerman Valley, Idaho (River Mile (RM) 585), a few sites above and below Minidoka Dam (RM 675), and in the American Falls Dam tailwater near Eagle Rock damsite (RM 709). Surveys at the State of Idaho's Thousand Springs Preserve (RM 585) indicated declining numbers of snails, with two colonies at or below 6,000 individuals (57 FR 59245).

New data collected since the time of listing indicate that the range of the species is discontinuously distributed in at least 255 miles (410 kilometers (km)) of the Snake River and some associated tributary streams, an increase of nearly 122 river miles (196 km) from the previously known range. Their current range in the Snake River extends from RM 585 near the Thousand Springs Preserve (Bean 2005, in litt.), upstream to the confluence of the Henry's Fork with the Snake River (RM 837; Fields 2005, p. 11). Colonies of the Utah valvata have been found in the Snake River near the towns of Firth (RM 777.5), Shelley (RM 784.6), Payne (RM 802.6), Roberts (RM 815), and in the Henry's Fork approximately 9.3 miles (15 km) upstream from its confluence with the Snake River (at Snake RM 832.3) (Gustafson 2003, in litt). Based on limited mollusk surveys, the species has not been found upstream from the described location on the Henry's Fork or in the South Fork of the Snake River. Tributary streams to the Snake River where Utah valvatas have been collected include Box Canyon Creek (RM 588) (Taylor 1985b, pp. 9-10), and at one location in the Big Wood River (WRM 35) (Bureau of Reclamation 2003, p. 22). Big Wood River observations require further investigation and may be the result of seasonal transport of Utah valvata snails via irrigation canals that connect the Big Wood and Snake Rivers, or passive transport via waterfowl (Miller et al. 2006, p. 2371) between large bodies of water (i.e., reservoirs).

5.1.7 Conservation Needs

For Utah valvata to be recovered, viable subpopulations need to be sustained and protected in suitable habitats from RM 572 to 709; securing upstream populations in American Falls Reservoir and the lower Henry's Fork would enhance the species survival and recovery. Suitable habitats have mud or sand substrates throughout the river profile and adjacent springs; have good water quality; temperatures below 18.5 °C; dissolved oxygen concentrations above 6 milligrams per liter; and pH levels between 6.5 and 9.5. Presently occupied habitats should be conserved, and threats such as dewatering and degraded water quality should be managed and minimized (Fish and Wildlife Service 1995, p. 29).

5.1.8 Critical Habitat

No critical habitat has been designated for the Utah valvata.

5.2 Environmental Baseline of the Action Area

This section assesses the effects of past and ongoing human and natural factors that have led to the current status of the species, its habitat and ecosystem in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have already undergone section 7 consultations, and the impacts of state and private actions which are contemporaneous with the consultations in progress.

5.2.1 Status of the Utah Valvata in the Action Area

The Program may potentially affect Utah valvata throughout its range, from the Henry's Fork downstream to the middle Snake River in the Thousand Springs area. Specifically, the Utah valvata may be affected by Program actions occurring within Department right-of-ways near the Snake River. This area is encompassed by Department District 4 (Blaine, Camas, Cassia, Gooding, Jerome, Lincoln, Minidoka, and Twin Falls Counties); District 5 (Bannock, Binham, Cassia, and Power Counties); and District 6 (Bingham, Blaine, Bonneville, Fremont, Jefferson, and Madison Counties).

5.2.2 Factors Affecting the Utah Valvata in the Action Area

Primary factors threatening the Utah valvata in the action area include hydroelectric dam development, water withdrawals for agriculture and small hydroelectric projects, peak loading of existing hydroelectric water projects, water pollution, and exotic species invasions (e.g., New Zealand mudsnail, *Potamopyrgus antipodarum*).

5.3 Effects of the Proposed Action

The implementing regulations for section 7 define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline" (50 CFR § 402.02). "Indirect effects" are caused by or result from the agency action, are later in time, but are still reasonably certain to occur. Indirect effects may occur outside of

the immediate footprint of the project area, but would occur within the action area as defined (50 CFR § 402.02).

5.3.1 Direct and Indirect Effects of the Proposed Action

Program actions involving in-water work or work below the OHWM may have adverse effects to snails and their habitats. These activities could result in erosion and sediment delivery to the Snake River, its tributaries or adjacent cold water springs complexes. These effects can degrade or inundate habitat used by snails during all life history phases, could reduce food abundance, and could cause snail mortality. Bank stabilization actions (e.g., rip-rap, gabion baskets) conducted below the OHWM may also crush and kill snails. We expect the BMPs incorporated into the Program to reduce the magnitude and severity of these potential impacts to snails, but not to a level of insignificance. The delivery of contaminants such as fuel, oil, or concrete washout water to Utah valvata habitat during implementation of Program actions may also impact snails. However, with implementation of the BMPs we expect these effects to be insignificant. The Program will not appreciably reduce the likelihood of both the survival and recovery of this species.

It should be noted that due to the programmatic nature of the proposed action, we lack site specificity regarding potential effects to the Utah valvata. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Program action is not consistent with our Opinion, that action will need to undergo a separate section 7 consultation.

5.3.2 Effects of Interrelated or Interdependent Actions

The Service has not identified any effects from interrelated or interdependent actions.

5.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Local government and private irrigation diversions from Milner Pool are anticipated to range from less than 44 to approximately 89 percent of the total water removed from the river channel (Snake River) at that point. These withdrawals have a significant effect on water quantity and quality downstream from Milner Dam both from removal of water from the river and from the return of water to the river that has been degraded (e.g., irrigation returns). It is anticipated that these cumulative impacts to water quality and quantity downstream from Milner Dam will persist into the future and that water quality could become more degraded as this region undergoes continuing development.

Throughout the Utah valvata's range, State, local, and private activities will continue to negatively affect snail habitats. These activities include destruction or modification of spring

habitats that provide sources of relatively good water quality at various locations along the Snake River; reduced water quality in the Snake River due to agriculture and urban uses (*e.g.*, runoff of pesticides, fertilizers, municipal water treatment systems, toxicant spills, and other sources of pollutants); withdrawal of water for irrigation under natural flow rights; and residential and commercial development projects.

Aquifer springs provide recharge to the Snake River at numerous locations along its length and within the range and recovery area of the Utah valvata in the action area. These springs provide large volumes of cold water of relatively high quality throughout the year. Nonetheless, water quantity and quality from these springs show signs of decline. Much of this is likely a cause of agricultural practices, particularly water withdrawals due to groundwater pumping for irrigation, and leeching of agricultural chemicals and animal wastes into the aquifer. Aquifer recharge programs and other steps are currently being taken to slow or stop aquifer depletion. However, depletion and eutrophication are expected to continue as the human population and water demands continue to grow in southern Idaho. These factors will likely result in the continued degradation of habitats in the Snake River, which will continue to limit available habitat for the Utah valvata.

5.5 Conclusion

The Service has reviewed the current status of the Utah valvata, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, and it is our conclusion that the proposed action is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for the species, therefore none will be affected.

While some individuals may be killed as a result of the Program and others disturbed, any impacts will be limited in duration and spatial extent and will not amount to an appreciable change in the status, distribution, or long-term persistence of the species. Additionally, Program BMPs are expected to reduce the magnitude of any adverse impacts to the Utah valvata. Any adverse effects are not expected to appreciably reduce the likelihood of survival and recovery of Utah valvata rangewide in terms of numbers, distribution, or reproduction of the species.

5.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without specific exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm in the definition of take in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying these species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited

taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Agencies have a continuing duty to regulate the activity covered by this incidental take statement. If the Agencies fail to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Agencies must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

5.6.1 Amount or Extent of Take Anticipated

Program actions involving in-water work or work below the OHWM may harm or kill individual Utah valvata snails. But the Service expects there will be few Program actions that will impact the Utah valvata during the five years of Program implementation. In addition, the BMPs incorporated into the Program are designed to reduce impacts to the Utah valvata. Given these considerations, the amount of take in the form of harm or mortality is expected to be low. Quantifying take is difficult because the exact location of Program actions is not known and the number of snails at any given site is also unknown (surveys show snail densities may range from 50 snails/sq m (range unavailable) to 197 snails/sq m (range 0 – 1724 snails/sq m). We will therefore use the amount of affected habitat as a surrogate for anticipated take. We predict that all snails within an area 600 feet directly downstream of any in-channel Program work will be harmed from elevated suspended and deposited sediment. Authorized take will be exceeded for any individual in-channel project if the downstream extent of suspended or deposited sediment exceeds 600 feet.

We also predict that all snails in the immediate vicinity of Program bank stabilization work conducted below the OHWM will be harmed or killed. The linear extent of bank stabilization work at any given location is not known. However, no individual project will be more than 300 feet in length and there will be no more than two bank armoring projects approved in any subbasin (4^{th} Field HUC) per year. Therefore, authorized take will be exceeded if any individual project is longer than 300 feet or if there are more than two projects per year in any subbasin inhabited by the Utah valvata.

5.6.2 Effect of the Take

The Utah valvata is documented to occur in the Snake River basin of southern Idaho from the lower Henry's Fork as far downstream as Grandview, and estimated densities throughout its range vary widely. It is not certain that snails will be present in the vicinity of any given Program action, but it is reasonable to assume they will be. The amount of habitat that will be lost or impacted as a result of the proposed Program represents a small amount of occupied and available habitats. Further, the number of individuals expected to be killed as a result of the Program is small relative to total population numbers for the species. Given the relatively small area expected to be impacted within the area known or potentially occupied by the species, it is unlikely that the loss of any snails present in the Program area would have an appreciable effect on survival and recovery of Utah valvata. In addition, it is likely that any remaining habitat within the Program area will be recolonized by Utah valvata from adjacent colonies following completion of individual Program actions (although the time required for complete recolonization is unknown). As such, take in the form of mortality and harm may occur but is

not expected to jeopardize or appreciably diminish overall numbers, distribution, or reproduction to the extent that it would influence persistence of the Utah valvata into the future.

5.6.3 Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of take on the Utah valvata.

1. Minimize the potential for disrupting Utah valvata habitat from Program implementation.
2. Minimize the risk of harm and mortality to the Utah valvata.

5.6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1a. As needed during any dewatering, the Agencies will identify for contractors where pump water from the dewatered area will be disposed. All necessary measures (e.g., settling ponds) will be taken to ensure that no sediment from pump water will reach Utah valvata habitat.

1b. All erosion and sediment control measures will be maintained until construction is complete and disturbed areas are stabilized.

2. Prior to conducting any in-channel or bank stabilization work in Utah valvata habitat, contact the Service for additional specific information on the distribution of Utah valvata and the need for implementing additional protection measures.

5.6.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (50 CFR 402.14 (i)(3).

1. As part of the process for implementing the Program, the Department is required to provide appropriate post-Project Monitoring Forms to the Service within 45 days of project completion. The Department will also host an annual coordination meeting to review the projects implemented under the Program during the previous year.
2. During project implementation, the Agencies shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for the Utah valvata relative to the proposed Program.

5.7 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to

minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

1. Whenever concrete is used, restrict washout of concrete trucks and equipment to locations that will minimize the risk of introducing wastewater to Utah valvata habitat.
2. Take all necessary precautions to avoid introducing petroleum contaminants to Utah valvata habitat.

6. SNAKE RIVER PHYSA SNAIL

6.1 Status of the Species

6.1.1 Listing Status

The Snake River physa snail was listed endangered on December 12, 1992 (57 FR 59244).

6.1.2 Reasons for Listing

Section 4 of the Act and regulations promulgated to implement the listing provisions of the Act (50 CFR part 424) set forth the procedures for adding species to the Federal list. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1) of the Act. Three of the five factors apply to Snake River physa: the present or threatened destruction, modification, or curtailment of its habitat or range; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

Primary factors threatening Snake River physa include hydroelectric dam development, water withdrawals for agriculture and small hydroelectric projects, peak loading of existing hydroelectric water projects, water pollution, and exotic species invasions (e.g., New Zealand mudsnail, *Potamopyrgus antipodarum*).

6.1.3 Species Description

The shells of adult Snake River physa snails are 7 mm long with 3 to 3.5 whorls, and are amber to brown in color (Fish and Wildlife Service 1995, p. 8). The aperture whorl is inflated relative to most other Physidae in the Snake River. This species occurs within the Snake River on gravel to boulder substrates, in habitats with low-to-moderate current, typically in deeper portions of the river.

6.1.4 Life History

Very little is known about the life history of the Snake River physa snail. This species existed in the Pleistocene-Holocene lakes and rivers of northern Utah and southeastern Idaho, and is thought to have persisted for at least 3.5 million years in the Snake River (Taylor 1988, p. 72). Taylor had described this species as occurring in deep river habitats dominated by rapids and boulders, but recent studies conducted by the Bureau of Reclamation below Minidoka Dam have recovered the species from river and pool (below spillway) habitats with moderate water velocity. Collections of this snail downstream of C.J. Strike Reservoir are consistent with the

habitats in the Minidoka area. Snails collected from the river were typically found in deeper areas of runs and glides where the gravel to boulder substrates were mostly free of fine sediments. The more common physid species, *Physa gyrina*, was found to be more common in side channels and shallow shore-line areas, but the two species were not typically found to occur together. The Snake River physa has not been recorded from reservoirs. Based on the life histories of other physid species, the Snake River physa likely lives for up to, or just over, one year.

6.1.5 Population Dynamics

Nothing is known of the Snake River physa's population size or natural population dynamics. Like other species in the Physidae, the Snake River physa is likely univoltine, a generation of snails persisting and reproducing in the course of a single year. No demographic studies have been conducted. The highest density population appears to be in the river reach between Minidoka Dam and Milner Reservoir, with a lower density population occurring downstream of C.J. Strike Reservoir.

6.1.6 Status and Distribution

The species is only known from the Snake River in south-southwest Idaho, with limited specimens recorded from a single major tributary (i.e., the Bruneau arm of C.J. Strike Reservoir). The Service (1995, p. 8) reported that the Snake River physa's "modern" range extended from Grandview (RM 487) to the Hagerman Reach (RM 573). Recently identified specimens collected by the Bureau of Reclamation (Kerans and Gates 2006, entire) and Idaho Power Company from 1995 to 2003 (Keebaugh 2009, pp. 1-124) confirm its distribution to as far upstream as Minidoka Dam (RM 675) and as far downstream as Ontario (RM 368), Oregon, some 128 miles downstream of its previously recognized downstream extent (Grandview). Two specimens were recovered from the Bruneau River arm (RM 4) of C.J. Strike Reservoir (Keebaugh 2009, p. 123) representing the only tributary of the Snake River from which the species has been recorded. A recent review of the Idaho Power Company specimens has called into question the identity of some of these specimens. The Idaho Power Company and the Service are currently investigating this apparent confusion. However, the current information on the species suggests it has a wider distribution than previously thought, though it is extremely patchy and/or absent from large portions of this range.

While the species is more widespread than previously thought, currently recorded from an estimated 307 river miles, it has not been found at high densities within much of its current, known range and is likely absent from portions of the river. The most extensive surveys conducted to date are from the 6 mile reach below Minidoka Dam (RM 669-675) (Kerans and Gates 2006, entire) in which live Snake River physa were recovered in 29 (8 percent) of 365 samples collected. In plots where they were found, densities were typically ≤ 32 per square meter, but live animals reached relatively high densities in a few of these samples, estimated at 40 to 64 individuals per square meter. Elsewhere in the Snake River, surveys have been much less intensive and not specific to Snake River physa. Of 758 samples reexamined by Keebaugh (2009) between river miles 200 and 589.2, 4.5 percent (n=34) contained Snake River physa. Of those, 67 percent (n=23) contained a single animal and one sample near Marsing, Idaho (RM 421) contained a high of seven individuals, extrapolating to a density of 28 per square meter. Hence, in habitats sampled in the lower Snake River, the species is not regarded as ubiquitous or

abundant, and is patchily distributed. As stated above, the identity of some of these specimens has been questioned. River reaches upstream of the Hagerman area (est. RM 590) through Milner Reservoir (est. RM 663) have not received systematic surveys or reexamination of previously collected materials.

6.1.7 Conservation Needs

The Service (1995) has published a final, approved recovery plan for the Snake River physa. For the Snake River physa to recover to self-sustaining levels, viable subpopulations/colonies must become established and be protected in lotic (riverine) habitats on the mainstem Snake River from RM 553 to 675 on rock/boulder substrates in deep water at the margins of rapids with good water quality (average water temperature below 18 ° C with dissolved oxygen concentrations greater than 6 milligrams per liter and pH levels of 6.5 to 9.0). River flows need to be managed, to the extent possible, to mimic a large river with natural flows and high water quality.

6.1.8 Critical Habitat

No critical habitat has been designated for the Snake River physa.

6.2 Environmental Baseline of the Action Area

This section assesses the effects of past and ongoing human and natural factors that have led to the current status of the species, its habitat and ecosystem in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have already undergone section 7 consultations, and the impacts of state and private actions which are contemporaneous with the consultations in progress.

6.2.1 Status of the Snake River physa in the Action Area

The Program may potentially affect the Snake River physa throughout its range. Specifically, the Snake River physa may be affected by Program actions occurring within Department right-of-ways near the Snake River. This area is encompassed by Department District 3 (Elmore and Owyhee Counties); District 4 (Cassia, Elmore, Gooding, Jerome, Minidoka, and Twin Falls Counties); and District 5 (Cassia County).

6.2.2 Factors Affecting the Snake River physa in the Action Area

The free-flowing, cold water environments where the Snake River physa evolved have been negatively impacted by anthropogenic activities throughout its range. Development of water impoundments and hydroelectric dams has changed the fundamental character of the Snake River. This has resulted in fragmentation of previously continuous river habitat, affected fluvial and energy flow dynamics (Sheldon and Walker 1997, p. 97; Osmundson et al. 2002, pp. 1733-1737), and contributed to the degradation of water quality. In addition to the loss of habitat and isolation effects posed by dams, hydropower operations, specifically load following, are documented to have negative impacts to aquatic species occupying habitats downstream of such facilities (Fisher and LaVoy 1972, pp. 1473-1476; Kroger 1973, pp. 478-481; Brusven et al. 1974, pp. 77-78; Brusven and MacPhee 1976, p. iv; Gersich 1980, p. 3; Morgan et al. 1991, p. 419; Christman et al. 1996, pp. 59-62). Water withdrawals for agriculture also affect the Snake River physa by reducing both the quality and quantity of water available for the snail.

6.3 Effects of the Proposed Action

The implementing regulations for section 7 define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline" (50 CFR § 402.02). "Indirect effects" are caused by or result from the agency action, are later in time, but are still reasonably certain to occur. Indirect effects may occur outside of the immediate footprint of the project area, but would occur within the action area as defined (50 CFR § 402.02).

6.3.1 Direct and Indirect Effects of the Proposed Action

Program actions involving in-water work or work below the OHWM may have adverse effects to snails and their habitats. These activities could result in erosion and sediment delivery to the Snake River, its tributaries or adjacent cold water springs complexes. These effects can degrade or inundate habitat used by snails during all life history phases, could reduce food abundance and could cause snail mortality. Bank stabilization actions (e.g., rip-rap, gabion baskets) conducted below the OHWM may also crush and kill snails. We expect the BMPs incorporated into the Program to reduce the magnitude and severity of these potential impacts to snails, but not to a level of insignificance. The delivery of contaminants such as fuel, oil, or concrete washout water to Snake River physa habitat during implementation of Program actions may also impact snails. However, with implementation of the BMPs we expect these effects to be insignificant. The Program will not appreciably reduce the likelihood of both the survival and recovery of this species.

It should be noted that due to the programmatic nature of the proposed action, we lack site specificity regarding potential effects to the Snake River physa. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Program action is not consistent with our Opinion, that action will need to undergo a separate section 7 consultation.

6.3.2 Effects of Interrelated or Interdependent Actions

The Service has not identified any effects from interrelated or interdependent actions.

6.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Local government and private irrigation diversions from Milner Pool are anticipated to range from less than 44 to approximately 89 percent of the total water removed from the river channel at that point. These withdrawals have a significant effect on water quantity and quality downstream from Milner Dam both from removal of water from the river and from the return of

water to the river that has been degraded (e.g., irrigation returns). It is anticipated that these cumulative impacts to water quality and quantity downstream from Milner Dam will persist into the future and that water quality could become more degraded as this region undergoes continuing development.

Throughout the Snake River physa's range, State, local, and private activities will continue to negatively affect snail habitats. These activities include destruction or modification of spring habitats that provide sources of relatively good water quality at various locations along the Snake River; reduced water quality in the Snake River due to agriculture and urban uses (*e.g.*, runoff of pesticides, fertilizers, municipal water treatment systems, toxicant spills, and other sources of pollutants); withdrawal of water for irrigation under natural flow rights; and residential and commercial development projects.

Aquifer springs provide recharge to the Snake River at numerous locations along its length and within the range and recovery area of the Snake River physa in the action area. These springs provide large volumes of cold water of relatively high quality throughout the year. Nonetheless, water quantity and quality from these springs show signs of decline. Much of this is likely due to agricultural practices, particularly water withdrawals due to groundwater pumping for irrigation, and leeching of agricultural chemicals and animal wastes into the aquifer. Aquifer recharge programs and other steps are currently being taken to slow or stop aquifer depletion. However, depletion and eutrophication are expected to continue as the human population and water demands continue to grow in southern Idaho. These factors will likely result in the continued degradation of habitats in the Snake River, which will continue to limit available habitat for the Snake River physa.

6.5 Conclusion

The Service has reviewed the current status of the Snake River physa, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, and it is our conclusion that the proposed action is not likely to jeopardize the species continued existence. No critical habitat has been designated for the species, therefore none will be affected.

While some individuals may be killed as a result of the action and others disturbed, any impacts will be limited in duration and spatial extent and will not amount to an appreciable change in the status, distribution, or long-term persistence of the species. The adverse effects are not expected to appreciably reduce the likelihood of survival and recovery of the Snake River physa rangewide in terms of numbers, distribution, or reproduction of the species.

6.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without specific exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm in the definition of take in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by

annoying these species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Agencies have a continuing duty to regulate the activity covered by this incidental take statement. If the Agencies fail to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Agencies must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

6.6.1 Amount or Extent of Take Anticipated

Program actions involving in-water work or work below the OHWM may harm or kill individual Snake River physa snails. But the Service expects there will be few Program actions that will impact the Snake River physa during the 5 years of Program implementation. In addition, the BMPs incorporated into the Program are designed to reduce impacts to the Snake River physa. Given these considerations, the amount of take in the form of harm or mortality is expected to be low. Quantifying take is difficult because the exact location of Program actions is not known and the number of snails at any given site is also unknown (surveys show that snail densities range from less than 32 snails per sq m to 64 snails per sq m and some samples contained only a single snail). We will therefore use the amount of affected habitat as a surrogate for anticipated take. We predict that all snails within an area 600 feet directly downstream of any in-channel Program work will be harmed from elevated suspended and deposited sediment. Authorized take will be exceeded for any individual in-channel project if the downstream extent of suspended or deposited sediment exceeds 600 feet.

We also predict that all snails in the immediate vicinity of Program bank stabilization work conducted below the OHWM will be harmed or killed. The linear extent of bank stabilization work at any given location is not known. However, no individual project will be more than 300 feet in length and there will be no more than two bank armoring projects approved in any subbasin (4^{th} Field HUC) per year. Therefore, authorized take will be exceeded if any individual project is longer than 300 feet or if there are more than two projects per year in any subbasin inhabited by the Snake River physa.

6.6.2 Effect of the Take

The Snake River physa is documented to occur in the Snake River basin of southern Idaho from as far upstream as Minidoka Dam (RM 675) and as far downstream as Ontario (RM 368), Oregon, and estimated densities throughout its range vary widely due to their patchy distribution. It is not certain that snails will be present in the vicinity of any given Program action , but it is reasonable to assume they will be. The amount of habitat that will be lost or impacted as a result of the proposed Program represents a small amount of occupied and available habitats. Further, the number of individuals expected to be killed as a result of the Program is small relative to total population numbers for the species. Given the relatively small area expected to be impacted

within the area known or potentially occupied by the species, it is unlikely that the loss of any snails present in the Program area would have an appreciable effect on survival and recovery of the Snake River physa. In addition, it is likely that any remaining habitat within the Program area will be recolonized by the Snake River physa from adjacent colonies following completion of individual Program actions. As such, take in the form of mortality and harm may occur but is not expected to jeopardize or appreciably diminish overall numbers, distribution, or reproduction to the extent that it would influence persistence of the Snake River physa into the future.

6.6.3 Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of take on the Snake River physa.

1. Minimize the potential for disrupting Snake River physa habitat from Program implementation.
2. Minimize the risk of harm and mortality to the Snake River physa.

6.6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1a. As needed during any dewatering, the Agencies will identify for contractors where pump water from the dewatered area will be disposed. All necessary measures (e.g., settling ponds) will be taken to ensure that no sediment from pump water will reach Snake River physa habitat.

1b. All erosion and sediment control measures will be maintained until construction is complete and disturbed areas are stabilized.

2. Prior to conducting any in-channel or bank stabilization work in Snake River physa habitat contact the Service for additional specific information on the distribution of the Snake River physa and the need for implementing additional protection measures.

6.6.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (50 CFR 402.14 (i)(3).

1. As part of the process for implementing the Program, the Department is required to provide appropriate post-Project Monitoring Forms to the Service within 45 days of project completion. The Department will also host an annual coordination meeting to review the projects implemented under the Program during the previous year.
2. During project implementation, the Agencies shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for the Snake River physa relative to the proposed Program.

6.7 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

1. Whenever concrete is used, restrict washout of concrete trucks and equipment to locations that will minimize the risk of introducing wastewater to Snake River physa habitat.
2. Take all necessary precautions to avoid introducing petroleum contaminants to Snake River physa habitat.

7. BLISS RAPIDS SNAIL

7.1 Status of the Species

7.1.1 Listing Status

The Bliss Rapids snail was listed as threatened on December 12, 1992 (57 FR 59244). On December 26, 2006, the Service received a petition from the Governor of Idaho and the Idaho Power Company to delist the Bliss Rapids snail. On September 16, 2009, we published a 12-month finding concluding that delisting the Bliss Rapids was not warranted (74 FR 47536). Based on a thorough review of the best scientific and commercial data available, we determined that the species continues to be restricted to a small geographic area in the middle-Snake River, Idaho, where it is dependent upon cool-water spring outflows. Although some threats identified at the time of listing in 1992 no longer exist or have been moderated, ground water depletion and impaired water quality still threaten the Bliss Rapids snail. In addition, there are significant uncertainties about the effects of hydropower operations and New Zealand mudsnails on the persistence of Bliss Rapids snails in riverine habitats. In the absence of the Act's protections, existing regulations are not likely to be sufficient to conserve the species. Given our current understanding of the species' geographic distribution, habitat requirements, and threats, the species continues to meet the definition of a threatened species under the Act.

7.1.2 Reasons for Listing

Section 4 of the Act and regulations promulgated to implement the listing provisions of the Act (50 CFR part 424) set forth the procedures for adding species to the Federal list. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1) of the Act. Three of the five factors apply to the Bliss Rapids snail: the present or threatened destruction, modification, or curtailment of its habitat or range; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. As discussed above, in our 12-month finding on a petition to delist the species we found that some of these factors no longer exist or have been moderated, but ground water depletion and impaired water quality still threaten the Bliss Rapids snail (74 FR 47536).

7.1.3 Species Description

The shells of adult Bliss Rapids snails are 0.08 to 0.16 inches long with 3.5 to 4.5 whorls, and are clear to white when empty (Hershler et al. 1994, pg. 235). The species can occur in two different color morphs, the white or pale form, or the red form (Hershler et al. 1994, p. 240). It is not known what controls these color forms, but some populations do contain more than one color form. This species typically occurs on the lateral and underside of gravel- to boulder-sized substrate in moderate currents in the main stem of the Snake River, as well as within numerous springs and spring tributaries that empty into the Snake River (Frest and Johannes 1992, p. 22; Hershler et al. 1994, p. 237). The species has not been found in impounded reaches of the Snake River (Frest and Johannes 1992, p. 23; Richards et al. 2006, p. 35) nor in river habitats upstream of the Upper Salmon Falls Dam (RM 581.5).

7.1.4 Life History

The Bliss Rapids snail is typically found on the lateral and undersides of clean cobbles in pools, eddies, runs, and riffles, though it may occasionally be found on submerged woody debris (Hershler et al. 1994, p. 239) where it is a periphyton (benthic diatom mats) grazer (Richards et al. 2006, p. 59). This species is restricted to spring-influenced bodies of water within and associated with the Snake River from King Hill (RM 546) to Elison Springs (RM 604). The snail's distribution within the Snake River is within reaches that are unimpounded and receive significant quantities (ca. 5,000 cfs) of recharge from the Snake River Plain Aquifer (Clark and Ott 1996, p. 555; Clark et al. 1998, p. 9). It has not been recovered from impounded reaches of the Snake River, but can be found in spring pools or pools with evident spring influence (Hopper, Service, in litt. 2006). With few exceptions, the Bliss Rapids snail has not been found in sediment-laden habitats, typically being found on, and reaching its highest densities on clean, gravel to boulder substrates in habitats with low to moderately swift currents, but typically absent from whitewater habitats (Hershler et al. 1994, p. 237). Difficulties rearing this species in a laboratory setting (Warbritton, 2009), along with its natural distribution within spring-influenced waters suggest it requires cool waters of relatively high or specific quality.

7.1.5 Population Dynamics

Bliss Rapids snails are dioeceous, having separate sexes. Fertilization is internal and eggs are laid singly within a capsule on rock or other hard substrates (Hershler et al. 1994, p. 239). Individual, life-time fecundity is not known, but deposition of 5-12 eggs per cluster, have been observed in laboratory conditions (Richards et al. 2009b, p. 26). Reproductive phenology probably differs between habitats and has not been rigorously studied in the wild. Hershler et al. (1994, p. 239) stated that reproduction occurred from December through March, but a more thorough investigation by Richards (2004, p. 135) suggested a bimodal phenology with spring and fall peaks, but with some recruitment occurring throughout the year, although his findings are restricted to a small number of spring populations.

It is difficult to estimate the density and relative abundance of Bliss Rapids snail colonies. The species is documented to reach high densities in cold-water springs and tributaries in the Hagerman reach of the middle Snake River (Stephenson and Bean 2003, pp. 12, 18; Stephenson et al. 2004, p. 24), whereas colonies in the mainstem Snake River (Stephenson and Bean 2003, p. 27; Stephenson et al. 2004, p. 24) tend to have lower densities (Richards et al. 2006, p. 37). Bliss

Rapids snail densities in Banbury Springs averaged approximately 32.53 snails per square foot (350 snails per square meter) on three habitat types (vegetation, edge, and run habitat as defined by Richards et al. 2001, p. 379). Densities greater than 790 snails per square foot (5,800 snails per square meter) have been documented at the outlet of Banbury Springs (Morgan Lake outlet) (Richards et al. 2006, p. 99).

In an effort to account for the high variability in snail densities and their patchy distribution, researchers have used predictive models to give more accurate estimates of population size in a given area (Richards 2004, p. 58). In the most robust study to date, predictive models estimated between 200,000 and 240,000 Bliss Rapids snails in a study area measuring 58.1 square feet (625 square meters) in Banbury Springs, the largest known colony (Richards 2004, p. 59). Due to data limitations, this model has not been used to extrapolate population estimates to other spring complexes, tributary streams, or mainstem Snake River colonies. However, with few exceptions (i.e., Thousand Springs and Box Canyon), Bliss Rapids snail colonies are much smaller in areal extent than the colony at Banbury Springs, occupying only a few square feet.

This difference in snail density between spring and riverine habitats is most likely due to the stable environmental conditions of these aquifer springs, which provide steady flows of stable temperatures and consistent water quality. Despite the high densities reached within springs, Bliss Rapids snails may be absent from springs or absent from portions of springs with otherwise uniform water quality conditions. The reasons for this patchy distribution is uncertain but may be attributable to factors such as habitat quality, competition from species such as the New Zealand mudsnail (Richards 2004), elevated water velocity, or historical events that had eliminated Bliss Rapids snails in the past.

By contrast, river-dwelling populations are subjected to highly variable river dynamics where flows and temperatures can vary by a magnitude, and water quality from human activities can vary greatly seasonally depending on human and natural factors. These river and anthropogenic processes probably play a major role in controlling snail populations within the Snake River. While Bliss Rapids snails may reach moderate densities (10s-100s) at some locations, they are more frequently found at low densities (Richards and Arrington 2009, p. 23; Richards et al. 2009a, pp. 35-39) if they are present. It is likely that annual river processes play a major role in the distribution of Bliss Rapids snails throughout their range within the Snake River, killing and moving snails and greatly altering the benthic habitat.

A genetic analysis of Bliss Rapids snails throughout their range (Liu and Hershler 2009, p. 1294) indicated that spring populations were largely or entirely sedentary, with little to no movement between springs or between springs and river populations. By contrast, river populations exhibited no clear groupings, suggesting that this population is genetically mixed (Liu and Hershler 2009, p. 1295).

7.1.6 Status and Distribution

At the time of listing in 1992, the distribution of the Bliss Rapids snail was thought to be discontinuous over 204 miles of the Snake River in Idaho, between King Hill (river mile (RM) 546) and Lower Salmon Falls Dam (RM 573) with a disjunct occurrence at RM 749. The species' distribution upstream of Upper Salmon Falls Reservoir was known to be localized to spring complexes (i.e., Thousand Springs (RM 585), Minnie Miller Springs (RM 585), Banbury Springs (RM 589), Niagara Springs (RM 599), and Box Canyon Springs (RM 588)) (57 FR

59244). This range was based on approximately 14 spring/tributary collection points (Richards et al. 2006, p. 33). The reported occurrence at RM 749 is now regarded as erroneous because: (1) samples from this collection have not been located to verify the occurrence (Frest 2002, in litt.); (2) the reported collection site is 150 river miles upstream of the known distribution of the species (Pentec 1991 in 57 FR 59244); and, (3) numerous collection efforts in and above American Falls Reservoir (Bureau of Reclamation 2003; Bureau of Reclamation 2004; Bureau of Reclamation 2005; Gregg 2006, in litt.), and in the upper Snake River (Fields 2006, pp. 1-34) have all failed to document the occurrence of the species.

The current known range of the Bliss Rapids snail is similar to what was described at the time of listing (minus the erroneous location at American Falls Reservoir). Increased sampling effort has documented its presence at many more locations within its range. Based on 837 sample events conducted by the Idaho Power Company (IPC), the Bliss Rapids snail is documented to occur within the non-reservoir sections of the middle Snake River from approximately RM 547 to RM 572, and RM 580 (Richards et al. 2006, pp. 33-38). This represents a refined distribution since the time of listing in 1992 due to more accurate survey data.

Bliss Rapids snails are also known to occur in 14 springs or Snake River tributary streams (from RM 552.8 to RM 604.5) derived from cold water springs including: Bancroft Springs; Thousand Springs and Minnie Miller Springs (Thousand Springs Preserve); Banbury Springs; Niagara Springs; Crystal Springs; Briggs Springs; Blue Heart Springs; Box Canyon Creek; Riley Creek; Sand Springs Creek; Elison Springs; the Malad River; Cove Creek (a tributary to the Malad River); and the headwater springs to Billingsley Creek (Richards et al. 2006, p. 2; Fish and Wildlife Service 2008a, p. 6).

The U.S. Geological Survey (USGS) reported finding several Bliss Rapids snails at Blue Lakes (approximately Snake River mile 610.4) in 1994, but surveys of this site in 1996 and 2007 did not locate the species (Mebane 2007, Grotheer 2008). Over 200 springs or spring clusters have been mapped or identified on the north side of the Snake River canyon (Clark and Ott 1996, p. 559) where the Bliss Rapids snail has been documented to occur. Springs also occur on the south side of the Snake River canyon (Clark and Ott 1996, p. 559), but studies conducted by the Idaho Power Company (IPC) have not observed Bliss Rapids colonies in springs or tributaries on the south side (Bates and Richards 2008, in litt.). The species is likely present at additional springs on private lands that have not been sampled (e.g., Hopper 2006, in litt.).

In summary, we now know the Bliss Rapids snail to be distributed discontinuously over 22 miles, from RM 547-560, RM 566-572, and at RM 580 on the Snake River and to occur in 14 springs or tributaries to the Snake River. The area between RM 561-565 represents reservoir areas where the Bliss Rapids snail does not occur. The species' overall geographic range has not substantially changed since it was first described by Hershler et al. (1994, pp. 233-242), but the species has been detected at more locations within its range.

7.1.7 Conservation Needs

Given the known limited distribution of the Bliss Rapids snail and its specific habitat requirements, maintaining or improving spring and river habitat conditions within its range is the primary need for this species to survive and recover.

The Bliss Rapids snail reaches its highest densities in cold-water springs dominated by cobble substrates and free, or relatively free, of fine sediments, and with good water quality. Protecting these habitats that contain Bliss Rapids snail populations is critical to their survival and recovery.

Ensuring that water quality within the Snake River is not degraded is important for sustaining the species' river-dwelling populations. Since water quality appears to be of crucial importance, protection of the Snake River Plain Aquifer is a priority since it is the source of water for the springs occupied by the snail and serves a major role in maintaining river water quality within the species' range.

7.1.8 Critical Habitat

The Service has not designated any critical habitat for the Bliss Rapids snail.

7.2 Environmental Baseline of the Action Area

This section assesses the effects of past and ongoing human and natural factors that have led to the current status of the species, its habitat and ecosystem in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have already undergone section 7 consultations, and the impacts of state and private actions which are contemporaneous with the consultations in progress.

7.2.1 Status of the Bliss Rapids Snail in the Action Area

The Program may potentially affect the Bliss Rapids snail throughout its range. Specifically, the Bliss Rapids snail may be affected by Program actions involving in-water work occurring within Department right-of-ways near the Snake River. This area is encompassed by Department District 3 (Elmore County) and District 4 (Elmore, Gooding, Jerome, and Twin Falls Counties).

7.2.2 Factors Affecting the Bliss Rapids Snail in the Action Area

The primary threats to this species are from water quality degradation, groundwater pumping, and invasive species. Recent work has established that while hydroelectric operations do impact river populations, those impacts are small relative to the size and range of that/those populations and not likely to diminish the species' chance of recovery. Degraded water quality from human activities both in the Snake River as well as the Snake River Plain Aquifer, are impending threats and are not likely to diminish substantially in the near future. While efforts have been made to reduce pollutants to the Snake River, there has also been increased human growth in the area and a significant increase in some agricultural activities that pose serious threats to water quality (Clark and Ott 1996, p. 555; Clark et al. 1998, p. 7). Groundwater pumping of the Snake River Plain Aquifer has also increased in recent decades (Clark et al. 1998, p. 9) and this, along with degraded water quality within the aquifer (Clark and Ott 1996, p. 555), may be the most serious threat to the species.

While Richards (2004, pp. 41-42) has provided compelling evidence that the New Zealand mudsnail (*Potamopyrgus antipodarum*) competes with and can displace the Bliss Rapids snail, the two species can still be found to coexist and may be present in moderate to high densities in adjacent habitats. While it is likely that the invasive New Zealand mudsnail has negatively affected the Bliss Rapids snail, it is difficult to quantify this effect after the fact. There are a

suite of other invasive species that currently pose threats to aquatic habitats throughout the west (e.g., zebra and quagga mussles, Eurasian milfoil), and it is not know if these species could become established in habitats occupied by the Bliss Rapids snail or the impacts they would have should they become established. Given the irruptive and devastating effects invasive species such as these can have on habitats in which they are not native, their introduction poses great concern to any native species with a restricted range such as the Bliss Rapids snail.

7.3 Effects of the Proposed Action

The implementing regulations for section 7 define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline" (50 CFR § 402.02). "Indirect effects" are caused by or result from the agency action, are later in time, but are still reasonably certain to occur. Indirect effects may occur outside of the immediate footprint of the project area, but would occur within the action area as defined (50 CFR § 402.02).

7.3.1 Direct and Indirect Effects of the Proposed Action

Program actions involving in-water work or work below the OHWM may have adverse effects to snails and their habitats. These activities could result in erosion and sediment delivery to the Snake River, its tributaries or adjacent cold water springs complexes. These effects can degrade or inundate habitat used by snails during all life history phases, could reduce food abundance and could cause snail mortality. Bank stabilization actions (e.g., rip-rap, gabion baskets) conducted below the OHWM may also crush and kill snails. We expect the BMPs incorporated into the Program to reduce the magnitude and severity of these potential impacts to snails, but not to a level of insignificance. The delivery of contaminants such as fuel, oil, or concrete washout water to Bliss Rapids snail habitat during implementation of Program actions may also impact snails. However, with implementation of the BMPs we expect these effects to be insignificant. The Program will not appreciably reduce the likelihood of both the survival and recovery of this species.

It should be noted that due to the programmatic nature of the proposed action, we lack site specificity regarding potential effects to the Bliss Rapids snail. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Program action is not consistent with our Opinion, that action will need to undergo a separate section 7 consultation.

7.3.2 Effects of Interrelated or Interdependent Actions

The Service has not identified any effects from interrelated or interdependent actions.

7.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area

considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Some of the most pertinent cumulative impacts to the Bliss Rapids snail lie on lands adjacent to the Snake River corridor, but affect the water resources that are critical to the continued survival of the snail. As discussed above, the Snake River Plain Aquifer probably represents the most important single resource for the conservation of the Bliss Rapids snail, but it is heavily influenced by human use. Aquifer depletion and contamination are global problems (Foster and Chilton 2003, p. 1957, Loague and Corwin 2005, p. 1) that threaten human welfare as well as biological diversity (Deacon *et al.* 2007, p. 688). While most of these impacts to the Snake River Plain Aquifer do not occur within the action area, the resulting impacts affect water resources in the action area via a direct pathway. As illustrated in Figure 2 in Kjelstrom (1992, pp. 1-2), groundwater pumping has resulted in declines of spring discharges over the past 60 years. While aquifer recharge has been suggested as a partial solution to over-pumping (IDWR 1999, pp. ix-xi), this may be overstated and may also increase the level or risk or aquifer contamination (Foster and Chilton 2003, pp. 1959-1961; 1967-1970).

Clark *et al.* (1998, p. 17) found the largest amounts of pesticides to be present in wells adjacent to agricultural areas around the Snake River between Burley and Hagerman, which are also the locations with the highest frequencies and concentrations of nitrates. Nitrate concentrations showed significant increases at several major springs, most with populations of the Bliss Rapids snail, from 1994 through 1999 (Baldwin *et al.* 2000, Fig. 18, pp. 22-23). The effects of these contaminants on the Bliss Rapids snail are not known, but in numerous wells these nitrate values have been recorded to exceed human health standards (Neely 2005, p. 2.7) and the presence of nitrates and other contaminants (Holloway *et al.* 2004, pp. 4-6; Carlson and Atlakson 2006, pp. 3-5) illustrate the direct pathway from agricultural areas to the sensitive habitats of the Bliss Rapids snail and other sensitive species.

Agriculture water quality issues within the action area are not restricted to aquifer-spring sources, but are widespread in surface water sources and conveyances (e.g., streams, irrigation return canals) (Clark *et al.* 1998, p. 17). For that reason, the effects of water quality degradation within the Snake River and some tributaries must be considered on the river-dwelling populations of the Bliss Rapids snail. State programs to meet Total Maximum Daily Load (TMDL) requirements have met with some success, but some portions of the Snake River, including those adjacent to and upstream of known Bliss Rapids snail populations, have not met TMDL standards. In addition, TMDL criteria for the middle Snake River have only been established for a limited number of contaminants (total phosphorous, total suspended solids), and do not include other nutrients, pesticides or consider the synergistic effects of these contaminants with one another (e.g., Hoagland and Drenner 1991, pp. 1-29). In addition, such agricultural contaminants, either through ground water or irrigation returns, are regarded as nonpoint source pollutants and are not subject to regulation under the Clean Water Act.

Lastly, aquaculture facilities make up a significant amount of non-consumptive water use in the middle Snake River region, and use an estimated 2,500 cfs of groundwater before releasing that water into the Snake River. This use contributes wastes from fish food, fish metabolism, and processing (Clark *et al.* 1998, p. 9) as well residual antibiotic and antiseptic compounds to the Snake River (EPA 2002, p. 4-19). While many of these facilities are permitted by the Environmental Protection Agency under the National Pollutant Discharge Elimination System

(NPDES), those facilities producing less than 20,000 pounds of fish (dry weight) per year are exempt from NPDES requirements and are not federally regulated. Most, if not all, of these issues or programs (e.g., aquifer recharge) are derived from private, local, or state initiatives and have little to no Federal oversight. As such, aquifer management and nonpoint source pollutant issues will likely continue to provide challenges into the future.

7.5 Conclusion

The Service has reviewed the current status of the Bliss Rapids snail, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, and it is our conclusion that the proposed action is not likely to jeopardize the species continued existence. No critical habitat has been designated for the species, therefore none will be affected.

While some individuals may be killed as a result of the action and others disturbed, any impacts will be limited in duration and spatial extent and will not amount to an appreciable change in the status, distribution, or long-term persistence of the species. The adverse effects are not expected to appreciably reduce the likelihood of survival and recovery of the Bliss Rapids snail rangewide in terms of numbers, distribution, or reproduction of the species.

7.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without specific exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm in the definition of take in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying these species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Agencies have a continuing duty to regulate the activity covered by this incidental take statement. If the Agencies fail to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Agencies must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

7.6.1 Amount or Extent of Take Anticipated

Program actions involving in-water work or work below the OHWM may harm or kill individual Bliss Rapids snails. But the Service expects there will be few Program actions that will impact

the Bliss Rapids snail during the 5 years of Program implementation. In addition, the BMPs incorporated into the Program are designed to reduce impacts to the Bliss Rapids snail. Given these considerations, the amount of take in the form of harm or mortality is expected to be low. Quantifying take is difficult because the exact location of Program actions is not known and the number of snails at any given site is also unknown (e.g., as discussed above, densities within Banbury Springs range from 350 snails/sq m to 5,800 snails/sq m). We will therefore use the amount of affected habitat as a surrogate for anticipated take. We predict that all snails within an area 600 feet directly downstream of any in-channel Program work will be harmed from elevated suspended and deposited sediment. Authorized take will be exceeded for any individual in-channel project if the downstream extent of suspended or deposited sediment exceeds 600 feet.

We also predict that all snails in the immediate vicinity of Program bank stabilization work conducted below the OHWM will be harmed or killed. The linear extent of bank stabilization work at any given location is not known. However, no individual project will be more than 300 feet in length and there will be no more than two bank armoring projects approved in any subbasin (4^{th} Field HUC) per year. Therefore, authorized take will be exceeded if any individual project is longer than 300 feet or if there are more than two projects per year in any subbasin inhabited by the Bliss Rapids snail.

7.6.2 Effect of the Take

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the Bliss Rapids snail across its range.

The Bliss Rapids snail is documented to occur in the Snake River basin of southern Idaho from Indian Cove Bridge (RM 525.4) to the Twin Falls area (RM 610.5), but documented extant populations are more restricted, being collected from the Snake River near King Hill (RM 546) to below Lower Salmon Falls Dam (RM 573), and from spring tributaries as far upstream as Elison Springs (RM 604). Estimated densities throughout its range vary widely. Given their patchy distribution, it is not certain that snails will be present in the vicinity of any given Program action, but it is reasonable to assume they will be. The amount of habitat that will be lost or impacted as a result of the proposed Program represents a small amount of occupied and available habitats. Further, the number of individuals expected to be killed as a result of the Program is small relative to total population numbers for the species. Given the relatively small area expected to be impacted within the area known or potentially occupied by the species, it is unlikely that the loss of any snails present in the Program area would have an appreciable effect on survival and recovery of the Bliss Rapids snail. In addition, it is likely that any remaining habitat within the Program area will be recolonized by the Bliss Rapids snail from adjacent colonies following completion of individual Program actions. As such, take in the form of mortality and harm may occur, but is not expected to jeopardize or appreciably diminish overall numbers, distribution, or reproduction to the extent that it would influence persistence of the Bliss Rapids snail into the future.

7.6.3 Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of take on the Bliss Rapids snail.