



U.S. Fish & Wildlife Service

Idaho Fish and Wildlife Office

## Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*)

### *5-Year Review: Summary and Evaluation*



Bill Rautsaw, U.S. Forest Service 2010

September 13, 2011

**For more information:** <http://www.fws.gov/idaho>

Suggested citation:

Burak, G.S. 2011. Draft Status Review for Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*). U.S. Fish and Wildlife Service, Region 1, Idaho Fish and Wildlife Office, Boise, ID. 29 pages.

## 5-YEAR REVIEW

**Species reviewed:** Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*)  
(Currently recognized as *Uroditellus brunneus brunneus*)

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**5-YEAR REVIEW**  
**Northern Idaho Ground Squirrel/ *Spermophilus brunneus brunneus***  
(Currently recognized as *Urocitellus brunneus brunneus*)

**1.0 GENERAL INFORMATION**

**1.1 Reviewers**

**Lead Regional Office:** Pacific Regional Office, Portland, Oregon.

**Lead Field Office:** Idaho Fish and Wildlife Office, Boise, ID; Greg Burak, (208) 378-5654.

**Cooperating Field Office(s):** NA

**Cooperating Regional Office(s):** NA

**1.2 Methodology used to complete the review:**

In preparing this draft status review, we used information contained in numerous technical reports, peer reviewed scientific studies related to the species, and monitoring and survey data conducted by the Idaho Department of Fish and Game (IDFG), habitat restoration information from the Payette National Forest (PNF), and other information from the Boise National Forest (BNF), College of Idaho, and other organizations and individuals.

**1.3 Background:**

**1.3.1 FR Notice citation announcing initiation of this review:** April 8, 2010. Endangered and Threatened Wildlife and Plants; 5-Year Status Reviews of 69 Species in Idaho, Washington, Hawaii, Guam, and the Commonwealth of the Northern Mariana Islands. 75 FR 17947.

**1.3.2 Listing history**

Final Listing

**FR notice:** FR 66, Vol. 65, p. 17779

**Date listed:** October 5, 2000

**Entity listed:** Northern Idaho Ground Squirrel

**Classification:** Threatened

**1.3.3 Associated rulemakings:** NONE

**1.3.4 Review History:** NONE

**1.3.5 Species' Recovery Priority Number at start of this 5-year review:**

RPN of 3C (high degree of threat/ high potential for recovery/ potential for conflict with economic activities)

**1.3.6 Current Recovery Plan:**

**Name of plan or outline:** Recovery Plan for the Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*)

**Date issued:** July 28, 2003

**Dates of previous revisions, if applicable:** NA

**2.0 REVIEW ANALYSIS**

**2.1 Application of the 1996 Distinct Population Segment (DPS) policy**

**2.1.1 Is the species under review a vertebrate?**

*Yes*

*No*

**2.1.2 Is the species under review listed as a DPS?**

*Yes*

*No*

**2.1.3 Was the DPS listed prior to 1996?**

*Yes*

*No*

**2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?**

*Yes*

*No*

**2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?**

*Yes*

*No*

**2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?**

*Yes*

*No*

**2.2 Recovery Criteria**

**2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?**

*Yes*  
 *No*

**2.2.2 Adequacy of recovery criteria.**

**2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?**

*Yes*  
 *No*

**2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery?**

*Yes*  
 *No*

**2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:**

In 2003, the Recovery Plan for the Northern Idaho ground squirrel identified the following criteria to recover the species (U.S. Fish and Wildlife Service (USFWS) 2003).

1. Of the 17 potential metapopulations that have been identified within the *probable historical distribution*, there must be at least 10 metapopulations, each maintaining an average effective population size of greater than 500 individuals for 5 consecutive years.

Status

Of the 17 metapopulations identified in the Recovery Plan, none have achieved the recovery criteria of an effective population size of 500, although 5 metapopulations do have greater than 100 individuals.

In 2010, of the 56 presumed-occupied Northern Idaho Ground Squirrel (NIDGS) sites, only 5 sites —Bear Meadow North, Squirrel Manor, Rocky Comfort Flat, Lost Valley Reservoir, and a portion of state/private land in Price Valley— appeared to support >100 squirrels (Evans Mack 2010a, p. 6). Three metapopulations (a group of spatially separated populations of the same species that interact at some level) – Lost Valley-Slaughter Gulch, Bear Meadows-Rocky Comfort Flat, and Price Valley – are approaching delisting recovery criteria number 1 (Evans Mack in litt. 2010, p. 2; Evans Mack 2010a, pp. 14-16; USFWS 2003, p. 22).

2. The area occupied by a minimum of 10 potential metapopulations must be protected. In order for an area to be deemed protected, it must be: (1) owned or managed by a government agency with appropriate management standards in place; (2) managed by a conservation organization that identifies maintenance of the subspecies as the primary objective for the area; or, (3) on private lands with a long-term conservation easement or covenant that commits present and future landowners to the perpetuation of the subspecies.

## Status

Thirteen of the 17 metapopulation areas are in Federal ownership, or in a combination of Federal, State, and/or private. While management standards have been incorporated within the PNF through consultation with the Service, they are lacking on State and certain private lands. One large metapopulation site that incorporates a large percentage of private lands is operating under a 15 year Safe Harbor Agreement with the Service (OX Ranch; see below), although this agreement does not provide for the same level of protection as a conservation easement or covenant.

Two conservation agreements have been implemented for NIDGSs since the completion of the 2003 Recovery Plan. The first agreement, the Schwisow low-effect Habitat Conservation Plan (HCP), between the Service and a private landowner, was signed in 2007 to address potential effects of development in Price Valley, Idaho. HCPs under section 10(a)(1)(B) of the Act provide for partnerships with non-Federal parties to conserve the ecosystems upon which listed species depend, ultimately contributing to their recovery. This 25-year agreement set aside a 1.2 hectares (ha) (3 acres (ac)) protected area currently occupied by NIDGSs, next to a 0.81 ha (2 ac) development project located in unoccupied habitat (USFWS 2007, p. 2). Presence of NIDGSs has been documented annually since 2008 within the Schwisow HCP agreement boundary (Evans Mack in litt. 2011c, entire).

The second conservation agreement, a Safe Harbor Agreement (SHA), was signed in 2009 between the Service, IDFG, and Hixon Properties Inc. (USFWS 2009b, entire). A SHA is a voluntary agreement involving private or other non-Federal property owners whose actions contribute to the recovery of species listed as threatened or endangered under the Act. This SHA will remain in effect for 15 years and enrolled 3,150 ha (7,783 ac) of privately owned land on the OX Ranch along Lick Creek, Bear Creek, and Steve's Creek near the town of Bear, Idaho. It is expected this SHA will provide a net conservation benefit for NIDGSs by enhancing and potentially increasing existing habitat within the enrolled lands, creating an opportunity to increase population numbers, and providing insurance against the loss of the species in the area as a result of habitat loss or other factors (USFWS 2009b, p. 2).

Monitoring of NIDGS occupancy and population estimates occurs annually at various locations within the boundaries of the SHA through the work of the interagency recovery coordinator. Population estimates in 2010 for the Bear Meadows Complex - Rocky Comfort Flat metapopulation, which includes the area covered by this SHA, is over 500 NIDGSs (Evans Mack 2010a, p. 14), making this an important area for recovery.

3. Plans have been completed for the continued ecological management of habitats for a minimum of 10 potential metapopulation sites.

## Status

Portions of 2 of the 17 metapopulation sites identified in the Recovery Plan, Price Valley and Lost Valley, have prescribed fire plans for maintaining NIDGS habitat that were developed by the PNF (U.S. Forest Service (USFS) 2009a, p. 6). While these plans don't encompass private and State lands and only address prescribed fire as an ecological management tool, they do accomplish the maintenance of NIDGS quality habitat through continued use of prescribed fire (USFS 2009a, p. 6). A metapopulation conservation plan for the entire Lost

Valley metapopulation area was drafted by the PNF and IDFG but was never finalized and released (Evans Mack in litt. 2011b, p. 2).

4. A post-delisting monitoring plan covering a minimum of 10 potential metapopulation sites has been completed and is ready for implementation.

### Status

A post-delisting monitoring plan has not been completed given the above Recovery Criteria have not been achieved.

## **2.3 Updated Information and Current Species Status**

### **2.3.1 Biology and Habitat**

#### **2.3.1.1 New information on the species' biology and life history:**

The NIDGS emerges from seasonal torpor in late March or early April and remains active above ground until July through early September (Yensen 1991, p. 593; Evans Mack in litt. 2010, p. 1). Adult males are the first to emerge, followed by adult females and then yearlings. Entrance into seasonal torpor is in approximately the same order, with pups active one month later than adult males, at times active until late August, early September (Yensen 1991, p. 593; Evans Mack in litt. 2010, p. 1). Females and males are sexually mature the first spring after birth, and females produce one litter per year of between two and seven pups depending on their fitness (USFWS 2003, pp. 8-10). Male and female NIDGSs live on average 1.7 and 3.2 years respectively, with one female documented living up to nine years (Evans Mack and Bond 2010. p. 4, USFWS 2003, p. 10). Males usually die at a younger age due to behavior associated with reproductive activity (USFWS 2003, p. 10).

Data from studies of the southern Idaho ground squirrel (SIDGS; *Spermophilus brunneus endimicus*; genus recognized as *Urocitellus*<sup>1</sup>; Helgen *et al.* 2009, p. 297), which is classified as a candidate species (i.e. candidate for protection under the Endangered Species Act), indicates that dispersal is undertaken by young of the year midway through their active period (i.e. while they are above ground; Panek 2005, p. 39). While less is known regarding NIDGS dispersal timing, at one occupied location in 2011 it was determined that NIDGS pups were dispersing in mid July (Rautsaw in litt. 2011b, p. 13). Regarding dispersal distances, SIDGSs have been documented dispersing up to distances of 2.4 kilometers (km) (1.5 miles (mi); Panek 2005, p. 32). Caution should be used when comparing dispersal results from SIDGSs for NIDGSs given the different habitat requirements for each subspecies (NIDGSs are found in meadow/ forested habitats, while SIDGSs are found in shrub steppe habitats). These different habitats requirements may influence the dispersal distances for each subspecies.

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<sup>1</sup> In 2009, Helgen *et al.* published in the Journal of Mammalogy the *Generic Revision in the Holarctic Ground Squirrel Genus Spermophilus*, which revised the genus for NIDGS and SIDGS from *Spermophilus* to *Urocitellus*. However, we refer to the genus *Spermophilus* because that is how it is currently recognized in the Code of Federal Regulations.

**2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:**

In 1985, the total NIDGS population was estimated to be 5,000 squirrels scattered among 18 known population sites (Yensen 1985, p. 29). In 2002, two years after listing, the population estimate for the NIDGS was 450 to 500 individuals (Haak 2002, p. 10). In 2010, NIDGSs occupied 56 sites, an increase of 34 sites compared to the 22 sites detected in 2002 (Evans Mack 2010a, p. ii). Modeled population results, combined with squirrels detected on surveys, estimate the minimum pre-pup population was 1,560 in 2010, down slightly from the 1,618 estimated in 2009 (Evans Mack 2010a, p. ii; Evans Mack in litt. 2010, p. 2; Evans Mack and Bond 2010, p. 6). The decrease in population from 2009 to 2010 is attributed to fewer sites surveyed in 2010 as opposed to a true population decrease (Evans Mack in litt. 2011b, p. 2). Overall, the 10-year NIDGS population trend is increasing while its distribution across the landscape continues to expand (Figure 1; Evans Mack in litt. 2011b, p. 2; Evans Mack 2010a, pp. 6, 10).

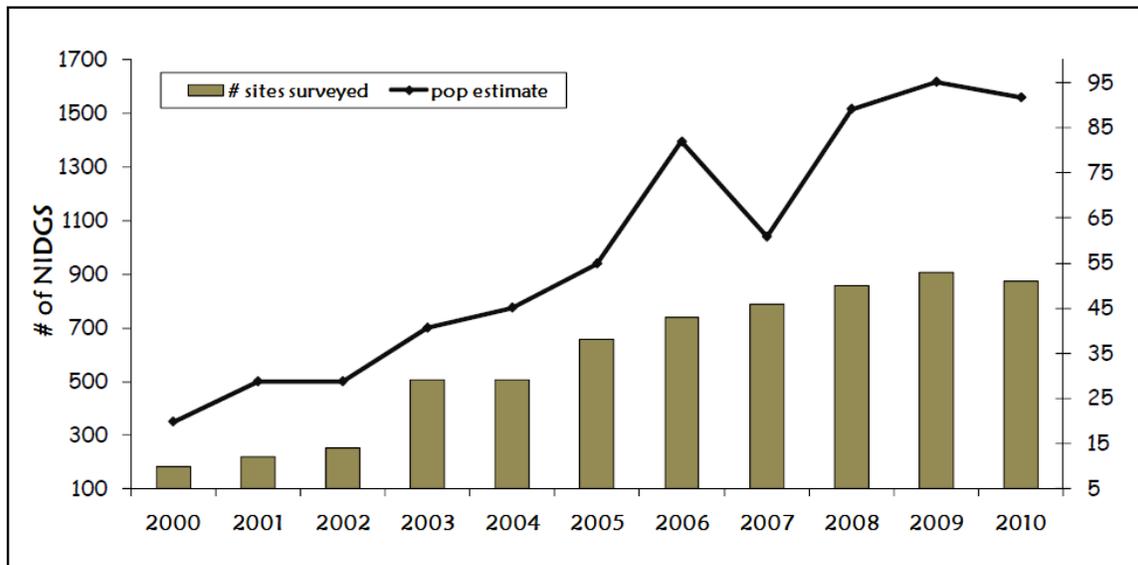


Figure 1: Northern Idaho ground squirrel population estimate and number of sites surveyed, west central Idaho, 2000-2010 (taken out of Evans Mack 2010a).

**2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):**

Northern Idaho ground squirrels exhibit low overall genetic diversity compared with other sciurid (squirrel family) species (Hoisington 2007, pp. 29, 33), have high levels of microsatellite diversity, and low to moderate differentiation among populations (Garner *et al.* 2005, p. 771) with more genetic flow between sampled populations than expected (Hoisington 2007, p. 33). Pairwise  $F_{st}$  values, which range from 0 (populations are interbreeding freely) to 1 (populations

are completely separate) and provide a measurement of genetic variability within and between populations, were found to be greater than the more widely distributed Piute ground squirrel (*Urocitellus mollis*), but similar to values found for fragmented colonies of black tailed prairie-dogs (*Cynomys ludovicianus*; Hoisington 2007, p. 33). Among all populations of sciurid species, the NIDGS exhibit low to moderate divergence at microsatellite loci but appear to have tolerated some degree of isolation without losing genetic diversity (Garner *et al.* 2005, p. 770). The majority of the NIDGS populations break into a western and eastern genetic cluster, with a ridge appearing to act as a filter for gene flow, though there is some evidence of gene flow between the western and eastern clusters (Hoisington 2007, pp. 67-68). One population, Round Valley, is considered isolated due to the high differentiation from the surrounding areas observed with the nDNA and mt DNA analyses (Hoisington 2007, p. 126). Given NIDGSs are more isolated now than in the past due to forest encroachment fragmenting habitat, gene flow and genetic diversity may continue to be impacted unless connectivity of populations is restored (Garner *et al.* 2005, p. 770).

#### **2.3.1.4 Taxonomic classification or changes in nomenclature:**

The first NIDGS specimens were collected in 1913 by L. E. Wyman, and described by A.H. Howell as a subspecies of the Washington ground squirrel (*Citellus townsendii brunneus*; Howell 1938, pp. 72-73). Subsequently, Howell (1938, pp. 72-73) reclassified the Idaho ground squirrel as a full species, *Citellus brunneus*. In 1949 (p. 300), Hershkovitz demonstrated that *Spermophilus* is the correct name for the genus. In 1991 (entire), Yensen determined that *Spermophilus brunneus* consisted of two taxonomically distinct subspecies based on morphology, pelage, and life history differences that also included biogeographical separation; the NIDGS and neighboring southern Idaho ground squirrel (SIDGS; *Spermophilus brunneus endimicus*; genus recognized as *Urocitellus*<sup>2</sup>; Helgen *et al.* 2009, p. 297). Yensen (1991, p. 583) suggested that the two subspecies were close to species-level separation, and subsequent genetic work has indicated that they could be validated as separate species (Gill and Yensen 1992, p. 155; Yensen and Sherman 1997, p. 1; Gavin *et al.* 1999, p. 163; Hoisington 2007, p. iii). In 2009, Helgen *et al.* (p. 297) revised the genus *Spermophilus* and placed the NIDGS into the genus *Urocitellus*<sup>2</sup>. Given the NIDGS is threatened throughout its range, it is not considered a distinct population segment.

#### **2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):**

The NIDGS is found in Adams and Valley Counties, Idaho. In 2005, the NIDGS was discovered at an elevation of 2,300 meters (m) (7,500 feet (ft)), which is 625 m (2,000 ft) above the previously documented elevation limit of known NIDGS population sites (Figure 2; Evans Mack

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<sup>2</sup> In 2009, Helgen *et al.* published in the Journal of Mammalogy the *Generic Revision in the Holarctic Ground Squirrel Genus Spermophilus*, which revised the genus for NIDGS and SIDGS from *Spermophilus* to *Urocitellus*. However, we refer to the genus *Spermophilus* because that is how it is currently recognized in the Code of Federal Regulations.

2006, p. ii). This discovery expanded the known distribution of the NIDGS to the north and west.

### Northern Idaho Ground Squirrel Probable Historic Distribution and 2010 Known Extant Colonies

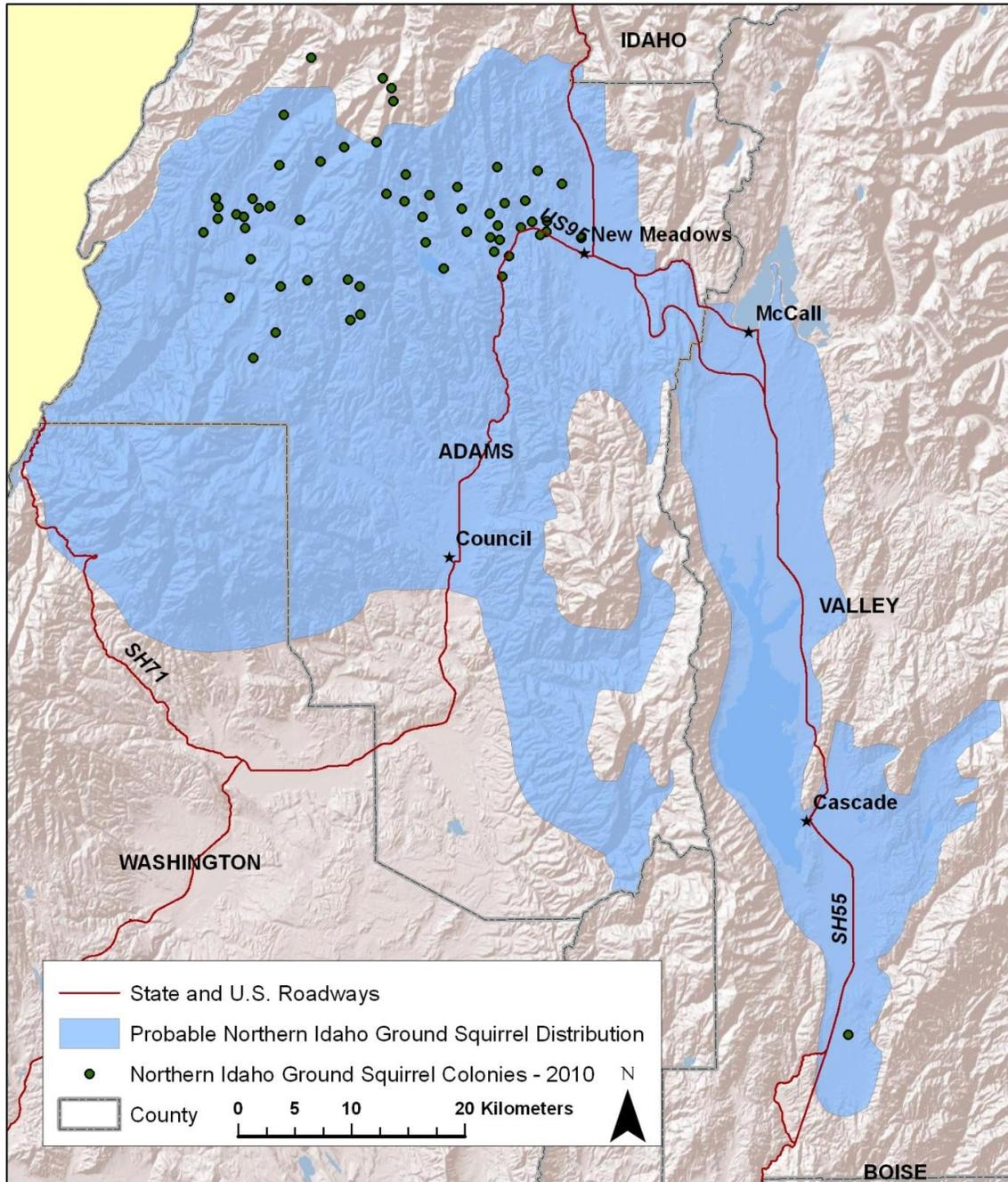


Figure 2: Northern Idaho ground squirrel historic and current distribution and known extant colonies as of 2010.

### **2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):**

Northern Idaho ground squirrels are associated with shallow, rocky soils where they inhabit three types of burrow systems: nest, auxiliary (i.e. escape), and hibernation (Yensen *et al.* 1991, entire). The NIDGS often digs burrows under logs, rocks, or other objects, though they have been found in the open (Yensen *et al.* 1991, p. 95; Sherman and Yensen 1994, p. 10). Nesting burrows are found in soil pockets greater than 1 m (3.3 ft) deep (Yensen *et al.* 1991 p. 93; Yensen and Sherman 1997, p. 3.), while dry vegetation sites with shallow soils of less than 50 centimeters (cm) (19.5 inches (in.)) deep above bedrock are used for auxiliary burrow systems (Yensen *et al.* 1991, p. 93). Burrows used for hibernation likely consist of a single tunnel (branched or unbranched) descending steeply to one chamber containing a nest (Yensen *et al.* 1991, p. 98).

Nearly all of the meadow habitats utilized by NIDGSs are bordered by coniferous forests of ponderosa pine and Douglas-fir forests, though NIDGSs are not abundant in meadows that are surrounded by high densities of small young trees (Sherman and Yensen 1994, p. 9). The NIDGS is an herbivore and will consume the roots, bulbs, leaf stems, flower heads, and seeds of 40 to 50 plant species that are major components of the diet during key periods of the spring and summer (Yensen *et al.* 2010, p. 5; Dyni and Yensen 1996, p. 99). Based on a pilot study, NIDGSs preferred forbs (63.3 to 76.7%) at two sites during the mid and late active season, with grasses comprising 2.6 to 17.6% of their diet during the same time (Yensen *et al.* 2010, p. 5). During the late active season, resources like rhizomes, roots, seeds, and insects constituted more than 25% of their diet (Yensen *et al.* 2010, p. 5). Therefore, a diverse component of forbs and grass species present appears to be important for NIDGS conservation.

Populations of the NIDGS are located on U.S. Forest Service (USFS), Idaho State, and private lands within Adams and Valley Counties. Known occupied NIDGS habitat comprises an estimated total of 929 ha (2,295 ac); of which 439 ha (1,085 ac) is privately owned, 415 ha (1,025 ac) is federally owned, and 75 ha (185 ac) are State administered lands (Evans Mack in litt. 2010, p. 5; Evans Mack in litt. 2011a, entire).

## **2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)**

### **2.3.2.1 (A) Present or threatened destruction, modification or curtailment of its habitat or range:**

At the time of listing, the threats to NIDGSs associated with Factor A included forest encroachment into grassland meadows; suitable habitat conversion to agriculture; residential construction; development of recreational facilities such as golf courses; and road construction and maintenance (USFWS 2000a, p. 17781). Below we have addressed an updated analysis of threats under Factor A.

### Meadow Invasion

Northern Idaho ground squirrels rely on meadow habitat connected within a matrix of ponderosa pine and/ or Douglas fir forested habitat. The primary threat to the NIDGS identified in the 2000 listing rule and 2003 Recovery Plan was, and appears to continue to be, meadow invasion by conifers (Rautsaw in litt. 2011b, p. 1; Evans Mack in litt. 2010, p. 5; USFWS 2009a, p. 2; USFWS 2003, p. 11; USFWS 2000a, p. 17779; Yensen and Sherman 1997, p. 3). Once open stands of conifers with an herbaceous understory have been replaced by dense stands of trees lacking an understory as a result of logging and fire suppression in post-settlement times (USFWS 2003, pp. 11-12; Burns and Zborowski 1996, entire; Crane and Fischer 1986 and Steele *et al.* 1986 in Yensen and Sherman 1997, p. 3). This has reduced the amount of suitable NIDGS habitat, while at the same time further isolating populations and reducing genetic exchange among populations. With limited connectivity for dispersal opportunities, small and isolated NIDGS populations are also likely more susceptible to the effects of predation.

Habitat restoration maintains and increases meadow habitats for squirrel populations while providing dispersal corridors for connectivity between populations. Livestock management, prescribed burning, reseeding, and forest thinning are habitat management tools identified in the Recovery Plan to restore and maintain preferred habitat conditions (USFWS 2003 p. 23). Loss of suitable meadow habitat and dispersal corridors due to conifer encroachment into meadows continues to be a threat to the NIDGS, though progress has been made and conditions have improved on Forest Service lands due to habitat thinning and prescribed burning by the PNF (Evans Mack in litt. 2010, p. 5; USFS in litt. 2010, entire). Between 1996 and 2010, the PNF conducted 33 prescribed fires to improve NIDGS habitat, totaling 1,109 ha (2,740 ac; USFS in litt. 2010, entire). In addition and conjunction with many of those prescribed fires, the PNF thinned 758 ha (1,873 ac) to further improve NIDGS habitat (USFS in litt. 2010, entire). In 2001, the PNF began longer-term habitat improvement projects within two NIDGS metapopulation sites; Lost Valley and Price Valley (USFS 2009a, p. 6; USFS in litt. 2010, entire). These sites were thinned and prescribed burned to improve NIDGS habitat (USFS 2009a, p. 6), with subsequent prescribed fires applied periodically to maintain quality habitat conditions (USFS in litt. 2010, entire). These treatments have increased the amount of suitable habitat in the form of meadows and increased corridors for movements between populations (Evans Mack in litt. 2010, p. 5).

From a genetic standpoint, habitat restoration should continue to be a conservation priority for the NIDGS given that the species exhibits high levels of microsatellite diversity and only low to moderate differentiation among populations (Garner *et al.* 2005, p. 771).

### Land Use Changes

Development and habitat conversion are historical and ongoing threats to NIDGS populations, especially on private lands (Evans Mack in litt. 2010, p. 5; USFWS 2003, p. 11; USFWS 2000a, pp. 17781-17782). Half of the currently known sites occupied by NIDGSs occur on private land, comprising an estimated 439 ha (1,085 ac) of occupied habitat (Evans Mack in litt. 2010, p. 5). The land incorporating the entire Round Valley NIDGS metapopulation is presently for sale, and a subdivision and private home have been developed in Round Valley in the last 6 years (Evans Mack in litt. 2010, p. 5). In addition, Potlatch Forest Holdings Inc. is advertising private timber

land for sale in the Mud Creek drainage along Price Valley and Mud Creek roads where there are known occupied NIDGS locations (Evans Mack in litt. 2010, p. 5). This conversion of once open space occupied by NIDGSs to housing developments on private land is a continuous and expanding threat to the species (Evans Mack in litt. 2010, p. 5).

Expanding the Lost Valley Reservoir to increase irrigation capacity was initially identified as a threat in the 2003 NIDGS Recovery Plan. Lost Valley Reservoir provides irrigation water for portions of the communities of Council, Cambridge, and Midvale, Idaho, and is drawn down each summer and fall. In 2008, the NIDGS Technical Working Group (TWG) wrote a position statement regarding potential impacts from the most recent Lost Valley Reservoir expansion proposal and its potential effects to NIDGSs (NIDGS TWG in litt. 2008, entire). In 2010, a minimum estimate for the NIDGS population along Lost Valley Reservoir was 154 individuals, making it one of the largest known populations of squirrels (Evans Mack 2010a, pp. 14-16). This population has been present along the reservoir since at least 1998 (NIDGS TWS 2008, p. 1). Summarizing the TWGs position statement, it was stated that until recovery for NIDGSs is further along than the present, expansion of the reservoir would inundate a substantial portion of the core squirrel habitat, thereby impeding overall recovery for the species as a whole (NIDGS TWS 2008, entire).

In 2003, a 28.8 km; (17.9 mi) gravel roadway from Council to Cuprum, Idaho, was upgraded to a two-lane paved roadway (USFWS 2000b, p. 1). This roadway was identified as a threat in the 2000 listing rule (USFWS 2000a, p. 17782). Approximately 6.5 km (4 mi) of this roadway bisects historic and currently occupied NIDGS habitat. As part of the associated 2000 Biological Opinion between the Service and the Federal Highways Administration, conservation measures were established to address potential impacts to NIDGSs from the roadway upgrade (USFWS 2000b, p. 3). While short-term monitoring was incorporated into mitigation measures for the species, it is unknown what the long-term affect of improving this roadway is having on NIDGSs from enhanced, and therefore increased, human access into NIDGS habitat that historically was more remote. In addition, it is unknown what the effect, if any, occurs from roadway mortality of NIDGSs along this enhanced roadway.

#### Motorized Recreation

In 2003, Slaughter Campground and National Forest roads #50076 and #51469 adjacent to Lost Valley Reservoir, site of a large NIDGS colony and long-term habitat improvement project (USFS 2009a, p. 6), were closed by the PNF (USFS 2003a, entire; USFS 2003b, entire; Rautsaw in litt. 2011a, p. 2). This action reduced human disturbance to NIDGSs and their habitat within a portion of an important NIDGS metapopulation area.

A threat to NIDGS habitat not discussed in the 2000 Final Listing Rule, but that has materialized since then, is off highway vehicle (OHV) use. Cross-country OHV use can detrimentally impact NIDGS habitat through soil compaction, removal of vegetation, and physical disturbance or harm to individuals (USFS 2007, pp. 3-183). While this threat has not been quantified, anecdotal evidence exists of NIDGS habit disturbance by OHVs in certain areas (Rautsaw in litt. 2011c, entire). While it's unlikely this threat is operating at the landscape level, isolated OHV cross-country use has the potential to negatively affect NIDGSs and their habitat through localized events, potentially threatening small and/ or isolated populations.

### Summary

In summary, the ongoing threats to NIDGSs under Factor A include forest encroachment into grassland meadows and land use changes. Since 1996, 58 habitat improvement projects totaling 1,869 ha (4,613 ac) have been implemented by the PNF for the benefit of NIDGSs. Additional habitat improvements are still needed within the range of the NIDGS to expand and connect populations to achieve the recovery criteria of 10 metapopulations maintaining an effective population size of 500 for 5 consecutive years. Land use changes, including developments and proposed reservoir expansions, also continue to be a threat to NIDGSs and their habitat. Cross-country OHV use is a potential threat since listing that can disturb NIDGSs and their habitat.

#### **2.3.2.2 (B) Overutilization for commercial, recreational, scientific, or educational purposes:**

At the time of listing, the threats to the NIDGS associated with Factor B included recreational shooting and poisoning (USFWS 2000a, p. 17782). An updated analysis of threats under Factor B is provided below.

#### Recreational Shooting

Illegal recreational shooting continues to be a threat to the NIDGS, though quantification of take remains unknown; therefore population effects are unclear (Evans Mack 2010a, p. 6). In 2009, an illegal shooting case was documented and brought to trial in Adams County, where the person charged pleaded guilty to illegally taking (shooting) a NIDGS (Evans Mack in litt. 2009, p. 1). In addition, NIDGSs are commonly mistaken for COGSs, which are still legal to shoot, both of which are often found occurring together in the same general vicinities. This potential confusion between the two species further increases the likelihood of continued illegal shooting of NIDGSs.

#### Scientific Collections and Translocations

While NIDGSs are actively monitored through live trapping, only 5 mortalities out of 2,490 trap events (<0.2%) have occurred in the past 8 years (Evans Mack in litt. 2010, p. 6). In 2005, a translocation attempt may have led to the loss of 9-13 NIDGSs (Evans Mack in litt. 2010, p. 6). Additional translocation attempts have not been carried out since then and concerns remain regarding the high mortality rate of translocated animals, low overall success, and diminished priority due to recent genetic findings.

#### Poisoning

No new information has been gathered regarding incidents of poisoning on NIDGSs.

### Summary

In summary, the ongoing threats to the NIDGS under Factor B include recreational shooting and potentially poisoning. In 2009 a person was charged with illegally killing a NIDGS. Additional reports of recreational shooting occur in occupied NIDGS habitat, although it is unknown what the overall level of population impact is on NIDGSs. Trapping associated with annual monitoring has and will continue into the future as a recovery measure, but mortalities from

trapping are less than 1% and not considered a threat to the species. Even though translocation is still identified as a recovery measure, future efforts utilizing it for recovery are unlikely given concerns regarding the high mortality rate of translocated animals, low overall success, and diminished priority due to recent genetic findings. While poisoning is still a potential threat, we are unaware of information regarding whether illegal poisoning is occurring, and if so, what the effects are on populations of the NIDGS.

#### **2.3.2.3 (C) Disease or predation:**

At the time of listing, the threats to the NIDGS associated with Factor C include predation, especially at smaller and more isolated populations (USFWS 2000a, pp. 17782-17783). The state of knowledge on disease and predation has not changed significantly since listing or the completion of the 2003 Recovery Plan. While disease is not considered a threat, it is presently unknown if plague (*Yersina pestis*) occurs within any NIDGS populations (Evans Mack in litt. 2010, p. 6). Fleas have been documented at one NIDGS population, which has undergone population increases and decreases, though it's unknown if fleas are the source of the population changes (Evans Mack in litt., 2010a, p. 6). Domestic dogs have recently been identified as a localized threat at two NIDGS sites on private land (Evans Mack in litt. 2010, p. 6). Additional interactions between domestic dogs, feral cats, and NIDGSs are likely to continue as once open private lands near occupied NIDGS habitat are converted to residential developments. In addition, the closure of Slaughter Campground by the PNF at the Lost Valley metapopulation site was primarily due to the negative effects domestic dogs were having on NIDGSs (Rautsaw in litt. 2011b, p. 32). Badgers continue to be a predation concern, primarily to small and isolated populations that are more susceptible to the effects of localized predation events. To reduce the threat of predation on NIDGS populations, limited mammalian predator control, primarily for badgers (*Taxidea taxus*), has taken place periodically from 2003-2009. While quantification of control actions are reported annually, its effectiveness at reducing predation to NIDGSs is unknown because it never has been measured (Evans Mack in litt. 2010, p. 6). Other predators to NIDGSs include raptors and weasels (*Mustela frenata*).

In summary, disease is not considered to be a current threat to NIDGSs, however, ongoing predation by badgers, raptors, weasels, continues to threaten NIDGS populations. A new threat that has been identified is predation by domestic dogs, and possibly feral cats.

#### **2.3.2.4 (D) Inadequacy of existing regulatory mechanisms:**

At the time of listing, the threats to NIDGSs associated with Factor D include inadequate regulations associated with take or possession, along with inadequate local land use ordinances and other regulations (USFWS 2000a, p. 17783). An updated analysis of threats under Factor D is provided below.

##### Illegal Take or Possession

Northern Idaho ground squirrels are a Federally threatened species, with illegal take regulated under Section 9(a)(1) of the Act. While hunting for several other species of ground squirrels in Idaho is unregulated by the State, the NIDGS is considered a protected non-game species under

State Law for which it is illegal to take: no person shall take or possess those species of wildlife classified as Protected Nongame, or Threatened or Endangered at any time or in any manner, except as provided in Sections 36- 106(e) and 36- 1107, Idaho Code, by Commission rule, or IDAPA 13.01.10, “Rules Governing the Importation, Possession, Release, Sale or Salvage of Wildlife,” Subsection 100.06.b (IDFG 2005, p. B-5). Even though it is illegal to shoot NIDGSs, illegal take continues to pose a threat to the species. In 2009, a person was charged and sentenced with the illegal killing of a NIDGS. The sentencing was minimal due to the lack of knowledge by the defendant regarding the presence of NIDGSs in the vicinity of the infraction, and as a result, additional signage has been erected at key locations within their range warning of the presence of a threatened species. Additional public outreach regarding the illegality of shooting NIDGSs is needed to further reduce this threat since people commonly mistake NIDGSs for COGSs, which are legal to shoot.

#### Payette and Boise National Forests

Because a large number of occupied NIDGS sites occurs on PNF administered lands, the PNF provides special management emphasis to the NIDGS through their 2003 Final Forest Plan Revision (USFS 2003c, p. E-1), while the BNF does not. In 2008 and 2009, the PNF and Service consulted under Section 7(a)(2) of the Act regarding management actions on NIDGSs and their habitat, which culminated in 3 biological assessments and associated biological opinions in watersheds occupied by NIDGSs which are in effect for 10 years (USFS 2008a, USFS 2008b, and USFS 2008c, entire; USFWS 2009c, USFWS 2009d, and USFWS 2009e, entire). Because the BNF does not contain known occupied NIDGS sites, but does contain suitable habitat adjacent to known occupied sites, the BNF consults with the Service on a project specific basis. The PNF Travel Management Plan (TMP) Final Environmental Impact Statement and Record of Decision for the Council and New Meadows Ranger Districts was signed in 2009 (USFS 2009b, entire). A result of the PNF TMP is that no OHV motorized travel to dispersed campsites is allowed within NIDGS occupied habitat, while dispersed camping is only allowed in designated areas within NIDGS occupied habitat (USFWS 2009c, pp. 17 and 21). In addition, occupied NIDGS habitat will be monitored for illegal OHV travel and if necessary, these areas will be closed by barricades, fences, gates, or other means to reduce potential negative impacts to NIDGS habitat. While regulations have been implemented, at times enforcement, such as enforcing the TMP, has been lacking (Burak in litt. 2011, entire).

In summary, since NIDGSs were listed as threatened in 2000, the PNF and BNF appropriately consult with the Service regarding management actions on NIDGSs and their habitat. The PNF revised their Forest Plan to extend special management emphasis to NIDGSs while at the same time providing additional regulatory requirements in NIDGS occupied habitat regarding OHV use through their TMP. These additional regulatory measures have reduced threats to NIDGSs while enhancing habitat through management actions within Forest boundaries. At times, though, enforcement has been lacking, especially with the PNF’s TMP.

#### State of Idaho

The Idaho Department of Lands (IDL) manages State lands within the NIDGS range as endowment lands. These lands, per the State of Idaho Constitution, must be managed “in such manner as will secure the maximum long term financial return” to trust beneficiaries, primarily Idaho’s schools (IDL 2007, p. 3). This management mandate limits the Idaho Department of

Lands ability to enhance NIDGS habitat on State endowment lands (Evans Mack in litt. 2011b, p. 2). While the Memorandum of Agreement (MOA) between IDFG and IDL provides opportunities to develop conservation measures to reduce impacts to NIDGSs during timber harvest activities (Evans Mack in litt. 2010, p. 4; IDFG and IDL 2005, entire), regulatory mechanisms making these conservation measures a requirement on Idaho State lands are lacking. Recently, OHV use through occupied NIDGS habitat has been documented near the now closed Slaughter campground, adjacent to Lost Valley Reservoir (Rautsaw in litt. 2011b, p. 33; Rautsaw in litt. 2011c, entire). At this location, there is evidence of recent cross-country OHV use originating from State lands through occupied and suitable NIDGS habitat on State and PNF lands (Rautsaw in litt. 2011c, entire).

While regulatory mechanisms for protecting NIDGS habitat are lacking on Idaho State lands, at this time we do not possess the information linking this lack of regulatory mechanisms as a threat to the species. We recommend the MOA between IDFG and IDL be continued and appropriately applied on State lands. Conservation measures may need to be better developed to address cross-country OHV use through occupied NIDGS habitat on State of Idaho lands. We encourage the IDL to take advantage of opportunities to enhance NIDGS habitat on State endowment lands while adhering to the Idaho Constitution mandate to secure the maximum long term financial return for the State of Idaho.

#### Private Land Development

As is discussed under Factor A, the development of occupied NIDGS habitat on private lands continues to be a threat to the species. Comprehensive plans for Adams and Valley Counties, where all of the known NIDGS occupied habitat occurs, contain goals of protecting wildlife and their habitats (Valley County 2010, pp. 11-12; Adams County 2006, p. 37). Even with these goals in place, private lands containing occupied NIDGS habitat continue to be developed in those Counties (see 2.3.2.1, Present or threatened destruction, modification or curtailment of its habitat or range). While IDFG continues to provide technical comments to various agencies, including local Counties regarding the effects of land use changes on NIDGSs and their habitat (Evans Mack 2010b, p. 12), the inadequacy of existing regulatory mechanisms regarding private land development continues to be a threat to the species.

#### Summary

Given the NIDGS is a Federally threatened species, take is regulated under Section 9(a)(1) of the Act. This is in addition to the protection afforded by Idaho, where NIDGSs are protected non-game for which it is illegal to collect, harm, or otherwise remove from its habitat. Therefore, the inadequacy of existing regulatory mechanisms for take or possession appears to be alleviated, although additional public outreach and education is needed to further minimize illegal take. The PNF and BNF consult with the Service as appropriate on activities which may affect NIDGSs. The PNF has incorporated NIDGSs into their Forest Plan which has reduced OHV threats within occupied NIDGS habitat, although at times enforcement of the TMP is lacking. These additional regulatory measures have reduced threats to NIDGSs while enhancing habitat through management actions within the PNF boundaries. While opportunities exist between IDFG and IDL, through the existing MOA, to develop NIDGS conservation measures to protect NIDGSs and their habitat on State of Idaho endowment lands, mechanisms are lacking to make these measures a regulatory requirement, though we don't have the information needed to link

this as a threat to the species. Conservation measures may need to be better addressed or developed on State of Idaho lands regarding cross-country OHV use through occupied and suitable NIDGS habitat. Given the ongoing conversion of occupied private lands to human development, the inadequacy of existing regulatory mechanisms regarding private land development continues to be a threat to the species and its habitat.

#### **2.3.2.5 (E) Other natural or manmade factors affecting its continued existence:**

At the time of listing, the threats to NIDGSs associated with Factor E include land ownership patterns, prelisting activities, and conservation efforts on private and public lands, along with habitat and resource competition with Columbian ground squirrels (COGS), winter mortality, and small populations and naturally occurring events (USFWS 2000a, p. 17783). An updated analysis of threats under Factor E is provided below.

##### Columbian Ground Squirrel Competition

Habitat and resource competition between NIDGSs and COGSs was identified in the 2000 listing rule as a threat (USFWS 2000a, p. 17783). Columbian ground squirrels and NIDGSs are sympatric (occur in the same area and capable of encountering each other) within certain areas of the NIDGS range, and dietary overlap exists, suggesting that both species are competitors for the same food source (Dyni and Yensen 1996, p. 107). Sherman and Yensen (1994, pp. 7-8) documented through removal experiments that COGSs can limit distribution of NIDGSs through direct competition. Columbian ground squirrels are larger than NIDGSs, and where they co-occur, NIDGSs have a tendency to occupy areas with shallower soils than they normally prefer (USFWS 2000a, p. 17783).

In 2010, it was found that COGSs occurred at 24 sites occupied by NIDGSs (Evans Mack 2010a, p. 6). It's been noted by Evans Mack and Bond (2010, p. 7) that COGS expansion at certain NIDGS sites is likely a result of habitat treatments for the benefit of NIDGSs. As the PNF conducts habitat treatments for the benefit of NIDGSs, we expect COGSs to also favorably respond by expanding their range into once unsuitable habitat. In addition, COGSs may displace NIDGSs in other parts of their range where habitat treatments have not occurred. Therefore the threat still exists for COGSs displacing NIDGSs from occupied habitat.

##### Forage Competition Between NIDGSs and Livestock

While potential forage competition between NIDGSs and livestock (cattle) was not identified as a threat factor at the time of listing, it was identified as a research priority (USFWS 2003, p. 24). Given most occupied NIDGS sites are also grazed by cattle, a pilot study to document the diets of NIDGSs and cattle at 2 occupied sites was conducted. In the recent preliminary study, diet comparison results indicate that there is low dietary overlap between NIDGSs and cattle, with NIDGS diets consisting of a higher proportion of forbs (herbaceous flowering plant) compared to a higher proportion of graminoids (grasses) in cattle diets (Yensen *et al.* 2010, entire). Further study of these results is needed to answer additional questions raised in this preliminary study (Yensen *et al.* 2010, p. 6) such as season of use by cattle/NIDGS overlap and intensity of grazing.

Domestic sheep grazing also occurs within portions of the range of NIDGSs. Domestic sheep have been known to alter the vegetation cover components in sagebrush ecosystems (Mueggler 1950, entire; Laycock 1967, entire). Spring grazing by domestic sheep has been shown to lead to a reduction of perennial forbs and grasses, while fall domestic sheep grazing has been shown to be less detrimental to the perennial forb and grass vegetation component (Mueggler 1950, pp. 314-315; Laycock 1967, p. 213; Bork *et al.* 1998, p. 299). Both perennial forbs and grasses are important diet components for NIDGSs. Given the likely dietary overlap between domestic sheep and NIDGSs, there is concern that domestic sheep grazing may negatively affect NIDGS habitat (Rautsaw in litt. 2011b, p. 35). Additional information is needed regarding the timing and extent of overlap of domestic sheep grazing in occupied and suitable NIDGS habitat to determine the extent of this potential threat.

#### Roadway Mortality

Mortality of NIDGSs from vehicles on roads has occurred near occupied sites on U.S. Forest Service and County roadways, and a U.S. highway, although total mortality has not been quantified (Evans Mack in litt. 2010, p. 7). Speed limits and timing restrictions have been identified as conservation measures, though they have not always been adhered to or implemented (Evans Mack in litt. 2010, p. 7). While vehicle induced NIDGS mortality is a potential threat, especially to smaller and isolated populations, additional study is needed to better quantify the amount of NIDGS mortality that occurs from vehicle collisions.

#### Idaho Department of Lands Land Exchange

In 2009, the Boy Scouts of America (BSA) approached the Service regarding entering into a safe harbor agreement, or similar agreement, related to a potential land swap between the BSA and IDL to establish a Boy Scout summer recreation camp (BSA in litt 2009, entire). The section of IDL land the BSA had proposed to acquire is adjacent to the large Lost Valley Reservoir NIDGS population. In 2010, this colony's population was estimated at 154 individuals (Evans Mack 2010a, p. 15). The proposed human access route from the identified section of IDL land to the Reservoir would also cross through occupied NIDGS habitat, thereby greatly increasing human disturbance to NIDGSs. While the present status of this land swap is unknown, as it is currently proposed by the BSA it would constitute a threat to the relatively large and important Lost Valley Reservoir NIDGS population and impede NIDGS recovery (Womack in litt. 2010, entire).

#### Small Populations and Naturally Occurring Events

Due to the threats discussed in this 5-year review, along with the fact that small and isolated NIDGS populations remain throughout their range, the NIDGS still likely has little resilience to naturally occurring events.

#### Climate Change

Climate is influenced primarily by long-term patterns in air temperature and precipitation. The Intergovernmental Panel on Climate Change (IPCC) concluded that climate warming is unequivocal, and evident from observed increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level (IPCC 2007, pp. 30-31). Continued greenhouse gas emissions at or above current rates are expected to cause further warming (IPCC 2007, p. 30). Eleven of the 12 years from 1995 through 2006 rank among the 12

warmest years in the instrumental record of global average near-surface temperature since 1850 (Independent Scientific Advisory Board (ISAB) 2007, p. 7; IPCC 2007, p. 30). During the last century, mean annual air temperature increased by approximately 0.6° Celsius (C; 1.1° Fahrenheit (F); IPCC 2007, p. 30). Warming appears to be accelerating in recent decades, as the linear warming trend over the 50 years from 1956 to 2005 (average 0.13°C or 0.24°F per decade) is nearly twice that for the 100 years from 1906 to 2005 (IPCC 2007, p. 30). Climate change scenarios estimate that the mean air temperature could increase by over 3°C (5.4°F) by 2100 (IPCC 2007, pp. 45-46). The IPCC also projects that there will likely be regional increases in the frequency of hot extremes, heat waves, and heavy precipitation, as well as greater warming in high northern latitudes (IPCC 2007, p. 46). We recognize that there are scientific differences of opinion on many aspects of climate change, including the role of natural variability in climate.

Specific regional predictions for the Interior Columbia Basin, including the range of the NIDGS, is warmer temperatures with more precipitation falling as rain than snow, diminished snowpack and altered stream flow timing, increase in peak flow of rivers, and increasing water temperatures through the 21st century (to 2099; Hansen *et al.* 2001, p. 769; ISAB 2007, pp. iii, 15-16).

Predicted changes of climate could result in a wide-range of potential outcomes for NIDGSs and their habitat. The effects to the NIDGS in either the short or long-term in a focused geographic area cannot be reasonably discerned without a specific aspect of its ecology or physiology linked to a confidently predicted climate change variable (e.g., water temperature tolerance of fish, or early snowmelt reducing wolverine denning). Increasing temperatures and drought could affect fire frequency and intensity and the susceptibility of forest vegetation to disease. This rise in temperatures may also affect the timing of NIDGSs entering and exiting seasonal torpor in response to vegetative timing changes from climate change; or may cause a response by NIDGSs to move up in elevation as lower elevation habitats become less suitable. Additional information is needed to better determine the response of the NIDGS to a changing climate.

### Summary

In summary, the ongoing threats to the NIDGS under Factor E include competition with COGSs, a potential land swap between the Boy Scouts of America and IDL, and small populations and naturally occurring events. The displacement of NIDGSs from occupied habitat by COGSs continues to be a threat to the species. The proposed land exchange by the BSA with IDL is a likely threat as it would potentially compromise one of the largest known NIDGS populations. Small and isolated NIDGS populations will continue to be threatened by naturally occurring events until they expand in size and/ or habitat connectivity is restored, thereby increasing the resiliency of these small and/ or isolated populations. Work examining dietary overlap between cattle and NIDGSs has been conducted and preliminary results indicate low dietary overlap. Additional information is needed to determine the extent of the potential threat to NIDGSs from domestic sheep grazing. While information exists regarding NIDGSs being killed by vehicles on roadways, we don't have the information enabling us to elevate it as a threat rangewide, though there is concern about its effects on smaller and more isolated populations. Finally, climate change may be a threat to the NIDGS, though additional information is needed to determine how the species will respond to a changing climate.

## 2.4 Synthesis

The available new information assessed in the 5-year review indicates that the primary threat at listing continues to be the major threat – meadow invasion by conifers. Northern Idaho ground squirrels rely on meadow habitat connected within a matrix of ponderosa pine and/or Douglas fir forests. Logging and fire suppression have led to increased dense stands of trees lacking an understory. This has reduced the amount of suitable habitat, while at the same time isolating populations and reducing connectivity opportunities. Other threats include loss of habitat due to land use changes, illegal recreational shooting (i.e. plinking), predation, inadequacy of existing regulatory information regarding private land development, competition with Columbian ground squirrels, small populations and naturally occurring events, and a potential land swap between Boy Scouts of America and Idaho Department of Lands.

Given threats remain, recovery criteria have not been met, but the population has shown a long-term positive trend, the 5-year review recommends that the northern Idaho ground squirrel continue to be classified as threatened under the ESA and the recovery priority remain at 3C.

## 3.0 RESULTS

### 3.1 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

*Extinction*

*Recovery*

*Original data for classification in error*

No change is needed

### 3.2 New Recovery Priority Number: No Change

**Brief Rationale:**

### 3.3 Listing and Reclassification Priority Number: No Change

**Reclassification (from Threatened to Endangered) Priority Number:** \_\_\_\_\_

**Reclassification (from Endangered to Threatened) Priority Number:** \_\_\_\_\_

**Delisting (regardless of current classification) Priority Number:** \_\_\_\_\_

**Brief Rationale:**

#### 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

##### 1. Continue and increase habitat treatments for NIDGSs

Given the primary threat continues to be meadow invasion by conifers, additional work is still needed to enhance and maintain habitat for the NIDGS. We encourage the PNF to continue their existing and ongoing efforts to enhance and maintain suitable habitat conditions for NIDGSs on National Forest lands. In addition, we support additional habitat treatments to benefit NIDGSs on non-federal lands.

##### 2. Explore and initiate conservation options on private lands

As mentioned in the inadequacy of existing regulatory mechanisms, the development of occupied NIDGS habitat on private lands continues to be a threat to the species. Approximately 50% of known occupied habitat occurs on private land (Evans Mack in litt. 2010, p. 5). Options for conservation may include outright acquisition, conservation easements, or long-term Safe Harbor Agreements, such as the 15-year agreement for the OX ranch, signed in 2009, that enrolls 3,150 ha (7,783 ac) of privately owned land.

##### 3. Revise the Recovery Plan

The NIDGS Technical Working Group requested that the Service update the NIDGS Recovery Plan (NIDGS TWG in litt. 2010, entire). There are several aspects of the 2003 Recovery Plan for NIDGS that need revision that have been identified by the Technical Working Group, including: (1) Identify realistic population targets for recovery; (2) Clarify and/or redefine primary and secondary metapopulation areas; (3) Shift metapopulation site boundaries and re-assign occupied sites to better reflect recovery potential; (4) Provide an enhanced discussion of the role of private lands to recovery; (5) Discuss risks to squirrels that weren't identified initially (e.g. large vehicle traffic); (6) Discuss NIDGS suitable habitat and provide a copy of the suitable habitat model; (7) Expand the Probable Historic Distribution boundary based on new locations of squirrels; and (8) Acknowledge the diminished role of translocation as a recovery tool (NIDGS TWG in litt. 2010, p. 1).

##### 4. Continue the NIDGS coordinator position

As part of the 2003 Recovery Plan, recovery measure D (Coordinate the NIDGS Recovery Program), an interagency recovery coordinator position was established in 2003 (USFWS 2003, pp. 26-27). The primary responsibilities for the NIDGS recovery coordinator are to (1) coordinate and integrate ongoing interagency recovery programs, and (2) monitor NIDGS populations (Evans Mack 2010b, p. 1; Evans Mack 2011, p. 3). The coordinator is an IDFG employee, whose work is carried out through an agreement with, and partially funded by, the Service. From October 2008 through September 2010, coordinator accomplishments included; interagency program coordination; technical working group coordination and attendance; providing technical assistance regarding NIDGSs to 16 different agencies and private entities; providing information and

education regarding NIDGSs through presentations and media outreach; securing funding for recovery actions; managing NIDGS tabular and spatial data; and, overseeing annual monitoring efforts (Evans Mack 2010b, entire).

5. Continue annual NIDGS population monitoring

Since listing in 2000, annual NIDGS population monitoring has been conducted utilizing various methods. Beginning in 2002, population monitoring has been overseen by the NIDGS interagency program coordinator. In 2004, standardized field protocols were developed for monitoring NIDGS populations (Evans Mack 2004, entire). Protocols are updated as needed, with the latest update occurring in January, 2011 (Evans Mack 2011, entire).

Presently, annual population monitoring includes examining demography and population trends at 5 intensive monitoring sites (Evans Mack 2011, p. 3), surveying previously known NIDGS sites to assess NIDGS occupancy, and surveying areas identified as suitable habitat for new populations (Evans Mack 2010a, p. 1).

6. Address information gaps. In their January, 2010 letter to the Service, the NIDGS Technical Working Group identified gaps in knowledge (NIDGS TWG in litt. 2010, entire). They include:

- a. Diet of northern Idaho ground squirrels and potential effects of forage competition with livestock and Columbian ground squirrels
- b. Other potential impacts of livestock grazing
- c. Other potential effects of competition with Columbian ground squirrels
- d. Monitoring effectiveness of habitat treatments to squirrel recovery, including timing of habitat treatments and maintenance treatments
- e. The impacts of predators and illegal hunting on northern Idaho ground squirrel populations
- f. Dispersal patterns and the importance of open habitat corridors for dispersal

7. Develop an updated Population Viability Analysis (PVA) model

In 1993, a computer population viability simulation program was constructed utilizing recruitment and death values recorded over 8 years from 1 intensively studied NIDGS population site (Gavin *et al.* 1999, entire; Sherman and Yensen 1994, entire). Utilizing the variables of no natural immigration, and beginning the population viability analysis with 50 individuals (30 less than the actual population size of 80) the model calculated that all but 1 of 100 population sites would become extinct in 20 years. In 1999, the Service contracted with the U.S. Geological Survey to develop a 2<sup>nd</sup> population model for NIDGS (Runge 1999, entire). Using the assumptions of a closed population and overwintering survival of the female and pups, this model predicted population extinction within 7 years (using 1999 demographic trend information) if no conservation measures were taken.

It's been 12 years since a NIDGS population model was developed and the species has not gone extinct. Many recovery actions have been implemented by the agencies involved in recovery for the species. Information gathered from the annual interagency monitoring of NIDGS populations, demographics, and trends has been used to refine annual population estimates. Utilizing the data gathered from the annual monitoring of NIDGSs, an updated model, such as from a population viability analysis, could prove informative for future recovery planning and prioritization purposes.

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**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of the Northern Idaho Ground Squirrel (*Spermophilus brunneus***  
***brunneus*)**  
**(Currently recognized as *Uroditellus brunneus brunneus*)**

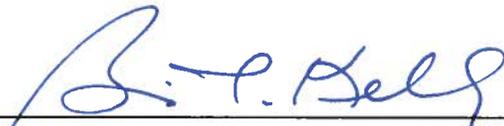
**Current Classification:** Threatened

**Recommendation resulting from the 5-Year Review:**

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** \_\_\_\_\_

**Review Conducted By:** Greg Burak, Idaho Fish and Wildlife Office, Boise, Idaho

  
\_\_\_\_\_  
**Idaho State Supervisor, Fish and Wildlife Service**

Date 9/13/2011