U.S. Fish & Wildlife Service

Horse and Burro Management at Sheldon National Wildlife Refuge

Revised Draft
Environmental Assessment

Before Horse Gather, August 2004

After Horse Gather, August 2005

September 2002

Front Cover: The top two photographs were taken one year apart at the same site, Big Spring Creek on Sheldon National Wildlife Refuge. The first photograph was taken in August 2004 at the time of a large horse gather on Big Spring Butte which resulted in the removal of 293 horses. These horses were placed in homes through adoption. The photograph shows the extensive damage to vegetation along the riparian area caused by horses. The second photo was taken one-year later (August 2005) at the same position and angle, and shows the response of vegetation from reduced grazing pressure of horses. Woody vegetation and other responses of the ecosystem will take many years for restoration from the damage.

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Photo credit: FWS, David N. Johnson

Department of Interior
U.S. Fish and Wildlife Service

revised, draft
Environmental Assessment for Horse and Burro Management at Sheldon National Wildlife Refuge

September 2007

Prepared by:
U.S. Fish and Wildlife Service
Lake County, Oregon

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Photo credit: FWS, David N. Johnson

Proposed Action: The U.S. Fish and Wildlife Service (Service) proposes to continue, on an interim and more-limited basis, its ongoing, operational program of gathering, removing, and adopting out feral horses and burros from Sheldon National Wildlife Refuge, Denio, Nevada.

Type of Statement: Environmental Assessment (EA).

Lead Agency: U.S. Fish and Wildlife Service (Service).

Cooperating Agencies: U.S. Bureau of Land Management and
Nevada Department of Wildlife.

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Abstract: The Service has developed a revised EA for interim Horse and Burro Population Management at Sheldon National Wildlife Refuge (Sheldon Refuge or Refuge) until completion of the Comprehensive Conservation Plan (CCP) for the Refuge. The EA evaluates alternatives for the conservation and management of horses and burros on the Sheldon Refuge. Sheldon Refuge encompasses 575,000 acres in the northwestern corner of Nevada. Applicable laws, regulations, and policies guiding administration of national wildlife refuges directs the Service to give priority management attention to achieving refuge purposes and the mission of the National Wildlife Refuge System (NWRS). Purposes of Sheldon Refuge were prescribed in Executive Order No. 5540, Executive Order No. 7178, and Public Law 94-223, signed in 1976.

Objectives for Sheldon Refuge's interim horse and burro management program include: preventing an increase in damage to valuable and sensitive Refuge habitats, including riparian areas and areas which have experienced recent wildfires; preventing an increase in collisions with vehicles on Highway 140; and conducting gathers and adoptions in a humane manner.

The purpose of this EA is to describe and evaluate a range of reasonable alternatives for a scientifically-grounded, interim horse and burro population management program that would help achieve Sheldon Refuge's purpose of conserving the pronghorn antelope and other native fish, wildlife, plants, and their habitats in the sagebrush steppe ecosystem.

The Service has identified and evaluated five alternatives, including a No Action Alternative (Alternative A), for managing the horse and burro program until completion of the CCP for Sheldon Refuge. The Alternatives are as follows:

- **Alternative A (No Action): The Refuge would discontinue the ongoing program of horse and burro population management.** Under this alternative, there would not be any horse and burro gathers, care or management efforts, or adoption program. Horse and burro populations would be allowed to continue to grow, checked only by disease, predation, weather, forage, other natural forces, and vehicle collisions.

- **Alternative B-1: Status Quo (Ongoing Program Management).** Under this alternative, current standard procedures would continue for managing horses and burros to bring their numbers into line with official Refuge program objectives. Refuge objectives established in 1977 and 1980 are to maintain populations of 75-125 horses and 30-60 burros. Current estimated numbers of horses (at least 800; see section 3.4, Feral Horses and Burros) and burros (approximately 90) on the Refuge exceed the population objectives and are causing environmental damage (See section 3.2, Biological Environment). Therefore, the Service would attempt to remove as many horses and burros, as quickly as possible (several hundred per year) to bring numbers in line with objectives.

  Horses and burros would be gathered using helicopter/horseback riders, horseback riders alone, and baited traps (corrals). All animals would be processed with expert staff and a veterinarian. Horses and burros would be placed in good homes through adoption agents. Standard practices would be followed for transporting animals, and monitoring population levels and ecosystem response. Contraception and marking techniques would be reviewed and used if appropriate. Other related and ongoing management actions include: continued building, replacement, repair, and maintenance of exterior (boundary) fences and gates; continued improvements to the central corral system and associated water delivery system; continued exploration of techniques for marking captured animals; and continued evaluation and improvements to the Refuge's inventory and monitoring programs.

- **Alternative B-2: Modified Status Quo – Proposed Action (Ongoing Program Management on an Interim and More-Limited Basis).** Under this alternative, most current standard procedures for managing horses and burros would continue, but on a more-limited basis, until completion of the Refuge CCP (currently scheduled for 2010). Estimated numbers of horses and burros currently on the Refuge are at least 800 and approximately 90, respectively. On an annual basis, the Service would gather and adopt out a limited number of horses and burros, approximately equal to the annual increase in the Refuge's populations. This would result in maintenance of relatively stable populations. Based on current population estimates, the annual removal would roughly equal 140-180 horses and 15-20 burros.

  Horse gathers would occur through use of helicopters assisted by horseback wranglers and through use of horseback wranglers alone. Burros would be gathered through use of baited traps (corrals). Gathers would target removal and either adoption or relocation of animals away from Refuge areas of greatest concern. Examples include areas near Highway 140, areas with degraded riparian habitats, and areas which had experienced recent wildfires. The next gather would occur in the fall of 2007 and/or winter of 2008. All animals would be processed with expert staff and a veterinarian. Horses and burros would be placed in good homes through adoption agents. Standard practices would be followed for transporting animals, and monitoring population levels and ecosystem response. Over the next several years, a range of contraceptive techniques would be tested for feasibility and efficacy. Treated animals would be returned to the Refuge. Contraception would target those horses and burros which were unlikely to be adopted (i.e., because they were too old or had physical disabilities, or because the adoption market was flooded with animals). Contraception would

also be used to assist in maintaining stable populations. Other related and ongoing management actions include: continued building, replacement, repair, and maintenance of exterior (boundary) fences and gates; continued improvements to the central corral system and associated water delivery system; continued exploration of techniques for marking captured animals; and continued evaluation and improvements to the Refuge's inventory and monitoring programs.

- **Alternative C: Adoption Directly from Refuge.** Under this alternative, Refuge staff would facilitate horse care and adoptions instead of the current practice of contracting the service through adoption agents. Refuge objectives and all other aspects of the horse and burro management program would be the same as Alternative B-1 or B-2.

- **Alternative D: Conduct Horse Gathers by Horseback Techniques Only.** Under this alternative, horses and burros would be gathered solely through the use of horseback riders. Helicopters would not be used. Burros would still be gathered with baited traps (corrals). Refuge objectives and all other aspects of the horse and burro management program would be the same as Alternative B-1 or B-2.

Alternative development and evaluation was based on internal and external scoping of issues, and comments received on earlier versions of this EA. There was a 37-day public comment period on the draft EA (30 day review plus 7 day extension), including a public comment meeting in Lakeview, Oregon on May 9, 2007.

Modifications to the draft Environmental Assessment

Based on comments received on the April 2007 draft EA, a number of revisions were incorporated into the June 2007 final EA. The comments received and Service responses to these comments were included in Chapter 5, and a new appendix (Appendix D Environmental Compliance Statement) was added to document Service compliance activities concurrent with preparation of the EA. A number of comments on the draft EA (FWS 2007) encouraged the use of contraception techniques and permanent marking as a means to more effectively track horses gathered from Sheldon NWR. We incorporated contraception as a technique category under then Alternative B (now labeled B-1) to explore its use, develop appropriate procedures, and apply the technique when it was determined to be cost-effective and humane as part of an adaptive management approach for reaching management objectives (section 2.1.4). Horses treated with contraception would be released back to Sheldon Refuge. Marking techniques would continue to be explored and as warranted, would be implemented concurrent with the proposed action. A discussion of associated environmental effects from incorporating these elements was included in section 4.2.2, Biological Effects, Horses and Burros. Following are examples of some other changes made between the April 2007 draft EA and June 2007 final EA.

- Discussion of the rationale for removing Lahontan cutthroat trout from Endangered Species Act consideration (Section 1.7; 2nd par.)
- " *...54 miles of new fencing around 137 seeps...*" and "*... establish 91 miles of exclosure fencing... ,*" was removed and replaced with "*the establishment of new fencing around the riparian habitat of 137 seeps/springs and 117 miles of perennial streams (current known locations)*" (section 2.1.5).

- A section describing use of contraception was added to Section 2.2, Alternative B, Improvements to the Program.
- "*Adoption of horses by individuals*" was changed to "*Adoption directly from refuge*" in section 2.2 Alternative C, main heading.
- "*... approximately 200 vertebrate species have been recorded on Sheldon Refuge*" was changed to "... 300 vertebrate species..." (section 3.3, 1st sen.).
- "*...season-long grazing by feral horses and burros...*" was changed to "*...year-round grazing...*" in Section 4.1.2, Biological Effects, Vegetation, 5th par.
- "*The current level of visitation to Sheldon Refuge is estimated at 22,000 visits per year for recreation (hunting, fishing, wildlife observation and photography, education and interpretation).*" was added to section 4.1.3, 4th par., 1st sen.
- A more comprehensive discussion of cost differences between helicopter and horseback gathers was included in section 4.4, 2nd par.
- "*... or other appropriate measures.*" was added to appendix D, Standard Operating Procedures, Responsibilities and Lines of Communication, last sen.

Modifications to the final Environmental Assessment

In late June 2007, the Service issued a final EA and draft Finding of No Significant Impact (FONSI) addressing the Refuge horse and burro management program. The next gather of these animals was scheduled to occur in early August 2007. In mid-July, the Service received additional comments on the EA and FONSI. In response to the concerns expressed, the Service canceled the scheduled gather, modified the proposed management program to create a new "proposed action," and made additional modifications to the EA to create a new, revised draft EA. Other changes made between the June 2007 final EA and the new revised draft EA include the following.

- An additional alternative (the new proposed action) was developed which would maintain the status quo of horse and burro populations on the Refuge for an interim period (until completion of the CCP and associated EIS, currently scheduled for 2010).
- Information was added regarding the value to some publics of observing horses and burros roaming freely across the Refuge.
- The document was updated with more-recent information regarding, among other things, Refuge horse and burros populations. Additionally, information was added about the protocols used in surveying these populations, and reliability of these surveys to generate comprehensive figures for total populations of horses and burros on the Refuge.
- Citations for information included in the EA have been added throughout.

The revised, draft EA is again being made available for public review and comment. All comments received during the public comment period will be considered by the Service in development of a revised, final EA and associated decision documents.

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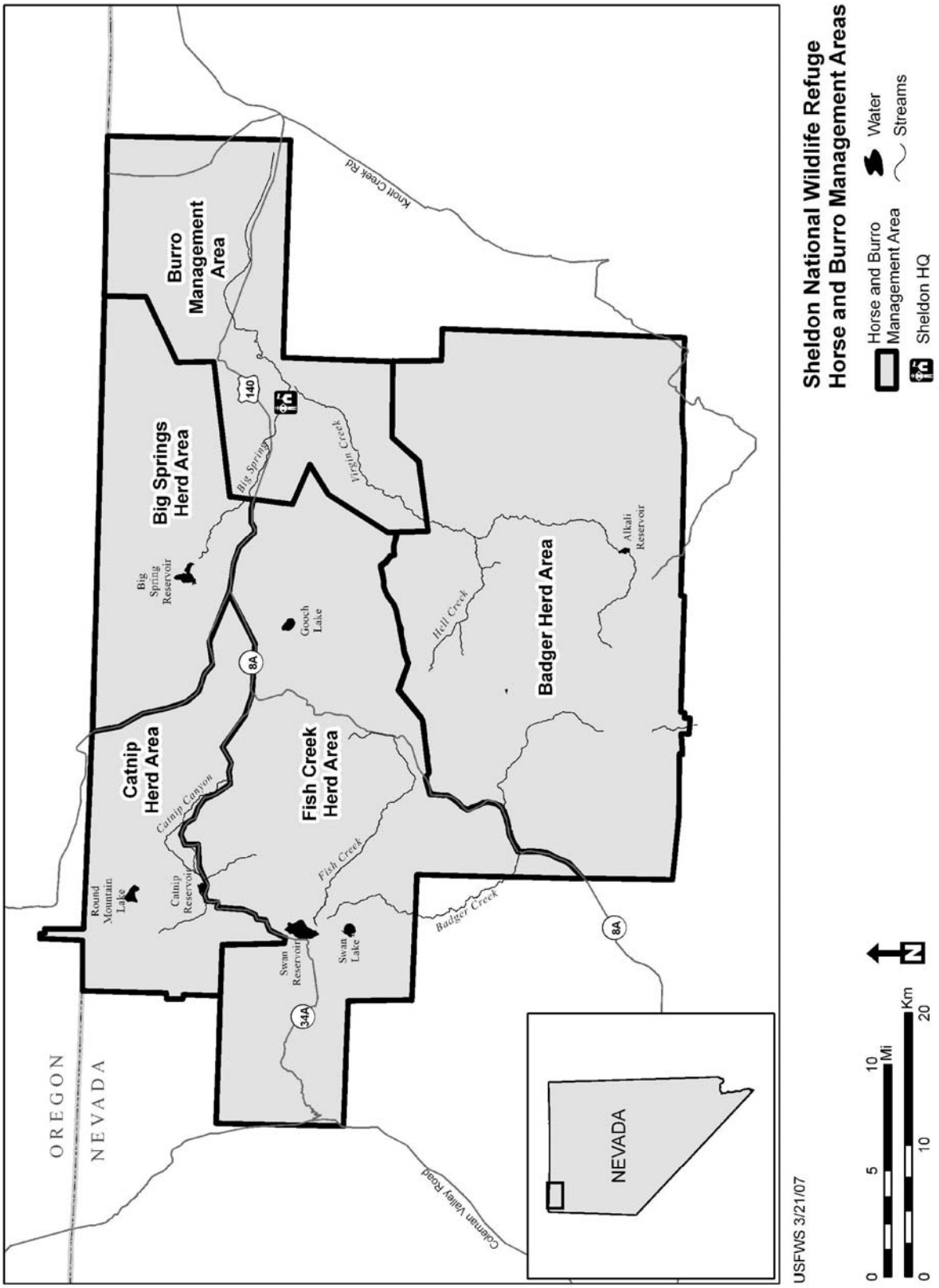


Figure 1. Map of Sheldon National Wildlife Refuge and Vicinity

Chapter 1: Purpose of and Need for Action

1.1 Proposed Action

On Sheldon National Wildlife Refuge (Sheldon Refuge or Refuge) in northwestern Nevada, the U.S. Fish and Wildlife Service (Service) proposes to continue, on a more-limited basis, current population management of feral horses and burros until completion of a CCP for the Refuge. The current program includes gathering of animals with the aid of helicopters, motor vehicles, horseback riders, and bait traps (corrals); removal from the Refuge; and adoption with the aid of adoption agents. The program has been conducted periodically, based upon availability of funding. See subchapter 2.2 for a more complete description of the Refuge's feral horse and burro population management program.

1.2 Need for Action

Sheldon Refuge was established by Executive Order No. 5540 in 1931 signed by Herbert Hoover and the Executive Order No. 7178 in 1935 signed by Franklin D. Roosevelt. See Figure 1 for a map of Sheldon Refuge and the surrounding area. The reference to herd areas is a label for geographic convenience, and is not synonymous with the Bureau of Land Management's Herd Management Areas and does not imply genetically distinct populations. Applicable law, regulations, and policy guiding administration of national wildlife refuges directs the Service to give priority management attention to achieving refuge purposes and the mission of the National Wildlife Refuge System (NWRS). Purposes of Sheldon Refuge were prescribed in Executive Order No. 5540, Executive Order No. 7178, and Public Law 94-223, signed in 1976. For further information on the Executive Orders and the Public Law see Appendix D, "Sheldon Legal History," of the 1980 Sheldon National Wildlife Refuge Renewable Natural Resources Management Plan (Management Plan) Final EIS. Native fish, wildlife, plants, and their habitats are the focus for management of the Refuge (see section 1.4 for Refuge purposes). Refuge feral horse and burro population objectives were established in the late 1970s and early 1980s (see FWS 1977 and FWS 1980). The intention of those objectives was to protect and perpetuate Refuge forage and water resources for native species while at the same time providing ample forage for horses and burros, for the benefit of Refuge visitors. See subchapter 1.4 for more discussion of relevant management guidance; chapter 3 for descriptions of feral horses and burros, and native fish, wildlife, plants, and their habitats on the Refuge; and chapter 4 for assessments of the effects of implementing horse and burro control programs.

Presently, at least 800 feral horses and approximately 90 burros wander freely, year-round across Sheldon Refuge (Collins 2007). They consume forage and water, trample vegetation, compact soils, and otherwise directly and indirectly impact native fish, wildlife, plants, and their habitats (see detailed discussion in section 3.1, Physical Environment and chapter 4, Environmental Consequences). In the Refuge's high-elevation, semi-arid environment, conflicts among feral horses and burros, and native species are most severe during late summer and mid winter, and are prominent at the Refuge's limited water resources and adjacent meadows, wetland, and riparian zones (see sections 3.1-3.2).

Gathering and removing feral horses and burros from across this large Refuge (more than one-half million acres) is very costly. Devoting the Refuge's very limited staff time and funding to management of feral horses and burros directly impacts the Refuge's ability to effectively manage native species and their habitats, and wildlife-dependent public uses, both of which are management priorities. During the last three years, the majority of refuge operations and maintenance funds have directly or indirectly been used towards management of horses and burros, versus the purpose of the refuge (see below) (Steblein and Johnson 2007).

1.3 Purpose of Action

The purposes of the Refuge's feral horse and burro management program are to: prevent an increase in damage to valuable and sensitive Refuge habitats, including riparian areas and areas which have experienced recent wildfires; prevent an increase in collisions with vehicles on Highway 140; and conduct gathers and adoptions in a humane manner.

As part of the Refuge's comprehensive conservation planning process, horse and burro management on the Refuge will be re-evaluated along with management of the Refuge's other natural and cultural resources, public uses, and specially designated areas. The Refuge's CCP is currently scheduled for completion in 2010. Accordingly, the proposal addressed in this EA is for the interim period between the present and completion of the Refuge CCP.

1.4 Applicable Laws, Regulations, Policies, Other Guidance, Plans, and NEPA Documents

Units of the NWRS are managed pursuant to a number of Federal statutes, regulations, policies, and other guidance. The core statute guiding refuge management (the NWRS' organic act) is the National Wildlife Refuge System Administration Act of 1966, as amended (NWRS Administration Act, 16 U.S.C. 668dd-668ee). The NWRS Improvement Act of 1997 (P.L. 105-57) made important amendments to the NWRS Administration Act. Among other things, the NWRS Improvement Act: provided the first-ever statutory mission statement for the NWRS; established a management hierarchy for refuges (wildlife first, compatible wildlife-dependent public uses second, and other uses last); required development of comprehensive conservation plans for all refuges; strengthened the requirements for refuge compatibility determinations; required the maintenance of the NWRS' biological integrity, diversity, and environmental health; required monitoring of refuge fish, wildlife, plants, and their habitats; and increased the requirements for coordination and consultation with State conservation agencies, refuge neighbors, and the general public. The NWRS Improvement Act further requires each refuge to be managed to fulfill the mission of the Refuge System and the specific purposes for which it was established. The purposes of Sheldon NWR include the following:

"…as a refuge and breeding ground for wild animals and birds…" (Executive Order 5540 dated January 26, 1931 signed by Herbert Hoover);

"…set apart for the conservation and development of natural wildlife resources and for the protection and improvement of public grazing lands and natural forage resources…" and "…the natural resources therein shall be first utilized for the purpose of sustaining in a healthy condition a maximum of three thousand five hundred (3,500) antelope, the primary

species, and such nonpredatory secondary species in such numbers as may be necessary to maintain a balanced wildlife population…" (Executive Order 7522 dated December 21, 1936)

"…to conserve (1) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" 16 U.S.C. 1534 (Endangered Species Act of 1973);

"…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act of 1929).

The NWRS is a unique system of public lands. It has more units and greater acreage than the U.S. National Park System. In contrast with multiple-use lands managed by the U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS), the NWRS is administered under a primary- or dominant-use management philosophy. Consistent with the mission statement and other guidance contained in the NWRS Administration Act, the NWRS is managed first and foremost for the conservation and, where appropriate, restoration of native fish, wildlife, plants, and their habitats. Management principles associated with commodity production and sustained-yield management of commercial resources do not apply to the NWRS.

The Wild Free-Roaming Horses and Burros Act of 1971, as amended (16 U.S.C. 1331-1340) does not apply to units of the NWRS, except to the extent that feral horses and/or burros roam on and off refuges from adjacent public lands administered by BLM or USFS. Service management of resident feral horses and burros on refuges is directed by the NWRS Administration Act; and relevant Service regulations (including control and disposition of feral animals, 50 C.F.R. 30.11-30.12) and Service policies (including management of feral horses and burros, 7 RM 6).

A relatively new policy (601 FW 3, finalized in April 2001) specifically addresses implementation of the 1997 statutory mandate for the Service to maintain the NWRS' biological integrity, diversity, and environmental health). The policy emphasizes maintenance of native species and healthy, functioning, intact habitats. Among other things, the policy states that, "…[the National Wildlife Refuge] System's focus is on native species and natural communities such as those found under historic conditions…." The policy defines historic conditions as, "Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape." Specific to biological diversity, the policy states that, "Unless we determine that a species was present in the area of a refuge under historic conditions, we will not introduce or maintain the presence of that species for the purpose of biological diversity."

Previous Refuge management plans and NEPA documents have been developed which describe and evaluate the effects of feral horse and burro management at Sheldon Refuge. The *Sheldon Horse Management Plan, Environmental Impact Assessment* and associated Finding of No Significant Impact (FONSI) were completed in November 1977. This management plan and environmental assessment includes: establishment of Refuge population objectives for horses and burros; description and assessment of the effects of implementing the Refuge gather and removal program, and alternatives to that program; and involvement of the public. In August 1980, the Service completed the *Sheldon National Wildlife Refuge Renewable Natural Resources Management Plan - Final EIS [Environmental Impact Statement]*. A Record of Decision (ROD) was signed shortly thereafter. This management plan and EIS was much more comprehensive;

including: Refuge management objectives for vegetation and priority native wildlife species, along with population objectives for feral horses and burros; description and assessment of the effects of implementing a broad range of Refuge management programs and alternatives to those programs, including the feral horse and burro gather and removal program; and involvement of the public. Finally, in June 2000, the Service signed the *Sheldon National Wildlife Refuge, United States Fish and Wildlife Service, Environmental Action Memorandum [EAM]*. This EAM documented NEPA compliance for a refinement of the horse and burro gather, removal, and disposal program. Prior to 2000, the Refuge sold captured feral horses and burros through public auction and disposed of unsold animals in a humane manner. The EAM established the following new requirements, "…the contractor chosen to carry out this project [gather and removal of feral horses and burros] will be required to arrange for adoption or otherwise provide for disposal of the horses captured in a manner that prevents slaughter for the meat market to the maximum extent possible and also prevents humane on-site euthanasia except in cases of debilitating injury or disease."

Recently, there has been renewed public interest in the Refuge's ongoing feral horse and burro population management program. In response to that heightened interest, the Service has decided to develop a new EA addressing impacts of current feral horse and burro gathering and removal from the Refuge. The process for developing this EA will provide the public with a formal opportunity to share with the Service their concerns regarding the existing program and their suggestions for improving it.

Application of Adaptive Management Concept

Sheldon NWR employs an adaptive management approach to its operational programs – simply, techniques and strategies are adjusted to better achieve management objectives based upon monitoring, new scientific information, and best professional judgment of the Refuge staff. Research and monitoring are important aspects of adaptive management. In an adaptive management program, the impacts of short-term actions are scientifically evaluated on a periodic basis. This approach incorporates monitoring, research and evaluation, which allows projects and activities to go forward in the face of some uncertainty regarding ultimate outcomes. Proceeding in this manner allows for accumulation of new information and responses to new data, which can affect direction, time frame, and actions taken in the future. The Refuge plans to use scientific information in an adaptive management context for managing feral horse and burro populations.

This year, Sheldon Refuge initiated development of a refuge CCP. This effort and the associated NEPA document will comprehensively assess the Refuge's entire management program. It would also include a re-evaluation of the feral horse and burro population management program, including an analysis of cumulative effects of this program in the context of all other Refuge management activities. The purpose of this current EA is to cover interim, short-term feral horse and burro gathers and removal that the Service would conduct until the Sheldon Refuge CCP and associated NEPA documentation is completed in 2010.

1.5 Decisions to be Made and Lead/Cooperating Agencies

The Service decision-maker must decide whether or how best to continue the Sheldon Refuge feral horse and burro management program. Options include periodic gathering, removal, and adoption of animals or implementing an alternative to that program.

The U.S. Bureau of Land Management (BLM) has been a cooperating agency for managing horses on Sheldon Refuge that are subject to the Wild Horse and Burro Act. BLM staff and information resources are periodically consulted because of their experience and expertise regarding horse and burro population management, including gathers, removal, and adoption. The Service coordinated with BLM on a pre-release draft of this EA.

The Nevada Department of Wildlife was invited and chose to serve as a cooperating agency for this NEPA process/document due to its experience and expertise regarding management of fish, wildlife, plants, and their habitats throughout the State of Nevada, and due to its role as an ongoing partner with the Sheldon Refuge.

1.6 Issues

This subchapter describes issues associated with the management of feral horses and burros on Sheldon Refuge. These issues were identified through extensive public comment received over the past year, deliberations among the Service staff, and publications (e.g., Beever 2003; Fisher 1983; Orr 2007, and Williams 2006). These issues are used as a tool to focus analysis in this EA.

1.6.1 Relevant Issues

The Service has identified the following issues associated with horses and burros and their population management at Sheldon Refuge. These issues are addressed in the evaluation of effects of alternatives in this EA.

1.6.1.1 Horses and burros have direct and indirect effects on native fish, wildlife, plants, and their habitats on the Refuge

The increasing populations of feral horses and burros are impacting the ability of the Sheldon Refuge to meet the purposes for which the Refuge was established. Biological monitoring at Sheldon Refuge (e.g., Barnett 2002, Steblein 2007) and a body of scientific literature (see review in Chapter 4) provide information about the continued impacts of feral horses and burros on native wildlife, plants, and their habitats. Species of particular concern include sage grouse and passerine bird species that depend upon vegetation structure for nesting. Aquatic species are being impacted by feral horses and burros due to water quality issues, loss of wetland vegetation, compaction/erosion wetland soils, and degradation water flow. This may also affect future recovery and restoration efforts for native cutthroat trout and riparian systems at Refuge sites. Additional information on these conflicts is available in Chapter 4 of this EA.

1.6.1.2 The Refuge's horse and burro management program is costly

A high percentage of the funds of the Refuge budget are currently being used to control feral horses and burros instead of being applied to wildlife management practices and support of the visiting public (Steblein and Johnson 2007). The high cost for capture, transport and adoption of each horse, and the large number of horses and burros on the Refuge, divert critical funding and staff resources from other wildlife and public programs at Sheldon, Hart Mountain and other national wildlife refuges. This is more formally and completely discussed in Chapters 2 and 4.

1.6.1.3 There are concerns regarding humane treatment of horses and burros during gathers on the Refuge and following disposition by the Service

Concerns have been expressed about the timing of gathers, especially pertaining to use of helicopters, handling of foals and pregnant mares, and vulnerability of Refuge horses and burros ending up in the slaughter market following disposition by the Service (e.g., see comments in chapter 5 and Orr 2007).

Refuge staff and the concerned public want to perform gathers at a time that would minimize the loss of unborn foals; be at the appropriate stage of pregnancy for mares; be at the appropriate age for foals; and that would avoid temperature extremes, disease, and inclement weather.

Refuge staff and some members of the public seek to improve the efficiency and safety of handling horses in the corral system at Sheldon NWR headquarters, including the water delivery system and configuration of pens in the corral system.

Some members of the public are concerned that helicopters are not the least impacting method of gathering; including speed of herding, distances moved, and general stress from the presence of the helicopter.

Refuge staff and the concerned public want foals and pregnant mares handled with the least impact; this includes preventing separation of mares and foals, preventing foals from being trampled during capture, and preventing injuries during processing and transporting.

Some members of the public are concerned that sending horses and burros in mass numbers to adopters increases the likelihood that some of them would be sent to slaughter.

1.6.1.4 There have been a number of horse and burro – vehicle collisions on the State highway passing through the Refuge

There is a concern for human, burro, and horse safety. The Refuge officer kept records of vehicle collisions with horses and burros between September 2005 and March of 2006 (Day 2007). There were 12 horses and burros killed on Highway 140. Most of the collisions occurred between mileposts 102 and 110. The Refuge maintenance staff reported two additional horses killed that were not added to the files because they were not reported until later and the exact locations and dates were not known (Day 2007). This brings the total up to 14 in a seven-month period. Fortunately no human fatalities were associated with the collisions, but injuries and damage to personal property occurred. The highway is marked with cautionary signs for horses and burros.

The area where most of the collisions occurred was north of Round Mountain. A herd of 60 to 80 horses was observed regularly in that area. The gather in June of 2006 concentrated on this location. There has only been one new vehicle collision with a horse in this section of highway since the June 2006 gather (Day 2007). For comparison purposes, Nevada Department of Transportation (NDOT) statistics recognize two wildlife-vehicle collisions over the previous three year period (one mule deer June 2004 near milepost 109; one pronghorn August 04 near milepost 84; NDOT 2007). A refuge staff member also collided with a mule deer in 2006 (Day

2007). Accidents with native ungulates (deer and pronghorn) represent a small proportion of vehicle collisions on Sheldon Refuge, horses and burros are the dominant species (Day 2007).

Vehicles killed 14 burros from 2001 to 2004 between mileposts 90 and 95 (pers. comm. Marla Bennett, Refuge Operations Specialist, 2004). Ninety-one burros were caught the following winter and the number of burros killed in vehicle collisions dropped dramatically (pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). Burro collisions are increasing again, with 5 recorded in 2007 (Day 2007).

1.6.1.5 Assertions have been made that horses and burros may be ranging from BLM lands to Refuge lands, and that management of these animals is subject to the Wild Horse and Burro Act

Most of the horse herds on Sheldon Refuge are located within the interior of the Refuge and do not stray outside the Refuge boundary. However, there are some areas on the periphery of the Refuge boundary where horses and burros may move on and off the Refuge when fences are broken. Prior to 2007, this activity had only been documented in a few locations on the northern boundary around Big Springs Butte (pers. comm. Brian. Day, Sheldon Refuge Manager, March 2007). Horses and burros confirmed ranging from BLM to Refuge lands are managed in cooperation with the BLM consistent with the Wild Horse and Burro Act. In light of the large reduction observed in Refuge horse numbers between July 2006 and July 2007 aerial surveys (Collins Aug 2007) and the fact that there were many improvements made to fences and gates along the Refuge's southern border in Spring 2007 (pers. comm. Brian Day, Sheldon Refuge Manager, April 2007), it is plausible that a number of horses may have crossed the Refuge's southern boundary and wintered on BLM lands (see also section 3.4 for discussion on survey results). When those animals attempted to return to the Refuge this past spring, they found closed gates and tight fences. Animals moving onto the Refuge also present an increased impact (both directly and indirectly) upon native fish, wildlife, plants, and their habitats, just as do the resident herds inside the Refuge. Management and removal of these trespass animals results in additional costs to the Refuge and decreased funding for management of native species and habitats.

1.6.1.6 Some individuals request that horse and burro gathers on and adoptions from Sheldon NWR be conducted by the Bureau of Land Management (BLM)

A number of people have suggested that the BLM should conduct horse and burro gathers on and adoptions from Sheldon NWR. This was posed because people considered all horses and burros on Sheldon Refuge to be subject to the Wild Horse and Burro Act (see discussion in section 1.4), or because BLM has a good program and facilities. The issue was discussed with BLM program managers and is addressed in section 2.1.

1.6.2 Issues Considered but Eliminated from Further Analyses

Additional issues were explored and objectively evaluated, but eliminated from detailed study. Following is a brief explanation of the issues considered.

1.6.2.1 Concerns have been expressed that the removal of horses and burros from the Refuge is designed to increase populations of pronghorn and mule deer for hunters to harvest and for the Refuge to make money on hunting tags.

Some members of the public believe that the horse and burro management program at Sheldon Refuge, including gathers and adoptions, is conducted to leave more forage and water available for pronghorn and deer for harvest by hunters. As further discussed in chapter 4, horses and burros directly and indirectly affect populations and health of Refuge fish, birds, mammals, insects, reptiles, amphibians, plants, and their habitats, including pronghorn, sage grouse, pygmy rabbits, mule deer, and rare species. A reduction in horse and burro numbers reduces the competition with native wildlife for forage, cover, and water, which should result in an increase in numbers and/or health of these native wildlife species. The executive orders and legislation that established the Refuge identify pronghorn and other native wildlife as priority management species at this Refuge. The populations of native wildlife are not managed solely or primarily for hunting, but consistent with relevant laws, policies, and plans. Of note, the NWRS Administration Act of 1966, as amended, directs the Service to, "…ensure that the biological integrity, diversity, and environmental health of the [National Wildlife Refuge] System are maintained for the benefit of present and future generations of Americans" (16 U.S.C. 668dd(a)(4)(B)). This legislative mandate has been interpreted through NWRS policy at 601 FW 3. All native species are managed for intrinsic values such as natural population fluctuations, healthy conditions, and wildlife diversity that result from a healthy ecosystem. In addition to hunting, a range of other human uses such as wildlife observation, photography, environmental education and interpretation, and other uses are allowed on national wildlife refuges where deemed compatible.

The Service authorizes and facilitates the hunting program at Sheldon Refuge, but the State of Nevada Department of Wildlife (NDOW) administers the issuance of tags and licenses, and the collection of fees. All proceeds from licenses and tags are collected and used by the State agency (not the Service) to support wildlife management throughout the State. The Service (Federal) allows hunting on many national wildlife refuges in the U.S. when it is compatible with the purposes of the refuge and when populations and conditions allow for harvest of a species with minimal or positive impacts to the population. The NWRS Improvement Act directs the Service to seek to provide the public with opportunities for hunting and other wildlife-dependent recreational uses across the NWRS, including at Sheldon Refuge. The Refuge has allowed hunting for many years and our experience reveals that it can occur while maintaining a healthy sage steppe ecosystem and ensuring that the activity is compatible with the purpose of the Refuge. The Service goal for hunting is to ensure a quality hunting experience (605 FW 2). This is done in coordination and cooperation with NDOW, and is adjusted on an annual basis depending upon herd health and vigor. For example, in 2005, the Service allowed NDOW to issue hunt permits for 4 bighorn sheep, 65 pronghorn, and 197 mule deer. These tags are highly desired by hunters due to the high number of mature males in the population of these big game animals and the small number of tags issued for harvest. For bighorn sheep, 1,630 people applied for 4 tags and 4 animals were harvested. For pronghorn, 1,202 people applied for 65 tags and 53 animals were harvested. For mule deer, 2,480 hunters applied for 197 tags and 97 animals were harvested. NDOW received the direct revenue of these hunting licenses and permits (or tags). Sheldon Refuge received a minor amount of receipts from commercial hunting guides that operate under Refuge special use permits. Other benefits include the long-term public support

that comes with having Refuge visitors, local economic stimulus, and environmental education associated with hunting and fishing.

1.6.2.2 Concerns have been expressed that the removal of horses and burros from the Refuge is designed to support cattle grazing.

Grazing by domestic livestock last occurred on Sheldon Refuge in 1994 (FWS 1994). It was determined that grazing by domestic cattle and feral horses was having a serious negative affect on the health of Refuge fish, wildlife, plants, and their habitats, including pronghorn and mule deer. The peak of grazing by cattle occurred in 1985 at 21,867 animal unit months (AUM's). At that time, the feral horse population added approximately 11,800 AUM's of impact to the Refuge. This high level of grazing was determined to have caused excessive impacts to wildlife and their habitats (Reiswig 1989); hence, management actions were taken to remove livestock in an effort to benefit native wildlife. At the time cattle were removed from Sheldon Refuge, the funding was inadequate to also remove feral horses. In the absence of regular gathers and removals, the horse population increased rapidly (see section 3.4). It is estimated that in 2006, the feral horse population removed approximately 27,000 AUM's of forage, and caused additional impacts to Refuge resources besides just grass removal (e.g., soil compaction, spread of invasive species; pers. comm. Dave Johnson, former Deputy Project Leader, Sheldon-Hart Mtn NWRC, Aug 2007). This intensity of grazing has been determined to have similar or more negative impacts to wildlife as the peak of grazing did in 1985 (FWS 1998). There are no plans to restore cattle grazing to the Refuge, and current actions are aimed at restoring native habitats by reducing impacts caused by feral horses and burros (as shown in Steblein 2007, LaRouche 2007). Shifts in policy during the late 1990's to present have eliminated further consideration of feral and domestic livestock grazing on National Wildlife Refuges unless the use helps achieve refuge management objectives (see for example National Wildlife Administration Act of 1966, as amended by The National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee); Biological Integrity, Diversity, and Environmental Health (601 FW 3).

1.6.2.3 Some individuals assert that Refuge horses and burros are native species and not feral animals

The issue as to whether horses and burros are native species and not feral animals is an issue that continues to be debated and has been neither proved nor disproved. The purposes for the establishment of Sheldon Refuge mention the conservation of specific wildlife species (e.g., antelope) and specific groups of species (e.g., migratory birds), but do not specifically mention horses or burros. Additionally, NWRS policy (7 RM 6) addresses management of horses and burros on a handful of Western refuges, specifically including Sheldon. The policy defines horses and burros on refuges as feral, and states that they should not be maintained on Sheldon Refuge.

Limiting the size of horse and burro populations at Sheldon Refuge is an ongoing Refuge management activity that is necessary for conservation of native plants and animals of the sagebrush steppe ecosystem, and achievement of Refuge purposes. Horse and burro populations on Sheldon Refuge have caused severe damage to water and vegetative resources, especially in riparian zones near springs, playa lakes, and streams (e.g., Steblein 2007). Specific examples include trampling of vegetation along stream banks and at springheads, physical exclusion of other species by dominant stud horses and burros, and water contamination from feces and urine.

This damage is adversely affecting the capacity of the Refuge to support native wildlife species and restore the native ecosystem. Monitoring information from 2001 and 2002 (Barnett 2002) concluded that 44 percent of all streams and 80 percent of the springs on the Refuge are heavily or severely degraded by horses.

Managing feral horse populations on the Refuge, however, has been constrained by inadequate funding. At the same time, we are coordinating our activities with those of the BLM on adjoining public lands and will be funding fence construction and maintenance projects to reduce the intrusion of horses from off-Refuge lands.

1.6.2.4 Some individuals believe that Refuge horses and burros are living cultural resources and therefore deserving of special consideration

As evidenced by the existence of the Wild Free-Roaming Horses and Burros Act, numerous web sites addressing free-roaming horses and burros, and comments received by the Service on the earlier draft EA for this program, many people believe that these animals are important cultural symbols of the American West. Among other things, Congress declared in the Horse and Burro Act that, "…wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West…." Despite the fact that this Act does not directly apply to management of national wildlife refuges, the Service recognizes the special values afforded these animals by many members of the public. Through development of this single-issue NEPA document and provision of opportunities for public involvement in our decision-making process, the Service has granted these animals special consideration and acknowledged concerns of some segments of the public.

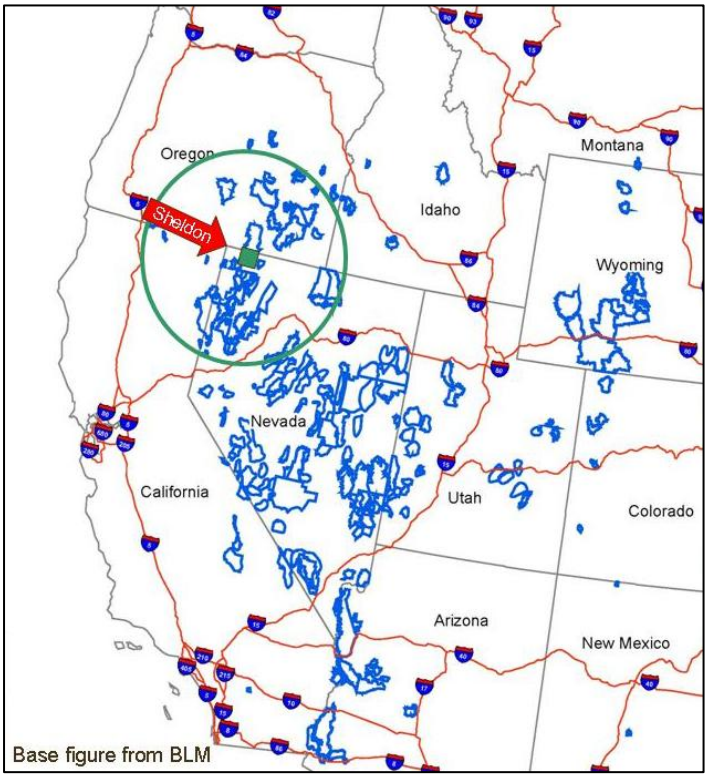


Figure 2. BLM Manages for horses and burros on 199 Herd Management Areas (HMA) across the West. Within 200 miles of Sheldon Refuge (circle on map), there are more than 30 HMAs. Source information for figure is from BLM (see references below).

Of special interest by some of these publics is the opportunity to view these animals roaming freely across the landscape. Although Sheldon Refuge currently provides such opportunities, it certainly is not alone. Within a few hours drive of Sheldon Refuge there are numerous opportunities for the public to observe horses and burros ranging freely across the landscape (Figure 2). Four BLM-managed Herd Management Areas abut the Refuge and together, these areas manage for more than 600 horses and 70 burros. BLM manages for more than 12,500 horses and almost 900 burros on more than 15 million acres in 102 HMAs in Nevada (see

http://www.wildhorseandburro.blm.gov/statistics/2007/Nevada.pdf). BLM manages for more than 2,500 horses and 25 burros on more than 2.7 million acres in 18 HMAs in Oregon (see http://www.wildhorseandburro.blm.gov/statistics/2007/Oregon.pdf).

The National Historic Preservation Act of 1966 (NHPA), as amended (16 U.S.C. 470 et seq.) requires Federal agencies to consider cultural resources as they administer their programs. The removal of feral horses from Sheldon Refuge would only affect cultural resources if the horses contribute to the significance of a historic property (site, district, or landscape). The Service has determined under a Section 106 review of the NHPA that there is no historic property present on Sheldon Refuge whose significance is derived from the presence of living herds of feral horses (Raymond and Parks 2007). In other words, the feral horses do not contribute to the significance of a historic property. Therefore, the removal of feral horses from Sheldon Refuge would have no effect on cultural resources eligible to the National Register of Historic Places. The effect of alternatives on cultural resources is further discussed in chapter 4.

1.7 Federal, State, or Local Permits, Licenses, or other Consultation Requirements

Federal requirements for environmental compliance are summarized in Appendix D.

With the recent delisting of the bald eagle, there are now no federally threatened or endangered species known to occur on Sheldon Refuge.

The management of archaeological and cultural resources of the Refuge will comply with the regulations of Section 106 of the National Historic Preservation Act (Raymond and Parks 2007). This report demonstrated that no historic properties would be affected by implementing the proposed action based on the criteria of an effect or adverse effect as an undertaking defined in 36CFR800.9 and Service Manual 614FW2, however, determining whether a particular action has a potential to affect cultural resources is an ongoing process. Should additional historic properties be identified or acquired in the future, the Service will comply with the National Historic Preservation Act if any management actions have the potential to affect any of these properties.

Chapter 2: Alternatives Including the Proposed Action

In this revised EA, the Service has considered a range of reasonable alternatives to address the need for and purpose of managing populations of feral horses and burros on Sheldon Refuge (see chapter 1.2 and 1.3). These alternatives are described in this chapter and their effects are evaluated in chapter 4. A table summarizing this information is included in subchapter 2.3.

These alternatives were developed based on: in-house discussions among Service personnel familiar with horse and burro management on the Refuge; review of several scientific, planning, and NEPA documents developed by the Service, other agencies, and non-governmental parties (the most-important of which are referenced in Appendix B Literature Cited); the review of public comments received prior to and during this environmental analysis and on horse-related web sites; and discussions with interested, affected, and knowledgeable parties. Fully developed alternatives for this EA are described in Section 2.2; those considered but eliminated are summarized in Section 2.1.

2.1 Alternatives Considered, but Eliminated from Detailed Study

The Service also considered other alternatives, but eliminated them from detailed study for the reasons described immediately below.

2.1.1 Remove all Horses and Burros from the Refuge

Refuge System Policy (7 RM 6.1, release 3, March 1982) states that feral horses and burros will not be maintained on Sheldon Refuge. This policy contradicts the management level for horses and burros set in the 1980 Management Plan and EIS (FWS 1980), but was developed after the 1980 plan. The plan established population objectives of 75-125 horses and 30-60 burros to remain on Sheldon Refuge as a concession to horse enthusiasts. These groups negotiated to have a small number of the AUMs, then allocated for domestic grazing animals, re-allocated for feral horses and burros. Since the approval of that plan in 1980, all domestic cattle have been removed from Sheldon Refuge. Although it is inconsistent with Service regulations and policy (50 C.F.R. 30.11-12, 7 RM 6, 601 FW 3) to allow feral animals to graze on Sheldon Refuge, no action has been taken to remove or change the level of horse grazing authorized under this plan. The purpose of this EA is to consolidate and improve the existing NEPA documentation (FWS 1977, 1980, 2000) developed for horse and burro management. However, this alternative does not achieve the management objectives of this program as laid out in the 1980 EIS (see subchapter 1.2 and 1.3), and therefore this alternative was eliminated from detailed study at this time. Horse and burro population objectives will be re-examined as part of the CCP process.

2.1.2 Remove Refuge Horses and Burros Using Lethal Techniques

As further discussed below, managing feral horses and burros on the Refuge, including periodic gathering and adopting out these animals, diverts scarce staff time and public funds from higher-priority Refuge species and programs. The Wild Free-Roaming Horses and Burros Act of 1971, as amended (16 U.S.C. 1331-1340) does not apply to management of horses and burros which range solely within Sheldon Refuge (see section 1.4). Service regulations (30 C.F.R. 30.11-30.12) and Service policies (7 RM 6) provide guidance for management of feral animals,

including horses and burros. Service policy (at 7 RM 6.9 A.) provides specific authority for the destruction of surplus horses and burros on Sheldon Refuge. Therefore, use of this authority may only be exercised if other methods are determined not feasible and the Regional Director's approval is secured. The policy states that the preferred method of managing feral horses and burros is live capture, and conducted as humanely as possible. This alternative was eliminated from further study because many segments of society would find control of horses and burros with lethal techniques to be unacceptable.

2.1.3 Send Horses and Burros to Auction

Prior to the enactment of the 1977 Sheldon Horse Management Plan, horses were gathered on the Refuge by local ranchers and were disposed of by sale at public auction or by direct shipment to commercial processing plants (Bennett 2005). The 1977 Horse and Burro Management Plan (FWS 1977) and 1980 Sheldon National Wildlife Refuge Renewable Natural Resources Management Plans (FWS 1980) directed the Service to discourage animals being sold for slaughter by limiting the sale at public auction to 5 animals per buyer. The funds received from these sales were used to offset the costs of management of the horse and burro populations. Horse enthusiasts believe that sending horses and burros to auction increases the likelihood that those animals will end up at commercial processing plants. In response to this concern, in June 2000, the Service developed an Environmental Action Memorandum (EAM) which addressed horse disposition methods. That EAM specified that contractors "will be required to arrange for adoption or otherwise provide for disposition of the horses captured in a manner that prevents slaughter for the meat market to the maximum extent possible and also prevents humane on-site euthanasia except in the case of debilitating injury or disease." The current removal and disposition program remains consistent with this philosophy and the Service remains committed to ensuring that these animals are adopted out to good homes and are not slaughtered for meat. See Appendix C for additional details on the adoption process.

2.1.4 Contraception Population Control

The Draft EA (FWS 2007) described contraception under Section 2.1, "Alternatives Considered, but Eliminated from Detailed Study." A number of comments on the Draft EA encouraged the use of contraception techniques.

By itself, it is unlikely that contraception would allow the Service to achieve its horse and burro population management objectives. A single stallion is capable of impregnating multiple mares. Therefore, to be effective, it would require that either all of the Refuge's male horses/burros or all of the Refuge's female horses/burros be gathered and treated (Eagle et al. 1993). If the treatment was not of a permanent nature, the animals would need to be gathered and treated on a cyclical basis. This would also require marking of individual animals and extensive record keeping to ensure that all animals were regularly treated and individual animals were not treated more frequently than required. This could be quite time-consuming and expensive, and trespass of animals (especially stallions) from outside the Refuge could wreak havoc in such a carefully orchestrated program.

Contraception may provide another valuable management tool when added to a more-comprehensive program that includes gathers and removals. For example, it could be an appropriate treatment for gathered animals which are unlikely to be adopted. Such individuals

could be treated and then returned to the Refuge. Therefore, and in response to comments received on the draft EA, we have incorporated contraception as a technique category under Alternatives B-1 and B-2 (Proposed Action) – see sections 2.2, 4.2, 4.3.

2.1.5 Fence-off Sensitive Habitats Until Horse Population Objectives are Reached

At current funding and horse/burro population levels, it would take an estimated 9-10 years to reach the Refuge's population objectives of 75–125 horses and 30–60 burros. To reduce damage to wildlife habitat and ecosystem function in the interim period, the most sensitive Refuge areas could be fenced to exclude horses. This would require, at a minimum, the establishment of new fencing around the riparian habitat of 137 seeps/springs and 117 miles of perennial streams (current known locations). Some aquatic gastropods and other invertebrates are susceptible to extinction because an entire population is usually tied to a single spring (Herbst 1996, NDOW 2006). This does not include protecting wetland habitats associated with playas, ponds and reservoirs (quantitative data were not available for calculation of area and costs). Nor would it address exclusion of horses and burros from recent wildfires to allow habitat recovery. When horse and burro population levels reached the Refuge's objectives, these same fences would need to be removed to protect wildlife. It would cost $1.66 million to establish 260 miles of exclosure fencing and $166,000 for removal of the same fencing (assumes 10% of original cost for removal and salvage). Annual maintenance of these fences would be about $166,000 (assuming 10% of capitalized costs per year). While these fences would provide the benefit of protecting and restoring a portion of the sensitive wetland habitats, they would not protect all wetlands nor any upland vegetation (and wildlife) from the impacts of horses and burros, and they also would have negative consequences for some wildlife species (Stoddart et al. 1975). Fencing standards on Sheldon Refuge have been modified to better accommodate movement of pronghorn and mule deer (e.g., Colorado Division of Wildlife 2007). The funds needed to establish, maintain, and remove fencing would equivalently reduce the funds available for wildlife management programs because the funds all come from the same source. Furthermore, there is about 145 miles of refuge exterior fencing that requires regular maintenance, 15 miles of exterior fencing that needs to be built, and an estimated 100 miles of interior fencing remaining from earlier grazing operations that require removal (pers. comm., Brian Day, Sheldon Refuge Manager, January 2007). Funding used on exclosure fencing could be focused towards development of more direct and efficient methods of accomplishing horse and burro management objectives.

2.1.6 Engage the Bureau of Land Management (BLM) to Gather and Adopt Horses and Burros

The BLM has gathered and adopted horses and burros from public lands administered by BLM and the Forest Service (USFS) for many years following the requirements set forth in the Wild Horse and Burro Act. In situations where horses and burros on Sheldon Refuge are crossing the boundary between adjacent BLM lands to Sheldon Refuge, the Service works with BLM to capture those animals and handle them under BLM's program. Horses and burros that do not cross the boundary are subject to Service laws, regulations, and policies. Following are the most important reasons why it is not feasible for BLM to conduct all of the gathers and adoptions for Sheldon Refuge.

- The vast majority of Sheldon horses are not subject to the Wild Horse and Burro Act. BLM does not have the facilities, staff or program capability to treat BLM/USFS animals separate

from Sheldon animals. There are serious legal, policy, and programmatic implications for integrating animals that are managed under different authorities.

- BLM does not have the capacity in facilities, staff, budget, and program to accommodate the numbers required for removal of horses and burros from Sheldon. BLM's adoption market is also saturated.

2.2 Alternatives Considered

Alternative A: No Agency Action on Horse and Burro Management

Under this alternative, the Refuge would discontinue the current program of horse and burro population management. The Refuge would not conduct any horse and burro gathers, care or management efforts, or horse and burro adoption program. Without these controls, horse and burro populations on the Refuge could double approximately every four years (Steblein and Johnson 2007) when populations increase at an average rate of 20 percent annually (Bennett 2002, Wolfe 1980). Horse and burro viewing opportunities would increase for Refuge visitors. However, this would occur at the expense of Refuge lands, water sources, wildlife habitats, and associated fish, wildlife and plant populations which would continue to be impacted. In addition, safety risks for travelers, horses, and burros along major public roads would increase. The effects of Alternative A (which are discussed in more detail in section 4.1) contrast sharply with the environmental effects of the action alternatives, B-D.

Management objectives for all of the Refuge's major natural and manmade resources would be re-examined through the CCP process, which will establish a new 15-year strategic management plan for the Refuge. The Sheldon Refuge CCP is expected to be completed in 2010.

Alternative B-1: Status Quo (Ongoing Management Program)

Under this alternative, the current Refuge horse and burro management program would continue, with minor refinements to improve the program, while a CCP for the Refuge was developed.

Management Objectives
Under the Refuge's current natural resources management plan (FWS, 1980), a number of AUM's were allotted to feral horses and burros. The plan described horse and burro management objectives as follows:

- To maintain a manageable horse and burro population (75-125 horses, 30-60 burros) in balance with other wildlife to assure a functioning natural landscape is available for the enjoyment of refuge visitors.
- To stop range deterioration and improve wildlife habitat and watershed conditions; to reduce adverse impacts on existing water resources.
- To ensure that the Sheldon Refuge provides ample forage for all wildlife populations endemic to the area and reduce the spread of horses into key wildlife areas.

The current number of horses on Sheldon Refuge is several times the approved population objective, and the burro population at least 50% greater than the objective level. Horses and burros have not been adequately managed because of insufficient

funding. Horse and burro numbers would need to be reduced substantially for this alternative to be successful in reducing damage to natural resources, restoring native plant/animal communities, reducing vehicle collisions with horses and burros, and establishing a situation allowing cost-effective, long-term management of horse and burro numbers. Under this alternative, the Service would attempt to remove as many horses and burros, as quickly as possible (several hundred per year) to bring numbers in line with objectives. An analysis of horse/burro population estimates, effects of various removal rates, and costs to implement alternative strategies was used to develop the best strategy which is discussed below (Steblein and Johnson 2007).

Management objectives for all of the Refuge's major natural and manmade resources would be re-examined through the CCP process, which will establish a new 15-year strategic management plan for the Refuge. The Sheldon Refuge CCP is expected to be completed in 2010.

Herds

The horses and burros presently found on Sheldon Refuge are domestic animals gone wild and their offspring (see section 3.4). The current horse population is at least 800 animals (Collins 2007; see also section 3.4). Horses would continue to be allowed in the Badger Herd area (See Figure 1 and FWS 1980 [map III-12]). Approximately 75-125 horses would be managed in this one area to increase public safety by keeping the herd as far away from US highway 140 as possible, limit impact from horses to one section of the Refuge, and seek to limit the logistical challenge of gathering horses which currently range across the entire Refuge. Because horses are highly territorial, they would be expected to stay within their respective areas as they have done historically. The current burro population is approximately 90 animals (Collins 2007), and would be reduced to 30-60. These animals would continue to be maintained in the burro management area (Figure 1), along US highway 140. The focus for removal of animals would be along the highway, and therefore would reduce potential for collisions with highway traffic.

Service personnel would inspect horses following capture (described below under Gathering). Some of the most desirable individuals could be returned to the Refuge to maintain a population of well-adapted animals with good color and conformation. The majority of horses would be placed in good homes through adoption agents. The Service would dispose of debilitated animals (i.e., deformed, crippled, and infirm) on-site in a humane manner (see Standard Operating Procedures in Appendix C). This would be determined by the Refuge Manager in consultation with a veterinarian.

The rates at which the feral horses and burros were removed from the Sheldon Refuge would continue to be affected by several uncontrollable factors such as budget allocations, weather, horse life history, and availability of adoptable homes for placement. However, when the opportunity to accomplish removal efforts was presented, there would be several different options that could be applied using the same procedures for gather and placement whether 80 or 800 individuals were removed each year. The numbers taken off in any single year would strongly affect the total number of animals to be removed over the long term because of the annual reproductive recruitment back into the herd by the animals remaining on the Refuge. This would consequently also affect the total amount of funds needed to accomplish the task.

Analyses reveal that the most desirable option would be to reduce the feral horse herd at the fastest rate possible, that is, between 600 and 1,000 horses per year (Steblein and Johnson 2007). This would minimize impacts to wildlife habitat, accelerate restoration of riparian habitats, improve water quality, and help maintain a safety corridor along Highway 140. It would also minimize impacts to horses - 1,000 fewer total horses would be removed at the higher annual removal rates – and would reduce chances of horse injury and stress, improve safety concerns to contractors and employees, and allow Refuge employees to accomplish other important resource management projects and programs. Finally, cost savings to the public would result from higher rates of horse removal from the Refuge.

Gathering

Methods proposed for use in gathering and transporting horses and burros from the Refuge incorporate a variety of features designed to reduce adverse impacts. They are summarized below and described in greater detail in Appendix C ("Standard Operating Procedures"). Removal of horses would not be allowed during the main foaling season, February through May (pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). June is technically considered a reasonable period for gathering horses on Sheldon Refuge, assuming that all foals would be at least one month old at time of gather (pers. comm. Leon Pielstick, Doctor Veterinary Medicine, June 2006). However, future gathers are unlikely to occur at that time of year in light of public concerns regarding potential risks to foals. Gather operations for horses and burros would occur primarily in the summer, fall, and winter. To avoid jeopardizing wild land qualities, development of roads into proposed wilderness areas would not be allowed. Additionally, traps (corrals) would be removed immediately after use to preserve the existing wild character of the area. Gathering, holding, and removal of horses would be supervised by Service personnel to ensure that the animals were treated humanely. These activities would also be available for viewing by the public in designated areas (assuring safe distance for horses, Refuge staff, and public).

Under this alternative, the largest numbers of horses gathered would likely continue to be with the use of a helicopter and 1-2 horseback riders through a private contract. The contractor would set up a trap (corral) and horses would be brought to the trap (corral) by using a helicopter to urge the animals along in a particular direction. The contractor would conduct the capture and use motorized vehicles to transport the horses to the Sheldon centralized holding facility. Use of helicopters for gathering would have several advantages (Cattoor 2007 and pers. comm. Sue Cattoor, Cattoor Livestock Roundup, Inc., Aug 2007). First, a large number of horses could be gathered in a short time. Second, speed of horses could be adjusted as appropriate during gathers from walking to gallop, depending on distance, terrain, weather, and number/age of young. Animals would typically be herded less than five miles to a trap (corral) location. The disadvantage of this technique is a public perception that it would cause an increase in stress levels to horses and an increased risk of injury (see comments summarized in chapter 5, or compiled original comments to draft EA (FWS 2007) posted on Sheldon Refuge website).

Another capture method that has been used is gathering horses with horseback riders through a private contract. Although there are variations to use of this technique, the core method would include riders on horseback either leading or driving horses to a trap (corral). The contractor would conduct the capture and use motorized vehicles to transport the horses to the Sheldon centralized processing facility. Advantages of this method would include flexibility for catching smaller numbers of horses and a public perception that it would cause reduced stress levels in and injuries to horses (see comments summarized in chapter 5, or compiled original comments to

draft EA [FWS 2007] posted on Sheldon Refuge website). The disadvantage of horseback gathering is that the animals would be brought to the facility in smaller numbers, which would create an overall decrease in efficiency for processing and transporting the animals. A minimum of 50 animals usually need to be on site in holding facilities to justify the cost of processing horses for disease testing by the veterinarian and brand inspection before transport. The slower accumulation of animals with this gather technique would require keeping horses in the Sheldon centralized holding facility for longer periods of time which would increase their opportunity for injury. This longer holding period would also tie up valuable Refuge staff time for feeding and watering, and detract from the employees' primary duties. This would also be the most expensive technique on a per-horse-gathered basis.

Capturing animals using the bait trap (corral) method would be accomplished by Refuge staff. Portable panels would be set up during the winter months and baited with hay. When an animal entered the trap (corral), a trigger would be released and the door closed. Traps (corrals) would be checked once or twice a day depending on horse/burro activity in the area. Following capture, Refuge staff would transport the animals to the Sheldon centralized holding facility. Experience at Sheldon Refuge has shown that this capture technique would be an especially effective way to catch burros (Johnson 2004). Disadvantages would be that this method was very labor-intensive, ineffective for catching horses, and required that animals be kept in the Sheldon centralized holding facility for longer periods of time (until sufficient number of animals were obtained for processing and adoption).

Horses and burros that are documented to cross the Refuge boundary onto and off of adjacent lands under the jurisdiction of the BLM are considered subject to the Wild Horse and Burro Act. These animals would continue to be managed cooperatively with BLM, and gathered and adopted through the BLM program. Until results were received from the August 2007 population survey, it was believed that the Big Springs Herd Area (Figure 1) was the only affected area at this time. Now it is believed that horses may have also crossed the Refuge's southern boundary in the past (see section 3.4).

Due to the Refuge's rugged terrain, injuries may occur to horses and burros during gathering activities, and foals and mares may become separated. However, techniques would continue to be employed to minimize these problems (Appendix C, Cattoor 2007).

Processing

Preliminary sorting of animals would be done at the field corrals (at the site of the gather) to match mares with foals and to keep separate from studs. Disease testing and processing of captured animals would continue to done at the Sheldon centralized holding facility (a corral system with various pen areas), following a week of rest after the gather. These activities would include putting each animal in a working chute where blood was drawn to perform the Coggins disease test. A description of the animal would be recorded with each animal assigned a number. A veterinarian would be contracted for the processing, and would be assisted by Refuge staff and cooperators. The veterinarian would also treat injured animals as appropriate. Animals would then be sorted into transport loads to ensure that mares and foals were paired; separate from studs; and fed, watered, and allowed at least 24 hours rest before transporting once health certification and brand inspections are completed.

Transportation
Horses and burros would continue to be transported from the Sheldon centralized holding facility to the adoption agent through different methods. Professional haulers in semi-trucks would transport the majority of the animals. If the distance was relatively short, Refuge staff would haul animals using stock trailers behind pickup trucks or a semi-truck trailer borrowed from the BLM. Regulations require that animals being hauled for more than 24 hours must be rested. Animals would be unloaded into a rented corral en route, and provided with 12 hours of rest, feed, and water before resuming transport. Before any animal was transported it would need to have a health certificate from the veterinarian, a brand inspection, and a cleared name and address of the recipient party.

Adoption Process
All adoptions would be completed through adoption agents who were engaged under contract or cooperative agreement. The animals would generally be transported to the agents' facilities where they would be adopted out to their new homes. The agent would be responsible for finding individuals who would give the horses or burros a good home. The agents would also be responsible for assuring that the animals do not go to a slaughter facility. Adoption agents would continue to be screened by the Service. All potential adopters would be required to fill out a form describing their intended use of the animal and the facility where it would be kept. Other options would be available to the agents for screening adoptees, such as requiring a reference from a veterinarian or a signed affidavit. Additional detail on this component of the management program is provided in Appendix C ("Standard Operating Procedures").

Improvements to the Program
As described in Section 1.4 ("Application of Adaptive Management Concept"), the Service would continue to improve the program through a process called adaptive management. As new information was discovered, the Service would make minor program refinements or adopt new techniques that improved end results, reduced costs, and reduced risk to horses and personnel. Adaptive management would also include upgrading facilities. For example, in 2007, the Service modified the corral system by establishing a number of smaller pens from large pen areas and made improvements to the loading ramp. An improvement to the corral's water delivery system is scheduled for the near future. These modifications would be expected to increase the efficiency of holding and sorting horses, as well as reduce risk to animals and personnel.

Over the next several years, a number of comments on the Draft EA (FWS 2007) encouraged the use of contraception techniques. We have incorporated contraception as an experimental component under this alternative. We would explore its use, develop appropriate procedures, and apply appropriate techniques when they were determined to be cost-effective and humane as part of an adaptive management approach for reaching management objectives. Horses treated with contraception would be released back to Sheldon Refuge. Contraception would especially be applied to horses that may be difficult to adopt (i.e., because they were too old or had physical disabilities, or because the adoption market was flooded with animals). Based on further study and our field experience, the feasibility and efficacy of contraception as a component of the larger management program would be further evaluated in the CCP.

Similarly, we received comments on the Draft EA recommending marking animals (especially horses) so that they can be distinguished as gathered from Sheldon and as a potential deterrent to

be sold for slaughter. There are tradeoffs between techniques (branding, tattoos, and microchips) in terms of acceptance by the adoption market, ease of use, and suitability towards the purpose of marking. These options would be further explored under this alternative.

Alternative B-2: Modified Status Quo – Proposed Action (Ongoing Management Program on an Interim and More-Limited Basis)

Under this alternative, most current standard procedures for managing horses and burros (as described for Alternative B-1) would continue, but on a more-limited basis, until completion of the Refuge CCP (currently scheduled for 2010). This alternative is the Service's new "Proposed Action."

Management Objectives

On an annual basis, the Service would gather and adopt out a much more limited number of horses and burros than with alternative B-1. Estimated numbers of horses and burros currently on the Refuge are at least 800 and approximately 90, respectively (Collins 2007). The numbers of animals removed would approximately equal the annual increases in the Refuge's current populations, thereby maintaining relatively stable populations of horses and burros. As discussed in section 3.4, Refuge horse and burro populations increase 17-23% annually (Bennett 2002, FWS Annual Narrative Reports). Therefore, based on the July 2007 population survey (Collins 2007), roughly 140-180 horses and 15-20 burros would be gathered and adopted out during the first year. In order to maintain relatively stable populations of horses and burros on the Refuge, removal objectives would be adjusted in subsequent years based on results of annual population surveys.

Management objectives for all of the Refuge's major natural and manmade resources would be re-examined through the Comprehensive Conservation Planning process, which will establish a new 15-year strategic management plan for the Refuge. The Sheldon Refuge CCP is expected to be completed in 2010.

Herds

In an effort to minimize impacts from horses and burros, gathers would target removal and either adoption or relocation of animals away from Refuge areas of greatest concern. Examples include areas near Highway 140, areas with degraded riparian habitats, and areas which had experienced recent wildfires. Burros would continue to be maintained in the Jackass Flat, Virgin Valley, and Bog Hot units.

Service personnel would inspect horses following capture (described below under Gathering). Some of the most desirable individuals could be returned to the Refuge to maintain a population of well-adapted animals with good color and conformation. The majority of horses would be placed in good homes through adoption agents. The Service would dispose of debilitated animals (i.e., deformed, crippled, and infirm) on-site in a humane manner (see Standard Operating Procedures in Appendix C). This would be determined by the Refuge Manager in consultation with a veterinarian.

With this more-limited program, the rates at which feral horses and burros were removed from the Sheldon Refuge would be somewhat less affected (when compared with alternative B-1) by

factors such as budget allocations, weather, horse life history, and availability of adoptable homes for placement.

Gathering
Methods proposed for use in gathering and transporting horses and burros from the Refuge would be the same as proposed under alternative B-1. These methods incorporate a variety of features designed to reduce adverse impacts. They are discussed above and described in greater detail in Appendix C ("Standard Operating Procedures"). The next gather would occur in October 2007.

Processing
Disease testing and processing of captured animals would continue to be done at the Sheldon centralized holding facility as described under alternative B-1.

Transportation
Horses and burros would continue to be transported from the Sheldon centralized holding facility to the adoption agent through different methods as described under alternative B-1.

Adoption Process
All adoptions would be completed through adoption agents who were engaged under contract or cooperative agreement as described under alternative B-1.

Improvements to the Program
As described in Section 1.4 ("Application of Adaptive Management Concept") and above, under alternative B-1, the Service would continue to improve the program through a process called adaptive management. As new information was discovered, the Service would make minor program refinements or adopt new techniques that improved end results, reduced costs, and reduced risk to horses and personnel. Adaptive management would also include upgrading facilities. Upgrades to the corral system to increase the efficiency of holding and sorting horses, as well as reduce risks to animals and personnel were recently completed and additional improvements are scheduled (see more detailed description under alternative B-1). Under this alternative the Service would also continue to explore marking of animals (especially horses), in part, so that they can be distinguished as gathered from Sheldon. This would also serve as a potential deterrent for horses susceptible to be sold for slaughter (see more detailed description under alternative B-1).

Over the next several years, a range of contraceptive techniques would be tested for feasibility and efficacy. Treated animals would be returned to the Refuge. Contraception would target those horses and burros which may be difficult to adopt (i.e., because they were too old or had physical disabilities, or because the adoption market was flooded with animals). If determined feasible and efficacious, contraception could also be used to assist in maintaining stable populations. Based on further study and our field experience, the feasibility and efficacy of contraception as a component of the larger management program would be further evaluated in the CCP.

Similarly, we received comments on the Draft EA recommending marking animals (especially horses) so that they can be distinguished as gathered from Sheldon and as a potential deterrent to be sold for slaughter. There are tradeoffs between techniques (branding, tattoos, and microchips)

in terms of acceptance by the adoption market, ease of use, and suitability towards the purpose of marking. These options would be further explored under this alternative.

Alternative C: Adoption Directly from the Refuge.

Under this alternative, Refuge staff (instead of an adoption agent) would screen individuals and organizations for potential adoption of gathered horses, care for horses until they are picked up, coordinate brand inspections, secure health certificates, and facilitate horse transport. This alternative would be implemented in concert with alternative B-1 or B-2, and all other aspects of the program would remain the same as described above for those alternatives. Current implementation of the program adopts horses out through several adoption agents. These agents conduct the screening of potential homes for horses, care for the horses in the intervening time, and coordinate transportation. Refuge staff have previously provided these services, but shifted to adoption agents to facilitate the process because of decreased staffing and funding. Application of this alternative, compared to Alternative B-1 or B-2, would require additional Refuge staff to accommodate the workload, veterinarian support, travel to inspect adoptee facilities and attend horse meetings, food and supplies for horses, and capitalization and maintenance costs for a new corral system (e.g., corral, well, hay storage, etc.). A new corral would be needed to provide a facility for care and to show horses while awaiting adoption. This facility would be separate from the existing corral that is now used for holding and processing horses from gathers. Gathers would likely continue to occur while other horses were awaiting adoption. The costs associated with implementing this alternative would be offset, in part, by the savings of adoption fees currently paid to agents and the Service's share of current transport costs (Steblein and Johnson 2007).

Alternative D: Conduct Horse Gathers Solely Using Horseback Techniques.

Under this alternative, the Service would propose to use only horseback riders to gather horses, and baited traps (corrals) to gather burros, eliminating the use of the combined technique of a helicopter and horseback riders. This alternative would be implemented in concert with alternative B-1 or B-2, and all other aspects of the program would remain the same as described above for those alternatives. The advantage of horseback gathers is the potential for more flexibility to gather smaller dispersed numbers of horses and continuance of a traditional gather technique. There are variations in the techniques used by wranglers to capture horses and the effectiveness of their respective techniques. A trap (corral) is setup using available landforms. Additional fencing (wings) is constructed from the trap (corral) to guide horses into the corral. Depending on the individual technique used, the horse-mounted wrangler either leads or drives horses into the trap (corral). Horses captured by this technique are accumulated in the holding corral over a number of weeks until there are adequate numbers for processing by a veterinarian and brand inspector. It is not clear whether adequate numbers can be removed each year solely using this technique.

2.3 Summary of Alternatives and Effects

The tables which follow, summarize and contrast major components of the five alternatives (Figure 3) and the effects of implementing those alternatives (Figure 4). The effects are described in more detail in Chapter 4.

Figure 3: Summary of Alternatives for Horse & Burro Management at Sheldon National Wildlife Refuge.

Horse & Burro Management Component	**Alternative A No Action On Horse and Burro Management**	**Alternative B-1 Status Quo**	**Alternative B-2 Modified Status Quo (Proposed Action)**	**Alternative C Adoption from the Refuge**	**Alternative D Use only Horseback & Trap (corral) Techniques**
Population Objective	None	75-125 horses and 30-60 burros	Approximately 800 horses and approximately 65 burros	Same as B-1 or B-2	Same as B-1 or B-2
Number gathered and adopted out annually	None	Several hundred horses and burros	Roughly 140-180 horses and roughly 10-15 burros	Same as B-1 or B-2	Same as B-1 or B-2
Gather Technique	Not Applicable	Aircraft, bait traps(corrals), horseback riders	Aircraft, bait traps(corrals), horseback riders	Aircraft, bait traps (corrals) horseback riders	Horseback riders, bait traps (corrals)
Use horse-back riders to gather	None	Conducted by contractor	Conducted by contractor	Conducted by contractor	Conducted by contractor
Use helicopters & horseback riders to gather	None	Conducted by contractor	Conducted by contractor	Conducted by contractor	None
Use "traps (corrals)" to capture burros	None	Conducted by Service staff	Conducted by Service staff	Conducted by Service staff	Conducted by Service staff
Work with BLM for horse/burro removal	None	Only horses/burros subject to WHBA	Only horses/burros subject to WHBA	Only horses/burros subject to WHBA	Only horses/burros subject to WHBA
Processing at onsite corrals with veterinarian (DVM)	Not Applicable	Yes	Yes	Yes	Yes
Transport to adoption sites (agents or adoptees)	None	Contractor or Service Staff	Contractor or Service Staff	Contractor, Service Staff, or adoptee	Contractor or Service Staff
Adoption	None	Conducted by adoption agents thru agreement	Conducted by adoption agents thru agreement	Conducted by Service	Conducted by adoption agents thru agreement
Explore use of contraception and marking of horses	None	Conducted by trained personnel	Conducted by trained personnel	Conducted by trained personnel	Conducted by trained personnel
Livestock Fencing	Maintain perimeter fence by Service & contractor	Maintain perimeter fence by Service & contractor	Maintain perimeter fence by Service & contractor	Maintain perimeter fence by Service & contractor	Maintain perimeter fence by Service & contractor

Figure 4: Summary of Effects of Horse & Burro Management Alternatives at Sheldon National Wildlife Refuge.

Environmental Consequences	**Alternative A No Action On Horse and Burro Management**	**Alternative B-1 Status Quo,**	**Alternative B-2 Modified Status Quo, (Proposed Action)**	**Alternative C Adoption From the Refuge**	**Alternative D Use Only Horseback & Trap (corral) Techniques**
Physical Effects	Deteriorating in correspondence with increasing number of horses and burros.	Improving in correspondence with decreasing number of horses and burros.	Degradation stabilized in correspondence with stable numbers of horses and burros	Same as Alt. B-1 or B-2	Same as Alt. B-1 or B-2
Aquatic resources (water quality, silt, bacteria, nutrients)	Severe impact to water quality & resources	Improved water quality & resources	Degraded water quality & resources stabilized	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Soil compaction and surface crust	Increased soil compaction, degradation of biol. crust	Reduced soil compaction & improved biol. crust	Degraded soil compaction & biol. crust stabilized	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Biological Effects	Deteriorating in correspondence with Increasing number of horses	Improving in correspondence with decreasing number of horses	Degradation stabilized in correspondence with stable numbers of horses and burros	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Vegetation	Decreased species richness & distribution of cover	Improved species richness & distribution of cover	Improved species richness & distribution of cover	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Invasive Species	Increased risk	Decreased risk	No change in existing risk	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Migratory Birds	Decreased habitat quality & species richness	Increased habitat quality & species richness	No change in existing habitat quality & species richness	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Reptiles, Amphibians, Small mammals	Decreased habitat quality & species richness	Increased habitat quality & species richness	No change in existing habitat quality & species richness	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Large mammals	Habitat degradation & increased competition	Improved habitat & decreased competition	No change in existing habitat & competition	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Endangered/candidate species	Decreased habitat potential	Improved habitat potential	No change in existing habitat potential	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Biodiversity (species richness of native species, biological integrity)	Severe degradation	Large improvement	No change in existing situation	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Horses & Burros	Reduced risk from gather operations, Decreased habitat quality, Increased mortality, risk of large die-offs	Increased risk from gather operations, Improved habitat, Stability of reduced population	No change in existing risk from gather operations, Degraded habitat quality unchanged, Existing population stabilized	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed

Figure 4: Summary of Effects of Horse & Burro Management Alternatives at Sheldon National Wildlife Refuge (Cont'd.).

Environmental Consequences	**Alternative A No Action On Horse and Burro Management**	**Alternative B-1 Status Quo,**	**Alternative B-2 Modified Status Quo, (Proposed Action)**	**Alternative C Adoption From the Refuge**	**Alternative D Use Only Horseback & Trap (corral) Techniques**
Social, Cultural, & Economic Effects	Positive & negative effects	Positive & negative effects	Positive & negative effects	Positive & negative effects	Positive & negative effects
Wildlife-related Recreation	Generally decreasing	Generally increasing	No change in existing opportunities and conflicts	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Economic Impact to Communities	Increases & decreases	Generally Increasing, but also decreases	No change in existing economic effects	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B -1 or B-2, but delayed
Cultural Resources	Increasing damage	Decreasing damage	No change in existing damage	Same as Alt. B-1 or B-2, but delayed	Same as Alt. B-1 or B-2, but delayed
Estimated cost of reaching and maintaining population management objectives (includes core costs of gathers and adoptions; but not contraception, fencing, etc.)	Not applicable, no management objectives established	Based on gather of 600 horses/year, $1,340,071 to reach mgmt obj; $50,000 per year to maintain horse numbers once mgmt. obj. reached; Burros: $22,700	Based on gather of 160 horses/year: Already at mgmt objective level. $216,141/year to maintain horse numbers; Burros: $22,700	**Alt B-1 Mgmt Obj Level;** $1,661,127 to reach mgmt objectives; $50,000/year to maintain horse numbers **Alt B-2 Mgmt Obj Level;** Already at mgmt objective level. $340,992 for 1st yr., $105,242 thereafter to maintain horse numbers, Burros: $22,700	**Alt B-1 Mgmt Obj Level;** $1,597,269 to reach mgmt objectives; $50,000/year to maintain horse numbers **Alt B-2 Mgmt Obj Level;** Already at mgmt objective level. $257,624 to maintain horse numbers, Burros: $22,700
Time to initially accomplish management objectives	Not applicable, no management objectives established	3 years	1 year	4 years for B-1 and 1 year for B-2	7 years for B-1 and 1 year for B-2

Chapter 3: Affected Environment

This chapter presents the potentially affected environment (i.e., the physical, biological, wildlife, horses and burros, cultural, social, and economic values and resources) of the impact area as identified in the internal and external scoping process. The best available information has been used in the Affected Environment, including use of information from 60 documents not previously used in the 1980 EIS. This also includes a number of studies and reports with information on Sheldon Refuge. This chapter provides the baseline for comparison of impacts described in Chapter 4. Chapter 3 is organized by affected resources.

3.1 Physical Environment

Location and Size

Sheldon National Wildlife Refuge (Sheldon Refuge), administered by the Service, is located in the northern portions of Washoe and Humboldt counties in northwestern Nevada and in the southeast portion of Lake County, Oregon (Figure 1). The total area within Sheldon's boundaries is 575,813 acres, with 575,186 acres in Nevada and 627 acres in Oregon. The closest towns of any size are Lakeview in Lake County, Oregon, Winnemucca in Humboldt County, Nevada and Alturas in Modoc County, California. The land surrounding Sheldon Refuge is owned primarily by the Federal Government and managed by the BLM through three districts; Lakeview District to the north, Winnemucca District to the east and south and Susanville District to the south and west.

Physiography

Sheldon Refuge is part of the High Desert (FWS 1980). The High Desert is characterized by wide-open spaces and a variety of landforms. The two most common landforms include narrow canyons that empty into rolling valleys with no drainage outlet to the ocean, and broad flat tables that end abruptly in vertical cliffs. The elevation of these landforms ranges from a high of 7,294 feet on Catnip Mountain to a low of approximately 4,200 feet on the northeastern boundary. The area generally decreases in altitude from west to east.

Geology

Three rock units dominate the Sheldon Refuge landscape (FWS 1980). The oldest unit, a layer of Rhyolite flows, called Canyon Rhyolite, commonly forms the bedrock upon which the two other rock units on Sheldon Refuge are laid. The most prominent exposures of Canyon Rhyolite on are McGee Mountain in the extreme east and the walls of Virgin and Thousand Creek Canyons. Above the Rhyolite, with thickness up to 1200 feet, is the High Rock Sequence. This formation is composed primarily of volcanic tuff and stream and lake sediments. The Virgin Valley Formation and Thousand Creek Beds are considered to be part of the High Rock Sequence and is the largest portion of this rock unit exposed on the Refuge. They comprise the area of the Virgin Valley and part of the outcrops east and west of Railroad Point, both of which are located in the northeastern part of Sheldon. The Virgin Valley formation and Thousand Creek Beds are important because the soils, which originate from them, are fragile, erode easily and support vegetation somewhat different from the surrounding area. The Virgin Valley Formation is also the only area with mineral production on Sheldon Refuge (USGS and Bureau of Mines, l978). The third unit is comprised of extensive basalt flows up to 100 feet thick, which form large broad tables and cap most of the mountains. Wherever the flows end or have been cut by erosion,

natural barriers in the form of rim rock have been created. This rim rock is usually steep enough to restrict livestock access onto the tables. Some of the larger basalt tables on Sheldon Refuge include Railroad Point, Big Spring Table, Rock Spring Table, Fish Creek Table, and Gooch Table.

Climate

Sheldon Refuge is influenced by climatic forces that restrict water supply and vegetation (FWS 1980). Annual precipitation on the area, because of long, cold winters, occurs mainly in the form of snow and averages about six inches on the east side and 13 inches on the west side. High summer temperatures, especially in lower elevation areas, result in significant evaporation and contribute to a scarcity of surface water and available soil moisture during the summer months. The probable occurrence of frost during any month restricts the growing season to the summer season.

Water

On Sheldon Refuge, water is scarce during the summer months, and the most consistent water sources (and therefore the most important) are natural springs (FWS 1980). The Refuge contains 137 Springs/seeps, 117 miles of perennial streams that flow most years, and 146 reservoirs, ponds, and playas that hold water early in the season of most years (unpublished data, Sheldon Refuge 2007). Most of the springs flow water year-round and have the potential of providing good quality water for dependant wildlife and plant species. Other water sources such as streams, lakes and reservoirs rely on average precipitation to flow or fill; and even with above average precipitation they are not reliable for late season water. For example, the largest streams are Hell, Virgin, Thousand, Fish, Wall and Badger Creeks; with only Hell and Virgin Creeks flowing consistently each year. Reservoirs such as Swan, Big Spring, Rock Spring and Alkali often do not fill and are sometimes dry. Natural lakes such as Swan Lake and Gooch Lake hold water year-round except during drought years.

Soils

Soils in northwest Nevada are semiarid, very young, and poorly-developed. Chemical and biological soil development processes, such as rock weathering, decomposition of plant materials, accumulation of organic matter, and nutrient cycling proceed slowly in this environment. Soil recovery processes are also slow; therefore, disruption of soil can lead to long-term changes in ecology and productivity. In many areas, natural or geologic erosion rates are too fast to develop distinct, deep soil horizons. The soils of Sheldon Refuge are complex and diverse.

Management practices may affect soils' ability to maintain productivity by influencing disturbances such as displacement, compaction, erosion, and alteration of organic matter and soil organism levels. When soil degradation occurs in semiarid, high desert regions, natural processes are slow to return site productivity. Prevention of soil degradation is far more cost-effective and time-effective than remediation or waiting for natural processes. Any activities that remove vegetative cover increase the erosion rate. Some soils are particularly vulnerable to soil erosion. If the surface layers of these soils are washed or blown away, the productivity potential is lost for a geologic time span (BLM 2003).

3.2 Biological Environment

Biological integrity, diversity, and environmental health

Landscapes dominated by sagebrush (*Artemesia* spp.) extend across large portions of 11 states in the Intermountain West and constitutes the most extensive habitat type on Sheldon Refuge. The sagebrush steppe ecosystem evolved with low densities of large bodied grazers. This period began with the Pleistocene extinctions of key mammals (including equines) from 10,000-14,000 years ago and continued until the introduction of the European horse breeds and other livestock more than 180 years ago (Beever 2003, Mack and Thompson 1982). Today, sagebrush steppe constitutes one of North America's most imperiled and neglected ecosystems (Noss and Peters 1995, Mac et al. 1998) due to the profound, ecologically transformative influences of livestock grazing, followed by alteration of natural fire regimes and consequent invasion of exotic plant species (Bock et al. 1993, Fleischner 1994, Saab et al. 1995, Rotenberry 1998, Young and Sparks 2002).

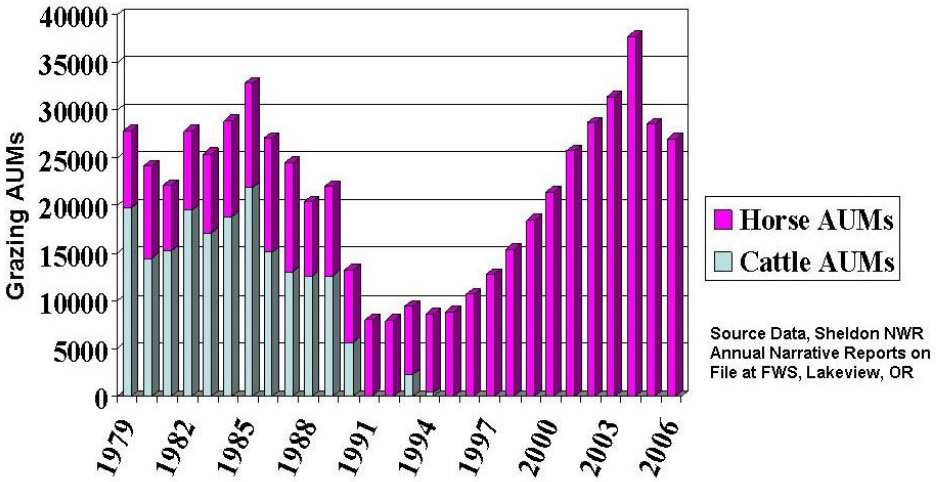
Global climate change is expected to change weather patterns in the Great Basin (Wagner 1998), and consequently species and ecological communities found in the Great Basin (Toweill 1998, Wagner 1998), which would include Sheldon Refuge. One assessment that considered the effect of global climate change on future ecological communities of the Great Basin, considered the emergence of several potential alternative weather patterns (Wagner 1998), including: increasing temperature, decreasing winter precipitation with increasing summer precipitation, and increasing winter precipitation with decreasing summer precipitation. Wagner (1998) described a complicated interplay between exotic livestock (which includes burros and horses), fire, and fire-adapted invasive species that has resulted in the loss of native plant communities and associated biota in the Great Basin. Climate change effects are likely to interact with the livestock-fire-invasive species pattern, potentially accelerating the loss of native communities, loss of many species, and affects to other aspects of the physical/biotic environment (Klopatek and Fleishman 1998, Toweill 1998, Wagner 1998). Toweill (1998) recommends taking action to protect water quality and flows in streams and rivers. On Sheldon Refuge, reducing the risks from these ecosystem stressors (grazing, invasive species, frequent fires) would enhance the resilience of the ecosystem to disturbance from global climate change and contribute to conserving the biodiversity of the Great Basin (pers. comm. Paul Steblein, Project Leader, Aug 2007).

The NWRS Refuge Administration Act, as amended, clearly establishes that wildlife conservation is the singular National Wildlife Refuge System mission. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act of 1997 states ". . . the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." Biological integrity, diversity, and environmental health are critical components of wildlife conservation. Biological integrity, diversity, and environmental health can be described at various landscape scales from refuge to ecosystem, national, and international. Each landscape scale has a measure of biological integrity, diversity, and environmental health dependent on how the existing habitats, ecosystem processes, and wildlife populations have been altered in comparison to historic conditions. Sheldon Refuge is the largest contiguous piece of land representative of the shrub-steppe ecosystem in the nation that is ungrazed by domestic livestock (pers. comm. Dave Johnson, former Deputy Project Leader, May

2007). It contains diverse plant and animal constituents that are mostly native, and strongly dependent upon the biotic and abiotic components with which they have co-evolved.

Vegetation

Figure 5. Grazing AUM's on Sheldon NWR (cattle and horses), 1979-2006.



Sheldon Refuge is the largest contiguous block of land in the Great Basin that is free of domestic livestock grazing. Livestock were removed from the Refuge in 1994 to allow recovery of upland and riparian habitats after decades of over-grazing and fire suppression (FWS 1994). However, since 1994, there had been a steady increase in horse abundance, which peaked in 2004 when horse use (37,674 AUM's) reached a level nearly twice the 1979 peak of cattle use (19,736 AUM's; Figure 5). As this was occurring, refuge staff noted that "... *on some areas of the refuge, horses are continuing to degrade riparian areas even with the absence of domestic livestock"* (FWS 1998). The use of AUM's is to illustrate the continued grazing pressure on the ecosystem, not in anyway to suggest horses, burros, or any other livestock should receive a range allocation for grazing.

A plant inventory was conducted during the late 1970's, which identified 615 plant species from 72 families, (Rogers and Tiehm 1979). Forbs and graminoids (e.g., grasses, rushes, sedges) dominated the floral diversity and they comprised 76% of the species diversity. Among nine species referenced as threatened, endangered, or sensitive one such sensitive species, *Astragalus alvordensis*, was considered at-risk, relative to burro impacts in the Railroad Point area. The authors concluded that a drastic increase in the burro population could adversely affect this species (Rogers and Tiehm 1979).

An additional rare plant survey was conducted on Sheldon Refuge in 1996 by The Nature Conservancy (TNC) (Nachlinger and Tiehm 1996). This survey identified three "plant species of concern" (as defined by TNC) that included *Ivesia rhypara* var. *rhypara*, *Hackelia ophiobia*, and *Lomatium roseanum.* Two separate populations of the *Ivesia* were located and contained 165,356 individuals which represents 86% of the known population in Nevada, and 85% of the total global distribution. The other two species *(Hackelia* and *Lomatium)* were determined to be secure and without threat on Sheldon Refuge, as long as disturbance such as grazing in these areas is prevented.

A comprehensive vegetation mapping effort on Sheldon Refuge was completed prior to the 1980 Management Plan and was updated in 1993. This effort used a method that classified vegetation based on range sites. A range site is a section of land with a distinct combination of soi1, topography, climate, vegetation, and wildlife, all of which determine how an area should be

managed. A 1977 study (Anderson 1978) identified 28 range sites on Sheldon Refuge, as well as the Virgin Valley Hills Formation. As a follow-up on the 1977 identification of range sites, a 1978 study compared 1964 range site data with 1978 data. Two important vegetative trends were identified on Sheldon Refuge (Anderson 1978):

1. Ecological condition of most range sites has remained static or only improved slightly since 1964, and,
2. The vigor of key forage species (grasses, forbs, and some shrubs) on Sheldon Refuge is generally low.

Ecological condition is a measurement of the stage of plant community evolution in relation to its potential or climax. It is usually broken down into four categories: poor, fair, good, or excellent. An area in poor ecological condition generally has less than 25% of its potential plant composition, whereas an area in excellent condition has from 75% to 100% of its original plant community. Climax plant communities in the High Desert are more diversified than lower successional stages. Therefore improving ecological condition of a site increases vegetation density and generally, species diversity.

Details on 13 of the 28 range sites and vigor and ecological condition trend information that occur on Sheldon Refuge (including the Virgin Valley Hills) can be found in the 1980 Management Plan (FWS 1980). These 13 range sites were chosen because of the number of acres they occupy or the habitat they provide, such as food or cover, are important for wildlife and are in the areas affected by feral horses and burros.

While there are few contemporary studies quantifying horse and burro impacts to Sheldon Refuge vegetation (e.g., Barnett 2002, LaRouche 2007), there are at least two photographic comparisons which have been completed (Reiswig 1989, Steblein 2007). These photo-point comparisons clearly show the impacts of domestic and feral livestock grazing (Reiswig 1989), and more specifically, horse and burro impacts on refuge habitat quality (Steblein 2007). Another survey just completed on springs of Sheldon Refuge documented 60% - 21 of 35 springs sampled – showed moderate to severe grazing disturbance (LaRouche 2007). These sites showed abundant sign of horses (e.g., horses on site, tracks, manure piles). As previously discussed, there is no undisturbed baseline for comparison considering that as cattle AUM's were removed, horse/burro AUM's increased proportionally. It is important to note however, that the Barnett (2002) study and the referenced photographic essays are consistent with the impacts quantified in other parts of the Great Basin or western United States (see for example Beever 2003; Beever and Brussard 2000a, 2000b, 2004; Beever and Herrick, 2006, Beever et al. 2003, 2006; Bock et al. 1993; Carothers et al. 1976; Crane et al. 1997; Danise et al. 1985, 1988; Densiton 1982; Douglas and Hurst 1993; Fisher 1983; Ganskopp and Vavra 1986; Hanley and Brady 1977; Ohmart 1994; Rogers and Tiehm 1979; Salter and Hudson 1980; among others).

Invasive Species

Approximately thirty species of plants are introduced, non-native, and often noxious varieties that have infested native vegetation types on the Sheldon Refuge (e.g., cheatgrass and perennial pepperweed are two of the most common on the refuge). Many of them were introduced during the livestock grazing era, while others have invaded as a result of road construction and Refuge visitors serving as unknowing vectors by bringing seeds in the undercarriage of their vehicles and on their clothing (Dave Johnson, former Deputy Project Leader, January 2007). Most concentrations appear along roadsides and water courses where seeds are more likely to become established.

3.3 Wildlife

To date, approximately 300 vertebrate species have been recorded on Sheldon Refuge (FWS 1993). Avian and mammalian species collectively comprise 93% of the Refuge vertebrate wildlife. Wildlife use of the Refuge differs on a seasonal basis among taxonomic groups of wildlife.

Invertebrates
Herbst (1996) identified Sheldon Refuge as rich in diversity for aquatic habitat types and invertebrate fauna, and important for biodiversity conservation in the Great Basin. The habitat types sampled in his survey included isolated desert springs and stream drainages, geothermal spring systems, and ephemeral playa lakes. Herbst's survey efforts resulted in the collection of 200 species, including several undescribed new species, rare and disjunct populations, and other species specially adapted to severe and transient desert water environments. Herbst recommended removing the remaining feral horses and burros and rehabilitating developed springs to allow recovery of aquatic resources on Sheldon Refuge. These management actions were corroborated by a technical reference for managing, restoring and conserving springs in the Western United States (Sada et al. 2001).

Fish
During the summer of 1978, a fisheries inventory was initiated. Although fish habitat is limited on Sheldon, 11 species were identified and located (Williams and Storm, l978). Lahontan cutthroat trout occurs on Sheldon Refuge and is Federally listed as a threatened species. However, Sheldon NWR lies just outside of the delineated area for the Black Rock Desert subpopulation, thus, the population is currently considered experimental, non-essential (USFWS 1994). It has been introduced into Catnip Reservoir as brood stock for restocking other Nevada localities.

Two other species, Tui chub and Alvord chub, are native to the area. The Tui chub found on Sheldon Refuge is an undescribed subspecies distinct from the Tui chub in the Catlow Valley of Oregon. It is restricted to a section of drainage unaltered by man's activities.

The remaining eight species have been introduced. One of the introduced species is in fact a hybrid of introduced rainbow trout and native (probably Alvord) cutthroat trout (pers. comm. Jim French, Fisheries Biologist, NDOW, June 2007). The 1978 (Williams and Storm) study did not find any pure strains of native (Alvord) cutthroat despite further investigation in 1979. More contemporary evaluations from NDOW, confirm the absence of pure strain Alvord cutthroat trout, but they do suggest that at least some recently sampled hybrids were spawned by at least one pure strain adult (pers. comm. Jim French, Fisheries Biologist, NDOW, June 2007).

Reptiles and Amphibians
A two-year study and inventory of amphibians and reptiles was initiated in 1978. Three amphibians and fifteen reptiles were found (Williams and Storm, 1978). One species of amphibian, the bullfrog, is not native to Sheldon Refuge but is confined to the warm spring pool at Virgin Valley campground, the Virgin Ranch, and Thousand Creek Gorge. The Great Basin spadefoot toad is widespread and utilizes pools in permanent or intermittent streams, stock

ponds, lakes or reservoirs for breeding. The Pacific tree frog is the most abundant and widespread amphibian on Sheldon. Its larvae occurred in almost every type of water checked at all elevations. The bullfrog was introduced by a private landowner, is considered an invasive species, and now found in Virgin Valley and Thousand Creek Gorge.

The 1978 inventory shows that reptiles most commonly occur in the Virgin Valley, Thousand Creek Valley and Bog Hot area. Several species of lizard (collared, leopard, desert horned, and western whiptail) occur only in this area. Of the total number of species of reptiles on Sheldon, only two did not exist in Virgin Valley. They are the short-horned lizard, which was found near Catnip Reservoir, North Lake, and Fish Creek Mountain, and the rubber boa, sighted near Badger Mountain, Swan Lake Reservoir and Bald Mountain Lake. No threatened or endangered species of amphibian's or reptile's were found in 1978 or 1979.

Other snake species observed on Sheldon Refuge include: Western rattlesnake, racer**,** gopher snake**,** long-nosed snake**,** and Western terrestrial garter snake, night snake, and striped whipsnake**.** The ringneck snake is suspected of occurring on the refuge, but not observed or documented.

Lizard species found on Sheldon Refuge include: Great Basin collard lizard, long-nosed leopard lizard, short-horned lizard, sagebrush lizards, Western fence lizard, desert horned lizard and northern side-blotched lizard. Other species suspected to occur there, but undocumented include Western skink and Great Basin whiptail. A complete list of known amphibians and reptiles occurring on Sheldon NWR is included on the USGS web site (USGS 2006).

Birds

Sage Grouse

Figure 6. Sage grouse on Sheldon NWR.

Historical accounts describe early settlers gathering buckets of sage grouse eggs for camp fare (FWS 1980). If these accounts are true, sage grouse were once very plentiful. Estimates of sage grouse numbers and production trend have been maintained for many years by conducting spring lek counts. This information has been used as a general trend index for known populations. Recent trends appear to suggest that most populations have stabilized, while a few are actually increasing. One of the biggest concerns for sage grouse populations all across the West is the potential of West Nile Virus (WNV) outbreak. Recent research has demonstrated that sage grouse are highly susceptible to this virus and have extremely high mortality rates approaching 100% (Clark et al., 2006). Recent monitoring shows small outbreaks in a number of locations of the sagebrush steppe ecosystem (Diearauf, 2006). There is concern that this disease may appear in the future with devastating consequences for this species. The US Geological Service, National Wildlife Health Center is conducting on-going research on this virus to determine if horses can act as an alternative host for this disease. More than 700 blood samples have been collected from feral horses over the past 3 years, and to date, all of these samples have resulted in a negative test result for WNV. Based on current information, horses are not considered a viable host for virus transmission of WNV to other species (USDA 2004).

During winter (October through April) sage grouse are almost completely dependent on sagebrush for cover and food - sage grouse lack a muscular gizzard containing stones so must depend on soft materials for food (Paterson 1952). For this reason, the primary winter use areas on Sheldon Refuge are low-lying big sagebrush communities (primarily arid loamy terrace sites) such as Sage Hen Hills and the area west of IXL Ranch. In early spring, sage grouse move toward higher elevations and are found in the vicinity of leks. In summer and early fall forbs and insects become an important food source, especially for chicks. Meadows in good or excellent condition are the best areas on Sheldon Refuge for forbs and insects. However, feeding sage grouse will avoid rank stands of meadow vegetation and prefer meadows with surface water available (Oakleaf 1969, Savage 1971). Since many of the meadows associated with springs are in poor ecological condition and have lowered water tables, there is a need to improve their condition for sage grouse. Sage grouse are one of the easiest birds for visitors to view and as such create a great deal of interest and contribute to public viewing.

California Quail, Mountain Quail, Chukar Partridge and Gray Partridge
California and mountain quail are native to Sheldon Refuge (FWS 1980). California quail are common although populations are not large, while mountain quail are uncommon and rarely seen. Willows are extremely important for both species and the elimination of woody species due to grazing may be the limiting factor on populations. Weather conditions and water availability also pose a challenge to these species. Chukar and Gray partridge are not native to Sheldon Refuge, and are not considered a management priority or to have a negative effect on native plants and animals. While gray partridge are uncommon, Chukar are common at lower elevations on the refuge. Refuge hunting of these species is permitted in coordination with Nevada regulations (50 CFR 32.47).

Waterbirds
Ten species of ducks nest on Sheldon Refuge including mallard, Northern pintail, gadwall, Northern shoveler, American wigeon, ruddy duck, redhead, common goldeneye, green winged and cinnamon teal (pers. comm. Brian Day, Sheldon Refuge Manager, January 2007). Great Basin Canada geese are common, and are yearlong residents except during extremely harsh winters. Swans do not nest in the area but may be seen during spring or fall migration (FWS 1980). Nesting pairs of greater sandhill cranes are rare and are seen only during wet years in IXL meadows, on one portion of Virgin Creek and around the Dufurrena Ponds on Thousand Creek. Because of limited water areas, wading and shorebird species are normally seen only during spring and fall migrations. Killdeer, Virginia rail, common snipe and coots nest locally around permanent water area. All water and marsh areas are used by water birds at some time during the year. Bog Hot Springs, Dufurrena ponds, Catnip Reservoir and Virgin Valley are areas with sufficient water to receive consistent use during most years. Intermittent water areas include Alkali, Swan and Big Spring Reservoirs, Smith and Onion Lakes, and the IXL ponds. Winter use is confined to Bog Hot Springs and Dufurrena Ponds where hot springs keep water areas open.

Raptors
Numerous rocky cliffs and outcroppings occur on Sheldon Refuge, which creates ideal nesting habitat for golden eagles, prairie falcons and red-tailed hawks (FWS 1980). Other raptors such as kestrels, northern harriers, and several species of owls are relatively common and nest in suitable habitats. Small numbers of bald eagles utilize low gradient wetlands on Sheldon Refuge during the spring and fall migrations.

Passerines
The predominance of bird species found on the Refuge are in the Order Passeriformes, which includes perching birds and song birds such as jays, blackbirds, warblers, and sparrows. Approximately 56 native land bird species are highly associated breeding species in shrub-steppe habitats (Altman and Holmes, 2000). Several of these species are only found in shrub-steppe vegetation which is common on Sheldon Refuge, including sage sparrow, sage thrasher, and Brewer's sparrow. Some examples of non-obligate species include: loggerhead shrike, lark sparrow, vesper sparrow, and Western meadowlark. Approximately 97 native land bird species are also highly associated breeding species in riparian habitats. In contrast to shrub-steppe, riparian habitat typically supports the greatest diversity of land bird species. Examples of species affected by removal and trampling of vegetation in this vegetation type include: song sparrow, yellow warbler, yellowthroat, willow flycatcher, spotted towhee, and Bullock's oriole.

Mammals

Small Mammals
A diversity of small mammals use the shrub-steppe ecosystem at Sheldon Refuge (FWS 1993) including species such as: deer mouse, pinyon mouse, grasshopper mouse, desert wood rat, sagebrush vole, Ord's kangaroo rat, Great Basin pocket mouse, kangaroo pocket mouse, Northern pocket gopher, least chipmunk, white-tailed antelope ground squirrel, Belding's ground squirrel, black-tailed jack rabbit, Nuttall's cottontail rabbit, and pygmy rabbit (Columbia Basin segment of population is listed as endangered).

Pronghorn
A biological unit is an area that contains all the necessary requirements for a species to survive including food, water, and cover. Sheldon Refuge is only a portion of the biological unit for an interstate herd of pronghorn that includes areas in both Nevada and Oregon as far north as Hart Mountain National Antelope Refuge (Hart Mountain Refuge) (FWS 1980). Within the biological unit are two separate summer pronghorn herds, one that centers on Sheldon Refuge and one that centers on Hart Mountain Refuge in Oregon. All data presented in the following paragraph are based on refuge ANR's, survey memoranda, and reports on file at Sheldon Hart Mountain NWR Complex, Lakeview, OR.

The summer population of the Sheldon Refuge herd has fluctuated annually with an average of about 870 animals. However, peak populations occur in the winter when pronghorn from the Hart Mountain herd and herds in between migrate to wintering areas on Sheldon Refuge. Annual pronghorn kid (also referred to as fawn) production on Sheldon Refuge shows an even greater fluctuation than total population figures, with a low of 8 kids per 100 in 1971 and a high of 99 per hundred in 1957. Pronghorn distribution during the spring, summer and fall depends on weather and forage. Normally on Sheldon Refuge, the Round Mountain-Horse Heaven to Fish Creek-Bitner Creek Area supports 50-60% of the summer herd. Other areas include Gooch Table south to Badger Mountain, Rock Spring Table, and land around Big Spring Reservoir. Most of these areas are low sagebrush communities that are usually broad, open, and flat. Pronghorn concentrate in these locations because their good eyesight and speed in these open areas allow them to evade predation.

The shrubby rolling hills site is important to pronghorn in the late summer and fall when the protein content of grasses decline and the protein content of bitterbrush reaches a peak. Depending on the amount of snow, pronghorn winter primarily on Gooch and Big Spring Tables. These two plateaus are dominated by big and low sagebrush communities which provide about 90% of the pronghorn's winter diet (Hansen and Anthony 1999, pers. comm. Jim Yoakum, Scientist, Western Wildlife). When snow covers Gooch Table, the herd moves to the Big Spring Table. Food is usually available on Big Spring because there is less snow due to high winds that keep the area barren. It is during this time that pronghorn from Hart Mountain National Antelope Refuge and areas in between migrate to their traditional wintering area on Big Spring Table (pers. comm. Brian Day, Sheldon Refuge Manager, May 2007).

Mule Deer

Mule deer populations on Sheldon Refuge and throughout the entire geographic range of the species have shown a decline since the early 1960's (FWS 1980). The following information is based on refuge reports and data, and assessments from Refuge staff (pers. comm. Dave Johnson, former Deputy Project Leader, and Brian Day, Sheldon Refuge Manager, April 2007). Although there are indications that the population has stabilized on Sheldon Refuge and might be slightly increasing, more time is needed to confirm the recent trend. The immediate causes for the decline are thought to be deficiencies in habitat that kept fawn survival at low levels. Mule deer use areas differ from pronghorn use areas on Sheldon Refuge except in the autumn when bitterbrush becomes preferred forage. In the spring, the mountain swale site is important for deer fawning because of the protection from predation provided by its dense cover. Summer-autumn use areas are generally on higher elevation mountains within the shrubby rolling hills and mahogany rock land range sites. These two sites include Badger Mountain which supports about 40% of the deer herd; Catnip Mountain, 15%; Bald Mountain, 15%; Fish Creek and Devany Mountains, 15%; and other areas, 15%. The dominant plant in the shrubby rolling hills site, bitterbrush, provides an important food source for mule deer, and mountain mahogany stands provide cover. Severe winter weather forces deer into primary wintering areas such as Upper Virgin Valley, Big Mountain, McGee Mountain, the southwest end of Guano Valley, between Gooch Table and Hell Creek, and areas south of Sheldon Refuge. The wide scattering of deer during winter is partially attributable to the fact that many of these areas are in poor ecological condition and provide marginal habitat. For example the area between Gooch Table and Hell Creek is mostly arid rolling hills site in poor condition. The major shrub, big sagebrush, provides adequate cover and a sufficient quantity of forage, but is of relatively poor qua1ity. Improving ecological condition of deer wintering areas is an important step in restoring mule deer populations to their former levels

California Bighorn Sheep

California bighorn were restored to Sheldon Refuge after disappearing for more than half a century. The following information is based on refuge reports and data, and assessments from Refuge staff (pers. comm. Dave Johnson, former Deputy Project Leader, and Brian Day, Sheldon Refuge Manager, April 2007). Remains of California bighorn sheep have been found at numerous locations throughout Sheldon Refuge (FWS 1980). The last record of bighorn sheep in the area (prior to their restoration) was a band of about 24 animals seen during the late 1920's on McGee Mountain. The reasons bighorn sheep disappeared are not clearly understood, but the general consensus is that encroachment by domestic sheep, introduced diseases, and poaching were responsible for their demise (FWS 1980). In 1968, eight California bighorn sheep were

transplanted on Sheldon Refuge into a 1,700-acre enclosure in the Hell Creek drainage, and today the Refuge supports a population of approximately 170 animals.

The arid rolling hills site is ideal habitat for bighorn sheep because of its ruggedness and close proximity to escape cover. The steep south-facing slopes are important for bighorns in winter because it is the first to be free of snow. Bighorns utilize both these sites in and around the enclosure on Hell Creek. Big Mountain, the adjacent Idaho Canyon in the southeastern section of Sheldon Refuge, and the slopes around Rock Spring Table are predominantly arid rolling hills with steep south exposure sites that have excellent potential for bighorn sheep habitat.

Predatory Mammals
Mountain lions are found on the refuge, but are very limited in numbers. Bobcats and badgers are widespread but not abundant (FWS 1980). Coyotes exist in moderate to high populations throughout Sheldon Refuge. Predator control has not occurred on Sheldon Refuge since 1967.

3.4 Feral Horses and Burros

Figure 7. Feral horses grazing in a spring on Sheldon NWR.

The following narrative is summarized from Bennett (2005). Horses and burros existed on Sheldon NWR prior to its establishment in1931. Historically, local ranchers managed these horse herds by mixing desirable modern domestic stock with the original Spanish horses that had migrated up throughout the Great Basin after the Pueblo wars in the 1500's. The region was a Cavalry Re-Mount area, where quality Thoroughbred, Quarter Horse, Morgan, and Draft stallions were deliberately released for the purpose of capturing and selling the offspring to the U.S. and European Cavalries for the various wars during the late 1800's and early 1900's. Ranchers living in the area now designated as the Sheldon Refuge managed these horses for about 100 years and enforced a rigid breeding program that favored the bigger stronger bloodlines of the European breeds. Intermixing of feral horses and rancher’s horses (on grazing permits or trespass animals from nearby ranches) continued at least through the early 1940’s (Bennett 2005). These bloodlines, combined with many generations of harsh natural selection and rigid culling by ranchers has resulted in a breed that is large, colorful, and sturdy, with a good conformation and very good feet. Today, this breed shows little resemblance to the Spanish stock that was thought to have occurred here before the European stock became prevalent. The Sheldon horses are reported by many adopters to have an unusually good disposition as well.

Livestock grazing occurred on the Refuge up until 1994 (FWS 1994), at that time it was permanently removed from Sheldon NWR because of conflicts with wildlife. Nonetheless, the

1980 Management Plan and EIS (FWS 1980) set out management objectives for wildlife, livestock and feral horses and burros. In the plan, “a certain number of AUM's would be allotted to feral horses and burros.” Since these animals are not native, they do not technically fall within the framework of the Service's objective at Sheldon to manage for a diversity of native plants and wildlife (Service policy 7 RM 6). However, as a result of public input to an environmental assessment on the Service's feral horse control program, the Service allowed a small proportion of the grazing allotment for horses and burros. But it was acknowledged that if their populations were left unchecked, they could seriously interfere with achievement of management objectives for native wildlife species (FWS 1977). Therefore, the Service opted in 1980 to maintain feral horse and burro populations at levels which they then believed would not seriously compromise attainment of higher priority objectives for native species. Due to the explosive growth of the feral horse population and the associated damage that horses were causing to range resources, the Service initiated corrective action with a 1977 plan to reduce the horse population to 75-125 animals - a population level that was believed to be compatible with native wildlife and plant species at that time. It was determined that periodic control was required to maintain this population level (FWS 1977). The 1977 plan stated that burro populations had been reduced to a level of 30 animals in 1977. The plan also stated that the Service would seek to maintain burro populations at between 30 and 60 individuals - a level that was determined at that time not to jeopardize native species (FWS 1980). These animals are located in the Virgin Valley, Jackass Flat, and Bog Hot areas of the refuge or the burro management area referenced in Figure 1 (pers. comm. Brian Day, Sheldon Refuge Manager, August 2007).

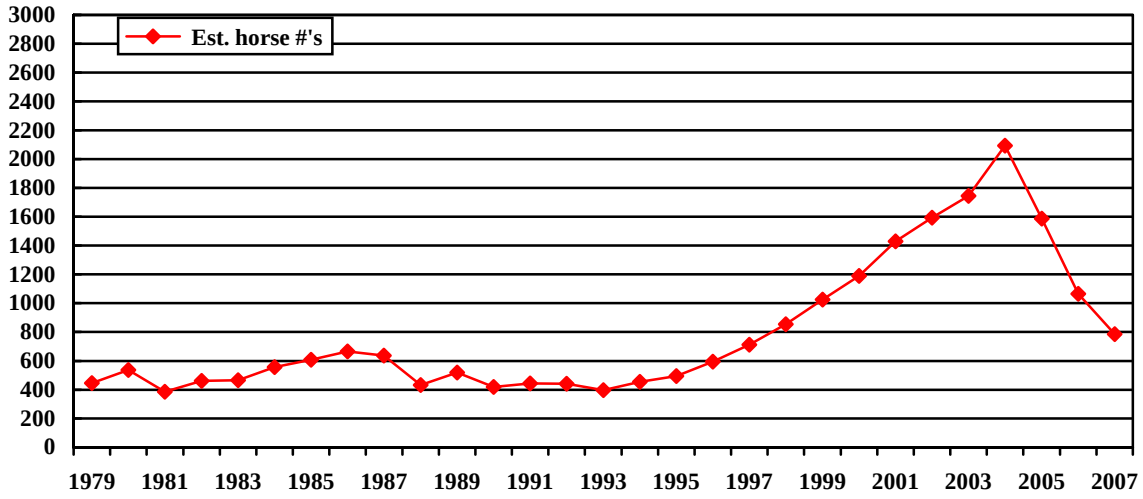


Figure 8. Estimate of minimum annual horse numbers on Sheldon NWR (post foaling and before gathers; source data from annual narrative reports, survey memoranda, and reports on file at Sheldon-Hart Mountain NWR Complex, Lakeview, OR.).

The population of feral horses was much smaller (200-300 animals) in the early 1990s than it is today and their impact was not as severe. However, the population has increased significantly in the past 15 years and habitat damage is now occurring at a much higher level (pers. comm. Barry Reiswig, former Project Leader, Sheldon-Hart Mountain NWR Complex, June 2007; Barnett 2002; Steblein 2007; see also section 4.1). Figure 8 shows a conservative estimate of the number of horses on Sheldon Refuge based upon horses counted in field surveys, horses removed from the Refuge during gathers, and interpolation between data points for years absent of survey data

(compiled from Annual Narrative Reports and field notes by Dave Johnson, former Deputy Project Leader, January 2007). The surveys were conducted to inform managers on the distribution and approximate numbers of horses on the Refuge, versus a statistically controlled calculation of the total population.

There was a large reduction observed in the number of Refuge horses counted in aerial surveys conducted during July 2006 (1,065 horses counted) and July 2007 (786 horses counted) (Collins 2007). Part of the explanation can be from sampling bias (e.g., variation in observer experience, aircraft), detectability of horses, or other statistical factors that are discussed below. The difference in numbers could also be due, in part, to the many improvements that were made to fences and gates along the Refuge's southern border in Spring 2007 (pers. comm. Brian Day, Sheldon Refuge Manager, April 2007). It is plausible that a number of horses may have crossed the Refuge's southern boundary and wintered on BLM lands. When those animals attempted to return to the Refuge this past spring, they found closed gates and tight fences. If this is the case, it is the first time we have recorded horse movements across the southern boundary of the refuge.

Aerial surveys using line transects, as conducted at Sheldon Refuge, typically underestimate the population because not all animals are detected (Caughley 1974, Pollock and Kendall 1987, Firchow et al. 1990, Johnson et al. 1991). Other factors that influence the survey results (both detectability and bias) include terrain, vegetation, aircraft, observer experience, and survey specification (e.g., transect width, flight speed and height) (Frei et al 1979, Walter and Hone 2003, Ransom et al. 2005). In two efforts to characterize the detectability of horses using a Mark-Resight technique, Ransom et al. (2005) reported a sightability of 50.8% and 55.1% on one known population, and 82.6% and 88.2% for a second known population (based on single flight counts). Thus, the 786 horses counted in 2007 on Sheldon could represent a population size between 891 and 1,547 horses for Sheldon Refuge based on the range of sightability reported by Ransom et al. (2005). However, a sightability coefficient would need to be developed for Sheldon Refuge based on site factors and sampling parameters specific to Sheldon. Refuge staff have begun reviewing horse and burro survey data from prior years to better document results and determine if the statistical reliability of prior years data can be determined (e.g., confidence interval). They are also reviewing survey techniques to develop a new protocol that is cost-effective and provides a statistically improved estimate of the population size for horses and burros. Results of these efforts will be used for horse and burro management through adaptive management, and in development of the Comprehensive Conservation Plan for Sheldon Refuge.

The Service, in conjunction with the Bureau of Land Management, has managed these herds for more than 70 years, and the current program to control horse and burro populations is a continuation of those efforts. Horses and burros are gathered as funding permits, and during the period of 1980 to 2006, almost 3,000 horses and approximately 300 burros were gathered and removed from the Refuge (compiled from FWS Annual Narrative Reports). Gathering of horses is accomplished by both helicopter and horseback. The latter technique is more difficult and more expensive than helicopter gathers, but provides the Refuge with flexibility in gather times and quantities (pers. comm. Mike O'Sullivan, Horseback Gatherer at Sheldon NWR 2002-2007, August 2007). The Service has conducted gathers in the past during the spring, summer and fall to meet population reduction targets that are required for the benefit of native plants and wildlife. Although horses can have foals almost any time of year, summer horse gathers (e.g., in late June) on the Refuge have been conducted after the peak of foaling (March, April and May), so that the majority of foals were at 3 months of age or older when the gather occurred (Leon Pielstik, DVM

involved with horse gathers on Sheldon NWR 2004-2007, August 2007). Gather techniques were adjusted to reduce the risk of mares and foals being separated, and to exclude mares with foals one month or younger. Burros are primarily gathered in baited traps (corrals) during winter months.

Careful consideration is given to the horses to ensure their well-being during horse removal efforts, including onsite support by a veterinarian and horse experts. The mortality rates on horses during the roundup have been one percent or less (pers. comm. Brian Day, Sheldon Refuge Manager, August 2007; see also section 4.2). The gathers are scheduled in such a way as to take advantage of more reasonable temperatures. If daytime temperatures are in the 90s (^{o}F), operations are modified to lessen the chance of heat stress (see Appendix C, Standard Operating Procedures).

Feral horses and burros on Sheldon NWR, have no natural predators except for an occasional mountain lion (pers. comm. Brian Day, Sheldon Refuge Manager, August 2007), and their populations increase at a very high rate when compared to populations of deer, antelope, and other native species for which the Refuge was established. There is some indication that weather conditions may affect mortality of horses on Sheldon Refuge, such as drought or deep winter snow pack (e.g., FWS 1993). The herd's growth rate is very strong, averaging around 20% and ranging between 17-23% net increase per year (Bennett 2002, FWS Annual Narrative Reports), which is comparable to rates observed in California, Colorado, Oregon, Utah, Wyoming, and other locations in Nevada (Wolfe 1980). The current population of horses is at least 800 animals and for management purposes, they are classified into four different groups based on the geographic area they are most frequently seen (see Figure 1 for map of herd areas). These areas include Catnip, Big Springs, Fish Creek, and Badger. With the current population and herd growth rate statistics (20%), roughly 140-180 animals must be removed each year just to keep the current population stable at 800 individuals.

During the past 10 years, the feral horse populations have increased to a level more than 10-times that of the management target established in 1980 (FWS 1980), causing damage to upland areas and water sources on the Refuge (Steblein 2007). For this reason, the Service has recently taken two gathers per year to decrease the total population, removing about 600 horses a year. While different protocols have been used over the years, population levels are currently obtained using a helicopter survey annually conducted in July (Collins 2007). The purpose of these counts has been primarily to determine location of horse concentrations and to provide an overall estimate of the minimum number known on the refuge at minimal cost versus a statistically robust calculation of the total horse or burro population on Sheldon Refuge (pers. comm. Paul Steblein, Project Leader Aug 2007). This horse count has been conducted concurrent with refuge counts for pronghorn antelope.

Since the removal of cattle in 1994, the horse population level on Sheldon has caused negative impacts to native wildlife and their habitats (Barnett 2002, Steblein 2007, see also section 4.1). Conflicts over scarce water in this desert environment include trampling of vegetation along stream banks and at spring heads, physical exclusion of native wildlife species by dominant stud horses and burros, and contamination from feces and urine (pers. comm. Brian Day, Sheldon Refuge Manager, August 2007). Horses also cause habitat degradation by removal and trampling of vegetation in the upland areas, although impacts are typically more pronounced in riparian areas (Crane et al. 1997). These areas provide important habitat for native species such as

pronghorn, mule deer, bighorn sheep, sage-grouse, waterfowl, and many species of native songbirds, mammals, reptiles, amphibians, plants and invertebrates. Removal of natural vegetation cover allows predators to more easily locate and kill the species that depend upon that cover to hide, especially during the fawning and brooding seasons. The impact horses and burros have on habitat and fish, wildlife and plant species threaten the biological integrity, diversity and environmental health of Sheldon Refuge (see 16 U.S.C. 668dd(a)(4)(B) and 601 FW 3) and the Refuge's contribution to conservation in the Great Basin ecosystem and the National Wildlife Refuge System. These effects are discussed in more detail in chapter 4, Environmental Consequences.

3.5 Social, Cultural, and Economic Environment

Social and Economic Environment

The local Counties of Lake, Humboldt, and Modoc combined contain over 22,000 square miles of surface area. According to the 2000 census Lake County, Oregon has a population of 7,722, Modoc County, California has a population of 9,449, and Humboldt County, Nevada has a population of 16,106; totaling 32,977. Most of the population is clustered in three large towns: Lakeview (Lake County), Winnemucca (Humboldt County), and Alturas (Modoc County). The economies of Lake, Humboldt, and Modoc Counties can best be described as narrow-based with a high dependency on government and agriculture for employment.

Recreation on Sheldon Refuge is associated primarily with wildlife/wildlands observation and appreciation; other popular activities include driving and hiking through the Refuge, picnicking, camping, and rock hounding. About 25% of visitors participate in hunting and fishing activities (2006 submission to Refuge Annual Performance Planning report). Because of the travel time involved in reaching Sheldon Refuge, many users camp overnight. Sheldon Refuge received an estimated 17,000 visits in 2006. Although the Refuge's horses and burros are not native wildlife species, many people across the United States view all horses and burros which roam across the western landscapes as valuable symbols of the Old West. For example, an Internet search for "wild horses" yielded almost 2.8 million sites, with passages and articles on people's personal experience or views of horses in the Old West (pers. comm. Paul Steblein, Project Leader, August 2007). Many people visit Sheldon Refuge primarily to view horses and burros, for example, travelers stop along the main highway, State Route 140, to view horses or burros . (Davis 2001, pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). Others who visit the Refuge primarily to participate in recreation associated with the natural landscape and native species, also enjoy seeing these feral animals (pers. comm. w/Brian Day, Sheldon Refuge Manager, Aug 2007). As is true with visitors to other conservation lands (e.g., other refuges and National Parks), visitors traveling to Sheldon Refuge provide economic benefits to the local communities including the use of hotels, restaurants, grocery stores, and gas stations (Caudill and Henderson 2005).

Positive contributions of recent feral horse and burro management activities include providing the public with an opportunity to own a horse or burro, opportunity for feral horse and burro viewing, and providing private contractors and businesses with income through involvement with feral horse and burro removal from Sheldon Refuge.

The negative impacts from the feral horses and burros include horse/burro-automobile collisions on Highway 140, decreased income to local horse ranchers and reduced success in other federal

adoption programs by flooding the horse-owning market with horses from Sheldon Refuge, and decreased quality of other forms of wildlife-dependent recreation on Sheldon Refuge (described above).

Cultural Resources

The cultural resource evaluation for this program included a review of the existing cultural resource records for Sheldon Refuge (Raymond and Parks, 2007). The purpose was to determine if previously recorded cultural resources occur in or near the area(s) of potential effect (APE), that is, places where horses are known to concentrate.

The review indicated that among the nine locations known for their horse concentrations, archaeologists previously surveyed seven. Among the areas that were surveyed by archaeologists all contain at least one prehistoric archaeological site. This is not surprising, because people, like wildlife and feral horses, are attracted to water. The areas surveyed were Big Springs Reservoir, Catnip Reservoir, Martinez Spring, Ten Mile Spring, Horse Canyon Spring, Hell Creek, and Virgin Creek. The site records for Big Spring Reservoir, Martinez, and Ten Mile springs include archaeological sites that are eligible for listing on the National Register of Historic Places.

Two areas, Big Spring Creek and Catnip Creek have never been surveyed by archaeologists. Given their proximity to permanent water, we suspect that these places also contain prehistoric archaeological sites.

Chapter 4: Environmental Consequences

This section analyzes the effects of Alternatives A-D to those resources described in the Affected Environment section above. The environmental effects of the Alternatives are analyzed in terms of their effects upon physical, biological, wildlife, horses and burros, cultural, social, and economic values and resources. Key issues that are analyzed include: horse and burro effects on native fish, wildlife, plants, and their habitats; effects of management versus no management on horses and burros; and effects upon cultural, social, and economic resources. The majority of information available in scientific literature characterizes the effects of horses on the environment. In some cases, studies or scientific reviews address livestock in general or other livestock species (e.g., cattle or sheep). Very few studies have been found that address the effects of burros directly in the sagebrush steppe ecosystem, most examined effects of burros on deserts of the Great Basin or other areas of the West. The best available information has been applied to the analysis, including use of information from 75 documents not previously used in the 1980 EIS. This also includes a number of studies and reports with information on Sheldon Refuge. Chapter 4 is organized by Alternatives. All resource effects from a single alternative appear under the discussion of that alternative or are referenced if summarized elsewhere in the chapter. These effects are also summarized in Figure 3.

The sagebrush steppe ecosystem evolved with low densities of large bodied-grazers, such as horses and burros (Mack and Thompson 1982). Feral horses have been found to negatively affect the modern-day Great Basin sagebrush steppe ecosystem through direct and indirect effects upon aquatic resources, soils, plants, habitats, invertebrates, and vertebrates (Beever 2003). Effects of feral burros upon modern-day plant communities, soils, wildlife, and water quality in the desert ecosystems of the western United States have been described in numerous papers (Carothers et al. 1976, Douglas and Hurst 1993, Stubbs 1998).

The specific effects of the alternatives described in this EA on the resources of Sheldon Refuge also need to be considered in the context of cumulative impacts to ecosystems of the Great Basin (especially sagebrush steppe and associated wetlands). Several authors (Noss et al. 1995, Wisdom et al. 2003, Sagebrush Sea Campaign 2007) have reviewed and summarized threats to the Great Basin ecosystems, including:

- *Livestock grazing* – includes both domestic livestock grazing and wild horses, 99% of the sagebrush steppe is affected by livestock grazing, both upland and riparian systems have been impaired by grazing;
- *Roads, fences, and utility corridors* – these developments have fragmented the sagebrush steppe, with approximately 95% of existing sagebrush habitat located less than 1.6 miles from a mapped road;
- *Invasive species* – many exotic species occur in the sagebrush steppe, with one species alone – cheatgrass – dominating 100 million acres of the Intermountain West; it is altering plant species diversity, vegetative structure, and fire regimes;
- *Agriculture development* – about 10% of the sagebrush steppe has been converted to dryland or irrigated agriculture;
- *Climate change* – climate change effects are likely to interact with the livestock-fire-invasive species cycle; this could potentially accelerate the loss of native communities, loss of many individual species, and result in effects to other aspects of the

physical/biotic environment (Klopatek and Fleishman 1998, Toweill 1998, Wagner 1998);

- *Unnatural fire* – warmer climate regimes and abundance of cheatgrass has led to shorter fire return intervals and wildfires of unprecedented magnitude in the Great Basin;
- *Oil, gas, and mining* – with rapidly growing energy demands and associated developments, many areas of the sagebrush steppe have become degraded due to mineral extraction;
- *Conifer invasion* – some native tree species, such as western juniper, have been rapidly expanding well beyond their historic distributions in the sagebrush steppe ecosystem;
- *Population growth and recreation* – growth rates in nine Western states exceeded 20 percent in the last decade; increased urbanization has resulted in direct loss of habitat while off-road vehicle use has increased and resulted in damaged habitat and watersheds.

Sheldon Refuge has the potential to conserve some of the key elements of the sagebrush steppe ecosystem (see Chapter 3). So far there have been some 615 species of plants, 300 species of vertebrates, and 200 species of aquatic invertebrates documented at Sheldon Refuge (Rogers and Tiehm 1979, FWS 1993, Herbst 1996, Nachlinger and Tiehm 1996). A number of these species are rare, represent disjunct populations, or are potentially new to science (Herbst 1996). Many taxonomic groups have not yet been surveyed on the Refuge, but these efforts are likely to yield many more at risk species. Representative examples of key ecosystem components of the Great Basin including entire watersheds occur across the 575,000 acres that comprise Sheldon Refuge (see Chapter 3). Many of the threats facing the sagebrush steppe ecosystem (e.g., fire, grazing, invasive species) can be managed on Sheldon Refuge to conserve representative examples of the biodiversity and ecosystem processes of the Great Basin. With regard to the alternatives in this EA, Alternative B-1 would provide the greatest benefit in ameliorating the cumulative ecological impacts that are threatening the sagebrush steppe ecosystem. This would be followed by Alternatives C, D, and then Alternative B-2. Alternative A would be anticipated to have minimal benefit to offset cumulative ecological impacts of the sagebrush steppe ecosystem. Management priorities and objectives for Sheldon Refuge will be comprehensively examined in the CCP process.

The cumulative impacts of Sheldon Refuge management activities on horses and burros are also considered. The following information was obtained from BLM's Wild Horse and Burro Management website: http://www.wildhorseandburro.blm.gov/statistics/index.htm
At the time the 1971 Wild Horse and Burro Act was passed, there were an estimated 17,300 horses and 8,045 burros (BLM 2007). BLM (2007) reported that 2006 population levels were 27,593 horses and 3,613 burros. These animals are wild and the majority of them occur on 199 BLM Herd Management Areas (HMAs) where horses and burros are a priority for management on 34 million acres. There are another 29,500 horses that are kept in short and long-term holding facilities. BLM is reaching their management levels for horses and burros on HMAs, and the numbers are relatively stable. Sheldon Refuge's approximately 800 horses and 90 burros are a relatively small proportion of those numbers, representing 2.8% and 2.4% respectively of the combined totals. So, the Refuges overall contribution to horse and burro numbers across the United States are relatively minor. There may be a greater effect of Sheldon's horses on the horse adoption market, where the average number of Sheldon horses removed and adopted over the last three years represents about 10% of the horses adopted out by BLM. There has been no difficulty in finding adoption homes for burros. In terms of the alternatives in this EA, Alternative A would have the least impact on the horse and burro adoption market but would

contribute to deterioration of habitat for horses, burros, and wildlife. Alternatives B-1, C and D would initially cause a negative affect to the horse adoption market (600 per year) until the management objectives are reached (75-125 horses, 30-60 burros), and then drop-off with the number removed to maintain the population with minimal impacts (about 20 per year). However, the habitat quality for horses, burros and wildlife would improve from the current condition. Alternative B-2, with emphasis on maintaining status quo for horse and burro populations, would contribute roughly 140-180 horses per year to the adoption market, minus those horses treated with contraception and returned to the Refuge.

A specific review of the environmental effects for each alternative is provided below.

4.1 Alternative A: No Agency Action on Horse and Burro Management

This section analyzes the effects of implementing alternative A upon those resources described in the Affected Environment section above. Alternative A would discontinue active management of Refuge feral horses and burros. Their populations on the Refuge would grow unchecked by the actions of Refuge management or contractors. The environmental effects of implementing alternative A are analyzed in terms of their effects upon physical, biological, wildlife, horse and burro, cultural, social, and economic values and resources. The costs and projected time to achieve initial management objectives are summarized in Figure 4.

4.1.1 Physical Effects

Aquatic Resources

Streams, springs, and riparian-area health would continue to deteriorate with Alternative A.

On Sheldon NWR, horses are intensively utilizing riparian habitats, and have a variety of effects upon water resources (Barnett 2002, Steblein 2007). Indirect effects by horses include reducing vigor of plants and loss of plants by grazing and trampling, which may result in compaction or disturbance to floodplain soils, increased erosion, entrenchment and instability of stream banks, and lowered water tables (Barnett 2002 and other citations).

Riparian habitat on Sheldon NWR was monitored in 2001 and 2002, including 20 stream reaches and 16 springs (Barnett 2002). Percentage of stream reaches were classified as to intensity of horse use of streams, with 44% receiving heavy to severe use, 22% receiving light to moderate use, and 33% with no to slight use. In general, stream reaches receiving no to slight use were either dry or had no access for horses. Springs received intensive use by horses with 80% classified as heavy to severe use (springs with water or accessible to horses). Moderately to intensively used streams and springs on the Refuge had extensive trampling of vegetation and bare ground with many feces piles, which would likely result in degraded water quality from siltation and nutrient loading. Trampling and fecal contamination by feral horses was the single biggest factor for deteriorated water quality on the Refuge. These observations were corroborated by more recent field observations (Steblein 2007, LaRouche 2007).

Erosion and high levels of turbidity caused by horse concentrations are the most common water-related problems on Sheldon (Barnett 2002, Steblein 2007). Most springs and adjacent meadows

on Sheldon Refuge have not been fenced in the past, and as a result, livestock and horses have trampled spring sources, vegetation has been weakened, and erosion and head cutting has occurred in the associated meadows. Without plants and soil to hold water in place, the water table has dropped and big sage, primarily on the periphery, has invaded meadows. Examples of these deteriorated conditions can be observed at Big Spring, Fish, Badger, Swan Lake, Sagebrush, and Virgin creeks, as well as Butler crossing (some of these are visible on Figure 1). It is important to have these meadows in good ecological condition because they provide important habitat elements for a diversity of native wildlife species. Almost all of the meadows adjacent to springs on Sheldon Refuge have deteriorated from past over grazing (Reiswig 1989) and current over use by horses. These meadows and streams are in need of rehabilitation. Another water-related problem is low water quality in Hell and Virgin creeks. The problem cannot be corrected in lower Virgin Creek below Virgin Valley Ranch because the highly erodible soi1s of the Virgin Valley Land Form naturally cause excessive levels of turbidity. Water quality in upper Virgin Creek and Hell Creek could be improved if riparian vegetation, impacted by prior overgrazing, were restored (Herbst 1996, pers. comm. Jim French, Fisheries Biologist, NDOW, May 2007).

More than 90% of the flowing waters and associated riparian habitat of the sage steppe ecosystem have been compromised by domestic livestock, feral horses and agricultural development (Chaney et al. 1990, Ohmart 1994). Many streams that once flowed year-round now flow intermittently; many others have disappeared entirely (Dobkin and Sauder 2004). Coffin (1996) described heavily grazed streams in the Great Basin as wide and shallow, with unstable, partially vegetated streambanks, lacking quality pools, seasonally elevated water temperatures, and large temperature fluctuations during the summer. A review article on the influence of livestock on stream and riparian ecosystems in the arid western United States concluded that livestock grazing [including grazing by horses and/or burros] negatively affected water quality and seasonal quantity, stream channel morphology, hydrology, soils, instream and streambank vegetation, and aquatic and riparian wildlife (Belsky et al. 1999).

Soils

The soils resource would continue to deteriorate under Alternative A.

The coincident deterioration of soils and vegetation is evident at numerous locations at Sheldon NWR due to horse impacts (e.g., Barnett 2002). Horses are heavier and the surface area of their hooves is larger than native ungulates, which results in potentially greater trampling of vegetation and compaction of soils than native species (Beever 2003). This was demonstrated in a study by Beever and Herrick (2005) at 12 locations in the western Great Basin where sites were compared between those which had been grazed by feral horses and those which had horses completely removed for the last 10-14 years. Sites were selected for similar aspect, slope, fire history, grazing pressure by cattle, and dominant vegetation (sagebrush). Sites where horses were removed, resulted in 3.0-15.4 times lower penetration resistance in soil surfaces, i.e., the soils with horses had greater soil compaction. The intensity of soil compaction (penetration resistance) was positively correlated with horse use (measured by horse defecations across the site). The study also found an interrelationship among horse use, soil condition, and vegetation. Horse occupied sites showed significantly lower grass abundance and cover, lower shrub cover, lower total vegetative cover, lower plant species richness across the site, and less continuous shrub canopy. Beever et al. (2006) found an inverse relationship between intensity of grazing

from cattle and feral burros and soil stability – increase in grazing intensity was associated with a decrease in soil stability. In a review of feral burro literature, Douglas and Hurst (1993) characterized burro effects on soils as accelerating soil erosion and inhibiting plant growth in trampled areas, and causing severe soil compaction on burro trails.

Horses, and other non-native grazers, can be detrimental to biological soil crusts (Belnap et al., 2001). Biological soil crusts are found between sparse vegetation in arid and semi-arid lands including at Sheldon NWR. They are comprised of highly specialized organisms, a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. They are an important contribution to species diversity and function as living mulch, stabilizing soil surface, retaining soil moisture, discouraging invasive plant establishment and spread, reducing wind and water erosion, fixing atmospheric nitrogen, and adding to soil organic matter. Biological soil crusts evince complex interactions with nutrients, moisture, mycorrhyzae, and vascular plants (resulting in higher nutrient content in vascular plants, and consequently food value). Intact biological soil crusts are a reflection of overall environmental health in arid and semi-arid regions.

4.1.2 Biological Effects

Vegetation

Vegetation would continue to deteriorate under Alternative A.

A management study was completed that examined the impact of horses on upland and riparian habitats on Sheldon NWR (Barnett 2002). Upland transects ranged from no use (0-5% utilization) through moderate use (40-60% utilization) with the overall pattern emphasizing slight use (6-20%). Results from the riparian sampling characterized 44% of stream reaches and 80% of springs with heavy use (61-80% utilization) to severe use (81-100%). Intensively used areas had a higher density of horse hoof prints and percent bare ground. Small exclosures were placed at a number of riparian sites to compare vegetation heights and evaluate the impacts of large grazing animals. In 2002, vegetation inside exclosures was 2-11.5 times taller than adjacent vegetation open to grazing.

These patterns of habitat impact are consistent with observations on habitat use by horses. In south-central Wyoming, where feral horses showed preference for streamsides, bog/meadows, and mountain sagebrush habitats. In contrast, they avoided lowland sagebrush (dominated by Wyoming big sagebrush), and showed no apparent selection for grassland and coniferous forest habitats (Crane et al. 1997). In other words, feral horses selectively used water-associated habitats. Burros in the Sonoran Desert exhibited the greatest grazing pressure within 2.5 km of water (Hanley and Brady, 1977).

Feral horses, burros, and other livestock can impact vegetation directly through consumption and trampling of plants, or indirectly by soil compaction, disturbance of soil crust, soil erosion, seed dispersal of invasive species, soil nutrient shifts, and differential grazing (e.g., Belsky and Gelbard, 2000, Douglas and Hurst, 1993). A number of studies have characterized the specific changes in vegetative structure and plant communities associated with livestock grazing. Beever and Herrick (2006) studied sites occupied by horses and other locations where horses have been completely removed for 10-14 years previously. In the sagebrush-dominated communities of the

Great Basin, horse-occupied sites had lower abundance and cover of native grasses, lower and less continuous shrub cover, lower total vegetative cover, and lower species richness. Beever and Brussard (2000) used exclosures in the Great Basin to compare impacts of horses and horses/cattle combined at springs and meadows. They found horse excluded-springs exhibited greater plant species richness along with greater percent cover and abundance of native grasses and shrubs. Meadows with all livestock excluded showed maximum vegetation heights which were 2.8 times higher than plots grazed by horses alone, and 4.5 times greater than vegetation grazed by horses and cattle. The greatest difference in species richness was observed between ungrazed plots (highest) versus sites with both horses and cattle grazing (lowest). Additional studies noted the impact of burros on vegetation in the Sonoran Desert, especially within 2.5 km of water (Hanley and Brady 1977) and plant communities of the Mojave Desert (Stubbs 1998).

Vigor of key forage species is an indicator of the combined effects of grazing pressure, fire, insects, disease, and climatic conditions during the recent past. It foretells the direction that the trend in ecological condition would likely take if such conditions continue. Besides drought, the most common cause of low vigor is continuous grazing during the entire growing season. Continuous grazing limits the plants' ability to maintain an adequate root system. In turn, this delays or slows spring growth, reduces foliage and seed production, and reduces plant residues. The chances of frost damage and heaving, soil erosion, and evaporation of soil moisture becomes greater if vigor remains static or declines. Although no cattle grazing has occurred since 1994 on Sheldon NWR, the year-round grazing by feral horses and burros continues to prevent improvement of ecological conditions on most of these sites (Barnett 2002, Steblein 2007, LaRouche 2007).

Feral horse grazing continues to be a perturbation factor on the Refuge, which is preventing recovery and restoration efforts in riparian and upland habitats. Feral burros have been documented to damage desert plant communities on numerous sites (reviewed in Douglas and Hurst, 1993), and also are expected to cause negative impacts on Sheldon NWR.

Invasive Plant Species

Livestock, including horses and burros, are implicated in increasing the vulnerability of native plant communities to invasive plant species by disturbing soils and vegetation directly, and ecosystem processes such as nutrient cycling (Belsky and Gelbard, 2000). In their review article, Belsky and Gelbard (2000) identified the following disturbance factors to contribute to the plant community vulnerability to invasion: selective grazing of native plants over weed species, trampling vegetation and compacting soils, impacts on biological soil crusts, impacts on mycorrhizael fungi, impacts on soil nitrogen, and impacts on fire regimes. Horses and burros can also act as direct dispersal agents of weed seeds that are transported in fur, on their feet, and through their intestinal system and deposited in dung. Couvrer et al. (2004) were able to germinate 31 species of plants from seeds taken from the fur of burros and 18 species from horses. Horses and burros also create a favorable seed bed through disturbance. Hoof action, over grazing, and concentrations around watering areas provide disturbed conditions that allow establishment of weeds such as cheatgrass, whitetop, tumble mustard, hoary cress, Canada thistle, and Russian thistle (pers. comm. Dave Johnson, former Deputy Project Leader, January 2007). Native ungulates may also provide some opportunity for weed spread, but the smaller hooves, lower numbers, and avoidance of concentrations at water holes reduces the prospect (pers. comm. Dave Johnson, former Deputy Project Leader, January 2007). Once established,

invasive species are very difficult and expensive to control and often exclude native species of vegetation that support native species of wildlife (National Invasive Species Council 2001).

Wildlife

Alternative A would result in considerable adverse effects upon native wildlife species.

Invertebrates
In a study comparing horse-occupied sites with those where feral horses had been completely removed for 10-14 years, Beever and Heerick (2006) observed significantly greater abundance (2.2 to 8.4 times) of ant mounds on sites without horses. Furthermore, they also found that ant species richness was higher on sites free of horses. Other impacts from horses noted in this study included increased soil compaction, and decreased vegetation structure and plant species richness. Although not examined in this study, it is possible there were differences in other invertebrate fauna as a result of direct or indirect effects from feral horses. In a survey of aquatic invertebrates of Sheldon Refuge, Herbst (1996) recommended removal of all horses and burros to protect the highly endemic aquatic insects and snails because of their impact to a wide variety of aquatic systems on Sheldon Refuge.

Fish and Aquatic Resources
Coffin (1996) summarized the impact of livestock grazing on arid riparian systems and potential adjustment of grazing management strategies to support viable habitat conditions for in-stream species, specifically the Lahontan cutthroat trout. These recommendations included restricting utilization of available forage to less than 25% and removing grazers during the hot season. Both of these conditions have been violated in recent years at Sheldon Refuge because of the large number of feral horses which occupy sites year-round. The adverse effects of feral horse grazing upon the in-stream environment was documented by Barnett (2002), and likely has had detrimental effects upon aquatic resources, including native fish species. It is not known at this time if horses and other livestock have caused permanent damage to stream function, riparian habitat quality, and the potential to fully restore the riparian communities. However, there are numerous locations on the refuge exhibiting impacts on spring/stream function that are attributable to grazing, such as downcutting, erosion, dropped water tables, and loss of vegetative cover (Steblein 2007, LaRouche 2007).

Reptiles and Amphibians
In a comparison of locations where horses were completely removed for 10-14 years prior to the study versus other horse occupied sites in the Great Basin, Beever (2004) documented greater species richness of reptiles and greater abundance for seven of nine species in areas removed of horses. Williams and Storm (1980) observed that springs and water sources on Sheldon were impacted by livestock (cattle, horses and burros), which may inhibit reproduction of juvenile amphibians.

Birds
The effect of grazing on avian communities occurs when species composition and structure of herbaceous and understory vegetation is altered (Earnst et al. 2005). More specifically, changing vegetation would likely affect birds by changing viability of nesting sites, suitability of foraging sites, food availability, and vulnerability to predators. Earnst et al. (2005) examined changes in riparian songbird abundance on Hart Mountain and Sheldon National Wildlife Refuges ten-years

after cattle were removed. During this time period, refuge staff actively removed horses to reach the management level of zero horses on Hart Mountain Refuge as specified in the Hart Mountain Comprehensive Master Plan (1994). This was completed on October 12, 1999, after which BLM was responsible for removing all horses (FWS 1998, 1999). Of the bird species with sufficient data, 71 percent exhibited a positive trend in abundance after cessation of cattle grazing. Twenty-one species exhibited a change in abundance, where 76 percent of these increased. Increases were seen among species associated with aspen and willow plant communities, ground/low cup nesters and high cup nesters, and birds foraging in ground/understory, overstory, and aerial layers. The authors were able to ascribe the changes in bird abundance to habitat improvements after removal of grazing, by comparing regional trends of bird populations. Another study examined the impact of horses on birds in a grass steppe ecosystem (Zalba 2004). This study showed a significant decrease in bird species richness in intensively grazed areas. A significant increase of nest predation was observed between areas excluded of horses (12.5% predated) versus grazed areas (70%).

One of the most serious impacts by horses on Sheldon NWR appears to be the damage to riparian habitats where extensive reduction of both herbaceous and shrubby vegetation along streams and at springs/seeps causes deteriorated habitat conditions for wildlife (Barnett 2002, Steblein 2007, LaRouch 2007). These areas are known to be important for sage grouse during brood rearing and late-season use when herbaceous vegetation in the upland areas has matured and declines in protein values (pers. comm. Michael Gregg, Land Management Research Demonstration Biologist, USFWS, May 2007). The reduction of herbaceous vegetation by feral horses in upland sagebrush habitats (Barnett 2002) could also affect sage grouse by reducing vegetative cover used by sage grouse to protect the birds from predators (like coyotes and raptors) and potentially affecting the quality of foraging habitat.

Miller and Eddleman (2001) report that poor livestock grazing practices can have a large negative impact on sage grouse habitat. The most significant long-term adverse impact of excessive grazing on sage grouse is the degradation of sagebrush, meadow, and riparian communities. Poor grazing practices change the proportion of the shrub, grass, and forb functional groups, increase opportunity for invasion and dominance of introduced annuals, shorten the growing season, and can cause an overall decline in site potential through loss of topsoil.

Small Mammals

Beever and Brussard (2004) found differences in small mammal communities in the Great Basin between sites occupied by feral horses and locations where horses had been completely removed for 10-14 years. No difference in species richness was found between horse-occupied and unoccupied sites, but small mammal communities were found to be lower in community completeness (biotic integrity, or species observed relative to those that could occur at a site based on ecological and geographic factors). The authors also found $\leq$7.4 times greater abundance of deer mice (*Peromyscus maniculatus*) on horse-occupied sites, because this species is a generalist commonly successful on disturbed sites. Vegetation at study sites were dominated by sagebrush, and not riparian habitats. In another study using horse exclosures in spring and meadow habitats, Beever and Brussard (2000) observed greater species richness and abundance of small mammals in ungrazed sites. With horse-induced soil compaction and reduced vegetation observed in spring and riparian habitats on Sheldon (Barnett 2002, Steblein 2007), it is likely that small mammal communities in these habitats evinced an even greater impact from

horses. Carothers et al. (1976) found high species diversity and density of small mammals on sites where feral burros were excluded. Ivey (1996) identified several studies where small mammals responded positively to release from livestock grazing in riparian habitats. Similar impacts on small mammals may be expected from burros on Sheldon Refuge (pers. comm. Paul Steblein, Project Leader, January 2007).

Large Mammals

A number of studies have looked at the relationship of feral horses and burros to other ungulates of the Great Basin, including pronghorn antelope, mule deer, elk, big horn sheep, and cattle. Hanley (1982) examined nutrition as a basis for food selection and niche adaptations in ungulates. Factors such as body size, type of digestion (cecal or ruminant), rumino-reticular volume to body weight ratio, and mouth size affected physiological constraints, types of food (example grasses versus forbs), and how selective they fed on plant parts.

Hanson and Anthony (1999) studied diets of ungulates on Sheldon and Hart Mountain National Wildlife Refuges. Samples were taken from animals in the same localities (i.e., all animals occurred with potentially overlapping territories). They found diet of pronghorn antelope consisted primarily of browse (e.g., sagebrush) and forbs, although grasses were important in spring. Similarly, mule deer consumed about half browse and the remainder of forbs and grasses (forbs during winter, grasses in spring, forbs in summer and fall). Big horn sheep diet was dominated by grasses, with forbs representing the next highest component (highest during winter and late spring). Feral horses consumed primarily grasses followed by forbs (dominant in fall and/or winter). Finally, diet of feral burros was dominated by grasses, with the remainder including shrubs and forbs. The greatest similarity in diet was observed between feral horses and burros, and big horn sheep. However, forbs were an important component in the diet of all five ungulates during the year.

Other studies showed similar patterns. Feral horse diets are comprised predominantly of annual and perennial grasses, emphasis on forbs during a part of the year, and minor utilization of shrubs on a year-round basis (Vavra and Sneva 1978, Hanley and Hanley 1982). Principal grasses in diets included wheatgrass, bluegrass, squirreltail, and needlegrass. Peak use of forbs occurs during spring and summer; Meeker (1979) found that forbs comprised 23% of feral horse diets on low sagebrush range of the Sheldon NWR during summer. In a study in Red Desert, Wyoming, Olsen and Hansen (1977) found that a large percentage of the horses, cattle, and elk ingest the same species of grasses and sedges – dominated by wheatgrass and needlegrass. Pronghorn consumed primarily sagebrush. Crane et al. (1997) found that the diet of horses consisted mostly of graminoid species with small and variable components of forbs and shrubs. *Carex*, *Agropyron* and *Stipa* genera were the most important groups of grasses in the diet of horses through all the seasons. Horses showed preferences for ridge tops and elevated areas with no seasonal shifts in home ranges observed (Ganskopp & Vavra 1986).

Figure 9. Pronghorn on Sheldon NWR.

There are conditions under which these ungulates (pronghorn, mule deer, big horn sheep, feral horses and burros) may not be directly competing for forage. This is based on dietary separation, and assumptions of rangelands (or habitat) being maintained in good condition where a balance of shrub, grass, and forb cover exists, environmental conditions remain constant and where populations are maintained below carrying capacity (Yoakum and O'Gara 1990). However, competition between species with dissimilar diets under normal conditions may occur during poor vegetation conditions, especially during drought or severe winter conditions (e.g., Yoakum and O'Gara 1990). Meeker found pronghorn antelope and feral horses maintained non-aggressive relations except when they watered together, where pronghorn gave way to approaching horses. Berger (1986) reported six cases in two years where horses displaced pronghorn at watering sites.

At Sheldon NWR, several factors increase the potential for competition between horses and pronghorn (pronghorn are a focal species because of the establishing purpose of the Refuge). First, horse numbers are very high (Figure 8) with visible damage to sensitive habitats (Barnett 2002, Steblein 2007, LaRouch 2007), and their population would be expected to increase under this alternative. Second, horse and pronghorn distribution and habitat use overlap substantially on Sheldon (Hanson and Anthony 1999, pers. comm. Paul Steblein, Project Leader, 2007). Low sagebrush is the primary habitat used by both horses and pronghorn within this region, with water sources being a key habitat element for both (though water is infrequent and dispersed). Habitat conditions in low sagebrush are less than ideal for late succession (i.e., shrub cover is excessive), and consequently, the potential for forb and grass competition is increased despite differences in diet selection among species (Yoakum and O'Gara 1990). Furthermore, horses may disturb pronghorn does during fawning and early fawn rearing, and through use of water during drought (Yoakum and O'Gara 1990). Subsequent publications by Yoakum recommend greater caution when considering management of horses and pronghorn on the same areas (Yoakum et al. 1995, Yoakum 2004, Yoakum 2006). Under current habitat conditions, the level of horse-pronghorn competition is related to the size of horse populations on the Refuge; the larger the horse population, the greater the potential for competition. Management guidelines developed by Salwasser (1980) suggested that horses either be removed or kept at low densities to avoid competition with pronghorn on principal winter and spring ranges.

Biodiversity

Biodiversity would continue to deteriorate under Alternative A.

Livestock grazing (now limited to feral horses and burros since cattle have been removed) is one of the two primary factors preventing restoration of Sheldon NWR habitats to natural conditions of environmental health, biological diversity, and integrity (Davis 1995). The other recommendation from the group was restoration of fire as a management tool, which is being done for fuels treatment and habitat objectives. Feral horses and burros have an effect on the Great Basin sagebrush steppe ecosystem that is varied, with direct and indirect negative impacts on aquatic resources, soils, plants, invertebrates, and vertebrates (e.g., Beever 2003, Douglas and Hurst 1993). The environmental effects of feral equines on native wildlife, plants and ecosystems are negative, numerous (see the extensive review under section 4.1 of scientific literature and studies/observations from Sheldon Refuge), and prevent restoration of degraded elements of biological integrity, diversity, and environmental health at the Refuge. Sheldon NWR has the

potential to make a critical contribution to conservation efforts in the sagebrush steppe ecosystem. The Refuge is the largest contiguous landscape in the sage steppe ecosystem that is currently not being grazed by domestic cattle, or impacted by agricultural practices. It has also been the source of native animals and plants for restoration of species and sites for conservation purposes. With horse and burro populations at levels well above current management objectives, the contribution of the Refuge to the sagebrush steppe ecosystem would be severely degraded, placed at risk to other disturbances (drought, fire, severe winters, invasive species), and not meet the purpose for establishing the Refuge.

Horses and Burros

Under this alternative, horses and burros would not be removed from Sheldon NWR. The absence of horse and burro gathers would remove the temporary stress that they undergo as a result of being captured, transported, and adopted. The small number of injuries and deaths related to gather operations (pers. comm. Dave Johnson, former Deputy Project Leader, Jan 2007) would not occur.

The current population level of horses and burros (estimated to include at least 800 horses and approximately 90 burros in July 2007, Collins 2007) is showing a pronounced impact on elements of the ecosystem, especially wetlands (Barnett 2002, Steblein 2007, LaRouche 2007). Without removal of horses and burros, their populations would be expected to increase rapidly until environmental and biological factors (reduced reproduction and increased mortality) significantly altered rates of increase in the population (BLM 1999). These environmental and biological factors include increased competition for forage and water, lower reproductive rates, poor body condition, increased winter mortality, increased competition for space, and increased mortality on highways (BLM 1999). During the summer of 2007, drought caused water holes to be reduced or dry-up on Beattie's Butte Herd Management Area (adjacent to Sheldon and Hart Mountain National Wildlife Refuges), resulting in stress and deteriorated physical condition to the horses, large impacts to natural springs, and forced horses out of the HMA to surrounding areas in search of water (pers. comm. Craig MacKinnon, Range Management Specialist, BLM, August 2007). Horses on Sheldon Refuge during the winter of 1992/93 suffered a kill from late winter snows and caused damage to sagebrush habitats (FWS 1993). The increased numbers of horses and burros would have a pronounced detrimental impact on habitat quality for horses, burros, and a broad diversity of native fish, wildlife, plants, and their habitats (see earlier parts of section 4.1).

4.1.3 Social, Cultural, and Economic Effects

There would be positive and negative social, cultural, and economic effects associated with implementing alternative A (which would discontinue active management of Refuge feral horses and burros and allow their populations to grow unchecked by actions of Refuge management or contractors).

Opportunities lost would include providing the public with an opportunity to own a Sheldon Refuge horse or burro, and providing private contractors with income through involvement with feral horse and burro removal from Sheldon Refuge.

The negative effects from increased populations of feral horses and burros include increased horse-automobile collisions on Highway 140, and decreased watershed and vegetation health which would be expected to reduce opportunities for wildlife-dependent recreation. A large negative reaction would be expected from the public based upon the deteriorated ecological condition of the habitat, and subsequent physical condition of wildlife, horses, and burros. The public reaction would be exacerbated if there were die-offs resulting from severe winter weather or drought.

The current level of visitation to Sheldon Refuge is estimated at 17,000 visits per year for wildlife-dependent recreation - hunting, fishing, wildlife observation and photography, environmental education and interpretation (FWS 2007). If the natural environment on Sheldon Refuge was further degraded by an even greater population of horses and burros, which resulted in an undesirable visitor experience, there could be fewer visitors. This could result in a reduced economic benefit to the local community including hotels, restaurants, grocery stores, and gas stations.

On the positive side, eliminating the adoption of Sheldon Refuge horses and burros would reduce the number of horses competing in the sales market possibly increasing horse sales for horse ranchers and BLM adoptions. Additionally, increasing populations of horses and burros would increase opportunities for viewing these animals by those Refuge visitors who were primarily interested in viewing horses and burros or enjoyed an enhanced visit when they also observed horses and burros.

4.1.4 Cultural Resources Effects

Alternative A would likely degrade archeological and historical sites the greatest in comparison to the other Alternatives. An increase in the number of horses and burros due to lack of management would likely cause an increase in the destruction of archeological and historical resources.

For this EA a cultural resource review was conducted which was limited to the existing identified cultural resource records for Sheldon Refuge (Raymond and Parks, 2007). The purpose was to determine if previously recorded cultural resources occur in or near the area of potential effect (APE), that is, places where horses and burros are known to concentrate, trample, and erode the soil.

The review indicated that among the 9 locations known for their horse concentrations, archaeologists previously surveyed 7. Among the areas that were surveyed by archaeologists all contain at least one prehistoric archaeological site. The areas surveyed were Big Springs Reservoir, Catnip Reservoir, Martinez Spring, Ten Mile Spring, Horse Canyon Spring, Hell Creek, and Virgin Creek. The site records for Big Spring Reservoir, Martinez, and Ten Mile springs specifically note that trampling and erosion from horses has impacted and threatens to continue impacting archaeological sites that are eligible to the National Register of Historic Places.

Following a wildfire, archaeologists conducted a site evaluation at Ten Mile spring because the erosion from horse grazing was considered a serious threat (pers. comm. with Anan Raymond,

Archaeologist, Aug 2007). The site records for Catnip Reservoir, Horse Canyon Spring, Hell Creek, and Virgin Creek document impacts to sites from grazing by horses and/or burros.

Two areas, Big Spring Creek and Catnip Creek have never been surveyed by archaeologists. Given their proximity to permanent water, we suspect that these places also contain prehistoric archaeological sites (pers. comm. with Anan Raymond, Archaeologist, Aug 2007).

4.2 Alternative B-1: Status Quo (Ongoing Management Program)

This section analyzes the effects of the alternative B-1 upon those resources described in the Affected Environment section above. Alternative B-1 would continue the current feral horse and burro management program on the Refuge pending development of a Comprehensive Conservation Plan. The environmental effects of implementing alternative B-1 are analyzed in terms of their effects upon physical, biological, wildlife, horse and burro, cultural, social, and economic values and resources. The costs and projected time to achieve initial management objectives are summarized in Figure 4.

4.2.1 Physical Effects

Aquatic Resources

The health of streams, springs, and riparian areas would improve with implementation of Alternative B-1. Maintaining Refuge horse and burro numbers within approved management levels under Alternative B-1 would likely reduce the intensity of adverse effects on springs, riparian areas, and streams on Sheldon, allowing revegetation of these sites, improved stability of stream banks and riparian soils, reduced fluctuation in water levels and temperatures, and higher water quality (reduced silt and nutrient loads) (Chaney et al. 1990, Ohmart 1994, Herbst 1996, Belsky et al. 1999, Barnett 2002, Steblein 2007; LaRouche 2007; pers. comm. Jim French, NDOW Fisheries Biologist, May 2007).

Soils

Soils would improve with implementation of Alternative B-1. Reduction of horse and burro numbers to the approved management level within 3 years under Alternative B-1 would be expected to improve habitat conditions by reducing soil compaction and soil erosion, and improve vegetation (Douglas and Hurst 1993, Beever 2003, Beever and Herrick 2005, Beever et al. 2006). A positive response would be expected from biological soil crusts, and subsequent benefits to soils and the plant communities of Sheldon NWR (Belnap et al. 2001).

4.2.2 Biological Effects

The majority of habitat restoration and associated costs would be accomplished by reducing horse and burro populations to management levels, and maintaining them at those levels. Vegetation, physical environmental factors, and wildlife species would respond favorably without the grazing and physical impacts of horses and burros.

Vegetation

The health of Refuge vegetation communities would be most improved through implementation of Alternative B-1. Reduction of feral horse and burro populations to management objective levels within 3 years would be expected to improve vegetative structure and species assemblages to better represent native plant communities and function of the sagebrush steppe ecosystem (Hanley and Brady 1977, Douglas and Hurst 1993, Beever and Brussard 2000, Belsky and Gelbard 2000, Barnett 2002, Beever and Herrick 2006, Steblein 2007).

Invasive Plant Species
Reduction of horse and burro populations to management objective levels within 3 years, through implementation of alternative B-1 should reduce physiological stresses upon, and therefore, the vulnerability of plant communities found on Sheldon NWR to invasive species, which in turn, would reduce the degradation of habitat for other native plant and animal species (Belsky and Gelbard 2000, Couvrer et al. 2004; pers. comm. Dave Johnson, former Deputy Project Leader, January 2007).

Wildlife

Wildlife habitat and populations would be expected to be the greatest with implementation of Alternative B-1. Reduction of horse and burro populations to management objective levels within 3 years would be expected to result in re-growth of vegetation in riparian habitats, improved water flow in wetlands, increases in invertebrates associated with natural functioning wetland vegetation, and increases in abundance and diversity of other vertebrate species following habitat improvements and with reduced direct competition with wildlife at waterholes. Specific citations are included in each section.

Invertebrates
Reduction of horse and burro populations to management objective levels within 3 years on Sheldon NWR should improve habitat conditions for native invertebrate species and communities in wetlands and uplands (Herbst 1996, Sada et al. 2001, Beever and Heerick 2006).

Fish and Aquatic Resources
Reduction of horse and burro populations to management objective levels within 3 years should improve the habitat conditions for fish and other aquatic resources (Williams and Storm 1980, Coffin 1996, Sada et al. 2001, Barnett 2002, Steblein 2007; pers. comm. Jim French, NDOW Fisheries Biologist, May 2007).

Reptiles and Amphibians
Reduction of horse and burro populations to management objective levels within 3 years on Sheldon NWR should improve habitat conditions for reptile and amphibian species and communities (Williams and Storm 1980, Beever 2004).

Migratory Birds
Reduction of horse and burro populations to management objective levels within 3 years on Sheldon NWR should improve habitat conditions for migratory birds (Miller and Eddleman 2001, Zalba 2004, Earnst et al. 2005).

Sage Grouse
Reduction of horse and burro populations to management objective levels within 3 years would be expected to result in re-growth of vegetation in riparian habitats and a coincident increase in the abundance of birds associated with riparian habitats, such as sage grouse and songbirds, such as neo-tropical migrants (Miller and Eddleman 2001, Barnett 2002, Zalba 2004, Steblein 2007, pers. comm. Michael Gregg, Land Management Research Demonstration Biologist, USFWS, May 2007).

Small Mammals
Reduction of horse and burro populations to management objective levels within 3 years and subsequent restoration of riparian and upland habitats, would likely result in better representation of native small mammals in those community types and on Sheldon NWR (Carothers et al. 1976, Ivey 1996, Beever and Brussard 2000, Beever and Brussard 2004).

Large Mammals
Reduction of horse and burro populations to management objective levels within 3 years would be expected to restore riparian and upland habitats and reduce competition between feral equines and native ungulates (especially under severe environmental conditions such as droughts and late winter snows) (Salwasser 1980, Yoakum and O'Gara 1990).

Biodiversity

Biodiversity would improve with implementation of Alternative B-1. Reduction of horse and burro populations to management objective levels within 3 years would be expected to improve the physical environment and the quality of habitat for plant and wildlife species (summarized from above sections). There would be improved vegetative structure and plant species assemblages that would better represent native plant communities of the sagebrush steppe ecosystem providing, resulting in better habitat for native wildlife. Revegetation of springs, riparian areas, and streams would improve the stability of stream banks and riparian soils, reduce the fluctuation in water levels and temperatures, and improve water quality (reduced silt and nutrient loads). A positive response would be expected from biological soil crusts, and subsequent benefits to soils and the plant communities. There would be reduced vulnerability of plant communities to invasive species, which in turn, would reduce the degradation of habitat for other native plant and animal species. Increased biodiversity in the landscape would be expected, with improved resiliency to major disturbance factors (e.g., extended drought, severe winters, wildfire, invasive species, and climate change) (Douglas and Hurst 1993, Belsky and Gelbard 2000, Beever 2003).

Horses and Burros

Under this alternative (B-1), horse and burro populations would be reduced on Sheldon NWR to be within 1980 management objective levels (FWS 1980). The current population level of horses and burros (at least 800 horses and approximately 90 burros as of July 2007 [Collins 2007]) is showing a pronounced impact on elements of the ecosystem, especially wetland systems (Barnett 2002, Steblein 2007, LaRouch 2007, pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). As noted elsewhere in this subsection, decreased horse and burro populations would result in improved environmental and biological conditions. Therefore, the Refuge's remnant populations of horses and burros would enjoy decreased winter mortality,

competition for space, mortality on highways, and competition for forage and water; and improved reproductive rates and body condition (BLM 2006, pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007, pers. comm. Craig MacKinnon, Range Management Specialist, OR State Office, BLM, Sept 2007). As noted elsewhere in this subsection, the decreased numbers of horses and burros across the landscape would result in a pronounced improvement on Refuge habitat quality for both native plants and wildlife, and horses and burros.

Federal agencies have managed the Refuge's horse and burro herds for more than 70 years, and the current program to control horse and burro populations is a continuation of that effort (FWS 1977, FWS 1980, Bennett 2005). Horses and burros are gathered as funding permits. Gathering of horses and burros is accomplished by helicopter, bait traps (corrals), and horseback, which are standard practices in federal programs and private ranches (Cattoor 2007). The last of these techniques is both more difficult and expensive than helicopter gathers, but provides the Refuge with flexibility in gather times, locations, and quantities of horses.

Low altitude flight by aircraft is considered a disturbance factor to wildlife (Efroymson et al. 2000). In developing a framework for ecological risk assessment for low-altitude overflights by fixed-wing and rotary-wing aircraft, Efroymson et al. (2000) reviewed distance effects thresholds, primarily as a behavior response (versus reproduction or other responses). For prairie falcon and golden eagle, the lowest observed adverse effect (LOAEL) was observed at 150 meters from aircraft. Mule deer showed no effect at 50 meters for habitat change, and 150 meters for desert bighorn sheep, although habituation has been observed in both species. Pronghorn showed no effect at 120 meters altitude. Distances were not reported for horses, but 113.4 dB was reported for LOAEL. Habituation to the disturbance was also observed in horses. Aircraft are used infrequently on Sheldon Refuge for aerial surveys (usually two days per year at a height of about 100 meters) and for horse gather activities (usually 3-6 days for 1-2 gathers per year) (pers. comm. Brian Day, Sheldon Refuge Manager, August 2007). Disturbance from aircraft used for these management activities is considered to have a temporary (short time after the disturbance) and relatively small impact (causing animals to flush or run from the disturbance) on wildlife and horses (pers. comm. Paul Steblein, Project Leader, Sheldon-Hart Mtn NWRC, Aug 2007).

Additional studies specifically examined use of helicopters in the conduct of gather operations. Hansen and Mosely (2000) found there were no significant differences in horse behavior and reproduction between three study groups, including undisturbed horses on the range, horses gathered by helicopter and placed in homes through adoption, and horses that were herded by helicopter but not captured. Ashley and Holcombe (2001) found that stress associated with gathering and handling of mares may cause pregnancy disruption. While their study examined reproductive rates between horses gathered by helicopter with undisturbed horses, many of the same stresses would apply with horses gathered by horseback (e.g., handling and transport). Pregnancy disruption has also been documented by free-ranging horses due to their social behavior. Berger (1983) observed pregnancy disruption in wild horses from the stress of forced copulation and social environment following band takeovers.

The effect of removing horses and burros from the population is not expected to have long-term impacts on herd dynamics or population variables, as long as the removal of horses and burros ensures a typical population structure was maintained (BLM 2006). Impacts to horses and burros remaining on the Refuge may include the temporary displacement of bands during capture and

the associated re-dispersal, modification of herd demographics (age and sex ratios), temporary separation of members of individual bands of horses, and re-establishment of bands following releases and the removal of animals from the population (BLM 2006). BLM (2006) found these impacts over the last 20 years to be temporary in nature with most, if not all, impacts disappearing within hours to several days of release. No observable effects associated with these impacts would be expected within one month of release except a heightened shyness toward human contact. Observations of animals following release (e.g., if returned after contraception is applied) have shown horses relocate themselves back to their home ranges within 12 to 24 hours of release (BLM 2006).

Injury and/or mortality to horses during gathering activities may also occur due to the rugged terrain and risks typical of handling livestock during gathers, processing activities (sorting, tagging, Coggins test, etc.), and transport among facilities. Impacts that could occur after the initial stress may include spontaneous abortion in mares, and increased social displacement and conflict in studs. Spontaneous abortion following capture is unusual. Traumatic injuries that may occur typically involve biting and/or kicking that may result in bruises and minor swelling which normally does not break the skin. These impacts are known to occur intermittently during horse gather operations. The frequency of occurrence of these impacts among a population varies with the individual. Techniques would be explored for marking horses, such as branding, tattoos, and microchips, for identifying horses. There may be short-term discomfort to horses while the procedure is administered. During the last six years, significant injury/mortality to horses has been 1% or less at Sheldon Refuge (pers. comm. Dave Johnson, former Deputy Project Leader, Jan. 2007). That is consistent with the record of other federal agencies across the West (Cattoor 2007). There is a potential for foals to become separated from their mares. Every effort would be made to prevent this from happening and to reunite the foal with its mother. Minor injuries such as scrapes, bites, and bruises are likely to occur while sorting and processing horses, typical of livestock handling. During management operations, a veterinarian would be on site or on call to address significant injuries. Processing of animals (aging, sexing, marking, Coggins testing) would be conducted by a veterinarian and horse experts. Small foals and other horses/burros with special handling requirements would be separated from the others to reduce risk of injury. Burros are less reactive to handling than horses during processing and results in fewer injuries and with no known mortality in recent years (pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). Transporting horses and burros has the potential to cause injury, but they would be transported in a manner that reduces risks to the animals and is compliant with state laws.

Management practices have been developed to provide humane treatment and minimize risks to horses and burros (see subsection 2.2, Appendix C). Some examples include: ensure animals are separated appropriately to reduce conflict while in the corrals or in transport; adequate food and water is always available; a veterinarian is on site or on call to advise on health problems and injuries; corral facilities are sound, designed for efficient and safe handling of animals; adequate pens are available to separate problem animals and minimize the need for repeated sorting; people and activity are minimized at the corrals to reduce disturbance to animals; during transport ensuring animals are off-loaded at appropriate intervals for food, water, and rest, ensuring adoption agents and adoptees have adequate knowledge and facilities to take care of horses and burros; ensure key staff have expertise and training on appropriate animal care and handling. The Refuge will periodically schedule an independent review of the animal care and handling practices by an appropriate trained official.

The Service would continue to seek to place horses and burros in good homes through contracted adoption agents. Current controls, which continue to improve, would remain in place and continue to ensure that adoption agents and adoptees are adequately screened to provide responsible care and prevent animals from going to slaughter, and there is follow-up contact with adoption agents and adoptees (Appendix C). However, it is possible that when animals are beyond the span of control of the Service, they could end up at a processing plant. When this happened in the past, the Service and its adoption agents interceded to purchase the animals and place them back in the adoption process (pers. comm. Dave Johnson, former Deputy Project Leader, Jan 2007).

Contraception may be a cost effective and humane treatment to employ in horses to prevent increases in populations, or with other techniques, to reduce horse populations (Bartholow 2004). In response to public comments on the EA, would also examine the viability of contraception techniques (e.g., PZP, surgical sterilization). Contraception techniques would be reviewed for feasibility, cost effectiveness, and effects on horses. In 2007, the Service explored use of intrauterine devices (IUD) with a small group of horses in a controlled setting. The preliminary results indicate the majority of mares did not retain the IUD, and consequently failed to prevent pregnancy (unpublished data, Leon Pielstick, Doctor Veterinary Medicine, 2007). This technique will no longer be evaluated because it was ineffective.

Surgical techniques may include sterilization of males or females (Kennelly and Converse 1993, Eagle et al. 1993, Garrot and Siniff 1993). One study indicated some success with sterilization of dominant male horses (vasectomy) in reducing foaling rates (Eagle et al 1993). Bands of horses with a sterilized male showed an 80% reduction of foaling rates, with reduction continued into the second year. Another study examined the impact of male sterilization on feral horses using computer simulation of population dynamics (Garrott and Siniff 1993). They noted that adequate reduction of population growth of horses may only result if a large proportion of male horses in the population are sterile because of their social behavior. Research results on sterilization of feral horses (spaying) was not found, but may be explored. A field technique for surgical sterilization of female horses may be practical, with minimal risk to the horse, and provide a lasting control on reproduction from treated individuals (pers. comm. Leon Pielstick, Doctor Veterinary Medicine, July 2007). Eagle et al. (1993) recommended conducting a study that included both male and female fertility control. Surgical sterilization techniques, while not reversible, may provide reproductive control on horses without any additional handling of the horses as in chemical contraception techniques.

One of the most promising chemical contraception techniques is the use of Porcine Zona Pellucida (PZP) as an immunocontraception vaccine on female horses (Kirkpatrick et al. 1993, Ransom et al. 2005). The use of immunocontraception techniques to limit reproduction in female horses has been in development sine 1988 (Turner et al. 2007). It has been used successfully to limit horse population growth at a number of federal land sites (e.g., Bartholow 2004). Continued research on PZP has sought to develop longer lasting formulations (Turner et al. 2001, Turner et al. 2007), remote delivery means (Ransom et al. 2005), and potential affect on horse behavior (Ransom et al. 2005). Horses showed minimal physical effects from injection, whether administered locally or remotely (Ransom 2005, BLM 2005). There are a number of considerations necessary in evaluating the use of a technique such as PZP on Sheldon Refuge, such as: potential to inoculate sufficient horses over an extensive, remote, and harsh

environment; feasibility of repeat inoculations; observable reduction in population increase (and decreased need to remove horses); and costs. The refuge would explore PZP as a management technique with appropriate partners.

In general, contraception would not remove horses from the Refuge's population which would result in some continuing environmental effects upon the Refuge by those individuals. Horses are long-lived reaching 20 years of age in the wild. Throughout their life span, those horses returned to the Refuge may continue exerting negative effects on the environment as described above. Contraception, if effective, reduces future reproduction. Limiting future population increases of horses would limit increases in environmental damage from higher densities of horses. It may also reduce the effect of horse gather activities on the environment (if it limits the numbers of horse gathers required). If application of contraception requires capturing and handling horses, the risks and costs associated with capture and handling of horses may be roughly equivalent to gathering of horses for removal to adoption (not counting the cost of adoption). Older horses are more difficult to adopt in an increasingly saturated adoption market (Bartholow 2004). Application of contraception to older animals and returning them to the Refuge may reduce risks associated with horses that are difficult to adopt or handle in captivity.

Horses involved in contraception would be affected by stress associated with the capture, sorting, handling, and processing to administer the contraception technique (BLM 2005). These effects vary amongt individual animals and range from an agitated state to apparent distress. Mortality is infrequent and may occur to less than 1% of the individuals handled (BLM 2005). Procedures and facilities for handling horses at Sheldon Refuge are setup for efficient and safe handling of animals. For example, the corrals and chutes are well constructed to efficiently load, sort, and handle horses with minimal risk for injuries. Numerous pens are available to separate horses as needed to reduce stress and potential for injury or illness while they are handled. Improvements to the facilities are expected to continue.

4.2.3 Social, Cultural, and Economic Effects

There would be positive and negative social and economic effects from reducing the horse and burro populations under this alternative B-1.

Opportunities afforded by this alternative would include providing the public with an opportunity to adopt a Sheldon Refuge horse or burro and providing private contractors with income through involvement with feral horse and burro removal from Sheldon Refuge.

Positive impacts from decreased populations of feral horses and burros would include decreased horse/burro-automobile collisions on Highway 140, and increased watershed and vegetation health increasing opportunities for Refuge-based, wildlife-dependent recreation. It should be noted that the number of horses and burros killed due to vehicle collisions exceeds the number lost due to gather operations during the same period (Day 2007). Conversely, opportunities would diminish for those Refuge visitors who were primarily interested in viewing horses and burros or enjoyed an enhanced visit when they also observed horses and burros.

As previously described (see section 3.4), within a few hours drive of Sheldon Refuge there are numerous opportunities for the public to observe horses and burros ranging freely across the landscape. Four BLM-managed, Herd Management Areas (HMA) abut the Refuge and together,

these HMAs manage for more than 600 horses and 70 burros. BLM manages for more than 12,500 horses and almost 900 burros on more than 15 million acres in 102 HMAs in Nevada (see http://www.wild horseandburro.blm.gov/statistics/2007/Nevada.pdf). BLM manages for more than 2,500 horses and 25 burros on more than 2.7 million acres in 18 HMAs in Oregon (see http://www.wildhorseand burro.blm.gov/statistics/2007/Oregon.pdf). In light of this, there would remain many opportunities in the vicinity of the Refuge for the public to view horses and burros in the wild even if implementation of this alternative reduced horse and burro populations on the Refuge.

With expected improvements to the natural environment on Sheldon Refuge from reduction of horses and burros, implementation of this alternative could result in a more desirable visitor experience resulting in more visitors. This would result in a greater economic benefits to local communities including hotels, restaurants, grocery stores, and gas stations (see earlier discussion in subsection 3.5)

On the negative side, the adoption of Sheldon Refuge horses and burros would increase the number of animals competing in the sales market possibly decreasing horse sales for horse/burro ranchers and BLM adoptions.

4.2.4 Cultural Resources Effects

Alternative B-1 would likely degrade archeological and historical sites less than Alternative A. A decrease in the numbers of horses and burros would likely decrease the destruction of archeological and historical resources due to decreased hoof action.

4.3 Alternative B-2: Modified Status Quo – Proposed Action (Ongoing Program Management on an Interim and More-Limited Basis).

This section analyzes the effects of the alternative B-2 upon those resources described in the Affected Environment section above. Alternative B-2 would continue the current feral horse and burro management program on the Refuge pending development of a Comprehensive Conservation Plan, but limited to maintaining horses at the estimated population level of about 800 horses and approximately 65 burros. The techniques for implementation of this alternative would be largely the same as alternative B-1. The environmental effects of implementing alternative B-2 are analyzed in terms of their effects upon physical, biological, wildlife, horse and burro, cultural, social, and economic values and resources. The costs and projected time to achieve initial management objectives are summarized in Figure 4.

4.3.1 Physical Effects

Aquatic Resources

The health of streams, springs, and riparian areas would stay about the same in a damaged state with implementation of Alternative B-2. Maintaining Refuge horse and burro numbers at the current levels under Alternative B-2 would likely continue the intensity of adverse effects on springs, riparian areas, and streams on Sheldon Refuge. Vegetation would be damaged by burros and horses, with loss of vegetation at wetland sites, deteriorated stability of stream banks and

riparian soils, abnormal fluctuation in water levels and temperatures, and reduced water quality (silt and nutrient loads) (Chaney et al. 1990, Ohmart 1994, Herbst 1996, Belsky et al. 1999, Barnett 2002, Steblein 2007; LaRouche 2007; pers. comm. Jim French, NDOW Fisheries Biologist, May 2007). Gather activities would focus on the most damaged areas, and may relieve some of the damage.

Soils

Soils would unlikely improve with implementation of Alternative B-2. Maintenance of horse and burro numbers at current levels under Alternative B-1 would be expected to continue damage to habitat from soil compaction and soil erosion, and loss of vegetation (Douglas and Hurst 1993, Beever 2003, Beever and Herrick 2005, Beever et al. 2006). Deteriorated condition would be expected to continue for biological soil crusts, and loss of benefits to soils and the plant communities of Sheldon NWR (Belnap et al. 2001).

4.3.2 Biological Effects

The ecological communities and associated wildlife habitat will not recover and will continue to exhibit deteriorated condition by maintaining approximately the current level of horses and burros. Vegetation, physical environmental factors, and wildlife species would continue to show damages from the grazing and physical impacts of horses and burros. Specific effects are discussed below.

Vegetation

The health of Refuge vegetation communities would not improve through implementation of Alternative B-2. Maintenance of feral horse and burro populations at current numbers would continue damage to vegetative structure and native plant species assemblages of the sagebrush steppe ecosystem (Hanley and Brady 1977, Douglas and Hurst 1993, Beever and Brussard 2000, Belsky and Gelbard 2000, Barnett 2002, Beever and Herrick 2006, Steblein 2007).

Invasive Plant Species
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue physiological stresses upon and therefore the vulnerability of plant communities found on Sheldon NWR to invasive species, which in turn, would continue the degradation of habitat for other native plant and animal species (Belsky and Gelbard 2000, Couvrer et al. 2004; pers. comm. Dave Johnson, former Deputy Project Leader, January 2007).

Wildlife

Wildlife habitat and populations would not be expected to improve but would not further deteriorate through implementation of Alternative B-2. Maintenance of horse and burro populations at current numbers would be expected to result in continued damage to vegetation in riparian habitats, attenuated and degradeded water flow in wetlands, decreased invertebrates associated with damaged function to wetland function, and limited abundance and diversity of other vertebrate species associated with habitat damage and direct competition from horses/burros with wildlife at waterholes. Specific citations are included in each section.

Invertebrates
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to habitat conditions for native invertebrate species and communities in wetlands and uplands (Herbst 1996, Sada et al. 2001, Beever and Heerick 2006).

Fish and Aquatic Resources
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to habitat conditions for fish and other aquatic resources (Williams and Storm 1980, Coffin 1996, Sada et al. 2001, Barnett 2002, Steblein 2007; pers. comm. Jim French, NDOW Fisheries Biologist, May 2007).

Reptiles and Amphibians
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to habitat conditions for reptile and amphibian species and communities (Williams and Storm 1980, Beever 2004).

Migratory Birds
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to habitat conditions for migratory birds (Miller and Eddleman 2001, Barnett 2002, Zalba 2004, Earnst et al. 2005, Steblein 2007).

Sage Grouse
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to vegetation in riparian habitats and a coincident limit to the abundance of birds associated with riparian habitats, such as sage grouse and songbirds, such as neo-tropical migrants (Miller and Eddleman 2001, Barnett 2002, Zalba 2004, Steblein 2007, pers. comm. Michael Gregg, Land Management Research Demonstration Biologist, USFWS, May 2007).

Small Mammals
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to riparian and upland habitats, and would likely result in continued reduction of native small mammal communities on Sheldon NWR (Carothers et al. 1976, Ivey 1996, Beever and Brussard 2000, Beever and Brussard 2004).

Large Mammals
Maintenance of horse and burro populations at current numbers through implementation of alternative B-2 would continue damage to riparian and upland habitats, and reduce continue competition between feral equines and native ungulates (especially under severe environmental conditions such as droughts) (Salwasser 1980, Yoakum and O'Gara 1990).

Biodiversity

Biodiversity would not improve with implementation of Alternative B-2. Maintenance of horse and burro populations at current levels would continue negative effects to native biological community types would limit the contribution of Sheldon NWR to biodiversity in the landscape and its resiliency to major disturbance factors (e.g., extended drought, severe winters, wild fire, and invasive species) (Douglas and Hurst 1993, Belsky and Gelbard 2000, Beever 2003).

Horses and Burros

Under this alternative (B-2), horse and burro populations would be maintained at current levels on Sheldon NWR. The current population level of horses and burros (at least 800 horses and approximately 90 burros as of July 2007 [Collins 2007]) is showing a pronounced impact on elements of the ecosystem, especially wetland systems (Barnett 2002, Steblein 2007, LaRouch 2007, pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). These effects would continue at their current level and rate through implementation of Alternative B-2. Effects on horses and burros themselves from the management actions of Alternative B-2 would likely be less than Alternative B-1 until about year six of implementation (Steblein and Johnson 2007). At this time the net effect of horse removal under Alternatives B-1 and B-2 is roughly equivalent in number of horses removed and cost (B-1 removes more horses up front and maintains a smaller population, B-2 removes a steady number equivalent to recruitment on a larger population level). These projections of horses and cost would be adjusted as contraception is applied (and may reduce recruitment) and changes in management brought about by implementation of the Sheldon CCP which is scheduled for completion in 2010.

Federal agencies have managed the Refuge's horse and burro herds for more than 70 years, and the current program to control horse and burro populations is a continuation of that effort (FWS 1977, FWS 1980, Bennett 2005). Horses and burros are gathered as funding permits. Gathering of horses and burros is accomplished by helicopter, bait traps (corrals), and horseback, which are standard practices in federal programs and private ranches (Cattoor 2007). The last of these techniques is both more difficult and expensive than helicopter gathers, but provides the Refuge with flexibility in gather times, locations, and quantities of horses.

Low altitude flight by aircraft is considered a disturbance factor to wildlife (Efroymson et al. 2000). In developing a framework for ecological risk assessment for low-altitude overflights by fixed-wing and rotary-wing aircraft, Efroymson et al. (2000) reviewed distance effects thresholds, primarily as a behavior response (versus reproduction or other responses). For prairie falcon and golden eagle, the lowest observed adverse effect (LOAEL) was observed at 150 meters from aircraft. Mule deer showed no effect at 50 meters for habitat change, and 150 meters for desert bighorn sheep, although habituation has been observed in both species. Pronghorn showed now effect at 120 meters altitude. Distances were not reported for horses, but 113.4 dB was reported for LOAEL. Habituation to the disturbance was also observed in horses. Aircraft are used infrequently on Sheldon Refuge for aerial surveys (usually two days per year at a height of about 100 meters) and for horse gather activities (usually 3-6 days for 1-2 gathers per year) (pers. comm. Brian Day, Sheldon Refuge Manager, August 2007). Disturbance from aircraft used for these management activities is considered to have a temporary (short time after the disturbance) and relatively small impact (causing animals to flush or run from the disturbance) on wildlife and horses (pers. comm. Paul Steblein, Project Leader, Sheldon-Hart Mtn NWRC, Aug 2007).

Additional studies specifically examined use of helicopters in the conduct of gather operations. Hansen and Mosely (2000) found there were no significant differences in horse behavior and reproduction between three study groups, including undisturbed horses on the range, horses gathered by helicopter and placed in homes through adoption, and horses that were herded by helicopter but not captured. Ashley and Holcombe (2001) found that stress associated with

gathering and handling of mares may cause pregnancy disruption. While their study examined reproductive rates between horses gathered by helicopter with undisturbed horses, many of the same stresses would apply with horses gathered by horseback (e.g., handling and transport). Pregnancy disruption has also been documented by free-ranging horses due to their social behavior. Berger (1983) observed pregnancy disruption in wild horses from the stress of forced copulation and social environment following band takeovers.

The effect of removing horses and burros from the population is not expected to have long-term impacts on herd dynamics or population variables, as long as the removal of horses and burros ensures a typical population structure was maintained (BLM 2006). Impacts to horses and burros remaining on the Refuge may include the temporary displacement of bands during capture and the associated re-dispersal, modification of herd demographics (age and sex ratios), temporary separation of members of individual bands of horses, and re-establishment of bands following releases and the removal of animals from the population (BLM 2006). BLM (2006) found these impacts over the last 20 years to be temporary in nature with most, if not all, impacts disappearing within hours to several days of release. No observable effects associated with these impacts would be expected within one month of release except a heightened shyness toward human contact. Observations of animals following release (e.g., if returned after contraception is applied) have shown horses relocate themselves back to their home ranges within 12 to 24 hours of release (BLM 2006).

Injury and/or mortality to horses during gathering activities may also occur due to the rugged terrain and risks typical of handling livestock during gathers, processing activities (sorting, tagging, Coggins test, etc.), and transport among facilities. Impacts that could occur after the initial stress may include spontaneous abortion in mares, and increased social displacement and conflict in studs. Spontaneous abortion following capture is unusual. Traumatic injuries that may occur typically involve biting and/or kicking that may result in bruises and minor swelling which normally does not break the skin. These impacts are known to occur intermittently during horse gather operations. The frequency of occurrence of these impacts among a population varies with the individual. Techniques would be explored for marking horses, such as branding, tattoos, and microchips, for identifying horses. There may be short-term discomfort to horses while the procedure is administered. During the last six years, significant injury/mortality to horses has been 1% or less at Sheldon Refuge (pers. comm. Dave Johnson, former Deputy Project Leader, Jan. 2007). That is consistent with the record of other federal agencies across the West (Cattoor 2007). There is a potential for foals to become separated from their mares. Every effort would be made to prevent this from happening and to reunite the foal with its mother. Minor injuries such as scrapes, bites, and bruises are likely to occur while sorting and processing horses, typical of livestock handling. During management operations, a veterinarian would be on site or on call to address significant injuries. Processing of animals (aging, sexing, marking, Coggins testing) would be conducted by a veterinarian and horse experts. Small foals and other horses/burros with special handling requirements would be separated from the others to reduce risk of injury. Burros are less reactive to handling than horses during processing and results in fewer injuries and with no known mortality in recent years (pers. comm. Brian Day, Sheldon Refuge Manager, Aug 2007). Transporting horses and burros has the potential to cause injury, but they would be transported in a manner that reduces risks to the animals and is compliant with state laws.

Management practices have been developed to provide humane treatment and minimize risks to horses and burros (see subsection 2.2, Appendix C). Some examples include: ensure animals are separated appropriately to reduce conflict while in the corrals or in transport; adequate food and water is always available; a veterinarian is on site or on call to advise on health problems and injuries; corral facilities are sound, designed for efficient and safe handling of animals; adequate pens are available to separate problem animals and minimize the need for repeated sorting; people and activity are minimized at the corrals to reduce disturbance to animals; during transport ensuring animals are off-loaded at appropriate intervals for food, water, and rest, ensuring adoption agents and adoptees have adequate knowledge and facilities to take care of horses and burros; ensure key staff have expertise and training on appropriate animal care and handling. The Refuge will periodically schedule an independent review of the animal care and handling practices by an appropriate trained official.

The Service would continue to seek to place horses and burros in good homes through contracted adoption agents. Current controls, which continue to improve, would remain in place and continue to ensure that adoption agents and adoptees are adequately screened to provide responsible care and prevent animals from going to slaughter, and there is follow-up contact with adoption agents and adoptees (Appendix C). However, it is possible that when animals are beyond the span of control of the Service, they could end up at a processing plant. When this happened in the past, the Service and its adoption agents interceded to purchase the animals and place them back in the adoption process (pers. comm. Dave Johnson, former Deputy Project Leader, Jan 2007).

Contraception may be a cost effective and humane treatment to employ in horses to prevent increases in populations, or with other techniques, to reduce horse populations (Bartholow 2004). In response to public comments on the EA, would also examine the viability of contraception techniques (e.g., PZP, surgical sterilization). Contraception techniques would be reviewed for feasibility, cost effectiveness, and effects on horses. In 2007, the Service explored use of intrauterine devices (IUD) with a small group of horses in a controlled setting. The preliminary results indicate the majority of mares did not retain the IUD, and consequently failed to prevent pregnancy (unpublished data, Leon Pielstick, Doctor Veterinary Medicine, 2007). This technique will no longer be evaluated because it was ineffective.

Surgical techniques may include sterilization of males or females (Kennelly and Converse 1993, Eagle et al. 1993, Garrot and Siniff 1993). One study indicated some success with sterilization of dominant male horses (vasectomy) in reducing foaling rates (Eagle et al 1993). Bands of horses with a sterilized male showed an 80% reduction of foaling rates, with reduction continued into the second year. Another study examined the impact of male sterilization on feral horses using computer simulation of population dynamics (Garrott and Siniff 1993). They noted that adequate reduction of population growth of horses may only result if a large proportion of male horses in the population are sterile because of their social behavior. Research results on sterilization of feral horses (spaying) was not found, but may be explored. A field technique for surgical sterilization of female horses may be practical, with minimal risk to the horse, and provide a lasting control on reproduction from treated individuals (pers. comm. Leon Pielstick, Doctor Veterinary Medicine, July 2007). Eagle et al. (1993) recommended conducting a study that included both male and female fertility control. Surgical sterilization techniques, while not reversible, may provide reproductive control on horses without any additional handling of the horses as in chemical contraception techniques.

One of the most promising chemical contraception techniques is the use of Porcine Zona Pellucida (PZP) as an immunocontraception vaccine on female horses (Kirkpatrick et al. 1993, Ransom et al. 2005). The use of immunocontraception techniques to limit reproduction in female horses has been in development sine 1988 (Turner et al. 2007). It has been used successfully to limit horse population growth at a number of federal land sites (e.g., Bartholow 2004). Continued research on PZP has sought to develop longer lasting formulations (Turner et al. 2001, Turner et al. 2007), remote delivery means (Ransom et al. 2005), and potential affect on horse behavior (Ransom et al. 2005). Horses showed minimal physical effects from injection, whether administered locally or remotely (Ransom 2005, BLM 2005). There are a number of considerations necessary in evaluating the use of a technique such as PZP on Sheldon Refuge, such as: potential to inoculate sufficient horses over an extensive, remote, and harsh environment; feasibility of repeat inoculations; observable reduction in population increase (and decreased need to remove horses); and costs. The refuge would explore PZP as a management technique with appropriate partners.

In general, contraception would not remove horses from the Refuge's population which would result in some continuing environmental effects upon the Refuge by those individuals. Horses are long-lived reaching 20 years of age in the wild. Those horses returned to the Refuge may continue exerting throughout their life span negative effects on the environment as described above, as opposed to the removal of a horse. Contraception, if effective, reduces future reproduction. Limiting future population increases of horses would limit increases in environmental damage from higher densities of horses. It may also reduce the effect of horse gather activities on the environment (if it limits the numbers of horse gathers required). If application of contraception to horses requires capturing and handling horses, the risks and costs associated with capture and handling of horses may be roughly equivalent (not counting the cost of adoption). Older horses are more difficult to adopt in an increasingly saturated adoption market (Bartholow 2004). Application of contraception to older animals and returning them to the Refuge may reduce risks associated with horses that are difficult to adopt or handle in captivity.

Horses involved in contraception would be affected by stress associated with the capture, sorting, handling, and processing to administer the contraception technique (BLM 2005). These affects vary amongst individual animals, and ranges from agitated state to apparent distress. Mortality is infrequent and may occur to less than 1% of the individuals handled (BLM 2005). Procedures and facilities for handling horses at Sheldon Refuge are setup for efficient and safe handling of animals. For example, the corrals and chutes are well constructed to efficiently load, sort, and handle horses with minimal risk for injuries. Numerous pens are available to separate horses as needed to reduce stress and potential for injury or illness while they are handled. Improvements to the facilities are expected to continue.

4.3.3 Social, Cultural, and Economic Effects

There would be positive and negative social and economic effects from maintaining the horse and burro populations under this alternative B-2.

Opportunities afforded by this alternative would include providing the public with an opportunity to adopt a Sheldon Refuge horse or burro, though more limited than alternative B-1. Private

contractors would receive income through involvement with feral horse and burro removal from Sheldon Refuge, though more limited that alternative B-1.

Maintaining roughly the same populations of feral horses and burros on Sheldon may continue the risk of horse/burro-automobile collisions on Highway 140. However, gather activities would be targeted to remove animals from these areas if possible. It should be noted that the number of horses and burros killed due to vehicle collisions exceeds the number lost due to gather operations during the same period. Continuing current horse/burro numbers would maintain current damage levels to watershed and vegetation health, limiting opportunities for Refuge-based, wildlife-dependent recreation. Conversely, opportunities would continue for those Refuge visitors who were primarily interested in viewing horses and burros or enjoyed an enhanced visit when they also observed horses and burros.

Without expected improvements to the natural environment on Sheldon Refuge from reduction of horses and burros, and continued heavy expenditure of funds on horses and burros, implementation of this alternative may limit improvements to visitor experience (e.g., interpretive programs and facilities). This would limit economic benefits to local communities including hotels, restaurants, grocery stores, and gas stations (see earlier discussion in subsection 3.5)

Alternative B-2 would reduce the pressure of Sheldon Refuge horses and burros on the adoption/sales market for horses and burros (versus Alternative B-1).

4.3.4 Cultural Resources Effects

Alternative B-2 would likely degrade archeological and historical sites less than Alternative A, but more than B-1. Continuing the current numbers of horses and burros would likely maintain current levels of destruction to archeological and historical resources due to hoof action.

4.4 Alternative C: Adoption Directly From Refuge

This section analyzes how adopting horses directly from the Refuge to individuals, instead of having adoption agents as middlemen, would impact aquatic resources, soils, vegetation, wildlife, horse, burro, social, economic, and cultural values and resources.

The primary factor that differs between Alternatives B-1/B-2 and C is that adoption of horses would be conducted from facilities on Sheldon NWR and with Refuge staff. This would require new staff and facilities, and further contribution from current staff. Commitment of significant additional staff time and resources from a currently limited staff and budget detracts from other aspects of the Refuge programs; such as managing the horse program, conducting facility maintenance, working and meeting with the public, support for wildlife monitoring and studies, support for fire management, and law enforcement. In general, the effects on wildlife habitat under Alternative C would be same as Alternative B-1/B-2, but not realized as quickly and it would have a higher funding cost to implement (Figure 4). Direct comparison of this alternative to B-1 or B-2 would be dependant on the targeted population level – i.e., adoption through agents or from the refuge could be used to maintain the current population level of horses (B-2), or reduce horses to the 1980 objective level (B-1).

With this Alternative there would have to be a new well to provide water. The present well could not handle both the corrals and the headquarters with the increase in horse and burro holding time.

This Alternative would require a lot more hay and other supplies while horses are held in Refuge corrals. A hay shed would need to be built to keep the hay out of the weather.

The most difficult aspect to this alternative is the remoteness of the holding facility. People, that have adopted a horse or burro in the past, have been unwilling and/or unable to make the remote trip to pick up the animal. The Service ended up hauling the animals to them. It was costly due to the necessity of hauling only one or two animals at a time.

There are two choices as to what to do with the unadoptable horses and burros. They can either be turned back out on the Refuge or kept in long-term holding facilities. Housing horses or burros in long-term holding facilities is costly. Turning them back out on the Refuge would contribute to environmental degradation and add to operational costs. During every subsequent gather, there is a probability of catching the released animals again. It has been demonstrated that the more times they are caught the harder they become to catch; and they teach this to the other horses. This adds to recapture costs.

One other relatively small cost would be the fact this alternative would require regular visits by a veterinarian. The closest one is in Lakeview and would not always be available.

4.4.1 Physical Effects

Implementation of this Alternative would have the same physical effects as Alternative B-1/B-2, but not realized as quickly or have a higher funding cost to implement.

4.4.2 Biological Effects

Implementation of this Alternative would have the same biological effects as Alternative B-1/B-2, but not realized as quickly or have a higher funding cost to implement.

4.4.3 Social, Cultural, and Economic Effects

Implementation of this Alternative would have the same social, cultural, and economic effects as Alternative B-1/B-2, but would not be realized as quickly if funding is held constant or would require a higher rate of funding to offset the higher costs to implement.

4.4.4 Cultural Resources Effects

Implementation of this Alternative would have the similar Cultural Resource effects as Alternative B-1/B-2, but not realized as quickly or have a higher funding cost to implement. Additional facilities required for this alternative would have to be located at a site to minimize impact to archaeological resources.

4.5 Alternative D: Conduct Horse Gathers by Only Horseback Techniques

This section analyzes how gathering horses with horseback riders, which excluding aircraft, would impact aquatic resources, soils, vegetation, wildlife, horse, burro, social, economic, and cultural values and resources. Direct comparison of this alternative to B-1 or B-2 would be dependant on the targeted population level – i.e., strictly horseback gathers could be used to maintain the current population level of horses (B-2), or reduce horses to the 1980 objective level (B-1). Bait traps (corrals) would still be used for burros regardless of the objective level.

The principal difference between Alternatives B-1/B-2 and D is that this alternative does not employ aircraft as a gather technique. This results in higher costs to reach the management objectives (Figure 4), and makes it unlikely that horse and burro numbers can be reduced to the target level within 2-3 years. Costs for horseback gathers, over helicopter gathers, are more expensive because the contracted per-horse charge is higher (36%). Post-gather costs are also higher for horses gathered by horseback wranglers alone because horses are gathered over a much longer period of time, requiring multiple trips for health and brand inspections, transport, and longer onsite care for horses (about 15%). The net cost increase for this alternative over Alternative B-1 is about 12.7% (Figure 4). In general, the delay in reaching management objectives would also delay the realization of beneficial effects. The higher costs would also detract resources from other Refuge programs as discussed in Alternative C. Other specific differences are discussed below.

4.5.1 Physical Effects

The physical environment would be subject to higher physical impacts than under Alternatives B-1/B-2, and C. The ability of horseback contractors to move horses over larger distances is decreased, and more trap (corral) sites would be necessary. This would increase the need for roads and access points for transportation once caught. Also, contractors would need to have access on a daily basis to secondary roads, creating additional impacts to these areas.

4.5.2 Biological Effects

Implementation of this Alternative would increase the impacts to wildlife in comparison to Alternatives B-1/B-2 and C. The increased attendance of riders, placement of additional trap (corral) sites, and extended time needed for gather would create increased opportunity for harassment of wildlife. The presence of people over a period of months would likely create more displacement of wildlife than a helicopter gather lasting two days.

Horses and Burros

The effects that this alternative would have on horses and burros is strongly dependent upon the techniques used and the effectiveness of the contractor performing the job. Horses gathered under this alternative would be subject to longer periods of disturbance due to the inefficiencies associated with this gather technique. It takes much more effort and time to “guide” the horses into the trap (corral) using this technique than using a helicopter, and roundups would have to occur over longer periods of time. This alternative would reduce short-term disturbance to wildlife from aircraft. See additional discussion on disturbance by aircraft to horses and wildlife under section 4.2.2 – Horses and Burros. Past observations indicate that horses would be subject to the same concerns

as using a helicopter gather method: such as separation of mares and foals, injury due to rough terrain, attempts to get out of the trap (corral), and transportation associated injury. Increased opportunity for injury associated with holding and processing would also be a concern, as animals would need to be kept in the corrals for longer periods of time until sufficient animals were collected to allow for disease testing and transportation. Horses used by the contractors to gather these wild animals would be subject to increased opportunity of injury due to rough terrain and extensive riding. Burros would only be captured with baited trap corrals.

4.5.3 Social, Cultural, and Economic Effects

Implementation of this Alternative would have the same social, cultural, and economic effects as Alternative B-1/B-2, but would not be realized as quickly if funding is held constant or would require a higher rate of funding to offset the higher costs to implement.

4.5.4 Cultural Resources Effects

Implementation of this Alternative would have a greater concern for Cultural Resources than Alternatives B-1/B-2 and C. Each additional trap (corral) site would need to be checked for cultural resources, as well as any roads leading to them to ensure protection of these resources.

Chapter 5: Public Comments and Responses

5.1 Public Comments on June 2007 final EA and draft FONSI, and Service Responses

In late June 2007, the Service issued a final EA and draft Finding of No Significant Impact (FONSI) addressing the Refuge horse and burro management program. The next gather of these animals was scheduled to occur in early August 2007. In mid-July, the Service received additional comments on the EA and FONSI. This subsection of the EA includes a summary of the public comments received on the June 2007 final EA and associated FONSI for Horse and Burro Management at Sheldon National Wildlife Refuge, and Service responses to those comments.

General Comment – The Service is Proposing to Remove too Many Horses and Burros:
The commentors expressed concern that the Service was proposing a massive roundup to remove more than 1,400 horses and burros from the Refuge during the summer of 2007. They stated that any roundup should await completion of the Refuge CCP. They also asserted that the June 2007 EA did not consider how to manage horses and burros on the Refuge, in balance with wildlife.

Response - The Service is Proposing to Remove too Many Horses and Burros: The Service is not currently proposing to remove 1,400 horses and burros from the Refuge. The Service has adopted a new interim and more limited Proposed Action in the September 2007 revised draft EA. How and why Refuge horses and burros are to be managed, and at what population levels, is clearly described.

Specific Comment	Response
The commentors expressed concern that the Service was proposing a massive roundup to remove more than 1,400 horses and burros from the Refuge during the summer of 2007.	The estimated numbers of horses and burros on the Refuge in the summer of 2006 was approximately 1,600. Although this number is much higher than the estimate of the current populations (Collins 2007), it was the best combined populations figure available at the time the June 2007 EA was published. If the Service were to conduct a single horse and burro gather and adoption to remove all of the animals needed to achieve the Refuge's approved population objectives (75-125 horses and 30-60 burros), approximately 1,400-1,500 animals would be removed. However, for many reasons, including logistics and cost, the Service has never gathered and adopted out that many Refuge horses and burros during a gather, or even a single year. For one reason, the capacity of the corral system is about 350 horses at one time. Instead, the Service's Proposed Action in the June 2007 EA was to gather and adopt out Refuge horses and burros consistent with available funding (likely at rates similar to what had been done in the recent past, i.e., approximately 550 to 600 animals [horses and burros combined] per year in the past 3 years). The current

	Proposed Action (in the September 2007, revised draft EA) would be much more limited. The numbers of animals removed would approximately equal the annual increases in the Refuge's current populations, thereby maintaining relatively stable populations of horses and burros (approximately 800 and 90, respectively). As discussed in section 3.4, Refuge horse and burro populations increase 17-23% annually (Bennett 2002, FWS Annual Narrative Reports). Therefore, based on the July 2007 population survey (Collins 2007), roughly 140-180 horses and 15-20 burros would be gathered and adopted out during the first year. In order to maintain relatively stable populations of horses and burros on the Refuge, removal numbers would be adjusted in subsequent years based on results of annual population surveys. See section 2.2 for more information.
The Service should increase the number of horses and burros permitted to live on the Refuge.	The Service does not propose to make final, long-term decisions regarding the appropriate population management objectives for horses and burros at Sheldon Refuge at this time. The sorts of analyses necessary for a decision of that nature should instead be made as part of the Refuge CCP and in the context of decisions for all other major management issues at the Refuge. The Refuge CCP is currently scheduled for completion in 2010.
The Service should postpone the roundup of Refuge horses and burros until completion of the CCP (which will address management of and appropriate population objectives for these animals).	The Service has gathered and evaluated site-specific data, and evaluated horse- and burro-related studies and information generated elsewhere, and determined that these animals are clearly having adverse effects on Refuge vegetation and wildlife. Horses and burros also pose a safety hazard to motorists on Highway 140. In light of this evidence, and consistent with its legal responsibility to manage the Refuge to conserve native fish, wildlife, plants, and their habitats; the Service cannot wait to take action until the CCP is complete. See section 2.2 for more information.
The June 2007 EA did not consider how to manage horses and burros on the Refuge, in balance with wildlife.	The Service has adopted a new Proposed Action in the September 2007 revised draft EA which involves conduct of the Refuge horse and burro management program on an interim and more-limited basis. Objectives of the program include: preventing an increase in damage to valuable and sensitive Refuge habitats, including riparian areas and areas which have experienced recent wildfires; preventing an increase in collisions with vehicles on Highway 140; and conducting gathers and adoptions in a humane manner. As noted above, horse and burro numbers would be managed to maintain approximately current populations. Gathers

	would target removal and either adoption or relocation of animals away from Refuge areas of greatest concern. As noted in section 1.4, the refuge CCP will include a re-evaluation of the feral horse and burro population management program, including an analysis of cumulative effects of this program in the context of all other Refuge management activities. See section 2.2 for more information.

General Comment – Proposed Action would Violate NEPA: The commentors alleged that implementing the Service's Proposed Action at this time would violate the National Environmental Policy Act.

Response – Proposed Action would Violate NEPA: This comment is a legal opinion with which the Service does not agree. The revised Draft EA and the process used in its development (see EA's Summary) speak for themselves. When published, the revised decision document will provide rationale for the Service's final NEPA-related decision for this program (i.e., does the Proposed Action constitute a major Federal action significantly affecting the quality of the human environment and, therefore, require development of an Environmental Impact Statement [EIS]).

Specific Comment	**Response**
The Service's NEPA review is based on 30-year-old environmental data and does not substantiate adverse effects of horses on wildlife. Conditions have changed on the Refuge, including removal of cattle grazing, and the NEPA document should evaluate the present situation.	The Refuge's approved population objectives for horses and burros were initially established through a public planning and NEPA process approximately 30 years ago, however the current situation and Proposed Action is based on a substantial amount of recent information. The revised draft EA has been updated with more-recent information regarding, among other things, Refuge horse and burros populations. Additionally, information was added about the protocols used in surveying these populations, and reliability of these surveys to generate comprehensive figures for total populations of horses and burros on the Refuge. Site-specific data and corrobative information generated elsewhere, clearly demonstrative adverse effects of horses and burros on Refuge vegetation and wildlife. See chapters 3 and 4. Citations for information included in the EA have been added throughout.
The Service failed to consider any reasonable alternatives and only cursorily evaluated some environmental effects.	The Service disagrees. The final June 2007 EA includes four reasonable alternatives and the September 2007 revised draft EA includes five reasonable alternatives, including No Action and the Proposed Action. The effects of all reasonable alternatives have been evaluated (see sections 2 and 4). Seventy-five references to publications and reports were used to evaluate the effects, a number of them are directly associated with Sheldon Refuge.
The Service should consider alternatives such as removing fewer horses and burros,	The Service has directly addressed this set of comments in the revised Draft EA. The new Proposed Action would involve an interim and more-limited program. The

maintaining existing populations until completion of the CCP, utilizing contraceptive techniques, and/or fencing sensitive habitats.	numbers of animals removed would approximately equal the annual increases in the Refuge's current populations, thereby maintaining relatively stable populations of horses and burros (approximately 800 and 90, respectively). As discussed in section 3.4, Refuge horse and burro populations increase 17-23% annually (Bennett 2002, FWS Annual Narrative Reports). Therefore, based on the July 2007 population survey (Collins 2007), roughly 140-180 horses and 15-20 burros would be gathered and adopted out during the first year. In order to maintain relatively stable populations of horses and burros on the Refuge, removal objectives would be adjusted in subsequent years based on results of annual population surveys. The new Proposed Action would also include testing a range of contraceptive techniques for feasibility and efficacy. Treated animals would be returned to the Refuge. Contraception would target those horses and burros which were unlikely to be adopted and would be used to assist in maintaining stable populations. See section 2.2 for more information. For the reasons explained in section 2.1.5, the Service considered, but eliminated from further study fencing of sensitive Refuge habitats.
The EA failed to consider effects upon horses of implementing the alternative, including that horseback gathers are less traumatic to horses and horses adopted through agents end up at slaughterhouses.	The revised Draft EA discusses the effects of the alternatives on horses in sections 4.1.2, 4.2.2, 4.3.2, 4.4, and 4.5.
The Proposed Action in the June 2007 EA, including roundup of 1,400 animals, is a significant major Federal action requiring preparation of an EIS.	As noted above, the Service is not currently proposing the roundup of 1,400 Refuge horses and burros. The September 2007 revised draft EA includes a new Proposed Action and, when published, the revised decision document will include the Service's rationale for the final NEPA-related decision (i.e., EA *vs.* EIS) for this program. That document will speak for itself.
In the June 2007 FONSI, the Service failed to address specific factors that govern the EA *vs* EIS decision, including controversy and uncertainty.	The Service will issue a revised decision document based on the analyses in the revised EA and public comments on that document.
The Service should cancel the June 2007 EA's Proposed Action and comply with Federal law, including NEPA and the Administrative Procedure Act.	In partial response to this comment, the Service canceled the gather scheduled for Aug 2007, modified the proposed management program, and revised the EA. The final Revised EA, the revised decision document, and the process pursued to develop these documents speak for themselves.

No new roundups should occur on the Refuge until the revised EA, with appropriate public input, has been completed.	The Service will not begin a new roundup of Refuge horses and burros until the current NEPA process is complete. The revised Draft EA will be made available for public review and comment.

General Comment – The Revised NEPA Document should Include More Information: The commentors urged the Service to enhance the quality of the revised NEPA document by including additional information.

Response – The Revised NEPA Document should Include More Information: In addition to adopting a new Proposed Action (and thereby creating a new alternative) the Service has endeavored to otherwise enhance the quality of the revised NEPA document by including other additional information and increasing the number of citations throughout.

Specific Comment	Response
Add information regarding the scientific bases for estimated population numbers and recruitment rates.	The revised Draft EA includes new (July 2007) population estimates for Refuge horses and burros. Survey protocols are described in Collins (2007). Refuge recruitment rates observed by Refuge staff are similar to those observed in other western States (see section 3.3).
Add information regarding the appropriate time of year for roundups.	The revised Draft EA includes information regarding the best time of year to conduct horse gathers. In general, gathers would occur primarily in the summer, fall, and winter to avoid the main foaling season of February through May (see section 2.2).
Add information on the stresses to animals associated with gathers that utilize helicopters.	See sections 4.2.2, 4.3.2, 4.4, and 4.5. Citations for information included in the EA have been added throughout.
Add information regarding the potential that gathered and adopted animals would end up at slaughterhouses.	See sections 4.2.2, 4.3.2, 4.4, and 4.5. Citations for information included in the EA have been added throughout.

5.2 Public Comments on April 2007 Draft EA and Service Responses

This subsection includes a summary of public comments received on the April 2007 Draft Environmental Assessment for Horse and Burro Management at Sheldon National Wildlife Refuge (FWS 2007), and Service responses to those comments.

General Comment - Selection of Alternatives: A large number of commentors provided the Service with their perspective on Alternative selection. At least a few commentors stated preference for each of the action alternatives, and in some instances, resurrected Alternatives considered but not studied in further detail. In a limited number of cases, new alternatives were offered for consideration by the Service. Additional concern was expressed regarding the characterization of alternatives studied in detail and the significance of technique updates within the "action" alternatives."

Response - Selection of Alternatives: The Service believes that the EA described and evaluated the effects of a range of reasonable alternatives. Federal agencies use different approaches in addressing ongoing management programs in their NEPA documents. We believed it was useful to describe and assess the effects of a "no horse and burro management" alternative (i.e., terminate gathers and removals). This description and analysis provided a benchmark against which the Service and the public could weigh the effects of the proposed action. Additionally, this alternative has in fact occurred occasionally and on a temporary basis in the past when adequate funding was not available to gather and remove horses and burros resulting in a rapid increase in horse and burro numbers. Finally, some members of the public believe that the Service should terminate horse and burro gathers and removals.

Alternatives considered but not studied in further detail that were referenced in the comments included removing all horses and burros from the Refuge (sec. 2.1.1), the use of contraceptives or other population control techniques (sec. 2.1.4), and partnering with BLM to gather and adopt horses and burros (sec. 2.1.6). Other options presented included relocating bands and herds to off-Refuge locations and developing partnerships with interested stakeholders. The Service has considered all of these options, and in response to public comment, has decided to incorporate some of these options as part of the Proposed Action (see final EA, section 2.2).

Specific Comment	**Response**
The Refuge should use only horse back riders to gather with, eliminating the use of aircraft (Alt D).	Comment noted.
The Refuge should not conduct any gathers, care or management efforts, or horse and burro adoptions (Alt A).	Comment noted.
The Refuge should setup a herd of “Sheldon Horses” off site.	This is a way that horse groups could help to maintain “Sheldon Horses”, provide for public viewing of horses, and to conserve the natural resources on Sheldon Refuge but is beyond the scope of this analysis.
The refuge should relocate bands of horses to sanctuaries with the FWS contributing to the initial setup costs.	This may be a viable option to explore. Horse groups would need to play a significant role to develop and implement a plan, but it is beyond the scope of this analysis.
The Refuge should remove all the horses and burros or increase the number of horses and burros gathered.	Comment noted.

General Comment - Cost of Implementing the Alternatives: Some commentors noted the high cost of implementing the action alternatives and the associated effects of discontinuing the program while others believed that the program was inadequately funded to be effectively implemented. One commentor suggested that our cost estimate for horseback gathering was too high and that in reality, the cost per horse was lower for this technique than for helicopter gathering.

Response - Cost of Implementing Alternatives: The Service agrees that maintaining consistency with policy and legal mandates through removal of horses and burros creates a financial burden; however, a burden that could become significantly higher through no agency action. Based on the documented population expansion rates of 17% - 22% annually and the associated impacts to habitat, discontinuing the gather program could result in increased tangible and intangible costs in regards to vehicle collision and potential loss of human life. The other intangible cost of eliminating horse and burro gathering is the increased population and associated effects to the horse and burro population itself as described in section 4.1.2, Biological Effects, Horses and Burros.

This EA has been used to develop the most cost effective strategy which includes the use of helicopters and rapid removal of horses and burros down to the population levels described in the 1980 Sheldon NWR RNRMP. The conclusion that helicopter use is more expensive than horseback only gathering techniques is incorrect. The Service Cost Analysis was presented in Figure 4 of the Draft EA and shows a relative total cost $3,019,000 to use helicopter gathers (Alternative B) versus $3,401,000 using horseback gathering techniques only. This cost difference is derived from actual contractor costs between helicopter and horseback gathering contractors, as well as anticipated increased staff and facilities expenses associated with increased length of gathering period with horseback gather only. The Service recognizes that funding has been limited in the past; however, we believe that the horse and burro management program as described in the proposed action (Alternative B-2 in the revised, draft EA) is the most cost-effective to implement.

Specific Comment	**Response**
The Refuge is wasting taxpayer dollars gathering horses and burros. It would save $3 million if the Refuge stopped gathers.	Stopping the management of horses and burros on the Refuge would result in a rapidly expanding horse and burro population. This would cause increasing damage to wildlife habitat and ecosystems on the 575,000 acre Refuge, a result which is contrary to achieving Refuge purposes. In addition there would likely be increased vehicle damage and animal mortality. This also represents a cost to the public.
Refuge goals are not realistic for horse and burro management funding; the Refuge has a record of insufficient funding.	The EA lays out a strategy that would be the most cost effective. Providing adequate funding is dependant on Congressional appropriation and budget allocation within the Service.
The cost estimate is too high for horse back gathering. Horse back gathering is less expensive than helicopter gathering.	We believe the assertion that horse back gathering is less expensive than helicopter gathering is inaccurate. The contract price for each horse gathered is higher for horse-back gather than helicopter, as well as the commitment of staff and facilities for disease testing and care of horses after they are in corrals.

General Comment - Equine History and Role on Refuge: Several comments were received regarding the role of horses on the Sheldon NWR landscape ranging from the concept that horses are a historic resource deserving protection, to the horses' role in improving ecological health.

Others expressed appreciation in terms of public viewing opportunity while others suggested that horses were a part of the landscape prior to Refuge establishment, and therefore, should be managed as a part of the Refuge. One commentor questioned the extent of herd overlap between Federally protected BLM horses (presumed Wild Horse & Burro Act covered) and those found on the Refuge.

Response - Equine History and Role on Refuge: The Service conducted a section 106 review under the Natural Historic Preservation Act (NHPA) as noted in Section 1.6.2.4 and 1.7 of the Draft EA. The results of this review were that there is no historic property on Sheldon NWR whose significance is derived from the presence of living herds of feral horses, thus, the removal of feral horses will have no effect on cultural resources eligible to be enrolled in the National Register of Historic Places. Horses also cause direct and indirect damage to cultural resource sites. It is recognized that some individuals see horses as a potential attractant for wildlife observers; however, discounting the fact that they have been characterized as feral animals in the Department of Interior, Refuge Manual (7RM6), wildlife observation is secondary to the primary mission of the Service which is wildlife conservation (NWRSAA as amended 1997). Additionally, horses and burros have the potential to displace native wildlife species which are consistent with wildlife observation principles of the Act. Feral horse and burro populations actually impede the Service's ability to meet this mandate. Federally protected horse management was addressed under section 1.6.1.5 (page 12) of the Draft EA.

Specific Comment	**Response**
Horses on Sheldon NWR are important for public viewing.	There are 199 Herd Management areas on BLM lands where horses and burros are a priority, comprised of more than 34 million acres. More than 30 of these are within 200 miles of Sheldon Refuge, some directly adjacent to the Refuge. There are only two places dedicated to pronghorn and other species native to the sagebrush steppe ecosystem - Sheldon and Hart Mountain National Wildlife Refuges.
Horses were present before the Refuge was established and, therefore, should be managed as part of the Refuge.	The Refuge was established by Executive Order with public support to protect and conserve pronghorn antelope. Horses were not mentioned.
Use the remaining horses to improve ecological health.	We believe remaining horses actually impede the Service from achieving ecological health as articulated in the Biological Integrity, Diversity, and Environmental Health Policy of the USFWS (601 FW 3). See chapter 4 of the EA for additional details.

To what extent, if any, do Federally protected wild horses mingle with horses on the Sheldon Refuge and if horses are removes and disposed of as is being planned, how will the FWS ensure that none of the animals are in fact federally protected wild horses?	Federally protected horse management was addressed in detail under section 1.6.1.5 (page 12) of the Draft EA.

General Comment - NEPA Process: Several commentor have asked that horse gathers be suspended until a Comprehensive Conservation Plan is developed and have suggested that an Environmental Impact Statement (EIS) would be more appropriate for this analysis. One commentor suggested that development of an Environmental Assessment (EA) is no substitute for preparing an EIS considering the number of changes occurring since release of the original 1980 EIS. Still other commentors believed that the number of alternatives was not adequate to address the range of issues discussed in the EA. FWS use of "tiering" and public participation in the NEPA process were also questioned.

Response - NEPA Process: Essentially, the Service is using this EA to reevaluate our existing management program. This program has been previously evaluated in the 1977 Sheldon Horse Management Plan and associated environmental impact assessment; 1980 Sheldon National Wildlife Refuge Renewable Natural Resources Management Plan and associated environmental impact statement; and 2000 Sheldon National Wildlife Refuge Environmental Action Memorandum. While the Service intends to initiate scoping on the Sheldon NWR Comprehensive Conservation Plan later in 2007, the scope of this environmental analysis is limited and focuses on analyzing our current, status quo, management program.

Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (NEPA Sec. 1508.28). In this instance, the population objectives evaluated in the 1980 Sheldon NWR RNRMP are not at issue; the management tools and techniques used to achieve the population objectives are.

The Draft EA was released for a 30-day public comment period beginning on April 17, 2007. The affected public was notified of the availability of these documents through a Federal Register notice, news releases to local newspapers, the Service's refuge planning website, and the Sheldon-Hart Mountain NWR Complex web site. Notices were sent to an extensive mailing list. Copies of the Draft EA were provided upon request. A copy was also available at the Lake County Library, Lakeview, OR. The Service hosted a public meeting in Lakeview, OR on May 8, followed by a Refuge tour on May 9, 2007. The meeting and tour were intended to provide the public an opportunity to discuss the Draft EA with Service staff. Due to public request, an eight day extension was added to the public comment period. These comments are being addressed and as appropriate, being incorporated into the Final EA.

Specific Comment	Response
Alternative A, No Agency Action, does not represent the no action alternative under NEPA because discontinuing horse and burro gathers is a change from the current strategy.	This comment was discussed under the General Comment Response - Alternatives. The Service recognizes that labeling alternative A as the No Agency Action may have caused some confusion because it would discontinue the current management program. This has been discussed in the final EA.
The Draft EA uses the term “will” as opposed to “would” which suggests that a decision has already been rendered.	The term "will," as opposed to "would," was inappropriately used in the Draft EA. This was used consistently among the alternatives and in no way implied that one alternative was preferred over another. The term "will" has been changed to "would" in the final document.
Suspend horse and burro gathers on the Refuge until the CCP is completed.	The Service has decided to gather horses and burros through development of numerous management plans and associated NEPA documents dating back to 1977. This includes the current EA. While the Service intends to re-evaluate the existing program through the Comprehensive Conservation Plan (CCP) process, we see no reason to discontinue gathers under the current, approved population objectives using methodology evaluated in this EA. Furthermore, delays make obtainment of the management objective more difficult, more expensive, and present health/safety risks.
The Refuge needs a full EIS instead of an EA for Horse and Burro Management.	The Service is using this EA to reevaluate our existing horse and burro management program and provide the basis for determining whether an environmental impact statement is necessary. That final determination will be documented in a finding of no significant impact or notice of intent to develop an environmental impact statement. The horse and burro gather program has been previously evaluated in the 1977 Sheldon Horse Management Plan and environmental impact assessment; 1980 Sheldon National Wildlife Refuge Renewable Natural Resources Management Plan and environmental impact statement, and 2000 Sheldon National Wildlife Refuge Environmental Action Memorandum. While the Service intends to initiate scoping on the Sheldon NWR Comprehensive Conservation Plan later in 2007, the scope of this environmental analysis is more limited and focuses on management of the Refuge’s horses and burros from the present through completion of the CCP (currently scheduled for 2010). The purposes of the Refuge’s feral horse and burro management program are to: prevent an increase in damage to valuable and sensitive Refuge

	habitats, including riparian areas and areas which have experienced recent wildfires; prevent and increase in collisions with vehicles on Highway 140; and conduct gathers and adoptions in a humane manner.
The public needs to be involved in the public process and to have a say in how horses are managed.	The public were invited to provide comment during the scoping process prior to development of the Draft EA. The Draft EA was then released for a 30-day public comment period beginning on April 17, 2007. The affected public was notified of the availability of these documents through a Federal Register notice, news releases to local newspapers, the Service's refuge planning website, and the Sheldon-Hart Mountain NWR Complex web site. Copies of the Draft EA were distributed to an extensive mailing list. In addition, the Service hosted a public meeting in Lakeview, OR on May 8, followed by a Refuge tour on May 9, 2007. The meeting and tour were intended to provide the public an opportunity to discuss the Draft EA with Service staff. Due to public request, an eight day extension was added to the public comment period.
The EA directs the public to gathering options; not horse and burro management options.	Horse and burro management was previously addressed in the 1977 Sheldon Horse Management Plan and environmental impact assessment; 1980 Sheldon National Wildlife Refuge Renewable Natural Resources Management Plan and environmental impact statement, and the 2000 Sheldon National Wildlife Refuge Environmental Action Memorandum. The purpose of this EA is to update the current NEPA documentation with techniques, not to fundamentally change the management objectives.
We feel there have been a number of changes in the last 26 years to warrant an EIS and not just an EA.	The Service agrees that the NEPA documentation should be updated which is why the current EA was prepared. The Service' Proposed Action is to continue conducting the "status quo." As noted earlier, the Service is using this EA to reevaluate our existing horse and burro management program and provide the basis for determining whether an environmental impact statement is necessary. That final determination will be documented in a finding of no significant impact or notice of intent to develop an environmental impact statement.

The EA did not address adequate management alternatives, but rather, appeared to be an excuse to not complete an EIS or a Comprehensive Conservation Plan (CCP). The only alternatives offered for management of wild horses were (A) "no action," or (B) "continue with existing action." Alternatives C and D had to do with the use of helicopters and adoptions which are not related to management objectives. These are clearly not sufficient alternatives.	As discussed in General Response to Comment - Alternatives, the Service evaluated the no action alternative (Status Quo Alternative B-1) and four action Alternatives (No Agency Action Alternative A, and Alternatives B-2, C, and D). The Service has addressed the misunderstanding surrounding characterization of these alternatives but believes that preparation and analysis of five alternatives is consistent with the requirements of the National Environmental Policy Act, NEPA Implementing Regulations, and Department of Interior and Service NEPA procedures.
An EIS must precede any agency decision and "not be used to rationalize or justify decisions already made (40 CFR § 1502.5).	The purpose of the EA was to update existing NEPA documentation regarding the 1980 Sheldon NWR RNRMP. An EIS was prepared and Record of Decision rendered in association with the RNRMP.
The FWS "no action" alternative, (A), asks what would happen if the Proposed Actions were not taken. It forms the "base case" against which the remaining alternatives are compared. Analysis of "No Action" and three other virtually identical alternatives is, as a matter of law, inadequate.	Characterization of the alternatives has been previously addressed. The Service believes that the EA presented a range of reasonable alternatives to achieve the Refuge management objective for horses and burros and disagrees that the development of a no action alternative (Status Quo Alternative B-1) and four action Alternatives (No Agency Action Alternative A, and Alternatives B-2, C, and D). is inadequate. Each alternative addresses a different management approach to achieve the population objectives presented in the 1980 Sheldon NWR RNRMP. The No Agency Action Alternative A addresses the effects associated with discontinuing the program.
While EA's and EIS's can, under certain limited circumstances be "tiered" to previous environmental documents, it is appropriate only where the pre-existing scientific and environmental information is still valid, current and not subject to question.	The purpose of an EA is to reevaluate our existing horse and burro management program, and determine whether an EIS should be prepared. In this instance, an EIS has previously been prepared to addresses population targets and the Service has no desire at this point to reevaluate these targets. Instead, the EA has been prepared to update changes in the methodology to achieve the previously defined targets and thus, the Service believes that this update is appropriately "tiered" to the original NEPA document.

The FWS draft EA attempts to rationalize or justify a decision that has already been made.	The Draft EA essentially updates the methodology used to achieve the population objectives previously defined in the 1980 Sheldon NWR RNRMP, which are, in effect, a decision that has already been made. As per the National Environmental Policy Act (see 404 D.F.R. 1508.28), the Service chose to tier from the 1980 Sheldon NWR RNRMP where the decision to gather Horses and Burros was already made.
It is inappropriate for FWS to tier this EA with a 26 year old EIS document.	Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (40 C.F.R. 1508.28). In this instance, the population objectives evaluated in the 1980 Sheldon NWR RNRMP are not at issue; the methodology used to achieve the population objectives are.
Removing horses requires an amendment to the 1980 Sheldon NWR Renewable Resources Management Plan, which in itself, would trigger NEPA review.	The Service Agrees. This is why an EA was prepared.
The agency must prepare new NEPA review to support it's decisions especially in light of new conditions and the public controversy surrounding the proposal.	The Service Agrees. This is why an EA was prepared.

General Comment - Partners and Other Stakeholders: Several commentors suggested that we allow for independent observers or development of an "oversight board" to assist in the development of management alternatives.

Response – Partners and Other Stakeholders: The Service is receptive to exploring this option for future gathers but must address safety concerns before considering implementation. The idea of an oversight board or other forum to more formally discuss concern/suggestions is an idea worth further exploration; however, it is beyond the scope of this EA. Options such as this can be further explored during development of the Refuge CCP.

Specific Comment	**Response**
Arrange for independent observers during horse and burro gathers, processing, and loading for transport.	We are receptive to exploring this suggestion for upcoming gathers. We also had, and will continue to offer, areas designated for the public to view the gather activities (from a safe distance so as not to disturb horses, staff, or contractors).

The Service should implement a collaborative oversight board with stakeholders and interested organizations to assist in the guidance and development of management alternatives for wild horses and burros on the Refuge.	We provided an opportunity for stakeholder and organization input through public comments during the scoping period and comments on the draft EA. The next formal opportunity for stakeholders and interested organizations to discuss and provide input on management alternatives for horses/burros and conservation issues will be during the scoping for the Comprehensive Conservation Plan for Sheldon NWR. We can explore different venues for providing that input, but do not expect to implement an oversight board.

General Comment - Policy: Comments regarding DOI and FWS Policy on horses and burros were less frequent but at least a few commentor questioned what the difference is between Horses covered under the Free Ranging Wild Horse and Burro Act (WHBA) and those found on the Refuge. Other commentor noted that allowing horses and burros on Sheldon NWR is against Service policy and that a compatibility determination should be prepared regarding gathers.

Response - Policy: The difference between horses covered under the WHBA was covered in Sections 1.4 (page 9) and 1.6.1.5 (page 12) in the Draft EA. Service policy was addressed in section 2.1.1 (page 16) and is expected to be further evaluated in the CCP process. While it is beyond the scope of this EA, compatibility determinations are not required in reference to refuge management activities that are necessary for the accomplishment of refuge purposes (see Service policy 603 FW 2.6 M).

Specific Comment	**Response**
What is the difference between BLM WHBA and Refuge horses.	This is addressed in Sections 1.4 (page 9) and 1.6.1.5 (page 12) in the EA.
Having horses and burros on the Refuge are against Service policies and purposes.	This is addressed under Section 2.1.1 (page 16) of the EA, and is expected to be evaluated in the CCP.
The Refuge needs to do a compatibility determination.	This is outside the scope of this EA. Compatibility determinations are not conducted on refuge management activities that are necessary for the accomplishment of the refuge purpose (603 FW 2.6 M).
The Service Policy chapter on horse and burro management is outdated and was released after the EIS was issued.	Current Service policy on horse and burro management on refuges can be found at 7 RM 6. This policy guides several refuges to remove all horses and burros, and was further reinforced by the NWRS Improvement Act amendments to the NWRAA (16 U.S.C. 668dd-668ee) and subsequent policies that guide the NWRS to critically review and act to manage for biological integrity, diversity, and environmental health (see 601 FW 3).

General Comment - Gather Procedures: Numerous comments were received regarding the procedures FWS uses during gathers and post-gather activities. Suggestions such as not gathering during the foaling season, releasing unadoptable horses and burros back to the Refuge

after contraception is applied, using year round gathers of smaller groups of horses and burros, providing a permanent marking system for all gathered animals, and working with adoption groups were all offered in the comments. Other commentors wanted to ensure that humane procedures were used in all phases of the gathering process while others questioned the use of helicopters. At least a few commentors questioned the adoption market and its ability to absorb such a large number of horses.

Response - Gather Procedures: The Service has considered all comments regarding gather procedures and has decided to incorporate some of these suggestions into the Proposed Action. The Service agrees that unadoptable horses should be released back to the Refuge after some form of contraception is applied; that a permanent marking system should be used; and that adoption groups should be used to aid in the adoption process. The latter approach may be used to minimize impacts to the adoption market referenced in several comment. A discussion on these factors has been added to the Final EA. Factors such as humane treatment of horses and burros, helicopter use, and gathers that occur during foaling season have been addressed in the EA and the Standard Operating Procedures provided in Appendix C. In all cases, the Service shares the desire to maintain as humane and smooth-running gather operation as possible.

Specific Comment	**Response**
Do not gather at inappropriate times; especially during foal season	The timing of gathers and its relationship to foaling season is discussed on page 20 of the EA under "Gathering".
Unadoptable horses should stay on the Refuge. Contraception should be used on those released.	We agree, and have changed the Proposed Action in response to the comment. If there are high-risk horses gathered that are considered to be unadoptable, we expect these horses will not be sent-out to adoption or held in captivity at the Refuge. They will receive contraception treatment and released back on the Refuge. We will explore which contraception treatment is best suited for this situation. This has been updated in Chapters 2 and 4 of the EA.
Use humane treatment for horses and burros.	The EA contains considerable documentation on the efforts of the Service to conduct horse and burro management while employing humane treatment. Handling large animals always has risks for animals and people, and we will continue to improve techniques and facilities for humane treatment and safety.
Provide detailed guidelines for humane treatment: standards of concentration in corrals, gathering, shipping, and processing.	Appendix C in the EA provides a description of standard operating procedures, including considerations for humane treatment of horses and burros. We expect to continue developing these procedures with increasing detail. Standard operating procedures will be available to the public.

Have year around horse back gathers, except during foaling season. This will enable bringing in smaller groups and promote less injuries.	Horse back gathers are described as one of the techniques in Alternative B. While more expensive, it does provide flexibility and should be available as one of the procedures.
Horses were ran too far with the helicopter gathers. Foals were left behind and injured.	Procedures were modified to accommodate conditions during the last gather. Helicopters moved horses at a slow pace, and mares with foals were cut out if they were behind or separated. While risk is always an issue, procedures have been further modified to minimize this risk in future gathers.
When a helicopter approaches, horses are crowded against fences and injured.	Use of helicopters to gather horses is a standard technique used in government and private sectors. Procedures have been developed to minimize the risk to horses and staff.
During captures we don't give antelope the same harsh treatment that we give horses.	The comment is outside the scope of this EA.
It is not possible to safely gather such a large number of horses in 1-3 years.	Comment noted. EA currently proposes annual reduction in horse and burro populations approximately equal to their annual increases. Thereby maintaining relatively stable, current population numbers. Approximately 140-180 horses and 15-20 burros would be gathered annually based on current populations.
Develop a permanent ID system to track horses.	We have begun review of techniques for permanent identification of Sheldon horses. This has been incorporated in Alternatives B-1 and B-2 in this EA.
Remove all necklaces from animals before shipping.	Necklaces are a key part of identifying horses for health certification and brand inspection. This has not been reported as a problem. We will discuss with adoption agents the need for removal of necklaces following transport to their site.
Make sure all mares and foals are bonded before shipping.	Pairing of mares and foals is given top priority as well as maintaining contact all through the process.
Wranglers at the last gather, doing foal rescue, were heard discussing whether they should shoot the foals before the public found out about them.	Refuge staff were not aware of this discussion. Foals were not shot and all possible care was given to them.

Do helicopters violate a noise ordinance?	The Service follows all regulations that govern the use of helicopters during gather operations. We are not aware of any noise ordinance which is relevant to use by the Federal government of helicopters to gather horses on Sheldon National Wildlife Refuge.
Do not auction the horses off.	This was addressed in Section 2.1.3 (page 17).

Complaints on the last gather were: there were aborted fetuses; foals were tied up, trampled, or left behind to die. Foals should not be separated from their mothers, left on the range, or put in a position of injury.	There was erroneous information circulated on results of the June 2006 gather. Foals were not tied-up and left behind. During the last gather, three orphaned foals were captured and tied until transportation could be moved to the capture site (about 1 hour) to pick them up. Staff stayed with the foals during this period of time. There were no mares observed with aborted fetuses. Only one foal was injured from trampling and later died. We have further modified our procedures to minimize risks to foals if they are present during gathers (e.g., re-fly area immediately after a gather activity to find and capture any potential orphaned foals). Priority has been given to matching up foals with mares and providing them with adequate food and water at all times. Foals are separated at all times from dry mares and studs.
Work with more adoption groups. Work with horse rescue groups for adoptions. Set up a lot more adoption agents.	We welcome the opportunity to work with adoption groups to find good homes for horses and burros. All potential adoption agents need to be screened as outlined in Appendix C of the EA. By working with a discreet number of adoption agents across the country, a variety of adoption markets will be tapped. We expect to work with more than a couple agents, but it takes time to work with adoption agents – to screen their applications, establish cooperative agreements and contracts, and to follow-up with them on progress in finding good adoption homes.
With the market already flooded how will we place a large number of horses? Can we actually find good homes for a large number of horses and avoid slaughter?	Discussions with adoption agents indicate that they can find sufficient homes for horses if given enough lead time to advertise and review potential adoption homes. We will also coordinate with them so that we are not planning gathers and shipping horses without knowing there are sufficient homes available.
Enforce accountability and penalties for contractors/agents that violate humane practices;	Part of the follow-up with adoption agents will include reviewing the relationship to ensure they are in compliance with stipulations on contracts and cooperative agreements. If not, appropriate action will be taken.
It creates a bad public image when gathering with a helicopter.	Comment noted.

General Comment - Rationale for Gathering Horses and Burros: Many comments questioned the Service rationale for removing horses and burros from the Refuge. Most commonly, the rationale was questioned relative to removing horses and burros to increase livestock grazing and hunting revenues. Other commentors questioned why the Service desires to remove horses and burros when other non-native species such as pheasant and chukar are tolerated.

Response - Rationale for Gathering Horses and Burros: There is no longer any livestock grazing occurring on Sheldon NWR. Livestock grazing permits were purchased by the Mellon Foundation and permanently retired from the Refuge in 1994 (section 1.6.2.2; Page 14). Hunting issues were addressed in Section 1.6.2.1 (page 13) of the draft EA.

Specific Comment	Response
The Refuge is reducing horse and burro herds in order to increase hunting. The Refuge favors other non-natives, i.e. pheasants, chukars.	This is addressed in Section 1.6.2.1 (page 13) in the EA. There is no known occurrence of ring-necked pheasants on the Sheldon Refuge. Chukar partridge occur on the Refuge, but the Service is unaware of any study demonstrating a negative impact of the species to other native wildlife or the ecosystem. Furthermore, the Service expends almost no effort or funds on managing chukar, nor receives revenue from chukar hunting. In contrast, many studies document the negative impact of horses and burros on native species and the ecosystem, and management of these species is costly.
The Refuge is reducing horse and burro numbers in exchange for herds of cattle.	This is addressed in Section 1.6.2.2 (page 14) of the EA. Cattle gazing is not allowed on Sheldon Refuge.

General Comment - Scientific Information and Data: While most comments in this category address the available science and data used to complete the EA, it is also used to respond to questions regarding whether horses and burros should be considered wildlife and the ability of the ecosystem to adapt to horse and burro use. At least a few comments were directed at horse/burro population objectives while at least one commentor asked us to include the data gathered by Barnett in 2002. A handful of commentors also questioned the scientific integrity of the Service with claims that government scientists tend to alter the scientific facts and that the EA in general did not address the horse and burro gather issue in a scientific manner but rather, made assumptions.

Response - Scientific Information and Data: The concept that horses and burros are "native" instead of feral animals was addressed in section 1.4 (page 9) in the draft EA. Regardless of this determination, section 1.6.2.3 (page 14) addresses the need to control species causing damage whether or not they are native. In reviewing the existing literature, the Service did not find any peer reviewed, scientific documents that suggested that feral horses and burros had positive, or even neutral, effects on habitat suggesting that Refuge habitats have not adjusted to feral horses and burro use. The Barnett 2002 data represents one such study conducted on Sheldon NWR and will be made available on the Refuge website.

Because the Service is using population objectives from the 1980 Sheldon NWR RNRMP, population objective discussions are beyond the scope of this EA. The purpose of this EA is to update existing NEPA documentation, not to adjust the 1980 population objectives; these objectives will however be evaluated during the Sheldon NWR CCP. Approximately 50 peer reviewed scientific papers were used to update past NEPA documentation in this EA. The Service Scientific Integrity policy requires that we use the best available science in developing our management recommendations, and the Draft EA was not an exception to this policy.

Specific Comment	Response
Manage horses and burros as "native" instead of feral animals. Horses and Burros contribute to the bio-diversity on Refuge.	This is addressed in several areas of the EA, including: Section 1.6.2.3 (page 14) which addresses the need to control species causing damage whether or not they are native; Chapter 4 which provides an extensive review of the negative effects that horses and burros have on plants, animals, soils and water resources that result in degradation of the ecosystem; and Section 1.4 (page 9) which references the regulations that define horses and burros as feral and provides guidance for their management. Relevant Service policy states that the National Wildlife Refuge "…System's focus is on native species and natural communities…" (601 FW 3.10 B.). A native is defined with respect to a particular ecosystem as, "…a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem" (601 FW 3.6 E.).

The Refuge can support larger numbers than the management level: 1) minimum viable population; 2) original targets were set arbitrarily or in different time. According to the 1980 EIS the Refuge can support 400-600 horses and 60-100 burros.	The management levels were set in the 1980 EIS through negotiation amongst stakeholders at the time. The purpose of this EA was not to establish new management levels, but to bring the NEPA process and documentation up-to-date. Since 1980, there have been numerous scientific studies that have documented the negative impacts that horses and burros have on virtually all components of the ecosystem. Furthermore, in 1997 the NWRS Improvement Act amended the NWRAA, and raised the threshold for managing refuges placing emphasis on biological integrity, diversity and environmental health. Elevated levels of horses and burros results in vehicle collisions on Rte 140. While horse/vehicle collisions have been reduced since 2005 after gathers in 2005 and 2006, burro numbers were not reduced in the same time period and vehicle collisions with burros continue along Rte 140 (Day 2007).
Horse impacts are causing damage to Refuge resources.	We agree and have included the best available scientific information to document the kinds, types, and amount of impacts.
The ecosystem has adjusted to horses and burros.	In the extensive review of scientific literature, there were no studies presenting evidence to support this opinion. In fact, all studies indicated a clear impact on native species and habitat.
Wildlife also transport noxious weeds.	Comment noted. However, horses and burros are considered to be better vectors of invasive species because of the higher rate of disturbance to soils and stress on native plants.

Government biologists/scientists alter the scientific facts to dupe the public.	We believe the assertion that government biologists/scientists alter scientific facts to dupe the public is inaccurate. Information is reported factually, and it is a top priority to be accurate.
Include Barnetts' vegetation/horse impact data in final EA.	We will post it on the Sheldon Refuge website.
As a threshold issue, there must be legal/scientific determination as to whether free roaming horses and burros on the Refuge are "wildlife."	This was addressed in Sections 1.4 and 1.6.2.3. Service regulations and policies specify that horses and burros are feral animals requiring control on Sheldon NWR. This legal definition notwithstanding, horses and burros would still require control of their populations because of the clear impact they are having on native species and the integrity of the ecosystem.

The EA did not address the issue of population size in a scientific manner, but rather, made assumptions.	The Service uses the best available information from scientific studies and field data to develop and implement its program. Estimated numbers of horses and burros are derived from field surveys. Burro numbers are estimated from road surveys and horse numbers are estimated from aerial surveys; the population numbers are then adjusted by the numbers of horses and burros removed by gathers. The rate of population growth that was used in estimating and modeling horse and burro numbers (20%), is a commonly cited figure in the scientific literature for the average observed rate of increase for both burros and horses.
Rainfall was responsible for difference in vegetation of sites. The 2004 cover photo was during a drought and the 2005 photo was during a wet year. There were no tracks or feces from horses in the photos indicating that horses were responsible for the damage.	The pictures on the EA cover show a perennial stream that held flowing water during the drought. Without the grazing pressure of horses, the site would still show lush growth. This was borne out by an additional photo from 2002 that shows a small exclosure at the same site. The area protected by the exclosure showed lush growth, and low stubble outside the cage. In March 2007 we returned to the same site. Since 2005, the number of horses has increased and the area again shows extensive impact by horses. We also have other before and after pictures of riparian areas from many other locations on the Refuge. Droughts exacerbate the damage caused by horses resulting in impacts to wildlife. The photos did not specifically show horse tracks and feces because they were photo points to characterize the state of vegetation and wetlands. The same sites examined in closer detail today show animal sign dominated by horse tracks and manure piles. Sign from other species are few in comparison.

Gather more scientific data on horses and burros. There is not adequate sampling of streams and springs.	More than fifty peer-reviewed scientific studies and review articles were consulted in preparing the EA. This analysis also included studies that were conducted on Sheldon Refuge. There were no studies found that indicated positive benefits for native plants, wildlife, habitat, or the ecosystem of the Great Basin. We are establishing an exclosure study to document current impacts to upland and riparian sites by horses and burros on Sheldon National Wildlife Refuge.
The current plan to reduce wild horse and burro populations within the Refuge to outdated population levels determined at a time when livestock grazing was still prolific fails to take into account or examine the impacts their removals will have to the documented issues and concerns of excessive forage production or healthy plant communities.	This is addressed under chapters 2 and 4 which describe both the impacts observed on the Refuge at current populations levels and impacts also documented in review of the scientific literature. AUMs are a management tool to aid in guiding grazing practices. Drought, fire, and ecological damage will affect the estimated availability of forage. On-the-ground inspections indicate that horses and burros are degrading the ecosystem.
Since the removal of livestock grazing from the Refuge and the native grazers, bison, there is a necessity for Refuge managers to find an alternative to historic ecosystem conditions that mimic these natural processes.	This concept was addressed in Section 3.2 of the draft EA. Large ungulate grazers were not a major part of the Great Basin ecosystem since the Pleistocene extinctions, approximately 10,000-14,000 years ago.

General Comment - Gather/Management Techniques: Comments and suggestions regarding horse gathers and other management techniques generated the most diverse set of comments of any category addressed, but in most instances, represented proactive and constructive suggestions. These include comments such as fencing riparian areas; investigating and using new contraception procedures such as immunocontraception (PZP) and spaying; putting up better road signs on State route 140 to minimize vehicle collisions; and developing partnerships with interested parties and other stakeholders. Other commentors discussed the gather itself and suggested setting distance limits on how far horses are chased or others that questioned how we can tell foal age from the air or questioned our population estimates. Additional comments were received inquiring about The Service' contractor screening procedures.

Response - Gather/Management Techniques: In response to suggested techniques for implementation, the Service has considered and incorporated the following suggestions into the Proposed Action; using contraception and developing partnerships with interested parties and other stakeholders. In fact, this latter suggestion provided a potential solution to a previous comment that rescue groups cannot keep up with the number of horses anticipated to hit the adoption market. The NV Dept. of Transportation has already posted caution signs for motorists on Highway 140. The Service is considering the use of livestock grazing exclosures to quantify the impacts of horse and burro impacts to springs and associated meadows and riparian zones.

Distance limits were addressed in the draft EA (Appendix C; page 67) and our assessment of foal age has been conducted from the ground, not the air. Our Standard Operating Procedures also discuss contractor screening.

Specific Comment	**Response**
Last year's gather proved that Refuge staff are inhumane to foals and mares; it was a disaster.	We believe these statements are inaccurate. There was erroneous information circulated on results of the June 2006 gather. Foals were not tied-up and left behind. During the last gather, three orphaned foals were captured and tied until transportation could be moved to the capture site (about 1 hour) to pick them up. Staff stayed with the foals during this period of time. There were no mares observed with aborted fetuses. Only one foal was injured from trampling and later died. Nonetheless, we have further modified our procedures to minimize risks to foals if they are present during gathers (e.g., re-fly area immediately after a gather activity to find and capture any potential orphaned foals). Priority is given to matching up foals with mares and providing them with adequate food and water at all times. Foals are separated at all times from dry mares and studs.
Set strict limits for the distance horses are chased.	This is addressed under Appendix C Standard Operating Procedures (page 67) of the EA. The distance limit will be set based on a number of factors to limit risk to horses and be within accepted standards for horse gather operations. Functional limits are equivalent to distances set by the BLM.
Put up better road signs to prevent animal accidents on Rte 140.	Comment noted. Caution signs for horses and burros are already installed on the highway in accordance with NDOT standards. The Service will explore other options with the Nevada Department of Transportation.
The horse and burro count is off, there are considerably less numbers than stated in the EA.	Horse numbers are based upon actual observations (which gives a very conservative estimate of numbers) from aerial surveys conducted by low flying helicopters in mid summer. Burro numbers are estimated from road surveys, and also estimated conservatively.
You can’t tell how old foals are from an aircraft.	The age of foals is estimated from the ground, not from aerial surveys.
Does the Refuge have a winter vegetation study for competition?	Anecdotal information is collected when in the field during winter, but no vegetation data was collected during winter specifically to address competition with horses and burros.
Fence riparian areas and provide water to horses outside the exclosure in a trough.	Fencing riparian areas was discussed as an alternative, but eliminated (Section 2.1.5, page 17 in EA). Constructing and maintaining water delivery systems would add significantly to the cost and increase conflicts with wildlife.

Both 54 miles and 91 miles of fencing is referenced in Section 2.1.5 in the EA, which is correct?	Thank you for pointing out the inconsistency. We obtained new data on springs and perennial streams and it was not correctly applied. This section has been updated, and fencing springs and streams would require 260 miles of fencing.
Auction the horses off.	Comment noted. This was discussed in Section 2.1.3 in the EA (page 17).
Rescue groups cannot keep up with the horse glut on the market; there is a need for partnerships with FWS.	We look forward to furthering partnerships to accomplish the management objectives of Sheldon Refuge and better address horse and burro management.
We have been informed that a number of animals removed from Sheldon Refuge have been documented at slaughterhouses in the past. We are hereby requesting a copy of the EAM and an explanation regarding how the three contractor's on the Sheldon Refuge's website were selected, and what, if any provisions, the FWS has adopted to ensure that contractors are fulfilling the terms of their contract.	The EAM (Environmental Action Memorandum) and other NEPA documents are available from the Sheldon Refuge website (http://www.fws.gov/sheldonhartmtn/sheldon/horseburro.html). Adoption agents are reviewed through a screening process (Appendix C in the EA), and then engaged either through a contract or cooperative agreement. The agreement specifies the terms of the relationship, including a strong statement of effort to prevent horses from going to slaughter. These agreements are reviewed on a regular basis and if the provisions are not fulfilled or the relationship is not constructive, the agreement is terminated.
At a minimum, management tools and a combination of management tools such as fertility control, fencing of sensitive areas, and partnerships with interested parties should have been considered.	Under the draft EA, the Service considered fertility control under Section 2.1.4, fencing under 2.1.5, and partnerships have been a standard approach for many projects (including horses). Based on input received through public comment, we have incorporated exploration of contraception techniques into the action alternative. Fencing off 137 springs, 117 miles of streams, and 146 reservoirs/ponds/playas would leave the vast majority of the Refuge unprotected from horses and burros, reduce habitat quality from the fencing itself, serve as a barrier for wildlife (the primary purpose of the Refuge), and is not considered feasible. We do look towards partnerships to further develop various aspects of the program.
Use more contraception such as PZP. Investigate techniques such as immunocontraception.	A number of comments encouraged the broader use of contraception techniques for limiting the growth rate of the horse population. This is discussed under Section 2.1.4 of the EA. Based on input received through public comment; we have incorporated exploration of contraception techniques into the action alternative.

The Refuge must stop sending horses to slaughter.	A number of comments claimed the Service is sending horses to slaughter. The Service does not allow horses to be sent to slaughter, and seeks to further reduce this risk by continued improvement in the adoption process. The EA describes the extensive and costly process of finding good homes for the horses and burros removed from Sheldon Refuge. The EA also describes the criteria considered in selecting adoption contractors and the requirements of their contracts (see Appendix C).
Define "horse expert".	A person with the necessary skills and experience to complete the assigned task.
Don't give in to private interest groups.	Comment noted.
What does it teach our children to treat horses as disposable objects like cell phones?	Comment noted.
Having 1% die is unacceptable.	Comment noted. The number of horses and burros killed in vehicle collisions well exceeds the mortality associated with gather activities.
Develop a long term horse plan to avoid crisis management.	The EA provides a management plan until replaced with the Comprehensive Conservation Plan or other management plan.
The Refuge is keeping a "token herd" to collect public donations.	Donations are not collected for horse viewing.
Use of the word "gather" is offensive and incorrect.	Comment noted.
Include sage grouse and pronghorn population numbers and trends in the final EA	This is outside the scope of the EA. These subjects will be addressed in the CCP.
Discrepancies in reported data and wild horse and burro impacts needs to be addressed satisfactorily for proper public evaluation of management actions and habitat needs (such as forage utilization levels by wild horses and burros estimated at 15,600 AUM's, not 27,000 as reported in the current assessment).	We disagree with your comment. The use of AUM in the EA is for comparison purposes between years. We used 1.5 AUM per horse and applied it consistently each year based on an annual estimate for the number of horses.

The numbers horses and burros involved in vehicle collisions did not include native species like mule deer and pronghorn. Providing data would allow evaluation of ratios.	This is beyond the scope of this EA. However, there are likely occasional collisions with deer and pronghorn. The behavior of horses and burros to stand in the road, and their larger masses, make them more vulnerable and dangerous to motorists.

Chapter 6: List of Preparers, and Agencies and Persons Consulted

6.1 List of Preparers

Name and Position	Contributions	Degree(s)	Years of Experience
Paul F. Steblein, Project Leader, Sheldon – Hart Mountain NWRC	All sections	B.S. Wildlife Science M.S. Zoology (Mammalogy)	27
Stephen B. Moore, Division Chief, Natural and Cultural Resources	Summary; Purpose of and Need for Action; Alternatives, Including the Proposed Action; Environmental Consequences; Public Comments and Responses; and List of Preparers, and Agencies and Persons Consulted	B.S. General Biology M.A. Natural Resources Planning and Management	33
Dave Johnson, former Deputy Project Leader, Sheldon-Hart Mountain NWRC	Affected Environment	B.S. Resource Management	31
Robert Bundy, Refuge Manager, Hart Mountain NAR	All Sections	B.S. Wildlife Biology M.S. Wetlands Ecology	20
Sue Goheen, Natural Resource Planner, Sheldon – Hart Mountain NWRC	All Sections	B.A. Art Design B.S. Environmental Education B.S. Soil Science	30

6.2 List of Agencies and Persons Consulted

Bureau of Land Management

- Dean Bolstad, Wild Horse/Burro Operations Lead, Washington Office, Reno, NV
- Craig McKinnon, Resource Management Specialist, Oregon State Office, Portland, OR
- Shirley Gammon, Lakeview District Manager, Lakeview, OR

Nevada Department of Wildlife

- Roy Leach, Supervising Wildlife Biologist, Western Region, Reno, NV
- Jim French, Fish Biologist, Winnemauca, NV

Sue Cattoor, Co-Owner, Cattoors Livestock, Nephi, NV
Leon Pielstick, Doctor of Veterinary Medicine, Harney County Veterinary Clinic, Burns, OR

Appendix A: Glossary

Most Definitions are taken from "A Glossary of Terms Used in Range Management" developed through the Society for Range Management. If a definition has been slightly modified it is marked with an *. Other definitions are from Grazing Administration Regulations Code of Federal Regulations, Chapter 43, Sec. 4100.0-5 or Bureau of Land Management Technical Reference. Definitions also include meanings that were developed by the Northeastern Great Basin Resource Advisory Council to understand their intent in the Standards and Guidelines.

Abiotic - Refers to the non-living components of an ecosystem e.g., soils, climate, and water.
ANR – Annual Narrative Report. Report developed annually by NWRS units to highlight events, accomplishments, staff observations and other activities.
AUM - Animal Unit Month. An animal unit month (AUM) is the amount of forage needed to feed a cow, or its equivalent, for one month. The equivalent of a cow for forage purposes is 1.5 horse or 5 sheep.
Biological Diversity - The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur.
Biological Integrity - Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.
Biotic - Refers to living components of an ecosystem, e.g., plants and animals.
BLM - U.S. Bureau of Land Management.
Canopy - (1) The vertical projection downward of the aerial portion of vegetation, usually expressed as a percent of the ground so occupied. (2) The aerial portion of the overstory vegetation.
Canopy Cover - The percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included.
CCP - Comprehensive conservation plan.
Climax Community - Relatively stable plants and animals living together in equilibrium with their environment and with good reproduction of the dominant species.
Climate - The average or prevailing weather conditions of a place over a period of years.
Conservation - The use and management of natural resources according to principles that assure their sustained economic and/or social benefits without impairment of environmental quality.
Distribution (Grazing) - Dispersion of grazing animals within a management unit or area.
EA - Environmental assessment (NEPA document).
EAM - Environmental action memorandum (NEPA decision document).
Ecological Site - The kind of land with a specific potential natural community and specific physical site characteristics, differing from other kinds of land in its ability to produce vegetation and to respond to management.
Edaphic - Refers to the soil.

Environmental Health - Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.
EIS - Environmental impact statement (NEPA document).
Equine body conditioning –
1. Poor. Extremely emaciated; spinal processes, ribs, tailhead, tuber coxae and ischii projecting prominently, no fatty tissue can be seen.
2. Very Thin. Emaciated; slight fatty covering over base of spinal processes; transverse processes of lumbar vertebrae feel rounded; spinal processes, ribs, tailhead, tuber coxae and ischii prominent; withers, shoulders, and neck structure faintly discernible.
3. Thin. Fat buildup about halfway on spinal processes; transverse processes cannot be felt; slight fat covering over ribs; spinal processes and ribs easily discernible; tailhead prominent, but individual vertebrae cannot be identified visually; tuber coxae appear rounded but easily discernible, tuber ischii not distinguishable; withers, shoulders, and neck accentuated.
4. Moderately Thin. Slight ridge along back; faint outline of ribs discernible; tailhead prominence depends on conformation – fat can be felt around it; tuber coxae not discernible; withers, shoulders and neck not obviously thin.
5. Moderate. Back is flat (no crease or ridge); ribs not visually distinguishable but easily felt around tailhead and area beginning to feel spongy; withers appear rounded over spinal processes; shoulders and neck blend smoothly into body.
6. Moderately Fleshy. May have slight crease down back; fat over ribs spongy; fat around tailhead soft; fat beginning to be deposited along the side of withers, behind shoulders, and along sides of neck.
7. Fleshy. May have crease down back; individual ribs can be felt, but noticeable filling between ribs with fat; fat around tailhead soft; fat deposited along withers, behind shoulders and along neck.
8. Fat. Crease down back; difficult to feel ribs; fat around tailhead very soft; area along withers filled with fat; area behind shoulder filled with fat; noticeable thickening of neck; fat deposited along inner thighs.
9. Extremely Fat. Obvious crease down back; patchy fat appearing over ribs; bulging fat around tailhead, along withers, behind shoulders, and along neck; fat along inner thighs may rub together, flank filled with fat.
Erosion - (v.) Detachment and movement of soil or rock fragments by water, wind, ice or gravity. (n) The land surface worn away by running water, wind, ice, or other geologic agents, including such processes as gravitational creep.
Exotic - An organism or species which is not native to the region in which it is found. Synonym non-native.
Feral horses and burros - "Non-indigenous, unbranded, unclaimed descendents of domestic horses and burros which roam free on certain refuge lands in the western United States" (7 RM 6.5 A.).
Foal - Young horse or burro of either sex.
FCC - Federal Communications Commission.
FONSI - Finding of no significant impact (NEPA decision document for an EA).
Service - U.S. Fish and Wildlife Service.
Grazing - For the purposes of this document grazing refers to the removal of vegetation by domestic livestock and feral horses and burros.

Ground Cover - The percentage of material, other than bare ground, covering the land surface. It may include live and standing dead vegetation, litter, cobble, gravel, stones and bedrock. Ground cover plus bare ground would total 100 percent.
Ground Water - Subsurface water that is in the zone of saturation. The top surface of the ground water is the "water table". Source of water for wells, seepage, springs.
Guidelines - Guidelines are livestock management practices (e.g. tools, methods, strategies and techniques) designed to achieve healthy public lands as defined by Standards and portrayed by Indicators. Guidelines are designed to provide direction, yet offer flexibility for local implementation through activity plans and grazing permits. Activity plans may add specificity to the Guidelines based on local goals and objectives as provided for in adopted manuals, handbooks and policy. Not all Guidelines fit all circumstances. Monitoring or site specific evaluation will determine if significant progress is being made towards achieving the standards, and if the appropriate guidelines are being applied.
Habitat - The natural abode of a plant or animal, including all biotic, climatic, and edaphic factors affecting life.
Herd Management Area - Herd Area or portion of a Herd Area that has been designated through the planning process where horses and/or burros can be managed as a component of the BLM public lands.
Historic Conditions. Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape.
HMNAR - Hart Mountain National Antelope Refuge.
Horse and Burro Act - The Wild Free-Roaming Horses and Burros Act of 1971, as amended (16 U.S.C. 1331-1340).
Indicators - Indicators are observations or measurements of physical, chemical or biological factors used to evaluate site conditions or trends, appropriate to the potential of the site. Indicators will be used to determine whether or not Standards are being met.
Infiltration - The flow of a fluid into a substance through pores or small openings. It connotes flow into a substance in contradistinction to the word percolation.
Infiltration Rate - Maximum rate at which soil under specified conditions can absorb rain or shallow impounded water, expressed in quantity of water absorbed by the soil per unit of time, e.g., inches/hour.
Intensity (Grazing) - A reference to grazing density per unit of time.
Invasive Species – Harmful non-native plants, animals, and diseases.
Litter - The uppermost layer of organic debris on the soil surface; essentially the freshly fallen or slightly decomposed vegetal material.
Management Objective - The objectives for which refuge and refuge resources are managed which includes specified uses accompanied by a description of the desired vegetation and the expected products and/or values.
Management Plan - A program of action designed to reach a given set of objectives.
Marsh - Flat, wet, treeless areas usually covered by standing water and supporting a native growth of grasses and grass-like plants.
Monitoring - The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives.
Morphology - The form and structure of an organism, with special emphasis on external features.

Native - "With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem" (603 FW 3.6E.).
Native Species - A species which is a part of the indigenous fauna or flora of the area in question.
NEPA - National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321-4347).
NDOW - Nevada Department of Wildlife.
NWR - National Wildlife Refuge.
NWRC – National Wildlife Refuge Complex.
NWRS - National Wildlife Refuge System.
NWRS Administration Act - National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 669dd-668ee).
Overstory - The upper canopy or canopies of plants. Usually refers to trees, tall shrubs and vines.
Percolation - The flow of a liquid through a porous substance.
Plant Cover - (1) The plants or plant parts, living or dead, on the surface of the ground. Vegetative cover or herbage cover is composed of living plants and litter cover of dead parts of plants. (2) The area of ground cover by plants of one or more species.
Proper Functioning Condition - Riparian-Wetland areas are functioning properly when adequate vegetation, land-form, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. [BLM Technical Reference 1737-9]
Range Improvement - Range improvement means an authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. The term includes but is not limited to, structures, treatment projects, and use of mechanical devices or modifications achieved through mechanical means.
Riparian - Referring to or relating to areas adjacent to water or influenced by free water associated with streams or rivers on geologic surfaces occupying the lowest position of a watershed.
ROD - Record of decision (NEPA decision document for an EIS).
RM - Refuge Manager
Refuge - Sheldon National Wildlife Refuge.
Service - U.S. Fish and Wildlife Service
Sheldon Refuge - Sheldon National Wildlife Refuge.
Sheldon Refuge-RNRMP- Sheldon National Wildlife Refuge Renewable Natural Resources Management Plan
Successional Stage – The composition of vegetation in a certain location at a certain time.
Seep - Wet areas, normally not flowing, arising from an underground water source.

Soil - (1) The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. (2) The unconsolidated mineral matter on the surface of the earth that has been subjected to and influenced by genetic and environmental factors of parent material, climate (including moisture and temperature effects), macro- and micro-organisms, and topography, all acting over a period of time and producing a product - soil - that differs from the material it was derived in many physical, chemical, biological, and morphological properties and characteristics.
Species - A taxon or rank species; in the hierarchy or biological classification, the category below genus.
Species Composition - The proportions of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, weight, etc. Synonym Vegetative composition.
Spring - Flowing water originating from an underground source.
T & E - Threatened and Endangered Species.
TNC - The Nature Conservancy.
Trend - The direction of change in ecological status or resource value rating observed over time. Trend in ecological status should be described as toward, or away from the potential natural community, or as not apparent. Trend in a resource value rating for a specific use should be described as up, down or not apparent. Trends in resource value ratings for several uses on the same site at a given time may be in different directions, and there is no necessary correlation between trends in resource value ratings and trend in ecological status. Some agencies use trend only in the context of ecological status. Syn. range condition trend.
USFS - U.S. Forest Service.
USGS - U.S. Geological Survey
Utilization - The proportion of current year's forage production that is consumed or destroyed by grazing animals. May refer either to a single species or to the vegetation as a whole.
Watershed - (1) A total area of land above a given point on a waterway that contributes runoff water to the flow at that point. (2) A major subdivision of a drainage basin.
Wetlands - Areas characterized by soils that are usually saturated or ponded, i.e., hydric soils that support mostly water loving plants (hydrophytic plants).
WNV - West Nile Virus.

Appendix B: Literature Cited

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Appendix C: Standard Operating Procedures

Gathers would be conducted by utilizing contractors or U.S Fish and Wildlife Service (Service) personnel. The following procedures for gathering and handling horses and burros would apply whether contractors or Service personnel conduct a gather.

Prior to any gathering operation, the Service will provide for a pre-capture evaluation of existing conditions in the gather area(s). The evaluation will include animal conditions, prevailing temperatures, drought conditions, soil conditions, road conditions, and a topographic map with wilderness boundaries, cultural resources, the location of fences, other physical barriers, and acceptable trap (corral) locations in relation to animal distribution. The evaluation will determine whether the proposed activities will necessitate the on site presence of a veterinarian during operations, versus on call. If it is determined that capture operations necessitate the services of a veterinarian, one would be obtained before the capture would proceed. If applicable, the contractor will be apprised of all conditions and will be given instructions regarding the capture and handling of animals to ensure their health and welfare is protected.

Trap (corral) sites and temporary holding sites will be located to reduce the likelihood of undue injury and stress to the animals, and to minimize potential damage to the natural resources of the area. These sites would be located on or near existing roads.

The primary capture methods used in the performance of gather operations include:

1. Helicopter Drive Trapping. This capture method involves utilizing a helicopter to herd horses and burros into a temporary trap (corral).
2. Helicopter Assisted Roping. This capture method involves utilizing a helicopter to herd horses or burros to ropers.
3. Horse-back Gather. This capture method uses horse-back wranglers to draw or drive horses into a temporary trap (corral).
4. Bait Trapping (corralling). This capture method involves utilizing bait (water or feed) to lure primarily burros into a temporary trap (corral) (may include horses).

Capture Methods used in the Performance of Gather Contract Operations

1. The primary concern of the contractor is the safe and humane handling of all animals captured. All capture attempts shall incorporate the following:

    All trap (corral) and holding facility locations must be approved by the Refuge Manager (RM) prior to construction. The title Refuge Manager covers the Project Leader, Deputy Project Leader and the Refuge Manager. The Contractor may also be required to change or move trap (corral) locations as determined by the RM. All traps (corrals) and holding facilities not located on public land must have prior written approval of the landowner.

2. The rate of movement and distance the animals travel shall not exceed limitations set by the RM who will consider terrain, physical barriers, weather, condition of the animals and other factors.

3. All traps (corrals), wings, and holding facilities shall be constructed, maintained and operated to handle the animals in a safe and humane manner and be in accordance with the following:

    a. Traps (corrals) and holding facilities shall be constructed of portable panels, the top of which shall not be less than 72 inches high for horses and 60 inches for burros, and the bottom rail of which shall not be more than 12 inches from ground level. All traps (corrals) and holding facilities shall be oval or round in design.

    b. All loading chute sides shall be a minimum of 6 feet high and shall be fully covered, plywood, metal without holes.

    c. All runways shall be a minimum of 30 feet long and shall be covered with plywood, burlap, plastic snow fence or like material a minimum of 1 foot through 5 feet above ground level for burros and 1 foot through 6 feet for horses. The location of the government furnished portable fly chute to restrain, age, or provide additional care for the animals shall be placed in the runway in a manner as instructed by or in concurrence with the RM.

    d. All crowding pens including the gates leading to the runways shall be covered with a material which prevents the animals from seeing out (plywood, burlap, plastic snow fence, etc.) and shall be covered a minimum of 1 foot through 5 feet above ground level for burros and 2 feet through 6 feet for horses

    e. All pens and runways used for the movement and handling of animals shall be connected with hinged self-locking gates.

4. No modification of existing fences will be made without authorization from the RM. The Contractor shall be responsible for restoration of any fence modification that he has made.

5. When dust conditions occur within or adjacent to the trap (corral) or holding facility, the Contractor shall be required to wet down the ground with water.

6. Alternate pens, within the holding facility shall be furnished by the Contractor to separate mares or jennies with small foals, sick and injured animals, and strays from the other animals. Animals shall be sorted as to age, number, size, temperament, sex, and condition when in the holding facility so as to minimize, to the extent possible, injury due to fighting and trampling. Under normal conditions, the government will require that animals be restrained for the purpose of determining an animal's age, sex, or other necessary procedures. In these instances, a portable restraining chute may be necessary and will be provided by the Contractor. Alternate pens shall be furnished by the Contractor to hold animals if the specific gathering requires that animals be

released back into the capture area(s). In areas requiring one or more satellite traps (corrals), and where a centralized holding facility is utilized, the contractor may be required to provide additional holding pens to segregate animals transported from remote locations so they may be returned to their traditional ranges. Either segregation or temporary marking and later segregation will be at the discretion of the RM.

7. The Contractor shall provide animals held in the traps (corrals) and/or holding facilities with a continuous supply of fresh clean water at a minimum rate of 10 gallons per animal per day. Animals held for 10 hours or more in the traps (corrals) or holding facilities shall be provided good quality hay at the rate of not less than two pounds of hay per 100 pounds of estimated body weight per day. An animal that is held at a temporary holding facility after 5:00 p.m. and on through the night, is defined as a horse/burro feed day. An animal that is held for only a portion of a day and is shipped or released does not constitute a feed day.

8. It is the responsibility of the Contractor to provide security to prevent loss, injury or death of captured animals until delivery to final destination.

9. The Contractor shall restrain sick or injured animals if treatment is necessary. The RM will determine if injured animals must be destroyed and provide for euthanasia of such animals in a humane fashion. A veterinarian will be available on site or on call for consultation or treatment of animals as needed. The Contractor may be required to humanely euthanize animals in the field and to dispose of the carcasses as directed by the RM.

10. Animals shall be transported to final destination from temporary holding facilities within 24 hours after capture unless prior approval is granted by the RM for unusual circumstances. Animals to be released back onto the Refuge following gather operations may be held up to 21 days or as directed by the RM. Animals shall not be held in traps (corrals) and/or temporary holding facilities on days when there is no work being conducted except as specified by the RM. Animals shall not be allowed to remain standing on trucks while not in transport for a combined period of greater than three (3) hours. Animals that are to be released back into the capture area may need to be transported back to the original trap (corral) site. This determination will be at the discretion of the RM.

Capture Methods That May Be Used in the Performance of a Gather

1. Capture attempts may be accomplished by utilizing bait (feed or water) to lure animals into a temporary trap (corral). If the contractor selects this method, the following applies:

    a. Finger gates shall not be constructed of materials such as "T" posts, sharpened willows, etc., which may be injurious to animals.

    b. All trigger and/or trip gate devices must be approved by the RM prior to capture of animals.

c. Traps (corrals) shall be checked a minimum of once every 24 hours.

2. Capture attempts may be accomplished by utilizing a helicopter to drive animals into a temporary trap (corral). If the contractor selects this method, the following applies:

    a. A minimum of two saddle-horses shall be immediately available at the trap (corral) site to accomplish roping if necessary. Roping shall be done as determined by the RM. Under no circumstances shall animals be tied down for more than one hour.

    b. The contractor shall assure that foals shall not be left behind, and orphaned.

3. Capture attempts may be accomplished by utilizing a helicopter to drive animals to ropers. If the contractor with the approval of the RM selects this method, the following applies:

    a. Under no circumstances shall animals be tied down for more than one hour.

    b. The contractor shall assure that foals shall not be left behind, or orphaned.

    c. The rate of movement and distance the animals travel shall not exceed limitations set by the RM who will consider terrain, physical barriers, weather, condition of the animals and other factors.

Use of Motorized Equipment

1. All motorized equipment employed in the transportation of captured animals shall be in compliance with appropriate State and Federal laws and regulations applicable to the humane transportation of animals. The Contractor shall provide the RM with a current safety inspection (less than one year old) for all motorized equipment and tractor-trailers used to transport animals to final destination.

2. All motorized equipment, tractor-trailers, and stock trailers shall be in good repair, of adequate rated capacity, and operated so as to ensure that captured animals are transported without undue risk or injury.

3. Only tractor-trailers or stock trailers with a covered top shall be allowed for transporting animals from trap (corral) site(s) to temporary holding facilities, and from temporary holding facilities to final destination(s). Sides or stock racks of all trailers used for transporting animals shall be a minimum height of 6 feet 6 inches from the floor. Single deck tractor-trailers 40 feet or longer shall have two (2) partition gates providing three (3) compartments within the trailer to separate animals. Tractor-trailers less than 40 feet shall have at least one partition gate providing two (2) compartments within the trailer to separate the animals. Compartments in all tractor-trailers shall be of equal size plus or minus 10 percent. Each partition shall be a minimum of 6 feet high and shall have a minimum 5 foot wide swinging gate. The use of double deck tractor-trailers is unacceptable and shall not be allowed.

4. All tractor-trailers used to transport animals to final destination(s) shall be equipped with at least one (1) door at the rear end of the trailer that is capable of sliding either horizontally or vertically. The rear door(s) of tractor-trailers and stock trailers must be capable of opening the full width of the trailer. Panels facing the inside of all trailers must be free of sharp edges or holes that could cause injury to the animals. The material facing the inside of all trailers must be strong enough so that the animals cannot push their hooves through the side. The RM shall do final approval of tractor-trailers and stock trailers used to transport animals.

5. Floors of tractor-trailers, stock trailers and loading chutes shall be covered and maintained with wood shavings to prevent the animals from slipping.

6. Animals to be loaded and transported in any trailer shall be as directed by the RM and may include limitations on numbers according to age, size, sex, temperament and animal condition. The following minimum square feet per animal shall be allowed in all trailers:

   11 square feet per adult horse (1.4 linear foot in an 8 foot wide trailer);
   8 square feet per adult burro (1.0 linear foot in an 8 foot wide trailer);
   6 square feet per horse foal (.75 linear foot in an 8 foot wide trailer);
   4 square feet per burro foal (.50 linear feet in an 8 foot wide trailer).

7. The RM shall consider the condition and size of the animals, weather conditions, distance to be transported, or other factors when planning for the movement of captured animals. The RM shall provide for any brand and/or inspection services required for the captured animals.

8. If the RM determines that dust conditions are such that the animals could be endangered during transportation, the Contractor will be instructed to adjust speed.

Safety and Communications

1. The Contractor shall have the means to communicate with the RM and all contractor personnel engaged in the capture of wild horses and burros utilizing a VHF/FM Transceiver or VHF/FM portable Two-Way radio. If communications are ineffective the government will take steps necessary to protect the welfare of the animals.

   a. The proper operation, service and maintenance of all contractor furnished property is the responsibility of the Contractor. The Service reserves the right to remove from service any contractor personnel or contractor furnished equipment which, in the opinion of the RM violate contract rules, are unsafe or otherwise unsatisfactory. In this event, the Contractor will be notified in writing to furnish replacement personnel or equipment within 48 hours of notification. All such replacements must be approved in advance of operation by the RM or his/her representative.

b. The Contractor shall obtain the necessary FCC licenses for the radio system

c. All accidents occurring during the performance of any task order shall be immediately reported to the RM.

2. Should the contractor choose to utilize a helicopter the following will apply:

a. The Contractor must operate in compliance with Federal Aviation Regulations, Part 91. Pilots provided by the Contractor shall comply with the Contractor's Federal Aviation Certificates, applicable regulations of the State in which the gather is located.

b. Fueling operations shall not take place within 1,000 feet of animals.

Requirements for Adoption Agents and Adoptees

All potential adoption agents must have a favorable background check conducted and contract/cooperative agreement established before receiving any horses or burros. Background checks will include the following:

1. A site visit will be completed by Refuge staff to assure that facilities are adequate to prevent escape or injury to the animals or visitors during holding, viewing, feeding, loading and unloading.
2. A determination will be made by the Refuge Manager as to whether or not the agent has the necessary skills and knowledge of horses and burros to safely handle, feed, and load and unload them.
3. A list of adopters will be required and certification and follow up will be conducted by Refuge Staff to ensure proper placement.
4. Refuge staff will also conduct phone interviews with at least two character witnesses and receive a recommendation from a local veterinarian regarding the Agent's ability to accomplish the adoption process.

Adoption agents are required to prevent horses and burros from going to slaughter and to screen potential adoptees for good homes. This is specified in legally binding contract/cooperative agreements between the adoption agent and the U.S. Fish & Wildlife Service. Agents will screen potential adoptees for appropriate facilities, adequate expertise to handle the horses and conscientious attitude towards the care and well being of horses and burros. Potential adopters must sign an agreement with the agent that states standard stipulations for care and preventing the horse/burro from going to slaughter. Agents must meet all state regulations for transport and exchange of livestock. The agent must also be willing to take the animal back if significant problems develop with the adoptee for up to one year from adoption.

Archaeological and Historical Site Clearances

1. Personnel working at gather sites will be advised of the illegality of collecting artifacts.

2. Prior to setting up a trap (corral) or temporary holding facility, Service will conduct all necessary clearances (archaeological, T&E, etc). All proposed site(s) must be inspected by a government archaeologist. Once archaeological clearance has been obtained, the

trap (corral) or temporary holding facility may be set up. Said clearance shall be arranged for by the RM or other Service employees.
3. Gather sites and temporary holding facilities would not be constructed on wetlands or riparian zones.

Animal Characteristics and Behavior

Releases of horses and burros would be near available water. If the area is new to them, a short-term adjustment period may be required while the horses/burros become familiar with the new area.

Public Participation

Opportunities for public viewing (i.e., media, interested public) of gather operations will be made available to the extent possible. However, the primary consideration will be to protect the health and welfare staff/contractors and the animals being gathered. The public must adhere to guidance from the on-site Service representative. It is Service policy that the public will not be allowed to come into direct contact with horses or burros being held in Service facilities. Only authorized Service personnel or its contractors may enter the corrals or directly handle the animals. The general public may not enter the corrals or directly handle the animals at anytime or for any reason during Service operations. In most cases, safe viewing areas will be setup for the public.

Responsibility and Lines of Communication

Lakeview Office – Project Leader
Paul Steblein
Lakeview Office - Deputy Project Leader (Acting)
Rob Bundy
Sheldon Refuge – Refuge Manager
Brian Day

The RM has the direct responsibility to ensure the Contractor's compliance with the contract stipulations. The RM will take an active role to ensure the appropriate lines of communication are established between the field and the Lakeview Office. All employees involved in the gathering operations will keep the best interests of the animals and safety of personnel at the forefront at all times.

All publicity, formal public contact and inquiries will be handled through the Project Leader. This individual will be the primary contact and will coordinate the contract to ensure animals are being transported from the capture site in a safe and humane manner and are arriving in good condition.

The contract specifications require humane treatment and care of the animals during removal operations. These specifications are designed to minimize the risk of injury and death during and after capture of the animals. The specifications will be vigorously enforced.

Should the Contractor show negligence and/or not perform according to contract stipulations, they will be issued written instructions, issued a stop work order, or other appropriate measures.

Appendix D: Environmental Compliance Statement

The following Federal statutes and Presidential Executive Orders have been reviewed as they apply to implementation of the Proposed Action as described in this Environmental Assessment for Horse and Burro Management at Sheldon National Wildlife Refuge.

- **National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321-4347).** The planning process has been conducted in accordance with the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508), and Department of the Interior and Service policies and procedures. These procedures include: the development of a range of reasonable alternatives; analyses of the likely effects on the human environment from implementing each alternative; and appropriate public involvement.

The Draft EA was released for a 30-day public comment period beginning on April 17, 2007. The public was notified of the availability of this document through a Federal Register notice, news releases to local newspapers, the Service's refuge planning website, and the Sheldon-Hart Mountain NWR Complex web site. Notice of the availability of the Draft EA was distributed to an extensive mailing list. In addition, the Service hosted a public meeting in Lakeview, OR on May 8, followed by a Refuge tour on May 9, 2007. The meeting and tour were intended to provide the public an opportunity to discuss the Draft EA with Service staff. Due to public request, an eight-day extension was added to the public comment period. Additionally, beginning in later June 2007, the final EA and draft Finding of No Significant Impact (FONSI) were made available to the public for 30 days prior to the next horse/burro gather which was scheduled to occur in early August 2007. In mid-July, the Service received additional comments on the EA and FONSI. In response to the concerns expressed, the Service canceled the scheduled gather, modified the proposed management program, and revised the EA. The revised, draft EA was again made available for public review and comment.

- **National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.).** Archaeological and historic resources of the Refuge would continue to be managed in compliance with requirements of this Act, including the regulations pertaining to section 106 of this Act. The Proposed Action (alternative B-2) would maintain, on an interim basis, roughly current populations of horses and burros on the Refuge. As described earlier (see "Alternative B-2" in section 2.2), the Service's proposal would target gathers in Refuge areas of greatest concern, including near springs, in meadows, and in riparian habitats. Not infrequently, these areas also host cultural resources. Therefore, at worst, implementation of the Proposed Action would cause no change in effects on the Refuge's cultural resources. At best, the targeted gathers could reduce horse/burro pressure in areas which also likely contain cultural resources. This contrasts with implementation of alternative A ("No Action"), which would discontinue management of the Refuge's horses and burros, allowing their populations to grow unchecked and their effects upon cultural resources to increase. Finally, should the Service decide to make further changes to the centralized corral system and its water supply, cultural resources surveys would be conducted prior to earth-disturbing activities and appropriate avoidance, mitigation, documentation, and/or consultation would be completed.

Raymond, A. and V. Parks. 2007. Management of Feral Horses on Sheldon National Wildlife Refuge and Section 106 of the National Historic Preservation Act. Unpublished USFWS report. 46 pp.

- **Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544).** This Act facilitates the conservation of threatened and endangered species of fish, wildlife, and plants. Section 7 of the Act requires consultation before initiating projects which affect or may affect endangered species. With the recent delisting of the bald eagle, there are now no federally threatened or endangered species known to occur on Sheldon Refuge. Therefore, no specific compliance actions are required or have been taken in association with implementation of the Proposed Action.

- **Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136).** In the early 1970s, the Service evaluated the suitability of the Sheldon NWR for wilderness designation. A proposed wilderness was identified and referred to the U.S. Congress. The proposed area will not become a designated wilderness area until action is taken by the Congress and legislation is signed by the President. In the interim, the area proposed for wilderness is being managed to so as not to adversely affect its wilderness character.

  FWS. 1974. Proposed Charles Sheldon Wilderness Area, Nevada. Draft EIS. Portland, OR.

- **National Wildlife Refuge System Administration Act of 1966, as amended by, among others, the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee).** The National Wildlife Refuge System Improvement Act (Public Law 105-57, Improvement Act) established wildlife conservation as the singular mission of the National Wildlife Refuge System.

  ‘‘The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.’’

  With respect to the System, it is the policy of the United States that each refuge shall be managed to fulfill the mission of the System, as well as the specific purposes for which that refuge was established. Refuge purposes are provided in section 1.1 of this EA (Applicable Laws, Regulations, Policies, Other Guidance, Plans, and NEPA Documents).

- **Floodplain Management (Executive Order 11988 of 1977).** Under this order Federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." Implementation of the Proposed Action is consistent with Executive Order 11988 because the Service proposes to maintain the natural and beneficial values served by floodplains.

- **Protection of Wetlands (Executive Order 11990 of 1977).** This EA complies with requirements of Executive Order 11990 because implementation of the Proposed Action (which would maintain, on an interim basis, roughly current populations of horses and burros

on the Refuge) would not worsen effects on Refuge wetlands. Additionally, as described earlier (see "Alternative B-2" in section 2.2), the Service's proposal would target gathers in Refuge areas of greatest concern, including near springs, in meadows, and in riparian habitats, areas where Refuge wetlands occur. This contrasts with implementation of alternative A ("No Action"), which would discontinue management of the Refuge's horses and burros, allowing their populations to grow unchecked and their effects upon Refuge wetlands to increase

- **Intergovernmental Review (Executive Order 12372 of 1982).** Coordination and consultation with affected Tribal, local and State governments, other Federal agencies, and local interested persons has been completed through personal contact by Refuge and/or other Service staff.

- **Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Executive Order 12898 of 1994).** All Federal actions must address and identify, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The Proposed Action was evaluated and no adverse human health or environmental effects were identified for minority or low-income populations, or Indian Tribes.

- **Responsibilities of Federal Agencies to Protect Migratory Birds (Executive Order 13186 (2001).** This Order directs departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act. A provision of the Order directs Federal agencies to consider the impacts of their activities, especially in reference to birds on the Fish and Wildlife Service's list of Birds of Conservation (Management) Concern (BCC). It also directs agencies to incorporate conservation recommendations and objectives in the U.S. National Shorebird Plan, North American Waterfowl Management Plan, North American Colonial Waterbird Plan, and other bird conservation plans developed by Partners in Flight (PIF) into agency planning. The effects of the alternatives to Refuge habitats used by migratory birds were addressed in section 4.1 of the EA.

_____ _____

Project Leader Date
Sheldon-Hart Mtn NWR Complex