



# Changing climates and the role of national wildlife refuges in the conservation of the Great Basin

Paul F. Steblein and Gail H. Collins, U.S. Fish and Wildlife Service, Sheldon-Hart Mountain National Wildlife Refuge Complex

**Abstract:** The Great Basin extends across large portions of the Intermountain West, however very little of the sagebrush biome remains undisturbed or unaltered. Both natural and anthropogenic processes have and are resulting in rapid and extensive changes to vegetation and other habitat components. The sagebrush-steppe ecosystem now constitutes one of North America's most imperiled and neglected ecosystems. This is due to profound influences of converging ecosystem stressors including livestock grazing, wild horse and burro management, agriculture, mineral extraction, invasive species, roads, utility corridors, and energy development. In addition, the relationship of these stressors to the influence of climate change is unknown. The conservation and resilience of the Great Basin will be dependant upon the ability to reduce ecosystem stressors across the landscape in the face of climate change. National wildlife refuges, working in partnership, have the potential to provide critical areas for such conservation, including opportunities for research, monitoring, and adaptive management. The Sheldon-Hart Mountain National Wildlife Refuge Complex, located in Oregon and Nevada, will be used as one example of potential ecosystem conservation occurring on a landscape-scale. The strategy for management at this refuge complex is to reduce the impact of ecosystem stressors (e.g., horses/burros, mining, invasive species, and catastrophic wildfire), restore habitats and ecosystem processes, and build partnerships with public/private stakeholders to advance conservation on the landscape. A scientific underpinning to these actions is necessary, and includes conducting research, inventory, and monitoring of ecosystem components and system responses. Results are then incorporated using adaptive management concepts

## Ecological Stressors in the Great Basin

### >Livestock grazing

### >Wild/Feral horses and burros

### >Agricultural development

### >Roads, fences, and utility corridors

### >Oil, gas, and mining

### >Invasive plants and animals

### >Juniper expansion

### >Changes in the fire regime

### >Human population growth and recreation

### >Climate change

#### Climate change

**Refuge Issue:** Large potential impacts with warming temperatures and changing patterns of precipitation; Complicated interactions with other stressors and uncertainty of response.

**Refuge Management:** Reduce ecological stressors to build resilience in system; Monitor system response at multiple scales; Broaden conservation planning and management to a landscape-scale with surrounding landowners.

#### Agricultural development

**Refuge Issue:** Water diversion, extraction and irrigation, and development of wet meadow complexes for pasture and hay.

**Refuge Management:** Working towards coordinated landscape-level conservation efforts with the BLM and private landowners; Participating in pilot effort to analyze vulnerability of refuges to changes in landuse.

#### Invasive plants and animals

**Refuge Issue:** More than 100,000 acres infested by exotic plants. Bullfrogs, guppies, and rainbow trout have excluded native frogs and fish.

**Refuge Management:** Develop IPM Plan and weed inventory program; Reduce ecological stressors; Treatment and control of invasive plants.

**Refuge Research:** Partnerships with Joint Fire Science and Agricultural Research Services to investigate methods for control and minimizing risk.

#### Wild/Feral horses and burros

**Refuge Issue:** Historical and ongoing use by expanding horse and burro populations.

**Refuge Management:** Control of feral horse and burro populations on Refuge lands. Hart Mountain Refuge – kept at zero; Sheldon Refuge – limiting population increases, considering reduction/removal to meet policy.

#### Human population growth and recreation

**Refuge Issue:** Although visitation is still low, most campgrounds are located in sensitive riparian areas and off-highway road use is increasing.

**Refuge Management:** Keep public use activities to compatible levels; Explore relocation of campgrounds; Use various methods to ensure OHV compliance to prevent habitat damage.

#### Roads, Fences, and Utility Corridors

**Refuge Issue:** Hundreds of miles of roads, 2-track, residual fences, and utility lines; Proposals for new energy corridors.

**Refuge Management:** Reduce/remove unnecessary roads; Reduce road impacts; Remove unnecessary fences; Ensure utility Right-of-Way permittees complete restoration; Restrict energy corridors from protected areas

#### Oil, Gas, and Mining

**Refuge Issue:** On Sheldon Refuge, 65,000 acres open to hard rock mining, several hundred active claims; Temporary withdrawal of 455,000 acres expires April 2011.

**Refuge Management:** Renew temporary withdrawal or make permanent; Regulations needed to improve management of active claims.

#### Livestock grazing

**Refuge Issue:** 140 years of livestock grazing; Permitted livestock grazing ended in 1994.

**Refuge Management:** Restoration of spring developments for natural hydrology; Removal of more than 100 miles of allotment fences.

#### Changes in the fire regime

**Refuge Issue:** Changes in climate, invasive species distribution, fire/fuel budget priorities; Increases in severe fire seasons and catastrophic fire events.

**Refuge Management:** Control of invasive species; deployment of fire suppression assets in most cost-efficient manner.

**Refuge Research:** Partnerships with Joint Fire Science and others to better understand the complex interplay of climate, fire, and invasive species.

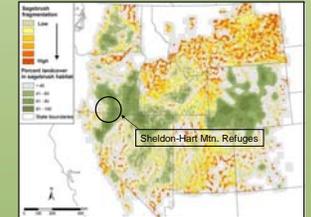
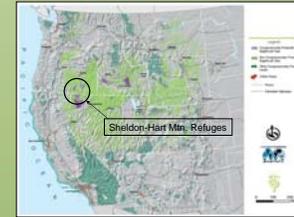
#### Juniper expansion

**Refuge Issue:** Approximately 10,000-20,000 acres of encroaching juniper.

**Refuge Management:** Use remote sensing to map areas and extent of juniper expansion. Conduct fuels treatments to convert back to sagebrush communities.

## So what is the conservation contribution of Sheldon and Hart Mountain National Wildlife Refuges?

- ✓ Almost 1 million acres protected
  - Sheldon Refuge: 575,000 acres; Hart Mountain Refuge: 275,000 acres
- ✓ One of the last and best relatively intact remnants of the sagebrush steppe
- ✓ No commercial livestock grazing
- ✓ No horse or burro grazing on Hart Mountain Refuge
- ✓ Water rights protected
- ✓ Relatively unfragmented landscape
- ✓ Good breeding populations of sagebrush/grassland obligate birds
- ✓ High in richness of native species
  - 650+ species of plants
  - 300+ species of vertebrates
  - Uncounted thousands of invertebrates (including endemic species)



Grazing by horses excluded (after only 4 months)

**Refuge Research:** Effects of feral horse use on upland and riparian habitats in the absence of livestock grazing.

#### Other Research:

- ❖ Distribution and movements of feral horses in the Great Basin
- ❖ Evaluation of feral horse diet using stable isotopes
- ❖ Greater sandhill crane movements
- ❖ Mule deer movement and distribution study
- ❖ Effects of livestock removal from riparian and shrub-steppe habitats
- ❖ Genetic connectivity of American pika populations

#### Inventory and Monitoring:

- ❖ Greater sage-grouse lek surveys
- ❖ West Nile virus monitoring
- ❖ Raptor nest occupancy surveys
- ❖ American pika surveys
- ❖ Mule deer composition survey
- ❖ California bighorn sheep composition survey
- ❖ Pronghorn composition survey
- ❖ Bat inventory and monitoring
- ❖ Pygmy short-horned lizard and other reptile surveys
- ❖ Malformed frog surveys

