

RAC AGENDA – September 2022



1. Welcome, RAC Introductions and RAC Procedure
- RAC Chair
2. Approval of Agenda and Minutes
- RAC Chair
3. Wildlife Board Meeting Update
- RAC Chair **INFORMATIONAL**
4. Regional Update
- DWR Regional Supervisor **INFORMATIONAL**
5. 2023 Fishing Recommendations and Rule R657-14
- Randy Oplinger, Sportfish Coordinator **ACTION**
6. Henry Mountains Bison Management Plan
- Guy Wallace, Wildlife Manager **ACTION**
7. LOA Rule Amendments – LOA Proposals
- Chad Wilson, Private Lands Public Wildlife Coordinator **ACTION**

Regional Presentations Only

- Strawberry Reservoir Fisheries Management Plan – CR Only **INFORMATIONAL**
– Alan Ward, Strawberry Project Leader
– Wes Pearce, Strawberry Project Biologist

**Presentations can be viewed at <https://wildlife.utah.gov/feedback.html>
Public Comment can be provided by clicking the link under the presentation.**

CR RAC – August 30th, 6:00 PM
Wildlife Resource Conference Room
1115 N. Main Street, Springville
<https://youtu.be/hDn8Xca9MFU>

SER RAC – September 7th, 6:30 PM
John Wesley Powell Museum
1765 E. Main St., Green River
https://youtu.be/T_DEQkoN0lo

NR RAC – August 31st, 6:00 PM
Weber County Commission Chambers
2380 Washington Blvd. #240, Ogden
<https://youtu.be/a1NzVyoKPoc>

NER RAC – September 8th, 6:30 PM
Wildlife Resources Conference Rm
318 North Vernal Ave, Vernal
<https://youtu.be/ypvzt3pbrmM>

SR RAC – September 6th, 6:00 PM
DNR Richfield City Complex
2031 Industrial Park Rd., Richfield
<https://youtu.be/bDHQT8UGeKE>

Board Meeting – September 29th, 9:00 AM
Eccles Wildlife Education Center
1157 S. Waterfowl Way, Farmington
<https://youtu.be/M1BOVsuyqOM>



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Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

JOEL FERRY
Executive Director

Division of Wildlife Resources

J. SHIRLEY
Division Director

MEMORANDUM

TO: Regional Advisory Council Members and Wildlife Board

FROM: Randy Oplinger, Sport Fisheries Program Coordinator, and
Craig Walker, Assistant Fisheries Chief, Sport Fisheries Program

DATE: August 18, 2022

SUBJECT: 2023-2024 Fishing Regulation Proposals

The UDWR is recommending the following regulation changes to the 2023 and 2024 Utah Fishing Guidebooks. All page numbers referenced in this memorandum refer to the location in the 2022 Utah Fishing Guidebook where a regulation change is proposed.

Central Region:

- Mona Res: Add "Limits for all species are double the statewide limits listed on page 7 of this guidebook"
- Yuba Res: Add "Limits for all species except tiger muskellunge are double the statewide limits listed on page 7 of this guidebook. Limit 1 tiger muskellunge over 40 inches. All tiger muskellunge under 40 inches must be immediately released."
- Strawberry Reservoir Tributaries: The DWR proposes removing the Sept. 1 through 6 a.m. on the second Saturday of October closure from all the creeks listed under (b) with the exception of Trout Creek (page 39). The catch and release, artificial fly and lure, and May 15 through 6 a.m. on the second Saturday of July stipulations would remain. The DWR proposes maintaining the May 15 through 6 a.m. on the second Saturday of July and the Sept. 1 through 6 a.m. on the second Saturday of October on Trout Creek. In addition, the DWR proposes maintaining the catch and release and artificial fly and lure stipulations on Trout Creek.

Northeastern Region:

- Big Sandwash Reservoir: Reduce the yellow perch limit to 10 fish. Increase the walleye limit to 20 walleye (no size restrictions on walleye at this water).
- Brown Duck Basin: Remove the existing seasonal closure (page 27).
- Jones Hole Creek: Strike language saying "Limit 2 trout, only 1 may be a brown trout over 15 inches". This would make the limit 4 trout, any species, any size. Keep the artificial flies and lures only restriction (page 33).



- Pelican Lake: Add “No limit for common carp. Anglers must not release any common carp they catch. All common carp must be immediately killed.” Also, add “Limit 50 bullhead” (page 36).
- Starvation Reservoir: Reduce limit on bluegill, green sunfish, black crappie, and yellow perch from 20 fish (a combined total) to 10 fish (a combined total; page 39).
- West Fork Duchesne River: DWR proposes shortening the stretch of the river where special regulations apply. The recommendation is to change the “lead in” text from “From the confluence with North Fork upstream to the headwaters, including Wolf Creek” to “From the confluence with Wolf Creek upstream to the headwaters, excluding Wolf Creek”. No changes are being proposed to the special regulation itself (page 41).
- Wolf Creek: Remove all special regulation wording (i.e., strike water from special regulations section; page 41).

Northern Region:

- Tony Grove Lake: Add limit of 8 trout from Aug. 15 - Dec. 31
- Stateline Reservoir: Add limit 4 trout or kokanee salmon, and no more than 1 may be a lake trout over 22 inches. All lake trout under 22 inches must be immediately released. Bonus limit of 4 kokanee salmon (total limit of no more than 8 trout if at least 4 are kokanee salmon).
- Causey Reservoir: Add limit 4 trout or kokanee salmon, and no more than 1 may be a lake trout over 22 inches. All lake trout under 22 inches must be immediately released.
- Lower Bear River: Add stretch from Cutler Reservoir to Great Salt Lake to the list of waters where dead yellow perch can be used as bait (Utah Administrative Rule R657-13-12 and page 12).
- Willard Pond: Add pond to the community fisheries list (page 28).
- Lost Creek Reservoir: Strike “CLOSED to fishing 10 p.m. to 6 a.m. daily. “
- Uinta Mountains: The DWR proposes increasing the limit to 8 trout with a 4 brook trout bonus limit from August 15 through December 31 on Beaver Lake, Bridger Lake, Marsh Lake, Quarter Corner Lake, and Teapot Lake. The limits on these lakes would be the same 4 trout with 4 brook trout bonus limit that applies throughout the Uinta Mountains through the remainder of the year. Current limits would apply year round to other waters in the Uintas (page 40).

Southeastern Region:

- The DWR is recommending that Green River Golf Course Pond is removed from the list of community fisheries (page 28).

Southern Region:

- Navajo Lake: Change “Limit 4 splake, brook trout, or tiger trout (a combined total), only 1 may exceed 22 inches” to “Limit 4 trout or arctic grayling, only 1 may exceed 22 inches” (page 35).

Statewide Recommendations Pertaining to Roundtail Chub:

- The DWR proposes removing roundtail chub from the prohibited species list on page 17. This proposal also involves removing roundtail chub from the prohibited species lists within Utah Admin. Rules R657-13-13 and R657-14-8.
- The DWR also proposes the regulation changes identified in the table that is below.

Water	Stretch	Proposed Regulation
Escalante River	Pine Creek confluence to Lake Powell	Catch and release with artificial fly and lure restriction
McElmo Creek	Colorado state line to San Juan River confluence	Catch and release with artificial fly and lure restriction
Colorado River	Colorado state line to Dirty Devil River confluence	Limit 2 fish
Delores River	Colorado state line to Colorado River confluence	Limit 2 fish
Green River	Sand Wash Boat Launch to Colorado River confluence	Limit 2 fish
Green River	Colorado state line to Sand Wash Boat Launch	Catch and release
San Rafael River	Entire river	Limit 2 fish
White River	Colorado state line to Tribal land boundary	Limit 2 fish



R657. Natural Resources, Wildlife Resources.

R657-13. Taking Fish and Crayfish.

R657-13-1. Purpose and Authority.

(1) Under authority of Sections 23-14-18 and 23-14-19 of the Utah Code, the Wildlife Board has established this rule for taking fish and crayfish.

(2) Specific dates, areas, methods of take, requirements and other administrative details which may change annually and are pertinent are published in the proclamation of the Wildlife Board for taking fish and crayfish.

R657-13-12. Bait.

(1) Use or possession of corn while fishing is lawful, except as otherwise prohibited by the Wildlife Board in the Fishing Guidebook.

(2) Use or possession of live baitfish while fishing is unlawful, except as authorized by the Wildlife Board in the Fishing Guidebook.

(3) Use or possession of tiger salamanders (live or dead) while fishing is unlawful.

(4) Use or possession of any bait while fishing on waters designated artificial fly and lure only is unlawful.

(5) Use or possession of artificial baits which are commercially imbedded or covered with fish or fish parts while fishing is unlawful.

(6) Use or possession of bait in the form of fresh or frozen fish or fish parts while fishing is unlawful, except as provided below and in Subsections (7) and (8).

(a) Dead Bonneville cisco may be used as bait only in Bear Lake.

(b) Dead yellow perch may be used as bait only in: [Bear River from Cutler Reservoir Dam downriver to the Great Salt Lake](#), Big Sand Wash, Deer Creek, Echo, Fish Lake, , Gunnison, Hyrum, Johnson, Jordanelle, Mantua, Mill Meadow, Newton, Pineview, Red Fleet, Rockport, Starvation, Utah Lake, Willard Bay and Yuba reservoirs.

(c) Dead white bass may be used as bait only in Utah Lake and the Jordan River.

(d) Dead shad, from Lake Powell, may be used as bait only in Lake Powell. Dead shad must not be removed from the Glen Canyon National Recreation Area.

(e) Dead striped bass, from Lake Powell, may be used as bait only in Lake Powell.

(f) Dead fresh or frozen salt water species including sardines and anchovies may be used as bait in any water where bait is permitted.

(g) Dead mountain sucker, white sucker, Utah sucker, redbreast shiner, speckled dace, mottled sculpin, fat head minnow (all color variants including rosy red minnows), Utah chub, and common carp may be used as bait in any water where bait is permitted.

(h) Dead burbot, from Flaming Gorge Reservoir, may be used as bait only in Flaming Gorge Reservoir.

(7) Commercially prepared and chemically treated baitfish or their parts may be used as bait in any water where bait is permitted.

(8) The eggs of any species of fish caught in Utah, except prohibited fish, may be used in any water where bait is permitted. However, eggs may not be taken or used from fish that are being released.

(9) Use of live crayfish for bait is legal only on the water where the crayfish is captured. It is unlawful to transport live crayfish away from the water where captured.

(10) Manufactured, human-made items that may not be digestible, that are chemically treated with food stuffs, chemical fish attractants, or feeding stimulants may not be used on waters where bait is prohibited.

(11) On any water declared infested by the Wildlife Board with an aquatic invasive species, or that is subject to a closure order or control plan under R657-60, it shall be unlawful to transport any species of baitfish (live or dead) from the infested water for use as bait in any other water of the State. Baitfish are defined as those species listed in sections (5)(b),(5)(c),(5)(f) and (8).

R657-13-13. Prohibited Fish.

(1) The following species of fish are classified as prohibited and may not be taken or held in possession:

- (a) Bonytail (*Gila elegans*);
 - (b) Bluehead sucker (*Catostomus discobolus*);
 - (c) Colorado pikeminnow (*Ptychocheilus lucius*);
 - (d) Flannelmouth sucker (*Catostomus latipinnis*);
 - (e) Gizzard shad (*Dorosoma cepedianum*), except at Lake Powell;
 - (f) Grass carp (*Ctenopharyngodon idella*);
 - (g) Humpback chub (*Gila cypha*);
 - (h) June sucker (*Chasmistes liorus*);
 - (i) Least chub (*Lotichthys phlegethontis*);
 - (j) Northern Leatherside chub (*Lepidomeda copei*);
 - (k) Razorback sucker (*Xyrauchen texanus*);
 - (l) ~~Roundtail chub (*Gila robusta*);~~
 - ~~(m)~~ Southern Leatherside chub (*Lepidomede aliciae*);
 - ~~(n)~~ Virgin River chub (*Gila seminuda*);
 - ~~(o)~~ Virgin spinedace (*Lepidomeda mollispinis*); and
 - ~~(p)~~ Woundfin (*Plagopterus argentissimus*).
- (2) Any of these species taken while attempting to take other legal species shall be immediately released.

KEY: fish, fishing, wildlife, wildlife law

Date of Enactment or Last Substantive Amendment: May 9, 2022

Notice of Continuation: September 28, 2017

Authorizing and Implemented or Interpreted Law: 23-14-18; 23-14-19; 23-19-1; 23-22-3

R657. Natural Resources, Wildlife Resources.

R657-14. Commercial Harvesting of Protected Aquatic Wildlife.

R657-14-1. Purpose and Authority.

(1)(a) Under authority of Sections 23-14-3, 23-14-18, and 23-14-19, and Sections 23-15-7 through 23-15-9, this rule provides the procedures, standards, and requirements for:

- (i) harvesting protected aquatic wildlife for use as fish bait; and
- (ii) seining protected aquatic wildlife.

(b) The commercial harvesting of brine shrimp and brine shrimp eggs is regulated under Rule R657-52.

R657-14-8. Prohibited Nongame Species.

The following species of protected aquatic wildlife may not be harvested, and if caught must be immediately returned alive and unharmed to the water from which it was taken:

- (1) bonytail (*Gila elegans*);
- (2) bluehead sucker (*Catostomus discobolus*);
- (3) Colorado pikeminnow (*Ptychocheilus lucius*);
- (4) flannelmouth sucker (*Catostomus latipinnis*);
- (5) gizzard shad (*Dorosoma cepedianum*);
- (6) grass carp (*Ctenopharyngodon idella*);
- (7) humpback chub (*Gila cypha*);
- (8) June sucker (*Chasmistes liorus*);
- (9) least chub (*Iotichthys phlegethontis*);
- (10) leatherside chub (*Gila cypha*);
- (11) razorback sucker (*Xyrauchen texanus*);
- (12) ~~roundtail~~ Virgin River chub (*Gila robusta seminuda*);
- (13) ~~Virgin River chub (*Gila robusta seminuda*);~~
- ~~(14)~~ Virgin spinedace (*Lepidomeda mollispinis*); and
- ~~(15)~~14) woundfin (*Plagopterus argentissimus*).

KEY: game laws, bait dealers, commercialization of aquatic wildlife

Date of Enactment or Last Substantive Amendment: September 4, 2002

Notice of Continuation: June 15, 2017

Authorizing, and Implemented or Interpreted Law: 23-14-18; 23-14-19; 23-13-13; 23-15-7; 23-15-8; 23-15-9; 23-14-3



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DEPARTMENT OF NATURAL RESOURCES

JOEL FERRY
Executive Director

Division of Wildlife Resources

J. SHIRLEY
Division Director

MEMORANDUM

TO: Wildlife Board and Regional Advisory Council Members

FROM: Guy Wallace, SER Wildlife Manager

DATE: August 17, 2022

SUBJECT: Bison Management Plan for Henry Mountains

A Henry Mountains Bison Plan committee was formed and, in conjunction with the Utah Division of Wildlife Resources (UDWR), has updated and revised the bison management plan approved in 2007. If approved, the new plan will guide the management of bison on the Henry Mountains for the next 10 years.

Below is a summary of the major updates to the bison management plan:

1. This plan provides guidance and direction for managing the bison population on the Henry Mountains.
2. The plan includes updates to the management goals, objectives and strategies based on input from the committee.
3. The most recent research studies and findings were added to the plan.
4. No change was made to the population goal for adult bison numbers after the hunting seasons have concluded.
5. Changes were made to the population strategies to consider habitat conditions based on the U.S. Drought Monitor in recommending permit numbers to the RACs and Wildlife Board.
6. The plan calls for continued monitoring bison movements and use areas using satellite radio-collars.
7. The plan allows UDWR to pursue opportunities to improve genetic heterozygosity by supplementing the bison population from other genetically pure and disease-free herds.
8. The plan directs the UDWR and its partners to implement strategies to achieve a distribution of bison that better utilizes available habitat and minimizes conflicts.
9. The plan calls for maintaining high quality hunting opportunities for bison by minimizing hunter crowding and maintaining high hunt success rates.
10. The plan also calls for utilizing hunting strategies that minimize early movements of bison on to winter ranges.



11. The plan encourages the use of all media platforms to increase public awareness and education of this unique wildlife resource in our state and expand opportunities for public viewing.
12. The plan provides an updated list of potential habitat projects to help resolve conflicts with livestock.

**BISON UNIT MANAGEMENT PLAN
HENRY MOUNTAINS
UNIT # 15**

PURPOSE OF THE PLAN

This document provides overall guidance and direction for managing the Henry Mountains (HM) bison herd. This plan offers general information on natural history, management, population status, habitat, and issues of concern for bison on this unit. This plan also outlines the goals, objectives, and strategies for managing the bison population and their habitat.

This unit bison management plan was revised by a 16 person advisory committee. The committee was diverse and had representation from the Utah Wildlife Board, Utah State University Eastern, Utah Department of Agriculture and Food, Sportsmen for Fish and Wildlife, Bureau of Land Management (BLM), Capitol Reef National Park (CRNP), Utah Farm Bureau, Bull Mountain Outfitters, Wayne County Commission, private landowners, livestock permittees, Utah School & Institutional Trust Lands (SITLA), and Utah Division of Wildlife Resources (DWR). This group met 9 times from August 19, 2019, to April 19, 2022.

UNIT BOUNDARY DESCRIPTION

Garfield and Wayne counties—Boundary begins in Hanksville at the junction of SR-24 and SR-95; south on SR-95 to the west shoreline of Lake Powell; south along this shoreline to SR-276 at Bullfrog; north on SR-276 to the Burr Trail-Notom road; north on this road to the Glen Canyon National Recreation Area boundary west of the Bullfrog Creek drainage; northwest on this boundary to the Capitol Reef National Park boundary; north on this boundary to SR-24; east on SR-24 to SR-95 at Hanksville.

BISON USE AREA DESCRIPTION

The area currently used by bison covers approximately 300,000 acres - from Blue Bench on the north to Eggnog on the south, to Coyote and Eagle Benches on the east, to the Notom-Burr Trail Road and CRNP boundary on the west, see Appendix, Map 1.

The elevation ranges from 4,800 feet to 11,500 feet above sea level. Annual precipitation averages 18 inches on the higher elevations and 8 inches on the lower foothills. The topography includes steep mountain slopes, benches and foothills, flat

mesas, and deeply eroded canyons. The primary vegetative communities found in the area are salt desert shrub, pinyon-juniper, mountain brush, aspen-conifer, and subalpine. Bison can be found throughout the area, in all elevations, topographies, vegetative communities, and seasons.

LAND OWNERSHIP

The following table shows land ownership of the area currently used by bison (Table 1). This area is included within the larger Wildlife Management Unit #15, which encompasses approximately 856,812 acres.

Table 1. Bison range area and approximate ownership

Ownership	Area in Acres	%
BLM Total	258,022	87
SITLA Total	33,793	11.4
Private Total	4,203	1.4
Tribal Total	0	0
Grand Total	296,108	100

HENRY MOUNTAIN BISON HISTORY AND STATUS

Bison are culturally symbolic of the American frontier. In 1941, along with other conservation efforts through the turn of the century, local hunters and conservationists joined together to establish a bison herd in southeast Utah to restore and preserve bison for their intrinsic value and the benefit of future generations. The Carbon Emery Wildlife Federation (the local chapter of the National Wildlife Federation), the Federal Grazing Service, local stockmen, and the Utah Department of Fish and Game obtained 18 bison, including three bulls and 15 cows, from Yellowstone National Park. It has been heralded as one of the greatest joint efforts in wildlife conservation (Bingham, 1971).

The 18 bison were released near Robbers Roost Ranch north of the Dirty Devil River on the San Rafael Desert. Most of the animals established themselves near the release site, despite a few that dispersed north and west. Bulls accounted for most of the dispersing animals, and it was deemed necessary to supplement the original reintroduction with an additional five bulls the following year (Bates & Hersey, 2016).

Those additional five bulls joined the majority of the bison and crossed the Dirty Devil River in 1942 onto the Burr Desert. The bison used the Burr Desert as winter range and the HM as the summer range until 1962. There have been no other introductions into this herd.

Bison moved from the area of introduction on the San Rafael Desert to ranges across the Dirty Devil River and expanded into new ranges utilizing forage that had been available to cattle. This caused concerns about forage competition on some grazing allotments between affected grazers and the DWR and continues to this day. Numerous habitat projects have been completed to try to improve forage availability for both cattle and bison. The committee, in the development of this bison management plan, has worked to improve relations and help minimize these issues as much as possible.

The HM bison population grew to approximately 71 animals by 1962, when brucellosis was detected in the herd. Blood samples were taken during a special hunt that year, and several animals tested positive for *Brucella* titers, indicating possible infection in the herd (Bates, 1965). In 1963, 69 bison were captured in a corral and tested and inoculated for brucellosis. Animals suspected of brucellosis infection were marked, then released, and killed by sport hunters. A significant behavioral consequence of the harassment and the capture operation was that the bison changed their home range. Since 1963, the herd has utilized the HM area as its home range.

Total summer population estimates have ranged from 59 in 1964 to a high of 602 in 2008 and averaged 319. In 2010, the post-season adult population objective was increased from 275 to 305. It was increased again in 2012 to 325 in alignment with the 2007 HM bison plan. The modeled number of adult bison post-season since 2012 has averaged 314. In 2021 the modeled summer herd numbers were 411, and the adult post-season estimate was 295 (Table 2). More historical long-term population data and trends are included in Appendix A, Tables 1 and 2.

Table 2. The table references the yearly observed and modeled population with the number of permits and harvest from 2007 to 2020.

	Modeled Summer Total Population	Aerial Observed Total Count*	Afield	Harvest	Modeled Post-Season Total Population Estimate	Modeled Post-Season Adult (1+) Pop. Estimate**
2007	593	563	141	117	515	396
2008	577	540	165	133	416	334
2009	522	470	146	109	352	292
2010	427	345	48	38	346	296
2011	403	372	25	21	383	310
2012	504	471	117	91	391	329

2013	464	425	98	62	382	321
2014	453	414	78	64	374	304
2015	447	413	55	43	386	317
2016	469	431	62	49	402	324
2017	569	461	86	63	413	325
2018	598	540	203	145	425	310
2019	464	393	127	83	353	316
2020	414	No Flight***	46	38	361	303
2021	411	342	80	53	343	295

*Actual count, no sightability factor.

** Post-season estimate used for setting harvest permit numbers to meet management objectives.

***The 2020 flight survey was canceled due to COVID19- Utah Dept. of Public Safety flight restrictions.

Over the last ten years, the number of bulls per 100 cows has averaged 60 (Figure 1). The number of calves per 100 cows has averaged 31 over the same period. The extreme drought during the years of 2017-2018 appears to have affected calf production as the number of calves counted per 100 cows during the 2019 summer classification was only 14.

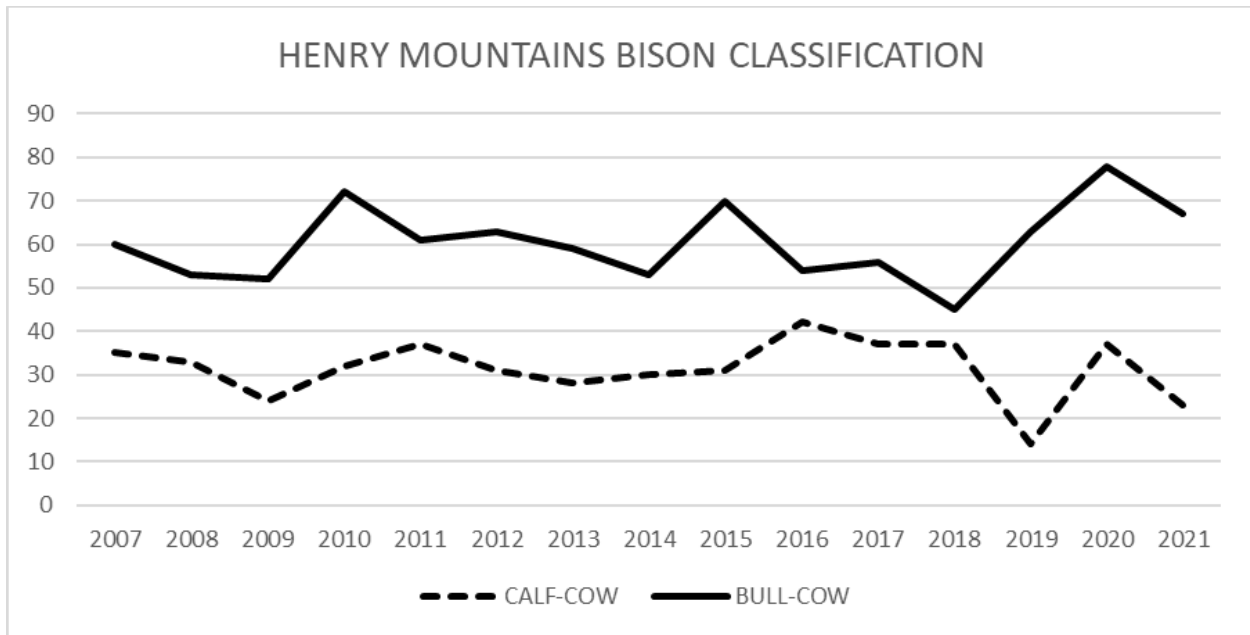


Figure 1. Bison classification 2007-2021.

POPULATION MANAGEMENT

Ongoing management continues to focus on conservation strategies to maintain a healthy and disease-free source of Yellowstone bison genetics and provide hunting and viewing opportunities. Management practices include extensive habitat management, summer herd composition surveys, annual helicopter surveys, sport harvest, and modeling population abundance. Pre-season (prior to the beginning of the bison hunts) population estimates of the herd, including calves, were done in the earlier years from the ground. However, since 1990, a helicopter has been used to survey the population to estimate the total numbers of adults and calves.

The model simulates a closed population where births and deaths are the only factors affecting population size. Since there is no migration into or out of the HM bison population, the model is a reliable fit to estimate abundance. A post-season (after the bison hunts end) adult (age 1+) population estimate is modeled annually using summer classification data, the number of animals harvested, and natural mortality.

Bison sex ratio data is gathered by counting at least one-half of the population and classifying the number of bulls, cows, and calves. Utah State University (USU) researchers estimated annual survival probability for adult HM bison at 0.982 (C.I. 0.966-0.998) from the historical cow-calf ratios and collar mortality data (Koons and duToit 2015), and from observed bull-cow ratios. This data is similar to Van Vuren and Bray (1986) survival estimates of calves averaging 94%, adult bulls 95%, and adult cows 96%.

USU also estimated the average sightability during the helicopter survey and found that the probability of detection was 95% due to the DWR observer's high collar detection. In comparison, DWR had previously estimated sightability between 90-93%. Hess (2002) developed aerial survey methods for Yellowstone National Park, where detection probability estimates were 92% during winter and 97% during summer (Terletzky and Koons 2016).

After the population is modeled, the estimate is compared to the number of animals counted during the summer helicopter survey. Under most circumstances, when the modeled adult population estimate is greater than the adult population estimate derived from the survey, the modeled estimate is used. Conversely, the survey numbers are used if the survey reveals a larger adult population than what is modeled. In the past 14 years, there have been three times when the survey showed the model underestimated the adult population. When this happened, survival was adjusted in the model to fit the observed numbers. Any underestimation or overestimation of modeled bison numbers may result in adjusting model inputs to fit observed numbers.

It is important to note that both the aerial survey and the model are used to estimate population abundance independently. In addition, the ratio of adults and calves from

classification and the aerial survey are compared to establish a higher probability of calf production data to input into the model. This adaptive framework of utilizing different methods of collecting, analyzing, and modeling HM bison population data strengthens current bison management.

Genetics

In 2014, researchers at USU, in collaboration with a team at Texas A&M, analyzed 129 individual HM bison genetic samples to assess overall genetic health. Researchers did not detect the introgression of domestic cattle DNA in either mitochondrial or nuclear genomes. Additionally, they found that the herd has a small number of genetic contributions from bison found on the National Bison Range, where 18 females are known to have been introduced into Yellowstone National Park before the HM translocation took place in 1941 (Ranglack *et al.*, 2015)(Figure 3).

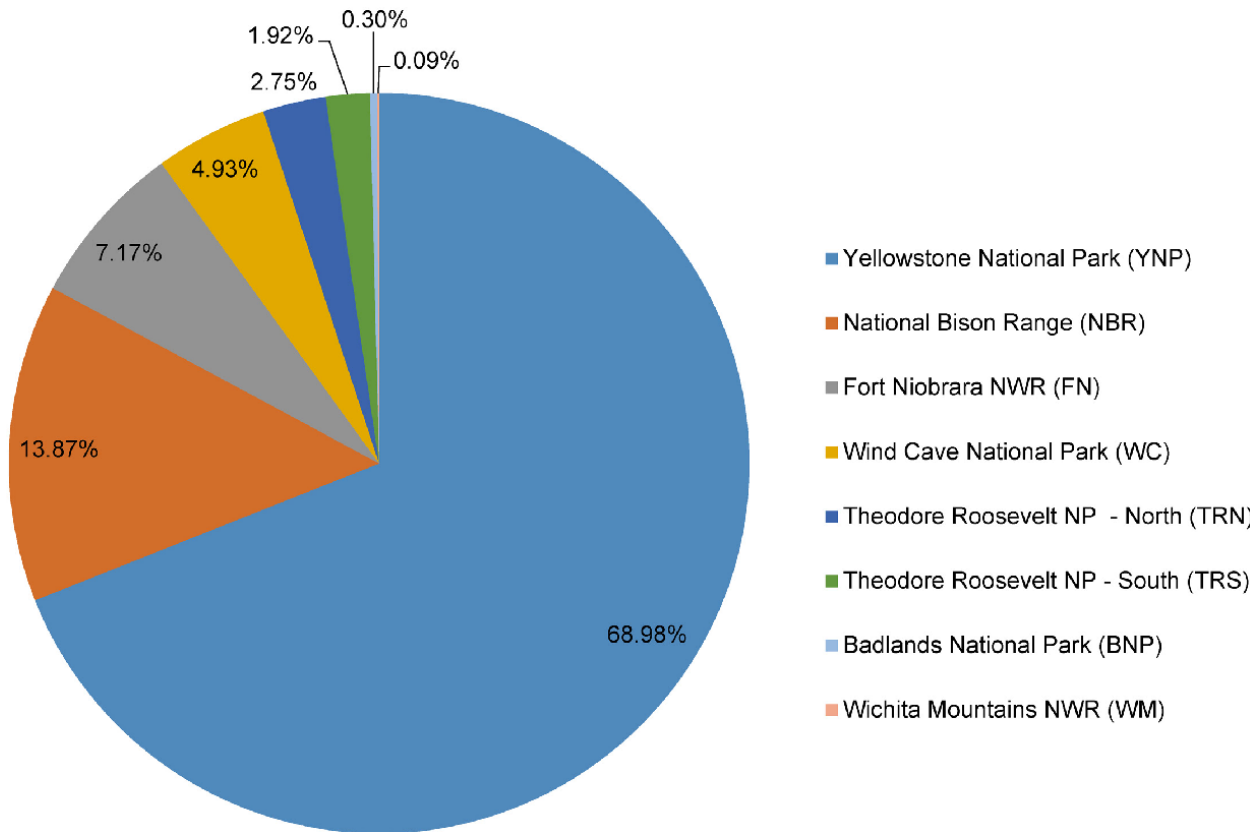


Figure 3. Genomic Contributions. Genomic contributions of 8 US federal bison herds to the Henry Mountains herd, in which 129 animals were sampled for 40 microsatellite loci. Herds were identified a priori for analysis. Contributions of <10% were considered insignificant (Ranglack *et.al.* 2015).

Since the early 1940s, a period >80 years, the HM bison herd has shared rangelands with cattle. This research reasonably confirms that it is highly unlikely for free-ranging bison to crossbreed with cattle naturally (Ranglack *et al.*, 2015).

The HM herd is the only demonstrated introgression-free, disease-free, and free-ranging bison population in North America (Ranglack *et al.*, 2015) and one of only four free-ranging, genetically pure herds remaining on public lands in North America. It is recognized as a key population in maintaining the bison genome. The others include Yellowstone National Park, Wind Cave National Park, and Elk Island in Alberta, Canada (Kunkel *et al.*, 2005).

To ensure the survival of the plains bison genome Kunkel *et al.* (2005) assessed management strategies for minimizing the potential negative effects of inbreeding, the goal being to maintain 90% of the genetic diversity of the gene pool over 500 years. They recommend that each population have at least 430 individuals, including adults and young, to maintain a minimum viable population.

Previous research has advised that individual herds should have an effective population size of 1000 (census number of 2000–3000) to avoid inbreeding depression and maintain genetic variation. If it is not possible to have this primary herd in one location, it could be in two or three locations with significant genetic exchange between them (Hedrick, 2009).

Herds should be maintained at an appropriate population size to minimize the loss of genetic variation and heterozygosity in the HM bison herd and maximize the probability of population survival (Gates *et al.*, 2010). For small herds, fluctuations in population size can have a substantial negative impact on retention of genetic variation (Nei *et al.*, 1975). Maintenance of population size is more important to population survival than the founder population size and should, therefore, be prioritized for small herds (Senner, 1980).

Recently, the U.S. Dept. of Interior (DOI) completed a collaborative genetic viability study of 16 bison herds residing on DOI administered lands and two others from Parks Canada. Two state-managed bison herds — the Utah Book Cliff and Henry Mountains herds — were included because most of their range is on lands administered by the Bureau of Land Management (BLM), and the BLM shares conservation stewardship of these herds. The metapopulation herds studied are geographically isolated and are managed at specific population numbers on range-limited landscapes.

Researchers analyzed the current genetic fitness of each population using Population Viability Analysis models then analyzed what each population would look like in 200 years under current management with and without translocations of new animals. They also analyzed different types of removals to manage population size and the removals' associated effects on long-term genetic viability. These studies indicate that smaller,

non-migrating populations lose genetic diversity more quickly than larger populations. Additionally, species with shorter generation spans lose diversity faster than those with longer generation spans. Therefore, in managing population size, the removal of younger animals retains more genetic diversity long-term than removing adults (Hartway et al., 2020). This is important to managing and conserving the HM bison because harvest removals reduce genetic viability faster than without harvest. Removing prime breeding age females will slow population growth and reduce the required number of removals, but it will also reduce adequate population size and increase genetic loss by shortening generation time. It can also limit the herd's ability to recover from a severe decline or catastrophic event (Traylor-Holzer, 2017).

Showing that the HM bison herd has declining genetic viability, Traylor-Holzer modeled HM bison removals (Figure 4) to maintain the current population objective averaging about 90 animals annually which declined over time to about 55 annually by year 200 as a result of inbreeding consequences. Whereas if there were no inbreeding effects, removals would average 120/year with only a slightly higher birth rate suggesting significant effects of inbreeding in the model. Animal removals also continue to decline over time as inbreeding accumulates (Taylor-Holzer, 2017). This also translates into fewer annual harvest permits to be made available to future generations of hunters.

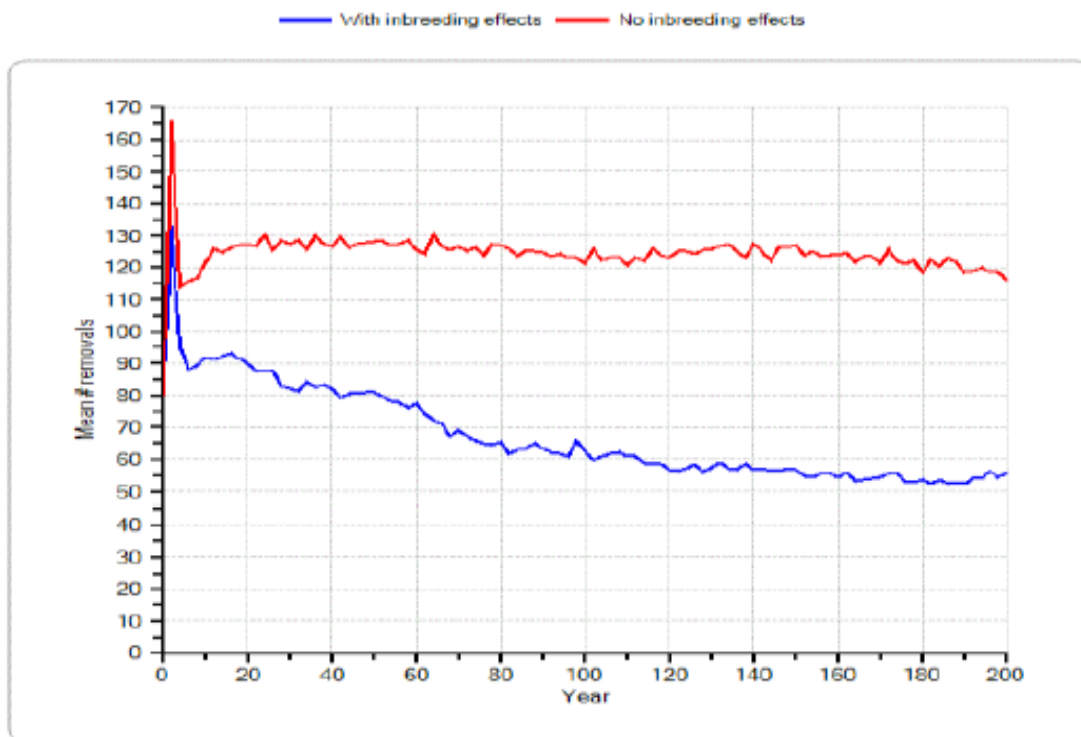


Figure 4. The projected mean number of removals over 200 years for Henry Mtns herd, with inbreeding (blue) and no inbreeding (red) impacts in the model.

Supplementing the HM population with younger bison from genetically best-matched conservation herds could potentially offset the impacts of low genetic diversity levels and the adult hunting management strategy used to control the size of the herd. Additional translocations would most likely be essential for the HM population because it is among the studied herds with the lowest levels of genetic diversity (Hartway et al. 2020).

The HM herd has significance because it was founded by bison from Yellowstone National Park. Therefore, it provides a source of disease-free genetics for future translocations to other conservation herds, sustaining and increasing genetic viability. Consequently, improving and maintaining genetic diversity in this population is a necessity for the future of bison conservation.

Disease

Diseases of significant concern to bison in Utah are bovine brucellosis, bovine tuberculosis, and malignant catarrhal fever.

Brucellosis, caused by the bacterium *Brucella abortus*, causes abortions during the third trimester of pregnancy, and occasionally retained placenta, infertility, reduced milk production, lameness, swollen joints, and swollen testicles (Olsen et al., 2010, Schumaker *et al.*, 2012). Bacteria are shed with birth fluids, and other animals are infected through direct contact with the fluids (Olsen *et al.*, 2010). Some bison can become chronic carriers of the bacteria and shed it intermittently (Olsen *et al.*, 2010). In Utah, blood from hunter-harvested bison is tested annually for brucellosis (Table 3). There have been no reactors since 1963, and the HM bison herd is considered brucellosis free.

Table 3. HENRY MOUNTAINS BISON, BRUCELLOSIS TESTING

HUNTER HARVESTED BISON					LIVE CAPTURED BISON		
Year	# of kits sent out	# bison harvested	Harvest samples returned	Kit return (%)*	Hunter harvested bison, Brucella testing results	# live bison tested	Live bison, Brucella test results
2014-15	70	62	48	77	39 Negative, 9 hemolyzed	0	NA
2015-16	60	43	31	72	31 Negative	0	NA
2016-17	58	49	37	76	33 negative, 4 hemolyzed	0	NA
2017-18	57	60	46	77	46 Negative	0	NA
2018-19	112	78	66	85	66 Negative	32	32 Negative
2019-20	129	84	50	60	50 Negative	0	NA
2020-21	46	38	19	50	19 Negative	7	7 Negative

*Calculated as (# of kits submitted to lab/ # of bison harvested)*100

Bovine tuberculosis, caused by *Mycobacterium bovis*, is a chronic debilitating disease of cattle that can affect bison and many other species (Wobeser, 2009; Miller *et al.*, 2013). No reactors were found among 12 yearlings tested before being translocated to Arizona from the HM in 2001.

Malignant catarrhal fever (MCF), caused by bovine herpesvirus type 2, is a severe viral disease affecting rancher bison (Berezowski *et al.*, 2005; Li *et al.*, 2006). It is most commonly transmitted from domestic sheep through body secretions, but wind-borne infections have been reported where bison contracted MCF from sheep grazed several kilometers away (Li *et al.*, 2008). Malignant catarrhal fever is highly fatal, with mortality rates reaching 100% on affected farms (Schultheiss *et al.*, 1998). Past operator conversion of BLM domestic sheep grazing permits to cattle on the HM has reduced the risk of MCF disease transmission to bison. There is one domestic sheep allotment on the HM unit, and domestic sheep have not been known to have grazed with bison. However, cattle are currently grazed on the allotment. No outbreaks of MCF have been documented in the HM bison to date.

A statewide brucellosis action plan is being developed to address a potential breakout of the disease in Utah. The action plan will be added to the appendix of this management plan upon completion.

Limiting Factors

Van Vuren (1983) investigated bison mortality factors on the HM and found survival to be high, with calves averaging 94%, adult bulls 95%, and adult cows 96%. The study did not determine specific causes of natural mortality, but the authors speculated the primary causes of natural mortality were predation of young, accidents, and old age. Wounding loss by hunters and poaching were identified as non-natural causes.

Bison will also share some dietary overlap with elk (*Cervus elaphus*). However, elk are managed at a population objective of zero elk on the HM to provide more forage for cattle and bison. The current number of elk is estimated to be between 20-30 elk. The effort to eliminate the elk population is managed through hunting. Dietary overlap of bison and mule deer (*Odocoileus hemionus*) is less but could conceivably occur on shared winter ranges, especially if heavy and severe winters rendered grass forage unavailable to bison. The balance between various wild ungulates populations will be determined through individual species management plans for the herd unit. These are reviewed and approved through the public Regional Advisory Council and Wildlife Board process and involve public input and discussion. Vegetation, watershed, and habitat monitoring will help form the basis for the future population objective recommendations.

Large mammalian predators in HM bison habitat include cougars (*Puma concolor*), coyotes, (*Canis latrans*), and bobcats (*Lynx rufus*). Although cougars and coyotes have

been documented to kill bison in the literature, they are not considered a significant threat to HM bison herds, other than the potential of predation on the very young. Mexican gray wolf (*Canis lupus spp. baileyi*) immigration into southern Utah from New Mexico and Arizona is possible. However, it is not anticipated that wolves will ever become established on the HM.

Drought also plays a part in regulating population growth. Three of the driest years in recent memory resulted in the lowest calf production on the HM in 2001, 2003, and especially 2019. In 2001, there were 18 calves produced per 100 cows; 17 in 2003 and the lowest in 2019, at 14 compared to the long-term average of 36 calves per 100 cows (cows one-year old and above). (The most recent drought of 2020-21 resulted in 23 calves per 100 cows in 2021). Reduced forage quality and yield may result in absorption of the fetus, low calf birth weight, and poor milk production, ultimately leading to lower calf survival. These conditions result in fewer calves being born or surviving, slowing population growth until habitat conditions improve.

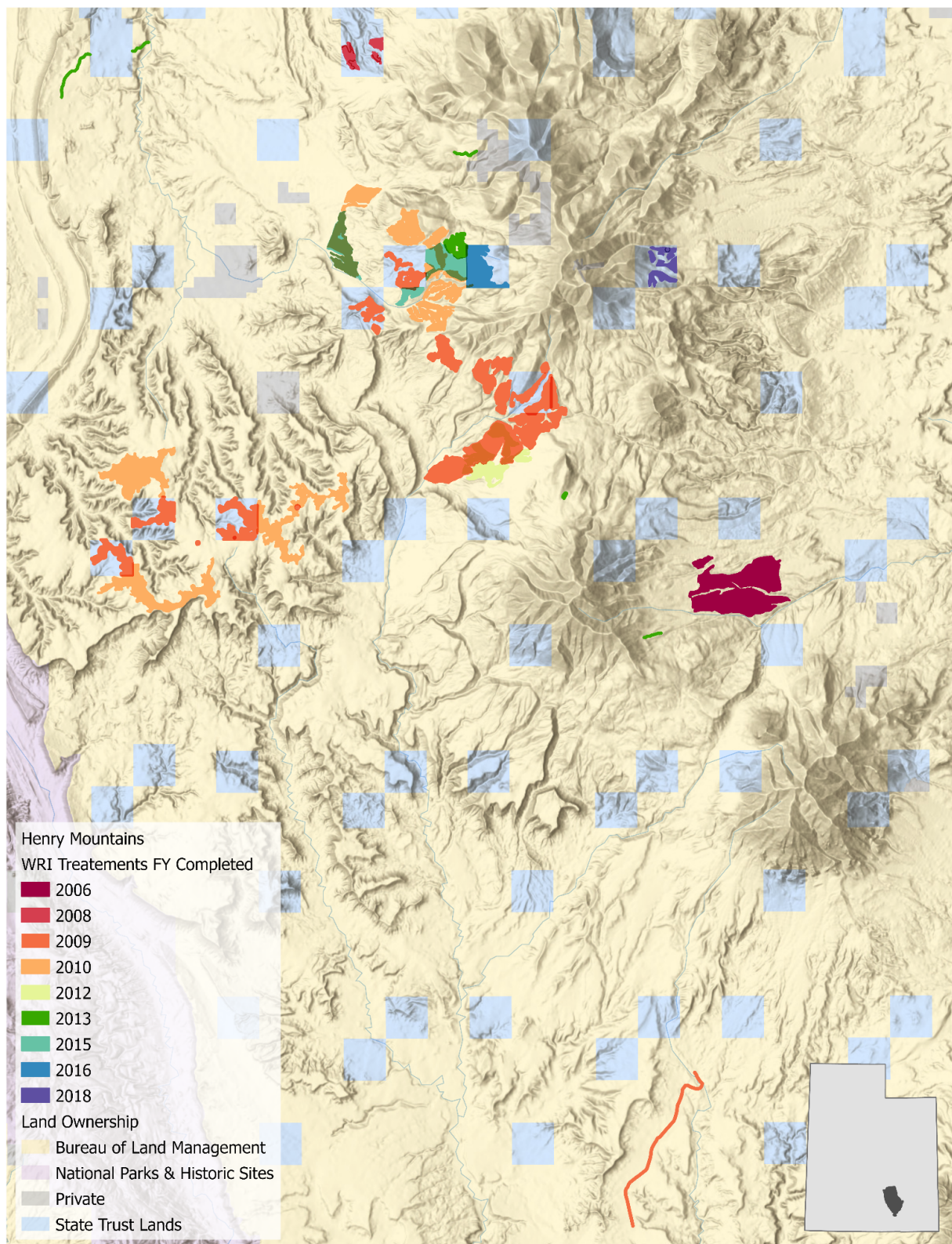
HABITAT

The HM bison are very adaptable, wide-ranging, and utilize a wide variety of habitat types. The herd uses grassland flats at just over 5000 feet in elevation, pinyon-juniper woodlands, and chainings from about 6000 feet to over 8000 feet. They also graze on grasses where woodlands once dominated from previous burns, as well as sub-alpine meadows at over 11,000 feet on Mount Ellen and Pennell. At times they prefer the shade of Douglas fir stands on the east side of Pennell during the summer, but they can also be found at the lower elevations on the stark Indian-ricegrass/globemallow flats during the hottest days of the year.

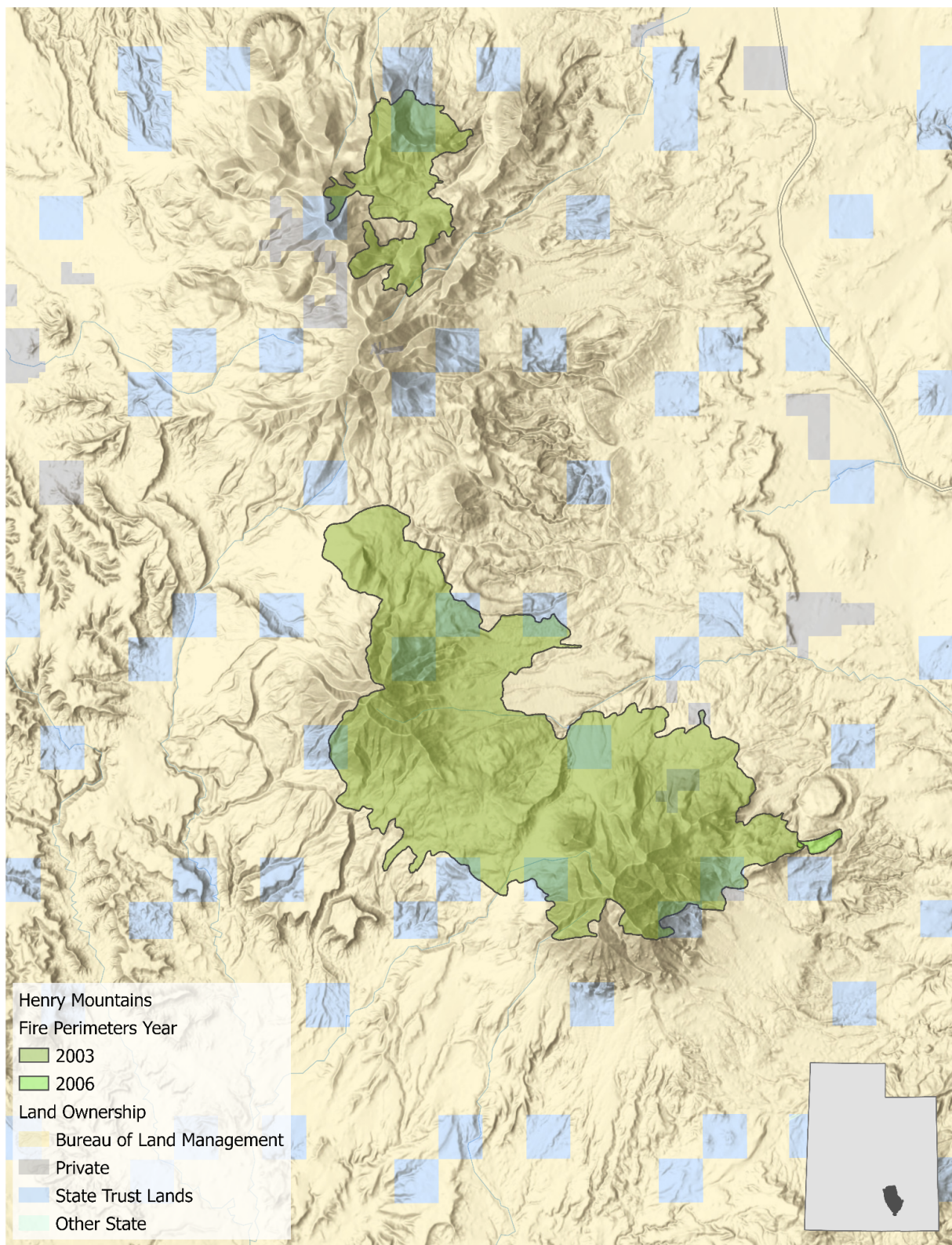
In 2015, USU researchers described bison using a diversity of habitats throughout the year, and grazing effects were widely distributed. Patches of grassland were favored over other habitats, whether naturally occurring or from mechanical treatments, regardless of patch distance from water (Ranglack and duToit, 2015). Burned areas were found to contain higher-quality forage than mechanically treated areas from testing fecal nitrogen concentrations. As a result, bison preferred chained or burned habitat types that produce grasslands, suggesting that continued habitat manipulations, especially burning stands of pinyon-juniper, increased grasslands forage, further distributing grazing effects from bison and cattle (Ranglack and du Toit, 2015a).

Utah State researchers also proposed that fire be used to manipulate HM habitat to attract bison to certain foraging areas and away from others where possible. This offers the potential to minimize conflict in some areas between bison and other interests such as cattle grazing, which is spatially more constrained by proximity to water. (Ranglack and du Toit, 2015a).

Habitat management practices on the HM have included vegetative treatments and water developments. The DWR, BLM, and SITLA have partnered to create suitable bison habitat on the HM. Numerous habitat improvement projects have been completed that increase forage quantity and quality for both bison and cattle. Efforts include rangeland prescribed burns, mechanical treatments, and reseedings (Map 1). Over 40,000 acres have been treated on the HM since 1965, greatly enhancing habitat. The Watershed Restoration Initiative (WRI) has funded projects covering over 8,200 acres. Also, two wildfires occurred in 2003, encompassing over 34,000 acres, most of which were reseeded (Map 2). The work dramatically increased the quality of habitat on the HM for livestock, bison, and mule deer. Conservation organizations, such as Sportsmen for Fish and Wildlife, and the Mule Deer Foundation, are active in negotiating, funding, and participating in habitat enhancement projects. The DWR is committed to promoting these types of efforts and working with other interested parties to increase the value of HM rangelands for the betterment of the wildlife that lives there and, in extension, the agricultural producers that share these public rangelands.



Map 1. WRI treatments by fiscal year completed for WMU 15, Henry Mountains.



Map 2: Land coverage of fires by year from 2000-2019 for WMU 15, Henry Mountains (Geosciences and Environmental Change Science Center (GECSC) Outgoing Datasets, 2020).

Vegetation trends are dependent upon annual and seasonal precipitation patterns. The Palmer Drought Severity Index South Central and Southeast division display periods of drought and wet conditions (Figure 2). Range Trend studies have been sampled within the WMU 15 regularly since 1987, with studies being added or suspended as deemed necessary (Range Trend, 2019). These studies are sampled on a five-year rotation with data last being collected on the WMU 15 in 2019.

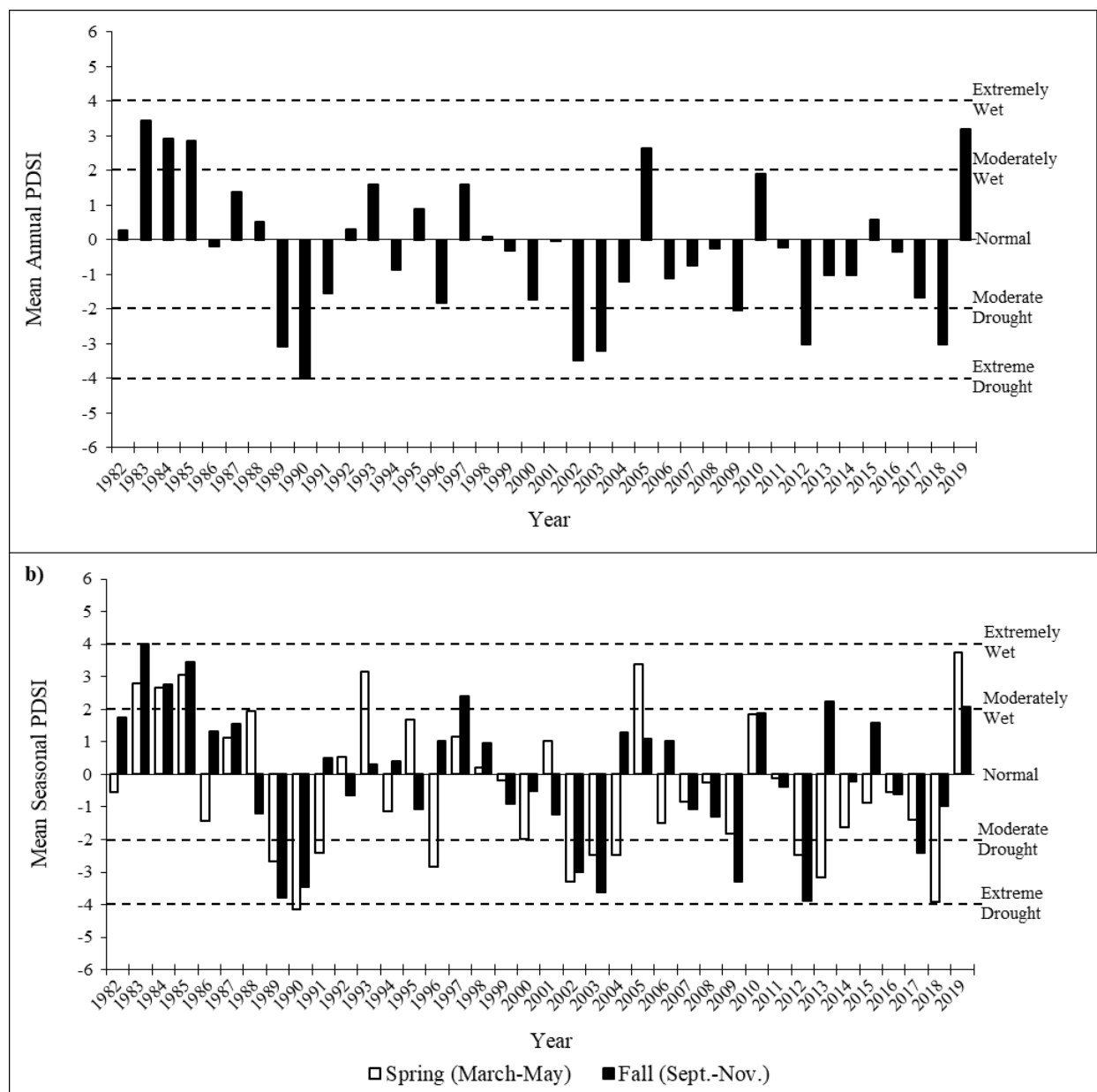


Figure 2: The 1982-2019 Palmer Drought Severity Index (PDSI) for the Southeast Division (Division 7). The PDSI is based on climate data gathered from 1895 to 2019. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is >4.0 = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to 2.9 = Moderately Wet, 1.0 to 1.9 = Slightly

Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -0.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and <-4.0 = Extreme Drought. a) Mean annual PDSI. b) Mean spring (March-May) and fall (Sept.-Nov.) (Time Series Data, 2020).

Since 2004, the condition of the sites across the unit has varied. But overall, the condition has been stable or has improved when considering all cover types. However, there are low potential sites where production is low on the lower elevations. These sites have the potential of being impacted through reduced diversity of desirable grass and forb species. The herbaceous understory on these sites is mostly comprised of annual forbs and grasses. Efforts to restore native plants should be made whenever possible. Native and introduced perennial grasses have decreased over some sites. The shrub component remains high. However, invasive cheatgrass puts these sites at risk for altering fire regimes. If ecological integrity becomes threatened, invasive plant species should be reduced at these sites.

The aspen community is considered crucial habitat for bison. The herbaceous understory on these sites is rich and abundant and primarily composed of native species, with perennial grasses and forbs dominating. Overall cover has increased since 1999, but frequency shows a decreasing trend. Most summer range and upper winter/transition ranges on the unit remain stable or are improving.

Habitat treatment projects on the Henry Mountains will be done to the extent possible on watershed scales across all land ownership types. Projects will be planned using the best management practices, available research, and techniques for site-specific treatments to restore habitats to more productive landscapes. All projects will follow appropriate NEPA requirements and will be proposed through the Utah Partners for Conservation Development and Utah Watershed Restoration Initiative. Other funding partners will be approached as projects develop.

Forage Competition

There is considerable overlap in the diet of bison and domestic cattle. Van Vuren and Bray (1983) calculated approximately a 91% dietary overlap between bison and cattle on the HM, and Nelson (1965) found that grasses and sedges comprised the majority of the bison diet from rumen samples. However, shrubs and forbs were also found, with snowberry being the most common shrub detected in the diet from higher elevations. Van Vuren (1979) reported that both bison and cattle on the HM were primarily grazers, but the bison diet consisted of 5% browse. Comparatively, cattle were more likely to use forbs than bison. Harper *et al.* (2000) reported that bison are very efficient at digesting low protein, high fiber diets.

Like other wildlife, bison range free, and unlike livestock, bison are not tied to allotment boundaries or seasons of use. Therefore, bison forage across the landscape through all seasons and utilize forage in areas where cattle graze and where they do not graze. From past BLM decisions, agreements, AUM purchases, relinquishments, and allocations, there are enough paper AUMs for bison on the HM unit. Although HM bison have enough paper AUMs in total, the AUMs are not in all places they forage or for every season of use. Methods for determining the number of livestock or wildlife on a given landscape are determined by the appropriate management authority and their respective processes and governing rules and regulations.

Bison behavior may also provide a degree of spatial separation in ranges used in conjunction with cattle. Nelson (1965) found bison behavior helps limit their direct impact on domestic livestock. First, Nelson found that bison seldom remained in an area longer than three consecutive days during the summer growing season resulting in greater distribution and more uniform utilization of foraging areas. While they did exhibit preferred areas during various seasons, bison were “almost constantly on the move and do not remain in an area until the plants are completely utilized,” as domestic cattle are known to do. On traditional winter ranges, bison were noted to be more sedentary. Second, he reported that free-ranging bison did not remain at water sources for extended periods and appeared to have lower water needs than domestic cattle. He noted that bison would water then move off — “...and little time was spent at watering holes.” Finally, Nelson also noted that while bison spent most of their time foraging in less steep areas, they did utilize rougher and more broken country than cattle. Regardless, any excessive grazing behavior from either bison or cattle may be detrimental to perennial grasses in desert ecosystems, such as galleta grass or Indian ricegrass, that are not capable of withstanding such pressure.

Van Vuren (1979, 2001) observed similar habits on Mount Ellen and a relatively low spatial overlap of 29%. When comparing habitat use by bison and cattle, he found that over 56% of all summer observations of feeding bison were over 10,000 feet, compared to 10 percent of feeding cattle. Both cattle and bison used relatively level areas to graze, but cattle did more so than bison. For example, 65% of bison observations exceeded 21 degrees slope, compared to only 32% of cattle observations. Bison also fed a greater horizontal distance from water than cattle, and cattle grazed in greater numbers in water proximity than bison. This natural distribution lessens forage competition between bison and cattle.

Van Vuren (1979) noted that “bison in the Henry Mountains frequently moved from area to area, a characteristic documented by Nelson 1965. Such movement generally resulted in better distribution of grazing pressure, but not always. For example, a particular site was used sequentially by a number of bison groups on several occasions. No group remained longer than a day or two, but the overall effect on the site was a week or more of continual bison use. Bison rarely remained at one site for extended

periods, but the impact may have been significant when this happened. One group of as many as 135 bison spent two weeks on Granite Saddle before dispersing.”

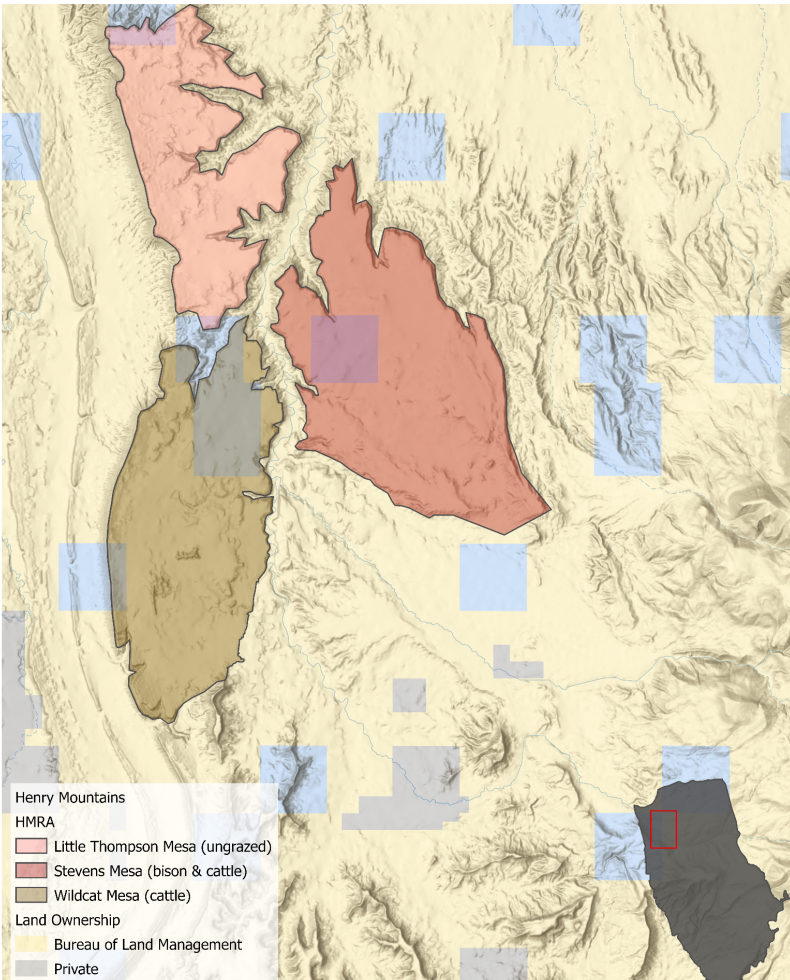
Ranglack and du Toit noted that bison on the HM are free to explore and utilize the best resource patches fully across the HM range. Considering that bison can forage more widely and range farther from water on shared rangelands, researchers pointed out that bison can serve as a reliable ecological indicator of rangeland conditions. (Ranglack, 2015b)

Through the fall of 2011 and 2012 (USU), researchers collected forage utilization data from exclosures set up for the study on Stevens Mesa, Apple Brush Flat, and Pete Steele Bench portions of the Steele Butte allotment. They set out to quantify the relative impacts of shared forage resources utilized by bison, cattle, and lagomorphs. The Steele Butte allotment was chosen due to concerns of bison foraging on cattle winter range during the summer and fall seasons. Data show that at the present population density, bison cause only modest reductions in forage availability for cattle and that cattle faced more significant forage challenges from lagomorphs than from bison in the study area (Ranglack et al., 2015). These results align with a concurrent study done by other USU researchers (Ware et al. 2014), as discussed below in the following paragraph. The grazing effects of small herbivores are often underestimated but must be accounted for as a potential driver of grassland structure and diversity (Rebollo et al., 2013). Bison and cattle segregate spatially on shared rangelands because bison range widely across the landscape, whereas cattle are central foragers, usually focusing their grazing around water sources (Van Vuren 2001; Allred et al. 2011). Therefore, researchers stated that the purported negative impacts of bison on cattle might be overstated (Ranglack et al., 2015).

In 2010-2012, Ware, Terletzky & Adler (2014) studied the effects of bison and cattle grazing on the Henry Mountains, specifically looking at suspected range degradation caused by bison. The research focused on comparing similar ecological sites on three adjacent mesas: on the Steele Butte cattle allotment; Stevens Mesa grazed by both cattle and bison; Wildcat Mesa, grazed almost solely by cattle; and Thompson Mesa, where only limited grazing by cattle occurred historically (Map 3). The study results suggested that bison grazing had not caused a significant change in plant productivity or plant community composition on the cattle winter range (Ware et al., 2014).

Ware (2014) stated that “bison and cattle movements and aggregations across the landscape can also influence changes in community composition. Although bison and cattle diets are similar, their spatial-temporal use of the landscape varies greatly. Cattle tend to concentrate in areas where water and shade are available, whereas bison are restricted less by these factors (Plumb & Dodd, 1993; VanVuren 2001; Ware et al., 2014). The behavior that bison exhibit naturally extends grazing beyond that of cattle, and maintaining spatial-temporal variation within native rangelands is believed to

increase heterogeneity fundamental to grazing landscapes (Fuhlendorf & Engle, 2001; Ware et al., 2014).”



Map 3. Henry Mountain Resource Area with detail of the three adjacent mesas studied in the Ware, Terletzky & Adler research looking at plant community composition.

After the completion of the range ecology research by Ranglack and duToit (2015), we have a better understanding of bison habitat use on the HM to combine with the results of an experimental grazing exclosure study (Ranglack et al., 2015) and a concurrent study of plant community composition on the HM rangeland (Ware et al. 2014), which both discounted bison–cattle competition at the patch scale. Ranglack and du Toit (2015) stated, “Our findings at the habitat scale add to those of van Vuren (2001), who found during 1977–1978 that bison and cattle spatial distributions showed relatively little overlap (29%) because bison used steeper slopes and higher elevations than cattle, which remained close to water sources. With the comparatively small bison population on the HM rangeland (<10% of cattle numbers), concerns of their overusing habitats needed for cattle could be resolved by creating more grazing habitats—by chaining or

preferably burning pinyon–juniper woodland—remote from watering points (Ranglack & du Toit, 2015a). Our findings should provide guidance for future bison management and hopefully ease tensions between the local ranching community and the state and federal government agencies regarding the commingling of bison with cattle (Ranglack & du Toit, 2015c).”

An example of spatial overlap that causes conflict between bison and cattle is on the Bullfrog BLM winter allotment. The allotment is within the southwest portion of the bison range, where bison migrate for winter. Bison overlap habitat with cattle on the northern half of the allotment during late fall, winter, and early spring. This area seems to be affected more by drought and lower precipitation than other areas in bison habitat. However, bison return each year and can find forage to survive through the winter, primarily in areas where there is spatial separation. This occurs because of the distances they can travel through rugged terrain and their ability to find grasses beyond where cattle will go to find feed. Many of these areas are outside the Bullfrog allotment boundary on the adjoining mesas. The forage conflict mainly arises in the spring during greenup when bison and cattle feed on Bullfrog and Mud Benches. The DWR is working with the BLM on their Indian Springs Benches habitat project on the South side of Mount Hillers. These two large benches are 1000 feet higher in elevation than Bullfrog Benches and are dominated by pinyon-juniper habitat. The trees will be mechanically removed and the benches will be seeded with grasses and forbes. This project will open enough area to graze about the same number of cattle that overlap with bison on the northern half of the Bullfrog allotment discussed above.

Spatial separation on the bison winter range occurs on Cave Flat and Swap Mesa and is in part a result of a BLM winter range road closure of the Cave Flat Road on Cave Flat. These areas become a place of refuge for most of the bison moving from hunting pressure and vehicular traffic on the mountain. Cattle are seldom if ever grazed on these mesas because of access issues and complex terrain. The road closure reduces hunting pressure so that bison are not pushed off Cave Flat and also Swap Mesa and onto adjoining allotments in greater numbers and time utilizing forage needed for cattle. Management access to Cave Flat and Swap Mesa by foot and horse protects habitat so that the wintering bison herd will have enough forage to help hold the herd on the mesas. Any attempt to establish a road onto Swap Mesa accessible to vehicles through CRNP would be imprudent. This management is crucial as it helps to protect surrounding allotments from increased numbers of bison leaving the mesas and utilizing forage that would otherwise be available to cattle.

Should future grazing and forage competition issues arise, the DWR will cooperate to resolve conflicts. Continued rangeland work will help address many of the issues that arise. The DWR has been a significant participant on cooperative range and habitat improvement projects. The DWR will participate within the framework and intent of applicable laws to pursue resolution of any chronic conflicts through all available means.

Agricultural Depredation

There has been only limited impacts by bison to agriculture on the HM. Agricultural fields that are irrigated and harvested are limited. Harvested crops are alfalfa or grass hay, which are both cut and baled or left standing as livestock pasture forage. Elk and deer depredation occur in these areas, and complaints are addressed through stack-yard fencing, payments for damages, or mitigation-type hunting opportunities. HM bison have been known to have used cultivated agricultural lands only three times in the past 34 years. Two of the events were during periods of drought. A technician was hired to herd bison from the fields, and the landowner was compensated for damages.

The current HM Limited Entry Landowner Association (LOA) addresses wildlife use of cultivated fields by providing funds from selling limited entry mule deer permits. Monetary damages by wildlife above and beyond the amount received through the LOA proceeds will be addressed by the DWR. Visits by bison to cultivated fields have generally not been of such impact or duration to elicit heavy complaints. If agricultural deprecations develop, they will be addressed promptly under the Utah State Code, DWR policy, and established guidelines.

RECREATION

Outdoor recreational activities have increased dramatically over the past two decades. Types of human-related recreation in bison habitat include backcountry travel, mountain biking, ATV and motorcycle use, horseback riding, antler gathering, camping, backpacking, hiking, trail or long-distance races, hunting of big game, cougar and bear, and others. Another popular activity has been outdoor educational schools that take large youth groups into the backcountry to learn survival and leadership skills.

Part of the mission of the DWR is to manage protected wildlife for its intrinsic, scientific, educational, and recreational values. Bison management certainly benefits from many recreational activities. Broad-based public support is realized when individuals or groups have the opportunity to observe or photograph bison in a wild setting. Funding for management is derived from the sale of hunting equipment, licenses, and Once-In-A-Lifetime permits and through the conservation permit program. DWR issues conservation permits to conservation groups who sell the permits to the highest bidder in the conservation permit program. These funds are used to enhance habitat or fund special projects, such as transplants or research. Bison population size is controlled through hunting which is an integral part of protecting fragile range resources.

However, outdoor recreational activities can have an impact on bison. Free-roaming bison are susceptible to disturbance from human activities. Nelson (1965) reported that bison would flee from an area after coming in contact with humans. During the summer

of 2003, public access to Mount Ellen and Pennell was closed due to the Lonesome Beaver and Bulldog fires. Also, no livestock were on Mount Ellen and heavier than normal summer precipitation resulted in higher than normal forage production. That year, bison use was limited almost entirely to Mount Ellen. The majority of the herd was observed feeding in open meadows, but still, bison would move to timbered areas when fire trucks or other official vehicles would traverse the area. Almost all the bison killed by hunters that year were taken on Mount Ellen. Interestingly, cattle were allowed back on Mount Ellen the following year to protect newly planted forage in the burn areas, and the roads were again open to public travel. Bison use declined on Mount Ellen that same year, and in 2005, almost all the bison had moved south to Mount Pennell. That trend reversed somewhat in 2006. Bison continued to use burned areas extensively, but almost half of the herd (169 of 381 observed) were found on Mount Ellen.

Another example of disturbance resulted from an early fall season archery hunt (2017-2020). The archery hunt allowed hunters to harvest bison before the herds moved to less accessible wintering areas, which they normally do during the November/December hunts. This management strategy failed because there was an increase in vehicles traversing roads to find bison to hunt, which pushed herds from accessible fall season habitat into the safer wintering areas.

Of particular concern may be the constant use of water springs by campers or hunters. This activity may preclude use by bison, other wildlife, and livestock. Recreational use of bison habitat can be compatible, but precautions should be taken to direct human use to areas where the public can have the possibility of viewing bison without negative impacts. Properly planned recreational use has the potential to benefit local economies and assist the DWR in meeting its mission.

Use and Demand

Bison population numbers on this unit are managed by sport harvest. This once-in-a-lifetime permit provides a unique opportunity for hunters to take a bison in a truly wild situation. Hunting permits are set to maintain the population at or below the current population objective and sex ratio in a combination of hunter choice or cow-only permits. The first bison hunt on the HM was held in 1950 when ten permits were issued, and hunters harvested six bulls and four cows. Hunting resumed in 1960, and permits have been issued every year since, except for 1965, 1972, and 1973. Due to difficulties in sex determination, the permit was officially designated as Hunters Choice in 1974. The first cow-only permits were issued in 1988, and an orientation course is offered each year to teach permit holders how to distinguish cows from bulls properly. Non-resident permits, based on 10% of total permits, were first presented in 1978. Conservation permits, sold at an auction to the highest bidder or by conservation groups at annual banquets, were first offered in 1982.

Since the first hunt in 1950 through 2020, there have been over 3200 bison hunters afield. Hunter choice permits had ranged from 9 in 1975 to 110 in 2018. There have been 1252 cow-only hunters afield. Permit numbers have ranged from 0 in 1992, 1993, and 1996 to 206 in 2018. Hunters have harvested over 2600 bison since 1950, comprising approximately 1400 bulls and 1200 cows. Since 2000, annual harvest has varied from 21 in 2011 to 145 in 2018 and has averaged 67 bison. Overall, hunter success has been about 83%. Figures 5 and 6 show total harvest and specific bull and cow harvest respectively from 2007 through 2021.

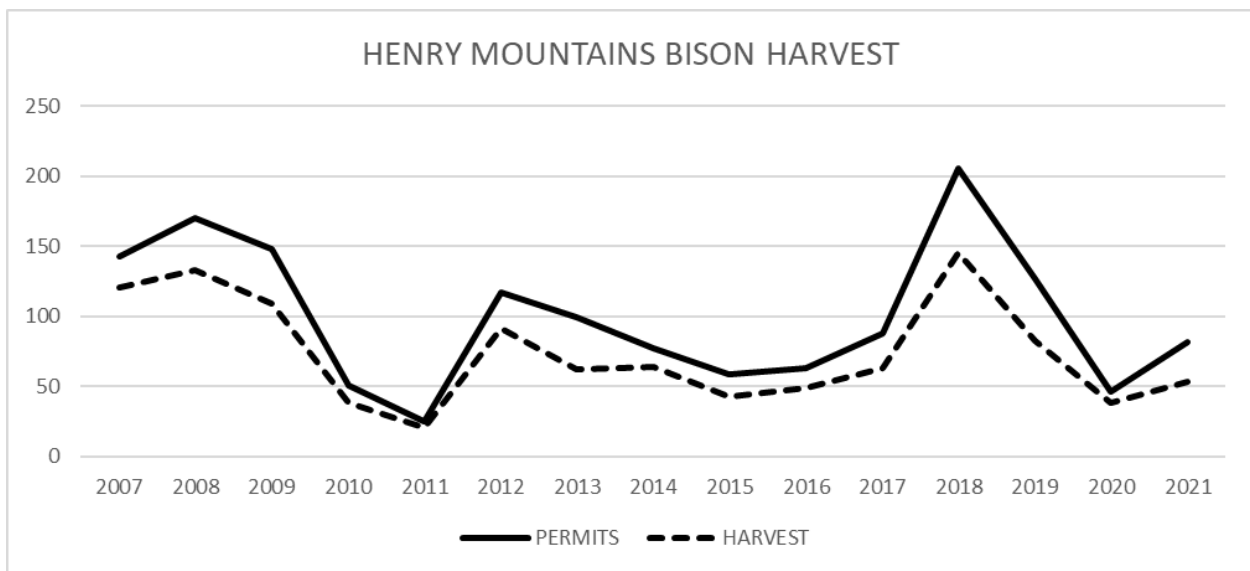


Figure 5. Henry Mountain total bison harvest 2007-2021.

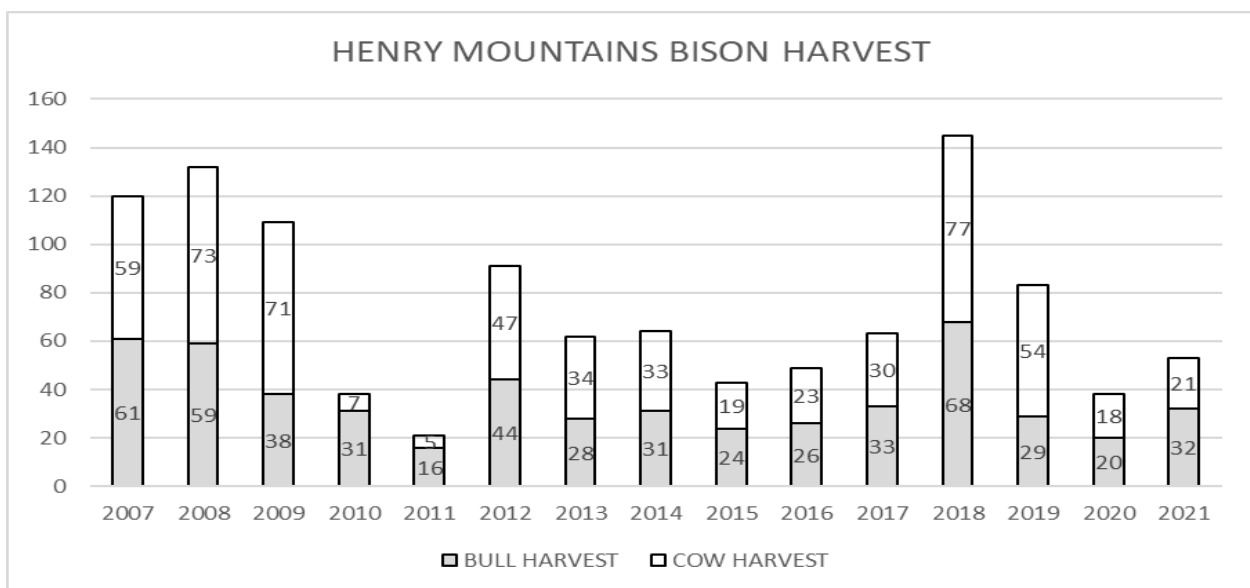


Figure 6. Henry Mountains bull and cow harvest 2007-2021.

Demand for these unique permits has steadily increased over the past 15 years (Figure 7). Resident applicants increased from 4336 in 2005 to 7876 in 2021. Nonresident applicants had increased even greater from 601 in 2005 to 4242 in 2021. In the last 10 years, odds of obtaining a permit has averaged about 100 to 1 for residents and 400 to 1 for nonresidents.

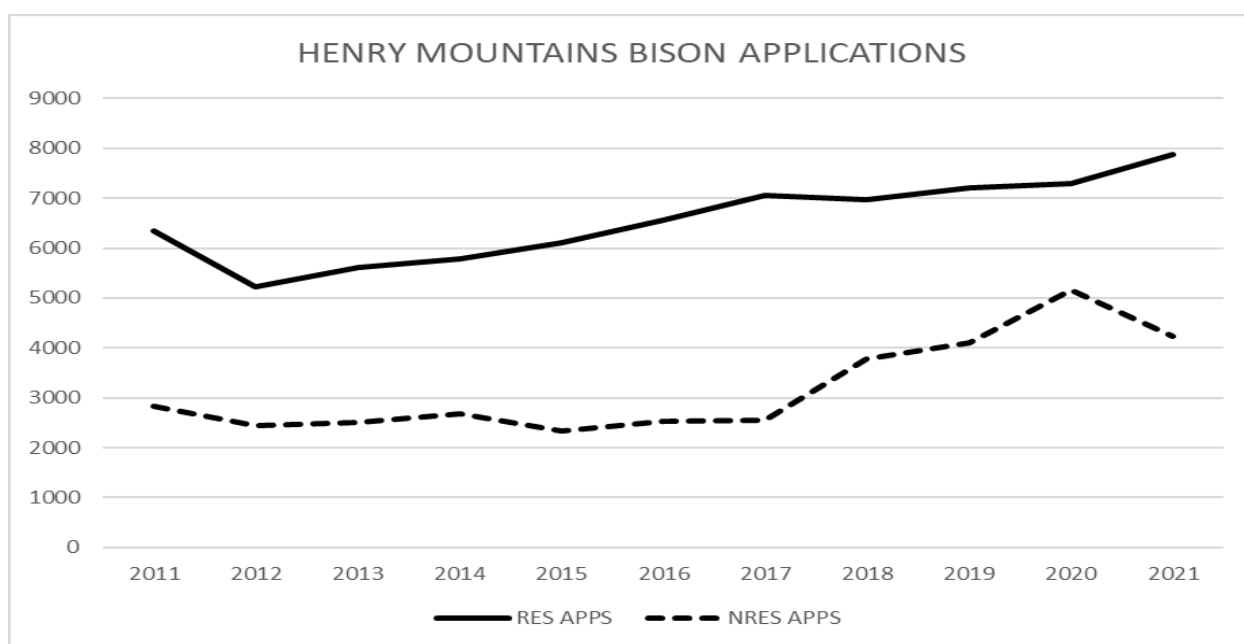


Figure 7. Henry Mountains bison permit applications 2011-2021.

UNIT MANAGEMENT GOALS

Maintain the Henry Mountains bison herd as a genetically viable free-roaming conservation population balanced with available forage resources and long-term habitat capacity.

Manage the bison population by providing diverse recreational opportunities, including hunting and viewing.

Balance bison herd goals and objectives with impacts on human needs such as livestock grazing, private property rights, and local economies.

POPULATION MANAGEMENT OBJECTIVES AND STRATEGIES

Objective 1: Maintain a post-hunt population size of 325 adult (age 1+) bison within the Henry Mountains Wildlife Management Unit. With an average annual production of approximately 80 calves, the total postseason population would be 405 bison.

Strategies:

1. Conduct helicopter surveys to determine population size. Use a sightability range between 85% and 95% determined by survey and range conditions and bison distribution to estimate the total pre-season population. The count can be compared with the modeled expectations to help determine sightability. Prepare a pre-survey description of modeled numbers, expectations, costs, contributors, range conditions, etc., followed by a post-flight summary via email.
2. Evaluate new technology as it evolves for application in aerial surveys to improve survey accuracy and efficiency.
3. Conduct annual summer classification counts during the rut to determine calf production and bull-cow ratios.
4. Utilize population modeling with annual mortality estimates derived from research to estimate post-season herd size. In years when the herd is obviously under-counted, use the previous years' model to estimate the post-season population.
5. Adjust model inputs to fit observed numbers when the model is underestimating or overestimating the bison population.
6. Habitat conditions, including effects of drought, will be discussed with the bison committee when harvest recommendations are reviewed.
7. Utilize the United States Drought Monitor at <https://droughtmonitor.unl.edu/> to make temporary adjustments in the bison population size depending on drought severity and range conditions. If drought-related conditions and bison densities negatively impact habitat, recommend additional bison permits at the August Wildlife Board meeting.
8. Continue monitoring of radio-collared bison to determine seasonal movements and habitat use areas during critical periods.
9. Collect blood samples from hunter-harvested bison to monitor for brucellosis and take necessary actions to maintain brucellosis-free status in compliance with Department of Agriculture guidelines.
10. Cooperate with the BLM to avoid the introduction of malignant catarrhal fever, Johne's, or other diseases.
11. Conduct law enforcement efforts to minimize illegal take of bison.
12. Address all agricultural depredation problems in a timely manner.

13. Preserve genetic integrity of the bison herd by maintaining herd size at management objective to prevent loss of unique allele composition.
14. Pursue opportunities to improve genetic heterozygosity by supplementing the bison population from other genetically pure and disease-free herds.

Objective 2: Maintain a ratio of 50 bulls per 100 cows to ensure older age class bulls remain in the population.

Strategies:

1. Conduct annual summer classification counts during the rut to determine the bull-cow ratio.
2. Use a combination of hunters' choice, cow-only permits, and removal of animals through transplant to maintain the desired bull-cow ratio.
3. Educate hunters to use the Mandatory Reporting Survey to report bison age based on tooth replacement and wear.
4. Require cow-only permit holders to complete the online orientation course each year to teach them how to identify the sex of the animal properly.

HABITAT MANAGEMENT OBJECTIVES AND STRATEGIES

Objective 1: Maintain or improve sufficient bison habitat to support population objectives.

Strategies:

1. Identify critical bison use areas and work with land managers and private landowners to improve or maintain habitat quality in these areas.
2. Pursue research studies to address concerns about bison-livestock forage competition and range overlap.
3. Design and implement habitat projects to reduce conflicts between bison and livestock. Use funds from conservation permits, Grazing Improvement Board, Utah Partners for Conservation Development, and other public and private money to pay for these projects (see Appendix A). All partners will work together to obtain funding. Increased forage may be allocated to bison and livestock. Habitat work will focus on winter ranges prioritizing areas of bison-cattle conflicts. Vegetation monitoring will be established on habitat projects prior to

implementation and read two years after implementation to evaluate success or failure of the project.

4. Support lease agreements between grazing permittees to minimize bison-cattle conflicts and better manage range resources. Such use would have to be approved by the BLM, which would require subleasing agreements or grazing permit transfers.
5. Use hunters and other volunteers to maintain range improvements on allotments used by bison. The DWR may assist by providing materials or workforce when available.

Objective 2: Increase habitat security to encourage bison use in select areas.

Strategies:

1. Work with land managers to minimize and mitigate the loss of bison habitat due to human disturbance and development.
2. Support efforts by the land managers to manage off-highway vehicle use in bison use areas, including law enforcement efforts. Especially the Cave Flat and Swap Mesa areas that provide a refuge from vehicular disturbance.
3. Support land management agency travel plans that include bison and wildlife considerations.
4. Design harvest strategies to minimize early movements of bison to winter ranges when possible.
5. Work with land management agencies to maintain hunter access to areas that discourage bison movements into Capitol Reef National Park.

Objective 3: Achieve a distribution of bison that better utilizes available habitat and minimizes conflict.

Strategies:

1. Provide adequate forage on summer and transitional ranges to discourage bison use on winter ranges during summer months. Consider other alternatives such as gap fences, herding, and fencing of water sources on winter ranges.
2. Address all depredation problems in a timely and efficient manner.
3. Develop water sources in areas that will improve herd distribution.
4. Discourage bison from areas with potential conflicts by improving range conditions in areas where conflicts do not exist.
5. Utilize research projects and radio telemetry data to help better

- understand bison use patterns.
6. In cooperation with the BLM, SITLA, and livestock operators, investigate realignment of grazing allotments to improve the distribution of both cattle and bison.
 7. Develop hunt strategies to disperse bison, or create refuge areas to encourage bison use on wintering areas where more forage is available and potential conflicts with livestock are reduced.
 8. Consider the use of hazing bison when needed to address range concerns in specific areas such as private land depredation, severe drought on winter ranges, and new seeding projects.

RECREATION MANAGEMENT OBJECTIVES AND STRATEGIES

Objective 1: Maintain high quality-hunting opportunities for bison.

Strategies:

1. Utilize multiple hunting seasons to minimize hunter crowding.
2. Maintain high hunter success rates.
3. Provide older age class bulls in the harvest by achieving desired bull-cow ratios.
4. Maintain hunting strategies that minimize early-season movements into wintering areas.
5. Investigate whether the length of the hunting season has an impact on other species.
6. Capitol Reef National Park supports efforts to provide hunter access to the western portion of the bison range through the Park.

Objective 2: Increase public awareness and expand viewing opportunities of bison without creating additional disturbance to the herd.

Strategies:

1. Work with the BLM and counties to install interpretive signs and provide viewing areas at selected spots in bison habitat to educate visitors about bison.
2. Utilize print and media (including social media) to educate the public about bison and bison issues.

LITERATURE CITED

- Bates, J.W. 1965. Buffalobluff. Utah Fish and Game Magazine 21:4-5.
- Bates, B., Hersey, K. 2016. Lessons Learned from Bison Restoration efforts in Utah on Western Rangelands. Rangelands 38(5):256–265. doi 10.1016/j.rala.2016.08.010
- Berezowski, John Andrew, Greg D. Appleyard, Timothy B. Crawford, Jerry Haigh, Hong Li, Dorothy M. Middleton, Brendan P. O'Connor, Keith West, and Murray Woodbury. (2005) An Outbreak of Sheep-Associated Malignant Catarrhal Fever in Bison (*Bison bison*) after Exposure to Sheep at a Public Auction Sale. Journal of Veterinary Diagnostic Investigation, 17: 55-58.
- Bingham, M.C. 1971. Where Buffalo Roam Free. Our Public Lands. Vol. 21, No 4., 19-21. Bureau Of Land Management.
- Fuhlendorf, S. D., & Engle, D. M. (2001). Restoring heterogeneity on rangelands: Ecosystem management based on evolutionary grazing patterns. BioScience, 51, 625–632.
- Gates, C.C., Freese, C.H., Gogan, P.J.P. and Kotzman, M. (eds. and comps.) (2010). American Bison: Status Survey and Conservation Guidelines 2010. Gland, Switzerland: IUCN.
- Harper, W.L., J.P Elliot, I. Hatter, and H. Schwantje. 2000. Management plan for Wood Bison in British Columbia. Min. of Env. Lands and Parks. Wildl. Bull. No. B-102. 43pp.
- Hartway, C., A. Hardy, L. Jones, B. Moynahan, K. Traylor-Holzer, B. McCann, K. Aune, G. Plumb. 2020. Long-term viability of Department of the Interior bison under current management and potential metapopulation management strategies. Natural Resource Report NPS/NRSS/BRD—2020/2097. National Park Service, Fort Collins, Colorado.
- Hedrick, Philip W. Journal of Heredity, 2009:100(4):411–420: doi:10.1093/jhered/esp024
- Hess, S. 2002. Aerial survey methodology for bison population estimation in Yellowstone National Park. Dissertation, Montana State University, Bozeman, USA.
- Koons, D. and J. duToit. 2015. Improved Monitoring for Management of the Henry Mountains Bison Herd. Utah State University. Report submitted to the Utah Division of Wildlife Resources.
- Kunkel, K., S. Forrest, and C. Freese. 2005. Reintroducing Plains Bison (*Bos bison*) to American Prairie Foundation lands in Northcentral Montana: 5-Year Conservation and Management Plan. Rep. to the World Wildlife Fund, 62 pp.

Li H, Karney G, O'Toole D, Crawford TB. (2008). Long distance spread of malignant catarrhal fever virus from feedlot lambs to ranch bison. *Canadian Veterinary Journal*, 49(2):183-185.

Li, H., Taus, N. S., Jones, C., Murphy, B., Evermann, J. F., Crawford, T. B. (2006). A Devastating Outbreak of Malignant Catarrhal Fever in a Bison Feedlot. *Journal of Veterinary Diagnostic Investigation*, 18(1), 119–123.

<https://doi.org/10.1177/104063870601800120>

McGranahan, D.A., Engle, D.M., Fuhlendorf, S.D., Winter, S.J., Miller, J.R., Debinski, D.M., 2012. Spatial heterogeneity across five rangelands managed with pyric-herbivory. *J. Appl. Ecol.* 49, 901–910.

Miller, R.S., Sweeney, S.J. (2013). *Mycobacterium bovis* (bovine tuberculosis) infection in North American wildlife: current status and opportunities for mitigation of risks of further infection in wildlife populations. *Epidemiology and Infection*, 141 (7), 1357-1370.

Nei, M., Maruyama, T. and Chakraborty, R. 1975. The bottleneck effect and genetic variability in populations. *Evolution* 29(1):1-10.

Nelson, Kendall L. 1965. Status and habits of the American Buffalo (*Bison bison*) in the Henry Mountain area of Utah. Pub. 65-2, Utah Dept. of Fish and Game. 142 pp.

Olsen, S., Tatum, F. (2010). Bovine brucellosis. *Veterinary Clinics of North America: Food Animal Practice*, 26 (1), 15-27.

Plumb, G. E., & Dodd, J. L. (1993). Foraging ecology of bison and cattle on a mixed prairie: Implications for natural area management. *Ecological Applications*, 3, 631–643.

Ranglack DH, Dobson LK, du Toit JT, Derr J (2015) Genetic Analysis of the Henry Mountains Bison Herd. *PLoS ONE* 10(12): e0144239. doi:10.1371/journal.pone.0144239

Ranglack DH, Durham S, du Toit JT. Competition on the range: science vs. perception in a bison-cattle conflict in the western USA. *J Appl Ecol.* 2015 Apr;52(2):467-474. doi: 10.1111/1365-2664.12386. Epub 2015 Jan 26. PMID: 25960573; PMCID: PMC4418398.

Ranglack, Dustin & du Toit, Johan. (2015). Habitat Selection by Free-Ranging Bison in a Mixed Grazing System on Public Land. *Rangeland Ecology & Management*. 68. 349-353. 10.1016/j.rama.2015.05.008.

Ranglack, D.H., du Toit, J.T., 2015a. Wild bison as ecological indicators of the effectiveness of management practices to increase forage quality on open rangeland. *Ecological Indicators*, 56 (2015), 145-151.

Rebollo, S., Milchunas, D.G., Stapp, P., Augustine, D.J. & Derner, J.D.

(2013) Disproportionate effects of non-colonial small herbivores on structure and diversity of grassland dominated by large herbivores. *Oikos*, 122, 1757–1767.

Schultheiss, P. C., Collins, J. K., Austgen, L. E., & DeMartini, J. C. (1998). Malignant Catarrhal Fever in Bison, Acute and Chronic Cases. *Journal of Veterinary Diagnostic Investigation*, 10(3), 255–262. <https://doi.org/10.1177/104063879801000305>

Schumaker, B.A., Peck, D.E., Kauffman, M.E. (2012). Brucellosis in the Greater Yellowstone area: disease management at the wildlife-livestock interface. *Human-Wildlife Interactions* 6(1), 48-63.

Senner, J.W. 1980. Inbreeding depression and the survival of zoo populations. In: M.E. Soulé and B.A. Wilcox (eds.), *Conservation Biology: An Evolutionary-Ecological Perspective*, pp.209-224. Sinauer Associates, Sunderland, Massachusetts.

Traylor-Holzer, K. (2017). Population Viability Analysis of Bison DOI Populations: Draft Report. IUCN SSC Conservation Planning Specialist Group. IUCN SSC American Bison Specialist Group.

Terletzky, P., and D. Koons. 2016. Estimating Ungulate Abundance While Accounting for Multiple Sources of Observation Error. *Wildlife Society Bulletin*; DOI: 10.1002/wsb.672

van Vuren, D. 1983. Group dynamics and summer home range of bison in southern Utah. *J. Mamm.* 64:329-332

van Vuren, D.H. 1979. Status, ecology and behavior of bison in the Henry Mountains, Utah. Report Submitted to the Bureau of Land Management, Salt Lake City, Utah. 37pp.

van Vuren, D. H. (2001). Spatial relations of American bison (*Bison bison*) and domestic cattle in a montane environment. *Animal Biodiversity and Conservation*, 24,117–124.

van Vuren, D. and Bray, M.P. (1983) Diets of bison and cattle on a seeded range in Southern Utah. *Journal of Range Management*, 36, 499-500.

van Vuren, D. and M.P. Bray. 1986. Population dynamics of bison in the Henry Mountains, Utah. *Journal of Mammalogy* 67:503-511.

Ware, I.M., Terletzky, P., Adler, P.B., 2014. Conflicting management objectives on the Colorado Plateau: understanding the effects of bison and cattle grazing on plant community composition. *Journal for Nature Conservation* 22, 293–301.

Wobeser, G. (2009). Bovine tuberculosis in Canadian wildlife, an updated history. *Canadian Veterinary Journal*, 50 (11), 1169-1176.

Appendix A.

Potential Habitat Projects to
Resolve Conflicts between Bison and Livestock

1. Indian Springs fuels reduction: To increase forage for cattle and wildlife.
2. Henry Mountains fuels treatments landscape wide by BLM- Canyon Country Fuels: Convert habitat into earlier seral stages for higher forage productivity for cattle and wildlife.
3. Various water development and spring upgrades where possible: Maintain and improve water availability for cattle and wildlife.
4. Trough replacement at McMillan for bison, Tarantula Mesa for cattle and wildlife, and Hancock Spring for cattle and wildlife.

Appendix B.

Table 1. Herd composition surveys of bison on the Henry Mountains, Utah, 1960-2020.

	Preseason*	Preseason	Age:	Sex Ratios		Post Season
Year	Pop Est	Adults	Bull:Cow	Calf:Cow	Calf:Adult	Adult Estimate
1960	74	60	91	52	23	
61	76	63	86	43	21	
62	86	68	83	56	28	
63	73	58	83	55	26	
64	59	45	55	47	31	
65	77	64			20	
66	92	75			23	
67	84	74			14	
68						
69	94	82			15	
1970	75					
71	73	56			30	
72	61	49			24	
73	121	99			22	
74	139	92			35	
75	126	95			33	
76	84	67			25	
77	151					
78	243	196	61	39	24	
79	296	232	46	40	28	
1980	300	232	69	49	29	
81	274	211	40	42	30	
82	252	191	41	47	32	
83	308	246	72	41	25	
84	314	245	50	42	28	235
85	365	328	55	42	27	280
86	352	224	37	37	33	267
87	368	222	48	43	34	280
88	395	322	46	33	23	311
89	345	272	44	46	27	282

Table 1. Continued

	Preseason*	Preseason	Age:	Sex Ratios		Post Season
Year	Pop Est	Adults	Bull:Cow	Calf:Cow	Calf:Adult	Adult Estimate
1990	559	479	56	26	17	320
91	426	368	58	25	16	285
92	324	270	61	32	20	240
93	474	381	71	42	24	293
94	470	393	42	28	20	297
95	360	314	58	23	15	226
96	416	350	63	31	19	290
97	397	342	55	25	16	275
98	460	374	54	35	23	285
99	420	345	65	36	22	250
2000	433	368	57	28	18	293
2001	379	341	57	18	11	246
2002	392	318	56	36	23	261
2003	352	318	56	17	8	254
2004	335	268	42	42	25	227
2005	265	196	38	49	26	169
2006	401	311	36	39	29	275
2007	591	486	60	35	27	396
2008**	602	494	53	33	65	334
2009***	522	452	52	24	16	292
2010	384	337	72	32	19	296
2011	422	346	61	37	23	310
2012	496	432	63	31	19	329
2013	457	399	56	28	18	321
2014	460	383	53	30	20	304
2015	444	374	70	31	19	317
2016	459	386	54	42	28	324
2017	490	402	56	37	24	325
2018	569	478	45	37	26	310
2019	462	425	63	14	9	316
2020	No Flight	No Flight	78	37	21	303
2021	407	361	61	23	14	295
Average	266	221	57	37	24	287

*Preseason population estimate is based on the observed count from the flight survey and incorporates sightability.

**2008- In January 2009 (Post-hunt 2008) 31 bison were captured and translocated to the Book Cliffs.

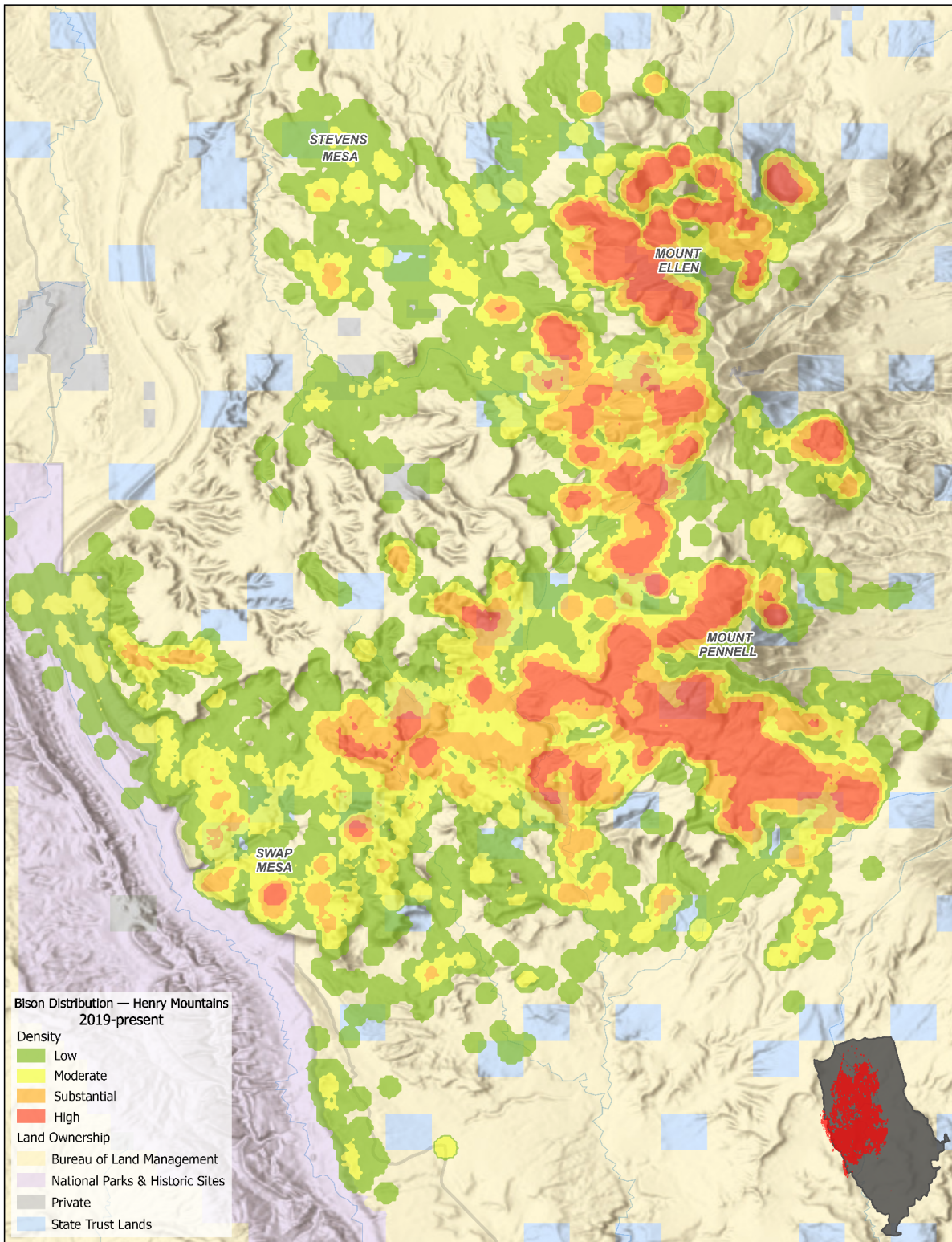
***2009- In January 2010 (Post hunt 2009) 40 more bison were captured and moved to the Book Cliffs.

Table 2. Bison harvest by hunt on the Henry Mountains, Utah, 2007 to 2020.

Year	Any Weapon Hunters Choice					Any Weapon Cow Only				
	Afield	Bull	Cow	Total	Success	Afield	Bull	Cow	Total	Success
2007	67	56	10	66	99%	74	5	49	51	69%
2008	67	53	11	64	96%	98	6	62	68	69%
2009	56	37	10	47	84%	90	1	61	62	69%
2010	40	31	3	34	85%	8	0	4	4	50%
2011	19	16	1	17	89%	6	0	4	4	66%
2012	60	42	10	52	87%	57	2	37	39	68%
2013	50	27	5	32	64%	48	1	29	30	63%
2014	41	29	6	35	85%	33	2	25	27	82%
2015	35	24	4	28	80%	20	0	15	15	75%
2016	39	26	6	32	82%	23	0	17	17	74%
2017	36	27	6	33	92%	40	3	24	27	68%
2018	90	52	18	70	78%	92	0	57	57	62%
2019	55	24	9	33	60%	51	1	35	36	71%
2020	18	16	2	18	100%	21	0	14	14	67%
2021	49	29	5	36	64%	23	0	14	14	61%
Average	48	33	7	40	85%	47	2	31	32	68%

Year	Archery Hunters Choice					Archery Cow Only				
	Afield	Bull	Cow	Total	Success	Afield	Bull	Cow	Total	Success
2017	10	7	0	7	70%	No hunt				
2018	20	16	2	18	90%	No hunt				
2019	9	5	2	7	78%	12	0	8	8	67%
2020	4	4	0	4	100%	3	0	2	2	67%
2021	7	0	2	2	25%	No hunt				
Average	11	8	1	9	85%	8	0	5	5	67%

Map 1. Occupied bison habitat in the Henry Mountains area from March 2019-January 2022. Densities are determined from 31 gps collared bison with approx. 20,500 locations and 2 points/bison/day. Low =1-1,420 points, Moderate = 1,421-2,899 points, Substantial = 2,900-4,409 points, and High = 4,410-14,717 points.



Committee Members

Cindy Ledbetter/Joe Chigbrow, Bureau of Land Management
Sue Fritzke, National Park Service
Bob McReady, National Wildlife Federation
Jayden Brian, Outfitter
Paul Pace, Permittee
Gordon VanDyke/Travis Van Orden, Sandy Ranch
Troy Justeson, Sportsman for Fish and Wildlife
Ron Torgerson, State Institutional Trust Lands Administration
Troy Forrest, Utah Department of Agriculture and Food
Wade Paskett, Utah Division of Wildlife Resources
Brett Behling, Utah Farm Bureau
Mike King, Utah State University Eastern
Kevin Albrecht, Utah Wildlife Board
Newell Harward/Dennis Blackburn, Wayne County Commissioners

The Henry Mountains bison management plan will be presented to the Utah Wildlife Board on September 29, 2022 and, if approved, will be in effect for a period of 10 years from this date. At the 10 year period the committee will review the plan to make a recommendation to the DWR for purposes of either updating the plan with new information and/or adding amendments. If the plan is acceptable and working it may be recommended to the DWR that it be continued for a specified time by the HM bison committee.



SPENCER J. COX
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Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

JOEL FERRY
Executive Director

Division of Wildlife Resources

J. SHIRLEY
Division Director

MEMORANDUM

TO: Wildlife Board and Regional Advisory Council Members

FROM: Chad Wilson, Private Lands/Public Wildlife Coordinator

DATE: August 18, 2022

SUBJECT: 2022 Landowner Permit rule (R657-43) change recommendation

On June 2, 2022 the Wildlife Board passed revisions to the Landowner Permit rule (R657-43). As part of the motion, LOAs (Landowner Associations) were given the opportunity to present additional changes to the landowner permit committee. If there were changes that the committee and the DWR could support those items would go back through to the RACs and Wildlife Board. The landowner permit committee met on July 28, 2022 and were presented change ideas by the LOAs. The committee and DWR were able to agree to four change ideas, which are being recommended to be added to the rule.

- Establish an LOA advisory committee.
- Clarify that individual landowners in an LOA could be held accountable before action was taken against the entire LOA.
- Program performance metrics would have input from LOAs.
- Modify the rule language to clarify LOAs and the DWR will work together cooperatively.

The LOA's also presented two ideas that were not supported by the landowner permit committee and the DWR.

- Use a 1.5X permit multiplier for lands enrolled in the LOA.
- If the multiplier was granted, a percentage of the permits would be used for funding the LOA and charity purposes.

These changes were not supported for multiple reasons:

- The vouchers allotted to LOAs are valid on public lands. This significantly multiplies the value of the voucher.

- More support would be given for a multiplier if the voucher was only for private land (Option B of the rule).
- The data used by the LOAs in recommending a multiplier was not apples to apples.
- The use of the vouchers should not factor into the decision of how many vouchers are awarded.
- The DWR can't mandate LOAs to participate in charitable program or another reciprocal program.

CW

R657. Natural Resources, Wildlife Resources.

R657-43. Landowner Permits[.]

R657-43-1. Purpose and Authority.

(1) Under authority of Sections 23-14-18 and 23-14-19, this rule provides the standards and procedures for [~~private-~~]landowners to qualify for and obtain [landowner permits for:]big game hunting opportunities in recognition of the benefits their private properties provide to wildlife resources in Utah.

~~[(a) taking buck deer within the general unit hunt boundary area where the landowner's property is located during the general deer hunt only; and]~~

~~[(b) taking bull elk, buck deer or buck pronghorn within a limited entry unit.]~~

~~[(2) In addition to this rule, any person who receives a landowner permit must abide by Rule R657-5 and the guidebook of the Wildlife Board for taking big game.]~~

~~[(3) The intent of the general landowner buck deer permit is to provide an opportunity for landowners, lessees, or their immediate family, whose property provides habitat for deer, to purchase a general deer permit for the general unit hunt boundary area where the landowner's property is located.]~~

~~[(4) The intent of the landowner appreciation permit is to provide an opportunity for landowners and their immediate family, whose property provides habitat for migratory deer, to purchase a general deer permit for the general unit hunt boundary where the landowner's property is located.]~~

~~[(5) The intent of the limited entry landowner permit is to provide an opportunity for landowners, whose property provides habitat for deer, elk, or pronghorn, to be allocated a restricted number of permits for a limited entry bull elk, buck deer, or buck pronghorn unit, where the landowner's property is located. Allowing landowners a restricted number of permits:]~~

(2)(a) The division shall offer a program providing opportunities for general season big game hunts ("General Season Landowner Permits") and a program providing limited entry big game hunts ("Limited Entry Landowner Permits").

(b) The division shall offer buck deer permits under both programs.

(c) The division shall offer buck pronghorn and bull elk permits under the Limited Entry Landowner Permit program only.

(3) The Landowner permit programs are intended to:

(a) [~~encourages~~]provide an incentive for private landowners to manage their [land for wildlife;]

[(b) ~~compensates the landowner for providing private land~~]lands as quality habitat for public wildlife;

(b) assist and support the division in managing big game populations;

~~[(c) allows the division to]~~

(c) increase private Landowner tolerance of big game on their Private Lands;

(d) increase big game hunting opportunities;

(e) increase and secure public hunting access on participating Landowners' Private Lands;

(f) reduce the division's obligations in responding to and compensating for depredation events occurring on participating Private Lands;

(g) use objective criteria to determine how hunting opportunities are allocated under the programs; and

(h) allocate hunting opportunities in a manner that fluctuates in proportion to variations in public draw permit numbers~~[on specific units].~~

R657-43-2. Definitions.

(1) Terms used in this rule are defined in Section 23-13-2.

(2) In addition:

~~[(a)]~~

(a) "Applicant" means a Landowner applying to participate in the General Season Landowner Permit program or the Limited Entry Landowner Permit program.

(b) "Cropland" means agricultural Private Land that is cultivated and mechanically harvested and upon which the division has determined that migratory deer rely to meet herd management objectives.

(c) "Draw Application" means that application for Permits submitted to the division after the Applicant has been approved to participate in the program.

(d) "Eligible ~~[property]~~Property" means:

(i) ~~[private land]~~Private Land that provides habitat for deer, elk or pronghorn as determined by the division~~[-of Wildlife Resources];~~

(ii) ~~[private land]~~Private Land that is not used in the operation of a Cooperative Wildlife Management Unit;

(iii) ~~[private land]~~Private Land that is not used in the operation of an elk farm or elk hunting park;

(iv) ~~[land]~~Private Land in agricultural use as provided in Section 59-2-502 and eligible for agricultural use valuation as provided in Sections 59-2-503 and 59-2-504; and

(v) ~~[private land]~~Private Land having one or more of the following attributes:

(A) for the purpose of receiving general buck deer permits, a minimum of one hundred (100) acres of Private Land that is Cropland, or a minimum of six hundred forty (640) acres of ~~[private land]~~other Private Land that is owned or leased by one Landowner or leased by one landowner within the general season unit hunt boundary or;

(B) for the purposes of receiving a ~~[landowner appreciation permit, a minimum of 100 acres of cultivated and mechanically harvested crop lands that, in the discretion of the division, is relied upon by migratory deer to meet herd management objectives;]~~

~~[(C) for the purposes of receiving a limited entry permit or voucher, private land, including crop lands;]~~Limited Entry Landowner Permit Voucher, Private Land owned or leased by members of a ~~[landowner association]~~Landowner Association that is within a limited entry unit.

(e) "Governing Documents" mean the legal documents executed by a Legal Entity Owners that govern the formation, operation, management, rules, duties, responsibilities, decision making and dissolution of such Legal Entity.

~~[(b)]~~f) "Immediate ~~[family]~~Family" means ~~[the landowner's or lessee]~~a Landowner's, a Lessee's, or a Legal Entity Owner's spouse, children, sons-in-law,

daughters-in-law, father, mother, father-in-law, mother-in-law, ~~brother, sister, brother~~ brothers, sisters, brothers-in-law, sisters-in-law, stepchildren, and grandchildren.

~~(e)g~~ “Landowner” means, for the purposes of this rule, any person, ~~partnership,~~ or ~~corporation who~~ Legal Entity which:

(i) owns property Private Land in Utah ~~and whose name appears on a deed as the owner of eligible property or whose name appears as~~ as evidenced by such deeds vesting title in such Landowner;

(ii) is the purchaser ~~on~~ of Private Land pursuant to a recorded contract ~~for~~ of sale; or

(iii) is a Lessee of eligible property Private Land, being any person or legal entity with a written lease whose terms permit the lessee to be in actual physical control of such Private Land..

~~(e)h~~ “Landowner ~~association~~ Association” means ~~an organization of private landowners~~ a Legal Entity created by Landowners who own ~~property~~ Eligible Property within a limited entry unit, which Legal Entity is organized for the purpose of working with the division as outlined in this rule.

~~(e) “Lessee” means any person, partnership, or corporation whose name appears as the Lessee on a written lease, for at least a one-year period, for eligible property used for farming or ranching purposes, and who is in actual physical control of the eligible property.~~

~~(f) “Limited entry unit” means a specified geographical area that is closed to hunting deer, elk or pronghorn to any person who has not obtained a valid permit to hunt in that unit.~~

(i) “Legal Entity” means an entity such as a corporation, partnership, limited liability company, or trust that is duly organized under the laws of the State of Utah and/or otherwise qualified to do business within the State of Utah.

(j) “Legal Entity Owner” means a person or other Legal Entity which has ownership in a Legal Entity, such as a shareholder of a corporation, a member of a limited liability company, a partner in a partnership, or trustee or beneficiary of a trust.

(k) “Permit” means a hunting authorization purchased from the division by a person who is the holder of a Voucher, pursuant to the terms and authorizations contained in such Voucher.

(l) “Private Land” means, for the purposes of this rule, any real property owned or leased by a Landowner, excluding:

(i) land owned by the state or federal government;

(ii) land owned by a county or municipality;

(iii) land owned by an Indian tribe;

(iv) land enrolled in a Cooperative Wildlife Management Unit under R657-37;

and

(v) land where public access for big game hunting has been secured.

(m) “Qualifier Application” means the initial application submitted to the division to determine if a Landowner meets the necessary requirements to participate in the landowner permit program.

([g]n) ["Voucher"] means ~~[a document]~~an authorization issued by the division to a ~~[landowner, landowner association, or Cooperative Wildlife Management Unit operator, allowing a landowner, landowner association, or Cooperative Wildlife Management Unit operator to designate who may]~~Landowner that entitles such Landowner or its permitted transferees (if allowed pursuant to this rule) to purchase a ~~[landowner big game hunting permit]~~Permit from ~~[a]~~the division~~[-office]~~.

R657-43-3. ~~[Qualifications for]~~General Season Landowner ~~[Buck Deer]~~Permits Availability and Eligibility.

~~[(1) The director, upon approval of the Wildlife Board, may establish a number of general landowner buck deer permits within each region to be offered to eligible landowners, lessees, and members of their immediate family for the general deer hunting season only.]~~

~~[(2) Only private lands will be considered in qualifying for general landowner buck deer permits. Public or state lands are not eligible.]~~

~~[(3) Crop lands will be considered in qualifying for general landowner buck deer permits if the crop lands provide habitat for deer and contribute to meeting unit management plan objectives.]~~

~~[(4) General landowner buck deer permits are limited to resident or nonresident landowners or lessees, and members of their immediate family.]~~

~~[(5)(a) An individual who receives a general landowner buck deer permit may not receive a landowner appreciation permit for the same year.]~~

~~[(b) If one or more general landowner buck deer permits are awarded based on an identified parcel of eligible property, landowner appreciation permits may not be awarded for that identified parcel of eligible property during that same year.]~~

(1)(a) The division will establish the number of General Season Landowner Permits for buck deer annually by identifying the number of public draw permits available in a unit and allocate an additional three percent (3%) of that number to the program. Vouchers for General Season Landowner Permits for buck deer will be issued through the General Season Landowner Permit draw. Vouchers may only be redeemed by the Landowner or Immediate Family members.

(2) An Applicant must meet the following eligibility criteria to apply for or obtain permits under the General Season Landowner Permit program:

(a) own the minimum quantity of Eligible Property in the proper general season unit boundaries as identified in this rule;

(b) be able to lawfully obtain and use a hunting license and big game permit;

(c) submit a complete application by the deadline

(d) participate in the General Season Landowner Permit drawing; and

(e) pay necessary fees.

(3)(a) An Applicant may apply for General Season Landowner Permits according to the following limitations:

(i) one (1) General Season Landowner Permit may be issued for six hundred forty (640) acres of Eligible Property owned or leased by the Applicant;

(ii) one (1) additional General Season Landowner Permit may be issued for each additional six hundred forty (640) acres of Eligible Property owned or leased by the Applicant; and

(iii) one (1) General Season Landowner Permit may be issued for one hundred (100) acres or more of Cropland owned or leased by the Applicant.

(b) Only one (1) General Season Landowner Permit may be issued to a Landowner based on Cropland acreage, regardless of whether that Applicant owns or leases more than one hundred (100) acres of Cropland.

(c) Only one (1) General Season Landowner Permit may be issued per parcel of Eligible Property.

(d) General Season Landowner Permits cannot be sold and may only be transferred to Immediate Family members.

(e) An Applicant may apply for and receive a maximum of five (5) General Season Landowner Permits in a single hunt year.

(4) Vouchers for General Season Landowner Permits will be issued following the draw and are valid for Landowners and their Immediate Family members.

R657-43-4. [~~Qualifications for~~General Landowner [~~Appreciation~~Buck Deer Permits – Applications, Drawing, and Permit Use.

~~[(1) The director, upon approval of the Wildlife Board, may establish a number of landowner appreciation permits within each unit to be offered to eligible landowners and members of their immediate family for the general deer hunting season only.]~~

~~[(2) Only private lands will be considered in qualifying for landowner appreciation permits. Public or state lands are not eligible.]~~

~~[(3) Private lands must]~~

(1) Qualifier Applications for General Season Landowner Permits are available from division offices and on the division website prior to draw.

(2)(a) Only one (1) Applicant may submit a Qualifier Application for the same parcel of Private Land.

(b) The division may reject all Qualifier Applications if more than one (1) application is received for the same parcel of Private Land.

(c) Where the Landowner's Private Land is in more than one (1) general unit hunt boundary area, the Landowner may select only one (1) of those units from which to receive the Permit.

(d) A Landowner may only submit one (1) Qualifier Application, regardless of whether there are:

(i) multiple individual persons owning the Eligible Property;

(ii) multiple Legal Entity Owners in the Legal Entity owning the Eligible Property;

or

(iii) similar instances of split ownership of the Eligible Property.

(3) Qualifier Applications for General Season Landowner Permits must include:

~~(a) [be relied upon by migratory deer for habitat; and]~~

~~[(b) in the discretion of the division, substantially contribute to the deer herd using the private lands in meeting its management objective.]~~

~~[(4)(a) Landowner appreciation permits are limited to resident or nonresident landowners and members of their immediate family]~~ total acres of Eligible Property within the respective general season unit hunt boundary area;

(b) the signature of all Landowners having an interest in the Eligible Property;

(c) a digital map of the Eligible Property indicating the parcel numbers, county, and general season hunt unit within which it is located;

(4) Qualifier Applications must be submitted to the regional division office with management responsibilities where the Eligible Property is located.

(5) the signatures of the Landowners on the Draw Application serve as an affidavit by such Landowner certifying ownership of the Eligible Property enrolled.

(6)(a) After Qualifier Applications are reviewed and approved, Draw Applications will be submitted pursuant to R657-62-27.

(b) [~~Lessees do not qualify for landowner appreciation permits~~]When submitting the Draw Application, the Applicant will select the season and weapon type.

~~[(5)(a) An individual receiving a landowner appreciation permit may not receive a general landowner buck deer permit in the same year.]~~

~~[(b) If a landowner appreciation permit is awarded based on an identified parcel of eligible property, general landowner buck deer permits may not be awarded for that identified parcel of eligible property during that same year.]~~

(7) Any person issued a General Season Landowner Permit under this rule is subject to all season dates, weapon restrictions, and any other regulations, specifically R657-5, and fees as provided in the guidebook of the Wildlife Board for taking big game.

R657-43-5. [~~Qualifications for~~]Limited Entry Landowner Permits – Availability and Eligibility.

~~[(1) The Director, upon approval of the Wildlife Board, may]~~

(1) Landowners in a limited entry unit may join together to form a Landowner Association for participation in the Limited Entry Landowner Permit program. In order to qualify as a Landowner Association, participating Landowners must:

(a) own more than fifty percent (50%) of the Private Lands that are Eligible Property within the limited entry herd unit;

(b) form a Landowner Association;

(c) limit participation to Private Lands within a limited entry hunt unit serving as habitat for that species;

(d) the president of the Landowner Association must participate in a division training annually.

(2) The division will establish [a]the number of [~~bull elk, buck deer and buck pronghorn~~]limited entry permits [~~to be offered to an eligible landowner association.~~]

~~[(2) Except as provided in R657-43-10(1)(b), limited entry landowner permits are available for taking buck deer, bull elk or buck pronghorn, and may only be used on designated limited entry units.]~~

~~[(3) Only private lands that do not qualify for]~~available under the program on an annual basis by:

_____ (a) identifying the number of public draw permits in a unit for the previous hunt year;

_____ (b) identifying the total acreage of Private Land in a unit enrolled in the Landowner Association;

_____ (c) calculating the percentage of habitat in the unit represented by the Landowner Association by dividing the habitat acreage represented by the Landowner Association by the habitat acreage in the whole unit; and

_____ (d) applying that percentage to the total number of available public draw permits from the previous year to determine the number of permits to be allocated to the Landowner Association.

_____ (e) Standard rounding will be practiced when determining permit numbers - .49 rounds down and .5 rounds up.

_____ (f) An approved Landowner Association that qualifies for less than one permit every year will receive one permit the first year after approval.

_____ (3) To form a Landowner Association, Landowners must:

_____ (a) elect a president;

_____ (b) enter into Governing Documents signed by all participating Landowners that:

_____ (i) agree to the formation of a Landowner Association for the purposes of participating in the program;

_____ (ii) establish membership qualifications;

_____ (iii) identify any yearly dues, if any, necessary to participate and how those funds will be utilized;

_____ (iv) establish a distribution plan for allocating Vouchers or revenue from Vouchers to members;

_____ (v) describe the process for adding and removing members in a fair and impartial process;

_____ (vi) describe how the Landowner Association will provide notice of upcoming meetings and how members can participate

_____ (vii) establish how voting and decisions on behalf of the Landowner Association will be made;

_____ (viii) establish rules and guidelines outlining permit holder conduct on Landowner Association property

_____ (ix) describe how the Landowner Association will complete compliance requirements for the program;

_____ (x) describe how the members will elect a president to represent the landowner association and the president's length of term;

_____ (xi) include a written waiver from each participating Landowner of all depredation claims due to big game damage during the term of such Landowner's membership in the Landowner Association;

_____ (xii) include a written agreement from each participating member to allow free public access onto all participating Landowner's Private Lands as required by R657-43-5(5) and R657-43-5(6); and

_____ (xii) other items deemed necessary and appropriate to administer the Landowner Association.

_____ (4) Limitations on the eligibility of Private Lands in Landowner Associations:

_____ (a) Private Lands enrolled in a Cooperative Wildlife Management [Units will be considered for limited entry landowner permits. Public or]Unit are not eligible to participate in a Landowner Association under this rule;

_____ (b) public and state lands are not eligible[.] to be included in a Landowner Association;

[(4)](c) [Only private lands]only Private Lands that qualify as [eligible property]Eligible Property will be considered for [limited entry landowner permits.]Limited Entry Landowner Permits;

[(5) Applications for limited entry landowner permits will be received from landowner associations only.]

[(6) Only]

_____ (d) only one [landowner association](1) Landowner Association, per species, may be formed for each limited entry unit[-as follows:]; and

[(a) A landowner association may be formed only if a simple majority of landowners, representing 51 percent of the eligible private lands within the herd unit, enter into a written agreement to form the association.]

[(b) The association may not unreasonably restrict membership to other qualified landowners in the unit.]

[(c) Each landowner association must elect a chairperson to represent the landowner association.]

[(d) The landowner association chairperson shall act as liaison with the division and the Wildlife Board.]

(e) [A landowner or landowner association]a Landowner or Landowner Association may not restrict [legal]legally established passage through [private land]Private Land to access public lands for the purpose of hunting.

_____ (5) A Landowner Association may choose one of two Voucher options during the term of its certificate of registration:

_____ (a) Option 1.

_____ (i) The Landowner Association will be issued Vouchers valid for the entire limited entry hunting unit; and

_____ (ii) an equivalent number of public hunters to the number of Vouchers received by the Landowner Association shall be provided complete access to hunt all of the Landowner Association's Private Lands at no charge for the species during the season dates identified on the Limited Entry Landowner Permit.

_____ (iii) The division will notify the lowest draw numbers of public hunters in that unit who will be given access to the Landowner Association's Private Lands pursuant to this section.

_____ (b) Option 2.

_____ (i) The Landowner Association will be issued Vouchers valid only for Private Lands enrolled in the Landowner Association;

_____ (ii) the number of Vouchers allocated to a Landowner Association will be initially calculated using the formula in Subsection (2), then reduced by twenty percent (20%), rounded up to the nearest whole number; and

_____ (iii) an equivalent number of public hunters to the number of Vouchers reduced by twenty percent (20%), rounded up to the nearest whole number shall be provided

complete access to hunt all Landowner Association's Private Lands at no charge for the species and during the season dates identified on the limited entry permit.

(iv) The division will notify the lowest draw numbers of public hunters in that unit who will be given access to Landowner Association's Private Lands pursuant to this section

(c) Vouchers are not valid for:

(i) multi-season hunting opportunities; or

(ii) late season limited entry buck deer permits on a general season unit.

(6)(a)(i) Public draw permit holders specified in paragraph 5 above will have access to all enrolled Landowner Association lands for the entirety of the hunt;

(ii) The Landowner Association will be responsible for ensuring those public draw permit holders identified in paragraph 5 above are given access to all private lands.

(iii) Landowner Associations may determine how to disperse public hunters by seasons. If all public hunters are in one season it will be the any-weapon season.

(b) The Landowner Association must provide a written copy of it's guidelines used to regulate a permit holder's conduct as a guest on the Landowner Association land. These guidelines will go through the RAC and Wildlife Board process to ensure they are fair and reasonable.

(7) Performance metrics will be established by the division, with recommendations from the Landowner Association Advisory Committee, to determine if the purposes of the program are being met.

R657-43-6. Limited Entry Permits – Application~~[for General Landowner Buck Deer Permits.]~~

~~[(1) Applications for general landowner buck deer permits are available from division offices.]~~

~~[(2) Only one eligible landowner or lessee may submit an application for the same parcel of land within the respective general unit hunt boundary area.]~~

~~[(3) In cases where more than one application is received for the same parcel of land, all applications will be rejected.]~~

~~[(4) Applications must include:]~~

~~[(a) total acres of eligible property owned within the respective general unit hunt boundary area;~~

~~[(b) the signature of all landowners or lessees having an interest in the eligible property; and]~~

~~[(c) a map of the eligible property indicating the county and general unit within which it is located.]~~

~~[(5) In cases where the landowner's or lessee's land is in more than one general unit hunt boundary area, the landowner or lessee may select one of those units from which to receive the permit.]~~

~~[(6) a non-refundable handling fee must accompany each application.]~~

~~[(7) An individual may not apply for or obtain a general landowner buck deer permit without possessing a valid Utah hunting or combination license.]~~

~~[(8) Applications will be available by May 1 and must be received by October 1 of each year.]~~

~~[(9) Applications must be submitted to the regional division office managing the general hunting unit that the applicant applies for.]~~

~~[(10) The landowner or lessee signature on the application serves as an affidavit of the landowner or lessee certifying ownership of the eligible property.]~~

~~[R657-43-7. Application for Landowner Appreciation Permits.]~~

(1) Applications for ~~[landowner appreciation permits]~~[a limited entry Landowner Association certificate of registration](#) are available ~~[from]~~[at](#) division offices and on the division website.

(2) ~~[Only one eligible landowner may submit an application for the same parcel of eligible property within the respective general unit boundary area.]~~[Applications must include:](#)

~~[—(3) In cases where more than one application is received for the same parcel of eligible property, all duplicate applications will be rejected.]~~

~~[—(4) Applications must include:]~~

~~[—(a) total acres of eligible property owned within the respective general unit hunt boundary area;]~~

(a) total acres providing habitat for the species in question that are participating in the Landowner Association;

~~(b)[the] signature of [all landowners having an interest in the property; and]~~

~~[—(c) a map of the eligible property indicating the county and unit within which it is located.]~~

~~[—(5) In cases where a landowner's land is in more than one general unit hunt boundary, the landowner must select one of those units from which to receive a permit.]~~

~~[—(6) A non-refundable handling fee must accompany each application.]~~

~~[—(7) An individual may not apply for or obtain a landowner appreciation permit without possessing a valid Utah hunting or combination license.]~~

~~[—(8) Applications will be available by May 1 and must be received by October 1 of each year.]~~

~~[—(9) Applications must be submitted to the regional division office managing the general hunting unit that the applicant applies for.]~~

~~[—(10) The landowner's signature on the application serves as an affidavit of the landowner certifying ownership of the eligible property.]~~

~~[R657-43-8. Application for Limited Entry Permits.]~~

~~[(1) Applications for limited entry landowner permits are available from division offices.]~~

~~[(2) Applications to receive limited entry landowner permits must be submitted by a landowner association for lands within the limited entry hunt unit where the private lands are located.]~~

~~[(3) Applications must include:]~~

~~[(a) total acres owned by the association within the limited entry hunting unit and a map indicating the eligible property acting as big game habitat;]~~

~~[(b) signature of each of the landowners within the association]~~[each of the Landowners within the Landowner Association](#) including acres owned, with said signature serving as an affidavit certifying ownership;

~~[(c) a distribution plan for the allocation of limited entry permits by the association;]~~

~~[(d) a copy of the association by-laws; and]~~

(c) a copy of the Landowner Association's Governing Documents;

(d) a digital map of the Private Lands participating in the Landowner Association and indicating the Private Lands which serve as habitat for the species in question; and

(e) a non-refundable handling fee.

~~[(4)3] The division may [provide a landowner association assistance]aid the Landowner Association in preparing the application, but the division is not responsible for errors in the application or a failure to properly or completely submit an application.~~

~~[(5)4] Applications must be completed and [returned]submitted to the [appropriate]regional division office managing the limited entry hunting unit where the Landowner Association is located by September 1[st] of the year prior to when the hunting is to occur.~~

~~[(6)5] The division shall [forward]review the application[,] and determine its completeness and formulate a recommendation[,] and other related documentation to the Regional Wildlife Advisory Councils for public review and].~~

(a) The division may reject any application that is incomplete or completed incorrectly.

(b) Applicants must notify the division in writing regarding any changes to the substance of their application while it is under consideration, or it may be considered incomplete or incorrect.

~~[(7)6] [Recommendations by the Councils will then be forwarded to]After evaluating the application, the Wildlife Board [for review and action]shall consider:~~

(a) the contents of the application;

(b) the division's recommendation; and

(c) any violations of the provisions of Title 23, Wildlife Resources Code by the Landowner Association, its operator, its president, or any of its members that would reasonably influence whether the applicant should be approved to participate in the program.

~~[(8)7] Upon receiving the application[,] and [recommendations from the Regional Advisory Councils and]recommendation from the division, the Wildlife Board may:~~

~~(a) authorize the issuance of a three -year certificate of registration allowing the [landowner association]Landowner Association to operate; or~~

~~(b) deny or partially deny the application and provide the [landowner association]Landowner Association with reasons for the decision.~~

~~[(9)8](a) [A landowner association]The certificate of registration[,] including any variance granted under R657-43-8(6);] for a Landowner Association must be renewed every three (3) years through the process outlined in this rule.~~

~~[(b)(i) Notwithstanding Subsection (9)(a), the]~~

(b) In evaluating a certificate of registration renewal application, the Wildlife Board shall consider:

(i) the Landowner Association's fulfillment of public access requirements during the term of the prior certificate of registration;

(ii) the Landowner Association's fulfillment of antlerless harvest access and success, if a condition of its prior certificate of registration;

(iii) the contents of its renewal application; and

(iv) a recommendation provided by the division.

(9) The Wildlife Board may ~~[annually modify permit types, numbers, and associated seasons authorized in]~~deny a certificate of registration ~~[when necessary to achieve unit management objectives or otherwise comply with applicable law.]~~

~~[-(ii)-]~~application or renewal application if:

(a) the Landowner Association has failed to supply the necessary documentation specified in the paragraph above;

(b) a member of the Landowner Association has been convicted of a wildlife violation;

(c) the president of the Landowner Association has engaged in conduct that results in the conviction of, a plea of no contest to, or a plea held in abeyance to a crime of moral turpitude, or any other crime that when considered with the functions and responsibilities of a Landowner Association president bears a reasonable relationship to their ability to responsibly operate a Landowner Association;

(d) the Landowner Association has failed to abide by the terms of their Governing Documents in a manner that undermines the purposes of the program; or

(e) the Landowner Association's president or its designee fails to complete mandatory annual training.

(10)(a) An applicant may appeal a denial of an application, renewal application, or request for certificate of registration amendment by submitting an appeal to the division Director.

(b) An appeal must be submitted to the division within thirty (30) days of receiving the notice of denial.

(11) If a Landowner Association is cited for violating any provision of this rule, Title 23 of the Utah Code, or any other proclamation or guidebook by the Wildlife Board, the Division may suspend or revoke the Landowner Association certificate of registration pursuant to R657-26.

(a) If an individual landowner who is part of a Landowner Association violates any provision of this rule, Title 23 of the Utah Code, or any other proclamation or guidebook by the Wildlife Board, the Division may remove the individual landowner from the Landowner Association's certificate of registration pursuant to R657-26.

(12)(a) The division shall annually review the permit types, numbers, and seasons authorized by a certificate of registration issued under this ~~[Section]~~section and ~~[recommend]~~implement modifications ~~[when necessary to achieve unit management objectives or otherwise comply with applicable law]~~for the following hunt season.

~~[-(iii)-] The division's recommendation and accompanying justification will be forwarded to the affected landowner association and the Regional Advisory Councils for review and recommendation.-]~~

~~[-(iv)-] The Wildlife Board shall consider the recommendations made by the division, Regional Advisory Councils, and landowner association and make a final decision on the proposed modifications consistent with the requirements in Subsection (9)(b).-]~~

(b) Landowner Associations and the Division will work cooperatively to achieve desired management directives, including antlerless management objectives.

~~(10)13~~(a) A ~~[landowner association]~~Landowner Association may petition to amend a certificate of registration upon submitting a written request to the regional division office where the ~~[landowner association]~~Landowner Association's Private Land is located.

(b) ~~[Amendment of the]~~A Landowner Association shall submit an application to amend their certificate of registration~~[is required]~~ for changes in:

(i) ~~[permit numbers]~~the Landowner Association's Governing Documents;

(ii) ~~[a landowner association's:]~~acreage;

(A) ~~[by laws; or]~~If during a term of its certificate of registration, a Landowner Association's Eligible Property decreases but remains at least equal to fifty percent (50%) of the Eligible Property in the limited entry unit, such Landowner Association shall submit an amendment outlining the new acreage to update their current certificate of registration.

~~[(B) distribution plan for the allocation of limited entry permits among its members;]~~

(B) If during a term of its certificate of registration, a Landowner Association's Eligible Property decreases and equals less than fifty percent (50%) of the Eligible Property in the limited entry unit, such Landowner Association's certificate of registration shall be deemed non-compliant and shall terminate at the end of the certificate of registration's term; provided, however, such Landowner Association may reapply for a certificate of registration as a new application.

(iii) ~~[acreage;]~~

~~[(iv) land]~~Private Land ownership; or

~~(v)~~iv any other matter related to the management and operation of the ~~[landowner association]~~Landowner Association not originally included in the certificate of registration.

~~[(c) Requests for amendments dealing with permit numbers or permit allocation among association members:]~~

~~[(i) may be initiated by the landowner association or the division;]~~

~~[(ii) are due on September 1st of the year prior to when hunting is to occur; and]~~

~~[(iii) shall be forwarded to the Regional Advisory Councils and Wildlife Board for consideration and approval]~~

(c) If approved, an amendment to the certificate of registration shall be issued in writing.

~~(A)14~~ (a) Upon approval ~~[by]~~of the ~~[Wildlife Board, an amendment to the original]~~ certificate of registration~~[shall]~~, Vouchers may be issued ~~[in writing.]~~

~~[(d) All other requests for amendments shall be reviewed by the region and Wildlife Section and, upon approval by the division director, an amendment to the original certificate of registration shall be issued in writing]~~and redeemed to purchase Limited Entry Landowner Permits from division offices.

~~[R657-43-9. Availability of General Landowner Permits and Landowner Appreciation Permits; Associated Season Dates.]~~

~~[(1) The following number of general landowner buck deer permits may be~~

available to a landowner or lessee:]

~~[(a) one general landowner buck deer permit may be issued for eligible property of 640 acres; and]~~

~~[(b) one additional general landowner buck deer permit may be issued for each additional 640 acres of eligible property.]~~

~~[(c) If an individual has both owned and leased eligible property, the acreage may be combined in determining the number of permits to be issued.]~~

~~[(2)(a) Only one landowner appreciation permit may be issued annually to a qualifying landowner or member of their immediate family, regardless of if that landowner owns more than 100 acres of eligible property.]~~

~~[(b) Only one landowner appreciation permit may be issued per parcel of eligible property.]~~

~~[(3) Successful applicants for the general landowner buck deer permit and the landowner appreciation permit may select only one season (archery, rifle or muzzleloader) for their permit, as provided in the guidebook of the Wildlife Board for taking big game.]~~

~~[(4)(a) General landowner buck deer permits and landowner appreciation permits are for personal use only and may not be transferred to any other person.]~~

~~[(b) If the landowner or lessee is a corporation, the person eligible for the permit must be a shareholder, or immediate family member of a shareholder, designated by the corporation.]~~

~~[(5) Any person who is issued a general landowner buck deer permit or a landowner appreciation permit under this rule is subject to all season dates, weapon restrictions and any other regulations as provided in the guidebook of the Wildlife Board for taking big game.]~~

~~[(6) The fee for a general landowner buck deer permit and landowner appreciation permit is the same as the fee for a general season, general archery or general muzzleloader buck deer permit.]~~

~~[(7) Nothing in this rule shall be construed to allow any person to obtain more than one general buck deer permit from any source or take more than one buck deer during any one year.]~~

~~[(8) Permits will be issued beginning in June, in the order that applications are received, and permits will continue to be issued until all permits for each region have been issued.]~~

~~[(9) To receive a general landowner buck deer permit or landowner appreciation permit, the eligible person must possess or obtain a valid Utah hunting or combination license.]~~

~~**[R657-43-10.]**~~

~~(b) The fee for any Limited Entry **[Permits and Season Dates.]**~~

~~[(1)(a) Only] Landowner Permit is the same as the cost of similar limited entry buck deer, bull elk, [buck deer] or buck pronghorn limited entry permits ~~[may be applied for by the landowner association].~~~~

~~[(b) A landowner association may not apply for or receive a:]~~

~~[(i) multi-season hunting opportunity on any limited entry hunt under R657-5; or]~~

~~[(ii) late season limited entry buck deer permits on a general season unit under R657-5-26(1)(b).]~~

~~[(2)(a) The division and landowner chairperson should jointly recommend the number of permits to be issued to the landowner association.]~~

~~[(b) If consensus between the landowner chairperson and the division on recommended permit numbers cannot be reached, a request for permits may be submitted by the landowner association along with a recommendation from the division for review by the Wildlife Regional Advisory Councils and the Wildlife Board.]~~

~~[(3) Permit numbers shall fall within the herd unit management guidelines. Permit numbers will be based on:]~~

~~[(a) the percent of eligible property within the unit that is enrolled in a landowner association and serves as big game habitat; or]~~

~~[(b) the percentage of use by wildlife on eligible property enrolled in a landowner association.]~~

~~[(4) Landowners]~~[c) A Landowner receiving ~~[vouchers may personally use the vouchers or reassign the vouchers to any legal hunter.]~~

~~[(5) All landowners who receive vouchers must:]~~

~~[(a) allow hunters who redeemed a voucher from that landowner access to the landowner's private lands included within the landowner association for hunting; and]~~

~~[(b) allow a number of public hunters with valid permits, equivalent to the number of vouchers the landowner received that year, to access the landowner's private land for hunting during the appropriate limited entry bull elk, buck deer or buck pronghorn hunting season, except as provided in Subsection (6).]~~

~~[(6)(a) Landowners receiving vouchers may deny public hunters access to the landowner association's private land for hunting by receiving, through the landowner association, a variance to Subsection (5)(b) from the Wildlife Board.]~~

~~[(b) The requested variance must be provided by the landowner association in writing to the division 30 days prior to the appropriate Regional Advisory Council meeting scheduled to review Rule R657-5 and the guidebook of the Wildlife Board for taking big game.]~~

~~[(c) The variance request must be presented by the landowner association to the appropriate local Regional Wildlife Advisory Council. The local Regional Wildlife Advisory Council shall forward a recommendation to the Wildlife Board for consideration and action.]~~

~~[(7)(a) Any person who is issued a limited entry landowner permit]~~[a Voucher for a Limited Entry Landowner Permit may sell or otherwise transfer such Voucher to any legal hunter so long as that person possesses or obtains a Utah hunting or combination license.

(d) Any recipient of a Limited Entry Landowner Permit must follow the season dates, weapon restrictions, and any other ~~[regulations]~~regulation governing the taking of big game as specified in ~~[Rule]~~R657-5 and the guidebook of the Wildlife Board for taking big game.

~~[(b) to receive a limited entry landowner permit, the person designated on the voucher must possess or obtain a Utah hunting or combination license.]~~

~~[(8) A limited entry landowner permit authorizes the permittee to hunt within the limited entry unit where the eligible property is located.]~~

~~[(9)e] Nothing in this rule [shall be construed to allow any person, including a landowner, to] permits the take of more than one (1) buck deer, one (1) bull elk, or one (1) buck pronghorn during any one year.~~

~~R[657-43-11. Limited Entry Permit Allocation and Fees]~~

~~[(1) In order to qualify for limited entry landowner permits, a landowner association must document and upon request provide to the division:]~~

~~[(a) a list of landowners within the landowner association receiving vouchers for the previous year, if applicable;]~~

~~[(b) the number of public hunters who contacted the landowner association during the previous year requesting access to private lands within the landowner association, if applicable; and]~~

~~[(c) the landowners that actually provided access during the previous year to public hunters for the limited entry hunt, if applicable.]~~

~~[(2) If a landowner association distributes vouchers for members of the landowner association and the proceeds are distributed among members of the landowner association, the public access provisions described in R657-43-10(5) shall apply to all landowners receiving benefit from distribution of those proceeds.]~~

~~[(3) The division may deny a request for limited entry landowner permits if the landowner association fails to provide requested documentation from the previous year.]~~

~~[(4) Upon approval of the Wildlife Board, the division shall issue vouchers to landowner associations that may be used to purchase limited entry permits from division offices.]~~

~~[(5) The fee for any limited entry landowner permit is the same as the cost of similar limited entry buck deer, bull elk or buck pronghorn limited entry permits.]~~

~~[R657-43-12. Limited Entry Permit Conflict Resolution.]~~

~~[(1)(a) If landowners representing a simple majority of the private land within a landowner association are not able to resolve any dispute or conflict arising from the distribution of permits or other disagreement within its discretion and arising from the operation of the landowner association, the permits allocated to the landowner association shall be made available to the general public by the division.]~~

~~[(b) Landowner associations may be eligible to receive landowner permits in subsequent years if the landowner association resolves the conflict or dispute by a simple majority of the landowners.]~~

~~[(2) The division shall not issue landowner permits to a landowner association that has not complied with the provisions of this rule.]~~ **657-43-7 Landowner Association**

Advisory Committee

(1) A Landowner Association Advisory Committee shall be created consisting of seven members nominated by the director and approved by the Wildlife Board.

(2) The committee shall include:

(a) two sportsmen representatives;

- (b) two landowner representatives;
- (c) one agriculture representative;
- (d) one at large public representative; and
- (e) one Regional Advisory Council chairperson or member.
- (3) The committee shall be chaired by the Wildlife Section Chief, or their designee, and shall be a non-voting member.
- (4) The committee shall:
 - (a) hear complaints dealing with fair and equitable treatment of hunters on Landowner Association lands;
 - (b) review the operation of the Landowner Association program;
 - (c) make advisory recommendations to the director and Wildlife Board on the matters in subsections (a), (b), (c), (d), and (e).
- (5)(a) The committee may, after hearing evidence of complaints or violations, place a Landowner Association on probation.
 - (b) A Landowner Association placed on probation status must provide the Landowner Association Advisory Committee a plan of corrective action to address concerns regarding operation of the Landowner Association, and report annually to the Landowner Association Committee during the probationary period regarding their progress in addressing such concerns.
 - (c) The Landowner Association Advisory Committee shall report to the Wildlife Board any Landowner Association that remains on probation during a certificate of registration renewal process.
- (6) The Wildlife Section Chief shall determine the agenda, time, and location of the meetings.
- (7) The director shall set staggered terms of appointment of members such that there is rotating representation and that all committee members' terms shall expire after four years.

KEY: wildlife, landowner permits, big game seasons

Date of Enactment or Last Substantive [~~Change~~Amendment]: February 9, 2015

Notice of Continuation: [~~January 2022~~February 27, 2017

Authorizing, and Implemented or Interpreted Law: 23-14-18; 23-14-19

Strawberry Reservoir Fishery Management Plan

05/02/2022

The following management plan drafted for Strawberry Reservoir was developed by the Utah Division of Wildlife Resources with input from the Strawberry Management Plan Advisory Team. The plan development process was facilitated by Jason Vernon (UDWR) and discussions and presentations led by Alan Ward (Strawberry Project Leader UDWR), and minutes were taken by Weston Pearce (Strawberry Project Biologist UDWR). The following entities and individuals were represented on the advisory team:

- US Forest Service
Justin Robinson, Anthony Gray
- Central Utah Water Conservancy District
Dave Lupold
- Wasatch County
Doug Smith
- Utah Division of Water Quality
Christine Osborne
- Strawberry Water Users
Kelly and Jeanne Lewis
- Utah Division of Wildlife Resources
Randy Oplinger, Chris Crockett
- Strawberry Bay Marina
Paul Phillips
- High Country Fly Fishers
John Schultz
- Trout Unlimited
Mike Fiorelli
- Strawberry Anglers Association
Ron Dunn, John "Andy" Clark
- Sportsmen for Fish and Wildlife
Ken Strong
- Blue Ribbon Fisheries Advisory Council
Randy Oplinger
- Utah Recreation Company
Nick Smith
- Friends of Strawberry Valley
John Schultz

Data from UDWR angler opinion surveys conducted during 2020, and the biological data obtained from the Strawberry Reservoir Special Project Office of the UDWR were also used to help guide the discussion and provide a basis to build the plan upon. Due to the high profile nature of Strawberry Reservoir, it was imperative that considerable public input from the opinion surveys, and the input from a very diverse advisory team, be allowed to drive the ultimate direction that this plan would take. The previous plan, developed in 2014, was in need of being updated with the most current biological data and public opinions. The 1987 plan was successful in building one of the most important sport fisheries in the Western United States, which receives as much as 1.5 million angler hours annually, and the 2014 plan helped to bring things more up-to-date. In 2006, the Strawberry Project received a distinguished award as the "Outstanding Project of the Year" in North America by the National American Fisheries Society, further validating the success of the program at Strawberry Reservoir. The following plan serves as the guiding document to help managers maintain, and even improve, this important world class fishery into the foreseeable future.

The following Strawberry management plan is comprised of two major components: Goals and Objectives. The "Goals" are the basic concepts that the group decided upon as overriding visions of what is desired from the fishery at Strawberry Reservoir. The "Objectives" outline more specific (often measurable) outputs that need to be met to provide the desired components to the fishery. In addition, a "Discussion and Strategies" section provides more detail and background validating the reasoning for each Goal and Objective, and the "Strategies" are a list

of possible tools or methods to obtain the related objective. It is important to note that the listed strategies are not a comprehensive list, nor do they provide a checklist, or stepwise approach, to meeting the objectives. They are simply a list of potential tools that should be considered in meeting the Goals and Objectives.

Though not identified as a goal or objective in the plan, it is important to note that illegal introductions of aquatic species are serious problems facing most fisheries. Illegal introductions have occurred, or have been attempted, at Strawberry in the past (Utah chub, smallmouth bass, and others). Fish species illegally introduced into Strawberry Reservoir will not be managed for or promoted, and appropriate actions will be taken on a case by case basis.

It should also be emphasized up front that the stocking of hatchery reared fish is vital to the success of the management plan at Strawberry Reservoir. And though the plan does continue to emphasize the importance of maintaining, and increasing, natural recruitment in the system, stocking will continue to be vital to overall success due to the high level of angling pressure that Strawberry Reservoir receives annually. It also must be acknowledged that there are obvious limitations on the State's fish production capabilities, and it will not always be possible to increase fish production within our current hatchery system to offset unforeseeable shortfalls in meeting some of the objectives set in the plan. Therefore, working within the constraints of our production capabilities and fish needs at other waters state-wide will need to be considered.

Strawberry Reservoir Management Plan

Guiding Statement

“Protect and enhance the unique, year-round angling experience that Strawberry Reservoir provides as one of Utah’s premier cold water fisheries”

Goals

1. Prevent Utah chubs from negatively impacting the sport fishery at Strawberry Reservoir

Objectives

1. Maintain minimum condition factor [$k_{TL} = \text{Weight gm}/(\text{TL mm})^3 \cdot 10^5$] of 0.82 in age 2 cutthroat during the fall netting.
2. Limit total catch rate of chubs sampled in gillnet surveys to 1.4/net-hour in overall zone adjusted fall curtain net catch rate¹.
3. Maintain number of 18” or greater cutthroat trout sampled in gill net surveys between 0.19 and 0.23 /net-hour in overall zone adjusted fall curtain net catch rate¹.

2. Provide a sport fishery where the species assemblage, fish size, and catch rates will appeal to its anglers

Objectives

1. Maintain an average angler catch rate for rainbow trout between 0.18 and 0.25 fish per angling hour in year-long creel surveys³ (or a comparable surrogate)

2. Maintain an average summer angler catch rate of 0.125 fish per angling hour for Kokanee salmon as measured in summer (typically July) creel surveys³, with a focus on improving and stabilizing kokanee numbers in Strawberry Reservoir.
3. Maintain average size of rainbows in the creel at 15” as measured in year-long creel surveys³ (or a comparable surrogate), while maintaining opportunities for harvest once the size objective is met.

3. Ensure a variety of fishing experiences

Objectives

1. Maintain a minimum fishing pressure of 1 million angler-hours annually, using a minimum of 200,000 angler hours during annual July creel surveys as an indicator of success between full-year surveys³. Falling below these levels for more than two consecutive years triggers further surveys and other actions.
2. Maintain a minimum of 150,000 ice angler-hours per year as measured in creel surveys when ice and snow conditions allow³. Alternate representative methods should be employed on year’s in-between year-long creel surveys.
3. Take action to provide additional fishing opportunities on Strawberry tributaries.
4. Enhance non-angling fishery related opportunities (viewing events, educational opportunities, and outreach) with angler recruitment focus.
5. Ensure and enhance opportunities for all angler types and methods legally allowed at Strawberry Reservoir.

4. Improve natural reproduction of cutthroat trout and Kokanee salmon populations

Objectives

1. Maintain average annual recruitment of Age I cutthroat trout at 0.033 fish per net hour, with a focus on increasing this level.
2. Maintain an average of 0.15 Kokanee per net hour from natural reproduction, with a focus on increasing this level.

**A review of this plan (informal and/or formal) should be conducted at least every five years, and formal reviews should coincide with year-long creel surveys and related angler opinion surveys.*

Discussion and Strategies

Goal #1 - Prevent Utah chubs from negatively impacting the sport fishery at Strawberry Reservoir - *Illegally introduced Utah chubs have had negative impacts on the fishery at Strawberry Reservoir during the past. Strawberry has been chemically treated on two occasions in the past (1961 and 1990) in attempts to remove these unwanted introduced species. It is critical to the overall health of the sport fishery that we control the Utah chub populations to try to avoid future problems including the need for expensive and difficult chemical treatments. Proper management of the predatory Bear Lake cutthroat has provided sustainable top down control of the Utah chub populations since 2003, thereby providing a template for control into the future.*

Objectives

1. Maintain minimum condition factor [$k_{TL} = \text{Weight gm}/(\text{TL mm})^3 \cdot 10^5$] of 0.82 in age 2 cutthroat during the fall netting¹ – *Condition factors [$k_{TL} = \text{Weight gm}/(\text{TL mm})^3 \cdot 10^5$] of age II cutthroat have averaged roughly 0.86 since the 1990 treatment. It is critical to maintain good growth rates and associated condition factors during the first year (for fish stocked as age 1) for the cutthroat to ensure sufficient survival and recruitment to adult sizes for chub control. Reduced growth rates could indicate food limitations brought on through competition for limiting resources. Competition for food resources between trout species and Utah chub led to the previous two rotenone treatments of Strawberry Reservoir.*

Strategies

- a. Monitor zooplankton for composition, abundance, and size – *Zooplankton comprise roughly 85% and 60% of the age 1 and age 2 cutthroat diets respectively throughout the year. Therefore, tracking zooplankton monitoring is a good way to track food availability for these fish. Current zooplankton sampling includes tows taken during the second week of February, third week of May, first week of August, and the second week of October. The May and October sampling dates coincide with the spring and fall stocking to assess what is available during these periods for stocked fish, and compare it to what is seen in fish diets from gillnetting. Data collected will be used to assess whether significant changes in zooplankton abundance and/or size could be affecting growth and survival of cutthroat trout. Due to the highly variable nature of zooplankton densities, trends over two to three years should be used to signify changes. If a decline is suspected, more intense sampling should be initiated to better document it.*
- b. Monitor water quality annually to assess limitations in growth and survival for cutthroat – *Basic water quality parameters such as temperature, dissolved oxygen, and pH will be monitored by UDWR in the water column in conjunction with zooplankton sampling to assess conditions and potential limitations to survival and growth for the cutthroat and other fish. Receiving water will also be monitored during stocking events to ensure that stocked fish are being placed into favorable conditions. High temperatures (>20 deg C) and low summer oxygen levels below the thermocline occur annually, and reservoir stocking should be avoided during these periods. Stream stocking should again be avoided when daytime temperatures could reach or exceed 20 deg C.*

- c. Monitor interaction of cutthroat trout with other species – *It is imperative that other fish species either currently found in Strawberry, or to be introduced, do not adversely affect the cutthroat trout populations which have proven an effective biological control on Utah chubs in Strawberry Reservoir. Any potential predatory and/or competitive interactions with other game fish should be closely monitored and adjusted to ensure adequate growth and survival in the cutthroat populations to provide the needed chub control. This monitoring will include, but not be limited to, annual curtain netting, hydroacoustic surveys, and fish trap/spawning monitoring operations.*
2. Limit total catch rate of chubs sampled in gillnet surveys to 1.4/net-hour in overall zone adjusted fall curtain net catch rate¹ – *Utah chub numbers have remained relatively low and stable since the enactment of the slot limit on cutthroat in 2003. This catch rate reflects the threshold based on our current curtain netting monitoring operations. The ability to keep Utah chub numbers below this level will help ensure that a quality sport fishery can be sustained into the future without the need for expensive (politically, feasibly, and monetarily) chemical treatments. The last 18 years of data from Strawberry Reservoir suggests that due to Utah chub longevity, and the fact that they can escape cutthroat predation by obtaining large enough sizes to not be eaten for the majority of their life span, there is little hope that chubs will ever be eradicated from the system. However, continued monitoring should also focus on ensuring that any severe reductions in Utah chub numbers do not somehow significantly affect cutthroat growth and condition. With the recent conversion to curtain nets (since 2017) it will also be important to periodically correlate these curtain net catch rates with the traditional net catch rates to make sure that the trends are consistent with the traditional net catch rates over the past 75 years.*

Strategies

- a. Adjust cutthroat trout population and age structure to control chubs – *Since 2003 it has been shown that the Bear Lake cutthroat have been extremely effective at controlling Utah chub populations in Strawberry Reservoir. However, adjustments in the management of the cutthroat have been necessary to provide the needed population structure to obtain chub control. In 2003, special regulations (a slot limit eliminating harvest from 15” to 22”) controlling the harvest of cutthroat were placed on the reservoir and have provided more, and larger sized, cutthroat needed to effectively control the chub populations (see Goal 1, Objective 3). Adjustments to numbers, size, and timing of stocked fish have also been necessary to provide the cutthroat numbers and age/size structure needed to control chubs. If chub populations expand beyond the objective with current cutthroat trout management protocols, future adjustments may also be needed to make sure that cutthroat populations remain robust enough to control chub populations.*
- b. Allow commercial harvest of chubs – *Commercial harvesters have taken Utah chub from Strawberry Reservoir in the past, particularly when the numbers of small chubs were high. These smaller chubs were primarily sold as bait. During 2004 (right in the peak of chub numbers since the 1990 treatment) the harvester sold 7,798 packages of a dozen chubs (93,576 chubs) harvested from Strawberry. This number pales in comparison to the estimated 64 million eaten by cutthroat*

predators the next year in the diet study, but does offer some help in chub control, and provided a viable commercial operation at the time. Currently these harvesters are not taking fish from Strawberry, largely because numbers of smaller chubs have diminished due to cutthroat predation, making baitfish harvesting there less profitable than elsewhere. If chub numbers increase, or another market opens up for a beneficial use of the chubs available in Strawberry, allowing these operations should be considered. However, making sure that the harvesting operations do not negatively impact sport fishing in any way is paramount. In addition, it would be crucial to make sure that these operations would not spread any unwanted aquatic invasive species or diseases through equipment being used elsewhere and actively being transported to other bodies of water.

- c. *Spot treatments for removal of chubs – If Utah chub numbers increase to a point where other biological controls are not keeping up with their expansion, then it may be advantageous to consider chemical spot treatments to kill off large concentrations of chubs, such as spawning concentrations. It is important to realize that spot treatments alone would not be completely effective at controlling chubs, and that the biological control mechanism currently provided through cutthroat predation is more effective in the long-term. Also, such treatment efforts should be considered a last resort. However, spot treatments may allow a short-term control mechanism that may help get the system back in balance if cutthroat populations suffer, and chubs get a stronger foothold. Spot treatments with chemicals would obviously have many unwanted side effects through its non-selective nature, and many sport fish could also be killed. It would be critical to run smaller test runs to determine methods and timing that would minimize the unwanted side effects.*
- d. *Consider introducing another sterile salmonid as a predator (while maintaining the rainbow fishery) – If the Bear Lake cutthroat currently being used as a biological control mechanism to reduce chub numbers proves ineffective at some point, other salmonid species could also be considered in addition to the Bear Lake cutthroat, or as a replacement if necessitated. The issue of sterility is important if introgression with cutthroat is likely, and/or if a positive control on the newly introduced population needs to be maintained, particularly during initial trial periods. However, the Bear Lake cutthroat have proven to be extremely effective for the past 18 years, and nothing at this point would dictate a need for a change. Recent (2020) opinion surveys indicate that cutthroat trout are considered a highly desirable sportfish at Strawberry Reservoir. In addition, current public opinion dictates that the rainbow fishery be continued at Strawberry Reservoir, thereby negating the substitution of another species for the rainbows as a strong possibility. In addition, current public opinion surveys dictate that only salmonids should be considered as alternative species in Strawberry Reservoir. Only 18% of respondents indicated that they would suggest another alternative species, and over 75% of those who wanted another species indicated that it should be another salmonid. Any inclusion of other species should not be taken lightly at Strawberry Reservoir due to the sensitivity of maintaining a sustainable biological balance, as well as meeting public desires. Therefore, public opinion*

surveys and coordination with a diverse public and agency advisory group will be part of the process.

3. *Maintain number of 18" or greater cutthroat trout sampled in gill net surveys between 0.19 and 0.23 /net-hour in overall zone adjusted fall curtain net catch rate¹ – Chub numbers have declined and remained relatively low and stable since the slot limit on cutthroat was enacted back in 2003, and certain levels of predacious cutthroat (>18") have been the primary factor contributing to the initial decline and maintenance of low chub numbers (Ward et al. 2008). A significant reduction of cutthroat numbers below these levels could allow Utah chub populations to rebound to previous levels that prompted expensive chemical treatments to restore the sport fishery at Strawberry Reservoir in the past. In addition to the needed chub control provided by the cutthroat, the anglers at Strawberry Reservoir have become accustomed to catching numerous large cutthroat trout, and would like to see that continue. Though cutthroat population levels are primarily being set through gill net catch rates for chub control under this objective, modeling of the predicted angler catch rates from past gill net catch rates of cutthroat >18" indicate that anglers should experience an overall year-long catch rate of 0.37 fish per angler hour for cutthroat trout. Curtain net catch rates are relatively new (since 2017) and it will be important moving forward that the catch rates from curtain nets be calibrated with the traditional nets periodically into the future. We have 75 years' worth of traditional net data, and maintaining a connection to this past data set is crucial to put these catch rates into perspective.*

Strategies

- a. *Adjust size restrictions and harvest limits on cutthroat trout – In order to maintain relatively high numbers of the large (>18") cutthroat in Strawberry Reservoir, care should be taken in adjusting harvest limits based on size and numbers. Strawberry continues to be driven by harvest, and unless overall angling practices/expectations change dramatically, many anglers will continue to harvest as many fish as the regulations will allow. With the considerable pressure that Strawberry Reservoir receives, legal harvest can, and will, quickly deplete cutthroat populations. The current slot limit allowing two cutthroat under 15" and one over 22" has been very effective at providing the numbers of 18" or larger cutthroat needed for chub control since 2003.*
- b. *Promote voluntary catch and release – Since the 1990 treatment of Strawberry Reservoir the UDWR has promoted voluntarily releasing cutthroat of any size in an effort to limit the harvest of this fish. It is difficult to quantify the effect of this program, but by continuing to send the same message, the angling public will hopefully further understand the importance of the cutthroat to the biological health of the system, and also reap the benefits of having numerous large cutthroat to catch.*
- c. *Adjust stocking of cutthroat trout – Stocking is one of the most important management tools that can be manipulated at Strawberry Reservoir. Since harvest continues to be an important aspect of the fishery for as many as 50% of the anglers at Strawberry, we have to make sure that stocking keeps up with natural and angler induced mortality. Increasing the numbers stocked of one species will likely decrease the numbers stocked of other species. Hatcheries are limited in the pounds that can be produced, as well as by funding. If all things*

remain equal, increased stocking of one species will reduce the potential to stock other species. Not only are the numbers stocked important, but size of stocked fish and timing of the stocks can be even more critical to survival. For instance, a study conducted at Strawberry Reservoir from 2017-2019 indicated that cutthroat stocked at 10" had a survival rate 3 times higher than those stocked at 8". The most recent studies did not focus on the timing of stocking, but obviously this can have ramifications as well. For instance, mid-summer periods when surface temperatures are at or above 20° C, and/or anoxic hypolimnion conditions exist, stocking would not be advised. Location, such as stocking in the tributaries, may also prove to be important in getting returns to tributaries to promote natural reproduction, and barge stocking in appropriate locations may also greatly improve survival. Obviously, there are many more potential alterations to the stocking program at Strawberry that could be tested in attempts to improve survival. It is important that managers continue to look for methods to help boost survival of stocked fish in Strawberry.

- d. *Law enforcement emphasis – For many years one of the most common suggestions/complaints in public opinion surveys conducted at Strawberry Reservoir have been regarding law enforcement presence at Strawberry Reservoir, with most people indicating that they would like to see an increase in law enforcement presence. With the special restrictions placed on cutthroat trout in Strawberry, and the high levels of pressure Strawberry receives, it is important that an adequate law enforcement presence be maintained. The most recent compliance data tallied from road blocks indicates that 96% – 98% of the anglers are not in violation of over limits/slot limits. These levels are very comparable to other similar waters. However, there is always the need for a certain level of law enforcement presence to maintain, or even improve, those numbers. Public perception of a law enforcement presence is probably an important part of this strategy.*
- e. *Monitor cutthroat trout angler catch rates –Monitoring of angler catch rates for cutthroat trout should be continued to ensure that angler satisfaction is being met for this species. During the last 5 year-long creel surveys dating back to 1996, angler catch rates for cutthroat trout have averaged 0.41 fish per angler hour. The current objective of providing an average net catch rate of 0.21 cutthroat >18" per net hour is currently predicted to yield an angler catch rate of roughly 0.37 fish per angler hour in the creel. It is important that the overall angler catch rate for cutthroat does not fall so low as to negatively affect angler satisfaction.*

Goal #2 - Provide a sport fishery where the species assemblage, fish size, and catch rates will appeal to its anglers

– The main purpose of this goal is to define the fishery that anglers would like to see at Strawberry Reservoir, and adopt any changes that may make it more appealing to as many anglers as possible. Angler catch rate targets under this goal are set for rainbow trout and Kokanee salmon, but not for cutthroat. It is important to realize that cutthroat trout are still considered one of the most important game fish species in Strawberry by anglers in recent angler opinion surveys, however, their abundance, and subsequent angler catch rates, are primarily set through levels in Goal 1, Objective 4. These levels of 18" and larger cutthroat catch rates in the gillnetting are predicted to provide creel catch rates (and sizes) similar to what anglers have become accustomed to since 2003 at Strawberry Reservoir. The latest modeling is

predicting an overall 0.37 cutthroat per angler hour catch rate for angler based on year-long surveys. Based on this level for cutthroat, and the following average objectives for rainbow and kokanee catch rates, anglers should experience an overall catch rate of roughly 0.6 fish per angler hour.

Objectives

- ^{1.} *Maintain an average angler catch rate for rainbow trout between 0.18 and 0.25 fish per angling hour in year-long creel surveys³ (or a comparable surrogate) – Year-long rainbow trout catch rates have fluctuated from 0.05 to 0.31 since 1996, with an average of 0.13 over those 5 surveys. Rainbow trout continue to be a highly sought after species at Strawberry Reservoir (most “sought after” species, and ranked highest in importance in 2020 angler opinion survey), and it was decided that there was a need to increase and stabilize the catch rate of rainbow trout to a higher average level. Obviously, this catch rate will fluctuate from year to year, and year-long creel surveys are typically only conducted once every 5 years (depending on funding and needs). Therefore, annual July only creel surveys will also be used as an indicator to track this objective. Catch rates over multiple years should be used to signify success or failure in meeting this objective.*

Strategies

- a. *Continue year-long comprehensive creel surveys on a five year rotation as long as funding is available – Since 1996, year-long comprehensive creel surveys have been conducted every five years at Strawberry. Supplemental funding from a creel fund housed in the Salt Lake Office of the UDWR for each of these intensive surveys has been needed. A five year rotation of these funds for a creel at Strawberry Reservoir would be desired as long as the needed funding remains intact. If catch rates of rainbow trout appear to have fallen well below the proposed objective for two to three consecutive years, it may be advantageous to implement more frequent year-long, or at least expanded, surveys to track catch rates more effectively.*
- b. *Continue conducting annual July creel surveys - Since 2015, we have conducted a July only creel survey at Strawberry Reservoir. This limited survey has been important in allowing us to track angling trends for all species on years in between the year-long surveys conducted every 5 years.*
- c. *Consider alternative survey techniques to obtain interim catch rate assessments – Other methods could be explored and used to monitor angler statistics and trends on years in between the more intensive creel surveys currently conducted every five years. Such methods could include data collected from fishing apps, social media or email surveys, and other similar methods.*
- d. *Adjust stocking of rainbow trout – Stocking is one of the most important management tools that can be manipulated at Strawberry Reservoir. Since harvest continues to be an important aspect of the fishery for as many as 50% of the anglers at Strawberry, we have to make sure that stocking keeps up with natural and angler induced mortality. Increasing the numbers stocked of one species will likely decrease the numbers stocked of other species. Hatcheries are limited in the pounds that can be produced, as well as by funding. If all things remain equal, increased stocking of one species will reduce the potential to stock other species. Not only are the numbers stocked important, but size of stocked fish and timing of the stocks can be even more critical to survival. For instance, a*

study conducted at Strawberry Reservoir from 2017-2019 indicated that cutthroat stocked at 10" had a survival rate 3 times higher than those stocked at 8", and similar results have been noticed with rainbow stocking. The most recent studies did not focus on the timing of stocking, but obviously this can have ramifications as well. For instance, mid-summer periods when surface temperatures are at or above 20° C , and/or anoxic hypolimnion conditions exist, stocking would not be advised. Obviously, there are many more potential alterations to the stocking program at Strawberry that could be tested in attempts to improve survival. It is important that managers continue to look for methods to help boost survival of stocked fish in Strawberry.

2. *Maintain an average summer angler catch rate of 0.125 fish per angling hour for Kokanee salmon as measured in summer (typically July) creel surveys³, with a focus on improving and stabilizing kokanee numbers in Strawberry Reservoir – Since 2015 Kokanee salmon catch rates at Strawberry Reservoir have averaged nearly 0.1 fish per hour during the July creel surveys, and have ranged from 0.05 to 0.18. It is important to note that the year-long catch rate for Kokanee is far less than this summertime average due to Kokanee being seasonal fishery (primarily summer months). Due the increasing popularity of this species with anglers at Strawberry, it was decided to work on increasing average catch rates of Kokanee salmon to help keep up with this trend. It is important to note that Kokanee populations have had a long history of fluctuating quite dramatically from year to year, and our ability to meet this objective will need to be measured through trends over multiple years. Kokanee have also proven to be a difficult species to manipulate through stocking and harvest alone. Therefore, our ability to meet and maintain this objective will be much more complicated than with other species in Strawberry Reservoir.*

Strategies

- a. *Adjust stocking rates - Kokanee populations at Strawberry Reservoir rely heavily on stocking, with over 50% of their numbers coming from stocked fish. Although, past data does not indicate that increased stocking always translates into more fish available to anglers, there is typically a tangible benefit from maintaining consistent stocking of these fish. Other factors (water levels, predation, natural mortality, etc.) can strongly influence Kokanee survival, but increased stocking in opportune circumstances can provide more fish when conditions permit.*
- b. *Adjust timing, size and location of Kokanee stocking – Again, Kokanee salmon have proven to be more difficult to manipulate through stocking sizes than other species at Strawberry Reservoir. Kokanee cannot simply be grown to larger sizes like other stocked species to avoid predation. Hatchery environments can cause problems with Kokanee physiology, particularly with reproduction, and Kokanee raised too long in the hatchery will mature at younger ages. Some studies have even suggested that Kokanee stocked as fry can survive better than those raised to larger sizes. Of course this can vary by system. Also, stocking location could have an impact on survival and returns to spawning locations. Typically, the majority of the Kokanee stocked into Strawberry Reservoir are stocked in the tributaries to promote returns to those tributaries for spawning purposes (particularly to the spawning trap on the Strawberry River). However, over recent years we have also stocked some smaller portions directly into the reservoir to*

hopefully facilitate better survival (there could be some losses from outmigration in the streams), and to also promote reservoir spawning activity. Unfortunately, we do not know whether stream stocking or reservoir stocking is more advantageous for survival, or for spawning success. However, it is likely that some mix of strategies would be most advantageous due to our current limited knowledge. Continuing the stocking of roughly 75% in the tributaries and 25% in the reservoir of 3" to 4" kokanee should continue until further information is obtained. Further studies addressing these deficiencies in understanding would be advisable.

- c. *Promote increases in natural reproduction (addressed in Goal 4, Objective 2) – Naturally reproduced Kokanee at Strawberry Reservoir have averaged about 44% of the standing population since 2017. It is important that we not only try to maintain this level of natural recruitment, but also look for ways to increase how many are produced in the system. Ongoing stream restoration efforts, stocking efforts (to promote returns to spawning habitat), and efforts to improve water quality issues can have positive impacts on spawning and recruitment.*
3. *Maintain average size of rainbows in the creel at 15" as measured in year-long creel surveys (or a comparable surrogate), while maintaining opportunities for harvest once the size objective is met³ – Since 2006, rainbows in the creel at Strawberry Reservoir have averaged 15". Recent angler opinion surveys have indicated that anglers are not opposed to some restrictions to help increase the size of rainbows. However, roughly half of the anglers also indicated that they still desire to have a consistent harvest component to the fishery at Strawberry Reservoir. Therefore, any restrictions on rainbow trout harvest (size or limits) will need to consider still allowing significant harvest of rainbows to satisfy the need for a harvestable component. The rainbows at Strawberry have provided the main harvest component in recent years due to the restrictive nature of the current slot limit on cutthroat. Surveys have also long documented that rainbow trout remain a favorite component of the catch at Strawberry.*

Strategies

- a. *Adjust size and timing of rainbow stocking as necessary – Recent studies conducted on cutthroat (2017-2019) have indicated that the stocking of 10" fish can be very effective at maximizing survival of stocked fish, while considering returns from pounds stocked. Therefore, stocking of 10" rainbows should be continued as long as it remains effective, with a mix of fall and spring stocks to provide harvestable fish at different times of the year. It is critical to continually monitor the effectiveness of the stocks, and future adjustments in size and timing of these stocks may be needed.*
- b. *If average size and/or condition drops due to competition, implement strategies for chub control found in Goal 1, Objective 2 – Competition between rainbow trout and Utah chubs has been well documented at Strawberry Reservoir (and elsewhere), and has prompted the past rotenone treatments there. If chubs become a problem again in the fishery, it will likely first be seen in rainbow growth and survival.*
- c. *Publicize growth rate as a way to promote catch and release – Growth rates of the rainbows at Strawberry are very good, and a slight change in the harvest patterns of anglers can have huge impacts on survival and size potential of the fish there.*

Strawberry continues to be driven by harvest and the promoting of voluntary catch and release with the promise of larger rainbows in the near future may alter some anglers harvest habits. The effectiveness of these types of programs is difficult to quantify, but they may help without much additional effort or cost.

- d. Apply harvest restrictions (size and/or numbers) as needed – *Since Strawberry Reservoir continues to be largely driven by harvest (anglers control populations of sportfish), restricting harvest remains one of the most effective means of controlling size and numbers of sportfish available. However, harvest in general remains important to roughly half of the anglers at Strawberry, and severe reductions in harvest potential will impact those anglers and their desire to fish at Strawberry Reservoir. Care should be taken to ensure that restrictions designed to increase the average size of the rainbows does not overly restrict the harvest potential at Strawberry Reservoir. However, a slight change in angler harvest patterns could have relatively large changes in the average size of rainbows available. Any proposed regulation changes on rainbows aimed at increasing the average size should be modeled as to the expected outcomes of harvest potential as well as potential size increases, and then run through public opinion surveys before being run through the RAC and Wildlife Board.*

Goal #3 - Ensure a variety of fishing experiences – *Strawberry Reservoir receives as much as 1.5 million angler hours on an annual basis, and remains one of the top sport fisheries in Utah. It is critical that a fishery be provided at Strawberry that will appeal to the largest group of anglers possible, which means providing a variety of opportunities. In addition, it is important to make sure that all anglers, and potential anglers, are aware of the opportunities available.*

Objectives

1. Maintain a minimum fishing pressure of 1 million angler-hours annually, using a minimum of 200,000 angler hours during annual July creel surveys as an indicator of success between full-year surveys³. Falling below these levels for more than two consecutive years triggers further surveys and other actions – *Strawberry has sustained an average annual fishing pressure of just over 1.1 million angler hours since the 1990 treatment, providing an obtainable, and sustainable, goal for pressure. Current population trends in the state of Utah are only increasing, and future projections only show this trend continuing. Therefore, falling below 1 million angler hours would indicate that something has changed in angling habits, desires, and/or the fishery itself to keep people from wanting to fish there.*

Strategies

- a. Focus on new recruitment – *Organize and promote activities and events that focus on recruiting new anglers of all ages to the sport*
- b. Advertisement/outreach – *Continue, and possibly increase effort, in advertising events and opportunities such as the following non-comprehensive list:*
 - i. *Cast for Kids, disabled veterans fishing event, ice fishing clinics, etc.*
 - ii. *Publicize rainbow availability and size*
 - iii. *Out of state campaign*
 - iv. *Quality aspect (cutthroat trout)*
 - v. *Promote kokanee angling opportunities*

- vi. *Publicize and promote watchable wildlife events (e.g. kokanee and cutthroat events)*
 - vii. *Web based weather and wildlife cameras*
 - c. Provide an appealing fishing experience to draw anglers (see previous objectives) – *If a highly desirable fishery can be developed, it is likely that people will use it. Many of the Objectives and Strategies outlined under Goal 2 provide the means to help accomplish this.*
 - d. Improve/maintain fishing-related recreational experiences at Strawberry – *For many, fishing at Strawberry Reservoir means more than just catching fish. Camping, ATV riding, hunting, wildlife viewing, and aesthetics/setting are also important to the overall experience. It is important that managers recognize the interactions of these activities, and that a management decision at one level can affect other areas as well. It is critical that all resource managers maintain a high level of cooperation and communication in the Strawberry Valley to ensure that all types of recreational activities are considered in management decisions.*
 - e. Make Strawberry more user friendly – *Make sure that fishing at Strawberry Reservoir does not seem too difficult or inconvenient for the largest possible group of potential anglers. Information availability, opportunities, fees, regulations, and facilities need to be geared towards making people comfortable with the experience. It is of obvious importance that good working relationships be developed and maintained with all partnering agencies and groups to make sure that the needs of users are being met. Continued support and involvement with the Friends of Strawberry Valley working group is crucial in maintaining these relationships.*
 - f. Explore opportunities for increasing and/or improving access for shore fishing (general public and disabled anglers) and for launching personal watercraft, consistent with Forest Plan – *Opportunities to increase and/or improve shore angling and use of small personal watercraft (e.g. float tubes and personal pontoon crafts) need to be explored. Strawberry continues to be a boat oriented fishery during ice-off seasons, and expansion of shore angling and non-motorized watercraft opportunities (including dissemination of information) has great potential to draw more anglers to Strawberry. Included in this concept, is the idea of providing facilities for disabled anglers. Any expansion and/or improvement would obviously have to be taken through the proper channels (typically including the Forest Service), as they are the land managers over the vast majority of the land around Strawberry Reservoir.*
2. Maintain a minimum of 150,000 ice angler-hours per year as measured in creel surveys when ice and snow conditions allow³. Alternate representative methods should be employed on year's in-between year-long creel surveys – *During the last four creel surveys since 2001, Strawberry has sustained an average of 188,000 hours of ice fishing pressure. Ice conditions at Strawberry Reservoir remain relatively stable and predictable from year to year compared to many other large bodies of water in Utah due to its high elevation and frequent cold air inversions that settle in the valley. Ice angling was identified as one of the most promising areas to expand angling opportunities to a wide array of the public due to the lack of a need for expensive equipment (e.g. boat) and because Strawberry Reservoir could sustain more pressure provided that adequate*

access can be maintained and even expanded upon. It is important to note, however, that even Strawberry Reservoir can have poor ice conditions and heavy snow conditions on some years, typically with regard to heavy snowfall that makes access around the ice difficult. Due to these variable conditions, it is important to take ice and snow conditions into account when evaluating the success of this objective. In addition, annual creel surveys have traditionally only been conducted on a 5 year rotating basis, therefore, it will be important to develop alternative methods on in-between years to track pressure during winter months that could be correlated to the pressure level set in the plan. If we fall below this objective for more than two or three consecutive years, actions should be taken to try and evaluate and address potential bottlenecks.

Strategies

- a. *Improve access and maintain access authorizations – Currently UDWR coordinates with Utah State Parks and Recreation, Strawberry Bay Marina, Wasatch County and the US Forest Service to keep angler parking areas open during the winter. The parking areas currently provided during the winter are often filled to capacity on busy days, and any efforts to expand ice angling opportunities would need to address access. Annually the UDWR is obligated to compete for funding to help pay for snow removal efforts at angler parking areas. This funding is in jeopardy of not being funded on any given year. If this funding were to not get approved for any reason, ice angling opportunities would be severely limited at Strawberry Reservoir. Managers at all coordinating agencies should always be looking for additional opportunities to help fund this vital service.*
 - b. *Explore opportunities to increase facilities to support more ice fishing (parking, restrooms, trash, etc.) - Look for opportunities to increase parking areas such as development of the proposed Chicken Creek East boat ramp and parking area. If currently proposed developments (or others) that provide winter access come to fruition, look for opportunities to provide ice angler parking areas in conjunction with their efforts. Any expansion of parking/access would obviously need to address other facilities such as restroom and trash services.*
 - c. *Promote opportunities through advertising and events – Past public ice angling events have met with tremendous success, and similar events that promote the sport to the new angler should be explored.*
 - d. *Develop alternate methods for tracking winter fishing pressure at Strawberry Reservoir – Year-long creel surveys have only been conducted every 5 years since 1996, and in order to track our ability to meet this objective, it will be important to find alternate methods for tracking fishing pressure during winter months that could be correlated to our estimates obtained through the creel surveys. Some possibilities could include: parking lot counts, short duration creels, online surveys, fishing apps, etc. However, it would be important to correlate these estimates to actual counts to verify that they could be used as a surrogate.*
3. *Take action to provide additional fishing opportunities on Strawberry tributaries – Opportunities to fish the tributaries to Strawberry Reservoir have been much more limited than they were prior to the 1990 treatment. Spawning closures, catch and release restrictions, and special gear restrictions have been used to protect spawning and*

rearing of naturally produced fish in the tributaries. And though many of these goals are still relevant (see Goal 4), managers should explore the potential to promote and expand fishing opportunities on the tributaries.

Strategies

- a. Remove some of the Kokanee spawning closures – *In some instances it may be possible to allow more fishing opportunities on certain streams during the current Kokanee spawning closure from September 1st to the second Saturday of October. The need for these closures has largely gone away over the years. Stream restoration efforts have successfully brought back healthy stands of willows along many of the tributaries where Kokanee used to spawn. As a result, beaver activity has significantly increased in many areas, which greatly limits the ability of Kokanee to migrate into some areas that they used to be able to access. Therefore, opening these sections up to angling during the Kokanee spawn will not have negative impacts on Kokanee spawning success. Careful monitoring of potential additional impacts to spawning and recruitment should be incorporated into any loosening of the regulations on the tributaries.*
 - b. Monitor tributaries (fish populations and water quality) – *Continue careful monitoring of fish populations and water quality valley-wide, including agreements between UDWR and UDWQ (EPA QAPP – Strawberry River Phase IV, 2012). This information would provide the basis for ascertaining the possibilities of allowing more angling opportunities on the tributaries.*
4. Enhance non-angling fishery related opportunities (viewing events, educational opportunities, and outreach) with angler recruitment focus – *Not all visitors who come to the Strawberry Valley are anglers. Through good education and information dissemination, non-anglers can also gain an appreciation for the fishery resources at Strawberry, and may potentially gain an interest in angling through these activities. With the connection of the UDWR fish trap facility to the USFS Visitors Center at Strawberry, there is a unique opportunity to connect many non-anglers to the area and resources.*

Strategies

- a. Fish viewing events – *Continue an emphasis on activities such as the Kokanee and cutthroat viewing days. Thousands of people come through the Visitors Center and fish trap each year to see the spawning fish. Other opportunities should also be explored to connect people at large with the resources. Providing online viewing opportunities should also be considered. It is imperative that a good relationship be fostered with the USFS, and that the facilities (such as the boardwalk and trap) are maintained to keep these valuable activities ongoing.*
- b. Educational tours – *Continue providing educational tours for a wide variety of people. Each year numerous tours/lectures on spawning and egg taking operations, stream restoration, natural resources and management, and fishing have been conducted for groups ranging from grade school children to the Governor, US Senators and heads of Federal agencies. Such activities provide valuable information and education that help not only in promoting the resource at Strawberry Reservoir, but in a broader sense as well.*

5. Ensure and enhance opportunities for all angler types and methods legally allowed at Strawberry Reservoir. – *Over the decades, anglers have become accustomed to being able to fish at Strawberry Reservoir regardless of their personal fishing styles and techniques. It is important that we recognize that Strawberry has a long history of being open and appealing to a wide variety of anglers, and that any further restrictions on methods or angling types could have a very negative impact on large numbers of anglers. In addition, it will be important to make sure that opportunities for all angling types and methods are not restricted by lack of amenities and facilities.*

Strategies

- a. Angler Opinion Surveys – *Managers need to ensure that angler opinion surveys are conducted on a regular basis (3-5 years for intensive surveys, and more frequently for on-reservoir or topic specific surveys). Without this critical information, it is quite impossible to keep up with current public perceptions and desires for this highly utilized fishery. These surveys should drive the discussion for any future revisions to the management plan.*
- b. Public Outreach – *It is important to keep in mind that as information is disseminated to the public about Strawberry Reservoir, that a conscious effort is made to make sure the public is aware of the opportunities for all anglers at this valuable resource. This would be particularly important if any future regulation changes were proposed. The intent of any future regulations or restrictions should carefully weigh the pros and cons of how these changes could be perceived by all types of anglers (and methods of angling), and should not unduly restrict or limit angling methods or types of anglers.*
- c. Future development – *As future projects and development occurs in the Strawberry Valley, fisheries managers should work closely with developers and land management agencies to help ensure that these projects will benefit a wide variety of fishery and wildlife users. These projects should include analyses of the limitations and needs for each type and method of angling. Considerations for ADA access should also be included in this.*

Goal #4 - Improve natural reproduction of cutthroat trout and Kokanee salmon populations – *Promoting natural reproduction at Strawberry Reservoir has been one of the primary goals since prior to the 1990 treatment. The 1987 management plan for Strawberry identified some lofty goals of natural reproduction (10 million fry produced each year) that were difficult for managers to track the progress of. However, the general idea of enhancing natural reproduction remains a high priority, largely based on the data that on average 32% of the cutthroat and 43% of the kokanee in Strawberry have come from natural reproduction since 1993.*

Objectives

1. Maintain average annual recruitment of Age I cutthroat trout at 0.033 fish per net hour, with a focus on increasing this level ¹ – *Since 2017, and the inception of our more robust reservoir sampling protocols, we have documented an average catch rate in our nets of 0.033 age 1 cutthroat per net hour (adjusted by strata and reservoir volumes) coming from natural recruitment. Moving forward it is important that this level of natural recruitment be maintained, with additional efforts being taken to increase this level.*

Strategies

- a. Stream restoration – *Millions of dollars, and a considerable amount of effort, have been spent in attempts to rehabilitate degraded tributaries in the Strawberry Valley since 1990. It is impossible to determine how much affect many of the past efforts have had in increasing natural reproduction, but current efforts have a monitoring component included that should help quantify the effects of the restoration efforts. However, it does seem intuitive, and is backed by considerable research, that certain improvements to stream quality does have a positive impact on spawning and recruitment of fish. Efforts to improve stream quality for fish spawning and recruitment should be continued. It is important to note that some of the desired outcomes from these restoration efforts will not be noticed immediately. For instance, one of our most limiting factors in recruitment on the Strawberry River is elevated temperatures. Restoration efforts on this stream largely focused on narrowing and stabilizing the channel, and providing more woody vegetation for shading (which was previously non-existent in most areas). It will take time for this woody vegetation to establish sufficiently to provide the needed shading for significant stream temperature reductions to occur.*
 - b. Improve/increase water flows – *Water is obviously one of the most limiting factors in fish populations. If options arise where water flow regimes can be improved they should be pursued. For instance, studies are currently being undertaken to find out why some valley streams dry up during late summer. Once dewatered reaches are identified and causes of water loss are found, measures to reverse these causes should be undertaken if feasible.*
 - c. Promote stream spawning – *Managers should look for opportunities to promote stream spawning activity. For instance, allowing cutthroat to bypass the trap during spawning migrations, looking into imprinting strategies, and stocking the streams to promote natural imprinting of stocked fish should all be considered. Continual monitoring and selective removal of fish migration barriers, such as beaver dams, is of obvious importance in critical areas as well.*
 - d. Continue Fish Marking Efforts – *Managers at Strawberry Reservoir have been marking cutthroat trout stocks since the 1990 treatment. These methods have been recently refined, and improved upon, and all of our stocked cutthroat can be marked with minimal effort (<3 hours per 400,000 fish) and cost. Yet the amount of additional information gained from this effort far out weights the minimal costs. It would be extremely difficult (and far more expensive) to try and track natural recruitment in Strawberry Reservoir without this marking effort.*
 - e. *Implement water quality improvement recommendations contained in “Strawberry Watershed Restoration Report, Strawberry Watershed Restoration Report Action Plan and Strawberry Reservoir TMDL Study (UDEQ, 2005).*
2. Maintain an average of 0.15 Kokanee per net hour from natural reproduction, with a focus on increasing this level. – *Kokanee salmon have increased in popularity among many anglers during the last 10 years or so. Even though they do not comprise a large proportion of the overall annual catch in the year-long creel (about 7% on good years), there is a considerable amount of interest in pursuing them during summer months (over 1/3 of anglers are actively pursuing Kokanee salmon in July at Strawberry). Managers were not able to effectively monitor Kokanee salmon populations in Strawberry Reservoir*

until 2017 when new netting protocols were adopted which now provides a very robust sample of all fishes in all strata of the reservoir. Naturally recruited Kokanee have comprised nearly 45% of the Kokanee population in Strawberry Reservoir on average since 2017, and this equates to an average catch rate of 0.15 per net hour in the fall nets. These naturally recruited Kokanee are vital to the success of the Kokanee fishery at Strawberry Reservoir, and efforts should be taken to maintain, and even improve upon, natural recruitment potential for these fish. Not only do kokanee provide an important sport fish opportunity at Strawberry, but they also provide an extremely valuable watchable wildlife opportunity (see Goal 3, Objective 4).

Strategies

- a. Investigate/monitor lake spawning and stream spawning activity– *Managers at Strawberry currently have very little understanding as to the successes of lake spawning vs stream spawning activity in Kokanee salmon at Strawberry Reservoir. Due to our long-term hatchery marking efforts of Kokanee in Strawberry we do know what percentage of the Kokanee population comes from natural recruitment annually, but we do not know where most of this recruitment comes from. Stream surveys have provided some information on numbers of stream spawners, and recent reservoir population estimates could provide some clues as to how many reservoir spawners we may have, but the spawning successes of each group remains unknown. Efforts to look at natal origins through microchemistry during research conducted from 2017 to 2019 failed to provide any clues due to the microchemistry of the streams and the reservoir being too close in signatures to evaluate distinctions. Further efforts should be taken to look for other methods to evaluate reservoir and stream spawning successes in Kokanee salmon at Strawberry Reservoir.*
- b. Explore stocking strategies – *Currently most of the kokanee stocked into Strawberry are stocked in late April or May, and they are stocked into the tributaries to promote returns to those tributaries. In recent years managers have stocked some of the kokanee directly into the reservoir in certain areas to try and promote lake spawning activity. In addition, some kokanee have been stocked in January as swim-up fry. The level of success of each of these varied methods and strategies has been difficult to quantify. Managers should look for ways to try and determine the successes and failures of various stocking strategies to try and maximize the returns on stocked kokanee. These efforts should be undertaken in conjunction with spawning location studies (see Goal 4, Objective 2, Strategy a). In addition to the timing, sizes and locations of stocking, managers should also continually evaluate the numbers being stocked as a way of manipulating natural spawning activity. For instance, a high proportion of the stream spawning population (about 60%) can come from stocked individuals. Therefore, the bulk of our natural recruitment can come from stocked kokanee. Again, balancing stream and reservoir stocking to areas that can produce the greatest returns to natural recruitment could bolster populations. It is also important to note that natural recruitment can vary greatly from year-to-year (<5% of the population to nearly 80%), and stocking can provide much needed stability to populations in years with poor natural recruitment.*
- c. Balance egg takes from Strawberry Reservoir – *Currently, the vast majority of the state-wide Kokanee egg production comes from spawning operations at Strawberry Reservoir, typically with the smaller fraction of these eggs taken from Strawberry,*

actually returning to Strawberry. It is important to make sure that we do not unduly compromise the stability of future spawning activity by not returning enough of the eggs taken back to the system that produces them. In addition, all of the eggs taken from Kokanee egg taking operations at Strawberry that are diverted to other waters will impact natural recruitment potential at Strawberry.

- d. *Provide spawning access/habitat for Kokanee salmon – Lower water levels during the fall can make spawning migrations up Strawberry Reservoir tributaries difficult for Kokanee salmon. Beaver dams are typically one of the biggest barriers for Kokanee migrations in the tributaries, and constant monitoring and dam removal is necessary to provide access to spawning habitat. The successes of our stream restoration efforts have created some issues for Kokanee migration. Managers should look for opportunities to provide access to the best habitat that can logistically be kept open for migration. Also, as mentioned in Goal 4, Objective 1, stream restoration activities can provide better spawning habitat, and these efforts should be continued.*
- f. *Continue Kokanee salmon marking efforts at Strawberry Reservoir –Marking operations of stocked Kokanee at Strawberry Reservoir has changed in recent years with the conversion from oxytetracycline marking to external colored dye marking. These dye marking methods have proven to be almost as effective, with the caveat that spawning Kokanee will lose about 12% of these external marks when they absorb their scales. Without these marking operations, it would be much more difficult to track natural recruitment in the system. These marking methods have become very streamlined. Very little time and effort goes into the marking of these fish, yet the amount of data obtained from these marks has become invaluable by allowing us to more effectively and efficiently track numbers, growth, survival, and natural recruitment.*
- g. *Implement water quality improvement recommendations contained in “Strawberry Watershed Restoration Report, Strawberry Watershed Restoration Report Action Plan and Strawberry Reservoir TMDL Study (UDEQ, 2005).*

¹ *Based on a three year moving average from data collected in the fall gillnetting at Strawberry Reservoir (gillnetting must remain consistent with past methods and effort). Some numbers have simply been adjusted from the old traditional nets to curtain netting conducted since 2017, and may need future adjustment as curtain net trend lines expand.*

² *Utah Water Quality Standards(Utah Administrative Code R317-2):*

<http://www.rules.utah.gov/publicat/code/r317/r317-002.htm>

³ *Based on the comprehensive year-long creel surveys which have been conducted every five years at Strawberry Reservoir since 1996, combined with data from limited surveys conducted in the interim years (Thomas and Chamberlain, 2000). Future surveys are dependent on available funding.*

References:

EPA, 2012. PIP and QAPP for the Strawberry River Restoration Phase IV. Unpublished. 23 pp.

Thomas, H. M., and C. Chamberlain. 2000. Roving creel survey data management and statistical analysis program. Utah Division of Wildlife Resources publication number 00-28, Salt Lake City, Utah.)

UDEQ. 2005. Strawberry Reservoir TMDL Study. Utah Department of Environmental Quality - Division of Water Quality. Salt Lake City, Utah. 101 p.

USDA Forest Service. 2004a. Strawberry Valley Restoration Report. Uinta National Forest. Heber City, Utah. 230 p.

USDA Forest Service. 2004b. Strawberry Valley Watershed Report Action Plan. Uinta National Forest. Heber City, Utah. 18 p.

Ward, A., J. Robinson, and R. B. Wilson. 2008. Management of a cutthroat trout predator to control Utah chub in a high use sport fishery. American Fisheries Society Symposium 62:595-608.