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December 30, 2020

Mr. Paul Souza, Regional Director  
United States Fish and Wildlife Service  
2800 Cottage Way  
Sacramento, CA 95825

Dear Mr. Souza: *Paul*

Subject: Adaptive Management Plan for Bi-State Sage-Grouse Brood-Rearing Habitat on  
Los Angeles Department of Water and Power Lands in Long Valley

Enclosed is the Los Angeles Department of Water and Power's (LADWP) Adaptive  
Management Plan for Bi-State Sage-Grouse Brood-Rearing Habitat on LADWP Lands in  
Long Valley.

This plan culminates several months of joint effort and is presented to satisfy the commitments  
made by LADWP in 2019 to develop and provide a plan that will outline land management  
principles and protocols that are designed to support critical habitat for the bi-state sage grouse  
and thus the success of the species.

I would like to particularly thank you for the engagement of your professional United States Fish  
and Wildlife Service staff in this endeavor, which has directly resulted in a plan that we are  
pleased to put forth. The partnership of our staffs and other key individuals has been a model  
for future cooperation and a testament to what committed public agencies can accomplish  
together to meet the needs of the environment and native species. Your leadership on this issue  
set the foundation for a level of species protection that I am confident can be achieved with  
great scientific precision and agreement in the coming years.

This predicted below-average precipitation year may prove to be an immediate stress-test of the  
management plan and an opportunity to verify its accuracy first-hand. I welcome the opportunity  
to continue to work collaboratively with your staff as we test this new tool. As always, if you have  
any questions or comments, please feel free to contact me.

Sincerely,

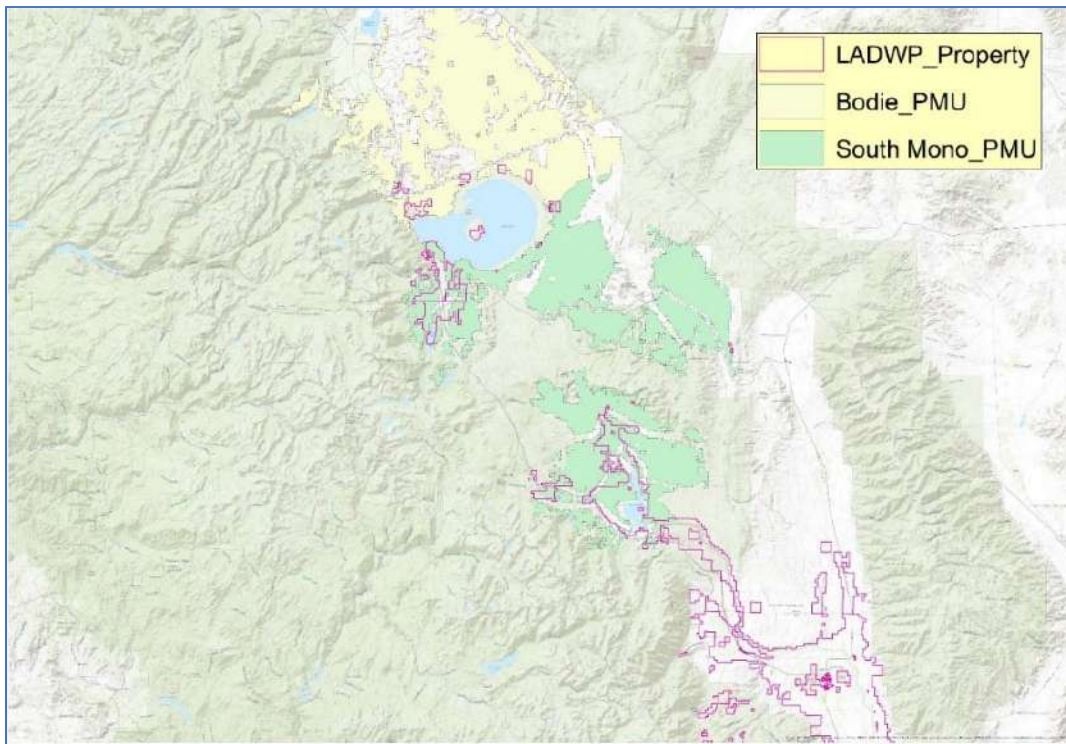
Martin L. Adams  
General Manager and Chief Engineer

MLA:ar  
Enclosure  
c: Mr. Richard F. Harasick  
Mr. Anselmo G. Collins

**Adaptive Management Plan**  
**for bi-state sage-grouse brood-rearing habitat**  
**on LADWP lands in Long Valley**

**Introduction**

Los Angeles Department of Water and Power (LADWP) owns and manages approximately 314,000 acres in Mono and Inyo Counties, California. Of these, approximately 38,389 acres provide potential year-round habitat for the bi-state sage-grouse (BSSG) within the Bodie Hills and South Mono Population Management Units (PMUs).



*Figure 1: LADWP land ownership within the Bodie Hills and South Mono Population Management Units for bi-state sage-grouse.*

In 2013, LADWP adopted a Conservation Strategy for managing BSSG habitat on their deeded property in Mono County, California. This approach was codified with the U.S. Fish and Wildlife Service (Service) in a Memorandum of Understanding (MOU) in 2014, and this plan has been incorporated and implemented into LADWP's management activities. In 2019, LADWP wrote a Commitment Letter (June 18, 2019) to the Service that reiterates their intention to continue managing the habitat in ways that will benefit BSSG. On July 27, 2020, LADWP informed Service that it would participate in developing an adaptive management plan that will "set objectives, define success, determine pertinent data and measurements, establish timelines, and outline scientific processes by which to guide land management decisions that will ultimately preserve and enhance the BSSG population." In these letters, LADWP committed to work with Service to develop a plan by

the end of 2020 that guide management toward enhancing and maintaining brood-rearing habitat. This Adaptive Management Plan (AMP) is intended to more fully explain the commitments LADWP made to the Service in both its 2019 and 2020 Letters. Modification and renewal clauses in the 2014 MOU will allow for continued codification of the collaboratively developed conservation approach to improve and maintain BSSG habitat on LADWP-owned lands.

LADWP has committed to managing its lands for BSSG habitat through the implementation of the 2013 Conservation Strategy. This includes the 38,389 acres of BSSG habitat that has been mapped on LADWP lands within the Bodie Hills and South Mono PMUs. This document will provide a supplemental adaptive management approach to more specifically identify objectives for managing mesic, brood-rearing habitat in pastures that have historically been altered by supplemental irrigation. The ability to manage for brood-rearing habitat will be dependent on the availability of water which can be dynamic. This will require annual assessment, evaluation, and calibration. The AMP sets forth strategies and the underlying data support to evaluate potential water supplies to maintain brood-rearing habitat, consistent with LADWP's 2019 Commitment Letter, in cooperation with the Service.

During development of this AMP, input was solicited from interested parties including U.S. Geologic Survey (USGS), Bureau of Land Management (BLM), Inyo National Forest (INF), California Department of Fish and Wildlife (CDFW), Mono County, Eastern Sierra Audubon and private ranchers. Continued input from these parties is anticipated.

The proposed AMP is a result of LADWP's ongoing commitment to sage-grouse protection in Long Valley. In addition to its Conservation Strategy and MOU with the Service, LADWP wrote a Commitment Letter in 2019 that outlined the steps it intended to take to ensure habitat protection for the sage-grouse. Among the many conservation actions outlined in that letter, LADWP formally committed to conserve and maintain mesic, brood-rearing habitat on portions of its land. Although LADWP is not providing a sum certain amount of water, LADWP is committing, as an operational necessity, to provide sufficient water to preserve delineated areas. All operational decisions and necessities concerning LADWP's management and use of its water rights, including those discussed herein, are subject to LADWP's Los Angeles City Charter obligations and limitations concerning those water rights.

The AMP is a more detailed description of the conservation activities LADWP pledged to undertake in its 2019 Commitment Letter and where these activities would be undertaken. The AMP is a bilateral document that supports the Service ongoing sage grouse conservation efforts. Through the AMP, LADWP reiterates, clarifies and defines the conservation actions it plans to incorporate into its operational plans going forward. Although the AMP does not include stakeholders as signatories, stakeholder input is provided for in the document.

An outline of the Purpose, Goals, Objectives, and Strategies are provided in the following 2 pages. The background, supporting documentation, and further details for each of the Goals, Objectives, and Strategies are provided, in order, throughout the remainder of the document.

## **Purpose, Goals, Objectives, and Strategies**

**Purpose:** Together, LADWP and the Service are striving for the most habitat, in high quality condition, within LADWP's operational capacity (ownership, infrastructure, and operational necessities) and with the most efficient allocation of water. The AMP is intended to more fully describe LADWP's conservation activities that were identified in the 2019 Commitment Letter. In particular, the AMP will identify conservation activities for maintaining or improving the quality and quantity of mesic, brood-rearing habitat. The implementation of this AMP will maintain and improve brood-rearing habitat on LADWP lands, will benefit BSSG in Long Valley, and will help the Service meet standards associated with the Policy for the Evaluation of Conservation Efforts (PECE; Appendix A).

**Goal 1:** Develop a framework that will identify LADWP operations in ways that can adaptively manage for high-quality brood-rearing habitat for BSSG.

- **Objective 1a:** Use the best available information to inform when and where LADWP's management can benefit brood-rearing habitat for BSSG.
  - **Strategy 1a1:** *LADWP will release water into identified ditches as early in the season as possible and maintain flows for as long as possible. The strategy for managing BSSG mesic habitat at the appropriate time largely be determined by water availability, infrastructure limitations and LADWP operational necessities.*
  - **Strategy 1a2:** *Pasture habitat associated with Convict Creek and McGee Creek will be managed in ways that will maintain and enhance brood-rearing habitat for BSSG.*
- **Objective 1b:** Identify habitat metrics and targets that will maintain or improve habitat quality for BSSG.
  - **Strategy 1b:** *Annually manage for an NDVI  $\geq 0.3$  along 100 meter bands between the months of May-September with infrastructure associated with Convict and McGee creeks with a minimum target of 0.3 NDVI by June 29.*
- **Objective 1c:** Conduct short-term and long-term monitoring of identified brood-rearing habitats.
  - **Strategy 1c:** *Actively monitor conditions to ensure mesic habitat targets are being achieved and changes in plant composition (diversity and cover) that are suitable for BSSG are not being compromised.*

**Goal 2:** Based on the best available information, develop recommendations for LADWP's annual operational plan to enhance and maintain BSSG brood-rearing habitat. This will include development of proposed operational plans, review and adaptive management process, reporting, and conflict resolution.

- **Objective 2a:** Outline the approach for development of an annual plan.

- *Strategy 2a: Annual meetings will occur four times per year: A winter meeting (late February/early March; virtual) will review water forecasts; A spring meeting (early April; virtual) will convene after LADWP forecasts the upcoming water year; a summer meeting (July; in-person) will be conducted in the field to assess conditions; and a fall meeting (October; in-person or virtual) will be held to discuss operational successes and challenges and to consider adaptive management opportunities.*
- **Objective 2b:** Identify the roles, components, and timelines for annual reporting.
  - *Strategy 2b: A report of the previous field season will be prepared by LADWP, reviewed by the Service, and completed by December 31<sup>st</sup> each year. The report will include (but not limited to) information related to water availability, management actions conducted, surveys and monitoring conducted, acres improved or maintained, adaptive management considerations/needs, collaborative participation.*
- **Objective 2c:** Identify the process by which issues will be elevated to LADWP and the Service management if needed.
  - *Strategy 2c: Any request for dispute resolution will first be submitted to LADWP's Aqueduct Manager and the Service's Reno Field Office Supervisor. Additional needs for resolution will be elevated to LADWP's Director of Water Operations and the Service's California/Great Basin Regional Director.*

### **Science products, assumptions, and constraints**

This AMP is designed to address needs for conservation of both water and bi-state sage-grouse. Therefore, the AMP is being developed using the best available science related to water availability, water infrastructure, appropriate timing for water distribution, and brood-rearing habitat on LADWP lands in Long Valley. Where data gaps exist, LADWP and the Service will look for opportunities to improve our understanding through science. New science products will be evaluated and, where relevant, be updated in the plan annually.

Currently, there are assumptions underlying the proposed AMP direction. The known assumptions are addressed more holistically later in this document. Guided by the best available science, LADWP and the Service, along with the help of partners will test these assumptions and work towards improving the efficacy of this plan. There are also inherent constraints related to static conditions (e.g., infrastructure) and uncertain variables (e.g., precipitation). There are no water holding facilities in the system so implementation of the AMP will rely on the availability of existing annual run-off. In addition, new water delivery systems may be needed or existing ones improved but these will not be a requirement of the AMP. The ability to manage for brood-rearing habitat will be limited by the available ditches and their capacity requirements.

While moving forward with implementation of the AMP is imperative, doing so in the most effective and efficient manner possible is critical. The approach to managing for brood-rearing habitat is

expected to improve through experience, monitoring, and research. Application of findings as appropriate will occur through an adaptive management process.

## Background and supporting information:

**Goal 1:** Develop a framework that will help guide LADWP operations in ways that can adaptively manage for high-quality brood-rearing habitat for BSSG.

**Objective 1a:** Use the best available information to inform when and where LADWP's management can benefit brood-rearing habitat for BSSG.

**When:** The appropriate time to manage for mesic habitat using water infrastructure is currently constrained by climate and operational capacity. By experience, it has been determined that it is best to put water out early each spring because the landscape can dry up very quickly and, once vegetation has desiccated, recovery to conditions that are needed for brood-rearing BSSG is difficult. On average, there's enough water in the system to fill ditches and irrigate pastures around May 1<sup>st</sup>. This however depends on snowpack and timing of snowmelt. The maintenance of mesic habitat will be most beneficial to BSSG during the late brood-rearing period (approximately June 29<sup>th</sup> through September; Coates et al. 2019). In most years, the cessation of irrigation is determined by reductions in flow and typically occurs in early September.

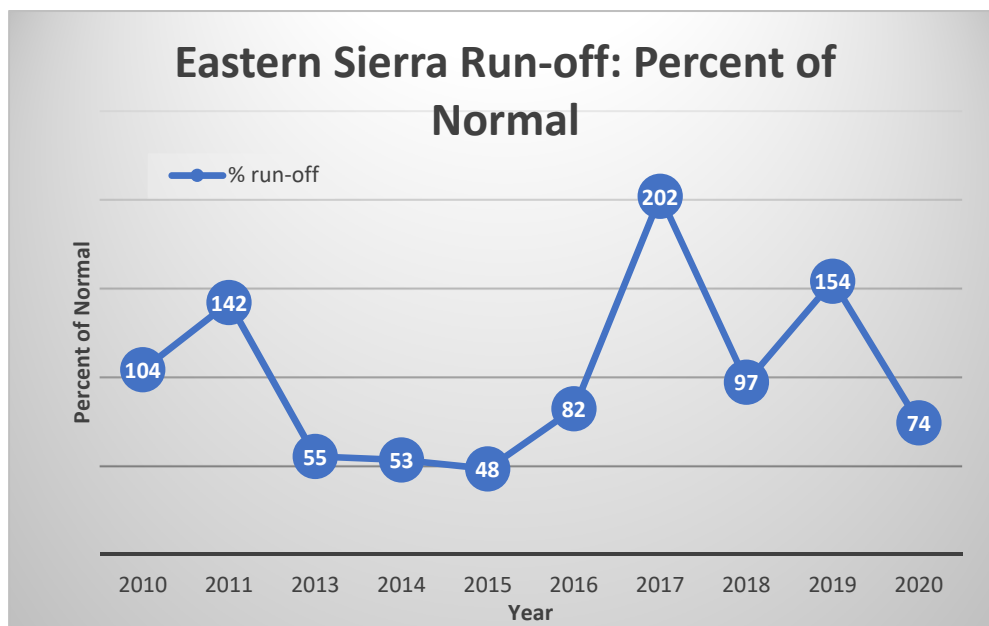
Strategy 1a1	<i>LADWP will begin releasing water into identified ditches as early in the season as possible and maintain flows for as long as possible. The strategy for managing BSSG mesic habitat at the appropriate time largely be determined by water availability, infrastructure limitations and LADWP's operational necessities.</i>
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**Where:** Data are currently available to help identify the LADWP lands where management has and can support mesic, brood-rearing habitat for BSSG (USGS reference). To further analyze areas of interest, we conducted a GIS exercise using available data (e.g., telemetry locations, seasonal habitat maps, LADWP ownership and infrastructure). This provided an understanding of where suitable brood-rearing habitat exists on and near LADWP lands, where habitat is selected by female grouse during the potential watering season (May 1-Sept 1), and where LADWP has irrigation infrastructure that would allow for habitat manipulation. The following steps were used to refine focus areas:

1. Where are areas within LADWP property that are most susceptible to drought?
  - a. Look at Eastern Sierra run-off over last ten years.
  - b. Compare this with NRCS/Sage-grouse Initiative interactive mapping tool, looking at changes in NDVI over recent years near Crowley Lake.
2. Where are BSSG brood-rearing habitats on LADWP lands?
  - a. USGS developed products
  - b. GIS exercise
3. Of these areas, where are opportunities to maintain or improve brood-rearing habitat conditions for BSSG using supplemental water.
  - a. Infrastructure limits
  - b. Suitability



Areas susceptible to drought: We used the Natural Resource Conservation Service’s interactive online mapping tool (<https://map.sagegrouseinitiative.com/ecosystem/mesic-resources>) to qualitatively assess where changes in precipitation have influenced on-the-ground mesic resources in Long Valley over 7 years (2010, 2011, 2013-2017). During these years, the Eastern Sierra experienced fluctuating snowpack with 3 years being above average and 4 years being below average (Figure 2).



*Figure 2: Percent (%) normal run-off for the Eastern Sierra 2010-2017 with 100% representing the long-term average.*

Based on the mesic maps generated with the online mapping tool (Appendix A), it appears that areas around Convict Creek experienced substantial change in mesic habitat during years of drought whereas other areas (e.g., Upper Owens) do not exhibit similar fluctuations. This suggests that the pastures associated with Convict Creek ditches are the most susceptible to drought conditions and other areas may exhibit more resilience to drought.

Bi-state greater sage-grouse use in the Long Valley area was delineated using Utilization Distributions (UDs) derived from collared BSSG (USGS). Larger use areas (i.e., home range) are represented by 95% UD during the months of May, June, and July (Figure 3). Core use areas, where grouse spend the majority of their time during those months, are represented by 50% UD (Figure 4). Based on these estimates, BSSG on LADWP-owned lands, including hens with broods, spend the majority of their time associated with areas near Convict Creek.



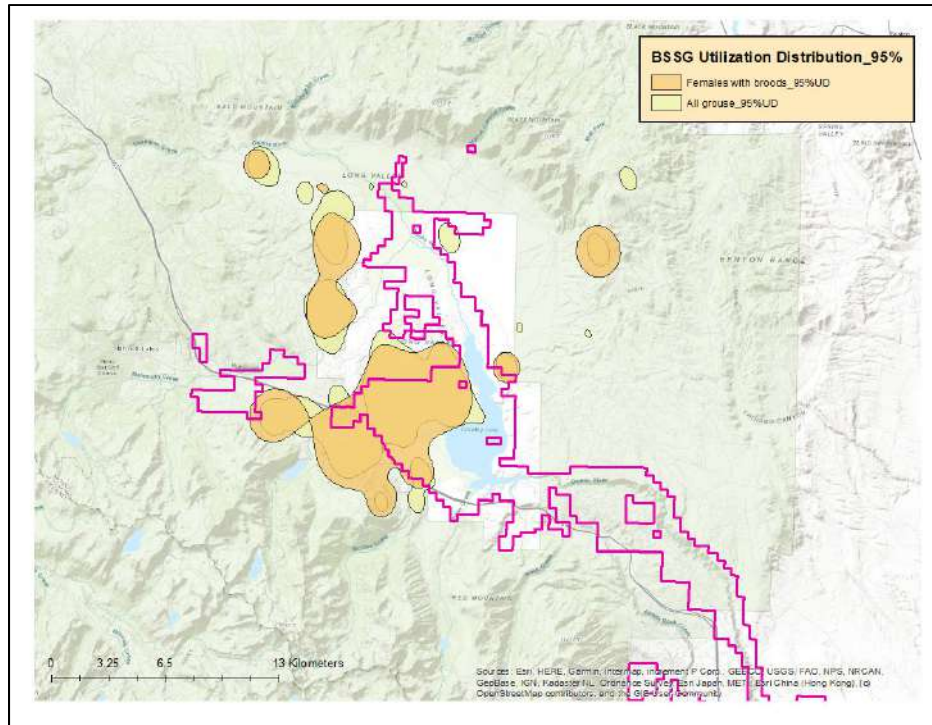


Figure 3: Bi-state sage-grouse use-areas in Long Valley as estimated with 95% Utilization Distribution polygons which equate to a home range. Grouse locations are grouped by “females with broods” and “all grouse” during May, June, July.

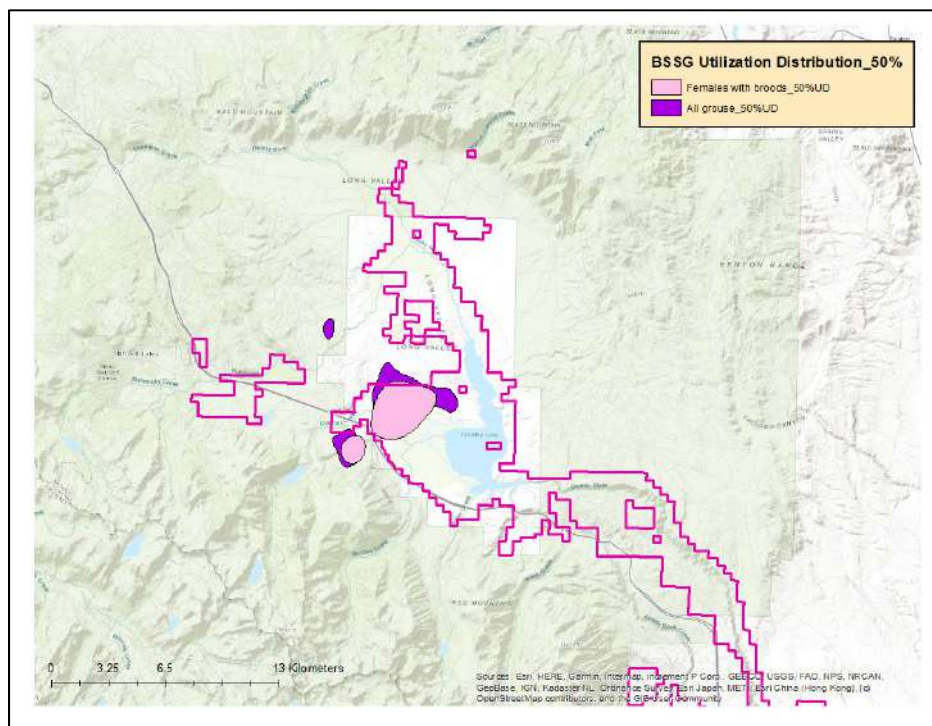


Figure 4: Bi-state sage-grouse use-areas in Long Valley as estimated with 50% Utilization Distribution polygons which equate to a core range. Grouse locations are from collared “females with broods” and “all grouse” during May, June, July.

To further evaluate areas that could be managed to benefit brood-rearing habitat we mapped female grouse locations (VHF and GPS) from 2015-2019 to look at use distribution between April 15-June 29 (early brood-rearing) and June 30-September 15 (late brood-rearing). This database did not identify which females had broods so this is simply a look at female use areas during the brood-rearing period. As with the identified core areas on LADWP property using 50% UD, we found female grouse during the brood-rearing season, were clustered around Convict Creek and McGee Creek with some use near Laurel Creek/Pond (Figure 5). Also shown in Figure 5 are clusters of female grouse use associated with Upper Owens River and Hot Creek but off of LADWP property. Although not represented in the existing database, observations of grouse using LADWP property near Upper Owens River and Hilton during the brood-rearing season have been reported.

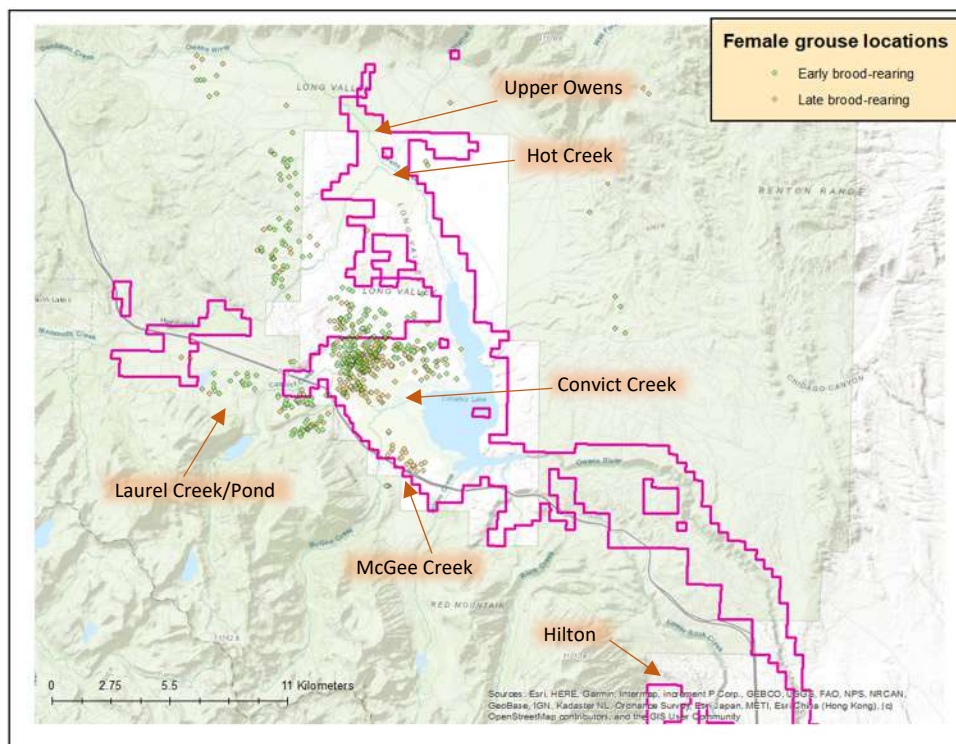


Figure 5: Female grouse locations during spring/summer months between 2015-2019. This database has all marked female grouse and does not specify if they are with broods. Also shown are areas of interest for potential brood-rearing habitat management.

With this analysis, each area was defined by the amount of BSSG use currently known, water infrastructure availability, and other known characteristics:

- Upper Owens
  - Anecdotal observations of 25-50 BSSG at a time in this area during grazing season have been reported.
  - Little to no documented grouse use on LADWP lands based on marked/collared birds.

- Adjustments to livestock operations on DWP lands would require a change to livestock management on federal land.
- McGee Creek
  - Appears to provide important habitat for a subset of birds in all years but may have even greater importance in dry years.
  - This area is known to have more water and therefore stays greener for longer and is more resilient to dry periods.
  - Diversions 30 and 31 appear to have little to no use based on telemetry database.
  - Prioritized management for BSSG would focus on D29 lower then D29 upper.
- Hot Creek
  - No detected BSSG use on LADWP lands using telemetry database.
  - Property here is heavily saturated, almost a swamp.
- Convict Creek
  - Concentration of use around ditches D26, Eaton and D25.
  - Little use and potential ecological trap associated with D27 except at the tail end, where habitat associated with Lek 3 would benefit from irrigation.
- Laurel Creek/Laurel Pond
  - Important brood-rearing habitat.
  - No water infrastructure.
  - Surface flow does not make it to the LADWP system.
- Hilton
  - No BSSG were detected in this area using telemetry database.
  - Urban expansion and recreational uses are greater here.
- Misc. springs and seep habitat
  - BSSG use associated with springs/seeps in Long Valley is currently unknown but generally these habitat types provide important mesic habitat.
  - No infrastructure with spring or seep habitat.

Based on the use of LADWP property by female BSSG during the spring and summer months and by locations of existing water diversion infrastructure, management to benefit brood-rearing habitat would be most effective along Convict Creek and McGee Creek (Figure 6).

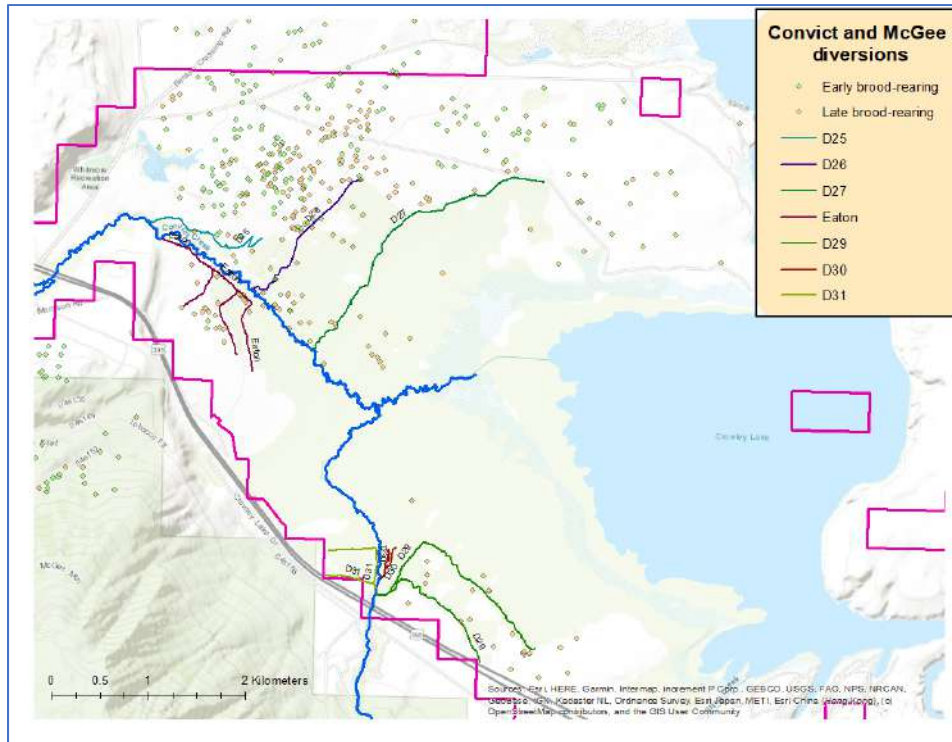


Figure 6: Irrigation diversions associated with Convict and McGee creeks with female grouse locations during the early (April 15-June 29) and late (June 30-Sept 15) brood-rearing season.

Strategy 1a2	Manage pasture habitat associated with Convict Creek and McGee Creek in ways that will maintain and enhance brood-rearing habitat for BSSG.
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**Objective 1b:** Identify habitat metrics and targets that will maintain or improve habitat quality for BSSG.

Effectively and efficiently managing for brood-rearing habitat (as well as knowing how much habitat can and should be managed) will entail an understanding of infrastructure capacity and limitations, and optimal habitat needs for brood-rearing BSSG.

Building on the assumption that managing pastures associated with Convict and McGee creeks for mesic conditions will provide the greatest benefit for brood-rearing BSSG, habitat targets and a prioritization of diversions associated with these systems has been identified (Table 1). Certain constraints will influence the ability to use water resources from Convict and McGee creeks. For example, retaining minimum flows of 10 cubic feet per second (cfs) in Convict and McGee creeks are desired to maintain riparian habitat functionality. Also, a threshold of water must be met in diversions before irrigation from check points can occur. When enough water is available to push into and spill from these diversions, it is anticipated habitat targets will be achieved and maintained during the months important for brood-rearing BSSG (May-Sept).



Normalized difference vegetation index (NDVI) is a measure of plant greenness and can be used as an index of mesic habitat value. Unhealthy or desiccated plants, having reduced chlorophyll, will absorb rather than reflect green light waves. In contrast, healthy and succulent plants have higher levels of chlorophyll and reflect green light waves. Categorized on a range from -1.0 (e.g., non-plant materials) to 1.0 (e.g., succulent plants), NDVI can provide a measure of habitat quality but cannot differentiate between plant types. For example, undesirable weedy species may exhibit similar spectral reflections as desirable species. High mesic quality and properly functioning meadow habitat, important for Greater sage-grouse brood-rearing, exhibits an NDVI value that is  $\geq 0.3$  (Donnelly et al., 2016). Coates et al., (2019) found similar selection preference for BSSG in Long Valley. Starting Julian day 180 (June 29), broods moved progressively closer to mesic habitat, selecting for an NDVI of 0.3 on day 180 and greater than 0.3 for the remainder of the summer months.

To provide quality brood-rearing habitat for BSSG while also recognizing the importance of water conservation, it's important to understand the appropriate quantity and spatial configuration for managed habitat. For the needs of BSSG, too little mesic habitat may be insufficient to support broods while habitat in areas not selected by BSSG may be an inefficient use of resources. In addition, there is an increased risk of predation in open and exposed habitat and BSSG prefer to stay close to the shrub edge when using meadows or pastures. Hens with broods selected for upland sagebrush habitat within 4,000 meters (m) of mesic habitat until approximately Julian day 180 (June 29). After day 180, the strongest habitat selection model for hens with broods in Long Valley included covariates of NDVI of  $\geq 0.3$  within 100m of edge habitat (Coates et al., 2019).

*Table 1: Prioritized order and habitat targets for ditches associated with Convict and McGee creeks.*

Priority	Convict Creek	Habitat target	McGee	Habitat target
1 <sup>st</sup>	Diversion 26	100m green band with $\geq 0.3$ NDVI	Diversion 29 (upper and lower)	100m green band with $\geq 0.3$ NDVI
2 <sup>nd</sup>	Eaton diversions	100m green band with $\geq 0.3$ NDVI		
3 <sup>rd</sup>	Diversion 25	100m green band with $\geq 0.3$ NDVI		
4 <sup>th</sup>	Diversion 27	Provide water to Lek 3 area		

\*A spreadsheet has been drafted to guide water management decisions based on this order of prioritized ditches and with different water availability.

Keeping within the purpose of this AMP, quality and quantity are important components of maintaining and improving brood-rearing habitat. The exact locations of suitable habitat, the configurations within and among these areas, and the means by which these targets are achieved, will potentially change overtime as we develop a greater understanding of the needs for BSSG in Long Valley and the effects of this adaptive management effort.

Strategy 1b	<i>Annually manage for an NDVI <math>\geq 0.3</math> along 100m bands between the months of May-September with the infrastructure associated with Convict and McGee creeks with a minimum target of 0.3 NDVI by June 29.</i>
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**Objective 1c:** Conduct short-term and long-term monitoring of identified brood-rearing habitats.

Continued maintenance and enhancement of brood-rearing habitat for BSSG will entail annual implementation and effectiveness monitoring by LADWP. Monitoring will account for management actions conducted toward this effort, progress toward meeting objectives of mesic habitat in defined areas, and changes in habitat condition for sage-grouse (e.g., species composition, cover, and presence/abundance of weed species). Specific monitoring actions are described in greater detail in the draft Sage-grouse Conservation and Adaptive Management Plan (Appendix C).

Strategy 1c	<i>Actively monitor conditions to ensure mesic habitat targets are being achieved and changes in plant composition (diversity and cover) that are suitable for BSSG are not being compromised.</i>
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**Goal 2:** Based on the best available information, develop recommendations for LADWP's annual operational plan to enhance and maintain BSSG brood-rearing habitat. This will include development of proposed operational plans, review and adaptive management process, reporting, and conflict resolution.

**Objective 2a:** Outline the approach for development of an annual operations plan.

LADWP and the Service will coordinate in the development of annual recommendations to LADWP's annual operations plan regarding operational water releases for BSSG habitat. Additionally, LADWP and the Service will seek input from interested stakeholders, including USGS, BLM, INF, Mono County, Audubon Society and CDFW during four management meetings/year. During those meetings LADWP and the Service will consider recommend management actions and assess implementation outcomes, provided by interested stakeholders. A winter meeting (late February or early March; virtual) will review water forecasts; a virtual spring meeting will occur around April 1. At this meeting, the snowpack and estimates for water will be reviewed and recommendations for maintaining and enhancing brood-rearing habitat will be developed; An in-person summer meeting, occurring around July 1, will be a field-based meeting to observe the outcome of management actions, discuss any changes to the water forecast and provide modified recommendations if needed. A fall meeting (in-person or virtual) will occur around October 1 and will serve to review the field season, the actions that were implemented, and the outcomes to brood-rearing habitat. The fall meeting will also be an opportunity to review new science and discuss any adaptive management recommendations for future years or modifications to the plan. In addition, landscape-level population and habitat conditions for Long Valley (or South Mono PMU) should be reviewed and discussed at this time.

Strategy 2a:	<i>Annual meetings will occur four times per year: A winter meeting (late February/early March virtual) will review water forecasts; A spring meeting (early April; virtual) will convene after LADWP forecasts the upcoming water year; a summer meeting (July; in person) will be conducted in the field to assess conditions; and a fall meeting (October; in person or virtual) will be held to discuss operationally successes and challenges and to consider adaptive management opportunities.</i>
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**Objective 2b:** Identify the components of and timelines for an annual report to be prepared by LADWP and the Service.

An annual report will be prepared by LADWP, reviewed by the Service, and completed by December 31<sup>st</sup> each year. The report should include sufficient information to monitor trends in brood-rearing habitat that result from management and to inform future decisions.

Strategy 2b	<i>A report of the previous field season will be prepared by LADWP, reviewed by the Service, and completed by December 31<sup>st</sup> each year. The report will include (but not limited to) information related to water availability, management actions conducted, surveys and monitoring conducted, acres improved or maintained, adaptive management considerations/needs, collaborative participation.</i>
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**Objective 2c:** Identify the process by which issues will be elevated to LADWP and the Service management if needed.

Disputes between technical staff arising out of the processes established in this framework shall first be submitted to local office managers: LADWP's Aqueduct Manager and the Service's Reno Field Office Supervisor for resolution. If resolution cannot be achieved at the local level, disputes shall be submitted to LADWP's Director of Water Operations and the Service's Regional Director of the California/Great Basin Region. Any dispute over any water allocation will be consistent with LADWP's 2019 Commitment Letter.

Strategy 2c	<i>Any request for dispute resolution will first be submitted to LADWP's Aqueduct Manager and the Service's Reno Field Office Supervisor. Additional needs for resolution will be elevated to LADWP's Director of Water Operations and the Service's California/Great Basin Regional Director.</i>
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#### Data gaps and science needs

As mentioned earlier, with this AMP, LADWP and the Service are striving for the most habitat, in high quality condition, within LADWP's operational capacity (ownership, infrastructure, and operational necessities) and with the most efficient allocation of water. The direction provided is based on the best, currently available information. However, LADWP and the Service recognize that improving our understanding of elements such as BSSG distribution, brood-rearing habitat needs, potential management actions and the outcomes of these actions, will all serve to refine this AMP, and to more effectively and efficiently address the conservation needs of both BSSG and water.



Current assumptions that warrant attention and further exploration include the distribution of BSSG and areas used for brood-rearing habitat on LADWP lands; the appropriate configuration, distribution, and prioritization of focus areas; the targets proposed for maintaining and enhancing brood-rearing habitat; the water resources that will be needed to achieve such targets, and the reliability and consistency of climatic conditions.

The areas selected, where management actions can maintain or enhance brood-rearing habitat, are based on a telemetry database between the years of 2015-2019. This is currently our best available information and is assumed to be representative of BSSG use on LADWP lands within Long Valley. However, anecdotal observations and reports have been made of additional areas of LADWP lands where grouse have been observed during the brood-rearing period. Additional monitoring of BSSG will refine our understanding of use and important habitat in Long Valley.

The diversions associated with Convict and McGee creeks are anticipated to provide management options that can benefit brood-rearing habitat for BSSG. Again, based on use patterns of marked birds, a prioritization of these diversions was drafted (Table 1) with the intent of guiding where water resources will yield the greatest outcome throughout the season. Application and evaluation of this system will inform its success and will help refine the most effective approach.

In addition to identifying and prioritizing the diversion, we have identified the habitat targets of having at least 0.3 NDVI by June 29<sup>th</sup>, maintaining or increasing the NDVI score into September, and managing for this level of mesic habitat along 100m of identified diversions. These metrics were derived from work on greater sage-grouse and on BSSG in Long Valley but should continue to be evaluated to ensure the implementation of the AMP is meeting Objectives. In addition, it is currently predicted that spilling 5 cfs from diversions will yield  $\geq 0.3$  NDVI along a 100m-wide band. This will be evaluated through remote sensing monitoring of NDVI throughout the season by LADWP.

It is also well known that climatic conditions in the Eastern Sierras can be highly variable. In addition to high precipitation and drought years, there will likely be timing challenges such as late snowpack or early run-off events. There will certainly be long series of dry years where the storage capacities of soils and downstream infrastructure are depleted, sometimes punctuated or followed by periods of historically high-water years. All the possible scenarios related to fluctuating climate and the appropriate management actions would be hard to conceptualize. However, continuing to account for snowpack and run-off along with management actions and associated outcomes will help build our understanding of how to manage for the objectives in this AMP and to continue striving for conservation of water resources and bi-state sage-grouse.

## Appendix A:

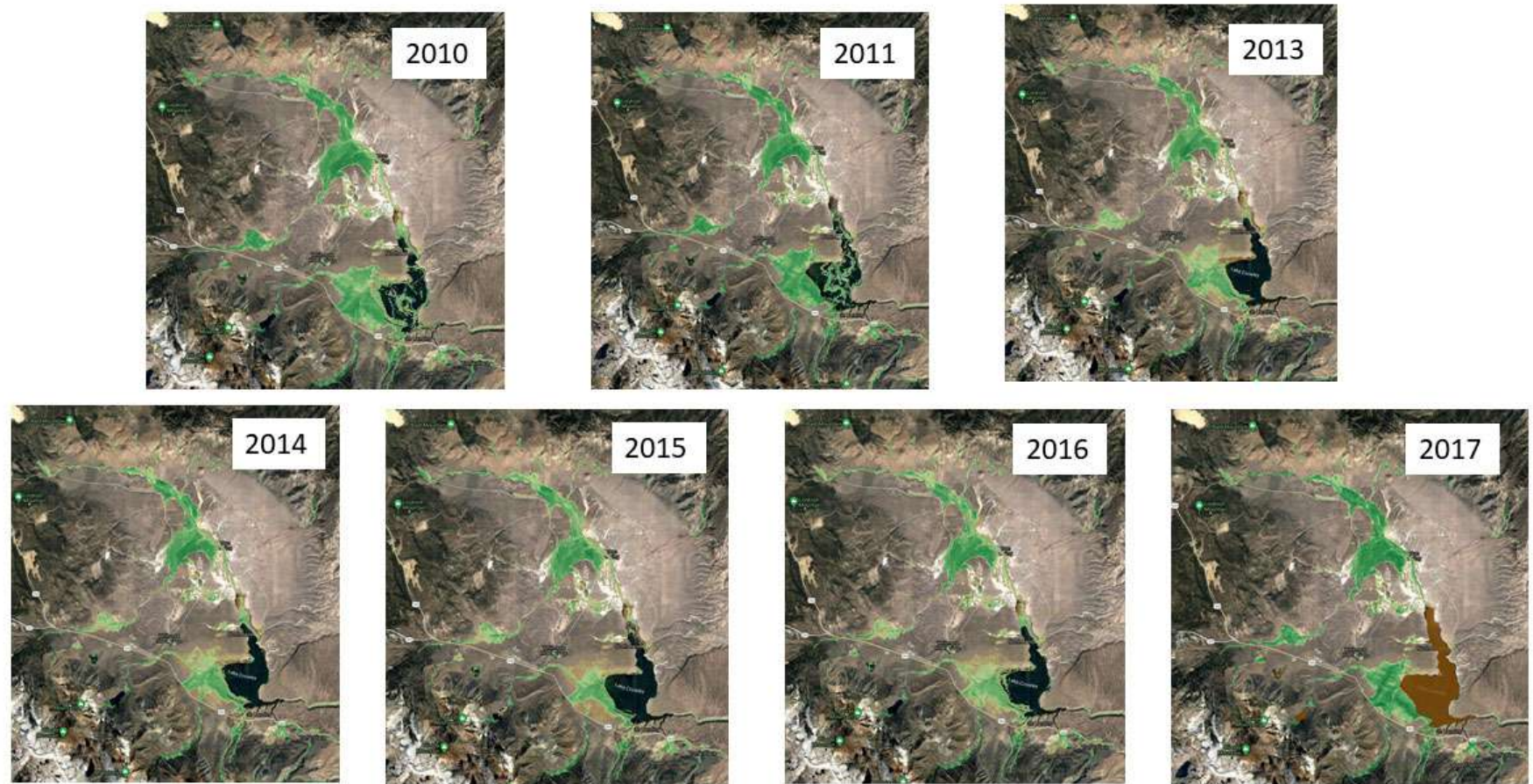
### **Policy for the Evaluation of Conservation Efforts (PECE)**

- Section 4(b)(1)(A) requires the Services to take “into account those efforts, if any, being made by any State or foreign nation, or political subdivision..., to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction or the high seas.”
- Purpose
  - To provide a policy framework and criteria for evaluating, within a listing determination, conservation efforts that have not yet been implemented or have not yet demonstrated whether they are effective.
  - To facilitate planning for conservation efforts to reduce or remove threats to a species.
- Standard to be met
  - “To consider that a formalized conservation effort(s) contributes to forming a basis for not listing a species or for listing a species as threatened rather than endangered, we must find that the conservation effort is sufficiently certain to be implemented and effective so as to have contributed to the elimination or adequate reduction of one or more threats to the species identified through the section 4(a)(1) analysis.”
    - Formalized Conservation Efforts - “conservation efforts identified in a conservation agreement, plan, management plan or similar document.”
    - Conservation Efforts - “specific actions, activities, or programs designed to eliminate or reduce threats or otherwise improve the status of a species.... may involve restoration, enhancement, maintenance, or other beneficial actions.”
- 9 criteria for Certainty of Implementation
  - (1) The conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified.
  - (2) The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described.
  - (3) The legal procedural requirements (e.g., environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort.
  - (4) Authorizations (e.g., permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations.
  - (5) The type and level of voluntary participation (e.g., number of landowners allowing entry to their land, or number of participants agreeing to change timber

management practices and acreage involved) necessary to implement the conservation effort is identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation (e.g., an explanation of how incentives to be provided will result in the necessary level of voluntary participation).

- (6) Regulatory mechanisms (e.g., laws, regulations, ordinances) necessary to implement the conservation effort are in place.
- (7) A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding.
- (8) An implementation schedule (including incremental completion dates) for the conservation effort is provided.
- (9) The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan.
- **6 criteria for Certainty of Effectiveness**
  - (1) The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described.
  - (2) Explicit incremental objectives for the conservation effort and dates for achieving them are stated.
  - (3) The steps necessary to implement the conservation effort are identified in detail.
  - (4) Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.
  - (5) Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.
  - (6) Principles of adaptive management are incorporated.
- If listing is not warranted due to PECE evaluated efforts, we are required to monitor those efforts into the future.

*Appendix B.*



*Figure 5: Maps of mesic habitat in Long Valley across 7 years. The lands associated with LADWP lands were largely resilient to drought periods (2013-2016) except areas associated with Convict Creek.*

**Los Angeles Department of Water and Power**  
**Sage Grouse Monitoring**

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### Los Angeles Department of Water and Power Sage Grouse Monitoring Plan

In 2013, LADWP drafted a Conservation Strategy (Strategy) for the bi-state sage-grouse (BSSG) on their lands in Mono County, California. This Strategy was approved by the Board of Water and Power Commission on August 18, 2014 and LADWP entered into a Memorandum of Understanding (MOU) regarding the implementation of this Strategy with the U.S. Fish and Wildlife Service (Service) in 2014. A component of this Strategy includes commitments to maintain BSSG lekking, nesting, and brood rearing habitat. In 2015, LADWP drafted the “Habitat Conservation Plan (HCP) for its Operation and Maintenance Activities on its land in Mono and Inyo Counties, California.” In 2018 LADWP reaffirmed its commitments to the Service and specifically identified an area for priority habitat enhancement for sage grouse. Consistent with these documents, LADWP manages the activities on its lands such as habitat restoration, livestock grazing, recreation, control of noxious and invasive weeds, fire suppression, infrastructure maintenance, and the management of water gathering and power production/distribution in a manner that is compatible with the conservation of the BSSG and the mission of LADWP.

LADWP land in the South Mono Population Management Unit (PMU) receives high use by BSSG year-round. The South Mono PMU has three breeding complexes, two of which occur on LADWP land – Long Valley and Parker. In the Long Valley breeding complex, there are eight trend leks (leks monitored to collect population trend data), three of which are on LADWP land. In the Parker breeding complex, all known leks (one lek and several satellite leks) are on LADWP land.

The Long Valley complex is particularly important to the BSSG because of the number of birds found at the leks here and the use of this area for nesting and brood-rearing. Important habitat components for BSSG in Long Valley include high quality nesting habitat and irrigated pastures that create artificial mesic-meadow habitat. The edges of mesic meadows such as these are valuable to sage-grouse during the brood-rearing stage and especially when they are in close proximity to nesting habitat.

Within the South Mono PMU LADWP staff participate in direct monitoring of BSSG through annual participation in multi-agency monitoring efforts that include the California Department of Fish and Wildlife (CDFW), U.S. Geologic Survey (USGS), the Service, and the Bureau of Land Management. Monitoring efforts include lek counts, brood surveys, and habitat assessment.

### Activities That May Adversely Affect BSSG on or near LADWP Land

Threats to the Bi-State DPS have been evaluated by local working groups within the PMU’s, a Bi-State Technical Advisory Committee composed of members of each PMU (Bi-State 2004, Bi-State TAC 2012), and in the Species Status Report by the Service (2013a). The specific threats to BSSG in the Conservation Strategy Area may vary by PMU and breeding complex.

The Service identified several threats to BSSG in the South Mono PMU. These include:

- Nonnative and Native, Invasive Plants
- Wildfire and Altered Fire Regime
- Grazing and Rangeland Management
- Urbanization and Habitat Conversion
- Recreation

- Infrastructure (i.e. roads, power lines, fences)

LADWP developed a monitoring program for the Conservation Strategy that describe monitoring associated with the threats described above.

### **Weed Management Monitoring**

Nonnative plant species may negatively impact sage-grouse habitat by altering the shrub and forb plant community structure, composition, and productivity that sage-grouse rely on (Service 2013a). The nonnative plant species of greatest concern is cheatgrass because it is widely dispersed and contributes to an increasing fire cycle.

LADWP has an extensive weed monitoring and treatment program. In implementing this program, LADWP identifies, documents, treats, and monitors nonnative weeds within the Conservation Strategy Area and has staff certified in the treatment of noxious weeds. LADWP conducts annual surveys for weeds typically from March through October to document the location and extent of weed occurrence. In addition, LADWP has trained their staff to identify weed occurrences while conducting operations and maintenance activities and conducts outreach programs to educate lessees and the public on identification and reporting of noxious weeds. Also, LADWP has trained their staff working in BSSG areas about grouse biology, habitat requirements, and avoidance and minimization measures that they will need to implement.

LADWP removes weedy species using the appropriate method for the ecological sensitivity of the site. For example, when weedy species are located near a special status plant species, a backpack sprayer is used instead of a truck-mounted sprayer because of ecological sensitivity. LADWP monitors weed management activities to determine their effectiveness by conducting surveys for at least five years to ensure that eradication has been successful.

By implementing these weed management activities, LADWP intends to limit the establishment and spread of undesirable plant species thereby maintaining or improving existing habitat.

### **Altered Wildfire Frequency Monitoring**

The potential of future wildfires and for increased wildfires are considered a risk within the South Mono PMU. Wildfire in the Long Valley area is of concern because it would result in the direct loss of habitat, habitat fragmentation, and could result in long-term changes in habitat quality and quantity including type conversion of vegetation communities (e.g. conversion of sagebrush community to cheatgrass). LADWP's monitoring includes recording the frequency, intensity, and location of wildfire (human and natural caused) events. These results will be compared to historic incidence of fire in an attempt to foster natural fire cycles where fire is a useful management tool or the habitat is adapted to fire.

### **Livestock Monitoring (including fencing)**

Livestock grazing is the most widespread type of land use in sagebrush areas. Improper livestock management can have negative impacts on greater sage-grouse habitats such as decreased herbaceous or sagebrush canopy cover or increased conifer cover (Connelly 2009).



LADWP land in the South Mono PMU is leased for cattle grazing. Cattle grazing occurs on irrigated pastures, upland habitats, and riparian pastures.

Livestock grazing monitoring activities include Range Trend, Pasture Condition, and Utilization Monitoring described below as well as any other activities necessary for livestock management in the Plan Area (e.g., fences, stock water). For a complete list of monitoring associated with livestock grazing please see the Owens Valley Land Management Plan (LADWP 2010) as well as the LADWP Habitat Conservation Plan.

#### Urbanization and Habitat Conversion

Urbanization and the conversion of sagebrush habitats on private lands to agriculture, housing and associated infrastructure has negatively affected BSSG and limited the current and future conservation opportunities (Service 2013a, FR 64368). The majority of private land within Unit 3 is LADWP land and includes key areas of BSSG habitat (Bi-State TAC 2012). LADWP lands within Unit 2 and 3 are composed primarily of sagebrush, antelope bitterbrush, native meadow, and irrigated pasture habitats. Approximately 1% of all LADWP land in Unit 2 and 3 has classified as “urban”.

#### **Outdoor Recreation Management Monitoring (including fencing)**

The primary risk to BSSG from recreation is disturbance and displacement from important use areas such as leks and brood habitats (Bi-State TAC 2012). This species is also vulnerable when concentrating in large groups such as during the lekking season, brood-rearing season, and during winter (Bi-State TAC 2012). Recreation can also adversely affect habitat quality and quantity.

LADWP land is largely unrestricted for public use as LADWP’s policy is to retain approximately 75 percent of its lands open for public recreational use. The other 25 percent of LADWP land may be posted “No Trespassing” as needed to protect biological, agricultural, or other resources.

Long Valley is subject to intense, year-round recreational pressure and human disturbance from recreation is considered a high risk to BSSG. Activities that take place in Long Valley include fishing, kayaking, boating, waterskiing, dog walking, bike riding, hot-tubbing, cross-country skiing, snowmobiling, snowshoeing, camping, birding, and hunting for BSSG and other species. Long Valley is a popular place to view BSSG leks, with the most frequently-visited lek in Long Valley located on LADWP land.

LADWP conducts periodic patrols in areas that are known to have high use by outdoor recreationists. During these patrols, LADWP personnel look for issues with fencing, road closures, creation of new roads, camping and campfires, dumping, weeds, vandalism, etc. Further, LADWP personnel also look for adverse effects associated with outdoor recreation while they are conducting their normal duties. After identification, corrections are implemented as soon as possible. If illegal activities (camping, dumping, artifact gathering, etc.) are observed LADWP contacts law enforcement.

#### **Water Flow Monitoring**

LADWP will track changes in flow in waterways to ensure compliance with Biological Goals and Objectives. Flow monitoring is done through automated telemetered flow gauging stations or manually by the aqueduct and reservoir keepers (A&Rs) or hydrographers at gauging stations. Flow

monitoring is conducted on all waterways (Section 2). Flow monitoring enables flow management that promotes water distribution to maintain and enhance existing and potential habitat for Covered Species.

Based on the use of LADWP property by female grouse during the spring and summer months and by locations of existing water diversion infrastructure, management to benefit brood-rearing habitat would be most effective along Convict Creek and McGee Creek (Figure 1).

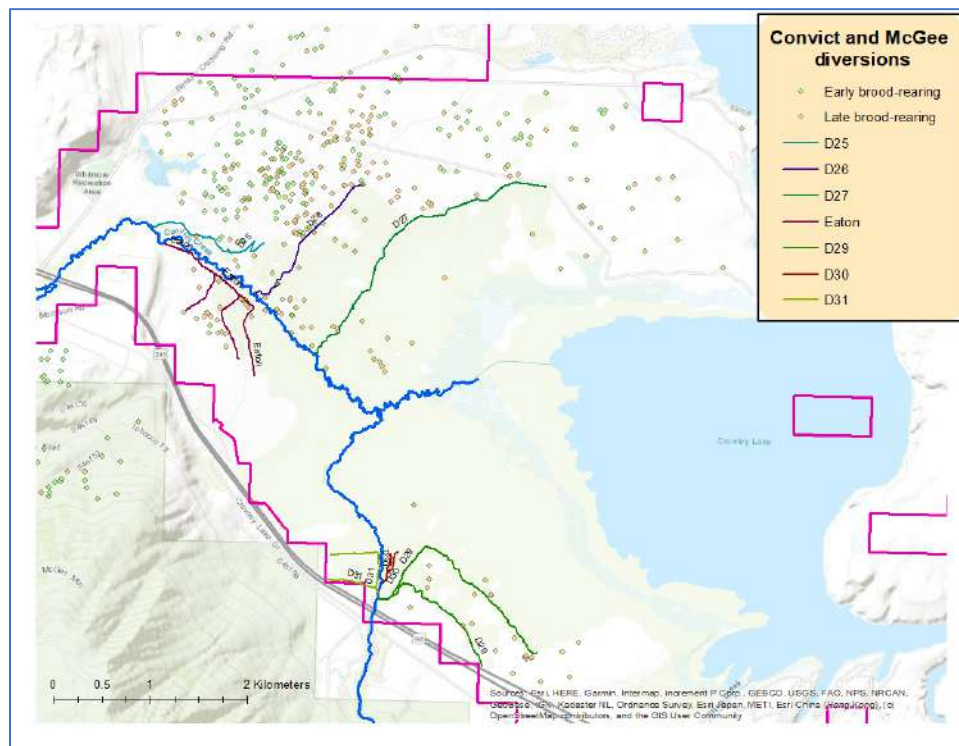


Figure 1: Irrigation diversions associated with Convict and McGee creeks with female grouse locations during the early (April 15-June 29) and late (June 30-Sept 15) brood-rearing season.

Building on the assumption that managing pastures associated with Convict and McGee creeks for mesic conditions will provide the greatest benefit for brood-rearing sage-grouse, habitat targets and a prioritization of diversions associated with these systems has been identified (Table 1). When enough water is available to push into and spill from these diversions, it is anticipated habitat targets will be achieved and maintained during the months important for brood-rearing sage-grouse (May-Sept).

Table 2: Prioritized order and habitat targets for ditches associated with Convict and McGee creeks.

Priority	Convict Creek	Habitat target	McGee	Habitat target
1 <sup>st</sup>	Diversion 26	100m green band with $\geq$ 0.3 NDVI	Diversion 29 (upper and lower)	100m green band with $\geq$ 0.3 NDVI
2 <sup>nd</sup>	Eaton diversions	100m green band with $\geq$ 0.3 NDVI		
3 <sup>rd</sup>	Diversion 25	100m green band with $\geq$ 0.3 NDVI		
4 <sup>th</sup>	Diversion 27	Provide water to Lek 3 area		

\*A spreadsheet has been drafted to guide water management decisions based on this order of prioritized ditches and with different water availability.

### Infrastructure

Three linear and two site-specific infrastructure features have been found to impact sage-grouse. The development and use of infrastructure such as roads, powerlines, fences, and cellular towers, results in habitat loss and fragmentation and may cause BSSG to avoid using certain areas. This infrastructure may also negatively affect BSSG habitat by promoting the introduction of invasive plants or providing perches or improved access for predators.

#### Roads

Many dirt roads exist throughout BSSG habitat with up to 100 miles of dirt roads on LADWP land in the Long Valley breeding complex area alone. LADWP staff have documented road locations and if feasible worked with neighboring land managers to close unnecessary or redundant roads.

#### Powerlines

A high-voltage transmission line crosses a small area of potential Greater Sage-Grouse habitat on LADWP land in the South Mono PMU and multiple small electrical distribution lines exist in all PMU areas. LADWP is working with USGS and Hardshell Labs to develop raven egg oiling to potentially reduce predation associated with LADWP transmission and distribution infrastructure.

#### Fences

Fences on LADWP land are used within the BSSG PMUs primarily for managing livestock and controlling recreational access. Fences can impact sage-grouse indirectly by causing habitat fragmentation or can result in injury or direct mortality through strikes. Fences with the highest risk of collision are those closest to lek sites on level terrain. Fences located in areas of more varied topography and increasing distance from lek sites are less likely to pose a collision risk.

In the mid-1990s, LADWP initiated a livestock fencing program in Long Valley. Some fencing associated with this program is in the vicinity of a large lek complex. Shortly after installation of fencing around this lek, evidence of BSSG mortality due to collision with the fence was found. Subsequently LADWP converted large sections of fencing to let-down fencing to reduce the potential for mortality.

### Communication Towers

One cellular tower exists on LADWP land south of Highway 395, near the community of Crowley Lake in the Unit 3 area. It is unlikely that this tower poses high risk to BSSG.

### Landfills and Transfer Station

The Benton Crossing landfill is located on LADWP land in Long Valley. The landfill, operated by Mono County, has been operating as a municipal solid waste disposal site since 1973 under a Business Lease to Mono County. The site is gated; it collects household hazardous waste, used oil, and appliances for processing and recycling, and buries construction and demolition waste as well as municipal solid waste. In 2012, an agreement was reached with LADWP to renew the lease through 2023, at which time the site is expected to reach capacity.

The Benton Crossing landfill is considered a threat to BSSG because it supports a subsidized population of common ravens which are potential nest predators. Nest success in Long Valley has been reported to be low compared to other PMU's in the bi-state area, although evidence that low nest success is limiting this population is not available.

### Habitat monitoring

In 2018 LADWP staff began a specific BSSG habitat monitoring effort following The Nevada Partners for Conservation and Development Pre- and Post-Habitat Treatment Vegetation Sampling Protocol. Four sample locations were randomly located in the Lek 2 area, three locations in the Eaton diversion area, and two locations in the Lek 3a area. Vegetation species cover and community composition were assessed at each location when the sampling points were established. Monthly photo points, collected during the growing season, began in 2020.

Additionally, LADWP staff conducted brood surveys with California Department of Fish and Wildlife during the summer of 2020.

Normalized difference vegetation index (NDVI) is a measure of plant greenness and can be used as an index of mesic habitat value. Unhealthy or desiccated plants, having reduced chlorophyll, will absorb rather than reflect green light waves. In contrast, healthy and succulent plants have higher levels of chlorophyll and reflect green light waves. Categorized on a range from -1.0 (e.g., non-plant materials) to 1.0 (e.g., succulent plants), NDVI can provide a measure of habitat quality but cannot differentiate between plant types. For example, undesirable weedy species may exhibit similar spectral reflections as desirable species. High mesic quality and properly functioning meadow habitat, important for Greater sage-grouse brood-rearing, exhibits an NDVI value that is  $\geq 0.3$  (Donnelly et al., 2016). Coates et al., (2019) found similar selection preference for BSSG in Long Valley. Starting Julian day 180 (June 29), broods moved progressively closer to mesic habitat, selecting for an NDVI of 0.3 on day 180 and greater than 0.3 for the remainder of the summer months.

To provide quality brood-rearing habitat for BSSG while also recognizing the importance of water conservation, it's important to understand the appropriate quantity and spatial configuration for managed habitat. For the needs of BSSG, too little mesic habitat may be insufficient to support broods while habitat in areas not selected by BSSG may be an inefficient use of resources. In

addition, there is an increased risk of predation in open and exposed habitat and BSSG prefer to stay close to the shrub edge when using meadows or pastures. Hens with broods selected for upland sagebrush habitat within 4,000 meters of mesic habitat until approximately Julian day 180 (June 29). After day 180, the strongest habitat selection model for hens with broods in Long Valley included covariates of NDVI of  $\geq 0.3$  within 100m of edge habitat (Coates et al., 2019).

LADWP will utilize Landsat 8 at approximately 2-week intervals beginning in late April each year to determine NDVI in the areas of interest.

### **Reporting Requirements**

LADWP agrees to meet annually or more frequently if necessary and agreed upon, with Service to review progress in implementing the Conservation Strategy and to review needs for project modifications due to any changes in circumstances. LADWP will submit its annual written report July 1 for the previous calendar year. Annual Reports will include monitoring results and will identify Adaptive Management Recommendations.