

## **APPENDIX A**

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### **Greater Sage-Grouse Conservation Measures Implementation Plan**

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## **A.1 BACKGROUND AND ADMINISTRATION**

### **Background**

Greater sage-grouse (*Centrocercus urophasianus*, *sage grouse*) use of the Project area has been documented through field surveys (JBR 2010, Nevada Department of Wildlife [NDOW] 2011), observational records (Elko District Office 2010), and telemetry data collection (NDOW 2011, Dyer 2005). Suitable habitat exists throughout and around the Project area for all seasonal uses (i.e. winter, lek/breeding/nesting, brood rearing, and fall) by sage-grouse. Predicted impacts to sage-grouse are from Project construction, testing, facility presence and maintenance of the power generation facilities, wells, power lines, pipelines, increased human activity, and increased noise.

The following conservation measures have been developed to offset the anticipated Project effects to greater sage-grouse. Overall, it is expected that implementation of the following measures will improve or enhance lesser quality habitats R1 to R4 to moderate the changes created by construction of the Project. Successful implementation and assessment of the conservation measures are dependent upon implementation of the noise and sage-grouse monitoring protocols. Other components that will be key to the success of the conservation measures will be the establishment of a Conservation Trust Fund and a Wildlife Working Group (WWG).

### **Administration**

A Conservation Trust Fund will be established by ORMAT in cooperation with the BLM and be dedicated to the Tuscarora Geothermal Project within 30 days of the signing of the Right-of-Way for the associated Transmission Line. The trust fund should be an interest bearing account to buffer the devaluation of the 2011 conservation dollars being utilized into the future. Initiating funds will be supplied by ORMAT by calculating the monetary value of the agreed upon conservation acreages using the \$600 per acre valuation as supplied in the 2010 Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse.

A Wildlife Working Group (WWG) should be made up of representatives from ORMAT, BLM, USFWS, and NDOW with other pertinent members being invited as needed. This oversight group will evaluate monitoring, confirm thresholds, develop habitat enhancement projects and evaluate any adaptive management that may be necessary in the implementation of this conservation plan.

All National Environmental Policy Act requirements, BLM policies, clearances and guidelines, including Section 106 of the NHPA, Native American Consultation, Endangered Species Act (ESA) and Special Status Species (SSS) habitat management guidelines and the 2001 Migratory Bird Executive Order will be completed and/or complied with prior to implementation of any sage-grouse habitat restoration or conservation measures projects.

## **A.2 CONSERVATION MEASURES FOR SURFACE DISTURBANCE ASSOCIATED WITH THE GEOTHERMAL POWER PLANT AND TRANSMISSION LINE**

### **Key Issues for Sage-Grouse**

Impacts to sage-grouse include the loss of 84.5 acres of sage-grouse foraging and nesting habitat, including potential Category 1 habitat as defined by Nevada's Governor Sage-Grouse Conservation Team (NGSCT, 2010), resulting from direct and/or long-term surface disturbance associated with Project construction and operation. Effects of habitat fragmentation from this habitat loss would be concentrated around the plants, production and injection pipelines, and wells.

### **Conservation Funding Determinations**

ORMAT will voluntarily fund, at a 6:1 ratio (NGSCT 2010) at \$600 per acre, terrestrial habitat enhancements and rehabilitation to compensate for disturbance in sage-grouse habitat in the vicinity of the Project (Figure 1). ORMAT will fund all enhancement projects to BLM specifications, following all WWG requirements.

At a 6:1 ratio, this equates to 507 acres (6 x 84.5 acres) of habitat conservation, improvement or protection, or a combination, thereof. The potential or likely treatment areas to be restored include BLM managed lands in vicinity of the Project area. These potential treatment areas will be identified on a case-by-case basis, based on field inventory of habitats, conditions, and potential value to sage grouse as indicated by monitoring results. Preference will be given to areas in close proximity to the Project, but outside the zone of influence, minimizing any indirect effects of the Project. Enhancement efforts can be identified in habitats that benefit any of the sage-grouse life cycles (lek, nesting, brood-rearing, and fall/winter). Habitat treatments will be prescribed for specific sites based on the probability of success and the degree of benefit to the local sage-grouse population. The determination of where a specific project is located and when work would be conducted would rest with the Wildlife Working Group.

### **Conservation Fund Goals**

Goals of these habitat enhancement projects will be based on habitat requirements for sage-grouse. Examples of these requirements (with variability based on vegetation types and ecological site potential), are: breeding habitats 15-25% sagebrush canopy cover, greater than or equal to 15% grass cover and greater than or equal to 10% forb cover from a diverse group of forbs, also a perennial herbaceous cover with greater than or equal to 18 cm in height. In winter habitat areas, the sagebrush canopy cover should be 10 to 30% with heights of 25-35 cm (Connelly et al. 2000). Additional guidelines from the Western Association of Fish and Wildlife Agencies (WAFWA) (Connelly et al. 2000) may be used in conjunction to those outlined above.

Habitat projects could be completed in R-1, R-2, R-3, or R-4 value habitats (NGSCT 2010). These R-values are restoration habitats defined from the “Energy and Infrastructure Development Standards to Conserve Greater Sage-Grouse Populations and Their Habitats in Nevada” produced by the Nevada Governor’s Sage-Grouse Conservation Team 2010 and listed below:

- “R-1 – Habitat areas that currently lack sufficient sagebrush and are currently dominated by perennial grasses and forbs, yet have the potential to produce sagebrush plant communities with a good understory composition of desired grasses and forbs.
- R-2 – Existing sagebrush habitat areas with insufficient desired grasses and forbs in the understory to meet seasonal needs of sage-grouse.
- R-3 – Sagebrush habitat areas where pinyon-juniper encroachment has affected the potential to produce sagebrush plant communities that provide adequate cover and forage to meet the seasonal needs of sage-grouse.
- R-4 – Habitat areas that have the potential to produce sagebrush plant communities, but are currently dominated by annual grasses, annual forbs, or bare ground.”

### **Conservation Fund Measures**

Measures may include, but will not be limited to, the following:

- Burn restoration (historic burns) including: seedings (sagebrush and understory vegetation via broadcast, broadcast and harrow, drill or hand seeding of seedlings), noxious and invasive plant treatment (Plateau® for cheatgrass and other herbicides as needed for other invasive and/or noxious weed species), and possible temporary fencing to protect areas of restoration. Meadow restoration or enhancement project will be given a preference for implementation.
- Brush thinning via mechanical, herbicide or hand thinning followed by seeding (seeding to be done via broadcast or drill methods) to increase the diversity in monotypic sagebrush habitat. Interseeding efforts on existing crested wheatgrass seeding areas. The intention of the treatments would be to reduce the amount of crested wheatgrass and re-establish a variety of native grass and forb species to improve the ecological diversity of the plant community with emphasis on sage grouse habitat improvements.
- Mechanical or hand shrub thinning or green stripping to reduce fuels and fire risk to sage-grouse habitats followed with successful seeding (seeding to be done via broadcast or drill methods).
- Weed treatment followed with successful seeding (seeding to be done via broadcast or drill methods).

- Retrofit existing power lines with predatory bird anti-perching measures.
- Retrofit existing power lines with flight diverters.
- Modify and mark livestock control fencing on prioritized (e.g. on or near lek, brood-rearing or fall/winter habitat areas) BLM project fences or landowner-approved private fences to reduce the potential for sage-grouse collisions while in flight or minimize the potential for predatory bird perch sites.
- In order to protect the restored habitat, temporary fencing may be used. Once restoration objectives, as identified above, are achieved, these fences will be removed.
- Funds created from this conservation measure that are held in the Conservation Trust Fund will be available for land acquisitions or easements if deemed appropriate by the WWG.
- Funds created from this conservation measure that are held in the Conservation Trust Fund may be used to compensate any willing livestock operator for deferring their grazing right to enclosed habitat enhancement projects by temporary fencing.

### **Monitoring**

Implementation of the above 6:1 land treatment funding would be a requirement of the BLM approval of ORMAT's application for a Right-of-Way associated with the Tuscarora Geothermal Project. BLM, NDOW and ORMAT agreed that the loss of 84.5 acres of sage-grouse habitat will require 6:1 replacement (by enhancement and/or rehabilitation) of that lost habitat. The trigger points for implementation and location of habitat restoration projects will be based on monitoring (see section A.8) and identified impacts of the implemented project.

### **Effectiveness**

These measures will improve sage-grouse habitat to substitute and offset the habitat lost through Project development and operation. Increasing the quality and the area of sage-grouse habitat in the area will be a benefit to not only individuals but to the local population as a whole.

Restoring burned areas will, in time, return those areas previously lost to sage-grouse habitat. Without sagebrush in these areas, the birds are less likely to utilize or, at best, will have limited use of the burned areas. Increasing the quality of the habitat through sagebrush and understory seedings, would permit individuals birds to once again utilize the areas in the future. Burned area reseedling of grasses, forbs and sagebrush seedlings and fencing such restoration habitat will re-establish sage-grouse habitat over time. The restored habitat will provide additional quality habitat, thus allowing sage-grouse populations to re-establish in formerly destroyed habitats.

Monotypic sagebrush habitats do not provide high valued habitat as they lack sufficient perennial understory. Breeding habitat (with vegetative variability mentioned above) should contain a sagebrush cover of 15-25% with greater than 15% for grasses and greater than 10% for forbs; winter habitat having sagebrush cover ranging from 10 to 30% (Connelly et al. 2000). By thinning sagebrush canopy cover to the desired amount and seeding the interspaces with desired native forbs and grasses, the habitat quality should increase. By green-stripping and brush thinning to create fuel breaks, the likelihood of a catastrophic fire is reduced, protecting existing and potential restored sage-grouse habitat. Successful establishment of understories and sagebrush communities over time will provide quality habitat restoration for sage-grouse and sage-grouse broods, which should ensure propagation of the local populations.

Invasive and noxious weed species reduce the health of a sagebrush stand and the quality of sage-grouse habitat. Treating these species to remove them from the area increases the quality of habitat for sage-grouse.

Modification of livestock control fencing to BLM specifications could include the reduction of the height of a fence while still retaining the intent of livestock control. Many fences have been constructed in the past, prior to BLM policy, without consideration for increased mortality risk for sage grouse and other wildlife. Sage grouse fly, at least, several feet above the ground where reduction in fence height would reduce potential for collisions. An example of a fence currently at 50-52 inches in height modified to 38-42 inches in height (BLM specs for three and four-strand fences), along with visual markers on fence wire and the top of fence posts, would reduce the risk of collision while in flight. Interim results from a study in Wyoming between 2005 and 2009 indicated that fence markers helped to reduce collisions by 61%.

Retrofitting existing power lines with predatory bird anti-perching measures will reduce the predation of sage grouse by raptors and corvids. In a small study conducted by the BLM's Kemmerer Field Office in Wyoming, researchers found no raptors on structures with perch deterrents whereas 159 raptors were documented perching on the control line (no deterrents) structures (Oles 2007).

Retrofitting existing power lines with flight diverters will reduce collisions by birds. Flight diverters on power lines would help to reduce collisions, similar to marking fences where the intent is the ability for birds to see the outline of the lines and divert their flight to avoid collision. Flight diverter use resulted in an 89% decrease in bird collisions in a study in Europe.

### **Conservation Measure Impacts and Constraints**

ORMAT's financial contributions that ensure the sage-grouse habitat will be replaced at a 6:1 ratio will have some financial impact to ORMAT.



Any herbicide treatments for invasive and noxious weeds shall be completed within the constraints of the Extension of Weed Treatments authorized by the 1998 Environmental Assessment (DOI-BLM-NV-010-2011-0003-DNA). Vegetation reseeding using mechanical means will result in some level of soil disturbance. Appropriate clearances prior to implementation of the reseeding efforts will avoid potential impacts to other resources.

Fencing of restored/revegetated habitat, depending on the size of the project, could reduce some portion of the grazing permittee's carrying capacity. Agreements for fencing with affected permittees would be required prior to fencing such projects. ORMAT would be required to maintain all restoration project fences.

Mechanical brush thinning or green stripping would assist firefighters in reducing the size and intensities of potential wildland fire threats to existing sage-grouse habitats. Mechanical or hand thinning of brush would reduce horizontal and vertical continuity of fuel beds. Short-term loss of some habitat may occur. Soils may be disturbed if mechanical thinning occurs. Potential impacts to other resources will be reduced based on implementation of requisite clearances prior to thinning applications. Long-term protection of remaining sage-grouse habitat may occur as a result of reduced fire intensity or fire size in existing habitat.

The changes in sage-grouse habitat by increasing diversity through seeding, seedlings, plantings, etc. will improve habitat quality, reduce the potential for plant disease, and improve sage-grouse propagation and survivability. Habitat would also be improved by modification and marking of livestock control fencing to BLM specifications, retrofitting of existing power lines with predatory bird anti-perching measures, and retrofitting of existing power lines with flight diverters. These actions would help reduce unnatural "additive" mortalities associated with artificial structures and, in effect, help to increase sage grouse populations.

### **A.3 CONSERVATION MEASURES FOR VISUAL AND PREDATION IMPACTS ASSOCIATED WITH THE TRANSMISSION LINE**

#### **Key Issues for Sage-Grouse**

The Project's proposed transmission line would be only 0.25-mile away from the Hot Springs 16NW lek, which would likely create both visual impacts (avoidance) and increased predation from raptors and corvids perching on the power lines or poles.

#### **Conservation Measures**

If within the first five years of plant operation male attendance at the Hot Springs 16NW lek drops 50% or more for two consecutive years the Operator will remove the first 8,500 feet of the transmission line nearest the power plant and replace it with underground cable by the following the lek season. Monitoring of the lek will be conducted by the Operator following NDOW

protocol (Attachment 1 to this appendix) and reported to the WWG, BLM, and NDOW. The cost of the power line removal and installation of the underground line will be held as a bond required by the terms and conditions of the Right-of-Way Grant for the Hot Sulphur Springs Transmission Line.

The Project would require implementation of a common raven monitoring and management plan as described in the following:

- During all phases of the Project (i.e., construction and maintenance), all food, waste, and trash will be placed in closed containers.
- ORMAT will prohibit employees, contractors and sub-contractors from feeding wildlife or leaving food available for scavenging wildlife.
- Road-killed wildlife on the Project site and associated travel routes will be promptly removed and disposed of in closed containers to eliminate access to ravens.
- Presence of road-killed animals will also be minimized by ORMAT's environmental protection measure of a <25 mph speed limit within the Project area.
- ORMAT has committed to implement the following environmental protection measures: perch and nest deterrents on all power poles; single pole power pole design (APLIC 2006).
- ORMAT will obtain a Raven Depredation Permit from USFWS or submit for coverage under the NDOW permit.

### **Monitoring**

See Section A.8 for monitoring requirements.

### **Effectiveness**

Replacing the overhead line with underground cable will remove the visual impact to the lek, and decrease the presence of avian predators within the lek vicinity, thereby decreasing the predation risk to sage-grouse.

### **Conservation Measure Impacts**

The burying of the transmission line will result in additional project costs being incurred by ORMAT. However, since the line will be placed within the previously disturbed footprint, additional environmental impacts associated with burying the line should be minimal.

The requirement to properly collect all food, waste, and trash are BMPs and State requirements for all industrial plant operations. These are considered operating costs for ORMAT.

The prohibition of workers feeding wildlife or leaving food at the project or construction sites will limit the likelihood of attracting wildlife (e.g., common ravens and raptor species). Removal of road kill will limit the attraction of ravens, buzzards, and other carrion eating raptors such as golden eagles; thus limiting the likelihood of additional predation on sage-grouse. Speed limits proposed by ORMAT on their workers, contractors, and sub-contractors should limit accidents that may kill or maim animals.

Application of the 2006 APLIC standards should limit perching opportunities of raptors on sage-grouse. These standards should also prevent the accidental electrocution of most avian species, especially eagles and large hawks. Application of APLIC standards to transmission line facilities will be an additional financial burden to ORMAT through the purchase and use of anti-perching devices and changes in engineering design of conductors to limit potential electrocution of most avian species.

#### **A.4 CONSERVATION MEASURES FOR NOISE, VISUAL INTRUSION, AND HUMAN ACTIVITY IMPACTS TO SAGE-GROUSE FROM GEOTHERMAL PROJECT CONSTRUCTION, TESTING, OPERATION, AND MAINTENANCE**

##### **Key Issues for Sage-Grouse**

The construction and operation of the proposed geothermal plant and related activities would create noise, visual intrusion and human activity that could disturb sage-grouse during lekking season.

##### **Conservation Measures**

ORMAT will ensure that timing of shift changes and deliveries will be scheduled outside the lekking period (15 March – 15 May, 1 hour before sunrise–10:00 AM).

Venting pressure or steam to the atmosphere (e.g., during well or flow testing) would occur outside the lekking period (15 March – 15 May, 1 hour before sunrise–10:00 AM).

Construction or maintenance activities associated with well pads, pipelines, transmission lines, plant facilities, and roads will not be permitted within two miles of active leks (see Sage-Grouse Population Monitoring below) during the lekking period (15 March – 15 May, 24 hours per day).

Noise generated by the Project will be managed so that sound pressure levels will be at or below 35 dBA (ambient 25dBA plus 10 dBA) at active leks (see Sage-Grouse Population Monitoring section below) during the lekking period (15 March – 15 May, 1 hour before sunrise–10:00 AM).

##### **Contingent Conservation Measures**

##### ***Trigger for Contingent Conservation Measures***

If noise monitoring, described in A.8 below determines noise levels at the monitored leks is greater than 35 dBA during the time period of midnight to 5 a.m. and that exceedance is due to ORMAT operations rather than natural conditions such as wind and weather, then the following actions will be taken.

***Contingent Conservations Measures That May Be Implemented***

- Employment of an acoustic engineer to identify and assess options to further reduce noise from Project components;
- Installation of sound damping shelters, walls, enclosures, or other barriers for pumps or other noise-producing equipment to reduce noise emitting from geothermal facilities (e.g., power plant, wellheads, turbine generator etc.);
- Reducing the amount or changing the timing of project related vehicular traffic;
- Installing poly-slats on chain link fences or other barriers around geothermal facilities to further attenuate noise emitted from those facilities.
- Sound pressure level monitoring data documenting successful reduction in dBA levels will be demonstrated and reported to the BLM within one week of the occurrence. If, after feasible attempts to reduce sound pressure levels at active monitoring leks, sound pressure levels cannot be reduced to below 35 dBA, ORMAT, BLM, and NDOW will agree on additional studies to determine whether or not further sound pressure level reduction measures will be attempted. If the studies determine that no other measures are feasible, this will end ORMAT's obligation to attempt further sound pressure level reductions.

**Monitoring**

Monitoring is described in section A.8.

**Effectiveness**

Reduction of noise, visual, and human activity disturbances associated with the Project during the lekking season at the time of day lekking occurs would reduce the disturbance on a lek. Diminished disturbance to the lek will likely lessen the chance of lower male attendance, shifting of lek locations, or loss of active lek locations.

**Conservation Measure Impacts**

The shift changes proposed from March 15<sup>th</sup> through May 15<sup>th</sup> may be a minor inconvenience to plant employees and operations of the facilities during these periods. There should be no financial burden to ORMAT from implementation of this mitigation.

The requirement to vent steam outside of the prescribed times may delay testing procedures for ORMAT. Since such test procedures are usually longer than twenty-four hours, ORMAT will be required to forgo such tests during the prescribed periods.

Finalization of construction and maintenance activities for well placement, pipelines, etc. are required for development of power plant and appurtenant facilities. Implementation of the above mitigation may delay full or timely facility development.

Modification of plant operations to reduce noise impacts, employment of an acoustic engineer, and installation of sound dampening barriers will increase operational costs to ORMAT. Any operational changes resulting from additional plant modifications prescribed by the acoustical engineer will also likely increase ORMAT's operational costs.

By reducing noise levels from plant operations, impacts to occupied sage-grouse leks should be reduced or eliminated, thus enabling lek activities to continue and protecting displaying males from noise disturbance.

#### **A.5 CONSERVATION MEASURES FOR NOISE, HUMAN ACTIVITY AND HABITAT FRAGMENTATION IMPACTS TO NESTING SAGE-GROUSE FROM THE GEOTHERMAL PROJECT**

##### **Key Issues for Sage-Grouse**

Project impacts to nesting sage-grouse are expected due to noise, human activity, and habitat fragmentation. The greatest impacts to nesting sage-grouse are expected during Project construction due to nest abandonment.

##### **Conservation Measures**

Nest "clearance" surveys will be conducted from March 15<sup>th</sup> to June 30<sup>th</sup> prior to any surface disturbing activities during each construction year. The area to be disturbed and a 0.5-mile radius buffer will be surveyed by a BLM approved specialist to determine if nesting sage-grouse are present. If an active nest is located, a 0.5-mile radius buffer will be placed around the nest and no surface-disturbing activities will occur until the nest is vacated.

##### **Monitoring**

Monitoring is described in section A.8.

##### **Effectiveness**

These measures will decrease the chance of nest destruction or abandonment due to construction and human activities.

##### **Conservation Measure Impacts**

By avoiding any occupied nest during construction and human activity, the likelihood of nest success may be increased; thus ensuring propagation of the local sage-grouse populations.

If nests are found by the surveys required by these conservation measures, construction delays for those aspects of the project will occur.

## **A.6 CONSERVATION MEASURES FOR INDIRECT EFFECTS TO SAGE-GROUSE BROOD-REARING HABITAT FROM THE GEOTHERMAL PROJECT**

### **Key Issues for Sage-Grouse**

Several springs, seeps, wet meadow, and riparian areas occur in close proximity to components of the Project. Although it is unknown to what extent these areas are being utilized by sage-grouse, any use by sage-grouse would likely be reduced or discontinued during and after Project development. The project is anticipated to impact 195 acres of brood-rearing habitat.

### **Conservation Measure**

ORMAT will complete treatments at a 3:1 ratio (NGSCT 2010) to protect and/or restore brood-rearing habitat in targeted locations on BLM managed land near the Project. At a 3:1 ratio, this equates to 585 acres (3 x 195 acres) of habitat improvement or a funding commitment of \$600 per acre, equating to \$351,000. The specific areas to be treated will be identified on a case-by-case basis, determined by field inventory of habitats, conditions, and potential value to sage-grouse. Treatments will be prescribed for specific sites based on the probability of success and benefit to local sage-grouse population. The design for these projects will allow access to water for beneficial use through the use of water gaps. Placement and construction of exclosures will also need general concurrence from the appropriate permittees. ORMAT will fund all such restoration/protection projects to BLM specifications.

- Treatments may include fencing of riparian areas and meadows for protection, plantings/seedings of desired native riparian species to increase biodiversity and habitat condition, stream restoration to improve riparian areas where there are currently incised channels or nick points, and treatment of invasive and noxious weeds (e.g., salt cedar). Stream restoration may include check dams, rip/rap fortification of damaged banks and nicks, and large boulder placement within stream channels to decrease water velocity during peak flows.
- Riparian exclosures may be grazed if BLM determines that it would be beneficial to riparian health. Specifics of this grazing will be based on a return to a healthy riparian condition based on current sage-grouse guidelines and working with the local grazing permittees.

- Funds created from this conservation measure that are held in the Conservation Trust Fund may be used to compensate any willing livestock operator that is deferring their grazing right to exclosed habitat enhancement projects by temporary fencing.
- Funds created from this conservation measure that are held in the Conservation Trust Fund will be available for land acquisitions or easements if deemed appropriate by the WWG.

### **Monitoring**

Monitoring is described in section A.8.

### **Effectiveness**

These treatments will improve sage-grouse brood-rearing habitat to substitute and offset the habitat lost through Project development. Riparian areas and meadows are important habitat for sage-grouse brood-rearing. Having healthy riparian areas and meadows that support the native forb species and invertebrate fauna is imperative (Sveum et al. 1998). Excluding riparian areas and meadows from grazing until deemed beneficial, protects the health of those areas. Managed grazing within these exclosures may increase species diversity with desired native species valuable to brood rearing habitat.

Sage-grouse chicks require a diet high in protein that consists mainly of forbs and insects (Sveum et al. 1998), production of which is enhanced by improved riparian habitat. The cover that a healthy riparian habitat provides may reduce predation from terrestrial and avian predators on sage-grouse broods. Effectively protecting and increasing the condition of the riparian habitats provides an improved value of brood-rearing habitat.

Incised channels and nick points degrade the stream habitat and can reduce the size and health of riparian areas. Resolving those stream issues will increase the riparian health and increase the quality of the habitat.

### **Conservation Measure Impacts**

Riparian exclosures (fences) improve riparian health, increasing diversity of desired native species and improving cover and diet for sage-grouse broods. Positive changes in stream morphology will lead to higher perennial water yields, resistance to spring flood events, and improved stream water quality.

The successful planting of seedlings of desired riparian vegetation when combined with exclosure fencing will hasten recovery of vegetation, increase species diversity, and enhance the overall recovery of damaged riparian areas.

Stream channel restoration of incised channels and nicks with check dams, rip/rap fortification, and boulder placement will limit future riparian habitat loss by reducing stream bank erosion during high water events. Overtime, these structures will be silted in; preventing soil loss and decreasing nick and stream incising.

Fencing springs, seeps, meadows and riparian areas may provide perching opportunities for raptors; which may lead to some predation of sage-grouse and other animals.

## **A.7 CONSERVATION MEASURES FOR EFFECTS ASSOCIATED WITH THE VISUAL PRESENCE OF PROJECT COMPONENTS**

### **Key Issues for Sage-Grouse**

Human activity and visual disturbance, e.g. the geothermal plant, reflections, moving vehicles, could disturb sage-grouse during all seasons leading to avoidance of otherwise good habitat.

### **Conservation Measures**

Where Project lighting is required, low output, motion sensor lights will be installed at facilities and must be shielded and directed to focus light only on the area requiring illumination. In addition to limiting human activity impacts to sage-grouse, such lighting will assist ORMAT in meeting the National Dark Skies initiative where ambient nighttime lighting has been identified as causing potential impacts to many wildlife species including volant species such as bats.

Non-reflective, tinted windows will be utilized in Project buildings to reduce visual disturbance.

### **Monitoring**

Monitoring is described in section A.8.

### **Effectiveness**

Reducing disturbance from visual and human activities will help reduce the overall impacts of the project that may induce individuals or groups of sage-grouse to abandon habitat in and near the immediate Project area.

### **Conservation Measure Impacts**

Low output, shielded and motion sensor lights could potentially cost more than other types of lighting, increasing costs to ORMAT.

Reduced ambient light emanating from the construction sites and operational facilities of the power plant reduces visual disturbance to sage-grouse and other wildlife.



Any ambient nighttime light emanating from the facility or construction site (as compared to the current, unlighted desert setting) could cause a concentration of insects and other prey bases for bats, night hawks and other insectivores in the vicinity of the light source. Possible collisions by nighttime insectivores with construction equipment or completed plant facilities could increase, leading to volant fatalities. ORMAT would be required to report to the NDOW and the BLM any incidents of such fatalities.

Non-reflective tinted facility windows will likely be more costly to ORMAT than regular glass windows. Conversely, the likelihood of volant mortality caused by window strikes will be reduced. Solar glare will be reduced from facility windows, reducing visual disturbance to sage-grouse and other wildlife (e.g., attraction to or avoidance of the project site).

## **A.8 MONITORING PROTOCOLS**

The following monitoring protocols will be conducted for ten lekking seasons following implementation of the Project. The protocols have been established to measure and evaluate a given parameter to analyze the Project perceived effect.

### **Sound Pressure Level Monitoring Within The Project Area And Zone Of Influence**

The goal for sound pressure level monitoring is to ensure plant operation sound pressure levels are below 35 dBA (ambient 25dBA plus 10dBA) at receptors (lek locations). By recording daily sound pressure levels for at least one week during each lekking season, and by monitoring sage-grouse activity at lek locations each season (15March – 15 May), a determination can be made as to the adequacy of the 35 dBA level to protect sage-grouse leks (see Sage-grouse Population Monitoring below). Additionally, the WWG may evaluate the findings and recommend modification or elimination of ORMAT's sound pressure monitoring commitments if objectives have been met. During the lekking season, AM), continuous sound pressure level monitoring will be conducted from midnight to 10:00 a.m. at the active monitoring leks surrounding the Project using appropriate acoustic monitoring equipment as well as any location that is far enough away from the ORMAT geothermal plant to serve as a "control" that is subject only to natural noise. To determine seasonal lek locations, at least one lek survey would be completed prior to placement of monitoring equipment. Acoustic monitoring equipment will be placed at the lek edge closest to the Project during the afternoon (12:00 –16:00) to avoid disruption to lek activity. ORMAT is required to monitor sound pressure levels daily and report any levels of 35 dBA and above to the BLM immediately during the lekking season. Weekly reports will be filed with the BLM.

### **Sage-Grouse Population Monitoring Within The Project's Zone Of Influence**

Annual monitoring of sage-grouse leks will be required. This includes both active leks and leks with unknown status, until leks with unknown status are determined to be inactive. Conversely,

if any unknown status leks are determined to be active, the active leks mitigation would apply. The identified active leks are Hot Springs, Hot Springs 16NW, Hot Springs 4, Hot Springs 18 and Harrington. The currently established unknown leks are Hot Springs 8SW, Hot Springs 7SE, Hot Springs 7W, Hot Springs 8SE and Hot Springs 9. Lek surveys must be completed by BLM approved biologists following standard lek survey protocol (Attachment 1) and ensure the following:

- Surveys must be conducted between 15 March and 15 May of each year. Male lek attendance is typically greatest later in the season; thus adjustments to lek survey schedules may be needed to collect accurate data.
- Surveys must be conducted at least four times per lek during the lekking season with eight days between lek visits.
- A center point of the lek activity will be recorded during each monitoring visit to document any shift in the lek location over time. The center point will be collected with a GPS unit either after lek activity has dispersed or by projecting the location using a rangefinder and compass bearing.
- Surveys must be conducted from one-half (1/2) hour before established sunrise until 10:00 AM each survey period.

To account for and evaluate annual climatic variations that may be influencing male lek attendance, the results from each of the monitored leks will be compared to the observed range of fluctuations in the following historic and trend leks outside the Project's influence. Comparison Leks will be Six mile, Willow Creek Reservoir 19 (PMU trend leks), Taylor Pass, Upper Maggie West, and Pie Creek Complex

Monitoring movements of sage-grouse at the affected leks will be conducted through radiotelemetry efforts. This monitoring will provide additional information should shifts in lek locations occur after the Project has been initiated. All efforts regarding capture and telemetry will be the responsibility of ORMAT through coordination with the BLM and NDOW. A minimum of three males and three females per targeted lek will be monitored per season for all affected leks. A minimum of one GPS radiocollar per lek per sex will be utilized. If radiocollars continue to function annually, the same males and females as previous years may be monitored. Monitoring will occur at minimum once per week during the lekking season (15 March –15 May), and once per month outside of the lekking season.

## **A.9 PUBLIC SEEPS AND SPRING MONITORING**

Seeps, springs and associated meadows located on the public lands surrounding the Project are important sage grouse brood rearing habitats. If the Project's use of geothermal waters or other groundwater decreases the supporting flows and availability of these habitats, the dependent sage grouse would be impacted.

A monthly seep, spring and meadow monitoring protocol will be established and the Operator will monitor the flow rates of these identified surrounding seeps and springs. ORMAT will monitor the following springs in the area of the Tuscarora Facility, including the BLM Public Water Reserve (R05598) and the following springs shown on Cottonwood Peak USGS 7.5 Quad:

- NENE Sect 17 T41N R52E - this is where the public water reserve is located. UTM is approximately 4589500 North 570750 East
  - Use the most significant expression of the spring for monitoring the following:
    - NWSW Sect 9 T41N R52E
    - NESE Sect 5 T41N R52E
    - Nw1/4 of Sect 4 T41N R52E
    - NE ¼ of Sect 6 T41N R52E
- Monitoring will begin as soon as possible, but no later than 30 days after BLM approval of the ROW grant.
- Monitoring will be conducted monthly for a minimum of five years. Monitoring data will be submitted to BLM and NDOW within one week of completed measurements.
- The only known flow measurement of the PWR spring was 3 gallons per minute (gpm) in September 1982.

### **Trigger and Response**

If the flow at the PWR drops to less than 1 gpm, ORMAT will construct a pipeline from the makeup water pipeline to the site of the PWR and use fresh water from the fresh-water cooling system sufficient to restore flow from the spring to 3 gpm. This provision will remain in effect for the lifetime of the Tuscarora Facility. Additionally should any of other monitored seeps and springs dry up ORMAT will create artificial water collection devices, termed guzzlers to offset the loss of these waters to the associated wildlife species. Meadow restoration or enhancement projects will be given a preference for implementation.

Should any of the other monitored seeps and springs dry up ORMAT will create artificial water collection devices, termed guzzlers, to offset the loss of these waters to the associated wildlife species.

### **Effectiveness**

These measures will help ensure that sage-grouse brood-rearing habitat remains available through Project development (IM 2008-204). Riparian areas, meadows, and the waters associated with them are important habitat for sage-grouse brood-rearing. Maintaining the integrity of the dispersed waters will result in greater availability and short distances to water, which can be important for early brood rearing.

### **Conservation Measure Impacts**

Implementation of the above conservations measures should have minimal impact to any resource, except cultural resources with the potential burying of a pipeline. Should this measure need to be implemented an archeological clearance should be conducted.

Construction of the pipeline or the guzzlers will increase operational costs to ORMAT.

## **A.10 REPORTING**

### **Annual Monitoring and Survey Results Report**

A report should be submitted, by ORMAT, to NDOW and BLM by June 15 of each year, for as long as the geothermal plant is operating, documenting the results from all required project monitoring (sound pressure level monitoring, sage-grouse lek and nest monitoring, spring and seep monitoring). The report should be submitted to the WWG no later than August 31 each year. Reports should include the following:

- Sound pressure level monitoring results, including daily dBA levels during the outlined lekking season and times; location (UTM, NAD83) of acoustic monitoring equipment; any isolated incidents that may have increased dBA levels temporarily
- Sage-grouse lek monitoring, including lek count data sheets, center point of sage-grouse leks (UTM, NAD83), isolated incidents disturbing sage-grouse lekking activities
- Sage-grouse radiotelemetry results
- Sage-grouse nest sites (UTM, NAD83) found during “clearance” surveys or collected opportunistically through other monitoring activities.
- Seeps and springs flow monitoring results.

- If future impact reduction measures are implemented, identification and a detailed description of the impact reduction measures and date of implementation will also be reported.

### **Annual Restoration Report**

A report tracking the implementation of conservation measures and identification of habitat enhancement projects or charges charged to the Conservation Trust Fund will also be supplied by ORMAT by August 31 of each year to NDOW, BLM, and the WWG.

## **Attachment 1**

### **Greater Sage-Grouse Lek Count Protocol**

#### **NEVADA DEPARTMENT OF WILDLIFE INSTRUCTION FOR GREATER SAGE-GROUSE LEK COUNTS**

- 1) Arrive at the lek at least 45 minutes before sunrise.
- 2) Do not approach any closer than about 200 meters from the lek. This will prevent disturbance of the birds while strutting.
- 3) Conduct all counts between 30 minutes before sunrise and 1.5 hours after sunrise.
- 4) If at all possible, observe the lek from inside your vehicle. Sage-grouse are less sensitive to the approach of a vehicle and its presence than they are to you.
- 5) Note your arrival time and departure time on the lek count form.
- 6) Obtain a minimum of three counts at 15-minute intervals of each lek on each date counted. A count of males, females, and unknown birds is always preferable to a flush count.
- 7) In the comments section of the form, please note the following information:
  - a. Wind direction and speed
  - b. Temperature in degrees Fahrenheit
  - c. Ground condition – dry, muddy, snow (depth in inches)
  - d. Cloud cover in the following manner:
    - i. Clear
    - ii. Partly cloudy (less than 25% cover)

- iii. Scattered (more than 25% but scattered horizon to horizon)
  - iv. Cloudy (more than 50% cover)
  - v. Foggy
- 8) Note the presence of predators by species, time and activity: Example – golden eagle @ 6:45 a.m. flying over lek; coyote chasing grouse at 8:15 a.m.
- 9) Be sure to use the common name of the lek.



## NEVADA DEPARTMENT OF WILDLIFE

### LEK COUNT DATA COLLECTION FORM



#### LEK ATTRIBUTES

LEK ID: \_\_\_\_\_ LEK NAME: \_\_\_\_\_  
LEK COMPLEX: \_\_\_\_\_ TREND LEK: \_\_\_\_\_  
PMU NAME: \_\_\_\_\_ PLANNING UNIT: \_\_\_\_\_

NDOW REGION: \_\_\_\_\_ UNIT: \_\_\_\_\_ BLM DISTRICT: \_\_\_\_\_  
COUNTY: \_\_\_\_\_ RANGE/VALLEY: \_\_\_\_\_ LEK STATUS: \_\_\_\_\_

EASTING \_\_\_\_\_ NORTHING \_\_\_\_\_  
GPS COORD (NAD83): \_\_\_\_\_ NEW/UPDATED: ☐

#### SURVEY ATTRIBUTES

OBSERVER NAME(S): \_\_\_\_\_ SURVEY METHOD: \_\_\_\_\_  
TIME OF ARRIVAL: \_\_\_\_\_ SUNRISE: \_\_\_\_\_  
DATE OF SURVEY: \_\_\_\_\_ TIME OF SURVEY: \_\_\_\_\_

WEATHER CONDITIONS: \_\_\_\_\_  
\_\_\_\_\_

TEMPERATURE: \_\_\_\_\_  
WIND SPEED: \_\_\_\_\_ DIRECTION: \_\_\_\_\_

OTHER ANIMALS AT LEK: \_\_\_\_\_  
\_\_\_\_\_

#### LEK COUNT DATA

	COUNT 1	COUNT 2	COUNT 3	COUNT 4
MALES:	_____	_____	_____	_____
FEMALES:	_____	_____	_____	_____
UNKNOWN:	_____	_____	_____	_____

HIGH COUNT    MALES: \_\_\_\_\_    FEMALES: \_\_\_\_\_    UNKNOWN: \_\_\_\_\_

REMARKS:

Form Revised: March 4, 2008