
Appendix G

Response to Comments on the Revised
Dixie Meadows Geothermal Utilization EA

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Appendix G.

Response to Comments on the Revised Dixie Meadows Geothermal Utilization EA

The BLM released the *Dixie Meadows Geothermal Utilization Project Environmental Assessment*, DOI-BLM-NV-C010-2016-0014-EA on May 9, 2017. Based on the comments received on the May 2017 draft EA, the BLM's subsequent coordination with cooperating agencies and ORNI 32, and the BLM's government-to-government consultation with the FPST, the BLM revised the EA and published a second draft EA on January 13, 2021. Comments and responses for the 2017 EA are included as Appendix G to the January 2021 EA.

The BLM held an additional comment period on the second draft EA from January 13, 2021, through February 12, 2021. The BLM received additional comments from local, state, and federal agencies; the FPST; and a nongovernmental organization on the second draft EA. Comment letter submissions on the second draft EA were received by email, fax, mail, or submitted using the online comment form available during the comment period at the project website: <https://eplanning.blm.gov/eplanning-ui/project/75996/510>.

Although not required for an EA by regulation, an agency may respond to substantive and timely comments. Substantive comments: 1) question, with reasonable basis, the accuracy of information in the EA; 2) question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis; 3) present new information relevant to the analysis; 4) present reasonable alternatives other than those analyzed in the EA; and/or 4) cause changes or revisions in one or more of the alternatives. No response is necessary for non-substantive comments. All comments were reviewed, considered, and then categorized into topics when feasible. Substantive comments and BLM responses from the January 13, 2021, through February 12, 2021, public comment period are provided in the table below.

Response to Comments Received on the Dixie Meadows Geothermal Utilization Project January 2021 Draft EA

Commenter	Comment Code	Comment	BLM Response
Center For Biological Diversity	Aquatic Resources Monitoring and Mitigation Plan	<p>History On June 30 of 2017, the Center submitted comments on the first Draft Environmental Assessment for DMGUP to the Bureau of Land Management ("BLM"), citing massive failures by BLM to properly disclose and analyze the potential impacts of geothermal development at Dixie Meadows on groundwater dependent resources at the site, in particular on the endemic Dixie Valley toad ("DVT").² This comment letter was accompanied by a technical memorandum from hydrologist Dr. Tom Myers, briefly analyzing the impacts of geothermal energy production on the Dixie Valley toad.³ ² See Exhibit 1: Center comments on 2017 Draft Environmental Assessment. ³ See Exhibit 2: Myers technical memorandum on 2017 Draft EA. Although the RDEA acknowledges the possibility of impacts to Dixie Meadows, the proposed mitigation measures are inadequate and infeasible The issues identified in this letter on the RDEA therefore are primarily pertaining to the inadequacy and infeasibility of the proposed mitigation measures, as well as the questionable hydrogeographic theories they are based on. The Center will not include the entirety of the substantial body of literature cited in the 2017 comment letter in this 2021 letter, but the entirety of our 2017 letter is hereby incorporated by reference. On July 6, 2017, Michelle Gordon, MS., Dr. Eric Simandle, and Dr. Richard Tracy published an article in the journal Zootaxa, entitled: "A diamond in the rough desert shrublands of the Great Basin in the Western United States: A new cryptic toad species (Amphibia: Bufonidae: Bufo (Anaxyrus)) discovered in Northern Nevada,"⁴ which first described the Dixie Valley toad as a unique taxon. ⁴ See Exhibit 3: Zootaxa article. On September 18, 2017, the Center submitted an Endangered Species Act ("ESA") petition to the US Fish and Wildlife Service ("FWS")⁵ to protect the DVT as an endangered species, citing the existential threat of geothermal development, which could potentially substantially alter or dry up its habitat. This petition was accompanied by a more in-depth memorandum from Dr. Tom Myers examining the threats to the Dixie Valley toad posed by geothermal development at Dixie Meadows.⁶ ⁵ See Exhibit 4: Center petition to FWS to protect the DVT under the ESA. ⁶ See Exhibit 5: Myers technical memorandum on ESA petition. On June 26, 2018, FWS issued a positive 90-day finding on the Center's Dixie Valley toad petition, finding that the petition presented "substantial scientific or commercial information indicating that the petitioned actions may be warranted."⁷ In the accompanying 90-day petition review form, FWS states, "The toad's life cycle is entirely reliant on dependable flows from the springs at Dixie Meadows, and a substantial library of literature exists indicating that if geothermal energy production occurs at Dixie Meadows, habitat for the Dixie Valley toad could be reduced or</p>	<p>The BLM has been in coordination with the USFWS to address the substance of the commenter's concerns. This coordination resulted in numerous revisions to the ARMMP (Appendix H) and the EA. Additionally, the EA incorporates new science from the USGS related to the Dixie Valley Toad.</p>

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		<p>eliminated."8 Furthermore, FWS states, "The petitioner provides substantial information regarding the difficulty of detecting negative impacts and the ability to mitigate for these impacts."9 7 See Exhibit 6: 90 Day notice in FR on ESA petition from FWS. 8 See Exhibit 7: 90 Day petition review form from FWS, p. 3. 9 Id., p. 5.</p>	
Churchill County, NV	Range of Alternatives	<p>After review of the Revised Draft Environmental Assessment, the County believes that the project proponent and BLM have done their due diligence in terms of identifying, disclosing and mitigating potential impacts of the Project. The County concurs with the BLM's finding that the Project is consistent with the County's ordinances, policies and plan (Page 1-12) and specifically, the County's Policy Plan for Public Lands, which is an element of the County's Master Plan. The County looks forward to working with the Project Proponent as it moves forward with development and generation.</p> <p>The County also wanted to express its appreciation and support for Alternative 1 (Southern Gen-Tie Route) and its analysis within this EA. The County realizes that this option is not currently included in the "Proposed Action" but would support implementation of this Alternative if it becomes necessary.</p>	Comment noted.
Fallon Paiute-Shoshone Tribe	Native American Religious Concerns	<p>I. The Dixie Meadows Hot Springs. Earlier in the administrative process, the Tribe submitted extensive comments explaining why the project imposes severe impacts on the environment, and why those impacts disproportionately impact the Tribe. The Dixie Meadows hot springs is still a sacred place where we go for medicines and healing. We have enjoyed the area in quiet, with unobstructed views of Fox Peak, our origin site. At nighttime, we viewed the night sky. We also relied on the native grasses, cattails, and other plants that surround the springs for food and weaving of baskets and clothing. The proposal will result in significant harm and risk of harm to the Dixie Meadows hot springs and surrounding ecosystems. The Tribe requests that the Secretary determine "that issuing the lease would cause unnecessary or undue degradation of public lands and resources." 43 C.F.R. § 3201.11(a). Dixie Meadows hot springs is a "sacred site" to the Fallon Paiute-Shoshone Tribe as that term is defined under Executive Order 13007, which means that BLM must "accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners" and "avoid adversely affecting the physical integrity of such sacred sites." The EA repeatedly demonstrates that the proposal would degrade both the springs and the surrounding environment. BLM must recognize that there is substantial uncertainty and likelihood of adverse impacts, make a finding of significant impacts, and require preparation of a robust environmental impact statement.</p>	<p>Please refer to Sections 3.12 and 3.13 of the EA. These sections include analysis that discloses the BLM's determination that the undertaking would have an adverse effect to the Dixie Meadows Hot Springs site. The Nevada SHPO concurred with that determination. As a result, the BLM, SHPO, Navy, ORNI 32, FPST, and ACHP entered into a Memorandum of Agreement for the Resolution of Adverse Effects to the Dixie Meadows Hot Springs Site. Through consultation with all parties, the BLM obtained resolutions to the adverse effects determination, and negotiated and executed the agreement on August 9, 2021. The resolutions contained within the executed Memorandum of Agreement (see Appendix K) are intended to lessen, minimize or mitigate the adverse effect to the site, and can result in a finding of no significant impact.</p>

Commenter	Comment Code	Comment	BLM Response
Naval Air Station Fallon	Range of Alternatives	Pg. 22 ORMAT has shared the planned route and coordinated with Naval Air Station Fallon on the proposed transmission line from the geothermal plant. In order to minimize impacts to the training operations, the Navy request ORMAT located the planned transmission as close to the current Terra Gen transmission line as practicable (as outlined in the original Environmental Assessment).	The BLM considered the Navy's request. Due to resource concerns, the powerline was realigned along the Dixie Valley Road to avoid impacts to riparian habitat before paralleling the existing terra-gen powerline north Dixie Meadows. The EA in Appendix J includes a new environmental protection measure requiring ORNI 32 to notify the Navy prior to drilling or construction activities so the Navy is aware of possible hazards to training activities.
Nevada Department of Transportation	Cultural Resources	Review of the proposed project indicates that the proponent previously conducted a cultural resources survey, the results of which were approved by the BLM and received concurrence from the State Historic Preservation Office (SHPO; Undertaking 2015-3448). The BLM identified the Dixie Meadows Hot Spring site as an ethnographic resource and potentially a Traditional Cultural Property (TCP), which may require further identification, evaluation, and mitigation efforts. The Nevada Department of Transportation (NDOT) recognizes the previous evaluations that have been undertaken.	Comment noted.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 1 Page: 3 Section: Exec sum, final 1.0 Comment: "Two of five springs known to harbor springsnails (Pyrgulopsis spp.), will be surveyed annually to monitor distribution and abundance." Why only two? If only two is possible could they be rotated annually so that there are not two that are always monitored and three that are never monitored? It will also be important to have adequate baseline distribution and abundance data for comparison purposes.	The ARMMP (Appendix H) has been revised to clarify that all five springs are geographically in the same area and would be monitored and measured monthly. Two springs would have continuous temperature monitoring annually. Springs 14 and 32 would have continuous temperature monitoring.
Nevada Division of Environmental Protection, Bureau of Water Pollution Control	Water Resources	The project may be subject to BWPC permitting. Permits are required for discharges to surface waters and groundwaters of the State (Nevada Administrative Code NAC 445A.228). BWPC permits include, but are not limited to, the following: - Stormwater Industrial General Permit -De Minimis Discharge General Permit - Pesticide General Permit -Drainage Well General Permit -Temporary Permit for Discharges to Groundwater's of the State -Working in Waters Permit -Wastewater Discharge Permits -Underground Injection Control Permits -Onsite Sewage Disposal System Permits -Holding Tank Permits	Comment noted.

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Nevada Division of Water Resources	Surface water	All Nevada water laws must receive full compliance. All waters of the State belong to the public and may be appropriated for beneficial use pursuant to the provisions of Nevada Revised Statutes (NRS) Chapters 533 and 534 and not otherwise. The State Engineer must permit all water used on the described project. Water diversions from any surface source must comply with the permitting provisions of Nevada Revised Statutes (NRS) Chapter 533.	Comment noted.
U.S. Fish and Wildlife Service	Editorial Comments	Pg. 2-7, Paragraph 0 Change NDOM to NDOW	NDOM is the correct acronym. No change.
	Sensitive Aquatic Species	It's a well-documented fact that geothermal power plants alter or dry up adjacent thermal spring systems. If Dixie Meadows' hot springs dry up, or if the temperature or chemical composition of their discharge changes that could spell doom for the Dixie Valley toad. Effective mitigation for such impacts is not possible, and creating a situation where the toad is reliant on the geothermal developer to mustian its habitat through replacement water is unacceptable.	ORNI 32, in coordination with the BLM, has revised the ARMMP (Appendix H) to monitor changes in groundwater and surface water resources. The ARMMP also includes adaptive management strategies that the BLM would implement to avoid, minimize, or mitigate impacts on hydrogeologic resources and associated aquatic habitats. Additional applicant-committed environmental protection measures in Appendix J of the EA would further avoid, minimize, or mitigate impacts on adjacent thermal springs. The EA has been revised to reflect changes to the ARMMP.
	Sensitive Aquatic Species	Geothermal springs and their associated wetlands represent critical habitats for several species of amphibians within the Great Basin Region. Any disturbance to these springs would likely result in the extirpation and potential extinction of these spring-dependent amphibians. The "Finding of no Significant Impact" letter makes the assertion that, "There would be no effects on federally threatened and endangered species or critical habitat, as such species and critical habitat are not present in the project vicinity." This is likely not true, as the upcoming 2021 IUCN Red List Update considers the Dixie Valley toad as "Critically Endangered" because its entire extent of occurrence is limited to ~7 km2, and...the great potential for continuing decline in the	There is no clear evidence to suggest that changes to the geothermal reservoir associated with the proposed project would change the hydrologic conditions of nearby riparian areas or the spring-dependent species that inhabit those areas. The proposed action would include an extensive groundwater and surface water monitoring program that would inform appropriate adaptive management

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U.S. Fish and Wildlife Service (continued)		<p>extent and quality of its habitat in due to the proposed geothermal expansion. Moreover, in 2018 the U.S. Fish and Wildlife Service determined that it may qualify for protection: "substantial scientific or commercial information indicating the petitioned action may be warranted for the Dixie Valley toad due to potential threats associated with the following: development of geothermal energy and difficulty in associated mitigation, decrease in spring discharge, changes in water temperature, and groundwater extraction (Factor A); and chytridiomycosis disease and predation by the invasive American bullfrog (Factors C and E)." Federal Register Vol. 83, No. 124 Wednesday, June 27, 2018. These are critical points that must be adequately studied and addressed before any geothermal expansion can occur</p>	<p>strategies should the monitoring data demonstrate a change in conditions. Following the release of the revised Draft EA, ORNI 32, in coordination with the BLM, revised the Aquatic Resources Monitoring and Mitigation Plan (ARMMP) to clarify and expand the proposed monitoring approach. The ARMMP also includes adaptive management strategies that the BLM would implement to avoid, minimize, or mitigate impacts on hydrologic resources and associated aquatic habitats. Additional applicant-committed environmental protection measures in Appendix J of the EA would further avoid, minimize, or mitigate impacts on adjacent thermal springs. The EA has been revised to reflect changes to the ARMMP (Appendix H). The EA and FONSI address special status species as to whether they are present. The Dixie Valley Toad listing review is not complete, therefore, there are no T&E species present.</p>
	Sensitive Aquatic Species	<p>It's a well-documented fact that geothermal power plants alter or dry up adjacent thermal spring systems. If Dixie Meadows' hot springs dry up, or if the temperature or chemical composition of their discharge changes that could spell doom for the Dixie Valley toad.</p>	<p>There is no conclusive evidence to suggest that changes to the geothermal reservoir associated with the proposed project would change the hydrologic conditions of nearby riparian areas or the spring-dependent species that inhabit those areas. The ARMMP (Appendix H) also includes adaptive management strategies that the BLM would implement to avoid, minimize, or mitigate impacts on hydrologic resources and associated aquatic habitats. Additional applicant-committed environmental protection measures in Appendix J of the EA would further avoid, minimize, or mitigate impacts on adjacent thermal springs.</p>

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U.S. Fish and Wildlife Service (continued)	Sensitive Aquatic Species	The Bureau of Land Management must prioritize permitting projects that are not in sensitive habitats.	Comment noted.
Center For Biological Diversity	Aquatic Resources Monitoring and Mitigation Plan	<p>This Comment Letter & Attachments Despite the preponderance of evidence of the potential impacts to the Dixie Valley toad and associated habitats from geothermal development, as outlined in our comment letter of 2017, project proponent Ormat and BLM Carson City District have insisted on proceeding with environmental analysis for this potentially destructive project. As will be shown in this letter, not only does the scientific evidence refute the legitimacy and feasibility of the proposed Aquatic Resources Monitoring and Mitigation Plan ("ARMMP"), such as it is, but that other agencies with responsibility for and jurisdiction over the DVT, namely the FWS, the Nevada Department of Wildlife ("NDOW"), and the US Navy, all have significant concerns with the RDEA which BLM and Ormat failed to address. Directly and indirectly it seems that these agencies do not desire the project to move forward as described in the RDEA. Dr. Tom Myers has prepared another technical memorandum for inclusion with this comment letter.¹⁰ His previous two comment letters, as seen in Exhibits 2 and 5, are incorporated herein by reference. In his latest memorandum, Dr. Myers analyzes the hydrogeologic conceptual model presented in the ARMMP, as well as the feasibility of the mitigation measures proposed therein. Dr. Myers concludes, "There is not sufficient understanding of the hydrologic systems near the Dixie Meadows site to develop it for geothermal resources without potentially substantially harming the springs. The development may use far more of the water budget than is available. The development relies on a fault network to protect the springs but has not presented sufficient geologic mapping or hydrologic data to rely on the faults. There is too little known about the hydrologic connections for monitoring and mitigation to protect the springs."¹¹ ¹⁰ See Attachment A: Myers, 2020. "Review of Environmental Assessment and the Aquatic Resources Monitoring and Mitigation Plan." ¹¹ Id., p. 9. This comment letter refers to numerous documents obtained from the BLM through a Freedom of Information Act ("FOIA") request. These documents shed important light on how other agencies are reacting to, critiquing, and interpreting the ARMMP. While these agencies were commenting on a draft version of the ARMMP from April 2020, we also obtained through FOIA a draft of the ARMMP from August 13, 2020 with changes from the April version tracked.¹² Feedback from the three agencies in question was dated prior to August 13, 2020. It is clear when viewing the tracked changes that the issues raised by the three agencies were not substantially addressed, and that the concerns expressed by those agencies are essentially still outstanding in the ARMMP which was</p>	<p>The BLM has been in coordination with the USFWS to address the substance of the commenter's concerns. This coordination resulted in numerous revisions to the ARMMP (Appendix H) and the EA. Additionally, the EA incorporates new science from the USGS related to the Dixie Valley Toad.</p>

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		<p>circulated for comment in January 2021. 12 See Exhibit 8: Draft ARMMP August 2020 with track changes. US Fish and Wildlife Service's comments in particular are illuminating, since their hydrologist Sue Braumiller provides the only substantive critique of the hydrology in the ARMMP from among these agencies.13 FWS primarily contrasts the information presented in the ARMMP with that sourced from a 2014 analysis of the structural hydrogeology of Dixie Valley, written by Iovenitti, et al.14 FWS refers to the document as EGS 2014a throughout their comments. 13 See Attachment B: Draft ARMMP review by FWS with Ormat response, August 6, 2020. 14 See Exhibit 9: Engineered Geothermal Systems (EGS), 2014a, EGS Exploration Methodology Project using the Dixie Valley Geothermal System, Nevada as a calibration site: Part I - Final scientific report baseline conceptual model, DOE Award: DE-EE0002778, 2 January 2014, 611 p. NDOW's comments15 and the Navy's comments16 are also included with this letter and cited herein. Additionally, meeting notes from a multiagency meeting on August 24, 2020 are included with this letter and cited herein.17 Also included are further comments from FWS on the RDEA itself, separate from the ARMMP.18 15 See Attachment C: NDOW comments on ARMMP with Ormat response, undated. 16 See Attachment D: Navy comments on ARMMP, undated. 17 See Attachment E: 08.24.20 ARMMP meeting notes. 18 See Attachment F: FWS comments on RDEA with Ormat response.</p>	
Fallon Paiute-Shoshone Tribe	Native American Religious Concerns	<p>Religious Significance of Dixie Meadows Hot Springs and Associated Legal Protections. The Dixie Hot Springs are a sacred site formed by the Creator that must remain in its natural condition. We treat everything in the natural world with reverence and respect. The spring's power derives from its undamaged relationship to the natural world, and altering that balance threatens severe spiritual and cultural harm to the Tribe and its members. When Tribal members have been sick, the hot springs have been their medical clinic. In other words, from the Tribe's perspective, Ormat's proposal is to build power plants on and around very sacred, spiritual land built by the Creator at the beginning of time. A. The springs are a sacred site. The Tribe's connection to the Dixie Hot Springs is well-documented. As the Tribe has referenced in previous comments, Catherine Fowler's "In the Shadow of Fox Peak: An Ethnography of the Cattail-Eater Northern Paiute People of Stillwater Marsh" (U.S. Fish and Wildlife Service, 1992) ("Fox Peak") is a seminal text that BLM must consider as part of its decision making and administrative record. In our native language, we refer to the Dixie Meadows hot springs as simply Paumu, hot springs, because of their priority importance among all hot springs.1 See "In the Shadow of Fox Peak: An Ethnography of the Cattail-Eater Northern Paiute People of Stillwater Marsh" (U.S. Fish and Wildlife Service, 1992) at 40. If BLM lacks a copy of this text, the Tribe will provide one upon request. The Fox Peak ethnographic</p>	<p>The BLM, in consultation with the Nevada State Historic Preservation Officer and the Fallon Paiute-Shoshone Tribe, has determined that the undertaking will have an adverse effect on the historic property CrNV-03-10543/CrNV-03-E0286 that is eligible for the National Register of Historic Places under Criterion A as a historic property with traditional religious and cultural significance to the FPST. The BLM, in consultation with the FPST, has determined that the Site, that consists, in part, of hot springs that tribal members use for cultural, religious, and spiritual purposes, constitutes a "sacred site" under Executive Order No. 13007. The American Indian Religious Freedom Act was meant to insure that American Indians were given protection guaranteed under First Amendment and was not intended to grant</p>

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		<p>account is based on interviews with Tribal elders, with a focus on Wuzzie George, who was the wife of Jimmy George, a "well-known and highly respected Native doctor, a person with a special relationship to certain types of supernatural power." Fox Peak at 169. The text details how sacred power flows through certain waters, much as blood flows through a human, and that springs provide an entry point to access such power. Dixie Meadows hot springs is a particularly important sacred site: Hot springs occurring in various areas of Cattail-eater territory were all considered to be sacred places. Due to White settlement and development, however, most were rendered inaccessible to Indian people by the 1900s. The exception was the large hot springs in Dixie Valley (paumagwaitu), toward the north end. This site was frequented by people wanting medicinal help for pains and sores, as the hot water and mud had curative properties. Fox Peak at 178. Because the "Cattail-eater people saw the Earth as an animate being, a living, breathing entity," development of the Earth, particularly around sacred sites, poses a significant harm to sacred sites and religious expression. Wuzzie George explained her view that "activities of Whitemen, such as the bombings of sacred sites, but more generally the land-altering activities of building highways, large buildings, etc., as particularly injurious to the Earth." Ms. George specifically tied expression of harm from the Navy's bombing of Fox Peak to Dixie Meadows hot springs, reporting that there was an earthquake and "Dixie Hot Springs was cold for quite some time after the event, confirmation of its seriousness." Fox Peak at 179. Jeremy and Wuzzie George's son, Ashley George, is a living Tribal elder. Recently, Cultural Resources Director Rochanne Downs conducted a video interview with him regarding the Dixie Hot Springs. A transcript is attached as Exhibit A to this letter, and the Tribe will provide an electronic copy of the interview to BLM. Mr. Ashley George describes regular trips with his family to the Dixie Valley Springs for a week at a time and camping at the spring. Tribal members dug small holes around the springs to collect and cool water, and then combine spring waters and the cooled water and muds to deliver healing. Mr. George explains how the springs were placed there by the Tribe's Creator, and that its power derives from its unchanged natural state. Mr. George also notes that other springs have either already been destroyed or lack the power and significance of the Dixie Valley Springs. These first-hand accounts provide powerful testimony as to the value of the springs and the unacceptable impacts and risks posed by the geothermal plant. B. The proposal would cause both certain harm and impose unacceptable risks. In his interview, Mr. George states that once the springs are damaged, they cannot be restored: you can't, you can't, you can't fix it to your, you can't fix it to, on your, the way you think it should be. It's all got to be natural, not disturbed or nothing...you take away, you take away some of the power when you, when you try to adjust it, because you're not the doctor or</p>	<p>them rights in excess of those guarantees. Please refer to case file Attakai v. U.S., D.Ariz.1990, 746 F.Supp. 1395.</p>

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		<p>you're not the (supreme being), that ah, that people believe, that the healing power (of all the service), it's all sacred. Mr. George's account provides a direct portrayal of the harm posed by the proposal to the Tribe and its members. The withdrawal of geothermal fluid associated with the springs is a harm in itself, and experimenting with various mechanisms of reinjection or trucking in outside water would not mitigate those harms. The Tribe also provides a memorandum from Dr. Tom Myers, attached as Exhibit B, explaining the significant technical flaws in the monitoring and mitigation plan. The EA and plan fail to account for the full amount of potential water and geothermal fluid to be used. The monitoring is periodic and limited, when water monitoring should be continuous and monitoring of ethnobotanicals should continue throughout project construction and implementation given the sensitive, culturally significant, and slow-growing biome. The mitigation relies entirely on a "guess and check" methodology, which has not worked in other locations and is based on the unsupported premise that damage to the springs is recoverable. The plan unacceptably presumes that there would always be geothermal production, even if there is significant harm to the springs. The Tribe's concerns are well-founded. As the Tribe has raised in previous comments, Ormat's geothermal plants have already permanently ruined the nearby Jersey Valley springs.² See, e.g., http://www.hotwaterslaughter.com/hotspring/jersey-valley-home-station-ranch-hot-springs (Review of Jersey Valley hot springs: "This spring is history. I regret having gone there only once, about 15 years ago. Every drop of hot water is now going into the huge geothermal plant across the road. The big hot-water hole is dry as a bone. The rock-and-mortar pool is long gone. This was one of the best soaks in the state. Sad. Check it out on Google Earth, look at the old photos in that app to see the progress of end of it."). According to media reports: The BLM confirmed that, after flowing for over a hundred years, Jersey Valley Hot Springs water flows started to decline not long after Ormat started commercial power production at the McGinnis Hills geothermal power plant in July, 2012. Two subsequent expansions have made McGinnis Hills the largest geothermal power plant in Nevada and the largest on BLM land... "From 2013 through 2015, it was observed that the JVHS output had decreased and ultimately became dry," states the BLM press release.³ https://insidenorthernnevada.com/MobileContent/NEWS/NEWS-Lander-County/Article/Ormat-to-resurrect-Jersey-Valley-Hot-Springs-/36/172/42711; see also https://www.blm.gov/press-release/environmental-assessment-available-orni-15-llcormat-nevada-inc-jersey-valley. Attached as Exhibit C. In exchange for ruining the springs, Ormat proposed piping in geothermal fluid. This response is uncertain and temporary because it requires ongoing implementation and funding. BLM fails to acknowledge the real and documented possibility that geothermal fluid extraction will</p>	

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		create irreversible impacts to the hot springs. This nearby example causes great concern to the Tribe, as a similar outcome at Dixie Meadows would be devastating. The proposed geothermal development would impose significant burdens on the Fallon Paiute-Shoshone Tribe's religious expression at the Dixie Hot Springs. As set forth above, the associated construction would deeply mar the surrounding environment and impose noise and visual pollution on users of the hot springs. Furthermore, the removal of huge amounts of geothermal fluid, removal of heat from that fluid, and reinjection, disturbs the natural order and poses significant risk of cooling or change in water quality, quantity, and chemical composition.	
Naval Air Station Fallon	Requests for Information	Pg. 36 Please notify the Community Planning and Liaison Officer (CPLO) - Robert Rule Robert.rule@navy.mil before the drill rig is set up. The CPLO will then notify the appropriate Operations Departments.	Comment noted.
Nevada Department of Transportation	Cultural Resources	NDOT requires additional information to satisfy our Section 106 requirements. Please provide the following: -The Area of Potential Effects, including both Direct and Indirect Effects, for the power plant site, both gen-tie alternatives, and any temporary laydown or construction areas. At present, it is unclear where the project will intersect with NDOT resources or rights of way. -A map indicating buffer zones around known and eligible cultural resources that overlap with NDOT resources or rights of way. -Copies of any reports, concurrence letters, or agreement documents relating to cultural resources that may be within or adjacent to NDOT resources or rights of way.	Contact BLM staff to request documents for NDOT's Section 106 review requirements. For additional requests for confidential sections of the Project record, please contact the Project's authorized officer.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 2 Page: 3 Section: Exec sum, final 1.0 Comment: "The hydrologic and biologic baseline conditions and thresholds would continue to be refined through a baseline monitoring period extending to 2022, in concert with the technical working group reviews that include involved federal and state cooperating agencies." This timeline could extend through 2022, to be determined by technical working group reviews.	The ARMMP has been revised to clarify that the baseline monitoring period would be 12 months from the date when the BLM signs the Decision Record.
Nevada Division of Environmental Protection, Bureau of Water Pollution Control	Water Resources	Please note that discharge permits must be issued from this Division before construction of any treatment works (Nevada Revised Statute 445A.585). For more information on BWPC Permitting, please visit our website at: http://ndep.nv.gov/bwpc/index.htm . Additionally, the applicant is responsible for all other permits that may be required, which may include, but may not be limited to: - Dam Safety Permits - Division of Water Resources -Well Permits - Division of Water Resources -401 Water Quality Certification - NDEP -404 Permits - U.S. Army Corps of Engineers -Air Permits - NDEP -Health Permits - Local Health or State Health Division -Local Permits - Local Government	Comment noted.

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Nevada Division of Water Resources	Groundwater	Water diversions from any underground source must comply with the permitting provisions of NRS 533 and 534.	Comment noted.
U.S. Fish and Wildlife Service	Sensitive Aquatic Species	Pg. 3-61, Paragraph 0 Objective 2 of the sensitive species policy. "To initiate proactive conservation measures that reduce or eliminate threats to sensitive species to minimize the likelihood of and need for listing of these species under the ESA." Since the FWS has just initiated our 12-month finding process to determine if listing the Dixie Valley toad (DVT: <i>Anaxyrus williamsi</i>), it seems premature and against BLM Policy to authorize a project which could lead to the listing of this species.	The extensive monitoring and mitigation measures in the ARMMP (Appendix H) are examples of proactive conservation measures.
	Sensitive Aquatic Species	If overexploitation of the geothermal reservoir does occur due to the proposed expansion, it may result in the rapid decline and death of all Dixie Valley toads. We need look no further than the cautionary tale of another geothermal project that Ormat developed in Jersey Valley, which is located only 70 Km from Dixie Valley. Ormat's 10-megawatt Jersey Valley Geothermal Project began operation in 2011. In 2009, the nearby Jersey Hot Spring flowed at ~190 liters per minute. However, flow started slowing when the Jersey Valley power plant went online. By May, 2013 the spring's flow had dropped by half, and in August 2014 the Nevada Division of Water Resources found that the water at Jersey Hot Spring had completely ceased flowing. If this also occurs in Dixie Valley due to the proposed geothermal expansion, the Dixie Valley toad will almost certainly go extinct.	There is no clear evidence to suggest that changes to the geothermal reservoir associated with the proposed project would change the hydrologic conditions of nearby riparian areas or the spring-dependent species that inhabit those areas. The proposed action would include an extensive groundwater and surface water monitoring program that would inform appropriate adaptive management strategies should the monitoring data demonstrate a change in conditions. Following the release of the revised Draft EA, Ormat, in coordination with the BLM, revised the ARMMP (Appendix H) to clarify and expand the proposed monitoring approach. The ARMMP also includes adaptive management strategies that the BLM would implement to avoid, minimize, or mitigate impacts on hydrologic resources and associated aquatic habitats. Additional applicant-committed environmental protection measures in Appendix J of the EA would further avoid, minimize, or mitigate impacts on adjacent thermal springs. The EA has been revised to reflect changes to the ARMMP.
Center For Biological Diversity	Aquatic Resources	Dispute Over the Hydrogeologic Conceptual Model The ARMMP presents, and indeed the entire mitigation hierarchy relies upon, a hydrogeologic conceptual model of Dixie Meadows. This conceptual model introduces new and unsubstantiated	The ARMMP (Appendix H) has been revised to reflect that Cool Springs at USGS 101 were monitored and showed no responses. The EA

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	Monitoring and Mitigation Plan	<p>information about faulting in the Dixie Meadows area. The spring complex at Dixie Meadows generally lies on a north-south line which is closely aligned with a well-established piedmont fault. The traditional conception of geothermal groundwater flow in the area is that it comes to the surface along the piedmont fault. 19 "The Piedmont Fault... likely diverts the deep flow from horizontal to vertical along its strike. Evidence for this is the colocation of most springs with the fault, all the way from spring USGS-101 southwest to spring 5B."20 19 See extensive discussion of this in Exhibit 5 and Attachment B. 20 Attachment A, p. 4. In contrast, the ARMMP introduces a completely new conceptual model, positing that rather than geothermal water traveling in an upward gradient from the well accepted piedmont fault, it travels upward from "east-northeast trending structures," previously undetected by the numerous previous hydrogeologic analyses and conceptualizations of Dixie Valley. As Dr. Myers notes, the evidence for this assertion in the ARMMP was, "presented as a citation to an oral communication from Ormat. This is impossible to review, so the argument cannot be evaluated. These faults are not identified in mapping from other source nor does McGinnis provide a discussion of structural geology that would indicate these faults are the primary source. Evidence of the faults' existence based on detailed mapping of the faults is necessary before a project can rely on their presence for development of a conceptual model or a design of a monitoring and mitigation plan."21 21 Attachment A, p. 4. Dr. Myers' overall summary of the ARMMP's hydrogeologic conceptual model is that it "includes unsubstantiated assumptions and may not be sufficient for designing an M&M plan."22 The dispute over the conceptual model is essential in the consideration of the validity of this project because the ARMMP's mitigation plans would of necessity require a sound conceptual model in order to properly direct mitigation. Given that independent hydrologists such as Dr. Myers and Ms. Braumiller at FWS provide such pointed critiques of the ARMMP's model, it calls into question whether or not the ARMMP will achieve its stated goals, and thus whether or not it is appropriate for BLM to issue a FONSI for the DMGUP. 22 Attachment A, p. 3. Dr. Myers takes exception with the water budget presented in the ARMMP, describing it as "very unusual."23 Since the ARMMP calculates the geothermal inflow as the error calculation, estimating all other values in the water budget, it is only a hypothesized amount. However, as Dr. Myers illustrates, there are significant issues with the estimates of other terms in the water budget, potentially having significant ramifications on the geothermal flow value. Dr. Myers states that the ARMMP's conceptualization of deep geothermal groundwater inflow is presented in the ARMMP "without providing any geologic reasoning or references."24 23 Attachment A, p. 2. 24 Attachment A, p. 2. FWS provided extensive comments on the hydrogeologic</p>	<p>and ARMMP also include additional information regarding flow testing, which is summarized in Appendix M of the EA. The presence of an observed deep pressure response to the east of Dixie Meadows, in conjunction with the lack of spring responses, especially at the high temperature springs NDOWSS-1 and 5A-5B within Dixie Meadows (see Section M.2 of Appendix M) supports the conceptual hydrogeological model in the ARMMP that the source of thermal spring discharge is from the shallow lateral flow system defined by temperature-gradient data, and not the hypothesized upwelling along the Piedmont Fault.</p>

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		<p>conceptual model, as seen in Attachment B. The comments analyze "...what is and is not known or supported regarding the bedrock lithology and structural geology at Dixie Meadows..."²⁵ (emphasis theirs). They further state that "...if accepted as is, the proposed Hydrogeologic Conceptual Model would significantly and adversely affect the interpretation of any changes detected at depth in bedrock, within the hydrothermal plume emanating from the range bounding fault into basin fill, and/or at the thermal springs (temperature or discharge); as well as the development and implementation of effective mitigation measures."²⁶ FWS is clearly concerned with the ARMMP's model and how it would significantly alter interpretation of monitoring data and thus mitigation measures. ²⁵ Attachment B, p. 1. ²⁶ Attachment B, p. 1. FWS points out that the geologic information upon which the ARMMP model is based lacks substantial supporting evidence. They note that only five holes have been drilled to sufficient depth to accurately assess lithology, and yet four of them are in the same general area. And thus, "...the relative locations/depths of major bedrock units defining the geothermal system at Dixie Meadows are known at essentially two locations: 42(19)-9 and the vicinity of 22D-8, 23-8/23A-8, and 24-8 - scant lithologic information with which to develop a Hydrogeologic Conceptual Model of the geothermal system at Dixie Meadows,"²⁷ (emphasis theirs). FWS takes exception with the ARMMP's characterization of the range bounding fault and primary piedmont fault as "moderately dipping," instead stating, "The basis for characterizing normal faults of the DVFZ at Dixie Meadows as moderately dipping (ARMMP Sections 6.2 and 6.3) is unclear and inconsistent with the considerable work and conclusions of EGS 2014a. Further, this reviewer finds no such estimate, or any estimate, of the dip of the range bounding fault at Dixie Valley, disputed or otherwise, in EGS 2014a (beyond repeated descriptions of the fault as steeply dipping at all investigated locations)."²⁸ This is important to the ARMMP's conceptual model because the moderate dipping is what allows for their hypothesized lateral flow of geothermal waters from the hypothesized northeast trending "hidden" faults. ²⁷ Attachment B, p. 2. ²⁸ Attachment B, p. 3. This is reinforced later in the FWS comments: "Depending on the locations/depths of the proposed geothermal extraction and injection, any errors in the hypothesized dip of the range bounding fault at Dixie Meadows (i.e., as moderately dipping rather than steeply dipping) may significantly and adversely impact the interpretation of any changes detected through bedrock monitoring and the future development and implementation of mitigation measures."²⁹ FWS continues further: "Given the inconsistency of this conclusion with the volume of information provided in EGS 2014a, it seems possible that a splay of the range bounding fault, intersected at depth in hole 22D-8, has been misinterpreted as the main range bounding fault. If so, efforts to interpret one (or</p>	

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		<p>more) logs for this particular hole have had a significant, but potentially unwarranted, influence on the hypothesized Hydrogeologic Conceptual Model of the geothermal system at Dixie Valley depicted in Figure 16."³⁰ In other words, the misinterpretation of data and flawed hypothesis of moderate dipping are central to the ARMMP's model and thus call into question its validity. 29 Attachment B, p. 8. 30 Attachment B, p. 3. The only response that Ormat has to this contention regarding the dip is, "Data collected during recent exploration activities suggest a moderate dip in the vicinity of Dixie Meadows."³¹ In the ARMMP it is simply cited as "verbal communication with Ormat." Clearly, they have no answer to FWS's assertions of misinterpretation of data. 31 Attachment B, p. 3. There is significant dispute about the source of the geothermal waters. FWS states, "there is one (major) piedmont fault at Dixie Meadows which is roughly coincident with the locations of the ~20 thermal springs/seeps; and moreover that the same piedmont fault continues north through Comstock and into the area of the ongoing Terra Gen operation."³² They continue: "the line of thermal spring orifices, which are virtually coincident with the piedmont fault, are located just east of the fault (as opposed to the fault being located east of the springs) - the former consistent with the fault being the source of the geothermal component of the thermal spring discharges prior to mixing with water in the basin-fill aquifer, at which point the locations of discharge to the surface are 'pushed' a short distance east of the fault's trace in the direction of the hydraulic gradient within the basin-fill aquifer."³³ Ormat has no answer other than the elusive and uncited "evidence" and verbal communication they refer to earlier.³⁴ 32 Attachment B, p. 5. 33 Attachment B, p. 5. 34 ARMMP, p. 18 FWS elsewhere reinforces this point: "The piedmont fault has been identified as the major producing structure at both Comstock and the Terra Gen site based on multiple lines of evidence (EGS 2014a Section 2.2.2)... Given that the bulk of vertical displacement within the DVFZ at Dixie Meadows has been shown to occur along the piedmont fault, as well as at Comstock and the Terra Gen site, there is no basis for concluding that the piedmont fault at Dixie Meadows is not also the major (natural) producing structure in the vicinity of the proposed project given the potential for a damage zone of significant permeability (likely in the hanging wall of the fault)."³⁵ 35 Attachment B, p. 7. While FWS and EGS 2014a are clear that the piedmont fault is the likely source of the geothermal waters, the ARMMP hypothesizes the waters emerge at east-north east trending hidden faults which then seep westward to discharge at the springs. FWS refutes this: "In summary, the basis for this set of hypothesized faults (Figure 15 of the ARMMP) is unclear and inconsistent with mapping by Page 1965, Speed 1976, Stewart and Carlson 1978, or Crafford 2007, and most recently EGS 2014a (and 2014b) - although apparently key to several of the</p>	

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		<p>structures hypothesized in Figure 16, the proposed Hydrogeologic Conceptual Model of the geothermal system at Dixie Meadows."36 Again, this calls into question the validity of the model and thus the entire ARMMP. 36 Attachment B, p. 7. It is rather shocking that despite presenting substantial new theories about the hydrogeology at Dixie Meadows, the ARMMP backs them up simply with citations to "communications." No fewer than seven times, the ARMMP cites communication with Ormat as evidence for substantial new information they are introducing and basing the ARMMP on. This is highly unorthodox and does not represent the best available science and is not independently verifiable by outside examiners, as has been pointed out in the Attachments. In summary, FWS calls into question the very validity of the hydrogeologic model in the ARMMP. "The explanation provided in the body of the ARMMP for the Hydrogeologic Conceptual Model hypothesized in Figure 16 is inadequate and unsupported and/or inconsistent with multiple lines of evidence provided in ESG 2014a and these comments."37 37 Attachment B, p. 9.</p>	
Fallon Paiute-Shoshone Tribe	Native American Religious Concerns	<p>Federal law protects Paumu as a sacred site, and the Government must not impose a substantial burden on the Tribe's use of the site in its natural state. Federal law imposes protections for the Tribe's religious expression, which BLM does not appear to take into account. BLM has a legal obligation to avoid such impacts to the Tribe's religious expression. The American Indian Freedom Restoration Act, 42 U.S.C. § 1996, states that: it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. This statement makes clear that indigenous beliefs, including the Tribe's view of the Dixie Meadows hot springs, deserve full legal recognition and protection. The Tribe has an "inherent right of freedom" to "worship through ceremonials and traditional rites" at the hot springs. Id. In the related Religious Freedom Restoration Act, Congress codified Constitutional jurisprudence by expressly finding that "governments should not substantially burden religious exercise without compelling justification." 42 U.S.C. § 2000bb(a)(3). The Act then provides that "Government shall not substantially burden a person's exercise of religion even if the burden results from a rule of general applicability," unless the Government demonstrates that "application of the burden to the person-(1) is in furtherance of a compelling governmental interest; and (2) is the least restrictive means of furthering that compelling governmental interest." 42 U.S.C. § 2000bb-1(b). An affected person may bring suit against the government for appropriate relief, which may include injunctive relief and money damages. 42 U.S.C. § 2000bb-1(c). The United States Supreme Court has recently confirmed that the</p>	<p>The American Indian Religious Freedom Act requires federal agencies to consider, but not necessarily to defer to, Indian religious values; it does not prohibit agencies from adopting all land uses that conflict with traditional Indian religious beliefs or practices, rather, an agency undertaking a land use project will be in compliance with this section if, in the decision-making process, it obtains and considers views of Indian leaders and if, in project implementation, it avoids unnecessary interference with Indian religious practices. Please see the following cases: <i>Wilson v. Block</i>, C.A.D.C.1983, 708 F.2d 735, 228 U.S.App.D.C. 166; certiorari denied 104 S.Ct. 371, 464 U.S. 956, 78 L.Ed.2d 330; certiorari denied 104 S.Ct. 739, 464 U.S. 1056, 79 L.Ed.2d 197. AIRFA requires federal agencies to evaluate their policies and procedures with aim of protecting Indian religious freedom, to refrain from prohibiting access, possession and use of religious objects and performance of religious ceremonies, and to consult with Indian organizations in regard to proposed</p>

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		<p>Religious Freedom Restoration Act is fully enforceable, both against agencies and individuals. <i>Tanzin v. Tanvir</i>, 141 S. Ct. 486 (2020). In that case, officials faced money damages for placing individuals practicing the Muslim faith on a "no fly" list, thereby burdening the exercise of religion and causing harm to the individuals. As described by Mr. Ashley George in his interview, the Dixie Meadows hot springs, Paumu, is integral to the free expression of the Fallon Paiute-Shoshone Tribe's religion and spirituality. The construction and operation of the power plants, along with the tampering with geothermal fluid that is integral to the hot springs, substantially burdens the exercise of Tribal religion. These activities will directly diminish and potentially permanently harm the Tribe's ability to carry out its spiritual and cultural practices. Because the Tribe has established the substantial burden, it is incumbent upon the Government to demonstrate that approval of geothermal energy production in this highly sensitive location is a compelling government interest, and the proposal is the least restrictive-i.e., least impactful-means of meeting that interest. The proposal set forth in the EA falls well short of that burden. Meeting Ormat's financial interests is not a compelling governmental interest. To the extent production of renewable electricity generally presents a compelling interest, it is not apparent that production at this location is such an interest, or that location of two geothermal power plants directly adjacent to a sacred site is the least restrictive means of meeting that interest. Rather, the geothermal plant more closely approximates the most restrictive and harmful proposal possible. The Religious Freedom Act analysis is buttressed by Executive Order 13007. President Bill Clinton signed Executive Order 13007 with the purpose of protecting sacred sites, with a site defined as: any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site. Where such a site is identified, the agency must: to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. The Dixie Meadows hot springs is a sacred site under Executive Order 13007. The EA states that: "Dixie Hot Springs has been used by the FPST as a traditional ceremonial and healing place for well over 50 years. The FPST continue to use the hot springs for ceremonial and healing purposes. The FPST identify Dixie Hot Springs as a sacred locality and one which they consider important to maintaining Western Shoshone/Northern Paiute cultural beliefs and practices." EA</p>	<p>action. Please refer to case files: <i>Havasupai Tribe v. U.S.</i>, D.Ariz.1990, 752 F.Supp. 1471, affirmed 943 F.2d 32, certiorari denied 112 S.Ct. 1559, 503 U.S. 959, 118 L.Ed.2d 207.</p>

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		<p>at 3-117. BLM acknowledges both that the Tribe has identified the site as one of religious significance and that the agency recognizes the claim. Accordingly, BLM must accommodate both "access to" and "ceremonial use of" the springs. This involves not only the ability to get to the springs, but also to preserve the continued function of the springs and the surrounding environment, which is critical to the spiritual experience of the springs. Installation of two major power plants and associated infrastructure does not preserve ceremonial use of a sacred site. BLM must also avoid affecting the physical integrity of the springs. The physical integrity includes preservation of the surroundings, water quality, and water quantity. "In the Shadow of Fox Peak," notes that an earthquake and lowered temperatures caused Wuzzie George to greatly fear that development had angered natural spirits, to such an extent that she could hardly eat for a month. Fox Peak 179. It is not acceptable for BLM to approve significant risk of harm to the springs, with associated harm to the Tribe and its members, based on the hope that the springs might recover with implementation of a mitigation plan. The proposal set forth by Ormat does not comply with the Religious Freedom Restoration Act or Executive Order 13007. The Tribe respectfully requests that BLM deny the proposal.</p>	
Naval Air Station Fallon	Cooperating Agency relationships	<p>The Navy would appreciate coordination and communication during the entire construction project. The primary reason is to adequately notify flight crews of the various construction efforts and potential avoidance areas due to dust, obstacles, lighting, etc.</p>	<p>As per the conditions of approval, ORNI 32 is required to notify to the Navy prior to commencing project activities.</p>
Nevada Department of Transportation	Cultural Resources	<p>NDOT Cultural requests that it be included as a consulting party as identification and evaluation regarding the TCP status of the Dixie Meadows Hot Spring Site continue. NDOT Cultural requests that it be included as a consulting party on any treatment plans or agreement documents should an adverse effect be determined for the Dixie Meadows Hot Spring Site given the proximity of the site to Dixie Valley Road.</p>	<p>The Cultural Resources and Native American Religious Concerns sections of the EA have been revised to include updated determinations and resolutions of adverse effects to the Dixie Meadows Hot Springs site. A Historic Properties Treatment Plan will be created as a condition of a Memorandum of Agreement to Resolve Adverse Effects to the Dixie Meadows Springs Site. The Dixie Meadows Hot Springs site, and any infrastructure (e.g., fencing, displays) related to resolution of adverse effects to that site, are located on Navy-owned land.</p>

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Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 3 Page: 4 Section: Exec sum, final 1.0 Comment: "If more aggressive actions are necessary, mitigation measures have been identified and may include augmenting impacted springs with geothermal fluids or fresh water at a quality and quantity sufficient to restore pre-production temperature, flow, stage, and water chemistry." Should also include temporary or permanent shut down of geothermal aquifer utilization here.	Refer to Section 10.9.1 in the ARMMP for Adaptive Management and Mitigation Measures. Specifically, the requirement for temporary cessation of pumping and/or injection at site-specific well locations until maintenance of pre-operation conditions is achieved.
Nevada Division of Water Resources	Water Rights	Any transfer of water rights may be submitted to the State Engineers office as per NRS 533.384. The State Engineer is authorized and is responsible for maintaining water right files and accompanying documents as per NRS Chapters 111, 240, 375, 532, 533 and 534. No use of any water required in support of this project, from any source, is allowed without the benefit of a permit or waiver issued by the Nevada Division of Water Resources.	Comment noted.
U.S. Fish and Wildlife Service	Sensitive Aquatic Species	Pg. 3-70, Paragraph 1 The springsnails collected during the 2020 surveys should be submitted to a genetics lab for proper identification. Furthermore, the Service recommends that the results from all the various spring surveys are submitted to the Spring Steward Institute for inclusion in the statewide database described in the Utah - Nevada Springsnail Conservation Agreement for which the BLM is a signatory.	Thank you for your recommendation. As the BLM works with the technical working group, genetic testing would be a consideration.
	Aquatic Resources Monitoring and Mitigation Plan	I propose that real-time monitoring of spring discharge rates, groundwater supply and recharge, water conductivity, surface and geothermal water temperatures should be insisted upon prior to any expansion of exploitation. I also propose that sampling for Dixie Valley toad distribution and abundance occur more often than the proposed twice annually with concurrent sampling for Bd, the fungus that causes the potentially deadly disease chytridiomycosis. Two staggered site monitoring efforts should be completed each Spring and Fall to fully capture any potentially detrimental effects of the proposed geothermal expansion. We must err on the side of caution in order to ensure the survival of this unique animal that is totally reliant on the uninterrupted and unaltered flow of the geothermal springs in Dixie Valley.	The degree of monitoring could be increased or decreased in accordance with the ARMMP and subsequent iterations of the ARMMP as adapted in accordance with monitoring results.
Center For Biological Diversity	Aquatic Resources Monitoring and Mitigation Plan	Lack of Adequate Information About the Proposed Action, A Lack of Baseline Data, and A High Degree of Uncertainty The results of the pump tests presented in the ARMMP indicate a high degree of uncertainty about the flow paths at Dixie Meadows, and thus call into question the assertions of certainty the ARMMP makes about its hydrogeologic characterization of the site. As Dr. Myers states, "The variable response rates at monitoring wells and springs indicate the connections vary and that some monitoring points farther from the source of pumping could respond quicker than nearby points; travel time for impacts is variable... There are many uncertainties in the understanding of the connections and sources of flow to the	The ARMMP (Appendix H) has been revised. Cool springs at USGS 101 were monitored and showed no responses. Additional text regarding flow testing has been added to Section 9.4, including temperature plots. The "guidance document" is a draft ARMMP outline prepared by the BLM that provided direction on how to begin the development of the ARMMP.

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		<p>geothermal springs and the rate that changes due to pumping propagate through the connections."38 Dr. Myers emphasizes that the uncertainty inherent in the limited data and analysis provided in the ARMMP indicate that the plan itself is unsubstantiated by evidence and not able to be fully evaluated: "The pump tests and lack of detailed mapping of faults that McGinnis relies on for the conceptual model and monitoring/mitigation plan together are evidence that this proposal and EA is much too premature and not ready for development without substantial harm to the spring/wetland resources. Due to the variable rates of flow and propagation through the faults, there is not sufficient confidence that a monitoring well can detect changes soon enough to predict changes in flow, or temperature, at springs."39 38 Attachment A, p. 5. 39 Attachment A, p. 7. Part of the reason for the uncertainty of impacts is that the proposed action has not even yet been fully fleshed out in the ARMMP. Per page 2-14 of the RDEA: "A detailed geothermal drilling program would be submitted to the BLM or Navy, as appropriate, for review and approval prior to beginning drilling operations." While the RDEA lays out a conceptual drilling program, it does not specify where the drilling would take place, especially relative to sensitive hydrologic resources, nor does it have details on the specifics of the proposed wells. It is impossible to properly evaluate the impacts of the proposed action when so much of the specifics will be determined at a future date, outside of the ability of the public to scrutinize it. It would be premature for BLM to issue a FONSI with such a glaring lack of important information. The Navy in particular took exception with this lack of a detailed drilling, pumping, and reinjection plan. Referring to section 8.6 of the ARMMP, the Navy states, "There is an indication that there is a program that needs to be developed in regards to the injection and maintenance of the water equilibrium/balance of the springs and shallow aquifer systems. Why this has not be developed yet? When will we expect this be developed? The water equilibrium has a huge influence on the riparian and wetland environments as well as the Dixie Valley Toad and Spring snails. How will the water being reintroduced be treated to meet the same qualities (pH, ions, temperature, chemicals, etc.) of the water that is being taken out?"40 Yet no substantive changes were made to the RDEA or ARMMP to address these concerns. 40 Attachment D, p. 3. Similarly, FWS had the same concern about the production and injection plan: "So the production and injection plan hasn't been developed yet and the only high feasible mitigation measure (Table 18) determined so far is to reinject geothermal fluid by surface discharge, rapid infiltration basins, or shallow injection wells. Perhaps more flow testing is prudent to try and figure out the best locations for production and injection wells. This will also enhance our knowledge regarding the impact on temperature after reinjection and any lag times which will be important to identify to know how long a minimizing</p>	

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		<p>measure will take to become effective."41 Ormat's response was that the plan would be forthcoming upon completion of additional exploratory drilling and flow/injection tests, clearly signifying that this ARMMP/RDEA does not yet have full information upon which to base its conclusions or upon which BLM can rely for justifying a FONSI. 41 Attachment F, p. 2. Beyond a lack of information about the proposed action and mitigation measures, there is not even substantial baseline information regarding the DVT upon which to base such measures. Baseline information is requisite in order to properly inform an environmental impacts analysis. "In analyzing the affected environment, NEPA requires the agency to set forth the baseline conditions."42 "The concept of a baseline against which to compare predictions of the effects of the proposed action and reasonable alternatives is critical to the NEPA process." "[O]nce a project begins, the pre-project environment becomes a thing of the past and evaluation of the project's effect becomes simply impossible."43 "[W]ithout [baseline] data, an agency cannot carefully consider information about significant environment impacts. Thus, the agency fail[s] to consider an important aspect of the problem, resulting in an arbitrary and capricious decision."44 42 Western Watersheds Project v. BLM, 552 F.Supp.2d 1113, 1126 (D. Nev. 2008). 43 Northern Plains v. Surf. Transp. Brd., 668 F.3d 1067, 1083 (9th Cir. 2011). 44 Id. at 1085. The lack of baseline information means that this RDEA and the project are not yet ready to be fully evaluated by the agencies or the public. NDOW states: "The baseline distribution and population analysis are ongoing, it is not known how many seasons will be needed to establish the baseline at this time. The cooperating agencies will need to review current and historical data after a baseline has been established before triggers for corrective action can be determined. This may not be feasible to complete before 2022."45 45 Attachment C, p. 2. Indeed, the RDEA acknowledges this at 3-86: "specific benchmarks and thresholds associated with objectives for Dixie Valley toad and springsnail habitat have not yet been identified." This is a glaring deficiency in the RDEA and renders the mitigation measures effectively meaningless, since Ormat and BLM would have no idea what targets they would be seeking to achieve with the mitigation. Again in a forthright manner, the RDEA acknowledges this as well at 3-86: "Therefore, current uncertainty in these thresholds could lead to adverse impacts in the case that geothermal utilization adversely affects wetland habitat conditions." So little is known about the DVT that it is impossible to properly evaluate the impacts of the proposed action. The RDEA states that, "There is a high likelihood that toads use terrestrial habitat near breeding habitat in Dixie Meadows... toads may use terrestrial habitat to forage. They may use rodent burrows for overwintering or thermal refuge during high temperatures."46 However the proposed action would impact and destroy basically the entirety of the</p>	

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		<p>terrestrial habitat adjacent to Dixie Meadows. The solution proposed by the RDEA is to simply fence off the project area. While this may prevent the direct loss of DVTs in the project area, it will also cut off the toads from important habitat for foraging or thermal refuge. How will the loss of this habitat affect the toad's life cycle? The RDEA fails to disclose and analyze the impacts of fencing off the project area and barring toads from terrestrial habitat, at least partially because the toad's actual use of such habitat is mostly speculative at this time. Until a full study of the toad's distribution and life cycle can be completed, the lack of information about the toad renders the analysis in the RDEA unlawfully incomplete. 46 RDEA at 3-83. The problems of baseline data being non-existent are compounded by the lack of available control sites for ongoing monitoring. Control sites, by their very nature, must be fairly certain not to experience the effects being monitored for. The ARMMP describes control sites (quoting the Guidance Document)⁴⁷ as "within the same or similar hydrologic or hydrogeologic conditions as the project area,' but are 'outside the influence of project operations,' which are established to 'monitor natural and seasonal variations of water resources' and 'to ensure potential impacts to water and aquatic resources that may be influenced by project operations are adequately captured.'" However, it is likely that, given the enormous volumes of water being circulated through the geothermal power plants, all springs at Dixie Meadows will be to some degree affected by the proposed action. There is no way of knowing whether or not the selected control sites will actually function as controls, but the ARMMP is relying on them for baseline data moving forward. This is a substantial problem which will call into question the validity of determinations made from ongoing monitoring and comparisons to controls. 47 ARMMP, p. 38. See section 8 below for more on the Guidance Document. The Navy had significant concerns with the ARMMP about the level of uncertainty and lack of specificity which were not addressed in subsequent revisions: "NAS Fallon has reviewed and finds the draft aquatic resource monitoring and mitigation plan to be inadequate and incomplete. Having a baseline is a good starting point but the project needs to go further in proposing mitigation measures and long-term monitoring. The NASF staff is concerned about the general lack of information on the biological monitoring plan, designation of triggers for mitigation for the Dixie Valley Toad and Springs Snails, proposed mitigation actions for these species and long term monitoring for the species and environment."⁴⁸ It is inappropriate to issue a FONSI based on the information presented in the RDEA and ARMMP. The Navy concurs with this assessment: "NASF requests either a fully developed mitigation plan (including thresholds and responses and long term monitoring) be in place prior to issuing a FONSI or a commitment from ORMAT to</p>	

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		be responsible for negative affects stemming from issues from the geothermal development."49	
Fallon Paiute-Shoshone Tribe	Groundwater	The Proposal Threatens Water Quantity and Quality. The EA describes Dixie Valley as a closed basin with relatively limited groundwater. Groundwater resources are already over-appropriated. EA 3-15 to 16. The EA makes conflicting assertions that geothermal water use is non-consumptive and unrelated to groundwater, EA 3-16, and that significant interchange between geothermal fluid and aquifers occurs in Dixie Valley, EA 3-18. The proposal also relies on significant water during construction and for potential mitigation efforts. As conceded in the EA, the basin is fully appropriated and construction would require 17.6 af for construction, and 2.5-3 af/year for operations. EA 3-29. The EA inappropriately characterizes these exceedances as minor relative to the entire basin. In fact, water use is cumulative, and any individual use must be considered as part of a cumulative exceedance imposing significant harm over time. The proposed decades of operations would contribute to significant loss of groundwater.	The analysis in Section 3.3.2 of the EA has been revised to clarify the nature and types of impacts relative to water quantity.
Naval Air Station Fallon	Geothermal Resources	Pg. 2-6 Row: Drilling Some General Questions Related to Drilling 1. Will Plug tests be conducted? 2. Will dye testing be conducted? 3. If the testing identified above is conducted will that information from those tests be shared? 4. Will directional drilling be used? If so will that occur under Navy Fee Lands?	The Utilization Plan and EA (see Chapter 2) have been substantially revised to clarify the proposed action. Commenter's items listed that are not in the proposed action will not be conducted, unless specifically required by the BLM.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 4 Page: 6 Section: Lease Area Project Information Final 3.2.1 Comment: "All geothermal exploration activities would occur within the Project Area, including any disturbance necessary for construction and drilling operations. The Project Area is approximately 970 acres in size and consists of a 20-acre block centered on each proposed well pad location, a 10-acre area at the existing and proposed mineral material sites, and a 400-foot-wide corridor centered on all proposed access roads. The entire Project Area would not be disturbed; instead, only the areas where the existing and proposed gravel sources would be expanded or constructed and those areas ultimately developed with a well pad and associated access roads would be disturbed." This is unclear, is the entire 970 acres permitted for disturbance however only what is needed will be disturbed? If Ormat determines that the entire 970 acres is needed and disturbed, would there be additional NEPA required? It may be helpful to clarify temporary and permanent disturbance acres here.	The acres permitted for surface disturbance is what would be disturbed within the project area. Refer to Tables 4 and 6 in the EA for the areas of disturbance associated with the Proposed Action and Alternative I, respectively.

Commenter	Comment Code	Comment	BLM Response
Nevada Division of Water Resources	Groundwater	Wells and Boreholes Water wells must be permitted, Monitor wells require a Waiver from the State Engineer's Office, and boreholes must be plugged within sixty (60) days after being drilled as required by NAC 534.4371. For the plugging of boreholes, all boreholes require a 20-foot surface plug by placing concrete grout, cement grout or neat cement from 20 feet below the surface to the surface, in addition to all other plugging requirements mandated by NAC 534.4371. Any drillholes (water or monitor wells or boreholes) that may be located on either acquired or transferred lands are ultimately the responsibility of the owner of the property and must be plugged and abandoned as required in Chapter 534 of the Nevada Administrative Code. If artesian water is encountered in any well or borehole it shall be controlled as required in NRS § 534.060(3). Abandoned wells need to be reported to the State Engineer's Office and must be plugged as required in NAC Chapter 534. Orphaned wells must be plugged and abandoned as required in NAC Chapter 534. A waiver for the use of groundwater from a new or existing water well may be allowed for the exploration phase, which may include drill pad construction, dust control/road work, oil and gas well and test well construction, and miscellaneous uses associated with this phase; however, a water right permit is required for any subsequent use of water beyond the exploration phase including, but not limited to, water used for the hydraulic fracturing process during the oil and gas well development stage. Construction and abandonment of any well, monitoring well, borehole, instrumentation borehole, or any other type of borehole, including but not limited to any "shot" holes, must comply with the provisions of Nevada Administrative Code (NAC) Chapter 534 (Regulations for Water Well and Related Drilling). All water sources used for exploration drilling, dust control, road construction, or for any other purpose must be permitted by the State Engineer.	Table 3 in the EA states that the proponent will follow "permitting pursuant to Nevada Revised Statutes Chapters 533 and 534."
U.S. Fish and Wildlife Service	Sensitive Aquatic Species	Pg. 3-71, Paragraph 3 The main threat described in the petition for listing was geothermal development, the very project being proposed in this EA.	Comment noted.
Center For Biological Diversity	Aquatic Resources Monitoring and Mitigation Plan	High Likelihood of Substantial Impacts to Spring Discharge and Mitigation Measures Are Not Clear or Likely to Mitigate Impacts In a substantial change from the 2017 DEA, BLM and Ormat now acknowledge that substantial impacts to the springs at Dixie Meadows are possible from development of the DMGUP. "Given the proximity of geothermal development to thermal seeps and springs in Dixie Meadows, avoidance of all potential effects may not be feasible."50 Furthermore, the RDEA now acknowledges that mitigation may not even be effective to ameliorating the impacts from the project: "...since there may be a time lag between detectable and maximum effects in surface expression, particularly in larger systems, maximum impacts can be larger than those observed when withdrawal is halted. Once halted,	The ARMMP has been revised. Cool springs at USGS 101 were monitored and showed no responses. Additional text regarding flow testing added to Section 9.4, including temperature plots in Appendix H.

Commenter	Comment Code	Comment	BLM Response
		<p>the recovery to the pre-pumping state may occur slowly. This effect may be minimized-but it may not be completely avoided-by monitoring and mitigation measures."51 51 RDEA at 3-29, internal citation omitted. Dr. Myers analyzed the results of the pump tests provided in the ARMMP. The pump tests clearly indicate that spring discharge at Dixie Meadows will be heavily affected by geothermal production there. As Dr. Myers states, "Spring NDOWSS-1 experienced water level and temperature increases at the cessation of pumping (ARMMP, p 33). The pumping likely decreased the upward geothermal flow to shallow groundwater or directly to the spring and its cessation allowed a quick recovery. Either way, this hydrologic connection between bedrock and shallow groundwater demonstrate that springs will be negatively impacted during any production of this geothermal reserve."52 52 Attachment A, p. 5. Furthermore, it is not just the immediate Dixie Hot Springs which would be affected. Dr. Myers notes, "Spring NDOWSS-1 lies close to the Piedmont fault northeast of the pumping well. Pumping could intercept flow whether the pathway to the surface is the east-northeast trending faults emanating from the fans or the Piedmont fault. The substantive pressure changes in well 42-8, far east of the well, indicate that pressure changes propagate at depth. The changes at well 22-8B indicates pressure changes propagate to the surface or that flow to the surface is intercepted near the pumping well. This suggests there are many pathways and no substantial barriers to the flow."53 This further calls into question the control sites described above in Section 4. 53 Attachment A, p. 5. NDOW emphasizes the importance of the thermal regime of the spring discharge to the Dixie Valley toad, and expressed concern that the mitigation plan did not adequately address how augmentation water would mimic natural temperatures in the flow regime: "Mitigation for cooling of hot springs is missing. Research suggest DVT use warm and hot water during different life stages and seasons for various strategies."54 54 Attachment C, p. 3. The benchmarks and thresholds established in the ARMMP are arbitrary and no evidence for their scientific basis is provided. For instance, there is an objective in ARMMP 9.8.1 for maintaining surface water flow within +/- 10% or +/- 15gpm/20mm, whichever is less, "outside the natural range of baseline conditions" for 90% of tier-1 monitoring sites. Similar objectives exist for temperature (+/- 10% or +/- 10°F, whichever is less) for all tier-1 monitoring sites; and for field parameters (pH, etc.) (+/- 10%) for 85% of tier-1 monitoring sites. However, the ARMMP and the RDEA provide no analysis of the effect of such changes, and whether exceedance of such thresholds would have a deleterious effect on DVT and other focal resources or not. It could be that the requisite values are +/- 5%, or it could be +/- 15%. Without scientific evidence for the basis of these thresholds, there is no way to evaluate whether or not maintaining water characteristics within those parameters will</p>	

Commenter	Comment Code	Comment	BLM Response
		<p>prevent impacts to the DVT. The thresholds get even worse in 9.8.2 when the ARMMP considers the DVT itself. First, it must be pointed out that there literally exists no baseline data for the DVT, as admitted in the ARMMP, so coming up with thresholds is a completely arbitrary exercise. The primary objective for the toad's population is to maintain greater than 80% of toad populations in 85% of toad monitoring areas. However, this threshold gives equal weight to all monitoring areas. Since we know that toads would tend to be concentrated within higher quality patches of habitat, there's the potential for the complete loss (100%) of toads in the 15% of monitoring areas which harbor the most toads while still maintaining populations within the threshold parameters. Given that there is not even baseline data to understand where the toads are, this is clearly unacceptable. There is also a significant issue with the temperature thresholds in 9.8.2. For some reason, the ARMMP switches from Fahrenheit to Centigrade for these thresholds, allowing for +/- 2°C "outside the natural range of Dixie Valley toad thermal tolerance (as defined by the range of temperatures measured during population/HQI surveys at Dixie Meadows) at 85% of Dixie Valley toad occupied springs." This threshold is problematic for a number of reasons. First, the toads do not live at springs, they live in the wetlands created by springs. Second, BLM has no idea what the thermal tolerance of the DVT as defined here is, since there is zero baseline data about it. Third, the reason that Dixie Meadows is able to harbor a population of endemic toads despite being in the coldest desert in North America is precisely because it is a hot spring. That 2 degrees centigrade could be the different between habitat completely freezing over in the winter or remaining open. Finally, as was stated by USGS above, the toad has different stages of its life cycle dependent on different types of habitat and presumably different water temperatures across those different habitat types. This threshold is far too arbitrary to properly capture the range of variation the toad needs for its life cycle. There is also the question of response time once changes are detected. While some of the monitoring points have continuous monitoring instrumentation, as described in ARMMP 9.1.5 and 9.2.4, data download of surface and groundwater monitoring data would only occur monthly. Then there is a hierarchy of response times: Code A, B, and C, which dictate the length of time between impacts detection and a "discussion" about mitigation.⁵⁵ This suggests that there could be a period of time as long as one month plus ten days, so forty days, between the onset of deleterious impacts to surface water conditions and the biota that rely on them and the initiation of a discussion about mitigation. ⁵⁵ ARMMP, p. 56-57. Per comments obtained through FOIA, the USGS's Brian Halstead said (paraphrased in meeting notes), "toads very sensitive to water availability and temperature- example of adaptive management would have to happen</p>	

Commenter	Comment Code	Comment	BLM Response
		<p>fast in some cases- ie. If the water temperature gets to cold, to avoid a mass mortality event, would have to be corrected in hours, not months."56 56 Attachment E. The mitigation measures proposed are outlined in 9.9.1 of the ARMMP. The primary mitigation measure is to "provid[e] geothermal fluids to the affected hot springs of a quality and quantity to approximate the pre-production temperature; flow, stage or equivalent; and basic thermal water chemistry of the hot springs."57 Other mitigation techniques proposed include modifying the volume or pressure of geothermal production or injection from various wells, relocating injection wells, drilling new wells, installing pipelines to deliver water to springheads, and related techniques.58 The fundamental thrust of these mitigation techniques is to move water around the site in order to mimic the pre-disturbance flow regime, temperature, and geochemistry. Generally, this is called "replacement water," also known as augmentation, and as described below in Section 7, this is a highly controversial technique. 57 ARMMP, p. 59. 58 ARMMP, p. 60. No information is provided about how Ormat would go about mimicking the flow rate, temperature, and geochemical composition of the original flow regime at the springs. It's highly unlikely that geothermal water pumped from depth would be of a similar makeup to baseline surficial expression water - would Ormat have an onsite lab where constituent geochemical elements are added or subtracted from the replacement water? How would hot and cold water be blended to mimic the original temperatures? Without a forthright description and analysis of the implementation of these mitigation measures, the ARMMP is lacking and it is impossible to evaluate the potential or lack thereof for the measures' efficacy. There is also skepticism about the ability of such measures to actually mitigate impacts. Dr. Myers states: "Other measures involve changing the production or injection volumes or locations/depths which would be a trial-and-error process. The EA does not analyze how difficult this could be without a detailed model of the reservoir. A model would be available only after substantial testing. These low feasibility measures should not be considered adequate for protecting the hydrologic resources which are necessary to protect the biodiversity of the meadows."59 Dr. Myers provides further critiques of the proposed mitigation measures in Attachment A. 59 Attachment A, p. 8-9. As a backstop, the ARMMP offers the ultimate mitigation measure: "Any other measure as directed by the BLM... which... may include shutting down the operation."60 After Ormat expends tens or hundreds of millions of dollars constructing the DMGUP, it is completely unreasonable to think that the project would ever be shut down, no matter the severity of the environmental impacts. Putting this mitigation measure into the ARMMP provides a false sense of assurance that the DVT and other sensitive biota would be saved from destruction if impacts were unmitigable. 60 ARMMP, p. 60.</p>	

Commenter	Comment Code	Comment	BLM Response
		<p>Indeed, there were concerns expressed by the Navy about how water augmentation would match the natural discharge parameters. "This draft plan points to a singular method of mitigation to respond to hydrological or wetland habitat changes: water augmentation of affected springs to regain their pre-production conditions. However, this plan does not address which water sources would be used, or how the hydrology, chemistry, and temperatures of the Dixie Meadows spring complexes would be achieved and sustained." The subsequent revisions to the ARMMP fail to address these questions. NDOW concerned that the project is moving too fast and there is not enough information about the mitigation methods: "The matrix which will need to be developed for the specific monitoring and mitigation strategies with quantitative data which incorporates established baseline information may take longer than a year and half." Ormat has no real answer for this, only responding that "Thresholds and triggers will be adjusted as additional data is collected." Furthermore, referring to the list of potential impacts to the Dixie Valley toad, NDOW said, "These may not be acceptable impacts; mitigation may not be suitable."61 61 Attachment C, p. 2.</p>	
Fallon Paiute-Shoshone Tribe	Surface water	<p>The EA also asserts that "surface water resources in Dixie Meadows appear to be isolated from any waters of the US (as defined in 40 CFR 230.3); therefore, there appear to be no jurisdictional waters within the project area." EA 3-24 to 25. This assertion appears unfounded. The referenced regulation refers to the definition set forth at 40 CFR § 120.2. Under 40 CFR §120.2(1)(i), waters that are "navigable in fact" are considered waters of the United States. This definition of "navigable-in-fact" comes from a long line of cases originating with <i>The Daniel Ball</i>, 77 U.S. 557 (1870). In <i>Daniel Ball</i>, the Supreme Court stated: "Those rivers must be regarded as public navigable rivers in law which are navigable in fact. And they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water." 77 U.S. at 563. In <i>The Montello</i>, the Supreme Court clarified that "customary modes of trade and travel on water" encompasses more than just navigation by larger vessels: The capability of use by the public for purposes of transportation and commerce affords the true criterion of the navigability of a river, rather than the extent and manner of that use. If it be capable in its natural state of being used for purposes of commerce, no matter in what mode the commerce may be conducted, it is navigable in fact, and becomes in law a public river or highway. <i>The Montello</i>, 87 U.S. 430, 441-42 (1874). In that case, the Court held that early fur trading using canoes sufficiently showed that the Fox River was a navigable water of the United States. Based on these tests, bodies of water such as the Great Salt Lake constitute "waters of the United States," even where they are</p>	<p>ORNI 32 would be required to obtain the appropriate discharge and stormwater construction permits, and spill prevention control and counter measures (SPCC) permits.</p>

Commenter	Comment Code	Comment	BLM Response
		terminal bodies located wholly within one state. The surface water in Dixie Meadows likely constitutes jurisdictional waters because it is generally present year-round and is both historically and currently subject to commerce, such as recreational boating for birding and other uses. BLM's analysis fails to assess whether the waters in the project area are jurisdictional waters, and thus is inadequate. The Tribe requests a jurisdictional determination and analysis. If the surface waters are jurisdictional waters, Ormat must obtain associated discharge and stormwater construction permits, and the EA must take into account these impacts.	
Naval Air Station Fallon	Range of Alternatives	Pg. 2-14 Row: Geothermal Well Drilling and Testing Line 2: Who defines "appropriate"	Change made; text revised for clarity.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 5 Page: 6 Section: 3.2 Comment: "Construction and operation of up to two 30-MW net rated geothermal power plant facilities and associates electrical substations;" Please clarify, that Phase I includes one 30 -MW geothermal power plant, when it is determined by the technical working groups that the first 30-MW plant can operate without harm to the associated environmental resources then the phase 2 plant could be considered.	The ARMMP in Section 3 states that: "The proposed monitoring network has been developed primarily in response to the proposed Phase I geothermal powerplant development, and in concert with the adaptive management approach, and may be modified or expanded to meet monitoring objectives for a subsequent Phase 2, or implementation of alternatives for geothermal reservoir development, subject to BLM approval."
U.S. Fish and Wildlife Service	Sensitive Aquatic Species	Pg. 3-85, Paragraph 4 "The project could indirectly affect the DVT and its habitat..." We recommend this this language is changed to state, "directly and indirectly" affect the DVT and its habitat	Change made; text revised.
Center For Biological Diversity	Cumulative impacts	Inadequate Cumulative Impacts Analysis NEPA requires a cumulative impacts analysis, to encompass "all past, present, and foreseeable future actions, regardless of who performs the action, that combine with the proposed action to cause an incremental environmental impact." Nw. Env'tl. Def. Ctr. v. Nat'l Marine Fisheries Serv., 647 F. Supp. 2d 1221, 1247 (D. Or. 2009). A cumulative impact is: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.7. "A cumulative impact analysis must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects." N. Plains Res. Council, Inc. v. Surface Transp. Bd., 668 F.3d 1067, 1076 (9th Cir. 2011) (internal quotation and citation omitted). "To be useful to decision makers and the public, the	The cumulative impact analysis in the EA (see Chapter 4) has been revised to include the Comstock geothermal project.

Commenter	Comment Code	Comment	BLM Response
		<p>cumulative impact analysis must include some quantified or detailed information; . . . general statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." Id. (internal quotation and citations omitted). "Superficial analysis" and "vague generalities" alone are insufficient to satisfy the obligation to assess cumulative impacts under NEPA. Center for Environmental Law and Policy v. U.S. Bureau of Reclamation, 655 F.3d 1000, 1008 (9th Cir. 2011). The RDEA clearly fails to meet these standards. Primarily because it fails to accurately disclose and analyze the potential for cumulative impacts to water resources and sensitive species from other geothermal development in Dixie Valley. In particular, less than five miles north of Dixie Meadows, Ormat is also engaged in geothermal exploration and development at the Comstock geothermal site. The cumulative impacts analysis duplicitously leaves out any mention of Comstock. It's entirely likely that the geothermal reservoir being targeted in the Comstock exploration is one and the same with that being targeted at Dixie Meadows, and thus it's highly likely that there would be cumulative impacts from the development of both projects. It's unacceptable for BLM to simply wait until development proceeds at Comstock to evaluate cumulative impacts. This omission is all the more troublesome in that it was specifically brought up by FWS in their comments on the RDEA. To wit, "There is no mention of the Comstock facility being proposed just to the north of Dixie Meadows. Presumably both power plants will be accessing the same geothermal reservoir. Any ARMMP should incorporate monitoring and mitigation of both power plants since both can potentially impact the water resources and associated wetlands at Dixie Meadows. Would it not be prudent of the BLM to move cautiously in approval of these power plant projects such that we can understand the potential impacts to the thermal springs and associated wetlands given the unique set of organisms which only occur in this one location?"⁶² 62 Attachment F, p. 1. Another fairly obvious cumulative impact which BLM fails to disclose or analyze in the RDEA is the proposed Dixie Valley Groundwater Export Project. This is a proposal by Churchill County to export billions of gallons of groundwater from Dixie Valley through a pipeline to the Lahontan Valley to be used for agriculture or residential or industrial development in and around Fallon.⁶³ Churchill County has applied for over 50,000 acre feet of water rights and have been studying pumping and exporting between 10,000 and 15,000 acre feet of water per year. While these water rights have not yet been granted by the Division of Water Resources, and the project is still speculative at this time, pumping and exporting that amount of water would have significant and grave consequences on the overall water budget of Dixie Valley and likely on the springs at Dixie Meadows. BLM is remiss in not including this project in the cumulative impacts section of the RDEA.</p>	

Commenter	Comment Code	Comment	BLM Response
Fallon Paiute-Shoshone Tribe	Level of NEPA analysis (EA vs. EIS)	<p>The Proposal Creates Significant Impacts Under NEPA. Standing alone, the construction presents probable, significant adverse environmental impacts that necessitate preparation of an environmental impact statement (EIS). If the power plants and wells are built, Tribal members' experience of these activities will be severely burdened by industrial noise, view obstruction, and lighting. However, as detailed above, the extraction of geothermal fluids threatens the essence of the springs by removing their heat and water. Consideration of these effects must take into account that other springs Tribal members could potentially visit have already been degraded. The Dixie Meadows hot springs are not only the most important and sacred hot spring to the Tribe, they are one of the last remaining springs accessible to the Tribe. This context makes impacts to the springs particularly significant, because under NEPA the significance determination must take into account both context and intensity. 40 CFR § 1508.27. BLM appears to rely on the monitoring and mitigation plan and the existence of a programmatic EIS as potential basis for a finding of non-significant impact. Both of these documents are inadequate. The plan is untested and relies on the assumption that after impacts occur, adaptive management may be able to remedy these impacts. This approach ignores the fact that impacts to the spring of any duration would be devastating to the Tribe, and the significant possibility that impacts may in fact be permanent and irreparable. The combination of known harms to the Tribe and the environment and the risk of permanent closure of the springs necessitates a finding of significant impact, because "the possible effects on the human environment are highly uncertain or involve unique or unknown risks." 40 CFR § 1508.27(b). With respect to BLM's reliance on the PEIS, that document is now more than 12 years old, and has no site-specific analysis, so cannot take into account the specific spiritual and cultural significance of the Dixie Meadows hot springs to the Tribe and its members. For example, the PEIS has a best management practice of locating geothermal wells 500 feet away from springs. That protection provides no benefit here, where the wells have a hydrologic connection to the springs, and industrial infrastructure located more than 500 feet but still in very close proximity to a sacred site imposes significant harms. Finally, the alternatives analysis in the EA is inadequate because it only provides for differing transmission routes. This analysis does not address the primary impacts of the proposal, which are construction of powerplants and infrastructure, and extraction of geothermal fluid, near the Dixie Meadows hot springs. An adequate analysis would consider less impactful alternatives, such as a reduced footprint further from the springs.</p>	<p>Refer to Chapter 5 in the EA and Appendix K, Memorandum of Agreement for Resolution of Adverse Effects.</p>
Naval Air Station Fallon	Editorial Comments	Pg. 2-19, Second Paragraph Please define the terms disturbed land	A footnote definition has been added.

Commenter	Comment Code	Comment	BLM Response
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 6 Page: 7 Section: Lease Stipulations and conditions of Approval Comment: "Stipulations are included in the federal geothermal leases issued to or acquired by Ormat in the Dixie Meadows Unit Agreement. Most leases in the Study Area contain a stipulation to protect riparian areas and threatened, endangered, or other special status species and their habitats. The riparian area stipulation states that no surface occupancy or disturbance would be allowed within either 500 or 650 feet (horizontal measurement), depending on the lease, from any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains. This stipulation would protect the integrity of these resources, which would be delineated by the presence of riparian vegetation and not actual water. Exceptions may be considered on a case-by-case basis if the BLM determines at least one of the following conditions applies: -Additional development is proposed in an area where current development has shown no adverse impacts; -Suitable off-site mitigation would be provided if habitat loss is expected (i.e., replacement of resources that are of the same type as those being impacted, replacement of resources that are of equal or greater value to public lands as those being impacted, or payment of funds to the BLM or other appropriate organization for performance of mitigation that addresses impacts of the project); or, -The BLM determines development proposed under any plan of operations would ensure adequate protection of these resources." NDOW has reservations about making exceptions to stipulations attached to federal geothermal leases unless agreed to by FWS and NDOW.	Lease stipulations for No Surface Occupancy buffers for riparian areas are found in Table J-1 in Appendix J of the EA.
U.S. Fish and Wildlife Service	Sensitive Aquatic Species	Pg. 3-86, Paragraph I "Implementing the ARMMP...would allow any adverse impacts from geothermal production to be avoided, minimized and mitigated as needed." The Service question this statement as the ARMMP is still not fully completed there is no production/injection plan (which the ARMMP is going to rely on), and baseline information has not been completed.	Implementing the ARMMP (Appendix H), which includes extensive monitoring and subsequent adaptive management based on monitoring results would avoid, minimize, or mitigate adverse impacts. The EA has also been revised (see, for example, Sections 3.3, 3.8, and 3.9) to clarify that implementing the aquatic resources monitoring and mitigation measures in the ARMMP would avoid, minimize, or mitigate adverse impacts.
Center For Biological Diversity	Range of Alternatives	Lack of Alternatives The NEPA implementing regulations refer to the selection and review of alternatives as "the heart" of the environmental review. ⁶⁴ Comparison of the alternatives helps to "sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decision maker and the public." ⁶⁵ NEPA requires that a range of meaningful alternatives be explored in the environmental review process. ⁶⁶ The agency must "study, develop, and describe appropriate alternatives to	The EA, in Section 2.3, discusses the alternatives considered but eliminated from detailed analysis. Several alternatives related to the geothermal production element of the project, including the power generation site, generation technology, and well locations

Commenter	Comment Code	Comment	BLM Response
		<p>recommend courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."67 63 See a description of the project and further information in Exhibit 10: minutes from a July 13, 2016 special meeting of the Churchill County Board of County Commissioners receiving a presentation regarding the Dixie Valley Groundwater Export Study. 64 40 C.F.R. § 1502.14. 65 Id. 66 42 U.S.C. §§ 4332(C)(iii),(E). 67 42 U.S.C. § 4332(2)(E). BLM provides only two alternatives for the project to select from: the preferred alternative, with a gen-tie line running to the north, and a southern gen-tie alternative, with a differing alignment of the power line. While doing so gives the appearance of BLM selecting from alternatives, in fact they have avoided presenting substantive alternatives for comparison. The gen-tie line is not, in general, the source of controversy or unresolved conflicts regarding this project. The main area of contention is the geothermal power project, which is identical in each of the alternatives. BLM is under no particular obligation to permit geothermal power production in the most sensitive habitats in the desert - Ormat has numerous geothermal leases throughout Dixie Valley and across the state of Nevada. BLM could fulfill the need for the project at numerous locations without unduly burdening the project proponent. The mere fact that a geothermal reservoir exists at Dixie Meadows is not in and of itself a justification for pushing forward with a project with disastrous environmental impacts and no clear way to mitigate those impacts. BLM should re-do this NEPA document and evaluate clear alternatives which provide a basis for comparison of impacts to see if the same purpose and needs can be met while avoiding catastrophic environmental impacts on the DVT.</p>	<p>were considered. The BLM evaluated these alternatives but they were dismissed from detailed analysis for reasons such as they did not meet the purpose and need, were not in accordance with the lease stipulations, or because they were not technically feasible.</p>
Naval Air Station Fallon	Editorial Comments	Pg. 2-19, 3rd Paragraph What defines the distance between the placement of power poles	The distance is generally defined by topographic features and available locations for pole siting.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 7 Page: 8 Section: Lease stipulations and conditions of approval 3.4 Comment: "BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM approved activity that will contribute to a need to list such a species or their habitat" Does this include the two current 30-MW facilities analyzed here, or only future development proposals?	Lease stipulations apply to all authorized activities to the applicable lease(s).
U.S. Fish and Wildlife Service	Sensitive Aquatic Species	Pg. 3-89, Paragraph 1 "Therefore, current uncertainty in these thresholds could lead to adverse impacts in the case that geothermal utilization adversely affects wetland habitat conditions." We agree with this statement.	The EA has been revised to remove this statement with added clarification about monitoring and mitigation.

Commenter	Comment Code	Comment	BLM Response
Center For Biological Diversity	Level of NEPA analysis (EA vs. EIS)	<p>An Environmental Impact Statement Is Required BLM has unlawfully decided to proceed with an Environmental Assessment for this project despite the obvious and significant impacts which the project will entail and the lack of comprehensive and certain mitigation measures to ameliorate those impacts. Preparation of an EIS is required for Federal actions "significantly affecting the quality of the human environment..."68 40 CFR §1508.27 instructs agencies to consider both the context and intensity of potential impacts from a project when determining if those impacts may be significant or not. The same section in the CFR provides ten criteria upon which agencies must evaluate the intensity of impacts in determining significance. The presence of any one of these factors "should result in an agency decision to prepare an EIS.69 68 42 USC §4332 69 Pub. Serv. Co. v. Andrus, 825 F. Supp. 1483, 1495 (D. Idaho 1993); see also Nat'l Audubon Soc'y v. Hoffman, 132 F.3d 7, 18 (2d Cir. 1997). For decisions on whether or not to prepare an EIS, NEPA requires the BLM to take a "hard look" at the consequences of its actions, to base its decision on a consideration of relevant factors, and to provide a "convincing statement of reasons to explain why a project's impacts are insignificant."70 Because the DMGUP will "significantly affect" the environment, NEPA's EIS requirement is triggered. Multiple "significance" factors are present which contribute to this conclusion, although the presence of even one of these factors is enough to trigger the need for an EIS.71 40 CFR §1508.27(3): Unique characteristics of the geographic area such as... wetlands... or ecologically critical areas. The Project's impacts clearly meet this criterion for intensity and significance. The geographic setting of Dixie Meadows is utterly unique in the desert - a series of thermal springs giving rise to a lush perennial wetland home to unique, endemic, and possibly endangered species. While springs are relatively common in the Nevada desert, the biological richness of the ecosystem at Dixie Meadows is almost unparalleled across the desert, and thus would qualify as unique. 70 Native Ecosystems Council v. U.S. Forest Service, 428 F.3d 1233, 1239 (9th Cir. 2005). 71 Appellants are not required to prove that these significant effects will in fact occur, rather appellants only have to raise "substantial questions whether a project may have a significant effect" on the environment. Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208 (9th Cir. 1998). 40 CFR §1508.27(4): The degree to which the effects on the quality of the human environment are likely to be highly controversial. As outlined in this letter and in Exhibit I, federal and state agencies, including wildlife and water management agencies, have expressed grave concerns about the Project and its impact to DMSC and the DVT. Over 1,000 members and supporters of the Center wrote to BLM to express their concern about the Project's impacts on the DVT in 2017 and in 2021. And the FPST has expressed serious concerns about the Project's impacts to their cultural and spiritual</p>	<p>Following the NEPA process, the BLM determined a FONSI could be reached due to the addition of the ARMMP (Appendix H) which is an adaptive monitoring and mitigative tool. A FONSI was also reached with the tribe's concerns and with signing of the MOA (see Appendix K).</p>

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		<p>heritage. In short, the project has become highly controversial. Moreover, there is significant scientific controversy over the project. As displayed by in particular the comments from FWS in Attachment B and Dr. Tom Myers in Attachment A, the scientific community disputes the findings of BLM that the ARMMP adequately discloses, analyzes, and mitigates the impacts of the proposed action. Courts have found that "The term 'controversial' refers 'to cases where a substantial dispute exists as to the size, nature, or effect of the major federal action rather than to the existence of opposition to a use.'"⁷² As revealed by the attachments to this letter, there is a substantial dispute as to the effect of the proposed action, and thus this significance factor applies. ⁷² Foundation for North Am. Wild Sheep v. U.S., 681 F.2d 1172 (9th Cir. 1982), citing Rucker v. Willis, 484 F.2d 158, 162 (4th Cir. 1973). 40 CFR §1508.27(5): The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. As outlined throughout this comment letter, there is a great deal of uncertainty regarding the impacts of the project and the efficacy of the sparsely described mitigation measures. There is a high degree of uncertainty as to the hydrogeologic setting of Dixie Meadows, the interconnectivity between the geothermal and basin-fill aquifers, and the effects of pumping and reinjection on groundwater discharge at Dixie Meadows. If BLM and the project proponent insist on proceeding with the Project, they are obliged to complete an EIS in which they conclusively prove beyond a reasonable doubt that the project will not affect spring discharge at Dixie Meadows, will not affect the DVT, and will not affect the cultural and spiritual heritage of the FPST. As evidenced by the Attachments to this letter, other agencies and scientists do not currently think the proposed action meets those thresholds. 40 CFR §1508.27(6): The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. The ARMMP would be precedent setting, in allowing a project proponent to substantially alter the flow, temperature, and geochemical composition of a spring system and then to "mitigate" such impacts through the use of replacement water. Replacement water is a highly controversial technique. For instance, in 2019, the Nevada Division of Water Resources put forward state legislation to enshrine mitigation plans which would include replacement water. This legislation engendered significant pushback from all sides of the conservation world, ranging from the Great Basin Water Network⁷³ to the Nature Conservancy.⁷⁴ If BLM were to authorize the proposed action and ARMMP, it could potentially set a precedent where future developments on public land, be they geothermal energy or otherwise, could be permitted to substantially alter or destroy natural spring flow regimes so long as such impacts were "mitigated" with replacement water. Such a precedent needs the full</p>	

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		<p>analysis of an EIS to determine if it is acceptable and in comportment with applicable statute. 73 https://thenevadaindependent.com/article/state-engineer-proposes-legislation-to-update-nevada-water-law-reviving-a-debate-over-mitigation-and-the-las-vegas-pipeline 74 https://www.rgj.com/story/life/outdoors/2019/02/28/plans-rewrite-nevada-water-law-get-rough-reception-legislature/3009924002/ 40 CFR §1508.27(7): Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. There are already two geothermal power plants within the Dixie Valley hydrographic region, both of which have caused significant environmental impacts. The Terra-Gen facility in Dixie Valley currently consumes 10,500 acre-feet of water per year because their cooling system consumes groundwater and because they are reinjecting basin-fill aquifer water into the geothermal reservoir to maintain pressure. A few miles further north, as described in the RDEA, the Jersey Valley Geothermal Project has already dried up a significant spring.⁷⁵ The de-watering of the Dixie Valley hydrographic region for geothermal energy could have disastrous consequences for wildlife, which rely on desert springs for their water supply. Other potential cumulative impacts are described above. An examination of the Project's impacts must evaluate them in the context of the cumulative impacts to the Dixie Valley hydrographic region. 75 RDEA, at 4-3. 40 CFR §1508.27(8): The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources. In the RDEA at 3-114, BLM states that it has determined that Dixie Meadows likely meets the criteria for a Traditional Cultural Property (TCP) and thus is eligible for listing in the National Register of Historic Places. The 2017 comment letter from the Fallon Paiute Shoshone Tribe clearly documents how the Project could cause the loss or destruction of significant cultural and historical resources.⁷⁶ We are also aware that the Tribe has submitted a comment letter on the RDEA opposing the project due to similar concerns. The Project is also likely to cause the loss or destruction of the habitat of the DVT. As a newly described species restricted to a small area of the Dixie Valley, the toad represents a significant scientific resource. This significance factor clearly applies. 76 See Exhibit 11: Fallon Paiute Shoshone Tribe comment letter on 2017 Draft Environmental Assessment. 40 CFR §1508.27(9): The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. On September 18, 2017, the Center submitted an ESA petition to the FWS⁷⁷</p>	

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		<p>to protect the DVT as an endangered species, citing the existential threat of geothermal development, which could potentially substantially alter or dry up its habitat. This petition was accompanied by a more in-depth memorandum from Dr. Tom Myers examining the threats to the Dixie Valley toad posed by geothermal development at Dixie Meadows.⁷⁸ On June 26, 2018, FWS issued a positive 90-day finding on the Center's Dixie Valley toad petition, finding that the petition presented "substantial scientific or commercial information indicating that the petitioned actions may be warranted."⁷⁹ While FWS has yet to issue a final listing determination for the species, public records reveal that the petition was, per FWS, "Put in 2021 bin- so would begin 10/1/2021= 2022 Oct- decision."⁸⁰ However, FWS is so concerned about the potential impacts of the DVGUP and the inadequacies of the ARMMP that "could be a problem-if they start production. Based on assumed risk to the species, could do an emergency listing- but don't want to do that."⁸¹ Emergency listing is an extraordinary measure that FWS uses in the most rare of circumstances. The fact that they are threatening to do so should this project move forward in its current state indicates that BLM has clearly not met the thresholds for a FONSI with the RDEA and ARMMP, and at the very least the more comprehensive analysis of an EIS is required. ⁷⁷ See Exhibit 4. ⁷⁸ See Exhibit 5. ⁷⁹ See Exhibit 6. ⁸⁰ See Attachment E. ⁸¹ See Attachment E. Regarding the need for an EIS, these aren't just arguments being made by the Center. Referring to impacts described in 9.6.1 ("Hydrological Concerns") and 9.6.2 ("Biological Resources") NDOW questioned whether an Environmental Assessment is even appropriate given the severity of the potential impacts: "At what level do these impacts trigger the need for an EIS?"</p>	
<p>Naval Air Station Fallon</p>	<p>Cultural Resources</p>	<p>Pg. 3-111, 3rd Paragraph This discussion is related to finding resources needs to be expanded. It needs to reflect the process found in VI of the BLM Protocol Agreement</p>	<p>Section 3.12.1 of the EA has been revised to include additional information from the BLM Protocol Agreement.</p>
<p>Nevada Department of Wildlife</p>	<p>Aquatic Resources Monitoring and Mitigation Plan</p>	<p>Cmt: 8 Page: 33 Section: Flow and Injection Testing 8.4 Comment: "Temperature and water level increases recorded in August 2017 at NDOWSS-1 are likely a response to the cessation of flow testing activities." This suggests that simple flow testing negatively influenced the two most vital attributes of one of the main sources of water utilized by Dixie Valley Toad for both reproduction and brumation which is very concerning to NDOW.</p>	<p>The ARMMP has been revised to add additional discussion in text Section 9.4 and plots for spring parameter measurements to Appendix H. In summary, there is no clear evidence of impacts to spring pool stage, temp or EC were observed during the 46 day flow test, conducted at rates between 2,100 to 1,650 gpm. A possible temperature increase as a result of the flow test was measured from about 139 to 145 °F. However, this rise in temperature is not conclusively a result of the</p>

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			<p>flow test, as post-test monitoring of temperatures ranged from 141 to 150 °F (increasing trend) and the range of historical temperature measurements at NDOWSS_1 has been between 130 to 160 °F, so temperatures throughout the flow test and post-test remained within the mid-range of historical measurements.</p>
<p>U.S. Fish and Wildlife Service</p>	<p>Water Resources</p>	<p>General comment: These comments are based on a review of the final draft of the Dixie Meadows Geothermal Project, Aquatic Resources Monitoring and Mitigation Plan (ARMMP), the revised Utilization Plan, and revised EA, following a detailed review of the 2014 DOE-funded investigation/report titled "EGS Exploration Methodology Project using the Dixie Valley Geothermal System, Nevada as a Calibration Site: Part I-Final Scientific Report Baseline Conceptual Model" (herein referred to as EGS 2014a), and a cursory review of Part II of the same report titled "Final Scientific Report Enhanced Conceptual Model" (herein referred to as EGS 2014b). Part I of this important (and most recent) comprehensive characterization of the geothermal system of Dixie Valley, including its geology (lithologic and structural) based on numerous multidisciplinary investigations, is also (now) referenced in the final draft ARMMP as "EGS 2014a". Substantive comments concerning this final draft ARMMP, revised Utilization Plan, and revised EA are provided in the following order: * Adequacy of the current project description. * Adequacy / limitations of geologic (lithologic and structural) and temperature data available to date for the Dixie Meadows area based on drilling, temperature logging, and geophysical surveys presented in this ARMMP for the purposes of developing a hydrogeologic conceptual model of the project area and area of potential project impacts - including that of the deep geothermal reservoir (cell) at Dixie Meadows and natural discharges from it; e.g., the hydrothermal plume emanating from the range-front fault into basin fill (EGS 2014a) and source of the thermal spring discharges. * Issues regarding the currently hypothesized hydrogeologic conceptual model described in Section 8.1 and depicted in Figure 16 of the ARMMP, including: - Apparent lack of supporting field data (as presented in this ARMMP), and in some cases inconsistencies with data provided in EGS 2014a for the Dixie Meadows area; and - Lack of uniqueness of the currently hypothesized hydrogeologic conceptual model given the sparsity of the field data presented in the ARMMP - including, but not limited to, a non-unique hypothesis concerning the source of the thermal spring discharges; which is also inconsistent with observations made in the Dixie Valley Producing Field (long-time Terra Gen geothermal production site) regarding the role of a Piedmont fault (outboard of the</p>	<p>The inferences that the Dixie Meadows geothermal reservoir is associated with the Piedmont fault are incorrect. The EGS (2014) work was not intended to define the geothermal reservoir, nor did it have sufficient data to define the reservoir at the project development level. The geothermal reservoir that has been defined and tested by ORMAT is a unique condition of permeability and temperature in Paleozoic sedimentary rocks (shale) which is typically not permeable, and resides deeper and west of the range-front fault system. The dilated east-northeasterly fracturing is encountered at zones of permeability and can be mapped extending into the mountain-front bedrock. Ormat has developed a 3D geologic framework model, using all available geologic data, which forms the basis for the Figure 16 cross-section, and conceptual flow system. Evidence a shallow lateral flow system in boreholes drilled west of the Piedmont fault document a shallow lateral geothermal flow system that is directly up-gradient of Dixie Meadows. Figure 17 temperature-gradient data has been added to the ARMMP, along with additional discussion in Section 6.4. The temp-gradient data document the presence of a lateral flow system directly up-gradient of the Dixie Meadows geothermal springs, and supports</p>

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		<p>range-front fault) as the most permeable conduit in the area for the movement of geothermal fluids from depth based on extensive multidisciplinary studies and decades of data collection and large-scale geothermal production (EGS 2014a). * Need for additional exploratory data collection (geologic, geophysical, temperature, and hydraulic testing) to support the development of an adequate understanding of the geothermal resource and overall hydrogeologic system at Dixie Meadows, as well as a description of the project in sufficient detail to allow its potential impacts on the area's natural resources to be evaluated; in addition to the development of an effective monitoring program and effective management and mitigation measures.</p> <p>**Fundamentally, the project proposes to extract energy from the geothermal system at Dixie Meadows - which is either the source, or intimately hydraulically connected to the source, of the thermal discharges from the springs. Consequently, the above (information about the local hydrogeology / geothermal system, as well as the proposed project in sufficient detail) is required to adequately evaluate whether that can be done without significantly diminishing the overall temperature (or possibly rate) of the thermal spring discharges which support the habitat for Dixie Valley toad.</p> <p>* Impact of the current hydrogeologic conceptual model described in this ARMMP on the development of an effective hydrologic monitoring program capable of identifying project impacts, if not providing "early warning"; which (given the nature of the proposed project and resources at risk) must include adequate hydrogeologic (i.e., bedrock pressure/hydraulic head and temperature) monitoring - irrespective of the details of the geothermal production and injection - which remain largely undefined as of this revised EA. If accepted as is, the proposed hydrogeologic conceptual model would significantly and adversely affect the interpretation of any changes detected at depth in bedrock at Dixie Meadows, within the hydrothermal plume emanating from the range-front fault into basin fill, and/or at the thermal springs/seeps (temperature or discharge) - under the proposed or any future monitoring program. * Impact of the current hydrogeologic conceptual model (described in this ARMMP), in combination with inadequacies in the current project description, on the development of effective and reliable management and mitigation measures - assuming effective and timely mitigation is feasible given that the source of the thermal spring discharges (which support habitat for Dixie Valley toad) and the geothermal system which must (in some manner) be the target of the proposed geothermal energy generation project, are one in the same - or at a minimum in intimate hydraulic connection.</p>	<p>the flow system interpretation of thermal waters that are mixed with cooler meteoric groundwater discharging in Dixie Meadows.</p>
Center For Biological Diversity	Sensitive Aquatic Species	82 See commentary in Exhibit 12: comment matrix from NDOW on McGinness Hills phase 3 environmental assessment. 83 Attachment C, p. 2	Comment noted.

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Center For Biological Diversity	Sensitive Aquatic Species	No Analysis of the Impacts of Operational Noise Geothermal power plants are well known to be noisy in their operational phase. In particular, Ormat's McGinness Hills project has been noisy enough to result in lek abandonment by greater sage-grouse. ⁸² The DVT has evolved in a place of little if any external disturbance and noise. Having a constant din from the operation of a geothermal power plant could have significant impacts on the DVT. The RDEA fails to make any analysis whatsoever of the operational noise of the geothermal power plants. NDOW raised this as a concern: "Noise from the power generating facility will be permeant and constant, impacts to wildlife are unknown and may not be acceptable." ⁸³ Ormat's only response is that "Continuous noise once the facility is up and running is unlikely to impact aquatic resources," with no evidence to base that assertion on. Toads can hear sounds, and the RDEA and ARMMP have failed to properly disclose and analyze the impacts to the DVT from the operational noise of the proposed action.	The EA, in section 3.7.2, does analyze the environmental impacts on wildlife from noise. Potential impacts would be minimized through plant design, operations, and other environmental protection measures.
Naval Air Station Fallon	Cultural Resources	Pg. 3-111 The discussion regarding effects is a bit confusing. I understand that the authors are trying to do in the discussion differentiating between archaeological sites and traditional cultural properties; however, would it not be easier to say that that all but one historic property (eligible) can be avoided with exception of C-03-EO286rNV and then launch into the CrNV-03-EO286	Section 3.12.1 has been revised for clarity.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 9 Page: 33 Section: Flow and Injection Testing 8.4 Comment: "In summary, it appears that there is a hydraulic connection between the bedrock and alluvium in the Dixie Meadows area, and that many faults and fractures in the Dixie Meadows area, including the regional Dixie Valley and Piedmont faults do not function as horizontal barriers to groundwater flow. An increase in temperature at spring NDOWSS-1 at the end of the flow test illustrates the connection between the bedrock aquifer and surface water expressions of Spring Complex 2. Existing tracer results cannot be used to make any conclusive determination of hydraulic properties or connections between aquifers and surface water expressions, however changes to hydrologic conditions at some of the springs during production may be expected." The uncertainty of the hydraulic connections in the Dixie Meadows area is the basis for the NDOW concerns.	The ARMMP has been revised for clarity. Uncertainty is managed by a robust network of monitoring at the springs to enable appropriate management actions to avoid detrimental impacts.
U.S. Fish and Wildlife Service	Geothermal Resources	Section 2.1, Figure 3, and Figure 2 of the revised EA; Section 3.2.1 of the final draft ARMMP; and Section 2.0 of the revised Utilization Plan Project Description (Section 2.1 of the Revised EA) - General Inconsistencies / Ambiguities Regarding the Installation of Production/Injection and Core Hole "Well Pads" as Part of the Proposed Action: The introductory text of Section 2.1 of the revised EA (and Section 3.2.1 of the final draft ARMMP), titled "Proposed Action", describes that up to 18 production and injection well pads (with up to 3 production or injection wells on	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells.

Commenter	Comment Code	Comment	BLM Response
		<p>each), and up to 8 previously permitted core hole "well pads" (with presumably up to 3 core holes on each given the limit authorized under both the 2010 and 2011 Exploration EAs) would be constructed at Dixie Meadows as part of the current Proposed Action (page 2-1 of the revised EA and page 6 of the ARMMP). The above description seems fairly clear. However, the text and figures that follow in this important section of the revised EA use multiple and in some cases ambiguous terms (e.g., "full-size") to describe the same thing; different terms interchangeably where they are not (e.g., "well" and "hole", "well" and "well pad" - the latter of which includes multiple "wells" or exploratory core holes in most, if not all, cases); and points to the same figure (Figure 3) twice as depicting the two different sets of "well pads" that would be constructed as part of the Proposed Action (the 18 proposed production/injection well pads and 8 proposed exploratory core hole "well pads"), although it clearly depicts only one. As a result, the locations of neither set of proposed well pads is clear in the current EA. The overall content of this important section of the EA is confusing. As such, we request this section be revised, as follows, to clearly and adequately disclose the Proposed Action: -Throughout Section 2.1 of the revised EA (and analogous sections in the Utilization Plan and ARMMP), we recommend text be revised to refer to "well pads" when describing "well pads", and "wells" only in reference to individual wells (i.e., not as "shorthand" for well pads given that in most, if not all cases, multiple wells or core holes are or would be authorized per "pad"). -Throughout Section 2.1 of the revised EA (and analogous sections in the Utilization Plan and ARMMP), the terms "well" and "hole" should not be used interchangeably. Please revise text (including the legends of figures) to refer to "wells" only in reference to drill holes that have or will be completed as wells (with casings, screens, etc.). Likewise, please revise the text to refer to "holes" only in reference to drill holes which have not or will not be completed as wells. - Throughout Section 2.1 of the revised EA (and analogous sections in the Utilization Plan and ARMMP), use of the term "full-size" (ambiguous in reference to a well versus core hole), or "full-size well pad sites" as referenced in the revised Utilization Plan, should be avoided. Also, please describe core holes as "exploratory core holes" for clarity, and reserve the term "exploratory well" for exploratory core holes subsequently completed as wells for used, for example, in flow tests. -The legend of Figure 3 in the revised EA (and any analogous figures in the Utilization Plan and ARMMP) should be revised to describe that it depicts the tentative locations of the up to 18 production and injection well pads that would be constructed as part of the Proposed Action. Please amend references to Figure 3 in the text accordingly; and replace the ambiguous (and apparently erroneous) label in the legend of Figure 3, "Proposed Deep Core Hole/Full-Size Well" with "Proposed Production and/or</p>	<p>Figures have also been revised for clarity and consistency.</p>

Commenter	Comment Code	Comment	BLM Response
		<p>Injection Well Pads". Note: Figure 3 in the revised EA is also described in Section 2.1.2 as depicting the locations of the up to 8 previously permitted exploratory core hole "well pads" that would be constructed as part of the Proposed Action. This reference is erroneous and confusing, thus we recommend it be removed. -Figure 2 of the revised EA purports to show the locations of 13 "wells" (and/or core holes?), the installation of which have been permitted under earlier exploration EAs, but not yet drilled; the 13 wells (and/or core holes?) apparently located on a total of about 11 or 12 separate "well pads" based on the figure (although unstated). Consequently, it is unclear whether Figure 2 depicts the locations of the 8 previously permitted (exploratory) core hole "well pads" that would be constructed as part of the Proposed Action, in addition to some subset of the other 35+ well pads that have been authorized under earlier exploration EAs but not yet constructed. Or whether the locations of the 8 exploratory core hole "well pads" described as part of the Proposed Action are not shown in this figure at all. To clarify what useful information Figure 2 is intended to provide (and any analogous figures in the Utilization Plan and ARMMP), we recommend this figure be replaced with: a) A figure clearly showing the locations, and only the locations, of the 8 previously permitted exploratory core hole "well pads" that may be constructed as part of the current Proposed Action (which is currently not provided in the revised EA, Utilization Plan, or ARMMP); b) a figure showing the locations, and only the locations, of previously permitted "well pads" (and wells / exploratory core holes) that have been constructed prior to this Proposed Action under the 2010 and 2011 Exploration EAs; and c) a figure clearly showing the locations, and only the locations, of the remainder of "well pads" that have been permitted under the 2010 and 2011 Exploration EAs, but either not yet constructed or not part of the Proposed Action. -Section 2.1.1, titled Schedule of Activities - Exploration Wells, describes the ongoing installation of exploratory core holes under earlier exploration EAs. We recommend this subsection, along with replacements 5(b) and 5(c) above for Figure 2, be moved to a different section of the EA, since they are not part of the current Proposed Action - e.g., Chapter 4, Cumulative Impacts.</p>	
Center For Biological Diversity	Sensitive Aquatic Species	<p>No Mitigation Specified for Butane Spills The RDEA clearly identifies the possibility that butane, the binary exchange fluid, would "make its way" into reinjected geothermal fluids.⁸⁴ Indeed, as the RDEA points out, this has been documented to happen at the Casa Diablo facility in Mammoth Lakes, California. The consequences of butane discharging from the hot springs which create Dixie Meadows and sustain the DVT could be quite grave indeed. The RDEA fails to analyze the impacts of such a scenario. The RDEA also fails to provide any specificity about mitigation actions which would be appropriate should butane be detected discharging from the springs.</p>	<p>The EA, Section 3.3.2, analyzes the environmental impacts of hazardous waste and other chemical contamination on water resources. Environmental protection measures in Appendix J and as described in the EA, Section 2.1.2, would avoid the potential for spills. In the event of a spill, the applicant has</p>

Commenter	Comment Code	Comment	BLM Response
		It says only, "If adverse impacts were observed, ORNI 32, in consultation with the BLM Authorized Officer, would apply mitigation measures, as needed, to reduce them." ⁸⁵ Given the significance of this potential impact, the RDEA needs to be revised to include a mitigation plan for the apparently somewhat likely event that Ormat's butane contaminates Dixie Hot Springs. ⁸⁴ RDEA at 3-28. ⁸⁵ RDEA at 3-29.	prepared a spill contingency plan (see Appendix J) to mitigate impacts.
Naval Air Station Fallon	Native American Religious Concerns	Pg. 3-115, Section 3.13.2 Are there indirect effects? Earlier discussions discuss the introduction of new elements that might have indirect effects, but the discussions appears to be incomplete.	The appropriate sections have been modified to clarify adverse effects to Dixie Meadows Hot Springs.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 10 Page: 37 Section: ARMMP 9.0 Comment: "As detailed in Sections 9.1 to 9.3, baseline data collection under the ARMMP monitoring network would take place for 1-2 years before production activities commence to further define the range of natural variability in hydrologic and biologic parameters. Because long-term climate variance can require multiple decades to define, climate trends would additionally need to be factored into consideration during development of baseline conditions and associated thresholds for adaptive management actions and mitigation measures." All baseline data should be completed prior to any well drilling or other activities that have the potential to impair the baseline data being collected over the next few years.	The ARMMP (Appendix H) has been revised to clarify that the baseline monitoring period would be 12 months from the date when the BLM signs the Decision Record.
U.S. Fish and Wildlife Service	Geothermal Resources	Section 1.0 of the revised Utilization Plan, Section 3.1 of the revised ARMMP, and Section 1.2 of the revised EA Project Description - Inconsistencies / Ambiguities Regarding the Number of Well Pads (and Number of Production/Injection Wells and/or Exploratory Core Holes per Pad) Authorized Under the 2010 and 2011 Exploration EAs: The current Utilization Plan describes that 15 well pads were permitted for construction at Dixie Meadows under the 2010 Exploration EA (Dixie Hope project acquired by Ormat in 2010), with up to three "drill holes" each; the type(s) of "drill holes" not specified in the Utilization Plan. Moreover, Figure 5 of the Utilization Plan shows at least 27 "well sites" (on 25 well pads?) without explanation. This same document describes that 20 more well pads were permitted for construction at Dixie Meadows under the 2011 Exploration EA, each approved for up to three "exploration wells"; without clarifying whether "exploration wells" refers to test wells (which can be readily converted to production/injection wells?) or exploration core holes. In total, the current Utilization Plan indicates that 35 well pads are already authorized for construction under the two earlier Exploration EAs (as shown in Table 2), for up to 105 wells/core holes. The current ARMMP, in contrast, doesn't describe the 2010 Exploration EA, nor does it describe the number of well pads that were authorized for construction under it, or the number or type(s)	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.

Commenter	Comment Code	Comment	BLM Response
		<p>of wells/core holes permitted on each. It does, however, describe the 2011 Exploration EA as authorizing the construction of 20 well pads, with up to three "exploration wells" on each - in particular, one temperature gradient well, one "observation" well (?), and one "production" (but not injection?) well. In total, the current ARMMP describes that a total of 20 well pads have been authorized for construction at Dixie Meadows prior to the current EA/Proposed Action (not counting up to two well pads for project water supply pumping), for a total of up to 60 wells/core holes. Finally, the current EA describes only that a total of 34 well pads have been permitted for construction under the two earlier Exploration EAs (2010 and 2011), with multiple wells (or core holes?) on each - in contradiction to the current Utilization Plan - but without specifying the number or type(s) of wells/core holes on each. Since only 7, or at most 8, of the well pads authorized for construction under the 2010 and 2011 Exploration EAs have been installed to date (based on Section 3.1 and Figure 4 of the ARMMP), and an additional 8 of the previously permitted well pads would be constructed as part of the Proposed Action, it appears that a significant number of well pads (and wells / core holes) can be constructed at Dixie Meadows under previous exploration authorizations at Ormat's discretion, in addition to those described in the current EA as the Proposed Action. Because this could represent a significant increase in the number of additional well pads, production/injection wells, and exploratory core holes installed at Dixie Meadows over that described by the Proposed Action, we recommend the Utilization Plan, ARMMP, and EA be revised to clearly and consistently describe the total number, locations, and types of well pads, and wells and exploratory core holes, already authorized for construction at Dixie Meadows under earlier Exploration EAs; as well as how many and which remain beyond those already constructed or included in the current Proposed Action. That some uncertainty persists in this respect is confirmed in Section 3.1.4 of the Utilization Plan which indicates that, "Previously approved sites that were located east of the Dixie Meadows wetlands buffer would not likely be used... [emphasis added]".</p>	
<p>Center For Biological Diversity</p>	<p>Aquatic Resources Monitoring and Mitigation Plan</p>	<p>Guidance Document" The ARMMP refers without explanation to a "Guidance Document" prepared by BLM, which the ARMMP draft was "prepared pursuant to."86 It goes on to state that the Guidance Document "is still considered a draft and is under review by cooperating agencies." There is no further explanation of the Guidance Document, and only one further reference, outlining ARMMP reporting requirements.87 There is nothing in the CFR, the BLM Handbook, or any other regulations that we could find describing what a "Guidance Document" is, its role in the NEPA process, or how it should be developed or used. If the Guidance Document is a part of, or the basis of, the ARMMP, the information needs to be</p>	<p>The guidance document is a draft ARMMP outline prepared by the BLM that provided direction on how to begin the development of the ARMMP.</p>

Commenter	Comment Code	Comment	BLM Response
		directly included for the public to evaluate. BLM needs to adequately disclose the Guidance Document as a part of the NEPA review process. 86 ARMMP, p. 38. 87 ARMMP, p. 51.	
Naval Air Station Fallon	Native American Religious Concerns	Pg. 3-115, Section 3.13.2 How are archaeological resources being defined in this context? If the archaeological site is associated with the TCP, modifying any part of the TCP could alter the interpretation of that property and its eligibility, unless the archaeological sites are not being considered contributing elements to the TCP.	Section 3.13 of the EA has been revised to clarify TCPs.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 11 Page: 42 Section: Monitoring schedule 9.1.5 Comment: "Baseline data collection would continue up to the time of production, which is currently anticipated to be early to late in 2022, dependent on obtaining all permits and scheduling of equipment orders (construction of power plants and well field facilities would require 12 to 24 months)." Suggest rephrasing, some baseline data will continue to be collected beyond the time of production and this timeline may need to be adjusted to reflect the current situation, 2024 at the earliest?	The ARMMP has been revised for clarity.
U.S. Fish and Wildlife Service	Geothermal Resources	Revised Utilization Plan, final draft ARMMP, and revised EA Project Description - Inconsistencies Regarding How Many, and Which, Previously Authorized Well Pad Sites Have Been Constructed to Date at Dixie Meadows: Section 1.2 of the revised EA describes that 4 wells and 5 exploratory core holes have been installed to date, a total of nine (under the 2010 and 2011 Exploratory EAs); including one well (14-8) that is not described as having been installed in Section 3.1 of the ARMMP, and excluding one well (MW1/21-9) and one deep exploration core hole (75-4) that the ARMMP describes as having been installed in 2011 and 2017. Please reconcile these discrepancies. Please ensure the ARMMP and EA provide a consistent and complete description of wells / exploratory core holes, and well pads, installed to date at Dixie Meadows - since these are a significant source of information (which is so far limited) about the hydrogeology of the site.	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.
Center For Biological Diversity	Aquatic Resources Monitoring and Mitigation Plan	Normative Assessment of Changes to Spring Discharge The ARMMP makes a somewhat bizarre statement regarding potential changes to spring discharge. "Changes do not necessarily equate to negative impacts. For example, increases in spring flow or stage and decreases in TDS during geothermal production may be viewed as a positive effect for the spring-dependent ecosystem and aquatic resources." ⁸⁸ This is patently false. The DVT and the groundwater dependent ecosystems at Dixie Meadows evolved over thousands of years adapting to a specific set of hydrogeologic and climatic conditions. Increasing spring flow or decreasing TDS will alter those set of hydrogeologic circumstances and throw off the delicate balance between biology and hydrology that the DVT has evolved in. There could be unanticipated and paradoxical effects of altering those conditions, and in no case	The BLM has been in coordination with the USFWS to address the substance of the commenter's concerns. This coordination resulted in numerous revisions to the ARMMP and the EA. Additionally, the EA incorporates new science from the USGS related to the Dixie Valley Toad. There is no direct evidence or data that indicates a source of Dixie Meadows springs being the piedmont fault. The fault may however have some hydraulic control over the daylighting of the springs, also

Commenter	Comment Code	Comment	BLM Response
		should changes to the spring discharge at Dixie Meadows be regarded as beneficial to the DVT or the ecosystem there. 88 ARMMP, p. 38.	the extensional seismic structure of the soils directly east of the piedmont fault. There is a possibility that some seepage up the piedmont fault occurs in addition to the lateral inflow from the west, but this component is not support as the primary source of flow given the current available data.
Naval Air Station Fallon	Native American Religious Concerns	Pg. 3-116 Do all medical plants contribute to the eligibility of the site or is it just the rare ones?	A delineation will not be made between rare/common plants.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 12 Page: 44 Section: Water Sampling 9.2.2. Comment: "Geothermal wells 23A-8 and 42(12)-9 would be sampled during flow/injection testing activities. Discharge water from geothermal wells would be routed to an approved sump and sampled midway through the planned discharge for chemical constituents listed in Table 15. This sampling would allow the Contractor to characterize geothermal fluids, compare geothermal fluid chemistry to shallow thermal and non-thermal water, and further understand the degree of mixing. In addition, temperature and pressure would be monitored as well." If technical working groups determine this water is of sufficient quality, it could be considered as an emergency source for wildlife habitat. Infrastructure to accommodate this potential mitigation action should be designed into power plant construction and immediately available upon detecting a trigger has occurred.	If the determination that the water is of sufficient quality to use as an emergency source for wildlife habitat, the BLM would work with the project proponent for measures to utilize and augment the existing infrastructure to implement mitigation action as needed within the scope of the existing NEPA.
U.S. Fish and Wildlife Service	NEPA	Revised Utilization Plan, final draft ARMMP, and revised EA Project Description - Would Approval of the Proposed Action Result in Authorization to Construct 18 Production/Injection Well Pads In Addition to the 35 (or More) Already Authorized Under the 2010 and 2011 Exploration EAs? Neither the revised EA, final draft ARMMP, or revised Utilization Plan indicate whether the 18 production/injection well pads that would be constructed as part of the Proposed Action are in addition to the 35 (or more) already authorized under the 2010 and 2011 Exploration EAs. We recommend the text of these three documents be revised to clarify the above so that the potential magnitude of the project that may be implemented by Ormat under the combined authorizations of the current EA and two earlier Exploration EAs is adequately disclosed; and because this needs to be taken into account in order to develop an effective monitoring program and effective management and mitigation measures	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.

Commenter	Comment Code	Comment	BLM Response
Center For Biological Diversity	Surface water	Terminal Ponds are Not Seasonal The RDEA at 3-12 describes the eastern terminal ponds of Dixie Meadows as seasonal, mostly dry, and only containing water in the winter. This does not align with reality. As can be seen below in Figure 1, satellite imagery from Google Earth shows the ponds full in September 2010. And as can be seen in Figure 2, a photograph taken by Patrick Donnelly of the Center for Biological Diversity in June 2017 also shows the ponds full in the summer. This error could have important ramifications for the navigability status of these waterways and thus their possible protection under the Clean Water Act. While there is some flux as to the exact status of jurisdictional waters due to recent turmoil at the federal government, this is clearly a deficiency in the RDEA that needs correction. [Figure 1: Terminal ponds east of Dixie Meadows full of water, from satellite imagery taken in September of 2010 (date is in upper left corner).] [Figure 2: Terminal pond east of Dixie Meadows full of water, photograph by Patrick Donnelly on June 21, 2017.]	The dates provided by the commenter (2010 and 2017) were both above normal water years (https://www.cnrfc.noaa.gov/monthly_precip_2010.php and https://www.cnrfc.noaa.gov/monthly_precip_2017.php), which likely resulted in the terminal ponds having standing water. As the EA notes, more often than not, these features are dry in the late summer and fall months.
Naval Air Station Fallon	Native American Religious Concerns	Pg. 3-116 Unless the undertaking will close access to the plants why say there is the potential. Why not just say in order to avoid closing access to these plants the BLM is going to maintain public access and improve access trails.	Comment noted. No change.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 13 Page: 52 Section: Identification of Potential Changes, Impacts, Thresholds, and Triggers 9.6.1.1. Comment: "The Proposed Actions covered under the 2017 Draft EA are discussed in Section 3.2. As described in the 2017 Draft EA (BLM, 2017a; updated October 2020), potential project impacts to water resources include: - degradation of surface water quality by increasing erosion and sedimentation or altering spring-discharged water chemistry; - alteration of groundwater or spring discharge water quality by changing the proportion of geothermal and fresh groundwater mixing; - alteration of water quantity by reducing (or augmenting) spring discharge rates, decreasing groundwater supply, or interfering substantially with groundwater recharge; - alteration of surface water temperatures; - alteration to surface water flow paths; and, - contamination of surface or groundwaters from spills or construction activities."	Comment noted. No change.
U.S. Fish and Wildlife Service	Range of Alternatives	Sections 2.1 and 2.1.4 of the revised EA; Sections 3.1 and 3.2.1 of the final draft ARMMP; Sections 2.0 and 3.1.4 of the revised Utilization Plan Project Description - Inconsistencies / Ambiguities Regarding the Maximum Number of Production/Injection Well Pads (and Number of Production/Injection Wells) That May be Constructed as Part of the Proposed Action, and Their Locations: The introductory text of Section 2.1 of the revised EA (and Section 3.2.1 of the final draft ARMMP), titled "Proposed Action", seems fairly clear regarding the number of production/injection well pads (18) and exploratory core hole "well pads" (8) that	Comment noted. No change.

Commenter	Comment Code	Comment	BLM Response
		<p>would be constructed as part of the Proposed Action. Section 2.1 of the revised EA also describes that up to 3 production and/or injection wells may be installed on each of the 18 production/injection well pads. However, Section 2.1.4 of the revised EA indicates that, "full-size production or injection wells may be drilled on the same well pads used for exploration" (confirmed in a footnote to Table 5 in the same section) - which by itself suggests that more than 54 (18 x 3) productions and injection wells may be authorized under the current EA/Proposed Action, although not clearly stated in the EA or Utilization Plan. Beyond that, after reiterating that the Proposed Action includes 18 production/injection well pads with up to 3 production or injection wells each, Sections 2.0 and 3.1.4 of the current Utilization Plan describes (in apparent contradiction) that, "Ormat is proposing [to develop] 32 locations shown in Figure 5... and listed in Table 5" (pages 8 and 13); followed on page 13 with, "Ormat is proposing that up to 15 of the 32 possible well pads would be for full-size production/injection wells" - which is less than the 18 indicated in both the EA and earlier in the Utilization Plan. The latter is also in clear contradiction to the information provided in Table 5, which indicates that production and/or injection wells may be installed on as many as 27 of the 32 well pads listed (one of which has already been constructed according to Section 3.1 of the ARMMP - 24-8, also known as 24(13)-8ST). Finally, Section 3.1.4 (page 15) of the Utilization Plan describes that, "Ormat is proposing that up to 8 of the remaining 18 well pads would be for core holes" (adding to the ambiguities/inconsistencies). Taken altogether, it is unclear how many well pads on which production and/or injection wells may be installed at Dixie Meadows as part of the Proposed Action. We recommend the Utilization Plan, ARMMP, and EA be revised to clearly describe and disclose the maximum number of well pad sites at which production and/or injection wells may be installed as part of the Proposed Action, if the current EA is approved (as is); as well as their "tentative" locations (tentative according to Section 2.1.4 of the EA), and the extent to which the indicated "tentative" locations may be modified by Ormat at their discretion (without additional disclosure or impact analyses). ** Additionally, please clarify the extent to which Ormat, at their discretion, can amend the locations of well pads authorized for construction under the 2010 and 2011 Exploration EAs (i.e., without additional disclosure or impact analyses). Note: We recommend replacing Figure 5 of the current Utilization Plan as part of these revisions because it is difficult to read and lacks the same "landmarks" used in other maps in these documents (thus difficult to compare). Moreover, Figure 5 only shows 29 of the proposed 32 locations.</p>	
Center For Biological Diversity	Sensitive Aquatic Species	<p>Conclusion The USGS's M.L. Sorey has stated that, "Changes in surficial features and land elevations accompanying geothermal development should be viewed as the rule, rather than the exception."⁸⁹ Another researcher noted, "Historical evidence shows</p>	Comment noted. No change.

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		<p>that natural thermal features have been affected, often severely, during the development and initial production stages of most high-temperature geothermal systems."90 89 Sorey, M. L. 2000. Geothermal development and changes to surficial features: Examples from the Western United States. Proceedings World Geothermal Congress 2000, pp. 705-711. 90 Hunt, T. M. 2001. Five lectures on environmental effects of geothermal utilization. United Nations University, Geothermal Training Programme. Reports 2000, Number 1:1-109. It is not a question of if the springs at Dixie Meadows will be affected by the proposed action, it is a question of how much and for how long. It is not a question if the Dixie Valley toad will be put in jeopardy by the project - it inevitably will. Meanwhile Ormat has put forward a cockamamie new theory about the hydrogeology of the region, unsupported by evidence and roundly criticized by independent scientists who evaluated it. Ormat has failed to provide any substantial baseline information about the Dixie Valley toad, its life cycle, its habitat needs, or other important criterion to properly understand and evaluate the potential impacts of the proposed action. Ormat has put forward inadequate, poorly developed, and novel mitigation methods, lacking any specificity and lacking any assurances that they would actually achieve the ends they purport to. BLM has put forward a RDEA and ARMMP riddled with errors, full of unfounded assertions, and based on a hope and a prayer that if the Dixie Valley toad goes extinct, nobody will notice. Not only does the Center for Biological Diversity take strong exception with this farcical environmental assessment, but cooperating agencies such as the US Fish and Wildlife Service, the Nevada Department of Wildlife, and the US Navy all have rebuked BLM and Ormat for the inadequacies therein in the strongest of terms. Their concerns were met with only token changes to the environmental documents. BLM and Ormat must recognize that there is simply no way to develop geothermal energy at Dixie Meadows without putting the Dixie Valley toad at risk for extinction. There are literally hundreds of other places across the state of Nevada to develop geothermal energy which do not have endemic life forms living at them. Ormat and BLM should be prepared for a long and complicated legal struggle over this project should they unwisely decide to continue pursuing it.</p>	
Naval Air Station Fallon	Native American Religious Concerns	Pg. 4-9 Row 4.11, First Paragraph May want to re-write sentence none of the highlighted activities appear to be new ways of utilizing public lands.	Comment noted. No change.
Nevada Department of Wildlife	Aquatic Resources	Cmt: 14 Page: 55-61 Section: Goals and Objectives 9.8-9.9 Comment: Consultation, adaptive management, and mitigation would include one of three categories (see management action and critical mitigation in Table 19): Code A - Discuss and re-	Comment noted. No change.

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	Monitoring and Mitigation Plan	evaluate within 10 days of exceeding a threshold the monitoring indicators, baseline conditions, thresholds, and timing of monitoring to determine if additional adaptive management or mitigation is required. Code B - Discuss and determine within 5 days the appropriate adaptive management or mitigation action to be taken. Code C - Discuss and determine within 24 to 48 hours the appropriate adaptive management or mitigation action to be taken immediately. Code A, B, and C should be applied to the five, Tier 1 flow monitoring sites for volume and temperature. If the "Objective Thresholds" are found to exceed the triggers (10-15%, 10C, etc) immediate mitigation actions should be taken by the plant operators onsite to remedy the issue. These are labeled in Table 19 as; USGS-101 Complex 2 Confluence Spring 5A/5B Confluence USGS-301 Salt Cedar NDOWSS-I	
U.S. Fish and Wildlife Service	Geothermal Resources	Sections 2.0 and 3.1.4 of the revised Utilization Plan Project Description - Objective Description of the Number of Production/Injection Well Pads That May Be Constructed as Part of the Proposed Action: Recommend that the following statements be removed from the Utilization Plan (as speculative) in order to provide only objectively verifiable information in describing the Proposed Action: - "... Ormat is proposing 32 locations shown in Figure 5", preceded by "Although only 18 full-size well pad sites, at most, would be developed..." (page 8); and - "Ormat is proposing 32 potential well sites as shown on Figure 5 and listed in Table 5; however, most of these well sites would never be used." (page 13).	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.
Naval Air Station Fallon	Native American Religious Concerns	Pg. 4-9, 3rd Paragraph I believe that 31 other federally recognized tribal groups would question this statement.	Text has been revised for clarity.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 15 Page: 117 Section: Table 18-19 Monitoring and mitigation measures Comment: We recommend including a mitigation measure to permanently suspend geothermal utilization and injection in the even that adverse impacts cannot be adequately managed (i.e. no thresholds exceeded).	Refer to Section 10.9.1 in the ARMMP for Adaptive Management and Mitigation Measures. Specifically, see measure 8, which clarifies that there would be temporary cessation of pumping and/or injection at site-specific well locations until maintenance of pre-operation conditions is achieved. The ARMMP adaptive management and/or mitigation measures include the use of temporary cessation for as long as needed until adaptive modifications can be made to operations.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Geothermal Resources	Sections 2.0 and 3.1.4 of the revised Utilization Plan Project Description - Objective Description of the Number of Production/Injection Well Pads That May Be Constructed as Part of the Proposed Action: Recommend that the following statements be removed from the Utilization Plan (as speculative) in order to provide only objectively verifiable information in describing the Proposed Action: - "... Ormat is proposing 32 locations shown in Figure 5", preceded by "Although only 18 full-size well pad sites, at most, would be developed..." (page 8); and - "Ormat is proposing 32 potential well sites as shown on Figure 5 and listed in Table 5; however, most of these well sites would never be used." (page 13).	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.
Naval Air Station Fallon	Editorial Comments	Pg. 10 Row 16 Please note that the artisan and pumped wells owned by the Navy are not abandoned. Most of these well have been converted to wildlife use and maintained for wildlife habitat.	Text in the ARMMP has been revised for clarity.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 16 Page: 59 Section: Section 9.9.1 Comment: We recommend ensuring all mitigation measures are properly permitted and in place (e.g. infrastructure, BLM and DWR permitting, etc.) prior to when potential impacts could occur (e.g. pre-production) to avoid issues experienced with the Jersey Valley Geothermal Project mitigation. Numerous springs and riparian resources were lost in the Jersey Valley area and have been dry for more than 8 years. To prevent impacts to the biological and vegetative communities through time, mitigation measures must occur immediately upon detecting an issue.	Before the Jersey Valley issues, there was not an ARMMP in place, like there is now for Dixie Meadows. The implementation of the ARMMP (see Appendix H) provides the assurances to avoid adverse impacts similar to those experienced at Jersey Valley. The intent of the technical working group is to provide the Authorized Officer recommendations as warranted to respond to issues and impacts as efficiently as possible in accordance with the ARMMP. Obtaining necessary agency permits is part of the BLM's requirements and decision making process.
U.S. Fish and Wildlife Service	Geothermal Resources	Final draft ARMMP and revised EA Project Description - Ambiguities Regarding How Many Well Pads May Still Be Installed Under the 2010 and 2011 Exploration EAs, Beyond Those Installed to Date and Proposed as Part of the Current Action: Section 1.0 of the revised Utilization Plan, Section 3.1 of the final draft ARMMP, and Section 1.2 of the revised EA, consistently describe authorizations under the 2010 and 2011 Exploration EAs in terms of a number of well pads authorized for construction, and in most cases a specified (multiple) number of wells and/or exploratory core holes on each. However, information provided in the ARMMP and EA about installations to date are provided only in terms of individual wells and exploratory core holes installed (e.g., Table 2 and text of the revised EA and numerous figures in the ARMMP) - Thus, we recommend the EA answer the following questions and include the associated supporting information: -How many well pads of those authorized	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.

Commenter	Comment Code	Comment	BLM Response
		<p>under the 2010 and 2011 Exploration EAs have been constructed to date; -how many previously permitted well pads (multiple wells / core holes on each) remain of those authorized for construction under the Exploration EAs, and what are their locations; -which of the above (item no. 2) would be utilized to construct the 8 "previously permitted" core hole "well pads" described as part of the current Proposed Action, and how many of those previously authorized for construction would remain and where are they located; and -can the remainder (item no. 3 above) be constructed by Ormat at their discretion (i.e., without further disclosure or impact analysis) concurrent or subsequent to implementation of the Proposed Action? The number of previously permitted well pads that would remain (item no. 3) appears to be about 20, with 3 possible wells and/or exploratory core holes on each for a total of up to 60 additional wells/core holes - beyond those already constructed at Dixie Meadows and those proposed as part of the current Action. This would represent a significant expansion of developments compared to that already installed (~7 or 8) and those proposed as part of the current Action (18 + 8 = 26), for a possible 53 well pads at Dixie Meadows inasmuch as this reviewer is able to determine. Consequently, the question regarding whether Ormat can construct the remainder of the authorized well pads (and wells / core holes) at their discretion (item no. 4) is an important one, with implications for the current cumulative impact analyses and development of an effective monitoring program and management and mitigation measures for the current Proposed Action. Please describe installations, both past and proposed, in the EA (and ARMMP) in terms of the number of well pads (where previously permitted well pads are involved), as well as any individual wells / core holes, to provide effective disclosure. More broadly, the EA and ARMMP should be revised to clearly describe the information sought in items nos. 1-4 above - which, as a practical matter, cannot be deduced from the information currently provided. *I Beyond those already constructed (~7 or 8) and those utilized for exploratory core hole "well pads" described as part of the Proposed Action (8).</p>	
Naval Air Station Fallon	Editorial Comments	Pg. 16, Sec. 5.7 Please note that there is no ground training authorized within the Dixie Meadows parcel, which is fee-owned by the Navy.	Text has been revised in the ARMMP for clarity.
Nevada Department of Wildlife	Aquatic Resources Monitoring and Mitigation Plan	Cmt: 17 Comment: Given the following EA statements: "however changes to hydrologic conditions at some of the springs during production may be expected" (pg 33) and "The challenge to geothermal resource development would be finding an acceptable geographic distribution for injection that would meet reservoir requirements while maintaining the environmental balance" page 37 What is your confidence level or what is the reliability that hydrologic spring and wetland resources can be detected and corrected prior to impacts occurring? Given that the	Ormat, in coordination with the BLM, has revised the ARMMP to monitor changes in groundwater and surface water resources. The ARMMP also includes adaptive management strategies that the BLM would implement to avoid, minimize, or mitigate impacts on hydrologic resources and

Commenter	Comment Code	Comment	BLM Response
		ARMMP is not complete (e.g. threshold and triggers have not been confirmed based upon the need for collecting additional monitoring data), we are concerned with prematurely permitting this development.	associated aquatic habitats. Additional applicant-committed environmental protection measures in Appendix J of the EA would further avoid, minimize, or mitigate impacts on adjacent thermal springs. The EA has been revised to reflect changes to the ARMMP.
U.S. Fish and Wildlife Service	Geothermal Resources	Section 1.0 of the revised Utilization Plan; Section 3.4 of the final draft ARMMP; Section 1.2 of the revised EA Project Description - Additional Ambiguities Regarding How Many Well Pads (and Wells / Core Holes) May Still Be Installed Based on Authorizations Associated With the Former Dixie Hope and Dixie Meadows Lease Blocks, In the Event That Ormat Deems Them to "Be of Interest" in the Future: Section 1.0 of the revised Utilization Plan, Section 3.4 of the final draft ARMMP, and Section 1.2 of the revised EA all describe that the Combined Dixie Meadows Geothermal Unit Area was created in 2010 by combining those portions of the Dixie Hope and Dixie Meadows lease blocks that "remain of interest" to Ormat. Although not described in these documents, presumably some activities/developments (e.g., construction of well pads and wells / core holes) were authorized under the previous leases which Ormat deemed as of 2010 to be "not of interest". Please revise the Utilization Plan, ARMMP, and EA to describe the fate of those previously permitted activities in the event Ormat has a renewed interest in developing them either now or in the future; with implications for cumulative impact analyses for the Proposed Action and development of an effective monitoring program and management and mitigation measures.	The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.
Naval Air Station Fallon	Aquatic Resources Monitoring and Mitigation Plan	Pg. 49 Row 10-13 I have continued concerns that there is no contingency plan for DV toad monitoring (by the contractor) for the life of the project in the case that federal funding is not available. This section is vague as to how long toad monitoring will be implemented. Please clarify.	The ARMMP (see Appendix H) outlines the monitoring and mitigation measures that will be implemented for the life of the project for special status species, including DVT.
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 18 Comment: We recommend committing to fund the construction of wildlife compatible gates on abandoned mines that serve as bat roosts within a 0.6 miles area of the project. NDOM 8 abandoned mine is identified in the BBCS (Bats C- 19-20, 3rdparagraph) that are within 0.6 miles of project and additional mines at Murphy mine within 500 feet of Ormat Jersey Valley Geothermal Plant. As stated in BBCS C.5.3, Page C-28 Bird and Bat enhancement options Ormat may use protection of maternity/hibernation roosts by constructing bat compatible gates. NDOW can identify which mines are used as significant bat roosts. These gates will also conserve human lives by preventing entry in dangerous mines	Thank you for your offer in identifying potential locations for future bat compatible gates.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Geothermal Resources	<p>Section 3.2.1, Section 3.1, and Figure 4 of the final draft ARMMP; Sections 1.2 and Table 2 of the Revised Utilization Plan; and Section 1.2 of the revised EA Project Description - Ambiguities Regarding the Maximum Number of Production/Injection Well Pads Permitted Under the Combined Authorizations of the 2010 Exploration EA, 2011 Exploration EA, and Current EA/Proposed Action: Section 3.2.1 of the final draft ARMMP (and Section 2.1 of the revised EA), titled "Proposed Action", indicate that up to 18 production and injection well pads, and up to 8 "previously permitted core hole" well pads would be constructed at Dixie Meadows as part of the current Proposed Action - a total of 26 exploratory well pads. At the same time, Section 3.1 of the ARMMP describes that Ormat has previously been authorized to construct up to 20 exploratory well pads at Dixie Meadows under the 2011 Dixie Meadows Geothermal Exploration Project EA (2011 Exploration EA), including one possible production or injection well on each; and Section 1.0 and Table 2 of the revised Utilization Plan indicates that Ormat is also authorized to construct an additional 15 well pads at Dixie Meadows as a result of their acquisition of the Dixie Hope leases in 20102 - a total of 35 well pads (apparently with up to 3 wells / exploratory core holes on each), prior to approval of the current EA. Since 2.1.4 of the revised EA indicates that, "full-size production or injection wells may be drilled on the same well pads used for exploration" (confirmed in a footnote to Table 5 in the same section), it appears that the maximum number of well pads which may include production and/or injection wells following approval of the current EA/Proposed Action are as many as 46, as follows: * 35 well pads were authorized for construction under the 2010 and 2011 Exploration EAs; 7 or 8 of which have already been constructed (based on information provided in Section 3.1 and Figure 4 of the ARMMP), and up to 8 more would be utilized to construct the core hole "well pads" described as part of the current Proposed Action - leaving 19 or 20 of the well pads originally authorized under the Exploration EAs, potentially all of which may include a production or injection well. * According to Section 2.1.4 of the revised EA, the up to 8 "previously permitted" core hole "well pads" that would be constructed as part of the current Proposed Action, may also include full-size production or injection wells - bringing the total number of well pads including a production and/or injection well to as many as 27 or 28. * Plus up to 18 additional well pads dedicated specifically to production and/or injection wells as part of the current Proposed Action - bringing the total number of well pads that may include a production and/or injection well to as many as 45 or 46. Please clarify the maximum number of well pads that may be constructed under the combined authorizations of the 2010 Exploration EA, 2011 Exploration EA, and current EA, and their locations, in the Utilization Plan, ARMMP, and EA prior to finalization of these documents. *2 Section 1.2 of the revised EA</p>	<p>The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.</p>

Commenter	Comment Code	Comment	BLM Response
		<p>indicates that Ormat is authorized to construct 14 "exploratory well pads" at Dixie Meadows as a result of their acquisition of the Dixie Hope leases in 2010 - a total of 34 exploratory well pads (with possible multiple wells on each). This should be reconciled with the information provided in the Utilization Plan and corrections made. *3 At least some ambiguity exists regarding what was permitted under the 2010 Exploration EA based on the information provided in these documents.</p>	
<p>Naval Air Station Fallon</p>	<p>Aquatic Resources Monitoring and Mitigation Plan</p>	<p>Pg. 49 Row 19-22 Appreciate the effort to consult with the stakeholder agencies for biological resources. What is the contingency plan in the event that the DV toad becomes listed? Consultation will be required but is not discussed in this plan. Implementation of all terms and conditions of the biological opinion will need to be the responsibility of the action proponent to fulfill, not the landowner.</p>	<p>If the DVT is listed, then the processes outlined under section 7 of the ESA would be followed.</p>
<p>Nevada Department of Wildlife</p>	<p>Bird and Bat Conservation Strategy</p>	<p>Cmt: 19 Page: C11 Section: Table C-2 Comment: Bird and Bat species in and near project area should include <i>Myotis lucifugus</i> (little brown bat) as it has been documented in the Dixie Valley settlement area.</p>	<p>Appendix C, Table C-2 has been revised to include <i>Myotis lucifugus</i> (little brown bat).</p>
<p>U.S. Fish and Wildlife Service</p>	<p>Range of Alternatives</p>	<p>Figures 2 and 3, and Section 2.1 of the revised EA; Figure 5 and Table 5 of the revised Utilization Plan Project Description - Ambiguities Regarding the Locations of the Up to 8 "Previously Permitted" Core Hole "Well Pads" to be Constructed as Part of the Proposed Action: Figure 2 of the current EA depicts the locations of 24 holes/wells, 10 of which have already been installed as described in Section 3.1 of the ARMMP - the remaining 14 holes/wells depicted as "permitted, not drilled". Given that the text of Section 3.2.1 of the ARMMP (and Section 2.1 of the revised EA), titled "Proposed Action", indicate that only 8 "previously permitted core hole" pads are to be constructed as part of the Proposed Action, it is unclear which of the 14 "permitted, not drilled" core hole sites shown in Figure 2 of the EA are part of the Proposed Action. Moreover, Figure 5 of the revised Utilization Plan, which ostensibly shows the locations of "proposed well pads" according to the caption, depicts a total of 29 core hole/well "sites" (equivalent to "pads"? for wells, core holes, both?), three of which have already been installed according to Section 3.1 of the ARMMP (228-B, 23-8, and 24-8). Of the 26 remaining "sites" shown in Figure 5 of the Utilization Plan, 18 are identifiable in Figure 3 of the revised EA as "proposed deep core hole/full size well" (presumably, but not clearly, corresponding to the 18 production and injection well pads described as part of the Proposed Action). This leaves 8 "sites" in Figure 5 of the Utilization Plan unaccounted for, which are apparently (by deduction) the locations of the future 8 "previously permitted" core hole pads described as part of the Proposed Action. However, these same 8 core hole pad locations should also be identifiable in Table 5 of the Utilization Plan, but are not. Please revise the Utilization Plan and EA, text and figures, to clearly describe and depict the locations of the 8</p>	<p>The Proposed Action as described in Chapter 2 of the EA and the Utilization Plan has been revised to clarify the number and types of proposed wells and well pads. A new figure has also been added to show the proposed action relative to existing and permitted wells. Figures have also been revised for clarity and consistency.</p>

Commenter	Comment Code	Comment	BLM Response
		"previously permitted" core hole "well pads" that would be installed as part of the Proposed Action.	
Naval Air Station Fallon	Cultural Resources	Pg. J-2 Item #7 I would think that the BLM would need to be contacted at a minimum and or possibly Navy. Process needs to consistent with Section VI of the Nevada State Protocol Agreement.	No change to restate policy. ORNI 32 would be required to adhere to the Agreement.
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 20 Page: C12-13 Section: C.3.1 Comment: Aerial surveys for cliff nesting birds has not been accomplished since 2011 (10year old data) and ground surveys are 5-8 years old for cliff nesting raptors. We recommend conducting aerial surveys for cliff nesting raptors including golden eagles	The 2011 survey indicated active eagle nests within the 4 mile buffer of the project area, therefore appropriate EPMs have been developed and will be implemented through the Decision. This made additional surveys unnecessary.
U.S. Fish and Wildlife Service	Range of Alternatives	Section 2.1.4 of the revised EA; Section 6.6 and Appendix A of the final draft ARMMP Project Description - "Target(s)" of Geothermal Production and Injection as Part of the Proposed Action, For All Practical Purposes Undefined to Date: The intended or possible use of directional drilling during the installation of the proposed production/injection wells has not been described in the Utilization Plan, ARMMP, or revised EA. To the extent that directional drilling may be employed to install production and/or injection wells as part of the Proposed Action, the locations of the actual well pads (wellheads), which have only been tentatively identified in any case per Section 2.1.4 of the revised EA, are largely irrelevant in terms of the potential hydrologic impacts of the proposed project, evaluating the potential for hydrologic impacts, or developing an effective hydrologic monitoring program. In terms of specifics, the revised EA offers only that there is a production "target", but provides no description of what it might be other than referring to it as "the targeted geothermal reservoir" (Section 2.1.4, page 2-15). The final draft ARMMP (Section 6.6, page 21), in contrast, describes that, "The targeted high-temperature geothermal resource at Dixie Meadows is expected to occur within the fractured bedrock (Jurassic Triassic shales ⁴) at depths ranging from 4,000 to 10,000 ft bgs". But also implies that the production target may be "permeable fault structures" along which "geothermal groundwater migrates upward"; the current ARMMP interpreting that the candidate permeable structures are "primary [east to northeast trending] faults" which it (newly) hypothesizes exist at Dixie Meadows. Moreover, to date, exploratory drilling into Triassic basement rocks ⁵ (identified elsewhere on the west side of Dixie Valley as the deep geothermal reservoir, EGS 2014a) has been limited to a maximum of 4,800 ft bgs ⁶ at Dixie Meadows. As such, the stated "target" of 4,000 to 10,000 ft bgs (in Jurassic Triassic basement rocks) is largely speculative - appropriately described in the ARMMP as "expected". Additionally, since Triassic	Additional Section 7 now details the exploration drilling activities and key observations for each borehole. The reservoir that has been defined is not similar to that defined at the Dixie geothermal power plant (associated with the Piedmont Fault system), nor interpreted at Comstock (associated with the range-front fault). In this regard, the inferences that the Dixie Meadows geothermal reservoir is associated with the Piedmont fault is incorrect. The EGS (2014) work was not intended to define the geothermal reservoir, nor did it have sufficient data to define the reservoir at the project development level. The geothermal reservoir that has been defined and tested by ORMAT is a unique condition of permeability and temperature in Paleozoic sedimentary rocks (shale) which is typically not permeable, and resides deeper and west of the range-front fault system. The dilated east-northeasterly fracturing is encountered at zones of permeability and can be mapped extending into the mountain-front bedrock. Ormat has developed a 3D geologic framework model, using all available geologic data, which forms the basis for the Figure 16

Commenter	Comment Code	Comment	BLM Response
		<p>(and/or Jurassic) basement rocks are known to occur at depth along the west side of Dixie Valley in the area between the range-front and Piedmont faults based on drilling and gravity data (see Figures 6b and 45b, EGS 2014a), it follows that the former could be encountered virtually anywhere between the range-front and Piedmont faults at Dixie Meadows at depths = 3,000 ft bgs - including right up to the Piedmont fault⁷, which is also roughly coincident with the thermal springs/seeps over a distance of ~2 miles and a clear potential source of the thermal spring discharges (also hypothesized in EGS 2014a). In conjunction with the implication that "permeable fault structures" may also be a production target (page 21 of the ARMMP), the "target" of the proposed geothermal production and injection at Dixie Meadows is, for all practical purposes, undefined as of the drafting of this EA and ARMMP. Such definition is necessary in order to conduct impact analyses and developed an effective monitoring program and management and mitigation measures for the current Proposed Action. ** Notably, the possibility of targeting the Piedmont fault for production is not addressed in the ARMMP. *4 The shales referred to are Jurassic in age according to EGS 2014a. *5 For example, shales, siltstone, slate, and mudstone (EGS 2014a). *6 Based on driller's logs provided in Appendix A of the revised ARMMP. *7 Along which the majority of displacement is known to have occurred between the range front and valley bottom (EGS 2014a).</p>	<p>cross-section, and conceptual flow system. Evidence a shallow lateral flow system in boreholes drilled west of the Piedmont fault document a shallow lateral geothermal flow system that is directly up-gradient of Dixie Meadows. Figure 17 temperature-gradient data has been added to the ARMMP, along with additional discussion in Section 6.4. The temp-gradient data document the presence of a lateral flow system directly up-gradient of the Dixie Meadows geothermal springs, and supports the flow system interpretation of thermal waters that are mixed with cooler meteoric groundwater discharging in Dixie Meadows.</p>
Naval Air Station Fallon	Cultural Resources	Pg. J-2 Item #7 As a suggestion I would change this to "would be mitigate through methods identified in the Nevada State Protocol Agreement which includes consultations with the Nevada State Historic Preservation Office, Tribal Governments, interested parties and potentially the Advisory Council on Historic Preservation.	Section J.2 in Appendix J has been modified to clarify resolution of adverse effects.
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 21 Page: C14-18 Comment: Migratory Birds should include American Avocet and Western Sandpiper as both nest on the Dixie Valley Playa and are a Species of Conservation Priority (Wildlife Action Plan 2012).	Appendix C has been revised to include American Avocet and Western Sandpiper
U.S. Fish and Wildlife Service	Range of Alternatives	Section 2.1.3 of the revise EA; Section 3.2.1.2 of the revised Utilization Plan; Appendix A and Table 7 of the final draft ARMMP Project Description - Expectation of Production at an Average Temperature of 300 or 320o F (per the Project Description); Unexplained Implications: Section 2.1.3 of the revised EA suggests, "based upon data from other Ormat facilities", that the average temperature of pumped geothermal fluids at Dixie Meadows as part of the current project will be 300o F. Section 3.2.1.2 of the revised Utilization Plan similarly indicates that the average temperature of pumped geothermal fluids is expected to be 320o F; again "based on data from other Ormat facilities", as opposed to temperature data obtained at Dixie Meadows. Yet, the highest temperature recorded to date at Dixie	Additional exploration information is now provided in Section 7 of the ARMMP to further explain and support the geological interpretations. Additional data such as temperature-gradient profiles (Figure 17) are now provided in Section 6.4 to support conceptual flow interpretations provided in the ARMMP. Updates have been made to Figure 16 to acknowledge other potential (hypothetical) flow paths for upward

Commenter	Comment Code	Comment	BLM Response
		Meadows during drilling (i.e., based on driller's logs provided in Appendix A of the ARMMP) is 152o F in Triassic basement rocks at a depth of ~4,600 ft bgs in hole 23A-8; with somewhat lower temperatures recorded at depths of ~4,000 to ~7,400 ft bgs in holes 22D-8, 24-8, 42(12)-9, 75-4 and 75-4ML. As such, it is unclear what, if anything, the expectation of pumping geothermal fluids at an average temperature of 300 or 320o F is based on; please address. As described in both the revised EA and Utilization Plan, this is based only on conditions achieved at other Ormat geothermal production facilities. Interestingly, the maximum temperature recorded at Dixie Hot Spring (NDOW-SSI) from 2015 to 2020 was ~160o F (Table 7 of the ARMMP), and according to this reviewer's memory, the highest temperature recorded historically was ~180o F. In conjunction with the lack of firmly defined production target(s), it is unclear whether the project plan includes producing from whatever geologic unit or structure (i.e., fault zone) may be necessary to meet the stated objective of producing at an average temperature of 300 or 320o F (likely an operational/economic requirement). Please revise the Utilization Plan, ARMMP, and EA to address this important question.	geothermal fluid movement, such as along the Dixie mountain front fault, or the Piedmont fault. This is duly reflected in the EA.
Naval Air Station Fallon	Cultural Resources	Pg. General I would not assume there are no paleontological resources and would recommend an updated paleontological study	Language has been modified and proper citation added.
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 22 Page: C-19 Comment: Bats (last paragraph) - Bat acoustic detectors were only deployed for two nights in July 2013 on a single site. Additional acoustic deployment by WRC in 2007 and 2008 are 7-13 year old data and may not adequately represent the current bat fauna. Furthermore, this survey effort could not adequately determine which species of bat are utilizing this habitat during the spring, summer or fall seasons. We recommend repeating bat acoustic surveys pre-project using enclosed BLM protocol	The 2013 bat survey identified the presence of bats within the project area, therefore appropriate EPMs have been developed and will be implemented through the Decision. This made additional surveys unnecessary.
Naval Air Station Fallon	Cooperating Agency relationships	Pg. General NAS Fallon consults with 13 Federally Recognized Tribes. Depending on the size of the APE this could include more tribes.	Comment noted.
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 23 Page: C-21 Comment: Well pads (paragraph 1) - How long will sumps be open? Page C-25, C-5.1 Existing Conservation Measures-If sumps are netted as described how often will nets be checked for stranded live birds? Many waterbirds cannot take off a surface such as a net and become entangled in netting. What is the rescue plan for live birds stranded on the netting?	If deemed applicable, netting would conform with NDOW guidelines.
Naval Air Station Fallon	Cultural Resources	Pg. General I would like to see previous cultural studies map for this area, table of sites noting determination of eligibility and associated studies.	Comment noted.

Commenter	Comment Code	Comment	BLM Response
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 24 Page: C-25 Section: 5th bullet point Comment: The document states that, "In order to avoid potential impacts on sensitive bird species...that all species regardless of status would be considered for protection under BBCS (Page C-10, C.3). These statements appear to conflict. Please clarify if all species or only "sensitive species" are considered for protection.	Appendix C has been revised for clarity.
U.S. Fish and Wildlife Service	GIS data and analysis	Sections 3.1 & 5.1, Table 1, Figures 4, 15, & 16 Available Data - Incomplete Description of Holes/Wells Drilled to Date at Dixie Meadows and Available Temperature Data: Section 3.1 of the final draft ARMMP describes that, to date, Ormat has drilled 8 of a total 60 sought and approved geothermal exploration holes under the 2011 Dixie Meadows Geothermal Exploration Project EA, and that Terragen Power drilled an additional two wells in 2011 prior to Ormat drilling. However, it does not describe or discuss at least 9 additional geothermal exploration holes, or nests of holes, that have been drilled at Dixie Meadows according to EGS 2014a (shown in Figure 31 of that report): 8g2, 8g1, 4g1, 18G/SR-A/4g2, SR-D/3G-1, SR-B/SR-D/3G-1, 20G-1/17G-1/19G-1, SR-C, and Mobil 8g3. In particular, EGS 2014a suggests that temperature curves for 8g1, 8g2, and 8g3 (shown in Figure 31) are indicative of the presence of a hydrothermal plume at Dixie Meadows that emanates from the range-bounding Dixie Valley Fault in the basin fill. Perhaps equally important, temperature curves for the remainder of the holes suggest that they lie outside the hydrothermal plume. Accordingly, it may be possible to delineate the areal extent of the plume using the latter locations. Additionally, Figure 31 of EGS 2014a shows temperatures increasing in deep hole 8g3 from ~120 to 290o F within the first ~160 ft (of basin fill?), then isothermal from ~160 to > 1,000 ft bgs at temperatures of 270 to 290o F - temperatures and temperature gradients unlike any observed in the 10 exploratory holes drilled to date by Terragen Power and Ormat at Dixie Meadows based on the driller's logs provided in Appendix A of the ARMMP; only 6 of which included temperature monitoring: 23A-8 (max temp 152o F), 22D-8 (max temp 151o F), 42(12)-9 (max temp 140o F), 24-8 (max temp 142o F), 75-4 *max temp 135o F), and 75-4ML (max temp 135oF) . Please describe, map and discuss the nine geothermal exploration holes (or nests of holes) shown in Figure 31 of EGS 2014a in this ARMMP as it is an important source of information regarding the geothermal system at Dixie Meadows, in addition to what can be gleaned from the 7 deep holes drilled by Terra Gen and Ormat to date. If this information cannot be obtained (proprietary to another company), then the existence of additional information which might or might not support the hypothesized Hydrogeologic Conceptual Model should be acknowledged.	Additional exploration information is now provided in Section 7 of the ARMMP to further explain and support the geological interpretations. Additional data such as temperature-gradient profiles (Figure 17) are now provided in Section 6.4 to support conceptual flow interpretations provided in the ARMMP. Updates have been made to Figure 16 to acknowledge other potential (hypothetical) flow paths for upward geothermal fluid movement, such as along the Dixie Mountain front fault, or the Piedmont fault. Temperature contours also added to Figure 16. Additional information provided in the newly added Section 7, but site-specific geophysical mapping is considered both proprietary and provisional as part of an ongoing exploration activities.

Commenter	Comment Code	Comment	BLM Response
Naval Air Station Fallon	Cultural Resources	Pg. General Unevaluated sites should be consulted on so that all sites have a determination of eligibility	Comment noted.
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 25 Page: C-28 Section: C.5.4 Comment: The document states, "Construction Design Standards, under proper spacing requirements are generally based on the wing span for the largest species within the given habitat". This would be the American White Pelican (wingspan 8') migrating through the project area (i.e. not perching danger). We recommend including any preventative measure that can be installed/adhered to when constructing powerlines. Dixie Valley is a flyway for waterbirds and shorebirds in route to Stillwater NWR, Carson Lake and waterbodies south. It also has been suggested that Dixie Valley could be a migration corridor for bats.	Appendix C has been revised for clarity.
U.S. Fish and Wildlife Service	Best available information	Appendix A, Sections 5.1, 6.3, 6.4, 6.6, and 8.1 of the final draft ARMMP Available Data - Bedrock Lithology at Dixie Meadows Based on Drilling Described in this ARMMP: Driller's logs for 9 of the 10 exploratory core holes drilled at Dixie Meadows to date are now provided in an appendix of the ARMMP (Appendix A): 23A-8, 22D-8, 42(12)-9, 23-8, 24-8 (also known as 24(13)-8ST, 75-4, 75-4ML, 86-7, and 22-8B; seven of which are deep exploratory core holes, 86-7 and 22-8B limited to 1,000 ft (basin fill). Whereas general references to some of the lithologies intercepted in these core holes are made in Sections 8.1, 8.3, and 8.4 of the ARMMP, the details of the lithologic data obtained (e.g., the depths at which major lithologic units of known geothermal and hydrogeologic significance were encountered in the 7 deep core holes, and depths of contacts) is nowhere discussed or interpreted in this technical report. Rather, after identifying Appendix A as containing the available driller's logs in Section 5.1, the hypothesized hydrogeologic conceptual model is presented in Figure 16 (Section 6.3) and described in general terms in Section 8.1 (with supporting hypotheses introduced in Sections 6.3, 6.4, and 6.6) without any intervening discussion/analysis. We recommend the ARMMP discuss in detail the lithology of the Dixie Meadows area, inasmuch as it can be known from the available exploratory drilling, specifically that obtained in the driller's logs for the 7 deep exploratory core holes, as a basis for developing a conceptual model of the hydrogeology of the area - primarily bedrock hydrogeology relevant to the geothermal system and understanding the source of thermal spring discharges.	The EA (Section 3.3) and ARMMP (Section 2) have been revised to further describe baseline hydrogeologic conditions. The EA now also includes Appendix L , which is a summary of exploratory drilling in the Dixie Meadows area since 2011.
Naval Air Station Fallon	Native American Religious Concerns	Pg. General A table outlining previous SHPO and Tribal Consultation efforts	Chapter 5 in the EA has been revised to include more information regarding previous and recent consultation with SHPO and the FPST.

Commenter	Comment Code	Comment	BLM Response
Nevada Department of Wildlife	Bird and Bat Conservation Strategy	Cmt: 26 Page: C-34 Section: C.6.2 & C.6.3 Comment: Response of Injured wildlife- Any injured wildlife encountered during construction or when under operation should be reported to Jenni Jeffers, NDOW Fallon and wildlife Rehabilitator in Dayton. Reporting (C.6.3) to NDOW should be immediate and wildlife transported same 8 hour day (not 24 hours as in reporting) to avoid further injury or diminished capacity. Treatment for injured wildlife should be timely to address injuries and avoid excess pain and suffering. For large raptors such as eagles or pelicans notify NDOW for capture to avoid injury to personnel.	Appendix C has been revised for clarity.
U.S. Fish and Wildlife Service	Best available information	Available Data - Temperature Data Acquired During Drilling at Dixie Meadows as Described in this ARMMP: Temperature data was recorded in 6 of the 7 deep exploratory core holes installed by Ormat/Terra Gen to date at Dixie Meadows based on this reviewer's detailed inspection of the driller's logs provided in Appendix A of the ARMMP: 23A-8 (max temp 152o F), 22D-8 (max temp 151o F), 42(12)-9 (max temp 140o F), 24-8 (max temp 142o F), 75-4 (max temp 135o F), and 75-4ML (max temp 135oF) . However, this data is nowhere discussed in the current ARMMP. In particular, please discuss the extent to which this limited temperature data supports the presence of a hydrothermal plume emanating from the range-front fault within the basin fill (notwithstanding that its presence is well documented in EGS 2014a based on temperature data collected in holes not identified in this report). Additionally, please describe maximum temperatures documented during the drilling of 6 of the 7 deep core holes installed by Ormat/Terra Gen, to date, in the ARMMP - the relevance of which has been discussed in some detail in comment no. 13.	Cool springs at USGS 101 were monitored and showed no responses. Additional text regarding flow testing added to Section 9.4, including temperature plots in Appendix H.
U.S. Fish and Wildlife Service	Best available information	Sections 6.3, 6.5, and 8.6 of the final draft ARMMP Available Data - Geophysical Data Collected by Ormat to Date at Dixie Meadows: Section 6.3 of the ARMMP references "recent drilling and geophysical surveys near Dixie Meadows" as a basis for characterizing the dip of the range-front fault at Dixie Meadows; and Section 8.6 describes geophysical data as supporting their hypothesis that "geothermal fluid[s] migrate upward through hypothesized east-northeast trending fault structures discharging... into basin fill". However, nowhere in this technical report is any geophysical data obtained by Ormat at Dixie Meadows described or discussed; including Section 6.5, titled "Geologic and Hydrogeologic Setting, Geophysics" (except for the identification of a negative magnetic anomaly reported in EGS 2014a, which is interpreted in EGS 2014a as indicative of the presence of a high-temperature long-standing geothermal system at Dixie Meadows). Please describe in the ARMMP any geophysical surveys or borehole geophysical data obtained by Ormat to date at Dixie Meadows, given that it may support hypotheses regarding, in particular, the presence of various faults advanced in this document, or not.	Additional information has been provided in the newly added Section 7, but site-specific geophysical mapping is considered both proprietary and provisional as part of an ongoing exploration activities.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Best available information	<p>Sections 6.3 and 8.1 of the final draft ARMMP Available Data - Generic References to "Exploration Activities" at Dixie Meadows in Support of the Presence of Hypothesized Faults (Key Elements of the Proposed Hydrogeologic Conceptual Model): Section 6.3 of the ARMMP hypothesizes that there are "several younger faults in Dixie Meadows that vary in strike from northeast to southeast" and that "recent exploration activities [generically speaking] suggest that the older reactivated east-northeast trending structures are the conduits and primary source of geothermal fluids at the Dixie Meadows geothermal field" (as reportedly discussed in greater detail in Section 8.1). However, Section 8.1 (in support of the hypothesis advanced in Section 6.3) refers broadly to "... existing hydrologic data, and spatial trends of gravity anomalies, thermal gradients, and magnetic lows" documented in Ormat 2019 of the ARMMP (an apparent citation error since in reference to a springsnail survey); although no specific hydrologic trends and no specific gravity, magnetic, or thermal gradient data are described in the ARMMP. Hypotheses advanced within the ARMMP should be supported by specific data, which is itself described in at least some detail in the ARMMP.</p>	<p>Additional exploration information is now provided in Section 7 of the ARMMP to further explain and support the geological interpretations. Additional data such as temperature-gradient profiles (Figure 17) are now provided in Section 6.4 to support conceptual flow interpretations provided in the ARMMP. Updates have been made to Figure 16 to acknowledge other potential (hypothetical) flow paths for upward geothermal fluid movement, such as along the Dixie Mountain front fault, or the Piedmont fault.</p>
U.S. Fish and Wildlife Service	Best available information	<p>Appendix A, Sections 3.1 & 5.1, Figure 4, and Table 1 of the final draft ARMMP Available Data - Lithologic Data Obtainable from Driller's Logs for the 7 Deep Exploratory Core Holes Drilled to Date by Ormat/Terra Gen at Dixie Meadows (Appendix A): Although not discussed in the ARMMP (see comment no. 15), the following lithologic information (relevant to the geothermal system and bedrock hydrogeology of the area) can be gleaned from the provided driller's logs based on this reviewer's recent interpretation of the logs. Of the 8 geothermal exploration holes drilled by Ormat and two holes drilled by Terra Gen at Dixie Meadows (described in Section 3.1 of this ARMMP), seven are installed to depth in bedrock according to Table 1 and the driller's logs provided in Appendix A (i.e., beyond three 1000-1500 ft holes and many shallow holes/wells completed in the local basin-fill aquifer or nearby playa sediments). Four of the 7 deep holes are located within about 700 ft of each other (0.1 miles east-west and 0.1 miles north-south) between the traces of the range-front Dixie Valley Fault and primary (and only mapped) Piedmont fault at Dixie Meadows based on electronic GIS data provided with the 2013 version of EGS 2014a: * 22D-8 [TD 4,025 ft, intersecting Triassic basement rocks at about 2,800 ft bgs]; * 23-8 and 23A-8 which are roughly collocated [TD 4,700 and 4,758 ft, respectively, both intersecting Triassic basement rocks at about 3,500 ft bgs]; and * 24(13)-8ST2, also known as 24-8 [TD 4,800 ft, intersecting Triassic basement rocks at ~3,300 ft bgs and intrusive granodiorite (Cretaceous?) ~4,300 ft bgs]. The remaining 3 deep holes are located east of the trace of the Piedmont fault, the latter</p>	<p>Please note that borehole depths in logs do not equal elevations due to borehole orientations - the reviewer has not taken into consideration the azimuth of the deep boreholes. Additional Section 7 now details the exploration drilling activities and key observations for each borehole. The reservoir that has been defined is not similar to that defined at the Dixie geothermal power plant (associated with the Piedmont Fault system), nor interpreted at Comstock (associated with the range-front fault). In this regard, the inferences that the Dixie Meadows geothermal reservoir is associated with the Piedmont fault is incorrect. The EGS (2014) work was not intended to define the geothermal reservoir, nor did it have sufficient data to define the reservoir at the project development level. The geothermal reservoir that has been defined and tested by ORMAT is a unique condition of permeability and</p>

Commenter	Comment Code	Comment	BLM Response
		<p>roughly coincident with the thermal springs/seeps (again, based on electronic GIS data provided with the 2013 version of EGS 2014a): * 42(12)-9 [TD 7,442 ft, intersecting tuff at about 3,700 ft bgs, with possible but less than clear evidence of basalt between ~2,100 and 3,700 ft bgs]; and * 75-4 and 75-4ML which are essentially collocated [TD 5,000 and 5,476 ft, respectively, both intersecting intrusive granodiorite, gabbro, and/or granite, and quartz diorite (likely Jurassic?) at 3,500 to 3,600 ft bgs immediately below the Quaternary basin fill]. Of the latter, only 42(12)-9 is roughly aligned west to east with the four deep bedrock holes on the west side of the Piedmont fault, so can be used to construct a conceptual cross-section of the area's bedrock lithology normal to the Dixie Valley Fault Zone (DVFZ). As such, the relative locations/depths of major bedrock units defining the geothermal system at Dixie Meadows are known at essentially two locations (based on the exploratory drilling described in this ARMMP), 42(19)-9 and the vicinity of 22D-8, 23-8/23A-8, and 24-8; and only to the following limited extent: 1. Depth to Triassic basement rocks in the vicinity of holes 22D-8, 23-8/23A-8, and 24-8 (located ~1,500 to 2,000 ft east of the trace of the range-front Dixie Valley Fault and west of the Piedmont fault) is ~2,800 to 3,500 ft; and 2. depth to Tertiary tuff (Oligocene) in the vicinity of hole 42(12)-9 (located ~7,000 ft or 1.35 miles east of the other deep holes, and ~5,400 ft east of the Piedmont fault) is ~3,700 ft; hole 42(12)-9 terminating in tuff (i.e., not reaching Triassic basement rocks). West of the piedmont fault, neither Miocene basalt, nor Jurassic basement rocks, both major bedrock units defining geothermal systems elsewhere along the west side of Dixie Valley (per EGS 2014a), appear to be present at Dixie Meadows based on the limited exploratory drilling conducted to date. Exploratory drilling conducted at Dixie Meadows so far provides scant lithologic information from which a Hydrogeologic Conceptual Model of the geothermal system can be developed, or the one hypothesized in Figure 16 of this ARMMP evaluated. However, this is the lithologic information that can be obtained from the driller's logs for core holes drilled to date at the site. As such, we recommend they be included in the ARMMP. ** Any Hydrogeologic Conceptual Model hypothesized in the ARMMP should comport with this data.</p>	<p>temperature in Paleozoic sedimentary rocks (shale) which is typically not permeable, and resides deeper and west of the range-front fault system. The dilated east-northeasterly fracturing is encountered at zones of permeability and can be mapped extending into the mountain-front bedrock. Ormat has developed a 3D geologic framework model, using all available geologic data, which forms the basis for the Figure 16 cross-section, and conceptual flow system. Evidence a shallow lateral flow system in boreholes drilled west of the Piedmont fault document a shallow lateral geothermal flow system that is directly up-gradient of Dixie Meadows. Figure 17 temperature-gradient data has been added to the ARMMP, along with additional discussion in Section 6.4. The temp-gradient data document the presence of a lateral flow system directly up-gradient of the Dixie Meadows geothermal springs, and supports the flow system interpretation of thermal waters that are mixed with cooler meteoric groundwater discharging in Dixie Meadows.</p>
<p>U.S. Fish and Wildlife Service</p>	<p>Best available information</p>	<p>Appendix A and Figure 16 of the final draft ARMMP Available Data - Lithologic Data Obtained from Drilling of Deep Hole 42(12)-9 East of the Piedmont Fault: The driller's log provided for hole 42(12)-9 located approximately ~7,000 ft or 1.35 miles east of the other deep holes (and ~5,400 ft east of the Piedmont fault) terminates at 7,442 ft along hole in tuff; i.e., does not reach Triassic basement rocks as shown Figure 16, the hypothesized hydrogeologic conceptual model.</p>	<p>The Piedmont fault has an inferred dip to the east. Drilling of 42(12)-9 did not encounter thermal conditions indicating the Piedmont fault is the geothermal source, thus exploration actions shifted to explore further to the west, as now explained in Section 7. Minor edit made to Figure 16 regarding Triassic basement contact at a lower elevation.</p>

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U.S. Fish and Wildlife Service	Best available information	Appendix A and Sections 6.2 and 6.3 of the final draft ARMMP Available Data - Structural Geology, Dip of the Range-Front Fault Based on Information in Driller's Logs for 3 of the 7 Deep Exploratory Core Holes Drilled by Ormat at Dixie Meadows: EGS 2014a repeatedly describes the DVFZ (west side of Dixie Valley and the focus of several major geothermal cells from Dixie Meadows to Comstock and the vicinity of the Terra Gen operation) as comprised of the range-front fault and one or more subparallel piedmont faults, a series of steeply-dipping step-down faults (EGS 2014a Section 2.2.2 and Blackwell et al. 2005 in particular), the presence of which are supported by multiple lines of investigation (geologic and geophysical). In contrast, The ARMMP describes the range-front fault and primary (and only mapped) piedmont fault at Dixie Meadows (per EGS 2014a) as moderately-dipping, and specifically ascribes a moderate dip of 47 degrees to the range-front fault (ARMMP Sections 6.2 and 6.3). Based on this reviewer's interpretation of the driller's logs for the 7 deep exploratory core holes installed to date, it is agreed that the range-front fault is indeed moderately dipping at Dixie Meadows; although this reviewer calculates (using information in the driller's logs for holes 22D-8, 23A-8, and 23-8) that the dip of the range-front fault is closer to 60 - 64o - although this is not a significant component of the Hydrogeologic Conceptual Model that has been hypothesized (Figure 16 and Section 8.1 of the ARMMP).	The dip of the range front fault is derived from the ORMAT 3D geologic model, which integrates all available published and unpublished geologic data, and is believed to be accurate. Exploration data are now thoroughly described in Section 7 of the ARMMP.
U.S. Fish and Wildlife Service	Best available information	Appendix A and Figure 16 of the final draft ARMMP Available Data - Structural Geology, Presence of Faults Hypothesized in Figure 16 (the Proposed Hydrogeologic Conceptual Model) Based on Information in the Recently Provided Driller's Logs: Based on a detailed interpretation of the recently provided driller's logs, this reviewer finds no evidence of fault breccia indicative of the "East-Northeast Striking Fault", shown as a splay off the Piedmont Fault in Figure 16, in the driller's logs for holes 22-8b, 22D-8, 23A-8, or 23-8. If the ARMMP has a different interpretation (or other so far undisclosed data) in support of the presence and hypothesized dip of the fault, it should be added to the ARMMP.	As reviewed in the Technical Working Group, and now more thoroughly described in Section 7, the east-northeasterly faults are encountered in exploration drilling and are not recent fault feature that are reflected on the land surface through the alluvium, but are mapped in the bedrock flank of the Stillwater Range, with strike and dip determinations from borehole fracture orientation logging.
U.S. Fish and Wildlife Service	Best available information	Section 6.3 and Figures 15 and 16 of the final draft ARMMP Available Data - Structural Geology, Hypothesis Regarding the Presence of the Piedmont Fault at Dixie Meadows Based on Drilling Conducted by Ormat to Date: Section 6.3 of the ARMMP concludes that, "Ormat exploratory drilling has not, to date, encountered evidence of a deep-rooted piedmont fault... [at Dixie Meadows]", citing an Ormat 2020 verbal communication; the Piedmont Fault roughly coincident with the Dixie Meadows thermal springs/seeps over a distance of ~2 miles and a clear potential source of the thermal spring discharges (also hypothesized as such in EGS 2014a). To the contrary, given the locations of the deep exploratory holes drilled to date at	The exploration boreholes are not vertical, most angle at varying angles to the west, as shown in Figure 16. Section 7 now provides additional details regarding the drilling of each geothermal borehole for the project, data for which are incorporated into the 3D geologic model that Ormat is using for project development, but which is provisional and proprietary. Figure 16 adds in a possibility for

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		Dixie Meadows (shown in Figure 15 of the ARMMP), and assuming the holes are vertical, none of the holes drilled to date could have intersected this major Piedmont fault - which is also clear in Figure 16 (the proposed Hydrogeologic Conceptual Model).	geothermal upflow along the Piedmont fault, but data to date (Section 7, and temperature-gradient data - Section 6.4 and Figure 17) do not support this flow path hypothesis.
U.S. Fish and Wildlife Service	Best available information	Sections 3.1 and 8.4 of the final draft ARMMP Available Data - "Flow" (i.e., Pumping) and Injection Tests Conducted at Dixie Meadows to Date: It is unclear, based on the information provided in Sections 3.1 and 8.4 of the ARMMP regarding "flow and injection testing" conducted by Ormat at Dixie Meadows in 2017: 1) Whether the "flow" (i.e., pumping) test and injection test (or tests) were conducted sequentially with adequate time for recovery in between; 2) what the duration of the pumping test was in 23A-8 (at 2,075 to 1,600 gpm) or the duration of injection was in 24-8 (at 2,500 to 1,300 gpm) or 75-4 (at an insignificant 165 gpm); or 3) how the tests were analyzed given that the description of conclusions are quite qualitative. In general, based on the information provided in Section 8.4, conclusions made based on these tests appear to be speculative.	Additional testing text and clarification is provided in Section 9.4. The test was one continuous 46 day test with discharged water from 23A-8 being piped and injected into 24-8 and 75-4 simultaneously. Geothermal fluids are not discharged to land surface like pumping tests from groundwater wells. Additional data on field parameters of measured at five springs during the flow testing is provided to support the findings, along with pressure / groundwater depth measurements and tracer testing is now available and plotted in Appendix H.
U.S. Fish and Wildlife Service	Best available information	Section 8.4 of the final draft ARMMP Available Data - References to an "Ormat Fault Model" (citation Ormat, 2017): Section 8.4 of the ARMMP references an "Ormat Fault Model" of implied detail; which, however, is not described (or disclosed) in the ARMMP - although any such information could be extremely valuable in confirming or disputing key aspects of the proposed Hydrogeologic Conceptual Model. As such, we recommend the "Ormat Fault Model" referred to be described, along with information that was used to arrive at this model, in the ARMMP.	For clarity, the model may be more appropriately termed a 3D geologic model. The model is proprietary and also considered an evolving work product (provisional) that is updated with new geologic information, as it becomes available.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Sections 6.3 and 8.1 of the final draft ARMMP Proposed Hydrogeologic Conceptual Model - Structural Geology, Conclusions Regarding Displacement on the Range-Front and Piedmont Faults at Dixie Meadows: Section 6.3 of the ARMMP implies, but does not clearly state, that a vertical displacement of 3,000 meters occurs at the Dixie Valley [range-front] Fault at Dixie Meadows; or at a minimum at the range-front fault, generally, on the west side of Dixie Valley. Although somewhat misstated in the section of EGS 2014a this information appears to have been quoted from (Section 2.2.2), taken in context, the information conveyed in EGS 2014a is that a maximum total displacement of about 3,000 m (9800 ft) occurs within the Dixie Valley Fault Zone based on the elevation of Miocene basalts in the Stillwater Range versus boreholes on the west side of the valley floor. While EGS 2014a does not speak specifically to the magnitude of displacement on the range-front fault at Dixie Meadows, or on the Piedmont fault at the site, the majority of normal displacement	Section 7 in the ARMMP and temp-gradient data (Figure 17) now in the ARMMP provides additional information as to why the Piedmont fault is not identified as a primary flow path for thermal springs in Dixie Meadows. Also see updated text in Section 6.4.

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		<p>within the DVFZ in the vicinity of the Comstock Mine and Terra Gen operation (north of Dixie Meadows) has been determined to occur on the Piedmont fault rather than the range-front fault (based on geophysical and drilling data described in EGS 2014a Sections 3.1, 3.2, and 6) - the piedmont fault referenced at Comstock being a continuation of the Piedmont fault at Dixie Meadows (which is roughly coincident with the thermal springs/seeps) based on electronic GIS data provided with the 2013 version of the Part I report, as well as Figures 49a, 49b, and 49c of EGS 2014a, and Figure 97 of EGS 2014b. See also Figure 14 of EGS 2014a in which the Piedmont fault at Dixie Meadows (and elsewhere to the north within the DVFZ) is interpreted to be a "major structure", while the range-front fault is not. Modeling undertaken as part of the EGS Part II investigation simulated displacement on the range front fault as 0.5 - 1 km, and displacement on the Piedmont fault at Dixie Meadows as = 1 km (EGS 2014b Figure 97) - in contradiction to conclusions provided in Section 8.1 of the ARMMP that "... [the Piedmont fault is] an unlikely source of geothermal fluid [movement in] the Dixie Meadows area".</p>	
<p>U.S. Fish and Wildlife Service</p>	<p>Aquatic Resources Monitoring and Mitigation Plan</p>	<p>Section 6.3 and Figure 15 of the final draft ARMMP Proposed Hydrogeologic Conceptual Model - Structural Geology, Mapped Faults at Dixie Meadows: Shapefiles describing the traces of mapped faults in Dixie Valley, plus the whole of the Stillwater Range, were provided as an electronic release with the 2013 version of EGS 2014a. This reviewer has mapped all of the fault-related shapefiles provided as part of that release, along with the geology of Crafford 2007 and locations of springs documented at Dixie Meadows as of 2017, and finds that (in addition to the range-front fault) there is one (major) Piedmont fault at Dixie Meadows which is roughly coincident with the locations of the ~20 thermal springs/seeps (contrary to conclusions expressed in Section 6.3 of the ARMMP); and moreover that the same piedmont fault continues north through Comstock and into the area of the ongoing Terra Gen operation. If any additional piedmont faults have been identified at Dixie Meadows, they were not documented in the extensive 2013 electronic data release; nor are they shown in any figures provided in EGS 2014a or 2014b - see, for example, Figure 49b of EGS 2014a and Figure 97 of EGS 2014b. Thus, we conclude that there is one (major) Piedmont fault at Dixie Meadows. The dashed line in ARMMP Figure 15, which trends NNE near the Dixie Meadows thermal springs and represents this major Piedmont fault, was originally shown (August 2020 draft of the ARMMP) as terminating at Dixie Hot Spring (a physically untenable condition), rather than continuing for more than an additional 10 miles up the west side of the valley. That error (called out in a previous comment) has now been remedied. Moreover, the trace of the Piedmont fault as depicted in Figure 15 of the August 2020 draft of the ARMMP was located just east of the line of spring orifices, which given the dip of the</p>	<p>The geologic mapping cited by the reviewer was not conducted to the local scale as has now been mapped by Ormat geologists and ENE faults as shown in Figure 15 are not reflected in the alluvium (older concealed faults). Section 7 provides additional details as to the permeability determined through testing in exploration boreholes 23A-8 and 22-8b, along with the structural geologic interpretations for the local area. Also, as now explained in Section 7, the Piedmont fault has not been determined to be the structure associated with the geothermal reservoir.</p>

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		<p>fault to the east suggested that the springs are a separate phenomenon from the fault; i.e., would preclude the discharge of geothermal waters from the fault via the springs if true. To the contrary, based on this reviewer's mapping of electronic data released with the 2013 version of EGS 2014a, along with the locations of springs documented at Dixie Meadows as of 2017, the line of thermal spring orifices, which are virtually coincident with the Piedmont fault, are located just east of the fault (as opposed to the fault being located east of the springs) - the former consistent with the fault being the source of the thermal spring discharges, prior to mixing with water in the basin-fill aquifer, the result of which is that the locations of discharge to the surface are "pushed" a short distance east of the fault's trace in the direction of the hydraulic gradient within the basin-fill aquifer. This error in the mapping of the Piedmont fault (relative to the thermal springs) has also been remedied in this final draft of the ARMMP (consistent with the electronic data released in conjunction with EGS 2014a). Beyond these two corrections, however, numerous additional (concealed) faults are shown in Figure 15 of the current ARMMP (the proposed hydrogeologic conceptual model) radiating outward in an unusual fan-like pattern from a drainage west of the thermal springs in directions ranging from SE to ENE. First, the strike of these hypothesized structures, if intended to represent faults within bedrock, are inconsistent with that of the two major sets of faults (other than thrust faults) identified in the Stillwater Range and floor of Dixie Valley (EGS 2014a Section 2.2.1): north trending normal (strike-slip) faults and northeast trending high-angle normal faults. Second, none of the hypothesized faults (radiating SE to ENE from a drainage west of the thermal springs) is shown in the geologic maps of Page 1965, Speed 1976, Stewart and Carlson 1978, or Crafford 2007. At most, Page 1965 shows what appear to be channels (ephemeral?) issuing in a fan-like pattern from a drainage in the Stillwater Range roughly west of Dixie Meadows (although not entirely clear since these light blue lines are not shown in the legend of that map); and something similar is depicted on the Speed 1976 map (more clearly surface drainages emanating from the base of the range). Stewart and Carlson 1978 shows the range-front fault along the east side of the Stillwater Range and a portion of the Piedmont fault at Dixie Meadows; while Crafford 2007 depicts no concealed faults at Dixie Meadows in the floor of the valley, only the range-front fault. In summary, the basis for this set of hypothesized faults (Figure 15 of the current ARMMP) remains unclear (supported only by qualitative assertions in the ARMMP) and inconsistent with mapping by Page 1965, Speed 1976, Stewart and Carlson 1978, or Crafford 2007, and most recently EGS 2014a (and 2014b) - although apparently key to several of the structures hypothesized in Figure 16, the proposed Hydrogeologic Conceptual Model of the geothermal system at Dixie Meadows.</p>	

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U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>Sections 1.0 and 4.1 of the final draft ARMMP Proposed Hydrogeologic Conceptual Model - Description of the Source of Thermal Discharges from the Dixie Meadows Springs/Seeps: Section 4.1 of the ARMMP describes the Dixie Meadows thermal springs/seeps as "valley-floor seeps and springs". This description of the Dixie Meadows thermal springs/seeps is also provided in the introductory text of Section 4, entitled "Basin Characteristics and Hydrologic Setting", and elsewhere in the document. Inasmuch as "valley-floor springs" is likely to be interpreted by the hydrologic community, as well as the reading public, to mean "water table springs" (spring discharges originating in the basin-fill/"valley-floor" aquifer), we recommend this language be modified to accurately disclose the hydrologic origin of the thermal spring discharges at Dixie Meadows. Other comments regarding the source of the thermal spring discharges provided in detail elsewhere in this review.</p>	<p>No change is needed, the terminology used is industry standard.</p>
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>Section 8.1 and Figures 15 and 16 of the final draft ARMMP Proposed Hydrogeologic Conceptual Model - Additional Issues With the Hydrogeologic Conceptual Model Depicted in Figure 16 and Described in Section 8.1 of the current ARMMP: Issues as follows in general order of significance: -Presence of a Hydrothermal Plume Emanating from the Range Bounding Fault versus Geothermal Discharge from the Piedmont Fault Forming the Thermal Springs: EGS 2014a has established that surficial hydrothermal plumes are present in basin fill overlying the geothermal cells at Dixie Meadows, Comstock Mine, and the area of the Terra Gen operation (see Figure 33 of EGS 2014a). That a hydrothermal plume exists at Dixie Meadows is not in dispute. However, based on the depictions provided in Figure 33 of EGS 2014a, and lack of information to the contrary in either EGS 2014a or EGS 2014b, all three surficial hydrothermal plumes are believed to emanate from the range-front fault (i.e., result from the movement of geothermal waters up the range-front fault from the respective reservoirs and then downgradient within basin fill). Secondly, the discharge of geothermal water from the range-front fault does not preclude the discharge of geothermal water from the same reservoir up other faults within the DVFZ at Dixie Meadows, just as it does not preclude the discharge of geothermal waters from other faults within the DVFZ at Comstock and the Terra Gen site - specifically, from the Piedmont fault. The Piedmont fault has been identified as the major producing structure at both Comstock and the Terra Gen site based on multiple lines of evidence (EGS 2014a Section 2.2.2). Given that the bulk of vertical displacement within the DVFZ at Dixie Meadows has been shown to occur along the Piedmont fault, as well as at Comstock and the Terra Gen site (Figure 97 of EGS 2014b), there is no basis for concluding that the Piedmont fault at Dixie Meadows is not also the major (natural) producing structure in the vicinity of the proposed project given the</p>	<p>EGS (2014) does not accurately characterize the geothermal reservoir that has been defined at Dixie Meadows by ORNI 32 exploration and testing - as now described in Section 7 of the ARMMP. The reference to EGS (2014a) - relates that up-gradient of the Piedmont Fault there is evidence of a shallow lateral flow system based on the temperature gradient data from 8G1-2. Additional temperature gradient data is now presented in Figure 17 and discuss in Section 6.4 of the ARMMP. The presence of the shallow lateral flow of thermal waters up-gradient of Dixie Meadows is a key component to understanding and correctly interpreting the local flow system, and sense it is conclusively documented directly up-gradient of the Dixie Meadows thermal springs, is the logical source for the spring source. Conversely, no data has been observed date to support the hypothesis presented by the reviewer that upwelling of thermal fluids is occurring along the Piedmont fault - the geothermal reservoir has been conclusively been identified WEST of the Piedmont fault, which in turn supports the</p>

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		<p>potential for a damage zone of significant permeability (likely in the hanging wall of the fault). Moreover, the thermal springs/seeps are roughly coincident with the Piedmont fault at Dixie Meadows and lie just east of the trace of the Piedmont fault based on electronic data released in conjunction with EGS 2014a - which is consistent with the Piedmont fault being the source of thermal spring discharges prior to mixing with water in the basin-fill aquifer, at which point the locations of discharge to the surface are "pushed" a short distance east of the fault's trace in the direction of the hydraulic gradient within the basin-fill aquifer. In summary, the movement of geothermal waters up the range-front fault and into the basin fill at Dixie Meadows, and discharge of the same geothermal waters from the same deep reservoir (Triassic basement rocks) up the Piedmont fault to produce the thermal spring discharges, are not mutually exclusive. The basis for omitting the latter significant characteristic/component of the geothermal system at Dixie Meadows from the current Hydrogeologic Conceptual Model (Section 8.1 and Figure 16 of the ARMMP) is unclear and without basis. -Piedmont Fault Hypothesized as "Non-permeable" and "Non-producing" (implications for the current conceptual model) - see annotation on Figure 16: Proposed despite the coincidence, for all practical purposes, of the Piedmont fault at Dixie Meadows with the thermal springs/seeps; and multiple lines of drilling and geophysical evidence that the majority of normal displacement within the DVFZ at Dixie Meadows occurred at the Piedmont fault (rather than the range-front fault), creating the potential for a damage zone of significant permeability (likely in the hanging wall of the fault). -Additional Faults Hypothesized between the Range Bounding and Piedmont Faults in Figure 16 (based on the hypothesized traces of faults in Figure 15 of the ARMMP?): It appears that the only plausible basis for the inclusion in Figure 16 of the east-northeast trending faults hypothesized between the Piedmont fault and range-front fault at Dixie Meadows is the intersection of transect A-A' with the hypothesized east-northeast trending structures shown in Figure 15; the existence of which have been disputed in detail in comment No. 27 (not shown in the geologic maps of Page 1965, Speed 1976, Stewart and Carlson 1978, or Crafford 2007, or any figures in EGS 2014a and 2014b). Moreover, all arguments presented in the current ARMMP for the existence of these faults has been qualitative and unsupported by specific data. Among these hypothesized east-northeast trending structures, one is depicted in Figure 16 (and also described in the text of Section 8.1 of the ARMMP) as being responsible for the movement of geothermal waters from the geothermal reservoir (at Dixie Meadows) into the basin fill aquifer to create the documented hydrothermal plume (also described in the first bullet of this comment). Specifically, the text of Section 8.1 of the ARMMP suggests that east-northeast trending faults (plural?) are "largely responsible for the main permeability</p>	<p>interpretation as source of upwelled thermal fluids in the E-NE faults, the upwelling of which then flow laterally at shallow depth of about 200 ft below land surface to the Dixie Meadows.</p>

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		<p>encountered in the [geothermal] system [at Dixie Meadows] and are likely the conduits for geothermal fluids entering the Dixie Meadows hydrologic domain" (the meaning of the latter unclear). Based on the annotation provide in Figure 16, this is the fault that is specifically hypothesized in the ARMMP (Section 8.1) to be the source of the surficial hydrothermal plume - rather than the range-front fault as shown in Figure 33 of EGS 2014a. -Extension of the Surficial Hydrothermal Plume (in basin fill) beyond the piedmont fault and thermal springs/seeps at Dixie Meadows, into an "extensional zone" which is depicted as extending to the playa (Humboldt Salt Marsh) in Figure 16: The basis or need for inclusion of this feature in the hypothesized Hydrogeologic Conceptual Model is unclear. -Bedrock Lithology Depicted in the Proposed Conceptual Model: Likely largely conceptually correct based on characterizations of bedrock lithology in the vicinity of the geothermal cells at Comstock and the Terra Gen operation (see Figures 45a and 45b of EGS 2014a), but hypothesized at Dixie Meadows based on exploratory drilling at, for all practical purposes, just two locations (i.e., hole 42(19)-9 and the vicinity of holes 22D-8, 23-8/23A-8, and 24-8). Moreover, the depth to Triassic basement rocks on the east side of the Piedmont fault is unknown (based on hole 42(12)-9 which terminated in tuff) - contrary to the schematic Hydrogeologic Conceptual Model proposed in Figure 16. -ARMMP Text Describing/Justifying the Hypothesized Hydrogeologic Conceptual Model Depicted in Figure 16: Limited, for all practical purposes, to three sentences on page 26 of the ARMMP; specifically: "Based on this stress regime, existing hydrologic data, and spatial trends of gravity anomalies, thermal gradients, and magnetic lows (Ormat, 2019), it appears that the east-northeast trending structures of Dixie Meadows are largely responsible for the main permeability encountered in the system and are likely the conduits for geothermal fluids entering the Dixie Meadows hydrologic domain. The discharge of geothermal water from these east-northeast trending structures does not preclude the discharge of geothermal water from the same reservoir up other faults within the DVFZ, namely the range-front and piedmont faults; however, the piedmont fault does not appear to contribute geothermal fluid to the shallow thermal regime [meaning unclear, citing EGS 2014a], making it an unlikely source of geothermal fluid to the Dixie Meadows area. Geochemical and stable isotope data suggest that there is not a direct hydraulic connection between the geothermal reservoir and the springs, but rather, geothermal fluid migrates upward through permeable segments of the east-northeast trending faults and reaches the shallow basin-fill alluvium, where it then mixes with alluvial groundwaters and migrates down-gradient and easterly." The explanation provided in this text in support of the proposed Hydrogeologic Conceptual Model (most</p>	

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		clearly depicted in Figure 16) is inadequate and inconsistent with multiple lines of evidence provided in EGS 2014a and these comments.	
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Section 8.1 and Figure 16 of the final draft ARMMP Proposed Hydrogeologic Conceptual Model - Implications of Moving Forward with the Current Hydrogeologic Conceptual Model: If accepted as is, the proposed Hydrogeologic Conceptual Model would significantly and adversely affect the interpretation of any changes detected at depth in bedrock, within the hydrothermal plume emanating from the range-front fault into basin fill, and/or at the thermal springs (temperature or discharge); as well as the development of an effective hydrogeologic (bedrock) monitoring program and development and implementation of effective management/mitigation measures.	The hydrologic monitoring plan is well suited to measure potential responses, as the flow system is presently defined by geologic and temperature data. The ARMMP identifies both the conceptual flow model supported by the existing data along with conceptual flow systems that have been postulated. The monitoring network is developed to address all conceptual flow path, with the main objective of preserving flows and habitat regardless of flow paths.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Final draft ARMMP Need for Additional Exploratory Data Collection - Geologic, Geophysical, Temperature, and Hydraulic Testing to support the development of an adequate understanding of the geothermal resource and overall hydrogeologic system at Dixie Meadows, as well as a description of the proposed geothermal production and injection in sufficient detail to allow its potential impacts on the area's natural resources to be evaluated; in addition to the development of an effective monitoring program and effective management and mitigation measures. Fundamentally, the project proposes to extract energy from the geothermal system at Dixie Meadows - which is either the source, or intimately hydraulically connected to the source of the thermal spring discharges. Consequently, the above (information about the local hydrogeology / geothermal system, as well as the proposed project in sufficient detail) is required to adequately evaluate whether that can be done without significantly diminishing the overall temperature (or possibly rate) of the thermal spring discharges which support the habitat for Dixie Valley toad. The collection of this additional exploratory data has already been authorized under the 2010 and 2011 Exploration EAs, the full development of which has only just begun - i.e., many well pads, exploratory core holes (including temperature gradient), and full-size wells that could be used for hydraulic testing have been permitted for installation at Dixie Meadow as of 10 or more years ago, but are uninstalled to date.	Additional drilling will occur, and additional data being developed will continue to be integrated into the conceptual geologic framework models and flow system models. The ARMMP document is intended to be adaptive to data as it is collected into the future.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Impact of the Current Hydrogeologic Conceptual Model (Described in This ARMMP) On the Development of an Effective Hydrologic Monitoring Program capable of identifying project impacts, if not providing "early warning"; which (given the nature of the proposed project and resources at risk) must include adequate hydrogeologic (i.e., bedrock pressure/hydraulic head and temperature) monitoring - irrespective of	As stated in the ARMMP Section 10.0, as additional data are collected, it will be integrated appropriately, in an adaptive manner, with the intent of no negative impact springs and habitat. If future data indicate

Commenter	Comment Code	Comment	BLM Response
		<p>the details of the geothermal production and injection - which remain largely undefined as of this revised EA. If accepted as is, the proposed hydrogeologic conceptual model would significantly and adversely affect the interpretation of any changes detected at depth in bedrock at Dixie Meadows, within the hydrothermal plume emanating from the range-front fault into basin fill, and/or at the thermal springs/seeps (temperature or discharge) - under the proposed, or any future, monitoring program.</p>	<p>additional monitoring points are needed, they can be added as requested by the BLM. Participation in the stakeholder Technical Working Group needs to be a priority for the USFWS, as this will be the mechanism for distribution and discussion of the data being collection and potential adjustment that may be made.</p>
<p>U.S. Fish and Wildlife Service</p>	<p>Aquatic Resources Monitoring and Mitigation Plan</p>	<p>Final draft ARMMP Impact of the Current Hydrogeologic Conceptual Model (Described in this ARMMP), in Combination With Inadequacies in the Current Project Description, on the Development of Effective and Reliable Management and Mitigation Measures: Substantial as described in the previous 32 comments -assuming effective and timely mitigation is feasible given that the source of the thermal spring discharges (which support habitat for Dixie Valley toad) and the geothermal system which must (in some manner) be the target of the proposed geothermal energy generation project, are one in the same - or at a minimum in intimate hydraulic connection.</p>	<p>The flow testing has demonstrated that pumping and reinjection can occur without severely affecting the discharge of springs in Dixie Meadows. This observation is now more thoroughly detailed in Section 9.4 and Appendix H.</p>
<p>U.S. Fish and Wildlife Service</p>	<p>Aquatic Resources Monitoring and Mitigation Plan</p>	<p>Section 3.3 and multiple figures in the final draft ARMMP Extent of the "WARD" (Water and Aquatic Resource Delineation area) for this ARMMP: A significant portion of the area between the range-front fault and the major Piedmont fault located ~0.6 - 1.0 miles to the east (coincident with the Dixie Meadows thermal springs/seeps in Sections 17, 8, and 5 of 22N 35E) has been omitted from the WARD (study area?) for this final draft of the ARMMP; the latter (continues to be) limited to the area of surficial water resources, rather than the project site and area of potential project impacts. The omitted area includes a recognized component of the geothermal system at Dixie Meadows per EGS 2014a Section 5.2.1 - a hydrothermal plume emanating from the range-front fault or a buried piedmont fault (the plume shown in Figures 33 and 6A of EGS 2014a). However, no piedmont fault is mapped in the Dixie Meadows area west (or east) of the major Piedmont fault in any figure provided in EGS 2014a (or EGS 2014b), or among the electronic GIS data provided with the 2013 version of the report, or modeled in EGS 2014b (Figure 97), or according to the USGS Quaternary Fault and Fold Database for the Nation (http://earthquake.usgs.gov/hazards/qfaults/). Therefore, the hydrothermal plume should be assumed to be emanating from the range-front fault and the WARD should be expanded to include it to the extent the WARD is intended to represent the "study area" for potential project impacts (including development of an adequate hydrologic/hydrogeologic monitoring program and mitigation triggers).</p>	<p>The Water and Aquatic Resource Delineation by design, is intended to determine the extent of riparian habitat as indicated by plant species and soil types.</p>

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>Section 9.2 of the final draft ARMMP Locations/Frequency of Proposed Subsurface Bedrock Monitoring: The number and limited locations/depths at which it has been proposed are inadequate, as well as the frequency of the proposed bedrock hydrologic monitoring (i.e., quarterly which may be difficult to interpret relative to changes in geothermal extraction/injection with a reasonable degree of certainty). Unfortunately, additional bedrock monitoring locations/depths (for temperature and head) cannot be further defined without first: 1) knowing the planned locations of geothermal production and injection; and 2) significantly enhancing/updating the current Hydrogeologic Conceptual Model of the geothermal system at Dixie Meadows.</p>	<p>The ARMMP is focused on monitoring springs and habitat - potentiometric and temperature changes in the geothermal reservoir and to some degree in the surrounding bedrock are expected, but if there is no change to the surface resources, then no impacts will occur. Priority has been placed on rigorously monitoring surface resources including critical sensitive species habitat.</p>
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>All Sections of the final draft ARMMP Extraneous and/or Inapplicable Information: The current ARMMP includes considerable extraneous information, or information which is inapplicable, to efforts to characterize the geothermal system at Dixie Meadows, devise means of detecting/monitoring project impacts, and/or formulating effective mitigation measures, as follows (and has been previously commented on): * Extensive descriptions of the local basin-fill aquifer. * Presence of confining sediments within the local basin-fill aquifer. * Preparation of a site-wide water budget: Which cannot be reliably estimated on a one-time basis due to unquantified leakage of geothermal waters into the basin-fill aquifer, and cannot be practically estimated on an ongoing basis. Also, any changes in the natural discharge of geothermal waters to the basin-fill aquifer or surface (via springs/seeps) due to project production/injection would be masked by variations in recharge to the basin fill and ET. Therefore, water budget assessment cannot be used to detect any impacts that might occur as a result of geothermal extraction/injection; nor would they be a useful basis for triggering mitigation. * Mixing of geothermal waters with basin-fill waters prior to discharge from the thermal springs/seeps: Which no doubt occurs, but varies with location, as well as temporally, with conditions in the basin-fill aquifer. Therefore, cannot be reliably assessed at any given time or at any particular location (i.e., the ~20 different thermal spring/seeps at Dixie Meadows); and consequently cannot be used as a trigger for mitigation measures based on, for example, changes in spring water quality. * Discussions/descriptions of thrust faulting (which are present, particularly in the Stillwater Range, but not salient to understanding the geothermal system at Dixie Meadows or developing an adequate hydrogeologic monitoring program for potential project impacts). * Earthquakes, past or recent. * Discussions/descriptions of the age of activity (movement) on any particular fault (the permeability of faults determined by the condition of fault damage zones, not necessarily when the "damage" occurred); or estimates of the ages of various spring discharges, for example at Dixie Meadows.</p>	<p>The ARMMP is not only defining the geothermal system, but the hydrology of the Dixie Meadows, which are only in part dependent on thermal waters - these are all components of characterization of the local hydrogeology, which is important to understanding the complete flow systems at Dixie Meadows.</p>

Commenter	Comment Code	Comment	BLM Response
		<p>* Seismically-induced liquefaction, past zones of compression and soft sediment deformation, and/or other discussions/descriptions related to the formation or condition of the playa (Humboldt Salt Marsh). Whereas some of the above is appropriate "background" information to the extent summarized; by virtue of its volume in the current ARMMP, it is difficult to find or follow the relevant information presented.</p>	
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>Section 3.4 Riparian Area Stipulation of "no surface occupancy or disturbance" within 500 or 650 feet, depending on the lease, from any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains": The source of the Dixie Meadows thermal spring/seeps is a major piedmont fault which is roughly coincident with the orifices of the thermal springs over ~2 miles and transmits geothermal waters from depth in the geothermal reservoir to the near-surface. Consequently, stipulation of "no surface occupancy or disturbance", while helpful and important, is not sufficient to "protect the integrity of [aquatic] resources" at Dixie Meadows given the nature of the proposed project and source of the thermal spring discharges. Also, the final draft ARMMP indicates only that "Most leases [emphasis added] in the Study Area contain a stipulation to protect riparian areas and threatened, endangered, or other special status species and their habitats."</p>	<p>The source of flow to Dixie Meadows is mischaracterized in the comment. The source as described in the ARMMP is thermal waters interpreted to be from the shallow lateral flow system to the west of the piedmont fault, from naturally recharged groundwater (cool) from the Stillwater Range and alluvial fan to the west of Dixie Meadows, and on occasion from surface water runoff originating from the west of Dixie Meadows. To date, there is no direct evidence or data that indicates a source of Dixie Meadows springs being the piedmont fault. The fault may however have some hydraulic control over the daylighting of the springs, also the extensional seismic structure of the soils directly east of the piedmont fault. There is a possibility that some seepage up the piedmont fault occurs in addition to the lateral inflow from the west, but this component is not support as the primary source of flow given the current available data.</p>
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>There are 24 sites identified in Table 14; however, some are Tier 1 and some are Tier 2. It is misleading to say in the executive summary that the BLM will be monitoring 23/24 sites when in reality Tier 2 sites will be monitored only if further investigation is warranted due to significant changes due to geothermal production.</p>	<p>All Tier 1 and Tier 2 sites will be monitored, the tiers are only used for management actions.</p>
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	<p>Are the four potential surface control sites part of the 23/24 sites mentioned previously or in addition to those sites?</p>	<p>As described in the revised ARMMP, Sections 3.0 and 3.1, the control sites are part of the 23 monitoring locations.</p>

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	"1). Annually monitor the extent..., 2) annually monitor wetland..., 3) monitor the distribution and abundance of special status species." It appears that the BLM will not require that special status species are monitored annually. What is the frequency of special status species monitoring, if any?	See Section 3.0 in the ARMMP for more information regarding proposed monitoring.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	"Two of the five springs known to harbor springsnails..." The Service recommends that all 5 springs known to have springsnails are monitored?	The ARMMP (Appendix H) has been revised to clarify that all five springs are geographically in the same area and would be monitored and measured monthly. Two springs would have continuous temperature monitoring annually. Springs 14 and 32 would have continuous temperature monitoring.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 4 "In the event that changes..." The low feasibility mitigation measures are being proposed as the first actions you list in this section. Will the BLM attempt to implement these measures first?	Actions will be dependent on responses observed, as detailed in Section 10.8 of the ARMMP.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 4 "If more aggressive actions are necessary..." These are the high feasibility level mitigation actions listed in Table 18. Please confirm whether or not the high feasibility mitigation measures are the "more aggressive actions" as described in this paragraph.	The ARMMP does not use the terminology high feasibility and low feasibility. Actions are intended to correspond with observations, in the most responsive manner.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 5, Paragraph I "The purpose of the ARMMP is to ensure that significant adverse effects on aquatic resources...do not occur" After reading the ARMMP, the data collected to date, and the many unknowns about where, how, and the efficacy of any implemented mitigation measures it is unclear how the BLM will ensure that no significant impacts will occur.	The BLM acknowledges that the USFWS disagrees with BLM's determination that the ARMMP is a sufficient tool to ensure significant adverse impacts do not occur. The ARMMP, using existing and future monitoring data along with recommendations from the technical working group, is designed to include adaptive management strategies that the BLM would implement to avoid, minimize, or mitigate impacts on hydrogeologic resources and associated aquatics habitats.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 6 "The drilling and testing under the EA..." I'm assuming you mean authorized under the EA. Some information is described in the sections referred to in this passage; however, there is no analysis of much of the water quality data which was collected during the exploratory drilling and flow testing. Please provide more analysis of the raw data in the text to explain the Table in the appendix.	The ARMMP has been revised to include additional flow testing data for spring monitoring during testing (see Appendix H), along with additional text to Section 9.4.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 7, Paragraph 4 "Stipulations are included...Exceptions may be considered on a case by case basis..." The Service recommends that the stipulations are mandatory and without exceptions.	The BLM Authorized Officer, with advice from other affected interests, has the authority to grant exceptions, modifications, or waivers to lease stipulations (unless otherwise stated on the lease). Stipulations and their application is determined at the leasing phase of development of geothermal resources.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 7, Paragraph 6 "Suitable off-site mitigation..." There is no suitable off-site mitigation for Dixie Valley Toad or springsnails from this wetland system.	Suitable off-site mitigation is included in the case that other DVT and springsnail habitat is identified in the future as just one of the several mitigation measures.
U.S. Fish and Wildlife Service	Editorial Comments	Pg. 22, Paragraph 1 "A summary of filed parameters..." Should be field?	Change made in EA.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 37, Paragraph 2 "In order to preserve..." The over-arching assumption of this project and ARMMP is that a future production and injection plan yet to be developed will not cause significant impacts to the wetland and the species that depend on this unique habitat.	The ARMMP has been revised for clarity.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 37, Paragraph 3 "The proposed monitoring network has been developed primarily in response to the proposed Phase I geothermal..." Phase I? It is unclear that BLM is planning additional phases. How many are proposed? Is this the first of many proposed power plants for this area? If so, please ensure the cumulative impacts are thoroughly described.	The proposed action as described in Chapter 2 of the EA and in the Utilization Plan are the only actions being analyzed as part of the current EA.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 3, Paragraph 3 "For example, increases in spring flow or stage..." Aquatic biota have evolved with the current conditions, including flow rate, temperature, etc, Any change(s) to the existing conditions, even those that are perceived to be positive, may have unknown consequences to these species and their habitat.	ARMMP revision - Made text edit to reference Phase 1 and Phase 2, rather than "subsequent phases".
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	"Upon completion of installation...or cause increased erosion at the spring outflow point." Only at the spring outflow point or do you mean the measuring device location, which may not be at the spring outflow, or both?	ARMMP revision - PAGE 38 - Para 3. Sentences qualified as "may" - no changes suggested.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 43, Paragraph 5 "It is proposed that the Contractor would sample monitoring wells on a quarterly basis..." Does BLM have data that supports this frequency of monitoring is sufficient? The Service recommends that BLM consider continuous monitoring of certain variables, such as temperature and pressure.	The ARMMP has been revised for clarity.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 46, Paragraph 4 "The Contractor would monitor wetland vegetation...and quantitative ..." Remote sensing techniques would be able to give you quantitative data, see DRI report on groundwater dependent ecosystems	The ARMMP has been revised accordingly.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 48 "Climate data would be sourced from..." See DRI report	Data has been incorporated into the final ARMMP.
U.S. Fish and Wildlife Service	Editorial Comments	Pg.48, Paragraph 4 The scientific name for bullfrogs is Lithobates catesbeianus	The ARMMP has been revised accordingly.
U.S. Fish and Wildlife Service	Editorial Comments	Pg. 49, Paragraph 5 The scientific name for bullfrogs is Lithobates catesbeianus	The ARMMP has been revised accordingly.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 50, Paragraph 2 The Service recommends sending springsnail samples collected during 2020 to a lab to get analyzed for species identification.	Thank you for your recommendation. As the BLM works with the technical working group, genetic testing would be a consideration.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 50, Paragraph 3 "Habitat quality indices of importance..." Is this information being collected at all the springs which are occupied by springsnails?	The ARMMP (Appendix H) has been revised to clarify that all five springs are geographically in the same area and would be monitored and measured monthly. Two springs would have continuous temperature monitoring annually. Springs 14 and 32 would have continuous temperature monitoring.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 51, Paragraph 1 "The Contractor would conduct springsnail abundance and distribution surveys every year at Springs 14 and 32..." The Service recommends monitoring all 5 known springs which are occupied by springsnails.	The ARMMP (Appendix H) has been revised to clarify that all five springs are geographically in the same area and would be monitored and measured monthly. Two springs would have continuous temperature monitoring annually. Springs 14 and 32 would have continuous temperature monitoring.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 56, Paragraph 2 It would be beneficial to have in the text the total number of tier 1 and tier 2 sites to put into context the objectives below. According to Tables 20-23, there are nine tier 1 surface monitoring sites and 15 tier 2 surface monitoring sites. There are nine tier 1 groundwater monitoring wells and 10 tier 2 groundwater wells. There are eight tier 1 vegetation and hydric soil sites, and 13 tier 2 sites that are proposed but have not been identified.	Section 3.0 of the ARMMP has been revised to include additional information and clarifying text.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 56, Paragraph 2 "(see management action and critical mitigation in Table 19):" This adaptive management scenario along with Table 19 is very confusing. It seems to depend on the site, the variable, the frequency of measurement, the amount of change detected, then on top of that you have pre-determined timeframes (Codes) for which you will act to address the situation. The information appears overcomplicated. If a metric being measured is outside its natural range of variability then the BLM should act immediately to address the problem, not wait for the next cycle of monitoring which could be a month or 3 months (quarterly) away. Aquatic species need water, and the species in Dixie Meadows (DVT, springsnails) need a specific temperature of water with which they have evolved. The Service's concern is that, by the time BLM has the "adaptive" approached formalized, the habitat requirements for these species may change enough to detrimental impact them.	The BLM acknowledges that the USFWS disagrees with BLM's determination that the ARMMP is a sufficient tool. Refer to Section 10.9.1 in the ARMMP for Adaptive Management and Mitigation Measures, specifically #8, which indicates that there would be a temporary cessation of pumping and/or injection at site-specific well locations until maintenance of pre-operation conditions is achieved. The ARMMP's adaptive management and/or mitigation measures include the use of 'temporary cessation' for as long as needed until adaptive modifications can be made to operations.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 57, Paragraph 3 "Hydrologic, aquatic habitat, and SSS objectives are as follows:" For the Service's clarification, the objectives for the proposed project are to first establish what the natural range of variability is for a given set of metrics, then allow for more variability (up to a certain percentage or value as described in each objective below) due to the proposed action. This change in variability must stay within the "new" range of variability at 90 percent of tier 1 monitoring sites. And since there are 9 tier one sites, 90 percent of those sites is essentially 8 of the 9 sites. Is this correct? Are there objectives for the one tier 1 site that is potentially sacrificed?	The ARMMP has been revised for clarity.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 57-58 Objective 2: One of the nine groundwater wells can go more than +/- 15 percent of hydraulic head? Since we don't know what the baseline hydraulic head is in each of the six spring complexes where the tier 1 monitoring locations are located, it is difficult to comment if this is adequate protection. Was 15 percent based on any data collected or was it arbitrarily conceived?	The goals and objectives found in the ARMMP were developed with technical working group input and designed to insure impacts to resources are not significant.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 Objective 3: How is the natural range of baseline conditions measured? Many of these springs show seasonal differences in temperature and flow. The minimum and maximum measurement of any metric should not be used as the range of natural variation as this does not accurately reflect the seasonal variation (i.e., the natural range of baseline conditions) of these springs. Table 7 depicts all the temperature data collected to date; however, there is no analysis completed on this data. The BLM is using both Fahrenheit (Objective 3) and Celsius (Objective 9, 11) when referring to temperature, please pick one.	Baseline data collection is outlined throughout the ARMMP (see Appendix H). The EA and ARMMP have been revised to display all temperature metrics in Fahrenheit.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 Objective 4: What are the field parameters? In approximately 17 different locations within this document, varying definitions of "field parameters" are presented including flow, water quality metrics (i.e., temperature, conductivity, electrical conductivity, turbidity, pH, oxidation-reduction potential, dissolved oxygen). Some places it says collect water quality samples and measure field parameters, some places the term includes flow metrics and others it doesn't. This is a confusing term which is not used consistently through this document. Table 17 lists many of these same metrics yet the term primary measurement parameter is used to describe them.	The ARMMP defines field parameters as temperature, pH, electrical conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity. See Tables 6 and 7 in the ARMMP.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 Objective 4: The Service is confused regarding why BLM changingd the percentage by 5 percent compared to previous objectives. It is still essentially one site. Maybe this is an error? If not, a justification on this change is needed..	The ARMMP has been revised to clarify that variances will be analyzed and reviewed at completion of the baseline data collection period. Methods will be discussed with the Technical Working Group. Edits were made for consistency using Fahrenheit.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 "Objective 6: Maintain DVT populations (all life stages) at a minimum of greater than 80 percent from baseline for 85 percent of USGS monitoring areas" This objective is essentially saying that a 20 percent reduction in the DVT population is acceptable. In addition, there are 60 establish plots where DVT are monitored by USGS, NDOW, and USFWS. In the 2019 USGS report DVTs were found in 38 of the plots. If the minimum requirements of the objective are met, that would mean 32 occupied plots is adequate, a reduction in 6 plots. Since DVTs use varying habitat over the course of the year, how will this be measured? Is BLM proposing a 20 percent loss in plots where breeding occurs in addition to or irrespective of plots used during the summer, winter? Also, how did BLM determine that a 20 percent loss of the DVT population (all life stages) is an acceptable amount of loss?	The ARMMP has been revised for clarity.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 Objective 8: The way this is described implies that there are springsnails in all Tier 1 sites when there are only two Tier 1 sites with springsnails. Please reference Table 23 and consider including the Tier 2 springsnail sites into Tier 1.	The ARMMP (Appendix H) has been revised to clarify that all five springs are geographically in the same area and would be monitored and measured monthly. Two springs would have continuous temperature monitoring annually. Springs 14 and 32 would have continuous temperature monitoring.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 Objectives 9 and 10: When it comes to springsnails and water temperature, and flow monitoring, tiers don't matter, it will be measured at all five occupied springs, correct?	The ARMMP (Appendix H) has been revised to clarify that all five springs are geographically in the same area and would be monitored and measured monthly. Two springs would have continuous temperature monitoring annually. Springs 14 and 32 would have continuous temperature monitoring.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 58 Objectives 11 and 12: It is unclear how these objectives will work. There are nine tier 1 sites which will be monitored for temperature. There are 38 known occupied plots that the agencies have identified for DVT. How do the tier 1 sites and DVT occupied plots correlate with each other? HIt is unclear how this is going to be measured. Same comment for objective 12.	The intent is to have tier 1 sites overlap with DVT occupied plots, if they do not, through the adaptive management and the ARMMP modifications would be made to tier 1 site monitoring locations and current objectives. These modifications could be made in response to the ongoing USGS habitat preference research.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Pg. 59 Objectives 13 and 15: There are eight Tier 1 vegetation sites, 85 percent is 6.8 sites. Why not just say 7 out of 8 sites?	The ARMMP has been revised for clarity.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Table 13: The only well where depth to groundwater was measured before and after flow testing resulted in an increase of depth to groundwater of 5.4 feet. Is this correct?	Correct, the other wells are artesian, "depth" to groundwater is above land surface and measured using pressure. Edits have been made to Table 13 of the ARMMP for clarification.
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Table 18: As with previous comments to the ARMMP, the only high feasible level mitigation measure presented is to augment spring discharge by directly discharging water on the surface, injecting water into an infiltration basin or injecting it into shallow injection wells. It is unclear why the four low feasibility level mitigation measures all have the same comment/recommendations which are essentially the same comments/recommendations as the two high feasibility level mitigation measures. Many of these actions are avoidance measures which should have a high feasibility level since they should be part of the proposed action.	The most practical high feasibility action would be reallocating injection or pumping within the existing wellfield.

Commenter	Comment Code	Comment	BLM Response
U.S. Fish and Wildlife Service	Aquatic Resources Monitoring and Mitigation Plan	Table 18: The comment/recommendation section for the first mitigation measure claims that cool springs and groundwater would remain unaffected. Were the cooler springs impacted during pump testing? Were they monitored? Is there data to support this? Could they be impacted not due to pumping as the BLM claims but from the mitigation measures such as re-injecting water into a rapid infiltration basin or shallow injection well?	Correct, the other wells are artesian, "depth" to groundwater is above land surface and measured using pressure. Edits have been made to Table 13 of the ARMMP for clarification.

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