CENTER for BIOLOGICAL DIVERSITY Because life is good.

January 12, 2023

Via Electronic and Certified Mail

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M. Camille Calimlim Touton,
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RE: Notice of Intent to Sue for Endangered Species Act Violations

Dear Secretary Haaland, Director Williams, and Commissioner Touton:

This letter serves to notify the U.S. Fish and Wildlife Service ("Service") and the Bureau of Reclamation ("Reclamation"), on behalf of the Center for Biological Diversity ("Center"),[1] of violations of the Endangered Species Act ("ESA")[2] relating to Reclamation's continued operation of the Deschutes River Basin Project ("Deschutes Project") and the Service's issuance of an incidental take permit ("ITP") for the Deschutes Basin Habitat Conservation Plan ("HCP")—*i.e.*, the Proposed Action. Specifically, the Service and Reclamation have failed to ensure that the Proposed Action will not jeopardize the continued existence of the Oregon spotted frog (*Rana pretiosa*) ("Frog")—a threatened species under the ESA—or destroy or adversely modify its critical habitat in the Upper Deschutes in violation of section 7 of the ESA. Additionally, the Service's issuance of the ITP unlawfully failed to meet the essential protective requirements set forth in section 10 of the ESA. The Service has also failed to develop and implement a recovery plan for the Frog and is therefore in violation of section 4(f) of the ESA.

The Deschutes River is one of Oregon's most beloved rivers. It is a central artery flowing through the high-desert city of Bend, Oregon, and is one of the West Coast's most important rivers for native amphibians like the Frog and for fish species like redband rainbow trout, steelhead, and Chinook salmon. It also provides world-class boating, fishing, and recreation opportunities to many locals and out-of-state tourists each year. Historically, the Deschutes River had relatively stable flows and ample vegetation that stabilized its banks. But now, as humans have altered the river to suit their needs, late summer flows are kept extremely high to deliver

[1] The Center for Biological Diversity is a national, nonprofit conservation organization with more than 1.7 million members and online activists dedicated to the protection of species hovering on the brink of extinction, including the Oregon spotted frog.
[2] 16 U.S.C. §§ 1531-1544.

water for irrigation and winter flows are very low as water is stored in reservoirs. As a result, the dams, reservoirs, and diversions have pushed sensitive species like the Frog closer to extinction.

In December 2020, the Service issued a Biological Opinion concluding that the Proposed Action—which would continue the same harmful flow levels in the Upper Deschutes for the foreseeable future—would not jeopardize the Frog or destroy or adversely modify its critical habitat—*i.e.* its "no jeopardy" opinion. In so doing, the Service violated section 7(a)(2) of the ESA because it improperly relied on insufficient and uncertain mitigation measures, failed to adequately analyze the effects of the Proposed Action, failed to rely on the best available science, and failed to determine whether the Proposed Action harms the Frog's ability to recover. The Service also violated section 7(b)(4) of the ESA by issuing an incidental take statement ("ITS") that failed to require reasonable and prudent measures necessary to minimize harm to the Frog and its habitat. By relying on the unlawful "no jeopardy" opinion and ITS, both the Service and Reclamation failed to ensure that the Proposed Action will not jeopardize the Frog or destroy or adversely modify its critical habitat. The Service's issuance of the ITP for the HCP was also unlawful because the Service failed to ensure that three essential protective requirements of section 10 of the ESA were met: that the applicant will "to the maximum extent practicable" minimize and mitigate the impacts of the taking; that the applicant has assured adequate funding for its HCP; and that the taking will not appreciably reduce the likelihood of the survival and recovery of listed species in the wild. In addition, although a Recovery Plan for the Frog was purportedly "anticipated" in August 2022,[3] to date the Service has not completed or implemented a Recovery Plan for the Frog, and no draft Recovery Plan has been made available for notice and comment, in violation of section 4(f) of the ESA.

The Center recognizes the substantial work and collaboration that went into the HCP. The Center also believes that the HCP alludes to measures that *could* benefit the Frog long-term. Many critical questions remain unanswered, however, and the fate of the Frog cannot be left hanging in the balance. With no specificity about the conservation measures that will benefit the Frog or its habitat, no assurances that the measures will be able to mitigate the harmful effects of the Proposed Action in the Upper Deschutes, and no Recovery Plan to guide restoration and recovery efforts, the Frog will continue to decline towards extinction. Thus, the Center intends to sue the agencies unless they correct the violations of the ESA described herein.[4]

THE ENDANGERED SPECIES ACT

Congress enacted the Endangered Species Act "to halt and reverse the trend toward species extinction, whatever the cost."[5] Its purpose is to protect endangered and threatened species and the ecosystems upon which they depend.[6] To those ends, section 9 of the ESA

[3] 2020 Biological Opinion at 156; *id.* Appx. D at 1; *see also id.* at 189, 194 (stating that the Recovery Plan was "expected [in] 2022").
[4] The Center provides this letter according to the citizen suit provision of the ESA's 60-day notice requirement, to the extent that such notice is deemed necessary by a court. 16 U.S.C. § 1540(g).
[5] *Babbitt v. Sweet Home Chapter of Cmtys. for a Great Or.*, 515 U.S. 687, 698 (1995); *see Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978).
[6] 16 U.S.C. § 1531(b).

prohibits "take" of protected species,[7] and section 7 imposes an affirmative duty upon federal agencies to prevent unlawful take.[8] The ESA defines "take" broadly to encompass all manner of harm and harassment, including direct injury or mortality and any acts or omissions that disrupt or impair significant behavioral patterns.[9]

Section 7 of the ESA requires all federal agencies to work to recover listed species, and it contains both procedural and substantive requirements for that purpose. Substantively, it requires federal agencies to insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species or adversely modify the species' critical habitat.[10] To avoid jeopardy and adverse modification of critical habitat, Section 7(a)(2) sets forth procedural requirements that direct an agency proposing an action ("action agency") to consult with an expert agency—in this case, the Service—to evaluate the effects of the proposed action on listed species.[11] If the Service finds that the proposed action will not cause jeopardy but may incidentally "take" or "harm" protected species, the Service provides the action agency with an "incidental take statement" ("ITS").[12] The ITS must specify the impact of the taking on the species, set forth "reasonable and prudent measures" that the Service considers necessary and appropriate to minimize the impact, and include "terms and conditions" that the action agency must comply with to implement the measures.[13] If the action agency adopts the measures and implements the terms and conditions, the resulting incidental take is exempted from section 9 liability. During consultation under section 7, the agencies must use "the best scientific and commercial data available."[14]

Section 10 of the ESA authorizes the Service to issue ITPs to private parties and state and local governmental entities if the "taking is incidental to and not the purpose of the carrying out of any otherwise lawful activity."[15] Before issuing an ITP, the Service engages in "intra-service" section 7 consultation with itself.[16] The Service may issue an ITP only if it determines that: the taking will be incidental, the applicant will minimize and mitigate the impacts "to the maximum extent practicable," the applicant will ensure that the plan has adequate funding, and the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.[17] The Service must also confirm that it has received "other assurances" that ensure the HCP is implemented and that the ITP contains terms and conditions that are "necessary or appropriate" to carry out the purposes of section 10.[18]

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[7] *Id.* § 1538(a)(1)(B).
[8] *Id.* § 1536(a)(2); *see also Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife Serv.*, 273 F.3d 1229 (9th Cir. 2001) (citing 16 U.S.C. § 1536(a)(2))
[9] 16 U.S.C. § 1532(19); 50 C.F.R. § 222.102.
[10] 16 U.S.C. § 1536(a)(2).
[11] *Id.*
[12] *Id.* § 1536(b)(4).
[13] *Id.*
[14] *Id.* § 1536(a)(2).
[15] *Id.* § 1539(a)(1)(B).
[16] *See* Consultation Handbook at 1-5, 1-6.
[17] 16 U.S.C. § 1539(a)(2)(B)(i)-(iv); 50 C.F.R. §§ 17.22(b)(2)(i), 17.32(b)(1)(ii).
[18] *Id.* § 1539(a)(2)(B)(v).

Section 4(f) of the ESA requires the Service to "develop and implement" recovery plans for the "conservation and survival" of listed species unless the agency makes a finding that "such a plan will not promote the conservation of the species."[19] Among other items, a formal recovery plan must enumerate site-specific management actions necessary to bring about a species' recovery, as well as objective, measurable criteria for gauging the species' progress to the point where it has recovered sufficiently to be removed from the safeguards of the Act.

FACTUAL BACKGROUND

I. The Oregon Spotted Frog's Life History and Biological Needs

The Oregon spotted frog is threatened with extinction.[20] Its range once stretched from British Columbia to Northern California, but human development has forced the Frog onto a tiny fraction of its former range and driven massive population declines. The Frog's habitat has been degraded and fragmented by ditches, diversions, and dams; urban and agricultural development; livestock grazing; and the removal of beavers. Land conversions from marsh to meadow and invasive plant species like reed canarygrass have further degraded the Frog's habitat. Introduced predators like bullfrogs and non-native fishes prey upon the Frog and have outcompeted and displaced it from much of its habitat. The Frog's remaining populations are small and isolated, making them particularly vulnerable to drought, disease, and predation.

Frog populations and habitats in the Upper Deschutes are critical for the Frog's survival and recovery, as there are more breeding sites between Wickiup Dam and Bend than anywhere else on the Deschutes. Currently, however, Frog populations in the Upper Deschutes are small and separated by long distances that prevent habitat connectivity, Frog dispersal, or gene flow between populations. In designating critical habitat, the Service noted that the Frog's threats in the Upper Deschutes are "significantly different" from all the other critical habitat areas.[21] The Frog's primary threat is habitat loss and degradation.[22] The Deschutes Project has driven much of the habitat loss in the Upper Deschutes and fueled other threats like nonnative plant invasions and predatory species that have decimated Frog populations.

Frogs in the Upper Deschutes depend on specific habitat features for each life stage. For pre-breeding (March 1 to March 31), there must be sufficient water for the Frog to migrate to suitable breeding habitat. Aquatic connectivity between the river and wetlands is crucial for the Frog's survival and recovery, and the amount of instream flow determines whether the Frog will successfully reproduce. For breeding (April 1 to April 30), the Frog requires shallow wetlands with emergent vegetation and sufficient water depth to prevent predation and egg desiccation. Females lay eggs in shallow pools, receding shorelines, on marginal benches of seasonal lakes and marshes, and in wet meadows. For the tadpole rearing and the active juvenile and adult stage (April 15 to August 31), the Frog requires shallow wetlands with abundant emergent vegetation or floating aquatic plants, which it uses for basking, cover, and to escape predators. For pre-overwintering (September 1 to October 15), the Frog must find suitable winter habitat that is

[19] 16 U.S.C. § 1533(f)(1).
[20] 79 Fed. Reg. 51,657 (Aug. 29, 2014).
[21] 81 Fed. Reg. 29,356 (May 11, 2016).
[22] *Id.*

aquatically connected to summer habitat. Overwinter (October 16 to March 1), the Frog must find a body of water with a portion of the surface that remains ice free, sufficient depth to not freeze solid, and sufficient sustained flows to provide well-oxygenated water and sheltering locations to protect it from predators and freezing.

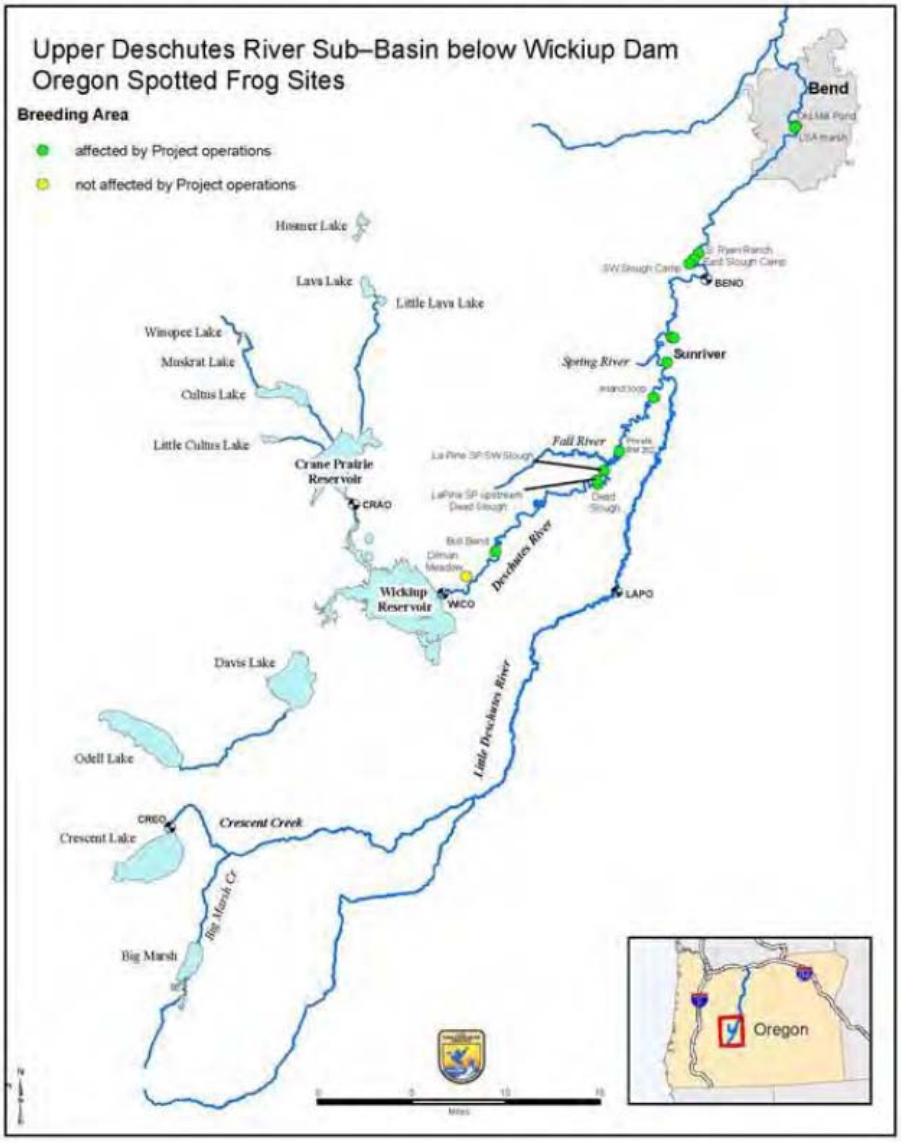

Figure 7. Oregon spotted frog breeding sites within the Upper Deschutes River subbasin below Wickiup Dam. Sites identified with green circles are those that are affected by ongoing irrigation storage and release operations. Sites identified with yellow circles are sites that are outside of the influence of storage and release operations.

II. Deschutes Project Background and Procedural History

A. The Deschutes Project's Impacts on the Frog

The Deschutes Project includes private and federal dams, reservoirs, and diversions. Reclamation holds legal title and is responsible for safety inspections and recommendations at Wickiup, Crane Prairie, and Haystack dams and reservoirs. Two irrigation districts, Central

Oregon Irrigation District ("COID") and North Unit Irrigation District ("NUID"), own natural flow and storage water rights and are responsible for operating and maintaining the dams.

For the past 70 years, the Deschutes Project has harmed the physical and ecological function of the Deschutes River and adjacent wetlands. In the Upper Deschutes, the Deschutes Project has significantly altered wetland habitats below Wickiup Dam by taking water when the Frog needs it most: in the pre-overwintering period—which coincides with the start of irrigation storage season when flows drop significantly below Wickiup Dam—and in the spring breeding period—which coincides with the start of irrigation season when flow fluctuations strand Frogs and desiccate eggs. Each fall, the drawdown forces Frogs out of the vegetated wetlands and into the main river channel, where they face a high risk of predation. In winter, few wetlands with water exist at all, so Frogs are forced into the main channel where they have nowhere to hide.

In its current condition, the Deschutes River is approximately 20 percent wider than it was historically due to the operation of Wickiup Dam.[23] The widened river channel affects the way and the levels at which water is distributed onto the floodplain and, as a result, many wetlands are "perched" such that higher than historical flows are needed to reach and support the ecological function of wetland habitats that the Frog depends on for its survival.[24]

B. The Center's Prior Litigation and Settlement

In December 2015, the Center sued Reclamation for ESA violations stemming from Deschutes Project operations.[25] In October 2016, the parties agreed to a settlement, under which Reclamation and the districts agreed to consult with the Service to issue a biological opinion in 2017 with an ITS to expire in July 2019.[26] The districts also agreed to provide interim measures to reduce the effects of the Project on the Frog while they developed an HCP, raising minimum winter flows out of Wickiup from only 28.3 cfs to 100 cfs from September 16, 2016, to March 30, 2017.[27]

C. The Service's 2017 Biological Opinion

In 2017, the Service issued a biological opinion on the effects of the interim measures in the 2016 Settlement Agreement. The Service determined that the Deschutes Project had degraded baseline conditions in the Upper Deschutes, which "has been significantly altered and continues to be influenced by the operation of Crane Prairie and Wickiup Reservoirs."[28] The Service found that project operations reduced the Frog's distribution and survival, and affect all essential features of critical habitat below Wickiup Dam.[29] In particular, extreme irrigation season flow fluctuations rapidly inundate and dewater wetlands, stranding tadpoles and adult

[23] 2020 Biological Opinion at 147.
[24] *Id.*
[25] *Ctr. for Biological Diversity v. Bureau of Reclamation*, Nos. 15-2358, 16-cv-35 (D. Oregon Oct. 28, 2016).
[26] *Id.*, Settlement Agreement at 5, ECF No. 72.
[27] *Id.* at 6-7.
[28] 2017 Biological Opinion at 40.
[29] *Id.* at 60, 124.

Frogs, and extremely high summer flows scour the river channel, preventing the growth of sedge vegetation that the Frog needs to survive and encouraging reed canarygrass invasions.[30] When Wickiup Dam's headgates close in late October and flows fall sharply from 600 cfs to 100 cfs, wetlands are rapidly dewatered, which kills Frogs, and any survivors have nowhere to go but the main channel, where they face a high risk of predation.[31] Even at 300 cfs Frogs are forced out of wetlands and into the main channel, and below 300 cfs they have nowhere to hide.[32] The Service further explained the adverse effects of minimum flows of 100 cfs in the winter:

> As flows continue to drop to 100 cfs at the WICO gauge, the surface area that is inundated by water is vastly reduced. Since ramp down operations occur during a movement period for spotted frogs between summer rearing and overwintering habitats, the reduction of water from their habitat impedes movement and increases the risk of avian and terrestrial predators. As stated above, limited overwintering habitat is available for spotted frogs at flows of 100 cfs at the WICO gauge and frogs are likely to be preyed upon by brown trout as they are concentrated in areas still subject to inundation from October to April 1.[33]

When flows do not increase soon enough in spring, the Frog cannot move to wetlands suitable for breeding, and even when flows are high enough to connect wetlands, sharp flow fluctuations leave egg masses and tadpoles exposed to the elements and predators.[34] When late-spring flows drop below 600 cfs, the Frog cannot access vegetation that provides cover from predators.[35]

For these reasons, the Service determined that the Frog's survival and ultimate recovery requires significant changes to Deschutes Project operations.[36] In particular, it requires "increas[ing] winter flows to provide more stable over-wintering conditions . . ., reaching levels that mimic natural hydrologic conditions" and ensuring that spring flows "provide additional water to support . . . breeding in the connected wetlands that provide habitat."[37]

The Service made important conservation recommendations in the 2017 Biological Opinion. Specifically, the Service recommended that if the HCP was not finalized by the time the 2017 Biological Opinion and ITS expired, winter flows should increase to 200 cfs below Wickiup until the HCP is completed.[38] The Service also recommended that the HCP aim to raise winter flows to 600 cfs below Wickiup "as early as possible" according to an incremental schedule that would deliver 300 cfs in the winter by year 5, 500 cfs by year 15, and 600 cfs by year 20 (assuming a 20-year ITP term).[39] The Service issued an ITS that expired in July 2019.

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[30] *Id.* at 61, 145.
[31] *Id.* at 63, 142, 150, 184-85, 199.
[32] *Id.* at 63, 64.
[33] *Id.* at 199.
[34] *Id.* at 71.
[35] *Id.* at 142.
[36] *Id.* at 121.
[37] *Id.* at 6.
[38] *Id.* at 215.
[39] *Id.* at 216.

D. The Service's 2019 Biological Opinion

In 2019, Reclamation reinitiated consultation with the Service, and the Service completed a new biological opinion. The Service determined that conditions in the Upper Deschutes had not improved and that not only were the harmful effects described in the 2017 biological opinion "likely to continue to occur" for an additional 17 months, but also that there would be a "longer duration of adverse effects . . . than previously anticipated."[40] The Service determined that the proposed 17-month extension would maintain the "highly degraded" condition of the Upper Deschutes.[41] Accordingly, the Service expected the HCP to "include conservation measures that *significantly improve* the environmental baseline conditions" for the Frog and its critical habitat.[42] The Service also presented two new key findings: (1) there are population-level adverse effects to entire generations of Frogs when irrigation season flow fluctuations are too sharp, and (2) there is a high risk of predation on eggs and juveniles when flows fall below 900 cfs in June.[43] The Service issued an ITS that expired December 31, 2020.

E. The Deschutes Basin Habitat Conservation Plan and ITP

In October 2020, the City of Prineville and the eight irrigation districts (COID, NUID, Tumalo Irrigation District, Arnold Irrigation District, Lone Pine Irrigation District, Ochoco Irrigation District, Swalley Irrigation District, and Three Sisters Irrigation District) applied for an ITP by submitting an HCP to the Service that proposes changes to the timing of flows and storage of Deschutes Project water for irrigation.

The HCP includes Measure WR-1, which aims to modify flows between Wickiup and Bend according to an incremental schedule occurring in three phases over the next 30 years ("Incremental Flows").[44] In Phase I (years 1 to 7), minimum winter flows below Wickiup will remain at 100 cfs from September 16 to March 31, and summer irrigation season flows will not be capped.[45] In Phase II (years 8 to 12), minimum winter flows below Wickiup will increase to 300 cfs, and summer irrigation flows will be capped at 1,400 cfs for no more than 10 days per year.[46] In Phase III (years 13 to 30), minimum winter flows will vary between 400 cfs and 500 cfs according to a tool "to be developed" by the Service and the Permittees in coordination with the Oregon Water Resources Department ("OWRD") and Reclamation, and irrigation season flows will be capped at 1,200 cfs for no more than 10 days per year.[47] Measure WR-1 also provides that minimum winter flows from Wickiup will increase in years 1 through 12 "in proportion to the amount of live Deschutes River flow made available to NUID during the prior irrigation season as a result of the piping of COID-owned canals."[48]

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[40] *Id.* at 5, 9.
[41] *Id.* at 17.
[42] *Id.* at 15 (emphasis added).
[43] *Id.* at 7.
[44] HCP at 1-13, 6-19 to 6-22.
[45] HCP at 6-19 to 6-22.
[46] *Id.*
[47] *Id.*
[48] *Id.* at 6-20 to 6-21.

The HCP explains that NUID needs to get 60,000 acre-feet transferred from COID to achieve the 300 cfs winter flows required in years 8 to 12 of the HCP, and 90,000 acre-feet of water to achieve the 400 cfs winter flows required in years 13 to 30.[49] If NUID does not get the 60,000/90,000 acre-feet, either from COID or other districts, there is a two-year grace period for NUID to achieve the flow requirements.[50]

The HCP also includes Measure UD-1, which establishes the Upper Deschutes River "Conservation Fund" by requiring the districts to pay $150,000 annually to fund restoration actions that address "*other* threats" than those associated with water storage and irrigation.[51]

F. The Service's 2020 ITP and Biological Opinion

In December 2020, the Service issued an ITP for the HCP that will expire December 31, 2050, and finalized a biological opinion on the effects of (1) its issuance of the ITP and (2) Reclamation's continued operation of the Deschutes Project—*i.e.*, the Proposed Action.

In examining the effects of the Proposed Action on the Frog, the Service found that "implementation of the DBHCP is likely to have adverse effects to the spotted frog and its critical habitat" but claimed that those effects "will lessen over time."[52] In particular, the Service found that the "minimum flow releases from Wickiup Reservoir" and the "ramping rates at Wickiup Dam before and after irrigation season" were likely to adversely affect the Frog and its critical habitat in the Upper Deschutes.[53] The Service explained that there are approximately 1,960 acres of designated critical habitat for the Frog below Wickiup Dam that are affected by the Proposed Action, including 1,227 acres of wetlands and 988 acres of riverine channel.[54]

Specifically, the Service relied on two measures from the HCP, the Incremental Flows and the Conservation Fund,[55] to support its claim that the HCP was "likely to improve the survival and recovery" of the Frogs that occupy wetland slough floodplain habitats along the Deschutes River.[56] The Service focused on anticipated long-term benefits from the Incremental Flows and relied on the purported ability of the Conservation Fund to address the short-term and "ongoing threats and stressors" to Frog populations in the Upper Deschutes through Phase I of the HCP.[57] The Service explained, however, that the Conservation Fund would only address some localized threats "outside of water operations,"[58] like encroachment of vegetation, treatment of reed canarygrass, and bullfrog removal, and would not fund actions that fully

[49] *Id.* at 9-9.
[50] *Id.* at 9-10.
[51] *Id.* at 8-227 (emphasis added).
[52] 2020 Biological Opinion at 125.
[53] *Id.* at 125.
[54] *Id.* at 136.
[55] *Id.* at 137.
[56] *Id.* at 138.
[57] *Id.* at 141, 145; *see also, id.* at 190 (stating that in Phase I, site-specific management of the Frog's habitat and threats is "essential" to Frog conservation).
[58] *Id.* at 138.

address the degraded habitat conditions in the Upper Deschutes.[59] The Service also relied on the Conservation Fund's purported ability to fund habitat improvement projects in Phase II of the HCP,[60] and explained that in Phase III "due to the enlarged river channel that has resulted from 70 years" of Deschutes Project operations, "active channel restoration will be necessary."[61] The Service asserted that "winter flows in the 400 to 500 cfs range are most likely to support restoration efforts" that connect the Frog's wetland habitats with the river channel.

In Appendix D of the Biological Opinion, the Service listed "*some*" of the general "types" of conservation actions that "could be implemented" in the Upper Deschutes with the Conservation Fund.[62] The Service again highlighted the importance of actions that restore the ecological function of the river channel and stated that site-specific actions that improve habitat function and reduce threats to the Frog are needed "[p]rior to and concurrent with increases in winter flows that are anticipated via HCP implementation."[63] The Service provided "[e]xamples of *potential* conservation and restoration actions"[64] but no details about what actions are necessary or what could actually be achieved with the Conservation Fund. The Service merely stated that "[s]pecific funding proposals will be developed consistent with the *Deschutes Basin Habitat Conservation Fund – Advisory Committee Standard Operating Procedure*."[65]

The Service stated in the Biological Opinion that the actions that "promote" the Frog's recovery "will be further identified" in an Implementation Strategy for the Upper Deschutes, which is a component of the Recovery Plan for the Frog "(anticipated August 2022)."[66]

Ultimately, the Service concluded that the Proposed Action was not likely to jeopardize the continued existence of the Frog based on anticipated long-term improvements to the Frog's habitat from the implementation of the HCP.[67] The Service also concluded that the Proposed Action was not likely to destroy or adversely modify the Frog's critical habitat based on anticipated improvements to critical habitat as Phases II and III of Incremental Flows are implemented, and on the expectation that the Conservation Fund would "enhance[e]" critical habitat in the Upper Deschutes."[68] Because it concluded that the Proposed Action will not jeopardize the Frog or destroy or adversely modify critical habitat, the Service issued an ITS.[69]

[59] *Id.* at 145.
[60] *Id.* at 191.
[61] *Id.* at 192.
[62] 2020 Biological Opinion, Appx. D at 2 (emphasis added).
[63] *Id.* at 3-4.
[64] *Id.* at 4 (emphasis added).
[65] *Id.* at 7.
[66] 2020 Biological Opinion at 145.
[67] *Id.* at 196.
[68] *Id.* at 197.
[69] *Id.* at 277-93.

ENDANGERED SPECIES ACT VIOLATIONS

I. The Service and Reclamation failed to ensure that the Proposed Action is not likely to jeopardize the Frog or destroy or adversely modify critical habitat, in violation of section 7(a)(2) of the ESA.

The Service and Reclamation violated section 7(a)(2) of the ESA by failing to ensure that the Proposed Action is not likely to jeopardize the Frog and destroy and adversely modify its critical habitat. The Service's 2020 Biological Opinion was arbitrary and capricious because the Service: (A) impermissibly relied on mitigation measures that are not sufficiently binding or certain to occur; (B) failed to follow the best available science, including the Service's own findings, that at least 600 cfs in the winter and a summer flow cap of 1,100 cfs are necessary for the Frog and its habitat in the Upper Deschutes; (C) failed to analyze short-term impacts of the Proposed Action within the context of the Frog's five-year lifespan; and (D) failed to properly consider whether the Proposed Action will harm the Frog's ability not only to survive, but to recover.

By relying on the arbitrary and capricious Biological Opinion, Reclamation has abrogated its own duty to ensure against jeopardy to the Frog. Accordingly, both the Service and Reclamation have violated the substance and procedures set forth in section 7(a)(2) of the ESA. At minimum, the Service and Reclamation must reinitiate and complete consultation on the effects of the Proposed Action because it will affect the Frog and its critical habitat in ways that have not been adequately offset or even described.

A. The Service improperly relied on mitigation measures that are not specific, enforceable, or reasonably certain to occur.

In concluding "no jeopardy" for the Frog, the Service improperly relied on conservation measures in the HCP that are not sufficiently specific, binding, or certain to occur.[70] The Service may reach a "no jeopardy" conclusion only by relying on mitigation measures that involve "specific and binding plans" and "a clear, definite commitment of resources," and which are "under agency control or otherwise reasonably certain to occur."[71] A "sincere general commitment to future improvements"—without more specificity—is insufficient.[72] The Service may only rely on mitigation measures that are "subject to deadlines or otherwise-enforceable obligations" and "describe, in detail, the action agency's plan to offset the environmental damage caused by the project," and it "cannot refer only to generalized contingencies or gesture at hopeful plans."[73]

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[70] *See Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv. ("NWF I")*, 524 F.3d 917, 935-36 & n.17 (9th Cir. 2008) (finding that a "sincere general commitment to future improvements"—without more specificity—is insufficient).
[71] *Id.* at 935-36 & n.17 (9th Cir. 2008).
[72] *Id.* at 935-36.
[73] *Ctr. for Biological Diversity v. Bernhardt*, 982 F.3d 723, 743 (9th Cir. 2020) (citing *Ctr. for Biological Diversity v. Rumsfeld*, 198 F. Supp. 2d 1139, 1152 (D. Ariz. 2002)).

Here, however, the Service unreasonably relied on conservation measures set forth in the HCP, which lack specific and binding plans, lack specific deadlines or otherwise-enforceable obligations, and are not subject to agency control or otherwise reasonably certain to occur.[74]

First, the Service improperly relied on the Conservation Fund (Measure UD-1) to conclude that the Proposed Action would not jeopardize or destroy or adversely modify the Frog's critical habitat. There are many uncertainties regarding implementing Measure UD-1. In Appendix D of the Biological Opinion, the Service lists the types of actions that *could* be implemented with the Conservation Fund and stresses the importance of actions that restore the ecological function of the Upper Deschutes river channel.[75] But there are no meaningful details about what specific actions will occur, where they will occur, who will implement them, the extent of the mitigation that will be funded compared to the need, or how effective the actions would be at ensuring against jeopardy. Nowhere does the Service explain the extent of actions needed to mitigate harm to the Frog or discuss how much the Conservation Fund could actually accomplish. And although the Service states that only with winter flows of 500 cfs could many important channel restoration actions occur,[76] there is no assurance that winter flows will ever reach 500 cfs, nor any estimate of how often they may reach that level.[77] Despite the many uncertainties about implementing Measure UD-1, the Service relied heavily on the Conservation Fund to conclude that harm to the Frog would be mitigated sufficiently to avoid jeopardy, ensure its survival and recovery, and avoid destruction and adverse modification of its critical habitat.[78] Thus, the Service's reliance on the Conservation Fund was arbitrary and capricious.

Second, the Service improperly relied on the Incremental Flows (Measure WR-1) to conclude "no jeopardy" for the Frog. The HCP provides insufficient detail about the incremental plan to modify flows below Wickiup, including how winter flows below Wickiup will be able to increase or how summer flows will be able to be capped in Phases II and III. The HCP provides only a vague assertion that the winter flow increase to 300 cfs in Phase II "will be accomplished by passing water through the reservoir during the winter rather than storing it"[79] along with a generalized plan to modify flows, but it never explains how, exactly, that will be achieved.[80] Moreover, there is similarly sparse information about winter flow targets in Phase III, which vary between 400 cfs and 500 cfs according to a tool "to be developed" by the Service and the Permittees in coordination with OWRD and Reclamation.[81] Despite the uncertainties about whether the flow targets set forth in Measure WR-1 will actually be met, the Service relied on the "anticipate[d] improvement" to critical habitat in Phases II and III to conclude "no destruction or adverse modification."[82]

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[74] 2020 Biological Opinion at 137.
[75] 2020 Biological Opinion, Appx. D at 3-4.
[76] *Id.* at 5.
[77] *See* HCP at 6-20 to 6-21, 7-17 to 7-18 (flow level between 400 and 500 cfs will be determined based on a yet-to-be-developed tool that considers reservoir storage levels).
[78] *See* 2020 Biological Opinion at 126, 132, 137, 138, 141, 145, 153, 155, 159, 164, 166, 177, 185, 186, 189, 190, 191, 192, 194, 195.
[79] HCP at 6-24.
[80] *Id.* at 10-1.
[81] *Id.*
[82] 2020 Biological Opinion at 197.

Accordingly, the Service failed to rely on mitigation measures that describe "in detail the action agency's plan to offset the environmental damage caused" by the Proposed Action.[83] Instead, by relying on the HCP's proposed measures to conclude "no jeopardy"—measures which are vaguely described, uncertain, constrained by Oregon water law, limited by contracts, require approvals by OWRD, and depend on other non-federal actions—the Service improperly relied on measures that are not sufficiently detailed, binding, or enforceable.[84] Thus, the Service's "no jeopardy" conclusion is unlawful.[85]

B. The Service failed to rely on the best available science.

Section 7(a)(2) of the ESA requires the Service to use the best available science to determine whether the Proposed Action is likely to jeopardize the continued existence of the Frog or destroy or adversely modify its critical habitat.[86] The Service, however, failed to rely on the best available science, including its own prior findings, that the Frog's survival and ultimate recovery requires winter flows of at least 600 cfs and a summer flow cap of 1,100 cfs.

Here, the Service disregarded the overwhelming scientific information, including its own analysis, which shows that even if the Permittees can meet the Phase III flow target of "400 to 500 cfs"—which, as stated above, is entirely uncertain—it will *still* not be enough to connect wetlands and overcome the "highly degraded" conditions below Wickiup that are threatening the Frog.[87] Winter flows of at least 500 cfs are needed to support the riparian sedge root systems that stabilizes the banks of the Frog's habitat.[88] Indeed, the Service itself notes that 500 cfs is the *bare minimum* necessary to support overwintering frogs downstream of Wickiup.[89] In 2017, the Service recommended that the HCP increase winter flows to 600 cfs out of Wickiup "as early as possible."[90] In comments on the draft HCP, Frog expert Teresa Simpson stated that winter flows of 600 cfs and an accompanying 1,100 cfs summer flow cap are required to connect wetlands, restore riparian vegetation, reduce erosion, and improve Frog habitat.[91] However, the Incremental Flows in the HCP do not even reach 500 cfs until *maybe* Phase III, and, as discussed above, even this is uncertain. Even then, "[d]ue to the enlarged river channel that has resulted from 70 years of storage and release operations, active channel restoration will be necessary" at that point—restoration which is, as described above, not specified or guaranteed.[92] Accordingly,

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[83] *Bernhardt*, 982 F.3d at 743; *see also Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv. ("NWF II")*, 184 F.Supp.3d 861, 935 (D. Or. 2016); *Ctr. for Biological Diversity v. Salazar*, 804 F.Supp.2d 987, 1004 (D. Ariz. 2011) (finding that a biological opinion cannot rely on a "promise—no matter how well-intended— to develop a plan in the future to mitigate the impacts of its proposed action.").
[84] *See, e.g., Ctr. for Biological Diversity v. BLM*, 698 F.3d 1101, 1114, n.9 (9th Cir. 2012) (where "a non-federal entity promises to take action mitigating the impact of a federal action on listed species but fails to do so, the contemplated protections of listed species may never materialize.").
[85] *See NWF I*, 524 F.3d at 935, 936.
[86] 16 U.S.C. § 1536(a)(2).
[87] 2020 Biological Opinion, Appx. A – Status of the Species, at 13.
[88] 2020 Biological Opinion at 192.
[89] *See* 2017 Biological Opinion at 73.
[90] 2017 Biological Opinion at 216.
[91] *See* Teresa Simpson Comments on Draft HCP, ("Attachment A").
[92] 2020 Biological Opinion at 192.

the Service's "no jeopardy" determination is not based on the best available science, is, therefore, arbitrary and capricious, and violates section 7(a)(2) of the ESA.

C. The Service failed to adequately analyze the effects of the entire Proposed Action, unlawfully deferring consultation on interrelated actions.

The Service failed to adequately analyze the effects of the Proposed Action on the Frog and its critical habitat. In preparing the Biological Opinion, the Service was required to evaluate the direct, indirect, and cumulative effects of the Proposed Action and "add the effects of the action and cumulative effects to the environmental baseline in light of the status of the species."[93] In undertaking this analysis, the ESA requires the Service to "analyze the effect of the *entire* agency action."[94] In the ESA context, "effects of the action" include all consequences of the proposed action, which include those actions that would not occur but for the proposed action and it is reasonably certain to occur.[95] Here, the Service failed to adequately analyze the effects of the Proposed Action, including a "long-duration" maintenance project planned to occur in Phase I that will reduce flows below Wickiup to as low as 10 cfs for three weeks in October or November—when Frogs are moving to winter habitat.[96] This maintenance project would not occur but for the Proposed Action, and it is reasonably certain to occur, and yet the Service failed to analyze its effects on the Frog.[97] The Service previously determined that a similar maintenance action was "likely to cause a significant impairment of essential behaviors" and was "reasonably certain to result in the death of an unknown number of spotted frogs," and, as a result, found that harm to the Frog was "likely to be more severe than previously anticipated."[98] By failing to adequately analyze the effects of the Proposed Action, the Service's "no jeopardy" conclusion is arbitrary and capricious.

D. The Service failed to Evaluate Short-Term Impacts to the Frog.

The Service's "no jeopardy" conclusion in the Biological Opinion is invalid because the Service failed to evaluate impacts to the Frog on a timeline that reflects its life cycle. Biological opinions must evaluate impacts to species as they actually occur: using a time-scale that reflects the life cycles of the species being evaluated.[99] Here, the Service ignored an important aspect of the problem when it failed to properly assess the short-term effects of the HCP's Incremental

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[93] 50 C.F.R. § 402.14(g)(4).
[94] *Conner v. Burford*, 848 F.2d 1441, 1453 (9th Cir. 1988) (emphasis added).
[95] 50 C.F.R. § 402.02.
[96] 2020 Biological Opinion at 19.
[97] *See id.* (explaining that "because the exact methods of dewatering and repair are not fully known at this time, Reclamation will consult with the Service separately on these activities prior to their implementation").
[98] 2019 Biological Opinion at 12.
[99] *Pac. Coast Fed'n of Fishermen's Ass'ns v. Nat'l Marine Fisheries Serv.*, 265 F.3d 1028, 1037-38 (9th Cir. 2001), 265 F.3d at 1037-38 (invalidating biological opinion analyzing impacts to salmon on a 10-year scale at the watershed level because "[t]his generous time frame ignores the life cycle and migration cycle of anadromous fish" and because "assuming away site-specific degradations that could lead to a jeopardy finding contradicts the purpose of ESA and is arbitrary.")

Flows in the context of the Frog's lifespan.[100] The Frog does not live longer than five years, and but the Incremental Flows change at year 8 and 13 (plus two years if NUID cannot get the acre-feet needed to release more water). This is critical because it could be three generations of Frogs before winter flows reach 400 cfs, and even longer for any restoration actions in the Upper Deschutes to deliver results that improve habitat conditions. The Service conducted no analysis of impacts on the five-year scale and instead based its "no jeopardy" finding on the assumption that the HCP would improve conditions long-term—which, as discussed above, is not certain. The Service did not consider the probability or impact of losing key Frog populations in the near-term *before* modified flows and restoration actions could improve habitat conditions for the Frog. Thus, because the Service failed to adequately analyze the short-term effects of the Proposed Action, its "no jeopardy" determination is arbitrary and capricious, and violates section 7(a)(2) of the ESA.

E. The Service Failed to Adequately Analyze Whether the Proposed Action Will Impair the Frog's Ability to Recover.

In making a "jeopardy" determination, the Service must consider whether the proposed action will "reduce appreciably the likelihood of both the survival *and* recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."[101]

Here, the Service did not adequately analyze how the Proposed Action might affect the Frog's ability not only to survive, but to recover. Although the action area is just a small part of the Frog's range, the Service has identified it as important and stated that recovering the Frog necessarily requires restoration actions that improve channel function and increase winter habitat in the Upper Deschutes. The Service admitted in the Biological Opinion that winter flows of only 100 cfs and uncapped summer flows will maintain the "functioning at risk" rating for Frog habitat below Wickiup Dam through at least Phase I of the HCP.[102] And the Service has repeatedly admitted that the Proposed Action is likely to maintain degraded conditions in the Upper Deschutes and *may* only improve them in the future.[103] Indeed, in its NEPA analysis, the Service specifically found that the Proposed Action will "perpetuate degraded habitat conditions" downstream of Wickiup Dam for over a decade.[104] Yet the Service failed to adequately analyze whether maintaining these harmful conditions for a decade or more might affect the Frog's ability to recover.[105]

The Service had ample information to find that the Proposed Action was likely to reduce the Frog's likelihood of survival and recovery. In 2017, the Service found that the interim winter

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[100] *Motor Vehicles Mfrs. Ass'n v. State Farm Mutual Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *Pac. Coast Fed'n v. NMFS*, 265 F.3d at 1037.
[101] 50 C.F.R. § 402.02 (emphasis added); *see Nat'l Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1286 (E.D. Cal. 2000) (noting that the "no jeopardy finding required by ESA § 7(a)(2) is identical to the survival finding required under § 10(a)(2)(B)(iv).").
[102] 2020 Biological Opinion at 173.
[103] 2020 Biological Opinion at 125, 159, 190 ("[w]inter habitat for OSF along the Deschutes River will remain limited through the first seven years of HCP implementation.").
[104] *See, e.g.,* FEIS at 3.4-34.
[105] *See* 2017 Biological Opinion at 60, 124, Appx. A, 13; 2019 Biological Opinion at 17.

flows (increased from 28 cfs to 100 cfs) and uncapped summer flows significantly harm the Frog in all life stages and habitats below Wickiup Dam.[106] In 2019, the Service found that extending the 100 cfs winter flows through 2020 would maintain "highly degraded" conditions in the Upper Deschutes, and that unregulated summer flows have population-level adverse effects on entire generations of Frogs.[107] In the 2020 Biological Opinion, however, the Service did not consider the additive effects of extending these same harmful conditions for nearly another decade and instead described the effects of the Proposed Action only relative to "historical conditions"—*i.e.* before the winter flow increase to 100 cfs in 2016—and improperly relied on an unsupported assumption that any harmful effects could "lessen over time."[108] Thus, the Service failed entirely to consider, much less ensure, that the Frog will be able to recover under these circumstances.

II. The Service's violated section 7(b)(4) of the ESA by issuing an ITS that failed to adequately specify the measures that are "necessary or appropriate" to minimize harm to the Frog.

Section 7(b)(4) of the ESA requires that when issuing an ITS, the Service must specify the reasonable and prudent measures ("RPMs") that are "necessary or appropriate" to minimize the harm to listed species and set forth terms and conditions "that must be complied with" to implement each RPM.[109] Here, however, the Service failed to provide any assurances that the measures that are necessary or appropriate to minimize harm to the Frog will actually occur. As discussed above, the proposed mitigation measures are not sufficiently specific or binding, rely largely on uncertain non-federal actions, and are otherwise unenforceable.[110] By failing to require that the measures *actually* be implemented and complied with by incorporating them in the RPMs and/or the terms and conditions of the ITS, the ITS is arbitrary and capricious, and violates section 7(b)(4) of the ESA.

III. The Service's issuance of the ITP was arbitrary and capricious, and violated section 10 of the ESA.

The Service's issuance of the ITP for the HCP was arbitrary and capricious because the Service failed to meet the essential protective requirements of section 10 of the ESA. Before issuing an ITP, the Service must find that the expected taking will be incidental; that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; that the applicant has assured adequate funding for its HCP; and that the taking will not appreciably reduce the likelihood of the survival and recovery of listed species in the wild.[111] The Service's section 10 Findings and Recommendations on its issuance of the ITP to the Permittees are deficient for a variety of reasons, which are discussed below.

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[106] 2017 Biological Opinion at 60, 124.
[107] 2019 Biological Opinion at 2, 5, 7, 9, 17.
[108] 2020 Biological Opinion at 125, 153.
[109] 16 U.S.C. § 1536(b)(4)(C)(ii), (iv).
[110] *See Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv. ("NWF III")*, 254 F. Supp. 2d 1196, 1213 (D. Or. 2003).
[111] 16 U.S.C. § 1539(a)(2)(B).

A. The Service failed to properly determine that the Permittees will minimize and mitigate the impacts of the taking of the Frog to the maximum extent practicable.

Before issuing an ITP, the Service must find that "the applicant" will minimize and mitigate impacts to the "maximum extent practicable."[112] For this purpose, "mitigation" means actions that will "offset impacts of taking on the species."[113] The Service, not the applicant, must independently determine whether the proposed measures truly minimize and mitigate take to the "maximum extent practicable."[114] The Service cannot rely on speculative future actions to show that mitigation is the "maximum extent practicable."[115] To make this determination, the Service considers both whether the mitigation is adequate and whether it is the maximum that can be practically implemented by the applicant.[116]

Here, the Service's determination was arbitrary and capricious in several respects. First, the Service failed to properly determine that the HCP's conservation measures are the maximum that can be practically implemented by the Permittees.[117] Instead, the Service provided a conclusory statement that the "Applicants propose to minimize and mitigate, to the maximum extent practicable, the impacts . . . via the conservation measures set forth in the [HCP]."[118] In making this finding, the Service relied on the Incremental Flows proposed in Phases II and III and on the mere promise of the future actions funded by the Conservation Fund to conclude that the proposed measures would offset harm to the Frog.[119] In so doing, the Service failed to independently determine that the Incremental Flows and the Conservation Fund are the maximum measures that can be practically implemented by the Permittees.[120]

Indeed, it is clear that more is required. In its NEPA analysis, the Service determined that measures that offset harm to the Frog more quickly were "realistic and reasonable"—e.g. measures that increase winter flows to 200 cfs or 300 cfs below Wickiup starting in year 1 rather than maintaining winter flows at only 100 cfs below Wickiup for a decade more.[121] Given its determination and its 2017 recommendation that the HCP raise flows to 200 cfs out of Wickiup sooner to minimize harm to the Frog,[122] the Service could not have issued the ITP consistent with section 10 of the ESA without making a finding that alternatives that raise winter flows sooner were impracticable. But there is no evidence that the Service ever made such a finding. In fact, the HCP flatly rejected any alternative that would raise winter flows sooner based on an unsupported assertion that any such measures are not possible because the "only viable

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[112] 16 U.S.C. § 1539(a)(2)(B)(ii).
[113] Habitat Conservation Planning and Incidental Take Permit Processing Handbook at 9-28 ("HCP Handbook").
[114] *Gerber v. Norton*, 294 F.3d 173, 184-85 (D.C. Cir. 2002).
[115] *Sierra Club v. Babbitt*, 15 F. Supp. 2d 1274 (citing *Sierra Club v. Marsh*, 816 F.2d 1376 (9th Cir. 1987)).
[116] HCP Handbook at 7-3.
[117] *See Gerber v. Norton*, 294 F.3d at 185.
[118] Findings and Recommendations at 2.
[119] *See* Findings and Recommendations at 18-21.
[120] *See Gerber v. Norton*, 294 F.3d at 185.
[121] *See* FEIS Appendix 2A, at 17, Table 2.
[122] 2017 Biological Opinion at 215.

approach" is "a gradual transition from historical reservoir operation."[123] Accordingly, because the Service failed to properly determine that the measures proposed in the HCP are the maximum measures that the Permittees can practicably implement, the ITP does not comply with applicable regulations.

Second, the Service improperly relied on future actions funded by the Conservation Fund to mitigate the take that would not be fully offset by the Incremental Flows.[124] However, the actions that the Conservation Fund might be able to fund in the future are not specified or required. The Service "may not rely on speculative future actions of others" in finding that an HCP minimize and mitigate the effects of the plan "to the maximum extent practicable."[125] Without concrete, objective criteria to enforce the Permittees' commitments to improve flows and restore habitat, the Service's conclusion that "the applicant will" in fact "minimize and mitigate" the taking of Frogs by improving flows and funding possible future conservation actions is arbitrary and capricious. The Service's issuance of the ITP was, therefore, unlawful.

B. The Service failed to determine that the Permittees will ensure that adequate funding for the HCP will be provided.

Before issuing an ITP, the Service must find that the applicant will ensure that adequate funding for the plan will be provided."[126] Here, the Service failed to ensure that the Permittees will ensure adequate funding for the HCP because its reliance on the Conservation Fund, alone, was arbitrary and capricious.

First, the Service failed to find that the Permittees will secure adequate funding to achieve the Incremental Flows proposed in the HCP. In the HCP, the Permittees admit that funding is not certain for the piping projects necessary to facilitate water transfers from COID to NUID, which is how the Permittees plan achieve the Incremental Flows at Wickiup.[127] In particular, the HCP noted that increasing winter flows would require "substantial funding from as-of-yet unidentified sources."[128] This is particularly troubling because the Service's NEPA analysis estimated that one proposed COID piping project is expected to cost "approximately $40 million"—a project that is "just one small element of all Central Oregon ID proposed piping."[129] The Service explained that that the single piping project "may require approximately $843,000 in annual payments" by both COID and NUID, which would represent an approximately 10% increase in the operating costs of the two districts (approximately 12% in COID and approximately 9% in NUID).[130] Moreover, piping the Pilot Butte Canal would cost approximately $183 million, and piping the Central Oregon Canal would cost approximately

[123] *See* HCP at 11-3; *see also id.* at 11-5 (claiming the Permittees need more time to replace water lost to instream flow because "to replace this water, other DBHCP Permittees (primarily COID) plan to pipe canals within their Districts and provide saved water (conserved live flow) to NUID.").
[124] *See* FRs at 20.
[125] *Sierra Club v. Babbitt*, 15 F. Supp. 2d at 1282.
[126] 16 U.S.C. § 1539(a)(2)(B)(iii).
[127] HCP 1-22, 9-8, 10-2 to 10-10.
[128] HCP at 11-6.
[129] FEIS at 3.9-12.
[130] *Id.*

$238 million.[131] There is no assurance provided, in the HCP or otherwise, that the necessary funding will be available to achieve the Incremental Flows set forth in the HCP.

Second, there is no evidence that the funding provided in the Conservation Fund is adequate. In fact, the HCP admits that the $150,000 contributed by the districts each year to the Conservation Fund is unlikely to fully fund the actions necessary to mitigate the harms to the Frog but, rather, would provide "seed money or matching funds to be used in consort with funding from other entities responsible for Oregon spotted frog management in the basin."[132] Although the Service's 2020 Biological Opinion outlines the different types of actions that the Conservation Fund *could* support and provides possible examples of how the money could be divided up each year among such actions,[133] nowhere does the Service explain the extent of actions needed to fully mitigate the harm to Frogs or how much the Conservation Fund could *actually* accomplish with annual payments of $150,000. Thus, because the Service failed to ensure that there will be adequate funding for the HCP, its issuance of the ITP was unlawful.

C. The Service failed to determine that the taking will not appreciably reduce the Frog's likelihood of recovery.

Before issuing an ITP, the Service must determine that the Proposed Action will not appreciably reduce the likelihood of the species' recovery.[134] In this regard, the "no jeopardy finding required by ESA [section] 7(a)(2) is identical to the survival finding required under [section] 10(a)(2)(B)(iv)."[135] Here, as discussed above, the Service failed to properly determine that the HCP will not appreciably reduce the Frog's likelihood of recovery. The HCP's proposed flows never achieve levels that will sustain the Frog's populations below Wickiup Dam, perpetuating conditions that harm the Frog's chances of recovery. Unless and until the HCP provides flows that support the Frog and its habitat below Wickiup Dam, the near-term effects of the HCP—effects which it failed to specify, as discussed above—are likely to harm the Frog's ability to survive below Wickiup Dam and, in fact, could harm the Frog populations below Wickiup Dam in ways that prevent the Frog's recovery. As a result, by failing to adequately determine that the HCP will not appreciably reduce the likelihood of the Frog's recovery, the Service's issuance of the ITP was unlawful.

IV. The Service is in Violation of Section 4(f) of the ESA by Failing to Develop and Implement a Recovery Plan for the Frog.

Section 4(f) requires that the Service develop and implement plans for the recovery of threatened species.[136] The Service has acknowledged the need for a Recovery Plan for the Frog and, indeed, in the 2020 Biological Opinion, the Service stated that the Recovery Plan for the

[131] *Id.* at 3.9-13.
[132] HCP at 6-41.
[133] *See* 2021 Biological Opinion, App. D.
[134] 16 U.S.C. § 1539(a)(2)(B)(iv); 50 C.F.R. §§ 17.22(b)(2)(i), 17.32(b)(1)(ii).
[135] *Nat'l Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1286 (E.D. Cal. 2000).
[136] 16 U.S.C. § 1633(f).

Frog was "anticipated" in August 2022.[137] To date, however, the Service has not issued, let alone implemented, a Recovery Plan that addresses the Frog's recovery throughout its range, including the Upper Deschutes River. This is a violation of the Service's mandatory duties under section 4(f) of the ESA.[138]

Moreover, the Service has also not provided any notice and comment opportunities for any draft of a Recovery Plan for the Frog. Section 4(f)(4) of the ESA requires the Service to provide public notice and an opportunity for the public to review and comment on a recovery plan prior to its implementation.[139] Despite stating in the Status of the Species document included as Appendix A of the 2020 Biological Opinion that a "draft recovery plan is anticipated to be completed in 2020,"[140] to date, there has been no public draft available for notice and comment. Thus, the Service must promptly release its draft Recovery Plan for the Frog.

CONCLUSION

Reclamation and the Service have failed to ensure that the Proposed Action is not likely to jeopardize the continued existence of the Oregon spotted frog or destroy or adversely modify the Frog's critical habitat and, thus, have failed to comply with the clear requirements of the ESA. Accordingly, the agencies' actions in this matter violate the ESA and APA, falling far short of what is required to protect and recover a highly imperiled aquatic species and its habitat. In addition, the Service's failure to develop and implement a Recovery Plan for the Frog not only violates the ESA, but also deprives the Frog of the critical information necessary to know whether the HCP, ITP, Biological Opinion could facilitate the actual benefits to the species by not only preventing its extinction, but supporting its recovery.

To comply with the ESA, the Service and Reclamation must reinitiate consultation to ensure against jeopardy to the Frog and destruction and adverse modification of critical habitat in the Upper Deschutes. The Service must also promptly issue a Recovery Plan for the Frog.

Please do not hesitate to contact me to discuss this matter.

Sincerely,

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[137] 2020 Biological Opinion at 156; *id.* Appx. D at 1; *see also id.* at 189, 194 (stating that the Recovery Plan was "expected [in] 2022").
[138] 16 U.S.C. § 1533(f).
[139] 16 U.S.C. § 1633(f)(4).
[140] 2020 Biological Opinion Appx. A at 17.

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Attachment A

Comments to the Draft Habitat Conservation Plan for the Deschutes Basin. November 6, 2019. Theresa Simpson

I have been asked by WaterWatch of Oregon and Center for Biological Diversity to provide my expert comments on the Draft Habitat Conservation Plan for the Deschutes Basin ("HCP") with regard to its discussion and effects on Oregon spotted frog ("OSF"). I have more than twenty years of experience monitoring and studying OSF in central Oregon, including populations along the Upper Deschutes River, Little Deschutes River, and Crescent Creek. I previously submitted expert declarations in litigation over operation of Crane Prairie, Wickiup, and Crescent dams, which gave details about my experience with and knowledge of OSF. These declarations also provided background information on the life history and habitat needs of OSF as well as the effects of dam operations on the Upper Deschutes, Little Deschutes, and Crescent Creek OSF populations. I am attaching those declarations here to be considered along with these comments. As explained below, the HCP does not contain measures that will improve conditions for OSF to ensure the survival and recovery of populations along the Upper Deschutes River, which contain genetic variability important for the species as whole.

I. HCP Goal of Maintaining Current Populations is Inadequate to Ensure Long-Term Survival

The first problem with the HCP is that it aims to "maintain" the current OSF populations along the Upper Deschutes River between Wickiup Dam and Bend. However, having a goal of simply maintaining these populations is not enough to sustain OSF along this stretch of the river for the long-term. In my opinion, any minimum flows less than 400 cfs won't maintain viable populations along the Upper Deschutes. Vulnerability to extirpation is already very high for these populations between Wickiup and Bend. Population levels along the river at all but Sunriver are low or extremely low (See HCP Table 5-13, page 5-58). Most OSF sites are too far apart for frogs to move between them, which further jeopardizes population persistence at these sites (See HCP Table 8-36, page 8-189 for reach distances). Note also that the frog breeding sites listed in Table 5-13 are not broken out by population or river reach so I will try to do that. Within Reach 1, Bull Bend is a population; and Dead Slough, Benchleg Pond and SW Slough sites are in close proximity to each other and considered one population. Reach 2 Fall River to Little Deschutes River has 2 sites I am unfamiliar with. Reach 3 contains the Sunriver population. Within Reach 4 Benham to Dillon, the SW Slough Camp, East Slough Camp and Ryan Ranch sites are considered one population. There are no sites in Reaches 5-6, and Reach 7 contains the Old Mill and Les Schwab sites that make one population.

Populations are currently at low levels and need immediate action to stabilize them. Some are already undetectable or so low it may be too late without an extreme measure like bringing in frogs from another site. All but two of the Upper Deschutes populations are affected by irrigation flow operations and are teetering on the edge of extirpation in the face of significant threats that are perpetuated by the HCP proposed action. The Sunriver population is large, but water levels in that stretch are controlled by Sunriver water management, not irrigation districts. Even so, this population has been in decline for some years now. The Old Mill and Les Schwab sites are also outside the irrigation district's flow control. These sites experienced two years of heavy winter mortality that has decimated this population from 86 breeders in 2013 to 6 in 2018. All other populations, which are affected by irrigation flow operations, are subject to extreme winter conditions as well. Old Mill/Les Schwab was one of the larger populations. If this population can be nearly wiped out in a series of two winter kill events, then every other

population on the river can be as easily decimated since they do not have suitable overwinter conditions with flexibility to adapt to extreme conditions.

In the 2017 BiOp, USFWS recognized the vulnerability of these small OSF populations to extirpation on page 24: "*The vulnerability of spotted frog egg masses to fluctuating water levels (Hayes et al. 2000, pp. 10–12; Pearl and Bury 2000, p. 10), the vulnerability of post-metamorphic stages to predation (Hayes 1994, p. 25), and low overwintering survival (Hallock and Pearson 2001, p. 8) can contribute to relatively rapid population turnovers, suggesting spotted frogs are particularly vulnerable to local extirpations from stochastic events and chronic sources of mortality (Pearl and Hayes 2004, p. 11).*" The HCP acknowledges this concern at Page 8-168. "*The covered activities have the potential to exacerbate natural mortality by increasing the magnitude and/or frequency of unfavorable flows. However, it is difficult to discern the extent to which reservoir operation is actually increasing natural mortality rates, particularly given the difficulty in determining trends in population and subpopulation size through egg mass counts (USFWS 2017*)."

Instead of mitigating threats, the HCP's proposed regulated flow operations in the Upper Deschutes River perpetuate chronic sources of mortality that in turn have a synergistic influence to make the Upper Deschutes River frog populations more vulnerable to stochastic events like those the Old Mill/Les Schwab population experienced. Flows below 400 cfs maintain current poor habitat conditions that lock in these chronic high mortality rates. By allowing 100-300 cfs minimum regulated flow levels for the next twenty years, the HCP is not managing for these small populations' long-term survival, let alone their recovery. Increases in population size and connectivity between populations are critical to reduce the likelihood of extirpation for these populations. Immediate action is needed to improve overwinter, connectivity and breeding habitat conditions to boost survival at each population site along the Upper Deschutes River being affected by regulated flow operations.

The HCP conservation measures fail to address key problems for OSF breeding habitat and overwintering habitat that have been occurring for decades. Connectivity between the river and wetland habitat is broken at every OSF site along the Upper Deschutes for half the year during the water storage season, including during the two OSF essential movement periods going from summer to overwinter habitat and then overwinter into breeding habitat. Within those seasonal habitats, frogs are forced to use unsuitable/suboptimum habitat (as compared to other sites), and do not have options to move around in the winter in order to respond to changing winter conditions such as dewatering, anoxia and extreme freezing. These conditions have killed frogs along the Upper Deschutes at the Les Schwab and Old Mill site (Bowerman personal communication) and are considered a significant threat everywhere else. Habitat conditions continue to degrade as a result of erosive high flows in summer (see channel degradation section). Each of these threats present on the Upper Deschutes between Wickiup Dam and Bend increases predation on all OSF life stages, increases mortality due to stranding (such as freezing and desiccation), and increases energy expenditure which decreases growth/wellness. These are the threats that the HCP conservation measures need to mitigate, but do not. Rather, there are consistently irrational, unsupported and poorly described assertions made that all of the above threats

(except long term channel degradation that is completely missed) will improve under the current proposal.

II. Current Conditions along Upper Deschutes are Far Less Suitable than other Sites.

OSF life history and habitat requirements are described in HCP sections 5.5.1 and 5.5.2, pages 5-52 through 5-55. It is useful to look at these HCP excerpts below of how frogs at other sites are living compared to populations between Wickiup Dam and Bend. Here are 6 notable divergences I found:

1) OSF are "*highly aquatic*" at other sites. All life stages occur in aquatic habitat conditions with aquatic connections to move between habitats. In contrast, nearly half the overwinter sites along the Upper Deschutes were called terrestrial or semi-terrestrial (Pearl et al. 2018). The HCP at page 5-63 describes the lack of aquatic connections with Upper Deschutes wetlands during winter that other sites do not experience: "*Most are directly connected during summer high-flow conditions and partially or completely isolated, if not completely dewatered, during the winter*." The current and proposed regulated flow operations dewater nearly the entire floodplain for six months of the year and create extreme fluctuations in habitat suitability, availability and connectivity that are far beyond the range of natural fluctuations.

2) Breeding sites are often reused every year and are "*typically in perennial, open-water wetlands bordered by seasonally-flooded, low-growing emergent vegetation of low to moderate density,"* and "*egg masses are typically deposited above the previous year's matted vegetation, rarely at sites with a rock or bare substrate*." At Upper Deschutes sites, breeding occurs in open water over mud rather than over vegetation. Suitable breeding habitat is not inundated at all during the entire breeding season. High summer flows associated with minimum 100-300 cfs winter flows still retard establishment of vegetation in mudflats that would upgrade breeding sites to suitable habitat.

3) "*Shallow, stable water levels are important for this species during the breeding period from oviposition to metamorphosis*." On the Upper Deschutes, water levels change as a result of flow operations during this time period, going from no water to excess of 4 feet of water between mid-March and late May. Egg masses are laid and hatched in poor habitat conditions. Hatchlings are nearly immobile and young tadpoles are weak swimmers, but they must move immediately upon hatching to find suitable warm, shallow, calm, vegetated habitat conditions.

4) "*At lower elevations, Oregon spotted frog breeding begins in February or March (McAllister and Leonard 1997). At high elevations, breeding begins soon after breeding sites thaw, and may occur as late as late May or early June in years with high snowpack (C. Pearl, unpubl. data, as cited in Cushman and Pearl 2007)… day length and water temperatures between 43 and 50 °F are likely involved in triggering breeding (Cushman and Pearl 2007). Surveys in 2015 and 2016 at sites on Crescent Creek in the Little Deschutes River subbasin have shown oviposition between about March 30 and April 12*." I have personally observed breeding begin March 15 on the Little Deschutes and know that this has occurred at other high elevation Oregon sites. Timing of the breeding season is delayed on the Upper Deschutes due to flow regulation. Water levels do not reach mudflat breeding habitat until mid-April or later at

many of the sites, causing delayed breeding, which in turn reduces the young of the year growing season.

5) "*Juveniles and adults overwinter in springs, beaver dams, and slow-moving stream channels associated with breeding habitat, and have been observed to be active beneath surface ice.*" More specifically, "*winter habitat includes ponds, pools, and channels in either still or moving waters with the following characteristics:*

• Over 6 inches (15 cm) deep (Hallock and Pearson 2001; Hayes et al. 2001);

• Reasonably close (maximum distance about 1.5 miles) to breeding and summer season areas, connected by surface water of stream or river, or by wetland habitat.

• Comprised of emergent wetland, scrub-shrub wetland, aquatic bed, and unconsolidated bottom habitats (Watson et al. 2003, as cited in Germaine and Cosentino 2004).

• Not scoured by winter storm flows in the average year (Germaine and Cosentino 2004).

• In-channel flow or springs present, if located in an area where ice forms for more than 1-2 weeks (Germaine and Cosentino 2004)"

In comparison, "*A recent study by Pearl et al. (2018) documented Oregon spotted frogs overwintering in river banks, semi-terrestrial beaver channels, beaver lodges, and lava flows, including sites on the Deschutes River*." The HCP claims Upper Deschutes frogs are more flexible because they choose terrestrial overwinter sites without any actual confirmation that sites were indeed terrestrial or that the frogs actually survived the winter. While 15 of 35 overwinter sites found were documented as terrestrial or semi-terrestrial, another OSF expert Jay Bowerman documented multiple overwinter kills where frogs were partially dewatered or trapped out of the water. The science overwhelmingly indicates that winter survival is related to persistent aquatic conditions. If frogs do not have this long term, consistent water source, they do not persist. It is dangerous to the frogs for the HCP to claim frogs are more flexible and can use terrestrial overwinter habitat without knowing if frogs are indeed using terrestrial habitats or if they survive the winter.

6) "*Oregon spotted frog larvae (tadpoles) are thought to be generalist grazers that feed on algae, plant matter and bacteria*." Egg masses at Upper Deschutes River breeding sites are laid and hatch over mud, without the vegetative substrate hatchlings feed on. Mud is anoxic. Hatchlings are very weak swimmers for the first few weeks, so they settle into the mud without food or oxygen.

III. The HCP Fails to Mitigate these Unfavorable Breeding and Overwinter Conditions

A. Channel Degradation and Impacts to OSF Habitat

The Draft HCP acknowledges that large fluctuations between high and low flows associated with irrigation flow regulation are causing channel damage in the Upper Deschutes River between Wickiup Dam and Bend, but it does not discuss how that channel degradation impacts OSF habitat by dewatering

floodplain wetlands, causing a downward trend in quantity and quality of OSF critical habitat. More specifically, overwinter habitat is severely constrained by dewatered wetlands right now as a result of annual dam operations. Overwinter habitat conditions will get worse over time as channel conditions continue to degrade and further dewater the floodplain. Aquatic connectivity between OSF seasonal habitats is also currently severely restricted during two critical seasonal movements due to annual dam operations: the fall movement to overwinter habitat and the movement to suitable breeding habitat during the spring egg laying period. The downward trend in dewatering the floodplain will further reduce connectivity during these critical movement periods.

Extreme flow fluctuations driving river channel changes is a well-known concern. The Upper Deschutes Watershed Council identified the primary issue of concern in the Upper Deschutes Subbasin as the rapid rate at which the Upper Deschutes River banks are eroding. This opinion is supported in many Upper Deschutes River documents noted below. The Federal Register identifies it as a threat to OSF in the Upper Deschutes River. The draft HCP provides baseline discussion about changes from the historic hydrograph and its effects on river flow conditions and rates of change in water levels in select areas within the floodplain. However, the draft HCP does not talk about the continuing, and in fact increasing, downward trend in channel condition that is causing more extensive dewatering of the floodplain, which in turn further reduces quantity and quality of OSF critical habitat over time.

Background

The Upper Deschutes River system went through a dramatic period of change starting in the 1950's when regulated flows for irrigation began. Time and money were spent documenting impacts to the river and fish. These changes were well documented for the 1996 Upper Deschutes Wild and Scenic River Final Environmental Impact Statement (EIS). The 1996 Wild and Scenic River EIS identified a target of around a minimum of 500 cfs for winter flows and a maximum of 1200 cfs for summer flows to obtain vegetation stabilization to reduce erosional forces, but these were not implemented.

River studies did not end with the 1996 Wild and Scenic River EIS. Multiple assessments and reports have been completed from the 1990's to the present to study the impacts to resources in the Upper Deschutes. The Upper Deschutes Watershed Council identified the primary issue of concern in the Upper Deschutes Subbasin as the rapid rate at which the Upper Deschutes River banks are eroding. This opinion is supported in many Upper Deschutes River documents. [1], [2],[3] ,[4] Stream bank erosion causes channel instability, land loss, diminished water quality, and riparian/aquatic habitat loss. The 2017 interim biological opinion covering the irrigation flow operations ("2017 BiOp") states that "*change in hydrologic regime significantly altered flows in river and the way the river interacts with its floodplain*".

[1] USDA Forest Service. 1996, Upper Deschutes Wild and Scenic River Record of Decision and Final Environmental Impact Statement. Bend, Oregon. USDA Forest Service, Deschutes National Forest.
[2] Yake, Kolleen E. 2003. Upper Deschutes Subbasin Assessment. Upper Deschutes Watershed Council, Bend Oregon.
[3] Upper Deschutes River Restoration Strategy. October 7, 2008. Deschutes River Conservancy, Upper Deschutes Watershed Council and Oregon Department of Fish and Wildlife.
[4] Walker, Tom and Rob Tanner. January, 2012. Upper Deschutes River Roadmap to Restoration Project. Oregon Department of Fish and Wildlife and USDA Forest Service.

These studies show the river channel continues to degrade and fish habitat conditions have not improved. Multiple river restoration monitoring efforts showed that channel restoration actions above Bend have been futile because high summer flows submerge and kill newly planted vegetation, and therefore such efforts have been abandoned until the extreme high/low flow patterns are moderated. Extreme low winter flows also have resulted in annual fish kills in the Upper Deschutes when the river flow is shut off for winter storage in reservoirs. As a result, the State of Oregon no longer transplants fish in the river above Bend. Once Oregon spotted frog was listed as threatened in 2014, impacts to OSF habitat became a higher priority issue and studies have documented serious threats to that habitat from the high/low flow fluctuations.

Channel Degradation

The regulated flow regimes create erosion conditions along the river that negatively affect OSF critical habitat (CH). High irrigation season flows have accelerated lateral erosion on the outside banks of river bends and increased deposition on the inside of river bends, resulting in a 20% increase in channel width between 1943 and 1991.[5] At a Sun River Anglers meeting in 2018, Jason Gritzner, Deschutes National Forest hydrologist, reported that more recent studies show the Upper Deschutes River as of 2010 was 25% wider.[6] Lateral erosion on the outside of banks converts suitable wetland CH to marginally suitable riverine habitat. Deposition on the inside of river bends creates a high berm of sediment between the river and the adjacent suitable wetland CH during all but the highest of flow conditions. Thus, this depositional berm breaks aquatic connectivity between the river and wetlands for all but the highest flows. As stated in the 2017 BiOp, a widening river channel delivers less water to adjacent wetland CH. This erosion process will continue to accelerate river channel changes as long as irrigation season flows remain high and vegetation is drowned out.

Another trend relating to erosional processes on the Upper Deschutes River is an increasing number of meander cutoffs. A river channel lies in its floodplain like a series of S loops, meandering through numerous curves rather than flowing straight. This sinuosity[7] slows the river flow and creates still backwater areas. Meander cutoffs occur when a naturally sinuous river becomes straighter due to high flows cutting into unstable banks on a channel corner. As the erosion continues, a new channel cuts and eventually breaks through into the river on the other side. The flow now goes through the shorter and straighter channel and the prior loop is abandoned and prone to sediment deposition that plugs the old channel. The velocity of flow is much higher in the shorter, straighter channel than in the prior curved channel, allowing for even more erosion and additional meander cutoffs. Walker and Tanner, page 35 states "*There has been a substantial increase in the number of cut-offs, from a total of 11 in 1943 to 33 under present conditions indicating an unstable channel with high bank erosion (Table 5). The greatest*

[5] USDA Forest Service. 1996, Upper Deschutes Wild and Scenic River Record of Decision and Final Environmental Impact Statement. Bend, Oregon. USDA Forest Service, Deschutes National Forest.
[6] Gritzner, Jason. 2018. Upper Deschutes River Flow, Function and Restoration. PowerPoint presentation to Sun River Anglers Association.
[7] Sinuosity is a measure of the "wiggliness" of a watercourse and is expressed as the ratio of channel distance to downvalley distance. A meandering channel has a higher sinuosity than a straight channel in a valley of equal length.

number of new cut-offs exist in the stretch of river from Wickiup to the confluence of the Little Deschutes River (Reaches 1 and 2), with 21 total...This has resulted in channel sinuosity decreasing from 3.18 in 1943 to 1.86 in 2011." Walker and Tanner go on to say at page 39 that "*However, due mostly to the regulated flow regime of the upper Deschutes River the meander cutoffs are most likely well out of proportion to the numbers evident in the geologic record. This accelerated rate is mostly due to the modified hydrograph of the river and the longer duration the river stays at a higher flow*." Jason Gritzner, at the 2018 *Sun River Anglers* presentation said 1995 may be an inflection point at which meander cutoff and meander abandonment has accelerated.[8]

With a trend of decreasing sinuosity, the channel length decreases, channel gradient and flow velocity increases -all processes that degrade CH. A trend of decreasing sinuosity combined with widening accelerates the drop in channel water surface elevation, reducing the amount of water delivered to wetland CH. These changes also influence the timing of water delivery to wetland CH, delaying inundation of wetlands and making the inundated period shorter, affecting all OSF life stages as the river channel continues to erode. Again, these erosion processes will increase over time if high irrigation season flows are not reduced.

The widening of the river channel due to erosion from high flows creates a system that acts like a giant drainage ditch during the six month low flow period, which also contributes to dewatering of the floodplain. When water is removed from a ditch, the ditch then acts as a conduit to draw down the groundwater table along its reach. The width and depth of the irrigation ditch, along with soil permeability, determine the extent and degree of dewatering adjacent to the ditch. The same thing happens with the Upper Deschutes River. Not only do lower flows during the six month storage season stop delivering surface water to wetlands, the extremely low winter flows allow for the mostly empty river channel to first draw out the residual water from saturated soils within the floodplain, and then to lower the natural groundwater table in the zone of influence along the ditch/river. In other words, seeps, springs and other groundwater supported flows (all critically important overwinter features for OSF) are also drawn down within the ditch zone of influence. The greater the channel size, the more effective the drainage ditch becomes at dewatering adjacent wetland CH. Decreasing sinuosity indicates the downward channel condition trend also makes for increased efficiency in dewatering the natural water table in the floodplains, including seeps and springs that support frog overwinter habitat and spring breeding sites.

Over time, decreasing sinuosity leads to an alarming rate of increase in ditch efficiency, which in turn dewaters the floodplain more efficiently and extensively. When I asked Jason Gritzner, Deschutes Forest hydrologist, about this change in sinuosity and its effect on the river at his November 2018 Sun River Anglers presentation in 2018, he told the crowd that the 1996 Wild and Scenic River EIS 500 cfs target flows proposed to achieve channel vegetative stability are no longer high enough to achieve this objective due to channel degradation since those recommendations were made. Now it will take 600 cfs because the channel is wider and deeper. In other words, it will take more water to inundate wetlands

[8] Theresa Simpson personal notes taken at the Jason Gritzner,2018, *Upper Deschutes River Flow, Function and Restoration* PowerPoint presentation to Sun River Anglers Association in November, 2018 (attached).

for frogs today than it would have had the problem been addressed when it was first targeted in the 1990's. This demonstrates that channel degradation is ongoing and will only increase over time if the extreme high and low flows are not both moderated.

Impacts on OSF Habitat

The degradation of the channel conditions described above adversely affect OSF habitat. As the channel becomes wider and deeper, less water gets to floodplains where the frogs are located, changing both the timing and the extent of inundation of frog habitat. With a larger channel, flows, and in turn river levels, need to be higher to reach wetlands. Because of the degraded (wider and deeper) channel conditions, inundation takes place later in the spring season as irrigation flows increase and drying takes place earlier in the fall when water storage begins each year. The delay in inundation affects OSF breeding in the spring, pushing it back later and/or forcing frogs to lay egg masses in exposed locations, which increases mortality rates for multiple OSF life stages including breeding adults, egg masses, and tadpoles. As the river channel continues to degrade, even higher flows that occur earlier and later in the season are needed for wetland inundation and aquatic connectivity from overwinter habitat to breeding habitat.

At Dead Slough, flow regulation leads frogs to lay eggs in open water over mud because water levels are not high enough to inundate wetlands during the breeding period. In the case of Slough Camp, some breeding sites have no surface water until flows reach 1200 cfs at the BENO gage. These frogs don't have the option to lay egg masses in suboptimal conditions like those at Dead Slough. They have to wait for inundation. Breeding habitat inundation is already delayed due to flow operations, and continued channel degradation driving the dewatering of the floodplain will contribute toward further delay in inundation of breeding habitat and aquatic connectivity to that habitat. At some point these breeding sites will no longer be productive because they will be dewatered all year long. We're close to that point or beyond at some sites in Slough Camp, Bull Bend and LaPine State Park.

The impact of channel degradation is also affecting OSF overwinter habitat. As high flows cause the river channel to continue to erode and get deeper and wider, the drainage zone of influence (*i.e.*, area of shallow groundwater dewatered adjacent to the river) expands, degrading or destroying even more overwinter habitat beyond what is currently occurring from the annual low water levels. This is particularly ominous because OSF overwinter habitat is already extremely limited in quality and extent. I don't know all the overwinter sites along the river but I do know that six of the seven sites at Slough Camp and the two sites in LaPine State Park are heavily influenced by groundwater fed seeps and springs within the drainage zone of influence of the river. Continuing to allow high summer flows that drown stabilizing vegetation and cause more erosion, which in turn allows for accelerating drainage efficiency, will continue this downward trend in quality and quantity of overwinter habitat. Likewise, as flows drop in fall for the storage season, continued erosion means aquatic connectivity is lost earlier, negatively affecting frogs moving to overwinter habitat. At some point, frogs are not able to find suitable overwinter habitat. (Note that I am not accepting the proffer that Upper Deschutes River frogs are more flexible than other OSF and can survive in terrestrial overwinter sites.) As channel degradation

accelerates, the aquatic disconnect between summer and overwinter habitat occurs even earlier in the fall, causing increased exposure to predation and stranding of frogs.

Failure of HCP to Address This Issue

The HCP does not address continued degradation in current and future channel condition and associated dewatering of the river's floodplain that is negatively affecting wetland habitats that support all life stages of OSF. I did not find any discussion in the HCP about how channel degradation ties to frog habitat. As noted above, the warning has been raised for decades that this degradation is happening. The HCP acknowledges that it happened in the past when flow regulations first began, but seems to suggest that now the river is stable and frogs have made appropriate adaptations. How it came to those conclusions in the face of what is known about the river is unexplained. Mostly the HCP ignores this important issue. For instance, the HCP talks about the detrimental impacts that frogs face at Dead Slough because they don't have good breeding habitat available to them during the time most egg masses are laid, but it does not talk about what will happen as that timing gets pushed back later each year due to continued channel degradation.

The HCP also does not acknowledge that continued channel degradation will lead to further loss of OSF overwinter habitat through loss of surface water and dropping groundwater tables. The HCP makes a very weak argument that local groundwater is unaffected by low winter flows. At page 8-21, the HCP states that the SW Slough Camp Site is supported by local groundwater discharge, is unaffected by river flows, and therefore is outside the area influenced by regulated flows. At the same time, it also documents drops in water levels at the site, and I have personally seen the water go down during the winter storage season, indicating this site is in fact being affected by low flow levels in winter.

The failure to address this downward trend in channel condition is a fatal flaw in the HCP because it will continue to cause significant changes in OSF habitat. Nothing in the HCP conservation measures addresses this problem because nothing limits the high summer flows that are the primary erosive force at work. Under the HCP, for at least the next twenty years, flows during nearly six months of each year will continue at or above flood stage, which will provide the annual highly erosive force of water causing continued channel degradation. High flows will continue to cut off more meanders, decrease sinuosity, and promote river channel straightening, which will lead to an increase in flow velocity and continued erosion. The Upper Deschutes riverbanks are made primarily of highly erodible volcanic soils with almost no armoring. There are only a handful of short reaches that have already scoured to bedrock so the river has significant potential to scour more. Nor is there vegetation to armor the banks because any vegetation that does establish there is submerged and killed from the high summer flows. This is the perfect combination for continued degradation of channel morphology. As noted above, this degradation will continue to accelerate because as the river becomes straighter and faster, the erosive forces become even stronger. This means dewatering of floodplain wetlands will become even more extensive.

However, the flow regime can be changed to both lower the erosive force of water and to allow for vegetative armoring of the riverbanks, and thus stop the downward trend in critical habitat condition.

In order to reverse this trend in channel degradation, high flows must be reduced to slow erosive forces and allow for vegetation to establish and stabilize banks. The 1996 Wild and Scenic River EIS identified a target of around a minimum of 500 cfs for winter flows and a maximum of 1200 cfs for summer flows to obtain vegetation stabilization, but today those winter flows must be around 600 cfs due to channel changes.

Dewatering of habitat has already occurred at many sites and will expand with further channel degradation. Unmitigated high flows will continue to accelerate erosion and dewater the floodplain, further reducing the limited breeding and overwinter habitat that exists. We are very near to or perhaps have already reached a threshold of floodplain abandonment that cannot be restored even under the HCP proposed minimum 400 cfs flow. If erosive flows are reduced, water levels in the floodplain should stabilize and vegetation will become established, allowing for improved habitat conditions. In my opinion the HCP Proposed Action does not do that, but rather perpetuates erosive flows that further degrade habitat. It is also my opinion that in order to optimize breeding and overwintering habitat as well as reversing the current state of channel and habitat degradation, irrigation and storage season water operations proposed in the HCP need to better smooth out annual flow fluctuations. That would mean raising minimum overwinter flows and lowering maximum irrigation season flows further than what is being proposed. With each passing irrigation season, both the physical potential and economic cost of recovery becomes exponentially more difficult. Time is of the essence to reduce erosive flows but the thirty-year HCP proposes no such measures.

B. Breeding Habitat

The HCP contains an objective for breeding/rearing/nonbreeding habitat along the Upper Deschutes River:

HCP page 6-18 *Wickiup Reservoir Objective 1-A: Provide flows in the Upper Deschutes River sufficient to sustain Oregon spotted frog breeding/rearing/nonbreeding habitat at multiple sites between Wickiup Dam and Bend, where breeding/rearing/nonbreeding habitat is defined as riverine wetlands meeting all of the following criteria:*

- *Current of 1 foot/second or less.*

- *Water depth of 6 to 12 inches from the onset of breeding through the completion of metamorphosis.*

- *Year-round water depth of at least 9 inches or direct surface connection to the main river channel from the onset of breeding to the onset of overwintering.*

- *Substrate cover of at least 50 percent vegetation dominated by herbaceous emergent, submergent or floating-leaved aquatic species.*

- *Less than 25 percent coverage of woody plants and tall-growing emergent wetland species such as cattails.*

The proposed flows below Wickiup Dam will not achieve this objective and are not sufficient to provide suitable breeding habitat between Wickiup Dam and Bend. The HCP proposes flows going from 100 cfs to 600 cfs (as measured at the WICO gage) during the March 15-31 time period, and then staying at 600-800 cfs for the month of April. The window for egg-laying is mid-March to the end of May, with the majority in the first half of April.

The well-documented classic frog breeding habitat of calm, warm, shallow water over vegetation is not available for any of the egg-laying period in any of the Upper Deschutes River OSF sites because proposed flows are not ramped up soon enough to inundate suitable breeding habitat. In addition, continuing high summer flows associated with the 100-300 cfs minimum winter flows will keep vegetation from becoming established on mudflats at current breeding sites.

Instead of having desirable breeding conditions available when weather permits egg-laying, often in late March and early April, most frogs at most sites wait until the latter half of the breeding season for inundation of breeding habitat, and then are breeding in open water over mud substrate rather than over the more desired vegetative substrate. The flows proposed in the HCP inhibit any possible breeding in late March due to the influx of rising, cold water in those few sites like Dead Slough that have any surface water at all. Many breeding sites need at least 600-800 cfs (WICO gage) to begin to inundate suboptimal mudflat breeding habitat. Suitable vegetated breeding habitat doesn't begin to inundate until above 800 cfs at the WICO gage. The HCP acknowledges the proposed flows are not enough to inundate vegetation, so frogs lay eggs in open water over mud. Under these proposed flows, the HCP objective of 6-12 inch water depth at breeding sites does not occur at most suitable breeding habitat until sometime in May when flows exceed 800 cfs at WICO and therefore is not achieved "*from the onset of breeding*." There are multiple results from delayed breeding and use of suboptimum habitat. Mortality rates for breeding frogs, egg masses and tadpoles increase above natural mortality rates due to higher predation, desiccation, freezing and mechanical injury. Breeders, hatchlings and tadpoles must expend more energy searching for suitable habitat conditions.

HCP proposed flows also do not provide an aquatic connection from overwinter habitat to breeding habitat in March and early April at most Upper Deschutes sites because it takes 600-800 cfs at WICO to begin to inundate mudflats that could provide at least suboptimal breeding sites. Delay in breeding shortens the growing period for young of the year OSF. The smaller the frog, the less chances for its survival through the winter. The lack of connectivity from overwinter to breeding habitat also means the proposed flows will not achieve the objective of year-round water depth of 9 inches or direct surface connection to the river from the onset of breeding to the onset of overwintering at all sites. This objective cannot be met at many sites unless flows are above 800 cfs for the entire breeding period. The HCP doesn't talk about the shortened growth period and decreased survival rate for young of the year frogs that occurs due to delayed breeding, and which will continue to occur under the HCP proposed flows.

When egg masses do not have protective vegetation, eggs and new hatchlings are vulnerable to predation and to getting washed away. Egg masses laid in open water over mud are susceptible to any current in the river or even getting blown by the wind. An objective of 1 foot/second of current will still

allow egg masses and tadpoles to be washed out of breeding habitat and increases mortality compared to eggs laid in calm water. The HCP doesn't discuss why 1 foot/second of current in breeding habitat is acceptable. Furthermore, once flows near and exceed 800 cfs as they ramp up in late April and early May, many unhatched egg masses and new hatchlings will get flushed out into the river where there is very small likelihood of survival. New hatchlings are very poor swimmers. As noted, most breeding sites along the Upper Deschutes River, including Dead Slough and SW Slough Camp, consist of open water over mud due to insufficient inundation of wetlands during the breeding period, and flows greater than 800 cfs starting May 1 will wash unhatched eggs and hatchlings out into deeper water due to lack of protective vegetation. This ramping up of flows after May 1 means the objective of 6-12 inch water depths at breeding sites will not be achieved "*through completion of metamorphosis*," which is generally in August. Oviposition sites are in the lowest parts of wetlands because these inundate the earliest in spring. When flows increase in May and June, these sites fill with water that is often multiple feet deep. New hatchlings are not very mobile but as water levels rise, they must move to find warm, calm, shallow water protected from predators. The HCP does not attempt to mitigate the problem of suboptimal breeding conditions, even in the long run, and the objective of 6-12 inches of water depth at breeding sites will only be met for a very brief period of time rather than from the onset of breeding to the completion of metamorphosis.

The suboptimal breeding conditions as a result of dewatered wetlands during the egg laying period cause a host of threats that the HCP recognizes: increased predation on breeders, egg masses and hatchling tadpoles due to lack of vegetative hiding cover; egg masses and hatchlings getting washed away; and hatchlings in deep, cold water or smothering in mud instead of grazing on vegetative matter in warm, calm, shallow water. The lack of good breeding habitat conditions for much of the egg laying season lowers survival rates for all OSF life stages below natural survival rates and reduces recruitment into the population at each site. The HCP acknowledges the impacts but does not mitigate them.

C Overwinter Habitat

Overwinter conditions are described in HCP Executive Summary, page 1-12 and page 5-52. "*Juveniles and adults overwinter in springs, beaver dams, and slow-moving stream channels associated with breeding habitat, and frogs have been observed to be active beneath surface ice. Although overwintering sites are typically located close to breeding sites, radio-telemetry studies have shown that adults may travel more than 1 mile between the two."* Overwinter conditions are further described in HCP p. 8-169. "*Winter habitat for Oregon spotted frog includes ponds, pools, and channels in either still or moving waters that are over 6 inches (15 cm) deep (Hallock and Pearson 2001; Hayes et al. 2001); reasonably close to breeding and summer season areas and connected by surface water or wetland habitat; and comprised of emergent wetland, scrub-shrub wetland, aquatic bed, and unconsolidated bottom habitats (Watson et al. 2003, as cited in Germaine and Cosentino 2004)."*

The Federal Register Final Listing Rule for Oregon spotted frog describes overwinter habitat at page 51661: "*Known overwintering sites are associated with flowing systems, such as springs and creeks, that provide well oxygenated water (Hallock and Pearson 2001, p. 15; Hayes et al. 2001, pp. 20–23; Tattersall and Ultsch 2008, pp. 123, 129, 136) and sheltering locations protected from predators and freezing*

(Risenhoover et al. 2001b; Watson et al. 2003, p. 295). Oregon spotted frogs apparently burrow in mud; silty substrate; clumps of emergent vegetation; woody accumulations within the creek; and holes in creek banks when inactive during periods of prolonged or severe cold (Watson et al. 2003, p. 295; Hallock and Pearson 2001, p. 16; McAllister and Leonard 1997, p. 17). They are, however, intolerant of anoxic (absence of dissolved oxygen) conditions and are unlikely to burrow into the mud for more than a day or two (Tattersall and Ultsch 2008, p. 136) because survival under anoxic conditions is only a matter of 4 to 7 days (Tattersall and Ultsch 2008, p. 126). This species remains active during the winter and selects microhabitats that can support aerobic metabolism and minimize exposure to predators (Hallock and Pearson 2001, p. 15; Hayes et al. 2001, pp. 20–23; Tattersall and Ultsch 2008, p. 136). In central Oregon, where winters generally result in ice cover over ponds, Oregon spotted frogs follow a fairly reliable routine of considerable activity and movement beneath the ice during the first month following freeze-up. Little movement is observed under the ice in January and February, but activity steadily increases in mid-March, even when ice cover persists (Bowerman 2006, pers. comm.). Radio-tracked frogs remained active all winter, even under the ice at Trout Lake NAP (Hallock and Pearson 2001, pp. 12, 14, 15) and Conboy Lake National Wildlife Refuge (NWR) (Hayes et al. 2001, pp. 16–19)." At page 51668, the Final Rule states: "*Because Oregon spotted frogs have specific habitat requirements, they are particularly vulnerable to habitat alterations:… (4) the species is vulnerable to the loss or alteration of springs used for overwintering; and (5) their habitat requirements (for example, spatial structure) for overwintering, active season, and breeding habitats are more complex than for other frog species (Hayes et al. 1997, p. 4)."*

A recent article by Pearl et al. notes that much of the early literature on overwintering habitat is based on sites located at low to mid- elevations in British Columbia and western Washington, while few data are available for overwintering sites in the high elevations of the Oregon Cascades, where waterbodies can freeze for several months. "*At these higher elevations, R. pretiosa and its sister species, R. luteiventris (Columbia Spotted Frog), can make pronounced fall migrations and use distinctive habitats like springs or undercut streambanks for wintering (Bull and Hayes, 2002; Pilliod et al., 2002; Chelgren et al., 2008). Rana pretiosa in a newly translocated population in Oregon often moved upstream in fall, and many frogs used a small flowing spring during the winter (Chelgren et al., 2008). Concentrations of frogs in distinctive habitats such as springs could mean these habitats are particularly valuable in maintaining populations."* In addition, *"Lab experimentation and radio telemetry have clarified physiological limitations and general movement patterns for some anurans that winter aquatically, but information gaps remain for many species (Tattersall and Ultsch, 2008). Wintering habitat use in ranid frogs reflects risks of freezing and requirements for respiration and metabolism (Lamoureux and Madison, 1999; Tattersall and Ultsch, 2008). These factors may be particularly important in montane areas with low temperatures and significant ice cover and where suitable habitats are limited (Bradford, 1983). Suitability and use of winter habitat is also affected by presence of predators (Pilliod and Peterson, 2001; Vredenburg, 2004), distance from summer sites, and quality of movement corridors between summer and winter range (Semlitsch, 2008; Pittman et al., 2014)."* (Pearl et al., 2018, p. 539). "*Given these more restrictive requirements in high elevation areas, suitable overwinter habitat is likely more limited than in lower elevation areas. Recent studies of Oregon populations, including sites on the Deschutes River,*

show use of springs, undercut streambanks, semi-terrestrial beaver channels, beaver lodges, and lava flows for overwinter habitat" (Pearl et al. 2018).

The Pearl et al. 2018 publication described a study aimed at learning more about OSF use of overwinter habitat along the east side of the Cascades, including the Upper Deschutes River. The abstract from the study stated: "*We used radio-telemetry to study late-season movement and habitat use by Oregon Spotted Frog (Rana pretiosa) at nine sites from four populations along the Cascade Mountains in Oregon. Movement rates declined with date and were the lowest at the end of tracking in December and January. Frogs across our sites used vegetated shallows in late summer and early fall. In fall, frogs used a range of habitat types, and at several sites moved to distinctive habitats such as springs, interstices in lava rock, and semi-terrestrial beaver channels. Distance between first and last tracking location was <250 m for 84.5% (49/58) of frogs, ranged up to 1145 m, and was greater for frogs in ditch habitats than those not in ditches. Distinctive features like springs or semi-terrestrial retreats can host multiple frogs and may represent particularly valuable wintering habitat for R. pretiosa in some sites in their Oregon range.*"

The study included one population with multiple sites in ditch habitat in the Klamath Marsh National Wildlife Refuge in southern Oregon, one population with multiple sites in marsh habitat around Gold Lake in the central Oregon Cascades, and two populations with three sites on the Upper Deschutes River- one site at Dead Slough in Reach 1 and 2 sites at Slough Camp in Reach 4. Fifty eight frogs met the criteria for analysis from capture to final overwinter site. At the two Slough Camp sites (D1 and D2), tracking and habitat data was collected on ten overwinter sites in 2011 and another ten in 2016; and at Dead Slough (D3), data was collected on seven overwinter sites in 2016.

It's important to pay attention to this study because the HCP appears to rely heavily on its findings for the Upper Deschutes sites. Here are the findings from the USGS telemetry study discussion.

a) Some Upper Deschutes River OSF movement toward overwinter sites may be initiated by dropping water and some not.

b) All movements were within the typical 400 meter distance found by the majority of other studies.

c) Frogs at the three Deschutes sites (D1 East Slough Camp, D2 SW Slough Camp, D3 Dead Slough) made rapid and directed movements starting between 14-23 September into or in very close proximity to final overwinter sites in the first 1-2 weeks. Once there, they stayed put. Movement at the overwinter site decreased or stopped as winter conditions set in. This is common behavior seen in most studies.

d) Although the study did not consider habitat availability, it suggested that this directed movement showed the frogs knew where to go. Directed movements are common behavior in these frogs. In my opinion, the study's suggested theory is reasonable, but it is also possible that there was a particular environmental cue that directed their movement. For instance, the frogs might be able to detect the noise of water moving into lava flows as water levels drop in the Slough Camp wetlands. Perhaps this noise was why they overwhelmingly went to the lava flow at D1 instead of going to the remnant wetland pools or out to the river. This critically important question was not answered or even considered in the study.

e*)* Wintering frogs at D1 and D2 made intensive use of distinctive habitats such as springs/inflows, beaver features, or semi-terrestrial retreats that contrasted with summer habitat, but frogs at D3 used statistically similar habitat between summer and winter. OSF use at the other study sites (Gold Lake and Klamath Marsh National Wildlife Refuge) was also statistically similar between summer and winter habitats. For the East Slough site, fifteen of the seventeen frogs at D1 went into the lava flow and winter sites were called terrestrial (without actually confirming there was no water present). All six frogs at D2 went into beaver structure around the edge of a pool supported by a spring, and final overwinter sites were called semi-aquatic *(*without actually confirming whether the frogs were in or out of the water*).* Beaver structure was statistically important for overwinter habitat at D2.

f) The study stated that this is the first time any study has observed non-aquatic overwinter habitat use. The study suggests the non-aquatic overwinter sites were likely thermally buffered relative to nearby air and water and that use of non-aquatic overwinter sites suggests some flexibility for frogs*.* As discussed below, I do not concur with this conclusion.

g) The study documented frogs within a few meters of another frog in the same microhabitat at three sites (2 frogs at W1; 4 frogs and 2 frogs in separate locations at D1; 2 frogs at D2). Two frogs also used the same proximity in two different years at D1. Aggregation is known to occur at other sites. Reuse of a D1 lava flow overwinter site between 2011 and 2016 suggests this is an important site.

While the telemetry study provides important information, it also has significant limitations that must be recognized to understand the value of this study and how it should be used. For one, the study could not confirm site conditions at any of the so called non-aquatic or semi-aquatic sites to establish definitively whether water was present and/or frogs were not in any water. The suggestion about frog flexibility is based on speculation that is inconsistent with data from every other overwinter study done on OSF. Even within this telemetry study, frogs at all other sites selected overwinter habitat with similar characteristics: aquatic sites that allowed for frogs to move around under ice and avoid freezing, provided cover from predators, well oxygenated water, aquatic connections to summer habitat and were in close proximity to the same. In contrast, the D1 Slough Camp wetlands were being dewatered during the primary time to move to overwinter habitat and were completely dewatered for more than a month before the final overwinter sites were determined. Given this dewatering of the wetlands, it is possible that the frogs followed a path of water through the lava rocks down to the water table. The telemetry crews could not see the precise conditions at the final overwinter sites, and should not have simply assumed that the final overwinter sites were completely terrestrial. Similarly, the D2 SW Slough Camp site was spring-supported and the frogs moved out of the main pool area into the beaver structure around the pool edge. The telemetry crew could not say definitively if frogs were in water inside the beaver lodge or in the beaver channels. Again, the crew should not have assumed the sites were semi –aquatic without any evidence of the actual conditions. It should be noted that studies have shown other Ranid species use water filled rock structures for overwinter sites and OSF from other studies frequently picked beaver structures to overwinter. Studies also found OSF used shallow springs and seeps where the water was well oxygenated and remained ice free during even the coldest conditions. Any beaver structure associated with a seep or spring is ideal overwinter habitat and one of

the more common overwinter structures I have seen. Therefore, the conclusions about terrestrial and semi-terrestrial overwinter sites were mere speculations not supported by any data.

The study did not evaluate what types of habitat were available, so it could not assess overwinter habitat preference. Nor did it address how the dewatering of wetlands affected frog mobility and site selection compared to frogs that have aquatic connections to overwinter habitat. Finally, the study did not document overwinter survival of frogs so there is no way to know if frogs survived in these sites. Given our cold climate for six months of the year and associated mortality threats from freezing, anoxia and predation, death is the most likely outcome for use of non-aquatic overwinter sites. No other study has documented successful non-aquatic overwinter habitat use, and multiple studies have documented frog mortality from freezing in poor water conditions. Jay Bowerman documented at least 35 frogs that died in a single winter in a lava flow when water levels dropped and exposed the frogs. In a subsequent year, frogs were found frozen on top of the ice. None of the ten frogs captured at D1 in 2011 were recaptured in 2016 even though 5 years is well within the life expectancy of an adult frog. Without further data, there is no way to conclude that these frogs purposefully selected non-aquatic overwinter sites, or that they survived the winter at non-aquatic overwinter sites. Any such conclusion would be counter to every other known study on OSF overwinter habitat.

Given the limited data on OSF overwinter habitat and survival along the Upper Deschutes River and the known threats from dewatering the system for six months, there is a high level of uncertainty that frogs are surviving overwinter habitat conditions at a rate high enough to sustain the current populations at sites between Wickiup Dam and Bend. Nearly all of the floodplain in this stretch of river is dewatered and aquatic connectivity broken during the time period when frogs should be moving to overwinter habitat. This dewatering results in very little suitable overwinter habitat and very few aquatic connections for frogs to reach those limited areas. Those limited areas seem to be heavily associated with groundwater-supported sites in the floodplain. The HCP at page 5-63 describes the lack of aquatic connections between the river and wetland habitats along the Upper Deschutes that other sites do not experience: "*Most are directly connected during summer high-flow conditions and partially or completely isolated, if not completely dewatered, during the winter*." The uncertainty of the current habitat suitability and poor aquatic connectivity, in combination with the accelerating channel degradation and floodplain dewatering that is resulting in a continued downward trend in quality and quantity of overwinter habitat, are indicators that immediate actions should be taken to improve overwinter conditions. The HCP does not provide those actions.

HCP Overwinter Objective at page 6-15: *Wickiup Reservoir Objective 1-B: Provide flows in the Upper Deschutes River sufficient to sustain Oregon spotted frog overwintering at multiple sites between Wickiup Dam and Bend as well as seasonal movement and dispersal between overwintering sites and breeding/rearing/nonbreeding sites.*

The proposed winter flows of 100, 200 and 400 cfs over the next thirty years will not even get water into the floodplains, and thus the floodplains will remain dewatered for six months of the year. Studies show overwinter sites are typically established in December, but aquatic connections from summer to overwinter sites dry up in October at most sites on the Upper Deschutes River, well ahead of the

December onset of overwintering. The proposed flows will not provide aquatic connectivity during the entire period needed for dispersal to overwinter habitat.

The proposed flows also do not provide for good overwinter habitat at most sites. Frogs are relying heavily on springs, seeps and groundwater-supported overwinter habitats at most sites but these habitats are limited. The degraded channel conditions caused by high erosive summer flows are actually dewatering the groundwater habitats frogs use for overwintering during the most critical time of need. The proposed winter flows are too low to inundate suitable vegetation, woody debris, undercut banks or beaver structures along the river banks. Where seeps, springs, and other groundwater supported habitats are not available, frogs must overwinter in the river itself, which is suboptimum habitat. Frogs in the river are exposed to fish concentrated in the same low water conditions with bird predators above. Frogs must hide in the mud to avoid predators but mud is anoxic so every one to two days frogs must expose themselves and move around to get enough oxygen. Frogs in the river are going to experience a higher predation rate than those in more suitable habitat conditions. This is another example of chronic mortality that the HCP does not address.

After year twenty, minimum 400 cfs winter flows may cause a slight decrease in the flood stage erosive flows but summer flows may still be sustained high enough and long enough to continue to drown out vegetation needed for hiding cover. Without a cap on summer flows, there is no certainty that high flows won't continue to drown vegetation even after year twenty and minimum 400 cfs winter flows. Thus, the HCP provides very little benefit for overwinter conditions along the Upper Deschutes either in the short-term or long-term.

IV. HCP Conservation Measures do not Provide for or Restore Critical Habitat PCEs

Another big concern with the HCP is that flow operations degrade OSF critical habitat in many ways and conservation measures are insufficient to provide or restore Primary Constituent Elements (PCE's). The HCP Executive Summary on page 1-13 describes PCE's this way." *The primary constituent elements (PCE) of critical habitat are those specific elements of the physical or biological features supporting the life history processes of the Oregon spotted frog that are essential to the conservation of the species. Three primary constituent elements were identified by USFWS:*

- *PCE 1 – Nonbreeding (N), Breeding (B), Rearing (R), and Overwintering (O) habitat*
- *PCE 2 – Aquatic movement corridors*
- *PCE 3 – Refugia habitat"*

Section 5.5.7.1 on page 5-72 in the HCP describes PCE's in greater detail. The highlighted PCE's are those that are impaired by flow operations.

PCE 1 – Nonbreeding (N), Breeding (B), Rearing (R), and Overwintering (O) habitat

PCE 1 consists of ephemeral or permanent bodies of fresh water, including but not limited to natural or manmade ponds, springs, lakes, slow-moving streams, or pools within or oxbows adjacent to streams, canals, and ditches, that have one or more of the following characteristics:

• Inundated for a minimum of 4 months per year (B, R) (timing varies by elevation but may begin as early as February and last as long as September).

• Inundated from October through March (O).

• If ephemeral, areas are hydrologically connected by surface water flow to a permanent water body (e.g., pools, springs, ponds, lakes, streams, canals, or ditches) (B, R).

• Shallow-water areas (less than or equal to 12 inches (30 cm), or water of this depth over vegetation in deeper water (B, R).

• Total surface area with less than 50 percent vegetative cover (N).

• Gradual topographic gradient (less than 3 percent slope) from shallow water toward deeper, permanent water (B, R).

• Herbaceous wetland vegetation (i.e., emergent, submergent, and floating-leaved aquatic plants), or vegetation that can structurally mimic emergent wetland vegetation through manipulation (B, R).

• Shallow-water areas with high solar exposure or low (short) canopy cover (B, R).

• An absence or low density of non-native predators (B, R, N).

PCE 2 – Aquatic movement corridors

PCE 2 consists of ephemeral or permanent bodies of fresh water that allow Oregon spotted frogs to move from one seasonal habitat to another. These corridors have one or more of the following characteristics:

• Less than or equal to 3.1 miles linear distance from breeding areas.

• Impediment free (including, but not limited to, hard barriers such as dams, impassable culverts, lack of water, or biological barriers such as abundant predators, or lack of refugia from predators).

PCE 3 – Refugia habitat

This PCE consists of nonbreeding, breeding, rearing, or overwintering habitat or aquatic movement corridors with habitat characteristics (e.g., dense vegetation and/or an abundance of woody debris) that provide refugia from predators (e.g., non-native fish or bullfrogs)."

Conservation Measures for the Upper Deschutes River between Wickiup Dam and Bend should provide for the highlighted PCE's above, but they do not. Conservation measures are described in the HCP on pages 1-15 and 1-16. "*Conservation Measure WR-1 will alter the operation of Wickiup Reservoir to*

improve conditions for the Oregon spotted frog in the Deschutes River between the reservoir and Bend. NUID will forego storage in Wickiup Reservoir, as needed, to maintain specified minimum flows downstream of Wickiup Dam during the winter. The minimum flow will be 100 cfs in Years 1 through 5, 200 cfs in Years 6 through 10, 300 cfs in Years 11 through 20, and 400 cfs in Years 21 through 30. Flows will exceed these minimums whenever inflow to the reservoir in a given year is predicted to be more than enough to fill the reservoir. NUID will also increase flows below the dam to at least 600 cfs by April 1 and maintain flows within specified limits for the entire month of April to support Oregon spotted frog breeding. The rate at which flows can be increased or decreased (ramping rates) will be limited by Measure WR-1 to protect downstream fish and wildlife from sudden changes in water depth." Conservation Measure WR-1 and rational is described in greater detail in the HCP at 6-15 through 6-19.

PCE 1 breeding and overwinter habitats are significantly degraded by flow operations that dewater the floodplain, and the proposed flow levels do not solve this problem. The majority of known overwinter sites are described as terrestrial or semi-terrestrial, which are generally considered lethal as compared to sites that are inundated with well-oxygenated, freeze-free water. The HCP does not provide flows that allow for more suitable overwinter conditions. The HCP's timing of rising flows in the spring will not inundate suitable wetland breeding habitat until after the breeding season. As a result, frogs are forced to breed in suboptimum mudflat habitat instead of in more suitable warm, calm, shallow, vegetated habitat. Under the HCP, water levels at breeding sites will change drastically (up to 4 feet) during the breeding season and tadpole rearing stage, forcing tadpoles to move around to find suitable habitat in ever changing conditions. This causes additional energy expenditure and exposes tadpoles to predators, reducing survival.

PCE 2 aquatic movement corridors will remain absent for six months of the year under the proposed flow operations. Data shows the vast majority of frogs stay in the floodplains year round and do not use the river. The floodplains are dewatered in October when frogs are moving to overwinter sites. All but a few acres of groundwater-supported microsites and the Dead Slough site will remain dewatered through the winter under the HCP. 600 cfs flows by April 1 begin to inundate mudflats at some sites that frogs are forced to use for breeding. Suitable breeding habitat remains dry through the breeding season.

PCE 3 refugia is not provided under proposed flow operations. Breeding frogs are forced to lay eggs over mud, which then hatch in this suboptimum habitat. Hatchlings and young tadpoles are in rising, unvegetated, open water conditions in April and May, and must try to find suitable warm, calm, vegetated rearing habitat. These conditions make all OSF life stages highly exposed to predation compared to frogs with access to timely, suitable breeding habitat.

V. HCP Effects Discussion

<u>Reach specific effects discussion excerpts from the HCP.</u>

The following excerpts from the HCP provide greater detail about effects of regulated flows and the HCP's conservation measures on OSF sites along the Upper Deschutes. My own comments about these points follow the excerpts.

Page 8-168. "*The covered activities have the potential to exacerbate natural mortality by increasing the magnitude and/or frequency of unfavorable flows. However, it is difficult to discern the extent to which reservoir operation is actually increasing natural mortality rates, particularly given the difficulty in determining trends in population and subpopulation size through egg mass counts (USFWS 2017). . . ."* The HCP acknowledges there are chronic mortality rates that are higher than natural conditions due to flow operations.

Page 8-188. "*Extremely low water levels in the winter have negative effects on Oregon spotted frog overwintering habitat in many of the riparian wetlands. Extremely high water levels in the summer support a number of wetlands that would not be inundated by unregulated flows, but the high flows have also widened the river channel and potentially modified associated riparian wetlands that may have existed prior to operation of the reservoir. . . . "* The HCP acknowledges negative impacts to overwinter habitat and channel degradation.

Page 8-188. "*It is anticipated the increased winter flows will improve overwintering conditions for Oregon spotted frogs in the Upper Deschutes River*."

Page 8-189. "*[T]he timing and rate of transition from storage to release of water will be modified by Conservation Measure WR-1. While irrigation releases from Wickiup Reservoir historically did not begin until mid-April, sometimes well into the Oregon spotted frog breeding season, releases will now begin no later than April 1. Releases will also be held relatively constant during April, compared to historical fluctuations of up to several hundred cfs on a daily basis…"*

Page 8-192. Reach 1 (Bull Bend and Dead Slough sites). "*[L]arge seasonal fluctuations in water depth have limited habitat suitability by causing many of the wetlands to be dry for up to 6 months of the year.*"

Page 8-192. Reach 1. Gritzner and O'Reilly observed the following dewatering conditions: "*habitat conditions began to deteriorate due to decreasing inundation levels at flows of less than 900 cfs at WICO. At 683 cfs, emergent vegetation was no longer inundated, mudflats within the wetland were beginning to be exposed, and the surface connection between the wetland and the river was beginning to be cut off. Below about 300 cfs, the wetland no longer responded to further decreases in river flow and the inundated portion of the wetland was confined to a narrow, mostly unvegetated channel. They also observed that Dead Slough appears to receive groundwater discharge that maintains minimal inundation levels throughout the winter. The response to decreasing flows in October 2014 was similar at Bull Bend, except that by 300 cfs the wetland was completely dry due to the absence of local groundwater discharge to support it when the river is low.*"

Page 8-192 through 8-193. Reach 1. The River Design Group (RDG) Habitat Suitability Criteria (HSC) study found: "*At Bull Bend, RDG (2017) estimated that Weighted Usable Area (WUA) of overwintering habitat increases steadily from 20 to 100 cfs, peaks at 300 cfs, and declines slightly between 300 and 600 cfs (Figure 8-101A). They point out, however, that WUA mathematically combines habitat quantity and habitat quality, and that although WUA may not change appreciably between 100 and 600 cfs, the*

relative amount of high quality habitat increases with increasing flow within this range. For breeding habitat at Bull Bend they estimated low WUA at flows below 800 cfs, when most usable habitat is within the river channel, and rapidly increasing WUA above 800 cfs when the off-channel wetland becomes inundated (Figure 8-101B). Peak WUA occurs at 1,200 cfs."

Page 8-193. Reach 1. "*At Dead Slough, RDG (2017) predicted the WUA of Oregon spotted frog overwintering habitat increases over the entire range of winter flows that were evaluated (20 to 600 cfs), and the rate of increase in WUA is greater above 400 cfs due to a prominent surface connection between the river and the wetland at the higher flows (Figure 8-102A). For breeding habitat at Dead Slough, RDG (2017) predicted low WUA from 20 to 300 cfs, gradually-increasing WUA between 300 and 1,200 cfs, and a dramatic increase in WUA above 1,200 cfs (Figure 8-102B)."*

Page 8-193. Reach 1. "*While the DBHCP increases in winter flows may not provide optimal conditions for overwintering Oregon spotted frogs at Bull Bend or Dead Slough, they will improve conditions relative to historical flows. This is particularly true for Bull Bend, where most potential overwintering sites have historically gone dry in all but the wettest winters. With minimum winter flows of 100 to 300 cfs, overwintering habitat will consistently be available within the main channel of the Deschutes River at Bull Bend, and potentially at similar locations throughout the reach. When the minimum winter flow reaches 400 cfs in Year 21, beaver channels within the Bull Bend wetland (out of the main river channel) will remain inundated throughout the winter*. "

Page 8-197. Reach 1. "*At both locations and under all projected flow conditions, most of the overwintering habitat will be associated with increased depth of water in unvegetated portions of the wetlands. As noted previously, neither wetland experiences appreciable inundation of emergent vegetation at flows of less than 700 cfs…The historical lack of consistent overwintering habitat has been identified as the likely cause for Oregon spotted frog absence from Bull Bend. The provision of overwintering habitat on a consistent basis under the DBHCP could lead to the establishment and persistence of breeding at the site*."

Page 8-197. Reach 1. "*Overwintering habitat at Dead Slough will increase gradually within increasing winter flows up to 400 cfs due to increases in the depth and width of the inundated area within the slough (RDG 2017). Unlike Bull Bend, most of the increase in WUA will occur within the slough itself (outside the main channel of the Deschutes River). The inundated area will have a mostly unvegetated substrate.*"

Page 8-197 to 8-198. Reach 1 Dead Slough. "*Seasonal movements between summer and overwintering habitats may be more difficult for Oregon spotted frogs in this reach of the Deschutes River under the DBHCP due to lower than historical flows during September 1- October 15 (Table 8-39)*."

Page 8-198. Reach 1 Dead Slough. "*However, the number of days with flows at WICO of at least 800 cfs (*the approximate threshold for inundation of wetland vegetation in Dead Slough*) will be roughly half what it was historically. This could leave Oregon spotted frogs exposed to greater potential for predation during the period of movement from summer to overwintering habitat."* Table 8-39 on the same page

shows that the number of days at 800 cfs drops from 35 to 18 days. It should be noted that the substrate used for the aquatic connection between summer and overwinter habitat at Dead Slough, which allows for increased predation due to lack of vegetation, is the same substrate used for the entire winter period. Therefore, there will also be increased predation during winter and the rest of the 6 month low water period due to lack of vegetation.

Page 8-198 to 8-199. Reach 1. "*[F]low at WICO will reach 600 cfs by April 1 (roughly 2 weeks earlier than the historical ramp up of flows), and will remain between 600 cfs and 800 cfs for the entire month of April. As a result, the median numbers of days between March 15 and April 30 with flows of at least 600 cfs will more than double under the DBHCP (Table 8-40). If the flow is increased above 600 cfs during April, it will not be subsequently reduced more than 30 cfs from the new high until May. These provisions in Conservation Measure WR-1 are intended to: a) inundate breeding sites for the beginning of the Oregon spotted frog breeding season, b) prevent over-inundation and flushing of egg masses during egg development, and c) prevent stranding and desiccation of eggs that might occur if flows are reduced… the amount of Oregon spotted frog breeding habitat will roughly double at Bull Bend and Dead Slough when the early April flow at WICO increases from 20 to 600 cfs…however, habitat in both areas is of relatively low quality with unvegetated substrate at 600 cfs. Significant increases in the WUA of breeding habitat do not occur at either wetland until flows at WICO exceed 900 cfs (USFWS 2017). Habitat quality at Dead Slough is low at flows below 900 cfs, and emergent vegetation is no longer inundated below 683 cfs (USFWS 2017, Appendix). This means eggs deposited at Dead Slough when flow at WICO is 600 cfs to 800 cfs could be in marginal habitat with little to no substrate vegetation. This condition could change over time if lower summer flows (and lower summer inundation depths) allow emergent vegetation to expand lower into the wetland where it will be inundated at flows below 683 cfs.*"

Page 8-199. Reach 1. "*The timing of wetland inundation in the spring under the DBHCP (no later than April 1) will be an improvement over historical conditions and will enable breeding where it did not occur before, particularly at Bull Bend. Individual frogs that attempt to breed prior to April 1, however, may find no improvement from historical conditions*."

Page 8-200. Reach 1. "*The presence of emergent vegetation such as sedges in seasonally inundated wetlands is a function of the timing and depth of flooding…inundation that continues into the growing season can inhibit growth and reduce plant height and density, and inundation that persists for the entire growing season can prevent plant growth altogether…The phased increase of minimum winter flows specified in Conservation Measure WR-1, and the corresponding phased decrease in summer flows, will allow time for emergent vegetation at Dead Slough and Bull Bend to respond to the changes*." In my opinion, it is not necessary to have five years within each phase of flow changes for plants to establish. Two years is likely sufficient for vegetation to become established.

Page 8-203. Reach 2 (two OSF sites between Fall River and Little Deschutes River). "*Low levels of Oregon spotted frog breeding (as evidenced by egg masses) have been detected intermittently at two small sites, but there have been few formal surveys of the reach due to inaccessibility of private lands…vegetated portions of wetlands most likely lie somewhat above elevations that would be inundated in the winter. As with the upstream reach, existing overwintering habitat for Oregon spotted frogs within this reach of*

the Deschutes River is probably limited to the main river channel and unvegetated portions of oxbow wetlands."

Page 8-204. Reach 2. "*Habitat for overwintering Oregon spotted frogs between Fall River and Little Deschutes River should improve under the DBHCP due to increased winter flows. The magnitude of increase in flow will be the same as described for the reach upstream of Fall River.*"

Page 8-204. Reach 2. The HCP acknowledges there is not much known about breeding, rearing, and basking habitat in this reach. It assumes vegetated wetlands most likely are not inundated during the storage season. It asserts that increased flows are likely beneficial for breeding, but reduced flows in summer may not be enough to inundate some habitat.

Page 8-205. Reach 3 (Little Deschutes River to Benham Falls). "*This increased flow (from Little Deschutes) means the main channel of the Deschutes River and many of the side channels remain inundated year round, but the seasonal fluctuations between high (summer) and low (winter) flow are still substantial, and most vegetated wetlands lack inundation during the winter (USFWS 2017)."*

Page 8-206 to 8-207. Reach 3. The Sunriver OSF population is the only breeding population in this Reach. "*During the winter the median DBHCP flows will not be high enough to inundate the wetland evaluated by O'Reilly and Gritzner (USFWS 2017, Appendix). During the summer, however, 80 percent exceedance flows projected for all phases of DBHCP implementation will be sufficient to keep the wetland inundated…Overwintering Oregon spotted frogs between Little Deschutes River and Benham Falls may benefit from increased flows under the DBHCP, but the magnitude of benefit will be small. Overwintering sites within the river channel may improve, but off-channel habitat will remain the same. If the 11-acre wetland evaluated by O'Reilly and Gritzner (USFWS 2017, Appendix) is typical of off-channel habitat throughout the reach, the continued absence of flows ≥ 1,200 cfs (BENO gage) in the majority of years will keep off-channel habitat unavailable during the winter…"* and consequently during the greater part of the breeding season.

Page 8-207. Reach 3. "*Overwintering Oregon spotted frogs between Little Deschutes River and Benham Falls may benefit from increased flows under the DBHCP, but the magnitude of benefit will be small. Overwintering sites within the river channel may improve, but off-channel habitat will remain the same. If the 11-acre wetland evaluated by O'Reilly and Gritzner (USFWS 2017, Appendix) is typical of off-channel habitat throughout the reach, the continued absence of flows ≥ 1,200 cfs (BENO gage) in the majority of years will keep off-channel habitat unavailable during the winter…Within the main river channel, however, increased winter flows may benefit Oregon spotted frogs if the flows improve the quality of bank habitat…As winter flow increases under the DBHCP, a greater portion of the existing stream bank in this reach will remain in direct contact with the river where it could function as overwintering habitat."*

Page 8-209. Reach 3. "*Flows will provide sufficient water depth to inundate the riparian wetland from April 1 on.*"

Page 8-212. Reach 4 (Benham Falls to Dillon Falls). "*The 9-acre wetland on the west side of the river (SW Slough Camp) is perched above the main channel of the river and is supplied by local groundwater discharge (Figure 8-107). It remains inundated year round and does not respond to seasonal or daily changes in river flow (Figure 8-108); thereby putting it outside the area influenced by operation of the irrigation reservoirs... Most of the wetland is inundated to a depth of 1 foot or more throughout the year*."

Page 8-213. See map of Slough Camp wetland locations.

Page 8-214 through 8-215. Reach 4. "*The wetland complex on the east side of the Deschutes River at RM 189 is known as East Slough Camp. At an estimated 52 acres (O'Reilly pers. comm. 2019), it is considerably larger than the 9-acre SW Slough Camp. Much of the East Slough Camp complex lies within the seasonal floodplain of the Deschutes River where it is affected to varying degrees by changes in flow, including those changes caused by reservoir operation…The largest wetland within the East Slough Camp complex (Wetland A in Figure 8-107) has a direct surface connection to the Deschutes River and a sink hole within the wetland that drains to groundwater. This wetland is inundated with over 1 foot of water during the summer, but has historically been completely dry in the winter. The surface connection provides direct access for fish from the Deschutes River during the summer. Small numbers of Oregon spotted frog egg masses (evidence of breeding) have been found in the vegetated margins of this wetland in recent years, but the wetland is believed to have provided no overwintering habitat under historical Deschutes River flows because it goes dry. The remaining wetlands at East Slough Camp lack direct surface connections to the river most of the year. Several of these wetlands retain surface water year round and have had consistent use by Oregon spotted frogs in recent years (USFWS 2019)… About 0.5 mile downstream of East Slough Camp is Ryan Ranch (Figure 8-107)… The US Forest Service (USFS) has recently restored a surface connection between Ryan Ranch and the river. Preliminary studies have indicated the site is capable of holding surface water year round and providing up to 65 acres of emergent wetland habitat if inundated by the river…The precise relationship between Deschutes River flow and inundation level at Ryan Ranch is currently under investigation, but it is likely that wetland habitat conditions at the site will be influenced by Wickiup Reservoir operation (flow in the Deschutes River) if the ongoing USFS project is successful.…*"

Page 8-215. Reach 4 "*The relationships between Deschutes River flows and water depths in the East Slough Camp complex were examined at five wetlands (Wetlands B through F in Figure 8-107) from September 2015 through October 2018. Water depths at all five wetlands correspond with flow at Benham Falls throughout the year, although the relationships between river flow and wetland depths appear stronger during the summer (Figure 8-109). All five wetlands retain open water year round, with depth of water varying from less than 1 foot to over 4 feet on a seasonal basis…open water area of these wetlands is reduced substantially during the winter.*"

Page 8-215. Reach 4. "*None of the wetlands illustrated in Figure 8-109 has a direct surface connection to the Deschutes River during the winter, but changes in wetland water depth that correspond with changes in flow during the winter suggest they all have subsurface connections. When the flow at*

Benham Falls increases above 700 cfs, water levels in all wetlands show corresponding increases in groundwater."

Page 8-215. Reach 4. "*1400 cfs at BENO gage is needed to begin inundation (*1200 cfs is sufficient if after a wet winter*). Emergent vegetation (suitable breeding habitat) begins to inundate at 1500 cfs. Wetland fully inundated at 1600 cfs…Similar trends were observed at other East Slough Camp wetlands, which had minor to moderate differences in the magnitude of flow needed to initiate inundation in the spring (Figure 8-109).*" The East Slough Camp Wetland B had breeding attempts in multiple years but they were not always successful because flows did not always reach 1500 cfs. Median flow between 1980- 2009 was 1270 cfs during this time period.

Page 8-216. Reach 4. "*Overwintering habitat at East Slough Camp may be negatively affected by low flows in the Deschutes River from October through March… only about 10 percent of the wetland area at East Slough Camp remains inundated through the winter. "*

Page 8-217. Reach 4. "*Of the 17 frogs Pearl et al. (2018) studied at East Slough Camp, three overwintered in aquatic habitats and the remaining 14 selected non-aquatic sites. Thirteen of the non-aquatic sites were within a lava flow adjacent to the wetland and the fourteenth site was a terrestrial location outside the lava flow. Pearl et al. (2018) also found that at SW Slough Camp (across the Deschutes River from East Slough Camp), where the wetland is inundated all winter, four of six adult Oregon spotted frogs selected upland sites for overwintering even though aquatic sites were available. While this was a preliminary study of relatively limited scope, it suggests that adult Oregon spotted frogs are not entirely dependent on aquatic habitats for overwintering.*"

Page 8-217. Reach 4. "*Minimum flows of 100 cfs to 400 cfs at Wickiup Dam from mid-September through March will result in median flows of 976 cfs to 1,067 cfs at Benham Falls (Table 8-43) …Wetland A at East Slough Camp will continue to remain dry most of the winter, but the surface connection between the wetland and the river may retain water in some winters once the minimum winter flow at WICO reaches 400 cfs in Year 21…Overwintering conditions in Wetland B at East Slough Camp are not likely to change under the DBHCP because water depth within the wetland does not increase appreciably until the flow at Benham Falls exceeds 1,400 cfs (Figure 8-109). Median winter flows of 976 cfs to 1,067 cfs at Benham Falls (Table 8-43) will increase the groundwater level below Wetland B, but surface conditions in the wetland will not change*."

Page 8-218. Reach 4. "*Seasonal movements from summer to winter habitats at East Slough Camp may be more difficult for Oregon spotted frogs under the DBHCP because overall inundation levels (number of days with flows at Benham Falls of 1,000 cfs or more) in late September and October will decrease during all phases of DBHCP implementation (Table 8-44). To the extent that Oregon spotted frogs require aquatic corridors to move between summer and winter habitats, these movements could be more difficult under the DBHCP. However, juveniles and adults were observed moving overland from the wetlands toward the river during the ramp-down of flows in early October 2016. This observation, combined with the findings of Pearl et al. (2018) suggests that at least some Oregon spotted frogs do not*

require aquatic corridors for seasonal movements, and are unaffected in this regard by the flows in the Deschutes River."

Page 8-218. Reach 4. "*USFWS (2017) has noted that conditions for breeding in Wetland B are impaired when the flow at Benham Falls is less than 1,600 cfs in April. The wetland is inundated by river flows between 1,400 and 1,600 cfs, but conditions within this range are less than optimal…the median number of days over 1,400 cfs will still represent less than 30 percent of the breeding season and the median number of days with flows over 1,600 cfs will be less than 10 percent of the breeding season (Table 8-46)… In most years the flow at Benham Falls will not reach 1,600 cfs and Wetland B will not reach full inundation until May. Breeding conditions at East Slough Camp may improve under the DBHCP because flows will increase at the beginning of April and wetland inundation levels will be higher than they have been historically, but optimal inundation levels still won't be reached until May in the majority of years*."

Page 8-218. Reach 4. "*For the first 20 years of DBHCP implementation the median number of days per year with flows greater than 1,600 cfs will be slightly higher than it was historically (Table 8-47*)."

Reaches 5 and 6 have no frogs. Reach 7 Les Schwab and Old mill sites are under a different water regime than irrigation districts.

<u>My Comments about HCP Effects Discussion</u>

My comments on the effects analysis reiterate many of the points I made above concerning breeding and overwinter habitat. The HCP acknowledges many of the adverse effects the regulated flows have on OSF sites along the Upper Deschutes. It claims that the proposed changes to flows will have beneficial effects to frogs, but the incremental benefits compared to current conditions are minimal and are not sufficient to achieve the increases in population abundance and connectivity between sites necessary for viable OSF populations along the Upper Deschutes River.

The HCP admits that floodplains are not inundated during the six-month storage period and only groundwater supported microsites provide overwinter habitat in the floodplains. For the initial twenty years of the HCP, winter flows will be below 400 cfs (WICO gage) and thus will only raise water levels within the river channel itself because flows will still be too low to inundate any floodplain habitat. The higher flows in the river may inundate a few more pieces of woody debris for frogs to hide under, so that is their perceived benefit. After year twenty, when winter minimum flows are 400 cfs, some of the deepest beaver structure will be inundated along the river banks, which, if it doesn't freeze solid, will provide the first notable suitable overwinter habitat in the river channel. Two of the twenty seven radio collared frogs in 2011 and 2016 did go to the river and overwinter in bank structure. But even at 400 cfs, flows will not inundate suitable floodplain habitat that would provide much more extensive and much better overwinter habitat.

Overwintering in the river channel is not ideal for frogs. There is minimal cover for frogs that would provide protection from multiple fish, avian and mammalian predators that exist in the area. Often times, the only cover for frogs in the river channel is to burrow in the muddy substrate. However, the frogs' physiological needs require that they move around to obtain oxygen, which exposes them to

predators. The RDG HSC study does not identify minimum habitat requirements for frogs to survive the winter in the river. In fact no studies have determined the essential cover requirements within the river channel to keep predation during winter months at acceptable levels and allow sufficient survival of frogs. There is no evidence that small increases in river flows will provide much improvement in winter survival for frogs when there is little hiding cover within the channel. In my opinion, we must assume the river is sink habitat for anything other than short term use (i.e., a couple days) during the winter due to risk of predation and lack of cover.

After twenty years, when minimum winter flows reach 400 cfs, they begin to support groundwater fed overwinter sites by raising water tables in the floodplain but still are insufficient to inundate most floodplain habitat. Higher winter flows of 400 cfs or more also would result in lower summer flows, which would slow erosive forces that are degrading the channel and exacerbating dewatering effects in the floodplain. As noted before, the HCP does not acknowledge that erosive forces continue to degrade the channel and further dewater groundwater-fed overwinter sites in the floodplains. These changes need to occur before another twenty years pass.

With regard to specific OSF sites along the Upper Deschutes, the HCP acknowledges at page 8-197 that the RDG HSC study states that poor overwinter conditions are likely the cause of frog absence at Bull Bend. It suggests that frogs may have been successful overwintering at that site the one year when winter flows were sustained near 400 cfs. Thus, there is little likelihood of winter survival at Bull Bend for at least the first twenty years of the HCP.

At Dead Slough, the proposed flows will increase water depth over suboptimum overwinter habitat in mud, which will provide only marginal improvement. Five of the seven radio collared frogs at Dead Slough did overwinter in the mud, but there was no effort to discern if sites were associated with spring or seep influence. I believe overwintering in mud substrate at Dead Slough is dangerous for frogs because it is anoxic. Frogs in overwinter habitat relying almost completely on mud for hiding cover must come out and expose themselves to predators regularly in order to breathe. Until high summer flows that prevent establishment of vegetation are capped, frogs are limited to overwintering in the mud. Adding a couple inches of water (or even a couple feet) in the winter will not make a difference, but moderated summer flows that allow vegetation to become established will make a big difference to improve overwinter habitat at Dead Slough. Also in Reach 1, the SW Slough site in LaPine State Park will not be inundated during winter with the proposed flows so the HCP measures will not improve overwinter survival at that site.

For the Slough Camp sites, the HCP relies heavily on Pearl et al. (2018) to assert that overwinter habitat will not be affected by the HCP proposal because frogs use non-aquatic overwinter habitat at those sites. As I explained above, it is unreasonable to rely on this single study because of its limitations and conflicts with all other known studies of OSF overwinter habitat. Pearl's crew acknowledged they could not confirm overwinter sites were dry, but still asserted the sites were non-aquatic even though data loggers showed water tables were high in the area, with water at or near the surface year round. O'Reilly also confirmed the sinkhole in East Slough Camp Wetland A, which is within a few yards of the lava flow, reached the water table. Given the lack of confirmation about water levels at the final

overwintering sites and the real possibility that cracks in the lava flow could allow frogs to reach the water table, the assumptions in the Pearl publication about terrestrial habitat use are unreliable and dangerous for frogs.

The Pearl study only looked at overwinter sites for two populations, which is a tiny sample. This study's value should be to help guide future studies, not draw any conclusions on habitat suitability. Oregon spotted frogs have never been observed successfully using terrestrial overwinter habitat anywhere else because freezing winter temperatures kill them. In another study of Upper Deschutes populations, Bowerman's more extensive radio telemetry work done at both Sunriver and Old Mill/Les Schwab populations found all frogs overwintered in aquatic habitats that allowed for movement and flexibility to choose optimum winter microsite conditions. Frogs that were out of water died in large numbers. The HCP reliance on the Pearl publication to say Upper Deschutes River overwintering frogs are more flexible and do not need aquatic habitats like other populations borders on preposterous.

For breeding habitat, the HCP claims proposed flows will benefit habitat at the edge of the river channel at Bull Bend. However, it fails to acknowledge that same habitat becomes completely unusable within days as flows continue to ramp up. Only when flows are above 800 cfs (WICO gage) will any suitable breeding habitat become available, which will not occur until the end of or after the breeding season.

Raising water levels to 600 cfs by April 1 and holding them steady until the end of April also will have little benefit for breeding at Dead Slough. Mudflats are available at Dead Slough as soon as temperatures melt the ice, so suboptimum breeding conditions are not dependent on 600 cfs flows by April 1. More than 800 cfs is needed to begin to inundate suitable breeding habitat. If high summer flows are capped at lower levels, vegetation would establish in the upper reaches of the mudflats after a couple years, which would provide necessary cover, but the HCP does not propose capping summer flows. The current proposed flows will perpetuate egg masses being laid over mud with no protective vegetation. These egg masses will be blown around by the wind in April due to the lack of cover, and then washed out into the river in May as flows rise and exceed 875 cfs.

Finally, the HCP claims breeding will improve at the Slough Camp sites because flows are increasing by April 1, while at the same time acknowledging that flows sufficient to inundate suitable breeding habitat will not occur until May. Like at Dead Slough, water will be a few inches deeper over suboptimum mud breeding habitat during the breeding period.

VI. Summary of HCP Conservation Measures

HCP management objectives and conservation measures for the Upper Deschutes frog populations are not sufficient to sustain viable frog populations. Some conservation measures look good on paper, but cannot be achieved. Others are designed to perpetuate suboptimum overwinter, breeding and aquatic habitats. As such, proposed flow operations cannot support the primary constituent elements (PCE) of critical habitat. These are the specific elements of the physical or biological features needed to support the life history processes of the Oregon spotted frog that are essential to its conservation.

The HCP proposed flow changes from historical operations and the associated conservation measures purport to be beneficial to frogs and their habitat. However, these benefits are so small as to be inconsequential.

The proposed HCP flow operations for the Upper Deschutes will continue to cause chronic high mortality rates of OSF at sites between Wickiup Dam and Bend by failing to adequately address: 1) poor breeding habitat conditions, 2) timing delay for breeding, 3) poor overwinter habitat conditions, 4) lack of aquatic connectivity between seasonal habitats, and 5) fluctuating water levels that are accelerating channel degradation and dewatering of wetlands. These chronic high mortality rates will continue to make the Upper Deschutes OSF populations highly vulnerable to extirpation.

VII. Importance of Maintaining Viable Populations Along Upper Deschutes River

The following concepts are taken from *Biodiversity*, Chapter 2.[9]

Evolutionary theory suggests that, for the long-term survival of a species, we need to conserve not just individual members of a species, but also a species' ability to evolve in the face of changing environmental variables — which means conserving individuals and genetic variation. Without genetic variation, a population cannot evolve in response to changing environmental variables and, as a result, may face an increased risk of extinction.

Arresting the loss of diversity is extremely difficult. As a listed species dwindles, it loses genetic variation — and even if the species rebounds, its level of genetic variation will not. Genetic variation will only slowly be restored through the accumulation of mutations over many generations. For this reason, a listed species with low genetic variation may risk extinction long after its population size has recovered.

The loss of genetically distinct populations within species is, at the moment, at least as important a problem as the loss of entire species. Once a species is reduced to a remnant, its ability to benefit humanity ordinarily declines greatly, and its total extinction in the relatively near future becomes much more likely. By the time an organism is recognized as endangered, it is often too late to save it.

The genetic diversity within each of the Upper Deschutes River OSF populations is important to the long term survival of OSF across their entire range. The Upper Deschutes River frog populations have had a significant stress put on them since dam operations began in the 1950's. Those that survived are believed to have persisted because they adapted to extreme physical and biological stresses from flow operations that create almost daily, weekly, monthly and certainly annual water level and habitat

[9] Wilson EO, Peter FM, editors. Biodiversity. Washington (DC): National Academies Press (US); 1988. Chapter 2, The Loss of Diversity Causes and Consequences. Available from: https://www.ncbi.nlm.nih.gov/books/NBK219310/

fluctuations that are well outside the natural range of variability OSF normally experience. Those physical and/or behavioral frog adaptations that helped Upper Deschutes River frogs persist despite the harsh environment are important to the long term survival of each population along the river and to the species as a whole. This uniqueness of Upper Deschutes River OSF populations must be preserved for the good of the whole species. As explained at the beginning, however, these populations are highly vulnerable to extirpation due to their very small size and isolation. A single stochastic event could eliminate an entire population and remove those genes forever. Changes must be made to water flows that allow these populations to grow by increasing reproduction and survival through winter.