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THE HONORABLE THOMAS COFFIN

UNITED STATES DISTRICT COURT

DISTRICT OF OREGON

EUGENE DIVISION

CENTER FOR BIOLOGICAL DIVERSITY,

Plaintiff,

v.

U.S. BUREAU OF RECLAMATION,

Case No. 6:15-cv-02358-TC
Consolidated with
Case No. 6:16-cv-00035-TC

DECLARATION OF THERESA L. SIMPSON IN SUPPORT OF

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Defendant, and **ARNOLD IRRIGATION DISTRICT, CENTRAL OREGON IRRIGATION DISTRICT, LONE PINE IRRIGATION DISTRICT, NORTH UNIT IRRIGATION DISTRICT, TUMALO IRRIGATION DISTRICT,** **Intervenor Defendants**.	PLAINTIFFS' JOINT MOTION FOR PRELIMINARY INJUNCTION
WATERWATCH OF OREGON, **Plaintiff**, v. **U.S. BUREAU OF RECLAMATION**, **CENTRAL OREGON IRRIGATION DISTRICT**, **NORTH UNIT IRRIGATION DISTRICT**, and **TUMALO IRRIGATION DISTRICT**, **Defendants**, and **ARNOLD IRRIGATION DISTRICT, LONE PINE IRRIGATION DISTRICT,** **Intervenor Defendants**.	Case No. 6:16-cv-00035-TC

I, Theresa L. Simpson, declare:

1. My name is Theresa L. Simpson, and I reside in Crescent, Oregon. The following facts are personally known to me, and if called as a witness I would and could truthfully testify thereto.

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

2. I hold an Associate Degree in Conservation Technology from Fox Valley

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Technical Institute, Appleton, Wisconsin (1980), a Bachelor of Science Degree in Science and Environmental Change from University of Wisconsin-Green Bay (1984), and twenty term hours toward a Master's Degree in Wildlife Sciences at Oregon State University, Corvallis, Oregon (1990-1991). My resume is attached as Exhibit 1.

3. I was certified as a Wildlife Biologist by The Wildlife Society in 2000.

4. I worked for the U.S. Department of Agriculture from 1980 to 2012, first as a Soil Conservationist for the Soil Conservation Service, and second – and most significantly – as a Wildlife Biologist for the U.S. Forest Service. My work history has given me extensive experience managing hydrologic, soil, and habitat characteristics for a wide range of plants and wildlife, as well as assessing and addressing impacts to species and habitat from various activities.

5. From 1980-1989, I worked on land management issues with the U.S. Department of Agriculture's Soil Conservation Service in Wisconsin. As a Soil Conservationist, I helped farmers navigate government farm program requirements for crops, grazing, dairy, woodlands, wetlands, wildlife, erosion control and water quality on over 25,000 acres. As part of my work, I assessed, designed and constructed erosion control and water quality improvement structures such as: waterways, access roads, stream crossings, diversions, sediment basins, ponds, rock chutes, filter strips, culverts, and manure pits.

6. In 1989, I went to work for the U.S. Forest Service as a Wildlife Biologist, the start of what became a 23-year career with the agency. I began as a Wildlife Biologist with the Sequoia National Forest in California, and then moved to the Fremont-Winema National Forests in Oregon in 1991. I served as the Wildlife Biologist for the Chemult Ranger District on that forest from 1991 until I retired in April 2012. I received numerous accolades from the agency

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recognizing my outstanding performance. *See* Ex. 1.

7. In my work as a Wildlife Biologist for the Forest Service, I amassed significant experience in proposed, threatened, endangered and sensitive plant and animal species program management including field surveys, habitat assessments, and preparing management guides and biological evaluations. I also provided plant and wildlife input to interdisciplinary teams completing environmental analyses on a wide range of projects including salvage, timber harvest, wildlife habitat improvement and riparian restoration.

8. I provided technical field research support and conducted habitat restoration projects for many plant and wildlife species, including Oregon spotted frogs (*Rana pretiosa*) (OSF).

9. As Wildlife Biologist on the Chemult District, my work required proficiency in inventory techniques, habitat assessments, wildlife impacts analysis, protection and mitigation from adverse forest activities, report writing, consistency reviews, interdisciplinary communication, interagency coordination and budget/staff needs to accomplish the district wildlife program. I was the lead biologist on numerous environmental assessments and watershed analyses, and I designed and implemented habitat improvement projects for willow planting, meadow encroachment removal, wetland ditch restoration, and protection fencing for sensitive species and damaged resources. I was also the district liaison for the Pacific Northwest marten research crew.

10. My work experience dealt extensively with Oregon spotted frogs and their habitat on the Chemult District. I participated in the annual district OSF egg mass and mark/recapture surveys for the Jack Creek population of spotted frogs from 1998 to 2006, and in the USGS-led annual OSF egg mass and mark/recapture monitoring from 2007-2012. I helped collect

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telemetry data on OSF in the Jack Creek watershed. I was also part of the group of interagency biologists that conducted annual OSF egg mass surveys on public ownership throughout the Klamath Basin.

11. I have spent many days in the field at several frog locations with Chris Pearl, U.S. Geological Survey frog expert. I assisted with the data collection on several OSF populations for several expert researchers (including Blouin et al. 2010; Pearl et al. 2007; Pearl et al. 2009a; Pearl et al. 2009b; Petrisko et al. 2008; Shovlain 2005) that published scientific papers on spotted frog demography, movement, genetics, diseases, habitat descriptions, habitat use, and population status.

12. My expertise with OSF has been used widely in Forest Service and interagency assessments, evaluations, and management and restoration plans. For instance, I provided technical support to the writing and review of the 2007 *Conservation Assessment for the Oregon Spotted Frog (Rana pretiosa).* I also consulted with local frog experts including Kathy Cushman (now retired, Bureau of Reclamation - Bend Office), Laurie Turner (Deschutes National Forest), Chris Pearl (USGS), and Jay Bowerman (Sun River Nature Center) during development of a comprehensive suite of Jack Creek spotted frog habitat restoration and improvement projects. I secured funding from the U.S. Fish & Wildlife Service and implemented a portion of the work before my retirement. I prepared two OSF biological evaluations for fencing habitat (2008) and habitat restoration (2009).

13. In addition, I wrote the section on threats and habitat conditions used in the 2011 *Jack Creek Oregon Spotted Frog (Rana pretiosa) Site Management Plan* (Exhibit 2), and also provided extensive review comments on other portions of the plan. Furthermore, I was a member of the Interagency Special Status and Sensitive Species Program Oregon Spotted Frog

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Working Group that set priorities and provided funding for interagency frog work leading up to the proposed listing in August 2013.

14. My work included assessing riparian areas, preparing riparian management plans and watershed assessments, and completing a variety of riparian restoration projects in several watersheds of central Oregon. For this work, I observed riparian areas year-round and through a variety of water conditions from extreme drought to extreme flooding.

15. Since my retirement in 2012, I have kept up to date with current science through discussions with experts and literature reviews on OSF. I used these literature reviews and my work experience to provide extensive comments to the OSF proposed listing (78 Fed. Reg. 53582) and proposed critical habitat (78 Fed. Reg. 53538) rules. *See* Exhibits 3 and 4 (comments on proposed listing and proposed critical habitat). In December 2013, I participated in a public hearing for the OSF listing.

16. Since retirement, my field observations and species monitoring activities have also continued. Each spring I monitor road access into and water temperatures in OSF breeding habitat in Jack Creek to support USGS's breeding surveys. Since beaver were relocated in Jack Creek in October 2012, I have also volunteered about two days per month year-round to monitor beaver activities on Jack Creek. During beaver monitoring trips in 2013, I found several dozen OSF in sections of Jack Creek not previously known to be occupied. In February 2013, I completed a 6-mile survey of active beaver sites along the Little Deschutes River for an upcoming OSF habitat improvement project.

17. Since my retirement, I have been actively conducting citizen monitoring of impacts to OSF habitat in the Jack, Sellers and Rock Creek watersheds from livestock. Many of my observations of grazing impacts were made concurrent with other monitoring efforts for

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beavers and OSF. I generally make field visits once or twice per week from early spring run-off (March-May) to the first significant snows in the fall (November-December).

18. From September 7, 2015 to November 29, 2015, I made nineteen trips to Crane Prairie Reservoir, Wickiup Reservoir, the Upper Deschutes River, Little Deschutes River, and Crescent Creek to observe OSF sites and habitat. I used photos and GPS coordinates obtained through Freedom of Information Act requests ("FOIA" or hereafter "FOIA documents") to visit known OSF sites on public lands and I looked at proposed critical habitat ("PCH") between sites. I walked through dry or disconnected sites and kayaked through those that had a navigable aquatic connection to the river. I was able to see most breeding sites, rearing habitat and low water refugia around Crane Prairie, Bull Bend, LaPine State Park, Slough Camp down through Ryan Ranch, Crescent Creek above and below Highway 58, Crescent Creek through the Rd 62 BLM tract, Little Deschutes through the Casey tract and Little Deschutes around Leona Park slough. Exhibit 5 to this declaration contains photos, dates and notes taken for each site visit.

19. I have reviewed FOIA documents received from U.S. Fish and Wildlife Service ("USFWS") and the Bureau of Reclamation, as well as other publicly available documents that contained information about OSF in the Upper Deschutes Basin, operations of Crane Prairie, Wickiup, and Crescent Lake dams, and water levels and water flows in the reservoirs and in the rivers below the dams.

20. Based on my knowledge, experience, and personal observations, initially WaterWatch and now both Plaintiffs in the consolidated action have asked me to provide my expert opinion on impacts to OSF from operation of the Crane Prairie, Wickiup, and Crescent Lake dams, and how operations must change to minimize or avoid harm to the species.

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OREGON SPOTTED FROG HABITAT AND STATUS

21. OSF are the most aquatic of all native frog species in the Pacific Northwest and almost always found in or near perennial water such as springs, ponds, lakes, streams, irrigation canals or roadside ditches. They require a variety of habitats to meet their life history needs. OSF need calm, shallow water areas for egg and tadpole survival, perennially deep, moderate to densely vegetated pools for adult and juvenile survival in the dry season, and perennial water for protecting all age classes in the winter. It is important that there are relatively direct aquatic connections that allow for unobstructed movement between the seasonal habitats.

22. OSF reach breeding maturity at 2 to 3 years of age. OSF lay their eggs in seasonally flooded, calm, shallow pools with aquatic connections to more persistent water. Egg laying occurs in spring. Native grasses, sedges and rushes are the preferred vegetation at egg laying sites. Full sun exposure at breeding sites is important, so vegetation needs to be flattened or sparse to allow sunlight onto the water.

23. A female OSF will lay her eggs in a single, cohesive, gelatinous ball a little bigger than the size of a baseball. An egg mass typically has about 400-600 eggs. OSF egg masses are free floating within vegetation at breeding sites. As water levels rise, they can be floated out of breeding habitat and into open water where they are more vulnerable to predators.

24. OSF seek out the warmest water available to lay their egg masses, starting as early as mid-March and continuing through mid- to late May in most years, depending on altitude and conditions of a particular location.[1] Typically, laying won't start until water temperatures reach at least 10 degrees Celsius. Accordingly, OSF prefer shallow waters that are

[1] I note that I expect breeding to begin slightly later this year due to the significant snow-pack we are experiencing in Central Oregon. This is why I am comfortable with putting injunction protections in place no later than the first week of April for this year, but that applies only for this year. In most years, those protections should begin earlier as set forth in detail below.

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approximately four to twelve inches deep because they become warm earlier in the season than deeper waters. However, OSF eggs cannot survive if they dry out. Thus, any drop in water levels greater than four inches at egg-laying sites will desiccate and kill egg masses present within that range of decreased water depth.

25. OSF are communal breeders. Egg masses of multiple females are often found in tight clusters. Therefore, harmful changes in water levels at breeding sites will affect a high percentage of OSF, not just a single egg mass.

26. Eggs hatch into tadpoles eighteen to thirty days after being laid, depending on water temperature. After hatching, tadpoles drop to the substrate at the bottom of the water column, feed and grow for about two weeks before becoming mobile and dispersing from the egg mass site. Optimum rearing habitat for tadpoles is in calm, warm, shallow, well-vegetated water. After about four months, tadpoles metamorphose into juvenile OSF.

27. After breeding, adult OSF move to deeper, more permanent calm water with a moderate amount of vegetation to forage and bask during the summer. This non-breeding habitat can include river oxbows, off-channel pools, remnant beaver ponds and perennial wetlands that retain water all summer. Often late season rearing habitat and non-breeding habitat overlap such that juvenile and adult OSF are using the same habitat in late summer and early fall.

28. OSF move to overwintering sites between mid-September and early December. Suitable overwinter sites require deep water that is well-oxygenated and provides shelter from predators and freezing. Shelter includes mud, silt, vegetation and wood in deep pools that do not freeze to the bottom. Springs and seeps in perennial wetlands, low velocity flowing channels, oxbows, beaver runs, undercut banks, and deep off-channel pools in wetlands offer winter shelter. Unlike most amphibians in the Pacific Northwest, OSF are known to move around a bit

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within overwinter sites. OSF begin to move toward breeding habitat in late winter. Typically, overwinter sites are within a quarter mile of breeding sites.

29. All OSF life stages need aquatic connections between all habitats used. Tadpoles die quickly out of water. Even adults make just short overland movements. Jay Bowerman documented OSF overland movements of about 30 feet between the Old Mill casting pond and the Deschutes River during the fall move to overwinter habitat.[2]

30. On August 29, 2014, the USFWS published a rule listing OSF as a threatened species under the Endangered Species Act (ESA). OSF are in severe decline and were listed as threatened because of habitat loss and degradation, inadequate regulatory mechanisms that result in habitat loss/degradation, predation and competition from nonnative species, small isolated breeding areas, low connectivity to other OSF populations, low genetic diversity within sub-basins and genetic differentiation between sub-basins.

31. Proposed critical habitat was also designated for OSF on August 29, 2013, but a final critical habitat rule has not yet been published. 78 Fed. Reg. 53,544 (August 29, 2013). Proposed critical habitat is the habitat necessary for the recovery of the species and includes physical or biological features and habitat characteristics required to sustain the species' life-history processes. Crane Prairie Reservoir, Wickiup Reservoir, the Deschutes River to Bend, Crescent Creek, and the Little Deschutes River to its confluence with the Deschutes River are all designated as Proposed Critical Habitat.

32. OSF are generally found in Crane Prairie Reservoir and Wickiup Reservoir, the Deschutes River connecting these reservoirs, and the mouths of several streams and rivers coming into these reservoirs; the Deschutes River and associated riverine wetland habitat from

[2] *See* Sewell Decl., Ex. 24, p. 17 (U.S. Fish and Wildlife Service document entitled, "Biological Assessment, Colorado Avenue Dam Paddle Trail Improvements Project" (June 17, 2014)).

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Wickiup Dam downstream to Bend; Crescent Creek and associated riverine wetland habitat from Crescent Lake Dam downstream to the Little Deschutes River near Gilchrist; and the Little Deschutes River and associated riverine wetland habitat from its confluence with Crescent Creek downstream to its confluence with the Deschutes River near Sun River.

HARM TO OREGON SPOTTED FROGS ALONG THE UPPER DESCHUTES RIVER

33. There are seven sites along the Deschutes River between Wickiup Dam and Bend that are known to be occupied by OSF. Bull Bend is about 4.1 aerial miles below the Wickiup Dam.[3] Juveniles were detected there in 2013, indicating breeding. Dead Slough and Southwest Oxbow are in LaPine State Park about 6.1 aerial miles downstream from Bull Bend. Nineteen and two breeding females were found at these respective sites in 2013. Sun River is about 8.2 aerial miles further downstream. Seven hundred and twenty-seven breeding females were detected at this site in 2012. The Southwest and East Slough Camp sites are about 4.2 aerial miles downstream from Sun River. There were eight and ten breeding females detected at these respective sites in 2014. The Old Mill site is another 8.9 miles downstream from Slough Camp sites. Fifty breeding females were detected there in 2013. The Sun River and Old Mill sites have their own management plans and are not discussed further in this declaration.

34. Flows in this part of the Deschutes River vary substantially during the course of the year. For example, flows just downstream of Wickiup Dam in calendar year 2015 varied between 17 cubic feet per second ("cfs") and 1920 cfs, with water depth ranging from .78 to 6.1 feet.[4] Farther downriver, at the Benham Falls site between Sun River and Bend, river flows in

[3] *See* Sewell Decl., Ex. 5 (U.S. Fish and Wildlife Service chart entitled, "2015 HCP OSF sites").

[4] U.S. BUREAU OF RECLAMATION, PACIFIC NORTHWEST REGION MAJOR STORAGE RESERVOIRS IN THE DESCHUTES RIVER BASIN, http://www.usbr.gov/pn/hydromet/destea.html (last visited February 2, 2016) (follow "Historical Data" hyperlink, then select "WICO – Deschutes River below Wickiup Res., OR" hydromet station to access data).

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2015 varied between 409 cfs and 2238 cfs, with water depths between 1.76 and 5.65 feet.[5] Flows at the Benham Falls site are generally 400 to 500 cfs higher than just below Wickiup Dam because of the addition of natural flows that enter the Deschutes River from several sources in between the two gauges.

35. Higher flows in the river translate to a higher volume of water and thus higher water levels in the river. As water levels rise, more wetlands along the edge of the river, or in connected sloughs and oxbows, become inundated with water. Annual precipitation, natural flow patterns, reservoir storage priorities, and seasonal water use for agriculture affect river flows, which in turn affects when and how much habitat is available to OSF.

36. OSF breeding, rearing, and nonbreeding habitat[6] occurs in the seasonally inundated riverine wetlands, including sloughs and oxbows[7], along the Deschutes River edges. This complex wetland habitat begins to inundate and provide suitable OSF habitat as flow levels rise in the river once spring irrigation releases begin. During high flows last summer and early fall, I observed extensive, well-connected, complex riverine wetland habitat with a variety of suitable OSF resting and hiding structures, calm warm water depths, and desirable vegetation within and between occupied OSF sites in the Bull Bend, LaPine State Park, Slough Camp, and Old Mill areas.

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[5] U.S. BUREAU OF RECLAMATION, PACIFIC NORTHWEST REGION MAJOR STORAGE RESERVOIRS IN THE DESCHUTES RIVER BASIN, http://www.usbr.gov/pn/hydromet/destea.html (last visited February 2, 2016) (follow "Historical Data" hyperlink, then select "BENO – Deschutes River at Benham Falls, OR" hydromet station to access data).

[6] Nonbreeding habitat is that habitat used for summer foraging and basking by adults and sub-adults.

[7] Sloughs and oxbows are used interchangeably in this declaration to describe a bend in the river that was cut off from the main river forming a backwater. Over time, they fill in with sediment and vegetation, transitioning from deep, open water to seasonally inundated shallow swales with emergent wetland vegetation.

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37. Observations at the Bull Bend, Dead Slough/LaPine State Park, and Slough Camp OSF sites, as well as in unoccupied critical habitat between those sites, showed that breeding, rearing, and nonbreeding habitat conditions were generally similar. They consisted of riverine wetlands along the river with warm, calm, shallow water and emergent vegetation and grasses. The Dead Slough site is a bit different because the riverine wetlands include a deep, open water oxbow. Habitat becomes available for breeding in spring once water releases from Wickiup Reservoir reach high enough flows to inundate the riverine wetlands. *See* Ex. 5, Photos 7, 13-15, 18, 22.

38. Under natural flows, water tables were higher in the riverine wetlands during the winter months, and lower during the summer months, creating generally stable habitat conditions for OSF. Natural flows averaged 730 cfs in the summer and 660 cfs in the winter.[8] In comparison, dam operations that include winter water storage in the reservoirs and variable water releases for irrigation during spring and summer create flows below the Wickiup Dam that are down around 20-30 cfs during the winter and up around 1400 cfs in July and August, varying from natural conditions by substantial amounts.

39. One of the biggest negative effects of the reservoir management leading to harm to frogs is that water releases from Wickiup do not occur early enough to inundate breeding habitat at the start of the breeding season, which is generally mid-March. Often flows are not high enough for the first 1.5 months of the breeding season to inundate suitable breeding habitat in the riverine wetlands. This causes OSF to delay breeding until later in the season or to select less than optimum habitat to lay eggs. *See* Sewell Decl., Ex. 10 (photos in U.S. Fish and Wildlife Service's "OSF HCP PowerPoint," slides 13-14).

[8] Threatened Status for Oregon Spotted Frog; Final Rule, 79 Fed. Reg. 51,658, 51,670 (Aug. 29, 2014).

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40. Delayed breeding harms OSF because it gives juvenile frogs less time to grow during optimum conditions before heading into the winter, decreasing their chances of survival through the winter. Laying eggs in less than optimum habitat early in the season makes egg masses more susceptible to desiccation and mortality, or slows egg mass development, which delays hatching and metamorphosis and creates smaller juveniles heading into winter.

41. Once water levels are finally high enough to inundate breeding habitat, they often continue to rise throughout the rest of the breeding season, making the search for suitable breeding habitat more difficult. OSF have high fidelity to breeding sites, but varying water levels during the breeding season and between years means OSF must search out suitable habitat and a mate in each breeding season, reducing the chance of breeding success. For egg masses that were laid at sites that might have been optimum early in the season, rising water levels create deeper, cooler water conditions that slow growth and reduce survival, or float egg masses out and away from protective vegetation.

42. For instance, hydromet data shows that river water levels at the Bull Bend site generally rise through the entire breeding season, making optimum conditions a moving target for OSF searching for egg-laying sites, and creating less desirable conditions for eggs that were laid at sites that were optimum earlier in the season. Inundating breeding habitat at the start of the breeding season, followed by stable water levels within the optimum elevation is critical for breeding success and avoiding harm to new generations of frogs. The other significant harms to OSF along the Upper Deschutes River are the rapid draw down of the river in fall and extreme low flows in winter when the reservoirs are refilled and are storing water. In fall, rapidly dropping water levels in the river and along riverine wetland habitat quickly dries out almost all rearing and nonbreeding habitat in a 10-day to 2-week period. The rapid draw down also

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severely reduces or wholly removes essential aquatic connections OSF need to move between rearing/nonbreeding habitat and overwinter habitat, which strands frogs, especially juveniles, and makes suitable overwinter habitat conditions extremely limited at most OSF sites along the Deschutes River. *See* Ex. 5, Photos 8-12, 16-23.

43. Over the past six years, water levels just below Wickiup Dam dropped between 2.8 and 4.9 feet during the short 10-day to two-week draw-down period. This large, rapid drop in water level during fall draw-down creates a narrow timeframe for OSF to move from rearing or nonbreeding habitat to overwinter habitat before aquatic pathways are dry. Without aquatic pathways, OSF are forced to move over land to overwinter habitat, which increases mortality rates.

44. Over-land movements are particularly difficult for juvenile frogs and result in harm to frogs. By way of example, I observed a juvenile OSF at the Slough Camp site on September 29, 2015 in the deepest part of a large pool of water that was about seven inches deep at the time. In contrast, the aquatic pathway to the river was about three inches deep. By October 9, 2015, this pool was dry. If the juvenile stayed in the deepest part of the pool until it went dry, which it likely did based on observations of juveniles staying put at other sites, it would have had to travel over land at least 400 feet to get to any potential overwinter habitat, and it is doubtful it would have been able to make such a long move. It is likely that some juvenile and adult OSF do not survive the transition from rearing/nonbreeding habitat to overwinter habitat each year. Compare Ex. 5 Photo 15 with Sewell Decl., Ex. 10 slide 12.

45. Low river flows during the reservoir refill season from mid-October to mid-April drop water tables to extremely low levels in riverine wetland habitat, eliminating or severely limiting suitable OSF overwinter habitat between Wickiup and Bend. During the fall of 2015, I

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observed that by late October, flows were so low that almost all riverine wetlands and river edge habitat were dry, making suitable overwinter habitat conditions extremely limited at most OSF sites along the Deschutes River. Only oxbows in LaPine State Park and a few small spring-fed pools in Slough Camp provided overwinter habitat outside of the main river channel at those sites, and no off-channel habitat occurred at the Bull Bend site. I also found no suitable riverine wetland overwinter habitat in the proposed critical habitat between occupied sites, making it difficult for OSF to move between sites or expand into new sites.

46. Overwinter areas must have permanent water with minimal velocity flow that keeps water oxygenated and must be deep enough to keep from freezing to the bottom during extreme cold conditions. Overwinter sites also must provide hiding cover in the form of vegetation, undercut banks, beaver runs, bank dens and lodges, woody debris, or muddy, silty pool substrates. The sites I visited varied in overwinter habitat.

47. At the Bull Bend site, I saw no suitable overwinter habitat conditions in the riverine wetland areas along the mile of river I walked. All riverine wetland habitat was dry by late October, leaving the main river channel as the only option for overwinter habitat, a condition harmful to OSF. River flows were so low, about 24 cfs, that much of the hiding cover for OSF on the edge of the channel or within the channel was also dry. I observed only a few scattered areas in the river that had low velocity flow, patchy cover, and were deep enough to not freeze, and thus were potential overwinter habitat. These same areas also had a large concentration of fish and birds that could predate on OSF. This lack of cover and inadequate water levels harm frogs. *See* Ex. 5, Photo 19.

48. The Dead Slough/LaPine State Park site had better overwinter habitat because OSF could use oxbows rather than the main river channel. The riverine bench wetlands were dry

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after river flows dropped in the fall, limiting habitat to much less than available under natural conditions and therefore constraining frogs, but the oxbows at least provided deep, freeze-free, low velocity flows and good hiding cover. Although oxbows are better than the main channel as overwinter habitat, the oxbows still have fish present that would predate on OSF. *See* Ex. 5, Photo 9.

49. There was little overwinter habitat at the Slough Camp site due to the sharp fall draw-down and extremely low winter flows. A few small pools that appeared to be spring-fed occurred in the riverine wetland habitat and likely provided oxygenated, freeze-free, suitable overwinter habitat. However, these pools were small, few in number, and spread far apart, making it very difficult for juvenile frogs to find them as the river is rapidly drawn down. Overwinter conditions in the main river channel at this location were only marginally suitable because all hiding structure along the edge of the river was dry, forcing OSF to find cover in submergent vegetation out in high velocity flows moving considerably faster than typical for OSF. For instance, BENO gauge data shows that OSF overwintering in the river near Slough Camp experienced flows that varied between 804 cfs and 1300 cfs from October 26, 2012 to March 15, 2013.

50. Because there is very little overwinter habitat available in the riverine wetlands at any of these sites, OSF are forced to overwinter in marginal or unsuitable habitat within the river. Use of this habitat in winter, assuming frogs can even get to it and don't die from stranding, causes great harm to OSF because they can be swept away by the current and they have to exert more energy to move around.

51. In addition, OSF are concentrated in the few areas of the river that have deeper, slower water in winter, and large fish often use these same areas, increasing mortality of OSF

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from predation. Risk of predation is also high because OSF likely must move around in the river channel in response to freezing conditions or changes in flow velocity, increasing their visibility to predators.

52. Short spikes in flow occur periodically that force OSF to move locations within the river. For instance, hydromet data shows this happened at the Bull Bend site in 2012, where flows varied between 2.89 cfs and 531 cfs over one week of December. At the Slough Camp sites, flows varied between 544 cfs and 1300 cfs over a one-week period in February 2014. Natural winter flows would not have experienced such large spikes in such a short time period. Large changes in velocity force OSF to move locations within the river channel to find low-velocity cover, causing them to expend energy and making them susceptible to being washed away or to predation, all of which increase mortality.

53. Higher stable river flows that allow for inundation of riverine wetland habitat in winter are critical to provide suitable overwinter habitat for OSF and aquatic connections to breeding, rearing, and nonbreeding habitat areas, and to stopping and avoiding ongoing harm to OSF.

54. Finally, the extreme seasonal fluctuation in river flows below Wickiup Dam has altered the river channel morphology, reducing the amount of suitable OSF habitat. I observed sand deposition bars at each occupied site high enough to cut off aquatic pathways to riverine wetlands even during high irrigation water release flows. Late this fall, I saw frost heaving in exposed portions of the river bottom that will later erode and wash sediment downstream when water levels rise, further exacerbating deposition in wetlands.

55. Impacts to breeding, rearing and overwinter habitat due to water management increase mortality of OSF along the Deschutes River and limit reproductive success, leading to

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small, disconnected populations that are at greater risk of extirpation. The potential loss of OSF from one or more of these sites decreases genetic exchange, which leads to loss of genetic variation within the sub-basin. Loss of genetic variation is one of the primary reasons for listing OSF as threatened under the Endangered Species Act. Further loss of genetic variation can lead to reclassification of OSF to endangered status.

HARM TO OREGON SPOTTED FROGS AROUND CRANE PRAIRIE AND WICKIUP RESERVOIRS

56. Estimates of breeding OSF in Crane Prairie and Wickiup Reservoir are incomplete. In 2013, there were an estimated 100 breeding OSF females in the northeast bay of Crane Prairie and 95 females in the northwest bay.[9] Forty females were detected in the Gold Fish Pond in 2012, and undescribed numbers of females along the southeast and southwest shores of Crane Prairie. In 2013, six egg masses were located on the south end of Wickiup Reservoir. In 2014, six egg masses were observed in the northern arm of Wickiup reservoir that drains from Crane Prairie.[10]

57. Crane Prairie and Wickiup reservoirs provide OSF breeding, rearing, and nonbreeding[11] habitat in a seasonally-inundated band of emergent[12] vegetation around the edges of the reservoirs. This habitat is estimated to be inundated and thus suitable for OSF when water surface elevations range between approximately 4,440 to 4,445 feet at Crane Prairie Reservoir

[9] *See* Sewell Decl., Ex. 5 (U.S. Fish and Wildlife Service chart entitled, "2015 HCP OSF sites"); Sewell Decl., Ex. 26 (U.S. Fish and Wildlife Service map of egg mass locations entitled, "CraneWickiupbreeding2012to2014").

[10] *See* Sewell Decl., Ex. 4 (U.S. Fish and Wildlife Service document entitled, "Upper Deschutes River Sub-Basin").

[11] Nonbreeding habitat is that habitat used for summer foraging and basking by adults and sub-adults.

[12] Emergent vegetation is rooted underwater, but their leaves and stems extend out of the water. They grow in wetlands and along the shore, where the water is typically up to, but no more than, 4 or 5 feet deep.

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and between 4,332.7 to 4,337.7 feet at Wickiup Reservoir. This estimate is based on personal observations I made in September of 2015 and the ecological water depth requirements that support emergent vegetation. Below these water levels, edge vegetation is dry and thus not suitable OSF habitat around the perimeter of the reservoirs. When both reservoirs are full, there are 3,710 acres of wetlands around the edges that are suitable for OSF.[13] Wickiup Reservoir has about 2-3 times more wetland edge vegetation than Crane Prairie Reservoir when reservoirs are full, yet fewer frogs for reasons discussed below.

58. Suitable breeding habitat exists in the shallowest portions of the seasonally-inundated band of vegetation around the reservoir edges. The optimum water depth at an egg laying site is 4-12 inches.

59. Tadpole rearing habitat exists in that same band of seasonally-inundated vegetation around the reservoir edges. Unlike egg masses, tadpoles are mobile. After hatching, tadpoles typically lie in the substrate at the egg mass location for a couple weeks before beginning to swim around. As they feed and grow, they become stronger swimmers. If water levels change slowly enough, tadpoles are able to find aquatic pathways and move around in the warm, shallow, vegetated hiding cover.

60. OSF nonbreeding habitat overlaps with rearing habitat within the band of inundated edge vegetation around both reservoirs.

61. If reservoir levels were kept at or very near full capacity so that water in inundated edge vegetation was at least 3-4 feet deep during fall and winter months, OSF would likely also try overwintering in the deeper inundated emergent vegetation that does not freeze solid.

[13] *See* Sewell Decl., Ex. 25 (Oregon Department of Fish and Wildlife Excel spreadsheet entitled, "PCH_Rana_pretiosa_ORWetReaches_20140720").

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62. Past operations of Crane Prairie and Wickiup reservoirs have harmed frogs by altering the OSF breeding, rearing, nonbreeding, and overwintering habitat found in seasonally-inundated vegetation along the edge of the reservoirs. The timing, extent, and duration of inundated vegetation available for each type of OSF habitat is affected by annual precipitation, reservoir fill priority, and seasonal water use for agriculture.

63. Changes in reservoir water levels during the breeding season cause harm to OSF in several ways. Dropping water levels during the breeding season can dry out egg masses in the shallow water, thereby increasing mortality and decreasing breeding success. In contrast, breeding habitat may be completely inundated until late in the season with water depths that are greater than what frogs prefer at egg laying sites (i.e.>12″), either eliminating breeding or delaying it such that juvenile development is delayed. Water levels that are stable and within the appropriate elevation during the breeding season is critical for breeding success.

64. Harmful changes in reservoir water elevations during the breeding season, from mid-March through mid-May, have occurred at Crane Prairie. Hydromet data from 2005 to 2015 shows that during many breeding seasons, water levels rose and/or dropped more than 12 inches at Crane Prairie. For instance, water levels both rose and fell between March 15, 2015 and May 15, 2015. Crane Prairie Reservoir was at 4,444.26 feet on March 15, 2015, rose another 8.4 inches by April 6, 2015, and then dropped 16 inches by May 15, 2015 to 4,443.53 feet. It is likely that egg masses laid in the peak of breeding season and at peak high water levels around April 6, 2015, were left stranded before hatching because of the 16-inch water drop.

65. Wickiup has priority over Crane Prairie Reservoir for fill timing and capacity and thus historically has been filled first. Hydromet data indicates that Wickiup generally has reached full capacity by late March to early April, while some years Crane Prairie does not fill completely. Thus, reservoirs are often still filling during March and April, so rising water levels

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often occur during the breeding season. The reservoir fill priorities translate to more variable, less suitable habitat conditions during breeding season in Crane Prairie.

66. Based on a review of BOR Hydromet data, the timing, extent, and duration of inundation of vegetation around the reservoirs also varies greatly from one year to the next. Changes to reservoir water levels between years adversely affect breeding OSF. Adult OSF are long-lived and have high breeding site fidelity, meaning they return—or try to return—to the same breeding location year after year. When breeding habitat is moved around the landscape from year to year due to variable water levels, this homing instinct to the breeding site is disrupted, resulting in a greater energy expenditure searching for suitable breeding habitat and a greater potential to not find a mate in a timely manner.

67. For instance, Hydromet data from 2010 shows water levels in Crane Prairie Reservoir were held between 4,442.28 and 4,443 feet during the breeding season. In 2015, water levels were held between 4,443.53 and 4,444.26 feet. These different water levels resulted in completely different breeding habitat being available each of those years. None of the Crane Prairie Reservoir breeding habitat used in 2015 was inundated in 2010 and conversely water levels at the 2010 breeding sites were too deep to be suitable for breeding in 2015. Availability of different breeding habitat in different years decreases breeding success. The timing and fill priority for Crane Prairie create higher variability in water levels between years than would occur under natural conditions.

68. Changes in reservoir water elevations from mid-May to mid-August also affect how much rearing habitat is available. In past years, agricultural water releases have typically begun in mid-April. Release priorities determine when and how much water is taken from each reservoir. As water is released, water levels drop and the band of inundated rearing habitat

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around each reservoir decreases.

69. Since 2005, Hydromet data shows water levels dropped below the band of edge vegetation before the end of rearing in mid-August for five different years at Crane Prairie Reservoir. This left only dry vegetation around the reservoir edge and forced tadpoles out into open water habitat that lacks cover from predators. In 2013, Hydromet data for Crane Prairie shows water levels dropped below 4,440 feet, the minimum level needed to inundate edge vegetation, as early as July 5. Hydromet data shows that in every year since 2005, Wickiup Reservoir rearing habitat went dry before mid-August, with the earliest date being May 29, 2010, again forcing tadpoles and/or juveniles into open water habitat.

70. When suitable rearing habitat in emergent edge vegetation goes dry, tadpoles are forced to go through metamorphosis in unsuitable open water habitat that has less cover available, adding a much higher risk of predation and increasing their mortality rate. To prevent this harm to OSF, water surface elevations in Crane Prairie should be kept more stable until at least mid-August, when most tadpoles have completed metamorphosis.

71. The amount of suitable nonbreeding edge habitat used by adult and sub-adult OSF also decreases as more water is released for irrigation in summer and fall. As more edge habitat dries out, OSF become more concentrated in the narrow band of habitat that remains inundated, raising competition for limited food resources during the peak growing/feeding season. When edge habitat goes completely dry, frogs are forced to expend energy to migrate to low water refugia instead of feeding and basking. The overall effect of limited resources and increased energy expense is less thriftiness and increased mortality.

72. Low-water refugia exist in areas that retain water after edge vegetation around the reservoirs is dry. Hydromet data shows that water levels are generally at or slightly below the

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lowest extent of edge vegetation often by late August in Crane Prairie and by June in Wickiup, forcing OSF to seek low-water refugia. A limited amount of suitable low-water refugia occurs around Crane Prairie in the mouths of rivers and creeks coming into the north and west sides of the reservoir. Such creeks and rivers provide permanent water with overhanging edge vegetation, emergent vegetation, undercut banks, beaver runs, bank dens and lodges, and woody debris for hiding cover. These low-water refugia can be used for nonbreeding and overwintering habitat. *See* Ex. 5, Photo 5. I also noted scattered snag patches in water around the edges of Crane Prairie that may provide hiding cover and some marginal low-water refugia to OSF. *See* Ex. 5, Photo 6.

73. As noted above, movement to these low-water refugia is harmful to OSF because it is incredibly energy intensive, may disrupt or delay other biological needs, and increases risk of predation. Accordingly, while low-water refugia may allow some OSF individuals to survive when habitat becomes unavailable for OSF around the edge of Crane Prairie Reservoir, traveling to these locales harms these individual frogs.

74. Because the Crane Prairie Reservoir water level remains low at the beginning of the overwinter period, the low-water refugia at Crane Prairie also corresponds with what I found for OSF overwinter habitat. These areas provide the perennial water and protection from predators and freezing that are necessary for overwintering.

75. Even though Wickiup Reservoir has significantly more suitable rearing and nonbreeding habitat than Crane Prairie when full, during the course of the irrigation season it provides less suitable habitat for OSF than Crane Prairie due to even greater water level fluctuations within the band of emergent edge vegetation. Water releases for irrigation cause water levels in Wickiup Reservoir to drop more quickly and earlier than Crane Prairie, thereby

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drying out all suitable OSF edge habitat by early summer each year. Hydromet data shows that water levels frequently have dropped more than five feet by mid-June. Edge habitat remains dry often until mid- to late winter. In September 2015, I observed water levels below the edge habitat at both Crane Prairie and Wickiup Reservoirs. *See* Ex. 5, Photos 1-4.

76. I found no suitable low-water refugia or overwinter habitat around Wickiup Reservoir. Rather, all life stages of OSF in Wickiup Reservoir have no choice but to move into open water habitat conditions for most of each year when water levels drop too low to inundate edge vegetation. *See* Ex. 5, Photo 4. The open water present in the reservoir does not provide cover from predators, suitable conditions for basking and foraging in summer, or suitable conditions for overwintering. The OSF mortality rate on both adults and immature life stages is likely very high when frogs are forced to take refuge in unsuitable open water habitat for such an extended time period.

HARM TO OREGON SPOTTED FROGS ALONG CRESCENT CREEK AND LITTLE DESCHUTES RIVER

77. Numerous sites along Crescent Creek and the Little Deschutes River below Crescent Creek are occupied by small numbers of OSF. These rivers are downstream of Crescent Lake Dam, and operation of Crescent Lake Reservoir has similar impacts to OSF breeding and overwinter habitat as described above for habitat downstream of Wickiup Reservoir. Timing and rate of water releases for irrigation affect availability, suitability, quantity, and connectivity of OSF habitat along Crescent Creek and the Little Deschutes River. In addition, irrigation diversions withdraw water from these two rivers that increases the variability of flow levels and OSF habitat conditions in and along them.

78. As on the Upper Deschutes River, during the fall draw-down and winter reservoir storage season nearly all riverine wetland habitat along Crescent Creek and the Little Deschutes

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River is dry, as I observed in the fall of 2015. Generally, irrigation releases have not begun until late spring, which means that these rivers have low flows for the start of the OSF breeding season, leaving most breeding habitat dry and unusable by OSF. Because peak irrigation releases do not occur until July in many years, rearing habitat often stays dry during much of the rearing period as well.

79. I observed that when river flow was 140 cfs at the LAPO gauge,[14] most near-by wetland breeding habitat along the Little Deschutes River at the Casey Tract OSF site was dry except for a small pool area that was spring-fed. Based on this observation, Hydromet data from the nearby LAPO gauge shows that water levels often were too low to inundate riverine wetland habitat not associated with springs or deep open water sloughs in this section of river for portions of breeding seasons in 2010-2015. For instance, in 2010, only five days of the entire OSF breeding season had flows higher than 140 cfs at the LAPO gauge. In 2011, flows started at 161 cfs at the beginning of breeding season, but dropped to 128 cfs by the end of March before jumping up to 366 cfs peak flows by the end of the breeding season. In 2015, flows at the beginning of the breeding season were 187 cfs, then dropped below 140 cfs by April 11 and continued dropping through the rest of the breeding season.

80. Inadequate releases from Crescent Lake Reservoir in spring that leaves OSF breeding habitat dry for most or all of the breeding season reduces breeding success. Water flows that drop during the breeding season would result in desiccation of egg masses that were laid early in the season. Frogs that delayed breeding would also be harmed because that delays tadpole development and metamorphosis, which decreases juvenile survival.

[14] U.S. BUREAU OF RECLAMATION, PACIFIC NORTHWEST REGION MAJOR STORAGE RESERVOIRS IN THE DESCHUTES RIVER BASIN, http://www.usbr.gov/pn/hydromet/destea.html (last visited February 2, 2016) (follow "Historical Data" hyperlink, then select "LAPO – Little Deschutes River near LaPine, OR" hydromet station to access data).

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81. The timing of irrigation releases also harms OSF rearing habitat. In 2013, Hydromet data from the LAPO gauge showed flows were above 140 cfs during the breeding season and early rearing season, but flows during twenty days in July were below 140 cfs, forcing tadpoles to find low water refugia in the river. In 2014, LAPO gauge flows dropped below 140 cfs by June 13 and stayed well below that level for the rest of the rearing season. Using the river for rearing increases predation risk for tadpoles.

82. In some years, flows at the LAPO gauge were so low in late spring and early summer that essential aquatic connections to deeper water and even entire rearing sites in this section of river would have dried out before tadpoles went through metamorphosis, leading to increased mortality rates. In other years, highly variable water releases in late spring and summer would result in highly variable water levels in riverine wetland habitat, causing tadpoles to expend extra energy moving around to find suitable rearing areas and making them more vulnerable to predation as habitat conditions changed. Increased expenditure of energy and predation risk decreases survival.

83. Low river flows in winter reduce the amount and quality of overwinter habitat as well. I observed OSF stay put in marginal overwinter habitat at sites along the Little Deschutes River as water levels dropped this past fall, 2015. These OSF were highly likely to have increased mortality due to freezing and anoxia.[15]

84. For instance, I found dozens of juvenile and adult OSF in late September of 2015 at the Casey Tract OSF site that were in two small pools about 35 feet from the river. These small pools had an aquatic connection to each other and to the Little Deschutes River and contained suitable OSF habitat conditions. By late-October, the smaller of the two pools was

[15] Anoxia is the absence or deficiency of oxygen.

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completely dry. Shortly before it went dry, I observed three juvenile OSF in the pool in about an inch of water despite dropping water levels and nighttime temperatures that were freezing the surface of the pool. It is highly likely these juvenile OSF did not survive. It also indicates as I discussed above, that juvenile OSF are not likely to move over land despite declining habitat suitability and will succumb to deteriorating conditions. *See* Ex. 5, Photo 29.

85. The second pool retained about a foot of water through late November of 2015. This pool not only had OSF but also bullfrogs, which are predators of OSF. In late November, there were five consecutive nights of below zero temperatures that created about five inches of ice in the small pool. Freeze events such as this likely killed at least some of the OSF still using the pool. In fact, Jay Bowerman documented a winterkill event in a shallow, but considerably larger pool under similar circumstances to those observed here.[16] These two pools were the only suitable overwinter habitat in the riverine wetlands at the Casey Tract site. All remaining off-channel habitat was dry. Natural river flows would have supported higher water tables in these pools and riverine wetlands. Historic higher water levels provided overwinter habitat more resilience to deep freeze events. *See* Ex. 5, Photo 30.

86. The Little Deschutes River itself provided some overwinter habitat at the Casey Tract site for part of the winter. When flows were about 140 cfs at the LAPO gauge in late September, some river edge habitat that provided cover for OSF was inundated and being used by frogs. *See* Ex. 5, Photos 25, 27. Flows dropped thirteen inches over the next two weeks, and by October 8, nearly all river edge habitat was dry and unusable. OSF that I had observed using the river edge habitat were no longer there. The only available habitat at that point was farther out in the river channel in deeper, higher velocity water with far less hiding structure available to

[16] *See* Sewell Decl., Ex. 24, p. 17 (U.S. Fish and Wildlife Service document entitled "Biological Assessment, Colorado Avenue Dam Paddle Trail Improvements Project" (June 17, 2014)).

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OSF. *See* Ex. 5, Photos 26, 28.

87. By December 9, 2015, flows returned to about 140 cfs at that site. Flows have varied between 128 cfs and 292 cfs from December 9, 2015 to today, January 26, 2016. Hydromet data since 2010 from the LAPO gauge shows that such variations in flow, or even greater variations, have occurred every year in the winter, causing OSF to move around frequently to find suitable overwinter habitat as flows change, expending a great deal of energy and exposing them to higher levels of predation, both of which increase mortality.

88. I also observed marginal overwinter habitat at the Leona Park site along the Little Deschutes River. I observed dozens of juvenile and adult OSF mixed in with bullfrogs in an oxbow off the river at this site from early October through late November. The oxbow did not have a surface water connection to the river during this time, and water levels in the oxbow dropped to less than seven inches. As the water in the oxbow began freezing, I searched several times in the near-by Little Deschutes River for OSF but did not find any. I continued to see OSF in the oxbow until ice obscured my view. My observations indicated that OSF were attempting to overwinter in the oxbow rather than move to the river. It is likely that mortality rates were high at this site due to late November subzero temperatures creating deep ice and/or anoxic conditions in the shallow pool. *See* Ex. 5, Photo 24. And again, I would expect similar conditions prevailed throughout shallow overwinter sites along Crescent Creek and the Little Deschutes River.

89. Impacts of Crescent Lake Reservoir management on OSF breeding, rearing, and overwinter habitat limit reproductive success and increase mortality of OSF along Crescent Creek and the Little Deschutes River, leading to small, disconnected populations that are at risk of extirpation. The potential loss of OSF from one or more of these sites decreases genetic

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exchange, which leads to loss of genetic variation within the Little Deschutes sub-basin population. Loss of genetic variation is one of the primary reasons OSF was listed as threatened, and further loss would put OSF closer to endangered status.

CONCLUSIONS ON HOW TO AVOID HARM TO SPOTTED FROGS PENDING COMPLETION OF A BIOLOGICAL OPINION AND HABITAT CONSERVATION PLAN

90. The threats and harm to OSF that I have observed, researched, and described above are all generally the result of the severely-altered system in the Upper Deschutes Basin (the Upper Deschutes Basin is upstream of Bend and includes the Little Deschutes and Crescent Creek tributary). Available historic information shows the Upper Deschutes River in particular was very stable in its flows, which were fed in large measure by groundwater flows (as well as snow and rain), as opposed to the more variable snow-melt-dominated systems often seen in the Cascades. Now the river is highly variable with extreme and rapid fluctuations in its flows and water levels. Now, under the artificial flow regimes created by the dams and reservoir system operation, extremely high flows occur in summer and extremely low flows in winter.

91. Numerous studies over thirty years have identified the creation and operation of the reservoirs as harmful to the river, the species in the river, and riverine and floodplain habitats. More recently and specific to the Oregon spotted frog, the alterations to the Upper Deschutes Basin's rivers and flows have been identified as a primary reason (if not the primary reason) the Oregon spotted frog is listed as threatened under the Endangered Species Act. In particular, as described above, the extremely high and unnatural flows in the summer months, the extremely low and unnatural flows in the winter months, and the sharp variations between and rapid changes in flows at various times of the year cause frog breeding cycles to be interrupted, desiccation of eggs, stranding of juveniles and adults, and crowding and increased predation of

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frogs, all of which increase mortality of frogs. Furthermore, the extreme fluctuations in operation of the System have altered habitat with uneven inundation and erosive flows in the summer months that then deposit silt in off-river channels, cutting off additional breeding, rearing, overwintering habitats and other areas of refugia that are no longer inundated at appropriate levels or times. Operation of the dam and reservoir system is harming Oregon spotted frogs in many ways throughout the year.

92. The overall status that must be achieved are flows and habitat inundation that more closely approximate natural conditions in the Upper Deschutes Basin and that are much more stable than current system operations. In order to achieve this, changes are necessary to the dam and reservoir system operations that do four things: 1) move System operations closer to natural conditions, 2) keep flow levels more consistent over time and eliminate extremes, 3) slow changes to flows, with ramp up or down over longer periods with less extreme change, and 4) time flows to more closely mimic natural cycles and to correspond to frog life stages.

93. For the **Deschutes River** upstream of Bend, Oregon, I recommend the following actions as necessary to avoid harm to OSF:

a. Begin spring releases of water from Wickiup and Crane Prairie dams on or before March 1 every year in order to inundate adequate breeding habitat early enough to ensure frog maturity by flow decrease times in fall.

b. By March 15 of most years, or earlier at the request of US Fish & Wildlife Service, reach flow levels of 770 cubic feet per second (cfs) as measured at the WICO gauge and maintain 770 cfs flows until September 15 every year. These conditions appear to be able to be met by available supply 75% of the time. In wetter years, summer flows may be higher—up to 838 cfs (which it appears the hydrograph in wetter years will

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support.). In the dry years, summer flows at WICO will be 650 cfs. These conditions appear to be able to be met in even the driest years that we have modeled. *See* Declaration and report of Greg Kamman. This will help ensure breeding habitat is inundated at the start of the breeding season, egg masses aren't desiccated, and tadpoles have suitable rearing habitat to fully and timely metamorphose without being stranded, expending undue energy finding food and cover and being exposed to excessive predation.

c. In order to achieve no egg mass stranding, during the period from March 15 through May 15 of each year, perform twice-weekly checks of monitors placed in frog breeding habitat above Bend, including, but not limited to Slough Camp, Dead Slough, and Bull Bend with multiple gauges in the very large sites such as Slough Camp. Report results of monitoring to Oregon Dep't of Fish and Wildlife ("ODFW"), USFWS, WaterWatch of Oregon and Center for Biological Diversity within 24 hours of gauge readings. Should gauges show a drop from water levels established on March 15 of 2 inches or more, flows should be increased at WICO adequate to recover March 15 levels within 24 hours from the monitor reading. From May15 to September 15 of each year the monitoring can decrease to once weekly. Make adjustments in flows to ensure rearing habitat does not dry out completely before September 15 of each year.

d. Begin winter drawdown on September 15, end winter drawdown by October 15 each year, and effectuate winter drawdown with an even rate of decrease in flows, spread equally over the month referenced here, in order to ensure frogs have time to move to winter habitat. This will help ensure drawdown is complete before significant freezing begins and gives frogs better opportunity to move by keeping aquatic pathways to winter

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habitat open longer.

e. During the 30 days of drawdown described in paragraph d, perform daily checks of WICO and BENO gauges and adjust as needed to maintain even flows. Perform daily checks of monitors placed in all frog habitat above Bend, including, but not limited to, Slough Camp, and report results of monitoring to ODFW, USFWS, WaterWatch and Center for Biological Diversity. Should the monitors show lowering water levels that would cause stranding of frogs, particularly juveniles, or that conditions are being created that force cross-country treks for frogs, pause drawdown and immediately implement a rescue plan to move frogs to suitable winter habitat.

f. Maintain consistent winter flow levels from October 15 to March 1 of at least 600 cfs measured at the WICO gauge in average and wet years, and at least 500 cfs in dry years. This recommendation comports with my observations and those of the Forest Service during recent fall/winter draw-downs as what is minimally adequate for winter flows to provide suitable overwinter habitat for frogs. *See above* and Gritzner email, Sewell Decl., Ex.15.

g. Alternatively, in place of recommendations in paragraphs b and f above (with paragraphs a, c, d, and e remaining in place), follow a second largely-unmanaged option (hereafter referred to as the "Run-of-the-River Option") to avoid harm to frogs in the Deschutes River upstream of Bend and around Crane Prairie and Wickiup Reservoirs. The Run-of-the River option requires the reservoir controls to be left open (or in the case of Crane Prairie set at 4,443.3 feet) and left in this condition throughout the year. Under the Run-of-the-River Option, the natural hydrograph will control habitat inundation and flows in the river, a condition that frogs obviously have evolved under. While the mere

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existence of the Crane Prairie and Wickiup Reservoirs on the landscape are damaging to frogs (reservoirs tend to fluctuate in ways that inundate and dry out frog habitat in a manner that is not natural), allowing Run-of-the-River will significantly limit the negative effects and the variability of those reservoirs, as shown by Greg Kamman's modeling of this condition based upon the last ten years of hydrological data. A review of the hydrograph (*see* Kamman Declaration and report) for the last eleven years demonstrates that allowing natural snowmelt/precipitation/groundwater flows to occur in the Upper Deschutes will avoid harm to frogs, allowing more natural breeding, rearing and overwintering.

94. For the **Little Deschutes/Crescent Creek tributary**, I recommend the following actions as necessary to avoid harm to OSF:

a. Begin spring releases of water from Crescent Lake dam on or before March 1 every year in order to inundate adequate breeding habitat early enough to ensure frog maturity by flow decrease times in fall.

b. In order to achieve no egg mass stranding, during the period from March 15 through May 15 of each year, perform twice-weekly checks of monitors placed in frog breeding habitat at Crescent Creek BLM section upstream of confluence with Little Deschutes River (NE ¼ of Section 5, Township 24 South, Range 9 East, Willamette Meridian); and Casey BLM Tract on the Little Deschutes River. Report results of monitoring to Oregon Dep't of Fish and Wildlife ("ODFW"), USFWS, WaterWatch of Oregon and Center for Biological Diversity within 24 hours of gauge readings. Should gauges show a drop from water levels established on March 15 of 2 inches or more, flows should be increased at CREO adequate to recover March 15 levels within 24 hours from

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the monitor reading.

c. From May15 to September 15 of each year monitor water levels in rearing habitat once weekly at Crescent Creek BLM section upstream of confluence with Little Deschutes River (NE ¼ of Section 5, Township 24 South, Range 9 East, Willamette Meridian); and Casey BLM Tract on the Little Deschutes River. Make adjustments in flows to ensure rearing habitat does not dry out completely before September 15 of each year.

d. Maintain minimum year-round flows of at least 40 cfs at CREO gauge on Crescent Creek.

95. Finally, I also recommend the following monitoring and reporting measures to serve as a check on the above recommendations to ensure that practices are not harming OSF:

Monitor the success of the above measures in terms of trends in annual frog egg mass counts for each occupied site. Complete adult visual encounter surveys at Slough Camp and Bull Bend breeding sites on the Deschutes River; Crescent Creek BLM section upstream of confluence with Little Deschutes River (NE ¼ of Section 5, Township 24 South, Range 9 East, Willamette Meridian); and Casey BLM Tract on the Little Deschutes River annually to determine trend in survival and recruitment into the breeding population. Include this information in the Deschutes Basin Habitat Conservation Plan study report.

96. As part of my work for the plaintiffs in these consolidated cases I was asked to review the proposal for OSF presented to the plaintiffs as part of the Bureau of Reclamation's response to plaintiffs' 60-day Notices of Intent to Sue, *see* Sewell Decl., Ex. 19. The proposal is titled "Management of OSF" with parts for Crane Prairie, Wickiup, and Crescent Lake Reservoir

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Operations. In my opinion, this proposal does very little, if anything, to avoid harm to OSF. It is my opinion the harm described in this declaration will continue largely unabated even if the Bureau of Reclamation and/or irrigation districts implement the proposal. My reasoning for this opinion is as follows.

97. My summary of the proposal is that it minimally juggles timing and amounts of releases from each reservoir with regard to the irrigation districts water budget, but without regard to the actual biological needs of OSF.

98. More specifically, the Crane Prairie proposals 1 through 5 are inadequate to protect breeding and rearing habitat in the reservoir. While the proposal to keep water levels within the 40,000 to 50,000 acre feet range will provide for inundation of suitable habitat, it does not allow for stable water levels in breeding habitat. Rather, it allows for a 2' variation in water level, which has potential to strand egg masses and/or wash them away. Nor does the proposal to maintain water levels within the 40,000 to 50,000 acre-feet range from March 15 to July 15 sustain rearing habitat for the entire tadpole rearing season. Rather, this proposal would force tadpoles out into the reservoir during the latter half of metamorphosis, a time period when they are very immobile.

99. The Crescent Lake Reservoir proposal to maintain at least 30 cfs in Crescent Creek is too low to inundate most overwinter habitat and provides no or extremely little inundation of breeding habitat during the appropriate period of March 15 to May 15. The proposal of 30 cfs is too low to support any off-channel habitat restoration such as Ryan Ranch.

100. There are no proposals to provide flows in Crescent Creek, Little Deschutes River or Deschutes River that support timely inundation of OSF breeding habitat, sustained aquatic connections for seasonal movements between habitats, or suitable overwinter habitat.

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101. There are no proposals to reduce highly erosive flow levels during peak irrigation season.

102. The following exhibits are attached to this declaration. For all photos presented in Exhibit 5 listed below and attached to this declaration, I either took the photo or was present when the photo was taken.

LIST OF EXHIBITS

Exhibit 1	Theresa L. Simpson resume.
Exhibit 2	Jennifer Gervais, *Jack Creek Oregon Spotted Frog* (Rana pretiosa) *Site Management Plan*, Forest Service, U.S. Dep't of Agriculture (Nov. 28, 2011).
Exhibit 3	T. Simpson comments in response to U.S. Fish & Wildlife Service proposed rule to list the Oregon spotted frog as a threatened species under the Endangered Species Act, 78 Fed. Reg. 53582 (submitted by T. Simpson Nov. 11, 2013).
Exhibit 4	T. Simpson comments in response to U.S. Fish & Wildlife Service proposed rule to designate critical habitat for the Oregon spotted frog under the Endangered Species Act, 78 Fed. Reg. 53538 (submitted by T. Simpson Nov. 11, 2013).
Exhibit 5	T. Simpson photos from field surveys in summer and fall of 2015; dates and locations noted on each photo.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

Executed this ___ day of February, 2016 at Crescent, Oregon.

Theresa L. Simpson

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REFERENCES

Blouin, M. S., I. C. Phillipsen and K. J. Monsen. 2010. Population structure and conservation genetics of the Oregon spotted frog, *Rana pretiosa*. Conservation Genetics. 11:2179-2194.

Chelgren, N.D., C.A. Pearl, M.J. Adams, and J. Bowerman. 2008. Demography and movement in a relocated population of Oregon spotted frogs (*Rana pretiosa*): Influence of season and gender. Copeia 2008:742-751.

Cushman, K.A. and C.A. Pearl. 2007. A Conservation Assessment for the Oregon Spotted Frog (*Rana pretiosa*). USDA-Forest Service, Region 6 and USDI Bureau of Land Management, Oregon and Washington

Funk, W.C., C.A. Pearl, H.M. Draheim, M.J. Adams, T.D. Mullins, and S.H Haig. 2008. Range-wide phylogeographic analysis of the spotted frog complex (*Rana luteiventris* and *Rana pretiosa*) in Northwestern North America. Abstract in Molecular Phylogenetics and Evolution 49:198-210.

Gervais, J. 2011. Jack Creek Site Management Plan. U.S. Department of Agriculture, Forest Service Regions 6. 42 pp., *available at* http://www.fs.fed.us/r6/sfpnw/issssp/documents2/smp-ha-rana- pretiosa-jack-creek-2011-11.pdf

Hayes, M.P. 1998. The Jack Creek population of Oregon spotted frog (*Rana pretiosa*) Chemult Ranger District, Winema National Forest (Klamath County, Oregon). Final report prepared for the Nature Conservancy under contract to the Winema National Forest. Unpublished report 14 pp.

Pearl, C. A., E. Bull, D. Green, J. Bowerman, M. Adams, A. Hyatt and W. Wente. 2007. Occurrence of the Amphibian Pathogen *Batrachochytrium dendrobatidis* in the Pacific Northwest. Journal of Herpetology, Vol. 41, PP.145-149.

Pearl, C.A., M. J. Adams and N. Leuthold. 2009. Breeding Habitat and Local Population Size of the Oregon Spotted Frog (*Rana pretiosa*) in Oregon, USA. Northwestern Naturalist. 90:136-147.

Pearl, C. A., J. Bowerman, M.J. Adams, and N.D. Chelgren. 2009. Widespread Occurrence of the Chytrid Fungus *Batrachochytrium dendrobatidis* on Oregon spotted frogs (*Rana pretiosa*). EcoHealth. DOI: 10.1007/s10393-009-0237.

Pearl, C. A. April, 2014. Email confirming OSF reproduction at Davis Flat.

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Petrisko, J.E., C.A. Pearl, D.S. Pilliod, P.P. Sheridan, C.F. Williams, C.R. Peterson, and R.B. Bury. 2008. Saprolegniaceae identified on amphibian eggs throughout the Pacific Northwest, USA, by internal transcribed spacer sequences and phylogenetic analysis. Mycologia 100:171-180.

Robertson, J.M., and W.C. Funk. 2012. Population genetic analysis of Oregon spotted frogs(*Rana pretiosa*) in Oregon. Final report submitted to USDI Bureau of Land Management, Oregon State Office. Assistance Agreement L09AC16051. On file with: Interagency Special Status/Sensitive Species Program, USDI Bureau of Land Management, Oregon State Office. 34 pp.

Shovlain, A. 2005. Oregon Spotted Frog habitat use and Herbage (or Biomass) Removal from Grazing at Jack Creek, Klamath County, Oregon. Master's Thesis, Oregon State University, Corvallis, Oregon.

USDA Forest Service, 2010. A Conservation Agreement for the Oregon Spotted Frog (*Rana pretiosa*) in the Klamath Basin of Oregon.

USDI USFWS. August 29, 2013. Proposed Rule to List the Oregon Spotted Frog (*Rana pretiosa*) as a Threatened Species under the Endangered Species Act. 78 Federal Register 53582-53623.

USDI USFWS. August 29, 2013. Proposal to Designate Critical Habitat for the Oregon Spotted Frog (*Rana pretiosa*) under the Endangered Species Act. 78 Federal Register 53538-53579.

USDI USFWS. August 29, 2014. Endangered and Threatened Wildlife and Plants: Threatened Status for Oregon Spotted Frog. 79 Federal Register 51658-51710.

Watson, J. W., K.R. McAllister, and D.J. Pierce. 2003. Home ranges, movements, and habitat selection of Oregon spotted frog (*Rana pretiosa*). Journal of Herpetology 37 (2):292–300.

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