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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 GREGORY R.
KAMMAN IN SUPPORT OF

DECLARATION OF GREGORY R. KAMMAN
(Consolidated Case No. 6:15-cv-02358-TC)- 1

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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, Gregory R. Kamman, declare the following on the basis of personal knowledge to which I am competent to testify.

1. I am over eighteen years of age and a resident of the State of California. I am a principal and a Principal Hydrologist of Kamman Hydrology and Engineering, Inc. ("KHE"), located at 7 Mt. Lassen Drive, Suite B250, San Rafael, California. I am providing this

declaration to WaterWatch of Oregon in support of the above-captioned litigation.

2. KHE has been in existence since 1997. KHE is a natural resources consulting firm specializing in watershed, wetlands, estuarine and coastal protection, restoration and enhancement. KHE performs its work for both private and public clients in multiple land-use contexts as varied as National Parks to urban corridors.

3. My curriculum vitae is attached hereto as Exhibit A. I am a hydrologist with over twenty-five years of technical and consulting experience in the fields of geology, hydrology, and hydrogeology. I co-own and operate the hydrology and engineering consulting firm Kamman Hydrology & Engineering, Inc. in San Rafael, California (established in 1997). I earned a Master of Science in Geology, specializing in Sedimentology and Hydrogeology as well as an A.B. in Geology from Miami University, Oxford, Ohio. I am a Certified Hydrogeologist (CHg) and a registered Professional Geologist (PG) in the state of California. I have been providing professional hydrology services since 1991 and routinely manage projects in the areas of surface- and ground-water hydrology, flood hazard assessment, water quality, water resources management, and geomorphology. My areas of expertise include: characterizing and modeling watershed-scale hydrologic and geomorphic processes; evaluating surface- and ground-water resources/quality and their interaction; assessing hydrologic, geomorphic, and water quality responses to land-use changes in watersheds and causes of stream channel instability; and designing and implementing field investigations characterizing surface and subsurface hydrologic and water quality conditions. The majority of this work is in support of aquatic ecosystem enhancement and restoration projects to improve habitat for endangered/threatened salmonid and amphibian species. Of particular relevance to this case are my extensive experience in the planning and design of breeding habitat for the endangered California red

legged frog and hydrologic and water operation assessments in the upper Klamath (Oregon/California), Trinity and Eel River basins for the protection and enhancement of salmon habitat.

4. The opinions and information given here are preliminary and provided in support of a Motion for Preliminary Injunction in the above-captioned case. In particular, they address hydrology and related matters in the Upper Deschutes River Basin in Central Oregon (the Upper Deschutes River and its tributaries upstream of Bend, Oregon, including the Little Deschutes and Crescent Creek). As such, they may be subject to change as more information becomes available either in the responses to the Motion or over the course of the litigation as discovery proceeds. The opinions and information given here are to the best of my knowledge and experience as of the date given and the information available at that time.

5. In preparing the opinions and information in this declaration and the attached report, I have primarily reviewed the following:

Autobee, R., 1996, Deschutes Project. Prepared by Bureau of Reclamation, 26p.

Biota Pacific Environmental Science, Inc., 2015, Oregon spotted frog (*Rana pretiosa*) 2015 Study Plan. Prepared for: Deschutes Basin Board of Control and City of Prineville, Oregon, January, 9p.

Deschutes River Conservancy, 2012, Upper Deschutes River Background Paper. September, 19p.

Earthjustice, 2016, Confidential settlement communication re: Proposal to change operations of the Crane Prairie, Wickiup, and Crescent Lake Dams and Reservoirs as related to harm to Oregon spotted frogs. January 8, 4p.

Fitzpatrick, K., Gorman, K., and B. Aylward, 2006, Reservoir Management, Deschutes Water Alliance (DWA) Final Report. August, 55p.

Law Office of Karl G. Anuta, P.C. and Earthjustice, 2015, First amended complaint for declaratory and injunctive relief, WaterWatch of Oregon v. U.S. Bureau of Reclamation, Case No. 6:16-cv-00035-TC, 17p.

National Marine Fisheries Service, Northwest Region, 2005, Endangered Species Act – Section 7 Consultation Biological Opinion & Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. Prepared for: U.S. Bureau of Reclamation, Pacific Northwest Region, February 17, 74p.

Oregon Water Resources Department, 2002, Determining surface water availability in Oregon. Open File Report SW 02-002, June, 170p.

River Design Group, Inc., 2005, Deschutes River – bank stabilization projects assessment. Prepared for: Deschutes River Conservancy, December, 38p.

Simpson, Theresa L., 2015, Declaration prepared in support of Plaintiff’s Motion for Preliminary Injunction, Center for Biological Diversity (plaintiff) v. U.S. Bureau of Reclamation (defendant), Case No. 6:15-cv-2358-TC. 29p. + 5 Exhibits.

U.S. Bureau of Reclamation, 2003, Operations description of the Deschutes River Basin Projects. Prepared by the Pacific Northwest Regional Office, January, 106p.

U.S. Bureau of Reclamation, 2016, Hydromet data for Pacific Northwest Region major storage reservoirs in the Deschutes River Basin. Retrieved from:
<http://www.usbr.gov/pn/hydromet/destea.html>

6. In particular, I have reviewed much of the research, findings, and recommendations of Theresa Simpson, as well as her declaration submitted in this case. Part of the purpose of my review of Ms. Simpson’s declaration and underlying information is to evaluate the hydrologic and water operation feasibility of Ms. Simpson’s recommendations. It is my opinion that the premise of Ms. Simpson’s work is logical and well-founded based on her field observations, professional experience and expertise. As such, I understand and concur with the hydrologic objectives set forth with respect to her reservoir levels/operations and stream flow rate recommendations as a basis to improve habitat conditions for Oregon spotted frog.

7. In order to further determine the long-term feasibility of Ms. Simpson’s preliminary flow and water level recommendations in the Upper Deschutes Basin as they relate to protecting and enhancing habitat conditions for Oregon spotted frogs, I have conducted a suite of water supply and water budget analyses. Using these tools and the available water supply in

the Upper Basin, I worked with Ms. Simpson to fine-tune the flow and water level recommendations in a manner that maintains the overall pattern and intent of her original recommendations for avoiding or at least minimizing harm to Oregon spotted frogs. As a result, I provide the information and recommendations set forth in the Expert's Memorandum that is attached hereto as Exhibit B. To summarize the information in the attached Memorandum, two feasible flow proposals were developed.

8. The first flow proposal is what I refer to as the Unregulated Flow Proposal. This flow proposal allows unregulated flow conditions to prevail for Crane Prairie and Wickiup Reservoirs as well as releases from Wickiup Reservoir to the Deschutes River. This proposal—also described as “run-of-the-river” conditions—will satisfy Ms. Simpson's recommendations for frogs during most years. There are a number of highlights to this proposal. First, it is easy to implement; the flow conditions basically become whatever the natural water availability conditions dictate. Second, it is likely that this is as close to natural flow conditions as we can achieve given the current landscape that has been drastically altered due to the construction and irrigation-dominated operations of two reservoirs controlling aquatic habitat in the Upper Basin. Third, given my review of over the last eleven years of data, I am confident that in the majority of years, the natural flows will mostly achieve the habitat improvements set forth by Ms. Simpson to avoid or minimize harm to frogs. And, while the 25% driest years may not achieve those optimal conditions in all instances or areas, it is constrained by available water supply and mimics what would occur naturally. Finally, our modeling demonstrates that the unregulated or “run-of-the-river” condition will result in much more stable reservoir levels at both Crane Prairie and Wickiup, a condition that Ms. Simpson also recommends.

9. The second feasible flow proposal is referred to as the Supply-Based Flow

Proposal and is a hybrid of Ms. Simpson's original flow recommendations that basically shifts the seasonal flow recommendations up and down by a constant increment depending on the amount of water supply available during any given year. This flow proposal is likely more difficult to implement as release rates would need to be based on start-of-season water supply and a forecast of watershed inflow. However, this alternative has the potential to achieve Ms. Simpson's original flow recommendations for the protection of frogs during the majority of the time, while providing maximum possible releases during drier years. The Supply-Based Flow Proposal also provides very stable water levels in Crane Prairie Reservoir and more stable levels in Wickiup Reservoir compared to current conditions.

10. The findings of my analyses also indicate that there was sufficient water supply over the past 11 years passing through Crescent Lake to satisfy Ms. Simpson's year-round flow recommendation of 40 cfs on Crescent Creek. However, this action will increase the magnitude of seasonal decline in lake/reservoir water levels as compared to current conditions.

11. Another benefit that will result from implementing either of the flow proposals is reduced instability and erosion within the Deschutes River. Findings the River Design Group, Inc. completed in 2005 indicate that the contemporary water management in the Upper Deschutes River yields a hydrograph substantially varied from the historic flow regime. The effect of this change, caused by irrigation releases, has led to reduced riparian vegetation along the river corridor and artificially high flow rates equal to pre-development flood stages. These changes from the high-flow irrigation releases lead to an increase in the rate of bank erosion and sediment load, adversely impacting channel morphology, habitat for aquatic organisms and water quality. For example, it is my understanding from Ms. Simpson's field observations that a lot of the side-channel wetland or oxbow habitat for frogs has been cut off due to sediment deposition

near the mouths of these off-channel areas, which Ms. Simpson notes has adversely affected the ability of frogs to access different habitats. This geomorphic change on the upper Deschutes River is corroborated in the 2005 River Design Group, Inc. report. My own experience on the study of other river systems is that the rapid change in channel water levels, bank soil moisture levels (weight) and hydrostatic pressures due to rapidly varying flow rates (akin to releases driven by irrigation demands) also increase bank instability and failure. A return to more natural and gradually varied flow rates associated with either of the flow proposals described above will reduce the current rate of channel instability and erosion and impacts to frog and fish habitat.

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 5th day of February, 2016, at San Rafael, California.



Gregory R. Kamman