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TO: Gerry Jewett, Bob Barwin and Carl Nuechterlein

THROUGH: Bill Yake BY

FROM: Dave Serdar DS, Art Johnson AJ, and Stuart Magoon

SUBJECT: First Progress Report on Ecology's Dioxin/Furan Survey of the Middle Columbia River.

The Washington Department of Ecology (Ecology)) is conducting a survey of chlorinated dioxins and furans in the Middle Columbia River in response to concerns over possible contamination with these compounds. This progress report summarizes the status of field and analytical work. It also reports results for one set of samples (returning chinook salmon collected from the Wenatchee River) for which analysis and QA/QC are completed. Objectives of the Ecology survey are to 1) measure concentrations of dioxins and furans in edible sportfish species from popular harvest areas, 2) evaluate concentration gradients of dioxins and furans through the Middle Columbia using sediments and bottom fish (largescale suckers), and 3) assess the occurrence of dioxins and furans in major tributaries.

Fieldwork for the Middle Columbia survey was completed in November 1990. Figure 1 shows the sample collection sites. Sportfish, sucker, and sediment samples were collected from the four mainstem Columbia River sites; Rufus Woods Lake, Rock Island Reservoir, Priest Rapids Reservoir, and Lake Wallula. Resident sportfish collection was limited to these mainstem sites. Sediment and largescale sucker samples were also collected from the Okanogan, Wenatchee, Snake and Yakima Rivers. Anadromous species were represented by returning adult chinook salmon generously provided by the Washington Department of Fisheries at the Priest Rapids Spawning Channel and the U.S. Fish and Wildlife Service at Leavenworth National Fish Hatchery. Adult chinook salmon caught commercially near the Columbia Mouth were purchased from a local packing company to serve as a reference for upriver chinook. Lake Wenatchee was used as a reference site for sportfish, suckers, and sediment.

We were able to obtain a total of 187 sportfish out of our target of 195. Table 1 compares our target species and sample size to those actually obtained. Our initial goal was to focus on walleye and rainbow trout. At sites where these were not obtained using our collection methods (electroshocking and gillnetting), other species were taken as follows: Bass, catfish and carp at Lake Wallula; bass and carp at Priest Rapids Reservoir; and lake whitefish at Rock Island Reservoir and Rufus Woods Lake. Five white sturgeon fillet samples from Lake Wallula were also obtained through the courtesy of Battelle Northwest Laboratories.

While carp are generally not considered sportfish in most parts of the state, the Washington Department of Health believes Southeast Asian-Americans living in the Tri-Cities area may consume a substantial amount of carp (Amman, 1990; Lorenzana, 1990). Carp from Lake Wallula have been reported to

contain high concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzo-p-furan (TCDF) (Tetra Tech, 1989). We collected carp in response to these data and concerns raised by the Health Department.

Tissue samples from sportfish consisted of homogenized skinless fillet from five individual fish (four for chinook). Largescale suckers were homogenized whole, five to a sample. Sediment samples were composites (3 grabs/station) collected from the top 2-cm surface layer with a stainless steel ponar grab.

Triangle Laboratories (Research Triangle Park, North Carolina) has performed all TCDD/TCDF analysis on sportfish samples. TCDD/TCDF analysis and independent QA review have been completed on the five chinook salmon samples collected from the Leavenworth hatchery (Table 2). TCDF concentrations were low and TCDD levels were low to undetectable (0.1 - 0.6 ppt detection limits). Toxicity Equivalents - calculated using the formula TCDD + (0.1)TCDF - ranged from 0.2 - 0.5 ppt. Toxicity Equivalents, or TEQ's, are used to compare the toxicities of chlorinated dioxin and furan congeners to that of 2,3,7,8-TCDD. Each dioxin and furan congener is assigned a factor relative to 2,3,7,8,-TCDD. The factors for TCDD and TCDF are 1 and 0.1 respectively (EPA, 1987).

Twenty-five other sportfish samples have undergone TCDD/TCDF analysis and are awaiting final QA review. An additional sixteen sportfish samples will be sent to Triangle Labs in mid-January for TCDD/TCDF analysis.

Sucker and sediment samples were sent to EPA's Environmental Research Laboratory at Duluth, Minnesota, in early December. EPA will analyze all 2,3,7,8 - tetra through hepta congeners. In addition, EPA will run a xenobiotic screen which includes analysis of pesticides, PCB's, and other target analytes of the National Bioaccumulation Study. Data from these analyses is expected in March 1991.

A second progress report is forthcoming in February, 1991. The results of the survey will be reported in full in April 1991.

References:

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DS/AJ/SM:krc

cc: Steve Hunter, Norm Glenn, Ed Rashin, Claude Sappington, Steve Saunders, Patrick Spurgin, Mike Lewellyn, Dick Cunningham, Dick Burkhalter, Lynn Singleton

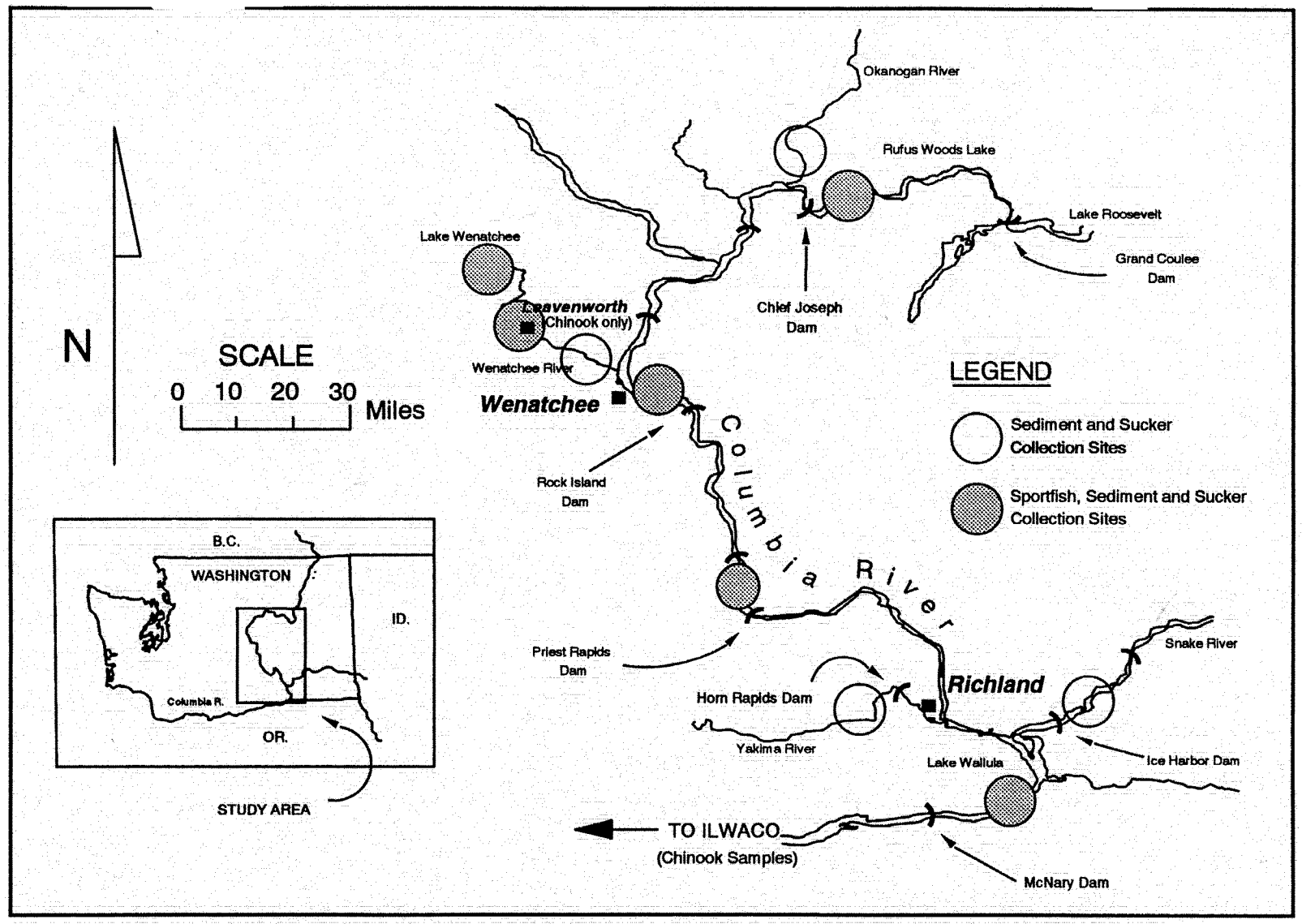

Figure 1. Location of Fish and Sediment Sampling Sites

Table 1. Comparison of Targeted and Obtained Sportfish Samples for the Middle Columbia Dioxin/Furan Survey

Location	TARGETED Species	TARGETED Sample Size	OBTAINED Species	OBTAINED Sample Size
Rufus Woods Lake	Walleye	3 (5)	Walleye	2 (5)
	Rainbow Trout	3 (5)	Rainbow Trout	3 (5)
			Lake Whitefish	2 (5)
Rock Island Reservoir	Walleye	3 (5)	Walleye	2 (5)
	Rainbow Trout	3 (5)	Lake Whitefish	1 (2)
Priest Rapids Reservoir	Walleye	3 (5)	Smallmouth Bass	1 (2)
	Rainbow Trout	3 (5)	Carp	3 (5)
	Fall Chinook	5 (4)	Fall Chinook	5 (4)
Lake Wallula	Walleye	3 (5)	Largemouth Bass	2 (5)
	Rainbow Trout	3 (5)	Carp	3 (5)
			Channel Catfish	3 (5)
			White Sturgeon	5 (1)
Lake Wenatchee	Rainbow Trout	3 (5)	Rainbow Trout	1 (4)
			Mountain Whitefish	3 (5)
Ilwaco	Fall Chinook	5 (4)	Fall Chinook	5 (4)
Leavenworth	Spring Chinook	5 (4)	Spring Chinook	5 (4)

Note: Figure in parenthesis corresponds to number of fish composited in each sample

Table 2. TCDD and TCDF Concentrations in Muscle Tissue of Chinook Salmon Collected from Leavenworth National Fish Hatchery on May 23, 1990 (concentrations in parts per trillion; each sample a 4 fish composite)

Sample No.	Mean Length (mm)	Mean Weight (g)	Percent Lipid	2,3,7,8-TCDD	2,3,7,8-TCDF	TEQ
218005	834	6,001	5.1	ND (0.6)	2.3	0.5
218006	841	6,178	1.7	0.2 EMPC	1.1	0.3
218007	866	6,838	9.4	0.2 EMPC	1.8	0.4
218008	862	6,002	8.6	ND (0.1)	1.3	0.2
218009	858	5,958	4.2	0.2 EMPC	1.1	0.3

ND = Not Detected; detection limits shown in parenthesis
EMPC = Estimated Maximum Possible Concentration
TEQ = 2,3,7,8-TCDD Toxic Equivalents [TCDD + (0.1)TCDF]
Note: Where TCDD not detected, 1/2 detection limit used for TEQ calculation