

APPENDIX B

SPAWNING AREAS OF SALMON AND STEELHEAD IN THE COLUMBIA RIVER BASIN

(Prepared by Environmental Research and Technology, Inc.
from information found in Fulton 1968 and Fulton 1970.)

CONTENTS

	<u>Page</u>
List of Tables.....	B-ii
Tables.....	B-1

LIST OF TABLES

	<u>Page</u>
Table B-1 Spawning Areas of Chinook, Chum, and Coho Salmon and Steelhead Trout in the Lower Columbia River.....	B-1
Table B-2 Sockeye Salmon Nursery Lakes of the Columbia River Basin.....	B-9
Table B-3 Spawning Areas of Chinook, Chum, and Coho Salmon and Steelhead Trout in the Middle Columbia River.....	B-11
Table B-4 Spawning Areas of Chinook, Chum, and Coho Salmon and Steelhead Trout in the Upper Columbia River.....	B-14
Table B-5 Spawning Areas of Chinook, Chum, and Coho Salmon and Steelhead Trout in the Snake River and Tributaries.....	B-16
Table B-6 Salmon Habitat Lost in the Snake River and Tributaries, and Remaining Habitat Presently Available, by Major Drainage.....	B-21

Table B-1
SPAWNING AREAS OF CHINOOK, CHUM
AND COHO SALMON AND STEELHEAD TROUT
IN THE LOWER COLUMBIA RIVER¹

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
<u>Chinook</u> (spring & summer)	Cowlitz R.	209	Upper section of main river and Ohanapecosh River	About same
	Lewis R.	145	Lower portion below Merwin Dam	Middle and upper Lewis R. and tributaries removed from production by Merwin, Yale, and Swift Dams.
	Willamette R.	303	None in main river.	None.
	Clackamas R.	129	Middle & upper portions of Clackamas R.; North Fork, Eagle Creek, Collawash R., and Hot Springs Fork.	18 km of main river.
	Santiam R.	18	None in mainstem	None
	N. Santiam R.	148	Lower 66 km of main stream, & lower 24 km of Little N. Santiam R.	Spawning areas in Breitenbush R. & upper tributaries of N. Santiam R. were cut off by Detroit & Big Cliff dams.
	S. Santiam R.	139	69 km stretch of main river and lower Wiley Creek	Same
	Middle Santiam R.	48	Well distributed throughout most of its course. Also 26 km of Quartzville Creek.	Same

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
McKenzie R.	138	Throughout length of main river & portions of Gate Creek, Blue R. Horse Creek, Separation Creek, and Lost Creek.	Mohawk Creek removed from production by past logging practice
South Fork	50	Main river and French Pete Creek	11 km of main stream inundated by Cougar D
Middle Fork Willamette R.	124	Fall, Little Fall, Big Fall, Winberry, & Lost creeks	About 1,508 km. of streams cut off by Dexter & Lookout Point dams. No record of spawning in river below Dexter Dam.
Coast Fork Willamette R.	80	None	Former runs were present in the upper Coast Fork
Sandy R.	72	Upper Sandy R.	Portions of lower Sandy & tributaries
Wind R.	52	Main river & limited amount in tributaries	None
Klickitat R.	143	Upper main river	About same
Deschutes R.	394	Main river near Squaw Creek; Warm Springs R. and its tributary, Beaver Creek; Metolius R.; and Squaw Creek	Crooked R. and Trout Creek
John Day R.	365	Upper main river, upper N. and Middle Forks, Granite Creek & its tributary, Clear Creek	Many areas of middle & upper main river & tributaries
Umatilla R.	192	Small section in upper part of main river	Upper half of Umatilla R. & tributaries

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
	Walla Walla R.	90	None	Upper & middle parts in main river and tributaries.
<u>Chinook</u> (fall)	Cowlitz R.	209	Throughout most of mainstem and many tributaries. Most productive area in section from mouth of Toutle R. to Mayfield Dam	13 km of intermittent spawning in main river inundated by Mayfield Reservoir.
	Youngs R.	29	2 km section of Youngs R., and lower section of Klaskanine R.	Same
	Lewis R.	145	Lower portion below Merwin Dam.	About 48 km inundated by reservoirs
	Willamette R.	304	None in mainstem	Small amount below mouth of Clackamas R.
	Clackamas R.	129	Lower 8 km	18 km inundated by hydroelectric impoundments
	Washougal R.	58	Lower portion of Washougal.	Some areas probably lost due to small dams. New areas gained.
	Sandy R.	72	Lower part of main Sandy	About same
	Wind R.	52	Lower & middle portions of main stream and limited about in tributaries	Limited to lower 2 km., which was flooded out by Bonneville pool.
	Little White Salmon R.	29	About 1 km. of spawning below hatchery rack	Lower 1 km inundated by Bonneville pool
	Big White Salmon R.	64	Lower 4 km	Probably lower 4 km & midsection

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
Hood R.	18	First 10 km. of main river	More extensive
East Fork Hood R.	42	None	Lower mainstem
Middle Fork Hood R.	14	None	No information
West Fork Hood R.	22	Limited use at present	Probably lower half of main stream
Klickitat R.	153	Lower 44 km of mainstem	Confined to area below Castile Falls.
Main Columbia R. (Bonneville Dam to McNary Dam)	237	None.	Bonneville and The Dalles reservoirs inundated some spawning areas
<u>Chum</u> Lewis & Clark River	40	Lower portions	About same
Youngs R.	29	About 1.6 km section above tidewater to Youngs R. Falls.	Same
Cowlitz R.	208	None in main Cowlitz R.	Main Cowlitz R. in vicinity of Mayfield Reservoir.
Lewis R.	144	Below Merwin Dam.	Same
East Fork Lewis R.	67	Lower portion	Same
Washougal R.	58	Lower Washougal R. & tributary	Same
Little White	29	About 0.8 km of spawning below hatchery rack	Lower 0.8 km inundated by Bonneville pool

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
	Columbia R.		None	In mainstem in stretch up to about 232-248 km above mouth
<u>Coho</u>	Lewis & Clark	40	Tidewater to Youngs R. Falls (0.8 km stretch)	Same
	Cowlitz R.	208	Upper main Cowlitz R. tributaries listed below	About same
	Lewis R.	144		Area above Merwin Dam and tributaries
	Willamette R.	303	None	None
	Clackamas R.	128	Upper portion and lower North Fork	Probably some of stream areas inundated by dams
	Santiam R.	18	None	None
	N. Santiam R.	147	None	None
	S. Santiam R.	101	Midsection of Thomas & Wiley Creeks & tributaries, lower 2/3 of Crabtree Creek	Species introduced
	McKenzie R.	138	Mowhawk R. & Camp Cr.	Species introduced
	Middle Fork Willamette R.	123	None in main stream	None
	Coast Fork Willamette R.	80	Bear Creek	Species introduced
	Washougal R.	58	Lower river, Little Washougal R., Winkler Creek and West Fork	Not as large
	Sandy R.	72	Middle Sandy R. and Cedar Creek	Salmon & Bull Run rivers

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
Wind R.	51	Middle portion and tributaries	Lower 2.4 km flooded by Bonneville pool
Little White Salmon R.	29	About 0.8 km of spawning below hatchery rack	Lower 0.8 km inundated by Bonneville pool
Hood R.	18	Section of main Hood R. East and West forks, and Neal Creek	Unknown
Klickitat R.	152	Section of main Klickitat & W. Fork	Species introduced
John Day R.	364	Small section of Middle Fork	Unknown
Walla Walla R.	90	None	Location unknown
<u>Steelhead</u>			
Lewis & Clark R.	40	Most of stream above tidewater	Dam, about 22 km up, has fishway but may be partial barrier at times
Youngs R.	29	Lower 0.8 km Youngs R. (above tidewater) Klaskanine R., & its North Fork	Barth Falls on Klaskanine R. laddered in 1964, opening new area
Cowlitz R.	208	Most of main Cowlitz R. & tributaries listed below	Areas inundated by Mayfield & Mossyrock Reservoirs
Lewis R.	144	River km 11 to 32	Area above Merwin Dam lost
E. Fork Lewis R	67	Lower 50 km	Same
Clackamas R.	128	Upper Clackamas R., Clear, Deep, & Eagle creeks. N. Fork, Roaring, Oakgrove Fork, Collawash & Hot Springs Fork rivers	Area inundated by dams. May have had spawning gravel.

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
Santiam R.	18	None	None
N. Santiam R.	147	Most of main stream & lower 2/3 of Little N. Santiam R.	Upper main stream & 540 km of tributaries cut off by Detroit & Big Cliff dams
S. Santiam R.	101	Upper South Santiam, Thomas, Crabtree, Wiley, & Canyon Creeks	Wiley Creek Falls laddered, increasing area. No former area cut off
Middle Santiam R.	48	Middle Santiam R. and Quartzville Creek	Lower portion of Middle Santiam R. inundated by dams
McKenzie R.	138	Upper half Mohawk R.	
Middle Fork	123	Fall & Winberry Creeks & main Middle Fork	Probably little use by species before they were introduced below Dexter R. Dam
Washougal R.	58	Main Washougal, lower Little Washougal, and lower half, West Fork	Not as large owing to fishway con- struction over Salmon Falls & removal of old dams.
Sandy R.	72	Sandy R. & tributaries	Some losses in 43 km stretch below Marmot Dam
Wind R.	51	Upper Wind R., Trout and Panther creeks	Not as large
Little White Salmon R.	27	Lower 0.8 km above Bonneville pool	Bonneville pool unin- dated lower 2.6 km
Big White Salmon R.	64	Lower 1.6 km above Bonneville pool	Lower part of main- stem and area above Condit Dam (3 km above mouth)

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
Hood R.	18	Midsection, east. west & middle forks & Neal creeks	About same
Klickitat R.	152	Upper Klickitat and Little Klickitat rivers	Falls were laddered, opening new areas
Fifteenmile Cr.	64	Scattered in most of main stream. Best area in upper reaches	Some loss in middle & lower portion
Deschutes R.	392	Stretches in lower 160 km of main stream	Crooked, Metolius & upper Deschutes rivers & Squaw Creek
John Day R.	364	Tributaries of upper John Day R., parts of Rock, Butte, and Thirtymile creeks, & tributaries of the South Fork R.	Some reduction though not located
Umatilla R.	191	Birch & Mecham creeks, South and North forks	Butter Creek & some sections of tribu- taries taken out of production of water for irrigation
Walla Walla R.	90	Upper Walla Walla R. and its tributaries	Some tributaries re- moved from production

¹Source: Fulton (1968; 1970); Mullan (1984)

²Former spawning areas refer to those taken out of use before 1969.

Table B-2
**SOCKEYE SALMON NURSERY LAKES
 OF THE COLUMBIA RIVER BASIN¹**

River	Surface Lake	Not Available in Late 1960s		Available in late 1960s Acres
		Passage Acres	Date Surface Blocked	
<u>Upper Columbia</u> ²	Upper Arrow	51,904	1939	
	Lower Arrow	37,504	1939	
	Whatshan	4,004	1939	
	Slocan	16,738	1939	
<u>Middle Columbia</u>				
Okanogan ³	Osoyoos			5,729
	Skaha	4,967	1921	
	Okanogan	85,990	1915	
Yakima	Bumping	631	1910	
	Cle Elum	1,982	1909-10	
	Kachess	2,744	1904	
	Keechelus	1,240	1904	
Wenatchee	Wenatchee			2,445
<u>Snake Area</u>				
Payette	Big Payette	1,000	1914	
	Little Payette	300	1914	
	Upper Payette	200	1914	
Wallowa	Wallowa	1,777	1929	
Salmon ⁴	Redfish		1913-34 ⁵	1,500
	Alturas		1913-34	1,200
	Petit		1913-34	395
	Stanley		1913-34	180
	Yellowbelly		1913-34	170

River	Surface Lake	Not Available in Late 1960s		Available in late 1960s Acres
		Passage Acres	Date Surface Blocked	
<u>Lower Columbia</u>				
Metolius	Suttle	250	1930	
TOTAL		211,231		11,619

¹ Source: Mullan (1984).

² Presence of kokanee suggests that sockeye once used Kinabasket, Windermere, and Columbia lakes

³ Fulton (1970) indicates that Palmer Lake once was used by sockeye. Unpublished data indicate that salmon never ascended above Enloe Falls on the Similkameen River.

⁴ Same as footnote 1 for Hell Roaring, Little Redfish, and Warm lakes.

⁵ Only a remnant sockeye run has persisted since passage was restored.

Table B-3
SPAWNING AREAS OF CHINOOK, CHUM
AND COHO SALMON AND STEELHEAD TROUT
IN THE MIDDLE COLUMBIA RIVER¹

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
<u>Chinook</u> (spring and summer)	Yakima R.	319	Upper Yakima R. & Naches R.	Satus, Toppenish, Ahtanum, Wenas, and Teanaway rivers
	Wenatchee R.	88	Most of main river; portions of Chiwawa, Little Wenatchess, & White rivers; & Nason, Icicle, & Peshastin creeks	Areas in Peshastin Creek & areas above Leavenworth National Fish Hatchery on Icicle Creek
	Entiat R.	84	Most of main stream	About same
	Methow R.	114	Main stream & large tributaries	About same as present. Some areas may be reduced in size owing to irrigation diversion
	Okanogan R.	129	Intermittent riffles throughout its length and lower 2 km of Similkameen R.	Salmon & Omak creeks were lost to production due to irrigation & dams. Most of Similkameen R.
<u>Chinook</u> (fall)	Yakima R.	319	Lower portion	Extent of former use unknown
	Section of main Columbia	539	Above McNary pool to Priest Rapids Dam, & a small area near mouth of Wenatchee R.	McNary, Priest Rapids Wanapum, Rock Island, Rocky Reach, Wells, Chief Joseph, & Grand Coulee pools inundated spawning area.

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
			In addition, areas above Grand Coulee were taken out of production when runs were cut off by high dam
<u>Chum</u>		Never reportedly frequented upper Columbia River but may have historically	
<u>Coho</u>			
	Yakima R.	317	Upper main Yakima R.
			Part of upper main Yakima R., Cle Elum & Kachess rivers, & Umptanum & Taneum creeks, also Naches R. Other areas unknown
	Wenatchee R.	88	Icicle Creek below hatchery and main Wenatchee R. below Leavenworth
			Portions of Icicle and Nason Creek
	Entiat R.	83	Entiat R.
			Reduced somewhat but specific areas unknown
	Methow R.	114	Main stream downstream from town of Twisp
			Upper Methow & Twisp rivers

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
<u>Steelhead</u>	Yakima R.	317	Upper Yakima R., parts of Naches R. & Satus & Toppenish creeks	Formerly much more extensive in tributaries
	Wenatchee R.	88	Throughout main Wenatchee R., lower Mission, Peshastin, Icicle, Chiwaukim and Nason creeks, Chiwawa, Little Wenatchee and White rivers	About same
	Entiat R.	83	Entiat & Mad rivers	About same
	Methow R.	114	Most of Methow R., Twips, & Chewack rivers and Lower Beaver Creek	About same
	Okanogan R.	128	Scattered throughout mainstem below L. Osoyoos to Omak Creek and Lower Similkameen R.	Salmon & Omak creeks & upper Similkameen R.

¹Source: Fulton (1968; 1970)

²Former spawning areas refer to those taken out of use before 1969.

Table B-4
SPAWNING AREAS OF CHINOOK, CHUM
AND COHO SALMON AND STEELHEAD TROUT
IN THE UPPER COLUMBIA RIVER¹

Stream	Length (miles)	In the Late 1960s	Former ²
<u>Chinook</u>			
Spokane River	90	none	Lower 50 miles and tributaries
Sanpoil River	75	none	Entire river
Colville River	40	none	Lower 4 miles below Meyer Falls
Kettle River	160	none	To a falls above stream running out of Christina Lake in Canada
Pend Oreille River			
Clarks River	100	none	Lower 20 miles and tributaries
Kootenai River	250	none	50 miles above its confluence with Columbia River
<u>Chum</u>			
Never reportedly frequented upper Columbia River but may have historically.			
<u>Coho</u>			
Spokane	90	none	Lower 50 miles
Sanpoil River	75	none	Entire river
Hall Creek	20	none	Lower 4 to 5 miles
<u>Steelhead</u>			
Spokane	90	none	Lower 50 miles and tributaries
Sanpoil	75	none	Entire river
Colville River	40	none	Lower 4 miles below Meyer Falls
Kettle River	160	none	To a falls above stream running out of Christina Lake in Canada

Stream	Length (miles)	In the Late 1960s	Former ²
Pend Oreille River (Clark River)	100	none	Lower 20 miles and tributaries
Kootenai	25	none	50 miles above its confluence with Columbia River

¹Source: Fulton (1968; 1970)

²Former spawning areas refer to those taken out of use before 1969.

Table B-5
SPAWNING AREAS OF CHINOOK, CHUM
AND COHO SALMON AND STEELHEAD TROUT
IN THE SNAKE RIVER AND TRIBUTARIES¹

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
<u>Chinook</u> (spring & summer)	Snake R.	1,609	None	None
	Palouse R.	241	None	None
	Tucannon R.	97	Middle & upper parts of main stream and Cummings Creek	Some reduction in habitat
	Clearwater R.	121	None in mainstem	Spawning gravel is present, but no record exists of past use
	North Fork	217	Lower half of Little North Fork	Most of main stream & nearly all lower portions of tributaries. (This area is now available but not now used.)
	Middle Fork Clearwater R.	39	None	Believed to have been used throughout entire length
	South Fork Clearwater R.	121	None	Scattered areas along main river & parts of many tributaries
	Grande Ronde	322	Upper half of main river & tributaries	Middle & upper Joseph Creek & tributaries. Some reduction of spawning area in upper main stream

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
Salmon R.	644	Small amount of spawning area scattered throughout lower 322 km. Many good riffles in next 258 km., but the most productive area is in upper 56 km.	About same
Little Salmon	69	Main stem & Rapid R.	Same
South Fork Salmon R.	132	Main stream and tributaries, Secesh R., East Fork, & Johnson Creek	About same but reduced use of East Fork & Johnson Creek
Middle Fork Salmon R.	171	Upper half Middle Fork & portions of Big, Camas, Loon, Sulphur, Marsh, & Bear Valley creeks	About same
North Fork Salmon R.	37	Lower 2/3 main river	Lower 18 km out of production for a period of years owing to dredging in upstream areas.
Lemhi R.	97	Most of main stream	About same
East Fork	48	Most of East Fork, & lower parts of some tributaries	About same
Imnaha R.	121	Upper river, Big Sheep Creek, & Lick Creek	Little Sheep Creek

	Stream	Length (km)	Spawning Area ²	
			In Late 1960s	Former
<u>Chinook</u> (fall)	Snake R.	1,609	From Palouse R. junction, scattered areas for 32 km; areas near Lewiston, Idaho; & scattered riffle areas up to Hells Canyon dam-site	Main river spawning above Hells Canyon damsite to Shoshone Falls. Ice Harbor, Oxbow, & Brownlee dams have flooded spawning areas, and Hells Canyon Dam flooded 32 km more.
<u>Chum</u>	Never reportedly frequented Snake River area but may have historically			
<u>Coho</u>	Snake R.	1,602	None	None
	Tucannon R.	96	None	Location unknown
	Clearwater R.	120	None	Location unknown
	Grande Ronde	320	Unknown	Lower section
<u>Steelhead</u>	Salmon R.	641	Middle & upper main Salmon R., lower Wind R., Whitebird, Slate, Crooked, Big Mallard, Bargamin, & Chamberlain creeks. Other tributaries listed below	Same
	Little Salmon R.	69	Lower & middle portions main stream & Rapid R.	Same
	South Fork Salmon R.	128	Throughout South Fork, Secesh R., East Fork & Johnson Creek	Same
	Middle Fork Salmon R.	170	A few sections of Middle Fork and most of Big Clover, Camas, Loon, Sulphur, Bear Balley, & Marsh creeks & tributaries	Same

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
North Fork Salmon R.	37	North Fork and lower parts of tributaries	Some reduction caused by mining
Lemhi R.	96	Most of Lemhi R. and lower portions of tribu- taries	About same
East Fork Salmon R.	51	Most of its length and lower parts of tribu- taries	Same
Imnaha R.	120	Throughout main Imnaha R., & Cow, Lightning, Horse, Little Sheep creeks, & several other tributaries	About same
North Fork Clearwater R.	216	None	Most of main North Fork lower 1/2 of Little North Fork, & Kelly Cr. and lower portions of many small tributaries
Middle Fork Clearwater R.	38	Throughout Middle Fork and tributaries.	About same
South Fork Clearwater R.	120	Lower section	Stream blocked by dam about 32 km above mouth for 14 years
Grande Ronde R.	320	Most of upper & middle main stream tributaries, Lookingglass, Clark, Phillips, Indian, Willow, Catherine, Five-Point, Beaver, Meadow, & Sheep Creek	Some reduction in upper Grande Ronde and tributaries due to gold dredging & channel relocation

Stream	Length (km)	Spawning Area ²	
		In Late 1960s	Former
Snake R.	1,600	Scattered spawning areas above Ice Harbor Harbor pool to Hells Canyon Dam	Main river spawning was lost by inundation. Because this species spawns during high water, it is difficult to see spawning activity & locate areas.
Palouse R.	240	None	None
Tucannon	96	Middle & upper Tucannon R., Cummings & Panjab creeks	Much area of lower stream damaged by floods, dredging & diking in 1965
Clearwater R.	120	Perhaps small stretches used	About same

¹Source: Fulton (1968; 1970)

²Former spawning areas refer to those taken out of use before 1960.

Table B-6
SALMON AND STEELHEAD HABITAT LOST IN THE SNAKE RIVER
AND TRIBUTARIES AND REMAINING HABITAT
PRESENTLY AVAILABLE BY MAJOR DRAINAGE¹

Major Drainage	Miles of Lost Habitat	Miles of Habitat Presently Available
Mainstem Snake and minor tributaries	440	175
Tucannon	0	55
Clearwater	627	1,248
Grande Ronde	0	647
Salmon	88	1,834
Imnaha	0	223
Powder	200	0
Burnt	140	0
Weiser	256	0
Payette	470	0
Boise	520	0
Owyhee	485	0
Malheur	<u>205</u>	<u>0</u>
Total	3,557	4,182

¹ Pacific Fishery Management Council, 1979. This report applies to salmon, but it is probably generally applicable to steelhead also.