

## Effects of Coded-Wire Tagging on the Survival of Spring Chinook Salmon

H. Lee Blankenship, Daniel A. Thompson and Eric Volk

The Washington Department of Fish and Wildlife began conducting a study in 1989 with Bonneville Power Administration funds to determine if there was a combined effect on survival and/or growth from handling, anesthesia, adipose fin clipping and coded-wire tagging salmonids. Three hatcheries (Cowlitz, Carson and South Santiam) on the Columbia River were chosen as test sites. Three consecutive brood years (1989, 1990, and 1991) of spring chinook were chosen as the test species.

The entire production at each hatchery each brood year was otolith marked with thermal banding patterns. The otolith marks were applied so that straying adults from non-facility or wild fish could be separated from the returning control adults. Approximately 33% of each brood was coded-wire tagged and adipose marked using normal procedures. Control or untagged juveniles were put through a wet counter for precise enumeration.

Adult hatchery rack returns have been analyzed for all three brood years. No significant differences in growth was found between tagged and untagged adult returns. Tagged adults at Cowlitz hatchery returned at exactly the same ratio or slightly higher than they left the hatchery as juveniles (Table 1). The three broods of tagged adults at South Santiam hatchery returned at 3.3%, 6.3% and 4.0% lower rate than the un-handled controls but none of these were significant (Table 2). A significant difference was observed at Carson hatchery where there was 8.9% lower survival for the 1989 brood coded wire tagged fish (Table 3). At Carson, records show that the 1989 brood juveniles had a high level of *Renibacterium salmoninarum* (BKD) prior to tagging and infectious hematopoietic necrosis (IHN) broke out during the time of tagging. The latter two broods of tagged fish returned at a rate of 0.6% and 6.6% less than the un-handled fish but neither was significant.

Table 1. Numbers of coded wire tagged and non-coded wire tagged 1989-91 brood spring chinook returning to the Cowlitz hatchery.

<u>1989 Brood Totals</u>		<u>Age at Return</u>				
		<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>
Tagged	= 3,106	1,370	317	1,154	240	25
Un-tagged	= 6,338	2,633	711	2,564	409	21
Total Sampled	= 9,444	4,003	1,028	3,718	649	46
Coded wire tag return		= 32.9%				
Coded wire tag release		= 32.3%				

Coded wire tagged fish survived 1.9% higher than non-coded wire tagged.

<u>1990 Brood Totals</u>		<u>Age at Return</u>				
		<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>
Tagged	= 1,920	1,424	52	205	230	9
Un-tagged	= 4,010	3,061	86	476	376	11
Total Sampled	= 5,930	4,485	138	681	606	20
Coded wire tag return		= 32.4%				
Coded wire tag release		= 32.4%				

Coded wire tagged fish survived equal to non-coded wire tagged.

<u>1991 Brood Totals</u>		<u>Age at Return</u>			
		<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>
Tagged	= 531	102	25	297	107
Un-tagged	= 1,018	182	66	548	222
Total Sampled	= 1,549	284	91	845	329

Coded wire tag return = 34.3%

Coded wire tag release = 33.1%

Coded wire tagged fish survived 3.5% higher than non-coded wire tagged.

Table 2. Numbers of coded wire tagged and non-coded wire tagged 1989-91 brood spring chinook returning to the South Santiam Hatchery.

<u>1989 Brood Totals</u>		<u>Age at Return</u>		
		<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>
Tagged	= 628	394	228	6
Un-tagged	= 1,338	861	475	2
Total Sampled	= 1,966	1,255	703	8
Coded wire tag return		= 31.9%		
Coded wire tag release		= 33.0%		

Coded wire tagged fish survived 3.3% lower than non-coded wire tagged. \*

\*Adjustment made for otolith thermal mark reading errors

<u>1990 Brood Totals</u>		<u>Age at Return</u>			
		<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>
Tagged	= 631	22	293	309	7
Un-tagged	= 1,398	44	777	572	5
Total Sampled	= 2,029	66	1,070	881	12
Coded wire tag return		= 31.1%			
Coded wire tag release		= 33.2%			

Coded wire tagged fish survived 6.3% lower than non-coded wire tagged.

<u>1991 Brood Totals</u>		<u>Age at Return</u>		
		<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>
Tagged	= 574	1	249	324
Un-tagged	= 1,240	3	687	550
Total Sampled	= 1,814	4	936	874
Coded wire tag return		= 31.6%		
Coded wire tag release		= 32.9%		

Coded wire tagged fish survived 4.0% lower than non-coded wire tagged.

Table 3. Numbers of coded wire tagged and non-coded wire tagged 1989-91 brood spring chinook returning to the Carson National Fish Hatchery.

<u>1989 Brood Totals</u>		<u>Age at Return</u>	
		<u>4 Year</u>	<u>5 Year</u>
Tagged	= 499	424	75
Un-tagged	=1,703	1,459	244
Total Sampled	=2,202	1,883	319
Coded wire tag return		= 22.7%	
Coded wire tag release		= 24.9%	

Coded wire tagged fish survived 8.9% lower than non-coded wire tagged.

<u>1990 Brood Totals</u>		<u>Age at Return</u>	
		<u>4 Year</u>	<u>5 Year</u>
Tagged	= 194	161	33
Un-tagged	= 395	333	62
Total Sampled	= 589	494	95
Coded wire tag return		= 32.9%	
Coded wire tag release		= 32.7%	

Coded wire tagged fish survived 0.6% higher than non-coded wire tagged.

<u>1991 Brood Totals</u>		<u>Age at Return</u>	
		<u>4 Year</u>	<u>5 Year</u>
Tagged	= 125	101	24
Un-tagged	= 280	234	46
Total Sampled	= 405	335	70
Coded wire tag return		= 30.9%	
Coded wire tag release		= 33.1%	

Coded wire tagged fish survived 6.6% lower than non-coded wire tagged.