WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
ELECTRONIC CODED-WIRE TAG DETECTION EQUIPMENT STUDY
DURING THE 1996 PUGET SOUND RECREATIONAL FISHERY

INTRODUCTION

Mass marking hatchery coho by removing the adipose fin has been proposed as a tool to allow additional fishing opportunity while protecting wild coho stocks. To preserve the use of the coded-wire tag (CWT), however, it will be necessary to sample commercial, sport and tribal catches with electronic detection equipment. The Washington Department of Fish and Wildlife (WDFW) Puget Sound Sampling Staff tested electronic detection equipment to recover CWT fish snouts in the Puget Sound recreational fisheries during the fall of 1996. The project goal was to determine the reliability, feasibility and sampling effort necessary to sample Puget Sound recreational salmon fisheries, assuming that mass marking of hatchery coho will occur. The electronic detection equipment tested was a hand-held Wand. Three objectives were specified:

- Test the reliability of CWT detection in the Puget Sound recreational fisheries using an electronic CWT detector.
    - Estimate the proportion of tagged coho not detected by the electronic detection equipment.
    - Estimate the proportion of coho where tags were detected but no tag was present.
- Test the feasibility of using a electronic Wand detector in various field sampling situations.
- Estimate the amount of sampling effort increase, if any, that will occur when using the equipment.

The Puget Sound recreational fisheries in September and October were assumed to provide adequate coho samples for the study. The sampling design criteria was for 60 coho samples for each site ($\propto$.99, $\pm$10%). It was also assumed that if the Wand tested positively at busy, more complex sites, then the equipment could be used at slower, less complex sites. Sites were chosen with these two assumptions in mind. However, for the 1996 season, coho returns were depressed, and the 60 coho samples per site were not achieved. The total number of salmon sampled during the entire study was 310 including 189 coho for all sites. Only one site (Ediz Hook in Port Angeles) achieved the sampling size designated for the test.

METHODS

One temporary position was added to sample during the September through October Puget Sound sport fishery. A total of 17 days were sampled with some sampling occurring each week

except for one week in October. Two individuals per day worked together in sampling individual locations.

The Point Defiance ramp, Point Defiance boathouse and Narrows Marina were initially designated to be tested since there were coho expected to return to the Puyallup River that were tagged but not adipose clipped.[1] Other sampling locations were as follows: Zittles ramp - Olympia, Armeni ramp - Seattle, Shilshole ramp - Seattle, Norton St. ramp - Everett, Glenn St. ramp - Bellingham, Cornet Bay ramp - Deception Pass area, and Ediz Hook ramp - Port Angeles. All of these sites were selected based on complexities of sampling and high use by anglers. See Figure 1.

Samplers were told to use the Wand for 1 hour and then visually sample for 1 hour. The timer would then switch with the sampler every 2 hours until the end of the sampling period. One sampler interviewed an angler asking information on a standard recreational data form (Figure 2). As soon as the interview began, the other sampler would start the timer. If an angler began asking questions, the timer would stop and began again only when the other sampler could begin asking questions to fill in the data form. During the interview period, the sampler performing the interview would examine all the fish caught. Timing ended when the interview and examination of fish were completed. When there were coho, the sampler would either use the electronic detector or visually inspect each individual fish. The timer would record whether a fish was adipose clipped and whether the Wand detected a tag (beeped). The sampler also recorded how they accessed the fish. Eight categories were listed: 1) On a float; 2) In a boat tied to a float; 3) In a boat not at a float; 4) On a trailer; 5) In a boat on a trailer; 6) Walking up to an angler carrying a fish; 7) In or outside a boat on a dolley (elevator), and 8) Other. The number of fish observed for each interview, and whether the sampler was visually sampling or using the Wand was also recorded. Snouts were removed from all adipose-clipped coho for examination at the WDFW CWT Lab.

The procedure for Wand use consisted of lifting the fish off of any metal surface, running the end of the wand first down the front of the snout, then up and down over the eye area, up and down over the middle area again, and then up and down over the other eye area. Samplers were instructed not to continue using the Wand on the fish if there was no response (beep) after completing the above procedure. Training occurred before testing began to familiarize samplers with the equipment and sampling procedures.

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[1]Further discussion concerning marked and unmarked coho returning to the Puyallup River may be found in Electronic Coded-Wire Tag Detection Equipment Study During the 1996 Treaty Coho Fishery, WDFW 1996.

Figure 1. Puget Sound CWT Electronic Equipment Study Areas.

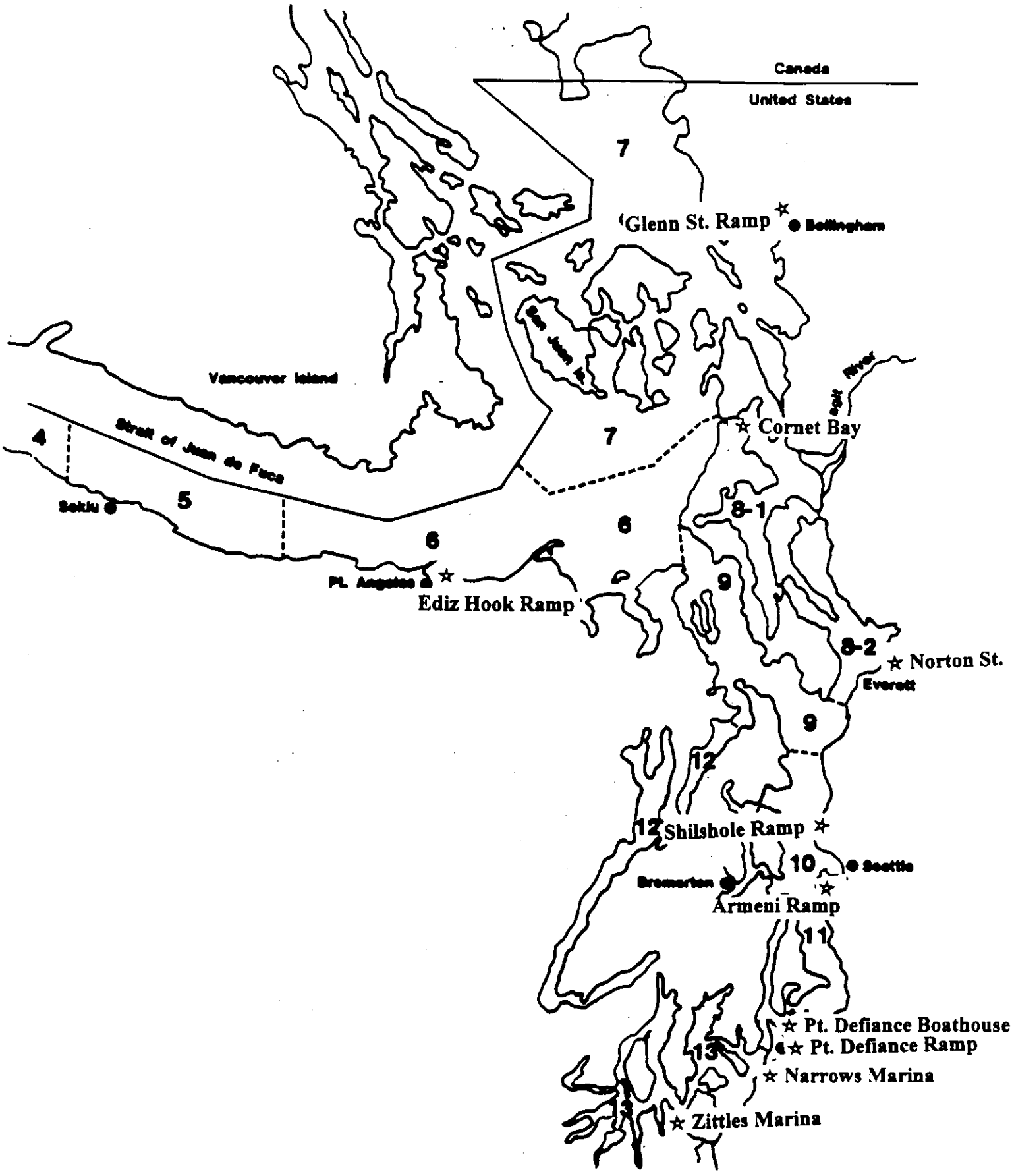

Figure 2.

PUGET SOUND RECREATIONAL FISHERY SAMPLING FORM

Week No._____ (1,2) Sampling Location_____ Sampler Name_____

Date:____/____/____ (3-8) Location Code_____ (9-12) Sampler Number_____ (52,53)
Mo. Day Year

Total Hours Sampled_____ (54-56) Start Time _____ (57-60) End Time_____ (61-64) Page ___of___

PC Area (13-14)	Fishing Method (15)	Interview No. (16-23)	Number Anglers (24-25)	Time Trip Start (34-37)	Time Trip End (38-41)	Target Species (42)	Chinook Caught (43-44)	Coho Caught (45-46)	Other Species (47-49)	Number Caught (50-51)	Salmon Release Information		As Needed
											Species Code (65)	# Released (66-67)	(69-75)

CPRATT:PSRFS2.CD APRIL 23, 1996

RESULTS

Test results have been broken down by Reliability, Feasibility, and Sampling Effort. In order to analyze the data according to the three criteria previously described, samplers were required to write out each day's observations. They were to note what worked well, what did not work well, problems, and anything unusual. These observations are included in the section on Feasibility.

Table 1 shows the number of interviews and salmon encountered for each area. Samplers conducted a total of 401 interviews of which 160 caught salmon. Coho, chinook and chum salmon were observed but, while all salmon were visually sampled, the Wand was only used on the coho. A total of 310 salmon were sampled and 189 of these were coho. Eighteen adipose-clipped coho were observed. These were taken to the WDFW CWT Lab for analysis. The majority of the coho (144) were sampled at the Ediz Hook boat ramp. Thirteen of the 144 coho sampled at Ediz Hook were adipose clipped. For two sampling days (9/16/96 and 9/19/96) at Ediz Hook Ramp samplers conducted interviews. They encountered 5 boats with no fish caught and 51 boats with salmon.

Table 2 lists the number of interviews and tests performed visually and with the Wand. While each area varied concerning number of coho sampled either with the Wand or visually, overall samples by both methods were similar, 101 sampled visually versus 88 sampled with the Wand.

Reliability Test

Table 3 shows the CWTs detected visually and with the Wand. The number of fish sampled was insufficient to adequately test reliability. However, of the 8 adipose-clipped, tagged coho sampled with the Wand, all were detected (beeped). Of 79 non-adipose-clipped coho sampled with the Wand, only 2 tags were detected (beeped). After closer examination, these 2 fish had hooks still in their mouths. When the hooks were removed (a consistent procedure with all sport sampling), the fish snouts did not beep. Including all coho sampled with the Wand, two of 88 fish (2.3%) were false positives (beeped but no CWT present). There was one coho that was adipose clipped but did not beep with the Wand. After examination by the CWT Lab, it was determined that this fish did not have a tag. Visual sampling resulted in 2 of 8 adipose-clipped coho that were not tagged (false positives).

Feasibility Test

While there were few interviews for each location to better evaluate the feasibility of the Wand, the following comments were mentioned in the sampler's field notes. Samplers felt that the Wand was balanced too far toward the end of the rod. This made it feel heavier than it's actual weight and difficult to use in a repetitive situation. This forced some samplers to hold the Wand in the middle of the rod section and not with the grip. In situations where fish will be encountered in large numbers (i.e., Straits, Everett area), there could be arm or wrist strain.

The handle was too large for smaller-sized hands, preventing some of the smaller samplers from getting a solid grip on the Wand. Samplers had retractable chains to prevent the Wand

Table 1. Sport sampling locations where interviews were conducted for CWT testing with a Wand electronic detector.

LOCATION	TOTAL INVERVIEWS	INTERVIEWS WITH SALMON	TOTAL SALMON	TOTAL COHO	NON-ADIPOSE CLIPPED COHO	ADIPOSE-CLIPPED COHO
SOUTH						
Narrows Marina-Tacoma	14	8	13	12	12	0
Pt. Defiance Boathouse-Tacoma	33	14	14	7	7	0
Pt. Defiance Ramp-Tacoma	94	23	35	18	15	3
Zittle's Marina-Olympia	12	1	1	1	1	0
CENTRAL						
Armeni Ramp-Seattle	67	19	32	3	2	1
Shilshole Ramp-Seattle	58	28	41	4	4	0
Norton St.-Everett	58	14	23	0	0	0
NORTH						
Glenn St. Ramp-Bellingham	8	2	5	0	0	0
Cornet Bay-Deception Pass	1	0	0	0	0	0
PENINSULA						
Ediz Hook Ramp-Port Angeles	56	51	146	144	132	13
TOTAL	401	160	310	189	172	17

Table 2. Total interviews and coho sampled visually and with the Wand electronic detector.

LOCATION	NUMBER OF INTERVIEWS	COHO VISUALLY SAMPLED	NUMBER OF INTERVIEWS	COHO SAMPLED WITH WAND
Narrows Marina-Tacoma	9	9	5	3
Pt. Defiance Boathouse-Tacoma	22	4	11	3
Pt. Defiance Ramp-Tacoma	45	11	49	7
Zittles Marina-Olympia	6	0	6	1
Armeni Ramp-Seattle	38	1	29	2
Shilshole Ramp-Seattle	25	3	33	1
Norton St.-Everett	31	0	27	0
Glenn St. Ramp-Bellingham	3	0	5	0
Cornet Bay-Deception Pass	1	0	0	0
Ediz Hook Ramp-Port Angeles	29	73	26	71
TOTAL	210	101	191	88

Table 3. Detection of coded-wire tags using the Wand and visually as determined by the WDFW CWT Lab.

TYPE OF SAMPLING	TOTAL COHO	ADIPOSE-CLIPPED					NON-ADIPOSE-CLIPPED COHO				
		TOTAL COHO	DID NOT DETECT		DETECTED		TOTAL COHO	DID NOT DETECT		DETECTED	
			TAG	NO TAG	TAG	NO TAG		TAG	NO TAG	TAG	NO TAG
WAND	88	9	0	1	8	0	79	0	0	0	2 HOOKS
VISUAL	101	8	0	0	6	2	93	0	0	0	0
TOTAL	189	17	0	1	14	2	172	0	0	0	2

from being dropped in the water and sinking. However, these retractable chains could not be used in some situations. The chains were too short for taller personnel.

The Wand was equipped with a holster but shorter personnel found it difficult to use when kneeling due to the length of the Wand. An easily removable belt should be provided for use with the holster. Samplers were concerned about dropping the Wand in the water and not being able to retrieve it.

The Wand was sensitive to metal around the small sampling area. It reacted to metal tackle boxes. On rainy days, concern for metal snaps on rain gear was expressed. Noise from running motors on boats made it difficult to hear the beep on the Wand.

Some situations are more difficult to sport sample than others. Samplers are sometimes required to sample not only on floats, in parking areas or beaches. They sample inside boats, climb onto trailers, climb from a trailer into a boat, sample in boats on dolleys (at boat lifts), and may have to wade into the water. In general, samplers felt that getting to the fish and sampling them with the Wand required more effort and time. Particularly, they had to get in boats more often than visual sampling to access the fish. The samplers were concerned about causing damage to fishing rods or other property owned by the boaters and they expressed some concern for injuries if they slipped or fell.

Since delays occurred while using the Wand, some boats needed to be sampled at tie-down areas. This area and where clipped salmon are processed may be some distance apart, causing additional sampling delays.

Sampling Effort

The tests to estimate total time to sample with and without the Wand electronic detector were based on individual interviews including examining salmon visually or with the Wand (minus processing of salmon snouts). However, other fish needed to be sampled along with coho. This may have influenced the time that it would take to sample, and partially masked actual sampling time with the Wand. In addition, including the entire interview likely introduced too much variability in the testing of time differences between using the Wand or sampling visually. A summary of the timed tests was not included in this report because of these potential biases.

Samplers started to miss boats (potential interviews) during busy periods. This is a concern since samplers try to interview 100 percent of the boats in a sampling period. While this is not required for baseline sampling, it has been required for any Special Area Fisheries (SAF) and emphasis sampling (i.e., Area 5). While only one area was busy enough to show that boats were missed (Ediz Hook), other areas can be very busy during the coho season. This was not the case in 1996 due to the lower than average abundance of coho. Ediz Hook samplers noted that within a 4-hour period, at least 4 boats were missed. Fifty-five boats were interviewed. During more normal coho years, samplers may interview up to 200 boats a day near the peak of the fishery.

All samplers stated that they believed time increased due to the way sampling needed to be performed when using the Wand, that is, needing to actually handle coho rather than visually look for the presence of an adipose fin.

CONCLUSION AND RECOMMENDATIONS

There were insufficient numbers of adipose-clipped coho to thoroughly evaluate the reliability of the Wand, but test results were consistent with those from the Puget Sound net fishery sampling (Flint and Pratt, 1997). These tests demonstrated that the Wand was very effective in detecting CWTs. All tags dissected by the WDFW CWT Lab were detected with the Wand (no false negatives). The one adipose-clipped coho that was not detected with the Wand (did not beep) turned out to be a No Tag (tag not found in the snout). Few false positives (beeped but no CWT present) were recorded with the Wand. The encounter rate of false positives was 2.3% (2 of 88 sampled) with the Wand and both of these were due to fish hooks. Visual sampling of adipose-clipped coho resulted in 2 No Tags (false positives) for 8 fish sampled.

There were some problems noted while using the Wand. Its weighted balance and grip could be modified to make it easier to use. It would help to have a floatation cap attached to the end, to prevent a loss of the equipment into the water. A belt and adjustable chain would help, as well.

The Wand did require additional sampling in more complicated situations, i.e. boats/trailers, both in the water and at the tie-down area. As samplers become more familiar with using the Wand and adapt their procedures accordingly, increases in sampling time may be reduced. However, an additional study should be performed concerning how many boats will be missed when using the Wand. This would help define the effect on the accuracy of the sport catch estimates and/or the number of additional staff needed over visual sampling.