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NOTES ON FISH TAG COMPARISON EXPERIMENT

by

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Fish used in the experiment were tagged during the period extending from March 26 to March 28, 1941. Fish tagged were chiefly yearling brook trout, with a few rainbows (the only fish readily available). In addition to standard and total lengths, alternate fish were weighed so that their condition might be compared later in the experiment, if this seemed desirable.

New type circular jaw tags were applied with the special applicator designed for them. The narrow, light weight size 10 x tags were applied with this same plier. Strap tags used as jaw tags were applied in the usual manner, with a long-nosed jewelers plier. Gill cover tags were applied with the regular strap tag plier supplied by the National Band and Tag Company. The penetrating pins of the U. S. B. F. button tags were sharpened on emery cloth before application to facilitate penetration.

Some of the fish of the same group from which the tagged fish were taken were affected slightly with fungus and fin rot. No fish which could be recognized as being so affected were used in the experiment.

On April 21, Mr. Roy Johnston observed a great blue heron carrying off one of the tagged fish. The pool was covered with wire netting later the same day. Throughout the spring and summer, the fish were kept in

a rearing pool in Sargent's Creek, near the Ontonagon Trout Station.

On April 10, a number of large adult trout were tagged with the new type jaw tags, narrow type jaw tags, and button tags to determine the reaction of the larger fish to the various types of tags.

In the case of the button tags, it was first observed on April 27 that algae were collecting behind the discs, obscuring them somewhat. The trout themselves seemed to suffer no ill effects.

On May 15, at the suggestion of Dr. A. S. Hazzard, Director of the Institute for Fisheries Research, a group of 50 trout were added to the pool containing the tagged trout, to act as controls. Measurements of these trout are shown in Table I. The fish were unmarked.

Table I.
 Untagged Trout Used As Controls For
 Tag Comparison Experiment
 May 15, 1941

Standard length	Total length	Species
220	250	
233	272	
222	260	
217	251	
233	272	
181	215	
195	225	
158	185	
153	176	
203	233	
203	236	
187	220	Rainbow
176	215	Rainbow
176	206	
152	183	
155	188	Rainbow
144	179	
211	240	
172	202	
249	283	
224	261	
243	280	
257	286	
267	294	Rainbow
252	279	
270	295	
149	176	
146	167	
165	192	
206	236	
222	255	
212	246	
237	270	
214	245	
208	240	
206	237	
205	234	
162	192	
234	270	
136	174	
215	250	
190	224	Brown
212	247	
146	171	
149	175	
155	183	
152	176	
196	225	
238	276	
203	237	

On May 25 it became suddenly necessary to move the tagged fish to an adjacent pool due to an urgent need for a greater flow of water through the ponds in which the hatchery display fish are kept. In moving the fish, the opportunity was taken to obtain total lengths of the tagged fish and to observe the condition of the tags. The results are shown with later results, in Table V. In the table, a letter is given to indicate the condition of the fish at the point of application of the tag. A key for the symbols used follows:

- E - excellent, no red mark at all at point of insertion of the tag.
- G - good, very slight redness or irritation.
- N - normal, expected amount of redness and irritation at point of application of the tag.
- F - fair, greater than average irritation.
- P - poor, extensive irritation or deformity as the result of tagging.
- L - loose - (gill cover tags), tags about to fall out, or quite loose, forming large hole in gill cover.

The record for the various tags by May 25 is shown in Table II.

Table II
Comparison of Tags on May 25

Tag Type	No. fish tagged	Mortality							
		to Date	No Record	E	G	N	F	P	L
8 x new type tags	61	2	4	32	18	4	...	1	...
10 x new type tags	50	2	5	14	20	7	2	...	...
Strap jaw tag	39	0	3	7	16	11	2	...	...
Narrow circular tag	50	1	5	12	15	14	3	...	...
Gill cover tag	49	0	11	0	3	20	8	7	31
Button type	15	0	4	1	2	0	4	4	...
Upper jaw 8 x	10	1	8	...	1	...	...	...	...
Upper jaw narrow circular	10	0	8	...	...	1	...	...	...

"No record" resulted from loss of tags, escape of fish from the pond, removal by great blue herons, or failure to pick up and obtain the tags from the dead fish. The last named was minimal or absent, since the caretaker picked up all dead fish each day as he fed the trout and cleaned the screens. Nine fish were found from whose gill covers the strap tags had already pulled out.

The gill cover area was in various stages of healing in the various specimens. Eight trout were found with sore upper jaws where upper jaw tags had apparently been lost. Six of the button tags were either tearing out or one of the disks was cutting sidewise into the flesh.

The fish were again measured and rated as to the condition of the tag insertions on October 13, when they were moved to Cook's Run rearing station for the winter. A compilation of the results is shown in Table III.

Table III
Comparison of Tagged Fish on October 13.

Tag Type	No. Tagged	Mortality	No record	E	G	N	F	P	L
8 x jaw tag	61	14	10	6	10	19	1	1	...
10 x jaw tag	50	23	10	0	3	13	1	...	...
Strap jaw	39	15	7	5	5	7	...	...	...
Narrow circular jaw	50	16	15	3	3	11	2	...	...
Gill cover	49	18	25	...	1	1	3	1	2
Button	15	4	6	1	1	2	1	...	...
Upper jaw 8 x	10	1	9	...	...	...	...	...	...
Upper jaw light circular	10	0	9	...	...	...	1	...	...
LARGE ADULT TROUT									
10 x jaw	18	9	4	2	...	3	...	...	...
Narrow circular	10	2	4	1	...	3	...	...	...
Button	9	6	2	...	...	...	1	...	...

One hundred eighty-three fish were found in the pond without tags. These consisted of trout which had entered from the pools above the experimental pool during high water, fish which had lost their tags, and the controls previously set up. Since they could not be distinguished, a new set of 50 controls was measured, and the posterior extension of the right pre-maxillary clipped off so that they may be recognized in the future. The new group of controls is indicated in Table IV.

Table IV
 Controls for Trout Tagging Experiment,
 Set Up October 13, 1941

Standard length	Total length	Species
230	264	
268	310	
277	318	
231	267	
230	267	
275	319	
305	351	
271	313	
289	332	
223	263	
302	346	
231	269	
291	335	
230	267	
240	282	
284	325	
275	317	
287	330	
286	322	
247	288	
226	262	
276	323	
252	296	
292	339	
265	303	
278	325	
240	276	
270	316	
237	276	
275	317	
304	348	
318	370	
291	335	
238	277	
262	310	Rainbow
280	323	
288	331	
282	326	Rainbow
228	262	
241	283	Rainbow
262	301	
285	328	Rainbow
225	261	
225	256	
303	345	
260	296	Rainbow
273	322	
301	349	
212	247	
308	352	

Three unmarked fish became accidentally mixed with the tagged fish and their controls:-

247	287	Brook
265	303	Rainbow
218	252	Brook

One hundred thirteen tagged fish and 50 controls remain in the experiment, and have been transferred to Cook's Run Rearing Station. The observations have been somewhat cluttered up by the intercommunication of trout among pools during high water, excessive mortality among all tagged groups, excessive numbers of "no record" cases for reasons previously mentioned, which reasons cannot be separated and ascribed to the individual fish concerned, etc.

Table V indicates the substance of the experiment as it has progressed up to October 13. No conclusions are here attempted until the experiment has been completed.

INSTITUTE FOR FISHERIES RESEARCH

By Paul Eschmeyer

Report approved by A. S. Hazzard

Report typed by: R. Bauch

COMPILATION OF RESULTS UP TO OCTOBER 13, 1941

Size 8 x, new type round jaw tags.

TABLE V

dead fish

no record

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
1 x	155	172	54.7	185	E	84 days			
2 x	153	175	58.2	194	E	...	221	256	G
3 x	172	192	...	204	N	84 days			
4 x	147	166	...	181	E	...	219	254	N
5 x	177	200	87.4	212	G	...	237	275	E
6 x	150	170	...	181	E	...	222	259	G
7 x	162	183	63.9	201	E	99 days			
8 x	197	223	...	239	E	...	285	330	N
10 x	165	185	77.0	202	G	...	234	266	N
11 x	157	178	...	192	E	...	222	252	G
12 x	138	158	43.1	167	G	...	200	228	E
13 x	165	188	...	203	G	...	238	276	N
14 x	141	160	49.6	172	G	152 days			
15 x	146	166	...	176	P	63 days			
16 x	159	177	60.5	187	E	...	227	262	G
17 x	141	160	...	172	E	...	212	245	E
18 x	163	187	61.5	200	E	...	250	290	N
19 x	141	162	...	...	...	40 days			
20 x	155	177	59.4	190	E	...	225	260	E
21 x	143	168	...	175	E	...	224	258	N
22 x	149	173	49.0	...	...	40 days			
23 x	164	184	...	191	G	...			
24 x	146	164	45.6	182	G	...	220	253	N
25 x	146	165	...	183	G	...			
26 x	143	159	41.4	169	E	...			
27 x	167	188	...	203	E	...	245	281	E
28 x	150	164	52.0	181	E	152 days			
29 x	143	164	...	...	...	...
30 x	134	157	36.2	160	G	...	198	230	N
31 x	147	164	...	180	G	...	187	217	N
32 x	151	174	55.8	189	E	152 days			
33 x	139	158	...	173	E	...	205	235	N
34 x	138	158	47.1	174	G	...	227	264	N
35 x	119	141	...	...	...	...

(continued)

Size 8 x, new type round jaw tags
(continued)

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Condition
36 x	152	175	48.6	186	G	...	226	263	N
37 x	163	184	65.4	201	N	71 days			
38 x	157	173	...	190	G	152 days			
39 x	167	188	...	203	E	...	240	277	N
40 x	220	248	156.7	262	G	...	284	326	N
41 x	185	213	...	228	E	...	232	272	G
42 x	155	178	56.4	192	G				
43 x	151	174	...	193	E	...	228	268	N
44 x	138	153	44.0	171	E	...	218	249	G
45 x	207	235	144.6			...	246	286	E
46 x	213	265	...	277	N				
47 x	143	164	...	178	E	...	217	252	G
48 x	133	154	38.0	171	E	84 days			
49 x	145	165	...	175	E	...	217	251	N
50 x	133	152	39.1	165	E	...	190	217	N
51 x	159	173	...	205	E	...	218	251	F
52 x	167	198	73.3	213	E	...	241	278	P
53 x	145	165	...	181	G	...	223	254	N
54 x	143	165	48.6	185	E	...	228	256	G
55 x	137	160	...	175	G	...	208	240	N
56 x	151	173	51.9	185	N				
57 x	158	180	...	193	E	...	302	367	G
58 x	134	157	42.1						
59 x	...	...	...	173	G	...	210	247	G
60 x	143	166	...	181	E				
61 x	135	156	44.2	163	E	84 days			
62 x	147	166	...	186	E	84 days			

TABLE V
(continued)
Size 10 x, new type round jaw tag

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
126 x	234	264	214.5	283	E	...	322	364	G
127 x	177	204	...	220	G				
128 x	170	194	78.4	210	E	99 days			
129 x	180	203	...	221	G	91 days			
130 x	206	237	134.4	251	G	...	273	304	N
131 x	216	247	...	254	G	99 days			
132 x	218	253	187.9	263	G	84 days			
133 x	?	?	...	237	E	...	268	307	N
134 x	144	164	64.1	...	...	...	205	239	N
135 x	240	272	...	280	N	84 days			
136 x	203	232	130.4	245	N				
137 x	208	237	...	250	E	...	261	297	N
138 x	220	250	152.8	258	G	...	298	319	N
139 x	209	237	...	245	G	91 days			
140 x	190	219	99.1	227	N	71 days			
141 x	226	255	...	265	E	...	300	342	N
142 x	208	235	150.5	248	N	71 days			
143 x	217	242	...	256	E	71 days			
R) 144 x	175	202	83.1						
145 x	205	231	...	241	N	71 days			
146 x	182	211	...	215	E	99 days			
147 x	235	268	188.9	282	G	71 days			
148 x	198	227	123.6	240	G	152 days			
149 x	214	244	...	255	E	99 days			
150 x	238	269	200.0	...	...	55 days			
151 x	214	245	...	260	G				
152 x	176	203	77.6	215	G	...	271	312	N
153 x	201	227	...	243	G	84 days			
154 x	212	240	159.6	247	F	...	253	290	N
155 x	202	230	...	242	G	...	263	305	N
156 x	198	204	123.9	240	E	...	268	306	N
157 x	203	227	...	245	G	152 days			
158 x	220	247	169.2	260	G	...	277	313	G
159 x	218	247	...	250	E				
160 x	191	217	109.9	229	E	...	255	287	N

(continued)

Size 10 x, new type round jaw tag
(continued)

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
161 x	229	260	...	...	...	
162 x	219	243	160.6	250	N				
163 x	205	234	...	...	...	
164 x	207	233	151.1	245	E	...	266	304	N
165 x	208	241	...	252	E	152 days			
166 x	219	227	122.7	...	...	58 days			
167 x	182	208	...	219	G	91 days			
168 x	217	257	184.5	273	N	71 days			
169 x	203	231	...	242	G				
170 x	212	240	139.4	255	G	...	269	313	G
171 x	202	229	...	...	...	40 days			
172 x	203	233	124.2	245	E	84 days			
173 x	198	224	...	237	G	...	270	306	N
174 x	183	209	91.7	221	G	71 days			
175 x	231	263	...	278	F	...	295	343	F

TABLE V
(continued)
Strap Tag Used as Jaw Tag - Michigan Method

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
15509	172	200	85.7	218	N	71 days			
15510	213	242	...	252	G				
15511	171	197	76.9	...	...	91 days			
15512	173	197	...	212	N	71 days			
15513	200	230	135.5	243	G	...	275	310	E
15514	194	223	...	231	N	...	274	311	N
15515	227	259	186.7	270	G	...	282	324	E
15516	181	206	...	224	F	...	241	277	G
15517	196	227	128.4	243	N	...	257	293	G
15518	224	254	...	266	N	71 days			
R) 15519	168	194	76.7	218	N	...	273	315	N
15520	177	202	...	207	G	99 days			
15521	162	185	72.0	194	F	63 days			
15522	167	192	...	200	G				
15523	122	143	...	260	E	83 days			
15524	174	196	79.5	210	G	99 days			
15525	543	565	...	...	...	84 days			
15527	198	226	132.3	238	E				
15528	135	157	...	171	E	99 days			
15529	162	188	70.2	200	G	...	237	277	E
15530	140	163	...	184	G	...	248	291	N
15531	212	241	152.5	250	E	...	256	293	N
15532	187	212	...	227	G	91 days			
15533	197	227	133.2	238	G				
15534	195	223	...	240	E				
R) 15535	216	251	148.1	261	E	...	320	367	G
15536	224	255	...	265	N	...	287	333	N
15537	227	260	185.6	...	...		
15538	174	203	...	220	G	...	226	260	E
15540	148	172	48.7	187	G	...	223	256	N
15541	223	257	...	267	G	...	288	330	E
15542	197	207	121.8	237	N	71 days			

(continued)

Strap Tag Used as Jaw Tag - Michigan Method
(continued)

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
15543	231	260	...	276	N	71 days			
R)15545	188	221	98.1	234	N	...	285	333	N
15546	198	207	...						
15547	172	196	96.2	215	G	...	260	299	G
15548	186	212	...	225	E	...	253	297	G
15549	182	210	99.6	220	N	84 days			
15550	160	182	...	193	G	71 days			

TABLE V
(continued)
Narrow Type (strap tag size) Circular Jaw Tag

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
6	174	200	...	213	N	...	247	285	N
8	235	265	195.7	273	F	...	291	332	N
10	155	177	...	193	G	...	...	...	...
11	166	188	69.0	201	N	...	229	264	N
12	235	266	...	279	N	99 days	...	...	...
13	222	250	199.0	263	E	...	297	343	...
R) 14	232	266	185.0	...	...	...	...	...	...
15	216	250	...	268	G	...	295	340	N
16	222	258	176.8	272	N	...	292	335	N
17	208	238	...	...	...	...	...	...	...
18	189	215	98.1	...	...	84 days	...	...	...
19	206	236	...	250	E	...	287	326	N
20	225	255	173.4	265	N	...	...	...	...
21	199	223	...	238	F	71 days	...	...	...
22	218	250	175.3	263	N	...	277	322	G
R) 23	157	180	160.1	193	E	...	...	...	...
24	222	256	...	265	G	...	...	...	...
R) 25	141	161	51.2	181	E	...	220	257	F
26	123	132	...	144	N	71 days	...	...	...
27	216	250	175.1	262	E	...	...	...	...
28	190	220	...	235	N	71 days	...	...	...
29	218	252	174.7	(266 270)	G N	...	...	...	...
30	203	230	...	245	G	...	...	...	...
31	202	234	129.0	245	N	...	...	...	...
32	228	256	...	267	N	152 days	...	...	...
33	228	258	202.4	271	N	...	322	362	F
34	213	243	...	257	N	71 days	...	...	...
35	207	230	142.4	245	G	...	256	292	G
36	207	236	...	251	G	...	283	320	E
R) 37	161	188	62.4	198	F	...	260	304	N
38	206	235	...	245	G	99 days	...	...	...
39	176	205	182.1	215	N	...	...	...	...
R) 40	155	179	61.6	198	G	...	267	308	N

(continued)

Narrow Type (strap tag size) Circular Jaw Tag
(continued)

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
41	206	237	...	250	E				
42	184	208	199.8	...	...	...	244	282	N
43	185	208	...	222	G	...	247	286	G
44	238	272	209.6	287	E				
45	210	239	...	256	G	152 days			
46	205	230	122.6	242	G	...	262	304	N
47	175	202	...	215	E	99 days			
48	193	218	125.2	...	...	5 days			
?	222	255	...						
49	205	233	140.5	243	E	...	261	302	E
50	190	215	...	235	E	99 days			
R) 51	171	199	80.6	215	G	71 days			
52	211	240	...	258	G	...	278	318	N
53	175	201	91.2	221	G	152 days			
54	185	213	...	222	E	99 days			
55	210	241	153.1	252	G	...	273	312	E
56	175	203	...	222	E	99 days			

TABLE V
(continued)
Strap Tag on Gill Cover - Ohio Method

Tag No.	March 26, 1941		Weight	May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length		Total length	Condition		Standard length	Total length	Condition
14978	170	198	82.1	210	N;L				
14979	166	188	...	196	P	71 days			
14980	157	179	60.7	184	P				
14981	153	177	...						
14982	141	164	50.2						
14983	158	182	...	191	P				
14984	148	166	54.9	182	N;L	84 days			
14985	197	222	...	237	N;L	...	258	300 F	
14986	170	199	83.3						
14987	157	182	...	190	G;L	99 days			
14988	165	189	68.4	198	F;L				
14989	162	184	...	196	F;L				
14990	160	183	75.8	200	N;L				
14991	182	208	...	218	N;L	198 days			
14992	150	170	59.0						
14993	167	192	...	203	P;L	...	230	272 G	
14994	163	184	66.4	190	P	61 days			
14995	166	192	...	170	F;L	71 days			
14996	160	182	58.3	191	P	99 days			
14997	156	176	...	195	N;L				
14998	173	194	81.0	208	N;L	71 days			
14999	152	176	...						
15000	168	188	63.0	208	F;L	99 days			
15451	170	195	...	207	N;L				
15402	183	203	81.0	212	N;L				
15403	162	187	...	192	N;L	71 days			
15404	194	220	111.7						
15405	163	184	...						
15409	155	177	61.7	181	P	71 days			
15413	160	182	...			Lost tag found in 61 days			
15414	156	178	57.1						
15415	160	177	...	190	N;L	84 days			
15416	206	232	130.0	240	N;L	...	253	291 P	
15417	157	178	...	192	F;L	71 days			
15418	217	240	160.0	255	G;L	...	271	307 F	

(continued)

Strap Tag on Gill Cover - Ohio Method
(continued)

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Con- dition
15419	167	188	...	204	N;L				
15420	162	187	63.4	199	N;L	99 days			
15421	175	200	...	215	N;L	84 days			
15422	152	173	61.6	Lost tag found in 61 days					
15432	163	180	63.1	192	F;L	71 days			
15434	152	172	...	180	N;L				
15435	151	169	49.0	181	F;L	71 days			
15502	200	227	138.6	Lost tag found in 61 days					
15503	208	242	...	253	N;L				
15504	194	223	108.8	234	F;L	71 days			
R)15505	193	225	...	245	N;L				
15506	196	228	133.0	245	N;L				
15507	252	285	...	296	G	...	318	358	N
15508	199	232	134.3	245	N;L	...	262	298	F

TABLE V
(continued)
8 x Tags on the Upper Jaw

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Condition
63 x	190	216	...	Tag lost in 1 day					
64 x	203	232	124.4	...	...	1 day			
65 x	212	239	...	...	...	61 days			
66 x	209	238	...	Tag lost in 61 days					
67 x	213	243	165.3	255	G				
68 x	208	236	141.9	...	...	1 day			
69 x	188	213	...						
70 x	199	227	129.9						
71 x	221	252	...						
72 x	203	232	129.8						

TABLE V
(continued)
Light (strap size) Circular Tag on Upper Jaw

Tag No.	March 26, 1941			May 25		Death occurred in:	October 13, 1941		
	Standard length	Total length	Weight	Total length	Condition		Standard length	Total length	Condition
57	174	201	79.9						
58	210	241	...						
59	180	209	92.3						
60	178	205	...						
61	198	222	129.1	233	P	...	263	300	F
62	188	215	103.0	225	N				
63	171	196	...	...	...	1 day			
64	213	244	...	...	...	1 day			
65	211	242	144.1	...	...	1 day			
66	149	172	...						

TABLE V
(continued)
Fish and Wildlife Service Button Tags

Tag No.	March 26, 1941		May 25		Death occurred in:	October 13, 1941			
	Standard length	Total length	Total length	Condition		Standard length	Total length	Condition	
L8076	228	258	194.2	271	G				
L8079	220	249	168.9	265	F	...	300	340	N
L8080	200	229	108.1	233	F	...	275	311	F
R)L8081	160	186	65.1	...	...	...	190	231	E
L8082	241	277	238.4	288	P				
L8083	237	270	219.2	280	F	152 days			
L8084	221	253	178.7	260	E	99 days			
L8085	246	279	258.3	290	P				
R)L8086	248	283	225.4	300	G	...	354	415	N
L8087	266	301	285.5	Tag lost within 65 days (152 days)					
L8088	230	262	207.5	278	P	84 days			
L8089	198	228	123.9						
L8090	216	246	163.2	260	F	...	281	318	G
Double blank	202	229	127.6						
L8078	...	...	...	258	P				

TABLE V
(continued)
Number 10 x new type jaw tags
Large Trout, 11 - 15 inches long
April 10

Tag Number	Standard length	Total length	Condition	Death Occurred In:
180 x				
181 x	350	398	N	...
182 x				
183 x				69 days
184 x	320	361	E	...
185 x				84 days
186 x	302	340	N	(October 13 - dying)
187 x				69 days
188 x				
189 x				56 days
190 x				
191 x				84 days
192 x	302	349	E	...
193 x	342	398	N	...
194 x				25 days
195 x				137 days
196 x				84 days
197 x				84 days

Narrow type circular jaw tags

67	320	365	N	...
68				
69	298	337	N	...
70				84 days
71				
72	349	399	E	...
73				
74				
75				76 days
76	297	339	N (Tag lost in 188 days)	

U S B F button tags

48091				137 days
48092	330	375	F	...
48093				49 days
48094				137 days
48095				
48096				137 days
48097				
48098				84 days
48100				58 days