



United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Dear Interested Party:

In 2004, the U.S. Fish and Wildlife Service initiated a study to evaluate experimental releases of adult hatchery steelhead into the Keswick Reservoir. This project was intended to investigate potential fishery benefits of outplanting excess adult hatchery-origin steelhead returning to the Coleman National Fish Hatchery. The study was supported by the National Marine Fisheries Service, the U.S. Bureau of Reclamation, and the California Department of Fish and Game.

Enclosed please find a summary of this project to release excess hatchery-origin steelhead into Keswick Reservoir.

Please contact Kevin Niemela at the Red Bluff Fish and Wildlife Office with any questions related to the enclosed materials at (530) 527-3043.

Sincerely,

James G. Smith
Project Leader

Enclosure

cc:

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History of the Decision to Transfer Hatchery Steelhead from the Coleman National Fish Hatchery to the Keswick Reservoir

Adult hatchery steelhead were released above the Coleman National Fish Hatchery (Coleman NFH) Barrier Weir from 1995 to 2004 to supplement naturally reproducing steelhead in Battle Creek. The primary goal of the Battle Creek steelhead supplementation program was to assist with the re-colonization of habitats that will be restored on a permanent basis through the Battle Creek Restoration Project (Restoration Project). In anticipation of the Restoration Project, instream flows in Battle Creek were increased beginning in 1995 through agreements between the resource agencies and the Pacific Gas and Electric Company. At that time, the California Department of Fish and Game proposed that hatchery-origin steelhead be released above the Coleman National Fish Hatchery (NFH) barrier weir to make use of returning hatchery steelhead in excess of the hatchery's broodstock needs and to take advantage of the improved spawning and rearing habitats in Battle Creek.

In 2002, following the 1998 Endangered Species Act (ESA) listing of Central Valley steelhead, the National Marine Fisheries Service requested that the U.S. Fish and Wildlife Service reevaluate the supplementation of steelhead in upper Battle Creek. During April through August of 2002, U.S. Fish and Wildlife Service (Service) personnel met with representatives from the other resource agencies (National Marine Fisheries Service, the U.S. Bureau of Reclamation, and the California Department of Fish and Game) to examine the supplementation program and consider alternative uses for excess hatchery steelhead. During these meetings, the Service presented new information to assist in this evaluation, including: 1) a comparison of the genetic relatedness of hatchery and natural origin steelhead in Battle Creek and other areas of the upper Sacramento River system; and 2) a comprehensive Monitoring and Evaluation Plan to assess steelhead supplementation in Battle Creek. Upon review of the existing information, a consensus decision was reached by the resource agencies to continue releasing excess hatchery-origin steelhead upstream of the hatchery's barrier weir (see Four Agency letter dated October 31, 2002).

One year later, in October 2003, a panel of scientists (Science Panel) was convened by the California Bay-Delta Authority (CBDA) Science and Ecosystem Restoration Programs to review and evaluate possible effects of the Coleman NFH on the planned restoration of anadromous salmonid populations in Battle Creek. A report containing findings and recommendations of the panel was developed in late-January 2004, and included the recommendation that "the current supplementation program for steelhead be revisited immediately in view of risk, uncertainties, alternative opportunities and compatibility with the comprehensive recovery plan". In response to this recommendation, the Battle Creek Watershed Conservancy requested the CBDA convene a second Science Panel with the explicit intent to review the Battle Creek steelhead supplementation program. This second panel identified several uncertainties associated with the Battle Creek steelhead supplementation program and, in its July 2004 report, recommended the program be discontinued. Based on this recommendation, the resource agencies promulgated a decision to discontinue releases of hatchery steelhead above the Coleman NFH barrier weir.

With the discontinuation of steelhead supplementation in Battle Creek, alternative uses for excess hatchery steelhead returning to the Coleman NFH during the 2004-2005 spawning

season were again investigated by the resource agencies. In August 2004, a subcommittee of the Battle Creek Working Group (BCWG) convened to discuss potential uses for returning steelhead exceeding the number needed as hatchery broodstock. This public meeting allowed stakeholders to provide input to the resource agencies regarding the pending management decision. Options were presented and discussed at the 25 August, 2004 meeting of the BCWG.

After considering the proposed options and input from stakeholders, the resource agencies decided to transfer excess hatchery steelhead to Keswick Reservoir. This decision was based on the belief that placing excess steelhead into Keswick Reservoir would provide additional angling opportunities and present minimal opportunity for hatchery steelhead to interact with anadromous fish populations in the Sacramento River; the resource agencies believed that the majority of steelhead released into the Keswick Reservoir would be contained between Keswick and Shasta Dams, and would not escape into anadromous waters of the Sacramento River.

Release of steelhead into the Keswick Reservoir

On 22 December, 2004 the Service transferred 194 adult hatchery steelhead from the Coleman NFH to the Keswick Reservoir. Prior to their release, steelhead were measured, identified to gender, and tagged with yellow, sequentially numbered plastic tags (Attachment 1). One hundred ten of the steelhead released into Keswick Reservoir were male and 84 were female. Mean fork length was 51.5 cm (minimum 30.0 cm; maximum 72.0 cm; S.D. 85.3 cm). A press release was distributed to attract angling effort and harvest and to encourage anglers to report catches of tagged steelhead to the Service's Red Bluff Fish and Wildlife Office.

Recoveries of steelhead initially released into the Keswick Reservoir

From 28 December, 2004, through 2 April, 2005, 27 tagged steelhead were recaptured in various locations downstream of the Keswick Dam; 13 were recaptured at Coleman NFH, 7 were recaptured at the Keswick Trap, 5 were recaptured at various locations in the upper Sacramento River, and 2 were recaptured at multiple locations (Attachment 2). The two steelhead that were recaptured twice were first captured at the Keswick Dam fish trap, released back into Keswick Reservoir, and then recaptured in either the upper Sacramento River by an angler (Yellow 1107) or at the Coleman NFH (Yellow 1058). Approximately three additional steelhead with yellow plastic tags were also observed by California Department of Fish and Game personnel during a steelhead redd survey in Middle Creek, a tributary of the Sacramento River located downstream of Keswick Dam. In addition to the steelhead captured downstream of the Keswick Dam, two steelhead were reported captured by anglers in the Keswick Reservoir. One of the steelhead captured in Keswick Reservoir was previously captured at the Keswick Trap (Yellow 1057). Additional recaptures of marked steelhead are possible in the future.

The most likely point of egress from the Keswick Reservoir into anadromous fish habitats of the upper Sacramento River is through the turbines of the Keswick Dam power plant. The turbine blades at Keswick Dam are approximately four feet apart and rotate at a speed of 85 rotations per minute. Water pressure inside the turbines is approximately 35 pounds per square inch.

Revised Management Strategy

Upon the discovery that several of the steelhead released into the Keswick Reservoir were recaptured downstream, additional planned releases into the Keswick Reservoir were cancelled to prevent unintended interactions with anadromous steelhead in the upper Sacramento River. Representatives of the resource agencies subsequently agreed that all hatchery-origin steelhead returning to Coleman NFH during the 2004-2005 spawning season be either spawned or sacrificed for coded-wire tag recovery. This protocol, which incorporates as many adults as possible into the spawning matrix, will now be implemented into the foreseeable future. Some eggs will be culled so that hatchery production targets are not exceeded, however, a portion of the eggs from each mating will be retained to maintain the genetic diversity of the spawners.

Attachment 1.—Floy tag number, gender, and fork length (mm) for steelhead collected at Coleman NFH and released into Keswick Reservoir on 12/22/2004.

Floy Tag	Gender	Fork Length (mm)	Floy Tag	Gender	Fork Length (mm)
Yellow 1001	Male	690	Yellow 1059	Female	570
Yellow 1003	Female	580	Yellow 1060	Female	460
Yellow 1004	Male	440	Yellow 1061	Male	470
Yellow 1005	Male	460	Yellow 1062	Female	540
Yellow 1007	Female	570	Yellow 1063	Female	580
Yellow 1008	Female	470	Yellow 1064	Male	490
Yellow 1009	Female	400	Yellow 1065	Female	420
Yellow 1010	Female	580	Yellow 1066	Male	510
Yellow 1011	Male	690	Yellow 1067	Male	390
Yellow 1014	Female	610	Yellow 1068	Female	600
Yellow 1016	Female	590	Yellow 1070	Male	480
Yellow 1017	Female	400	Yellow 1071	Male	490
Yellow 1018	Female	580	Yellow 1072	Male	490
Yellow 1019	Female	460	Yellow 1074	Female	460
Yellow 1020	Male	460	Yellow 1075	Female	550
Yellow 1021	Male	480	Yellow 1077	Male	440
Yellow 1022	Male	460	Yellow 1078	Male	490
Yellow 1023	Male	450	Yellow 1080	Female	510
Yellow 1024	Female	410	Yellow 1082	Male	720
Yellow 1025	Male	470	Yellow 1087	Male	600
Yellow 1026	Male	480	Yellow 1088	Female	460
Yellow 1027	Female	480	Yellow 1091	Male	450
Yellow 1028	Female	490	Yellow 1092	Male	560
Yellow 1029	Male	530	Yellow 1093	Female	450
Yellow 1030	Male	600	Yellow 1094	Male	460
Yellow 1031	Female	530	Yellow 1095	Male	630
Yellow 1032	Female	550	Yellow 1097	Female	640
Yellow 1033	Female	430	Yellow 1098	Male	510
Yellow 1034	Male	570	Yellow 1099	Male	380
Yellow 1035	Female	470	Yellow 1100	Female	440
Yellow 1036	Female	550	Yellow 1101	Male	480
Yellow 1038	Male	490	Yellow 1102	Female	600
Yellow 1039	Male	470	Yellow 1103	Female	620
Yellow 1040	Male	450	Yellow 1104	Female	450
Yellow 1041	Female	580	Yellow 1105	Female	580
Yellow 1042	Female	570	Yellow 1106	Female	590
Yellow 1043	Male	600	Yellow 1107	Female	460
Yellow 1045	Female	540	Yellow 1108	Male	490
Yellow 1046	Female	590	Yellow 1109	Female	580
Yellow 1049	Male	720	Yellow 1110	Male	510
Yellow 1050	Female	470	Yellow 1111	Female	540
Yellow 1051	Male	480	Yellow 1112	Male	460
Yellow 1052	Female	410	Yellow 1113	Female	560
			Yellow 1114 &		
Yellow 1053	Male	440	Yellow 1115	Female	550
Yellow 1054	Female	490	Yellow 1116	Male	670
Yellow 1055	Male	630	Yellow 1117	Female	470
Yellow 1056	Male	630	Yellow 1118	Male	450
Yellow 1057	Male	630	Yellow 1119	Female	500
Yellow 1058	Male	690	Yellow 1120	Male	470

Attachment 1 (continued).—Floy tag number, gender, and fork length (mm) for steelhead collected at Coleman NFH and released into Keswick Reservoir on 12/22/2004.

Floy Tag	Gender	Fork Length (mm)	Floy Tag	Gender	Fork Length (mm)
Yellow 1121	Male	580	Yellow 1183	Female	650
Yellow 1123	Male	630	Yellow 1186	Male	560
Yellow 1125	Female	520	Yellow 1188	Male	530
Yellow 1122	Male	500	Yellow 1189	Male	640
Yellow 1126	Male	680	Yellow 1190	Male	520
Yellow 1127	Male	600	Yellow 1193	Female	440
Yellow 1128	Female	520	Yellow 1194	Male	540
Yellow 1129	Male	520	Yellow 1197	Male	520
Yellow 1130	Female	490	Yellow 1199	Female	480
Yellow 1134	Female	560	Yellow 1200	Male	510
Yellow 1135	Male	440	Yellow 1201	Male	490
Yellow 1136	Male	510	Yellow 1203	Male	460
Yellow 1137	Male	450	Yellow 1204	Male	600
Yellow 1138 &					
Yellow 1139	Female	460	Yellow 1206	Male	640
Yellow 1140	Male	480	Yellow 1207	Male	570
Yellow 1142	Male	640	Yellow 1208	Male	650
Yellow 1145	Female	480	Yellow 1212	Male	480
Yellow 1146	Female	510	Yellow 1213	Male	610
			Yellow 1214 &		
Yellow 1147	Female	610	Yellow 1215	Male	580
Yellow 1148	Male	650	Yellow 1216	Male	640
Yellow 1149	Female	630	Yellow 1217	Male	630
Yellow 1151	Female	470	Yellow 1219	Male	640
Yellow 1152	Male	480	Yellow 1220	Male	620
Yellow 1153	Male	580	Yellow 1221	Female	320
Yellow 1154	Male	670	Yellow 1222	Male	380
Yellow 1155	Male	490	Yellow 1223	Male	370
Yellow 1156	Male	490	Yellow 1224	Male	380
Yellow 1157	Male	620	Yellow 1225	Female	370
Yellow 1159	Female	400	Yellow 1226	Female	350
Yellow 1160	Male	480	Yellow 1227	Male	340
Yellow 1161	Female	570	Yellow 1228	Male	390
Yellow 1162	Male	460	Yellow 1229	Female	300
Yellow 1163	Female	520	Yellow 1230	Male	350
Yellow 1165	Male	490	Yellow 1232	Male	400
Yellow 1166	Female	560	Yellow 1233	Male	390
Yellow 1167	Female	460	Yellow 1234	Female	400
Yellow 1168	Female	480	Yellow 1235	Male	350
Yellow 1169	Male	460	Yellow 1236	Male	390
Yellow 1170	Male	510	Yellow 1006	Male	550
Yellow 1171	Male	490	Yellow 1012	Female	590
Yellow 1172	Female	450	Yellow 1069	Male	410
Yellow 1173	Female	600	Yellow 1073	Female	460
Yellow 1174	Female	460	Yellow 1076	Male	440
Yellow 1175	Male	460	Yellow 1085	Female	450
Yellow 1176	Female	460	Yellow 1086	Male	450
Yellow 1179	Female	570	Yellow 1141	Male	630
Yellow 1180	Male	450	Yellow 1002	Female	580
Yellow 1181	Male	630	Yellow 1205	Female	550

Attachment 2.—Date of recapture, location of recapture, floy tag number, gender, fork length, and specific comments for steelhead released into Keswick Reservoir and recaptured at various locations.

Date of Recapture	Location (River Mile)	Floy Tag	Gender	Fork length (mm)	Comments
12/28/2004	Keswick Trap	Yellow 1106	Female	590	
12/28/2004	Keswick Trap	Yellow 1107	Female	460	
12/28/2004	Keswick Trap	Yellow 1153	Male	580	
12/28/2004	Keswick Trap	Yellow 1200	Male	510	
12/29/2004	Coleman NFH	Yellow 1123	Male	630	
1/4/2005	Keswick Trap	Yellow 1128	Female	520	
1/4/2005	Sacramento River (296)	Yellow 1016	Female	590	Collected during the late-fall Chinook salmon carcass survey (CDFG).
1/11/2005	Keswick Trap	Yellow 1057	Male	630	
1/11/2005	Keswick Trap	Yellow 1058	Male	690	
1/11/2005	Keswick Trap	Yellow 1082	Male	720	
1/12/2005	Coleman NFH	Yellow 1039	Male	470	
1/12/2005	Coleman NFH	Yellow 1072	Male	490	
1/12/2005	Coleman NFH	Yellow 1102	Female	600	
1/12/2005	Coleman NFH	Yellow 1138	Female	460	Second floy tag Yellow 1139; spawned with natural origin steelhead on 1/31/05.
1/12/2005	Coleman NFH	Yellow 1140	Male	480	
1/12/2005	Coleman NFH	Yellow 1169	Male	460	
1/12/2005	Coleman NFH	Yellow 1219	Male	640	Found dead in raceway #47
1/12/2005	Sacramento River (299)	Yellow 1107	Female	460	Previously recaptured at the Keswick Trap. Caught by angler near Caldwell Park.
1/24/2005	Coleman NFH	Yellow 1020	Male	480	Spawned with a natural origin steelhead; may have entered hatchery holding ponds earlier than 1/24/05.
1/24/2005	Coleman NFH	Yellow 1008	Female	470	Found dead in pond at Coleman NFH.
1/26/2005	Coleman NFH	Yellow 1194	Male	540	Spawned with a natural origin steelhead 1/31/05.
1/26/2005	Coleman NFH	Yellow 1021	Male	480	
1/26/2005	Coleman NFH	Yellow 1094	Male	460	
1/30/2005	Sacramento River (300)	Yellow 1004	Male	440	Caught and released by angler approx. 1 mi. downstream of Keswick Dam. Date is unknown, but the letter postmark is dated 1/31/2004.
2/1/2005	Keswick Reservoir	Yellow 1119	Female	500	Caught by angler.
2/2/2005	Sacramento River (298)	Yellow 1223	Male	370	Caught by angler across from boat launch (South side) at Caldwell Park
2/5/2005	Keswick Trap	Yellow 1166	Female	560	
2/23/2005	Coleman NFH	Yellow 1058	Male	710	Previously recaptured at the Keswick Trap. Spawned with natural origin steelhead at Coleman NFH.
3/15/2005	Sacramento River (291)	Yellow 1093	Female	450	Caught by angler downstream of the Bonneyview boat ramp.
4/19/2005	Keswick Reservoir	Yellow 1057	Male	630	Previously recaptured at the Keswick Trap. Specific capture date was not provided by angler.
4/2/2005	Sacramento River	Yellow 1171	Male	490	Caught by angler.

