COLEMAN NATIONAL FISH HATCHERY

ANNUAL REPORT

FISCAL YEAR – 2022

Prepared by:

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INTRODUCTION

Located in California's Central Valley, Coleman National Fish Hatchery (NFH) is situated on the north bank of Battle Creek, a tributary of the Sacramento River. Coleman NFH was established in 1942 to mitigate for the loss of salmonid spawning habitat that ensued following the construction of Shasta and Keswick Dams on the Sacramento River. The hatchery is operated by the U.S. Fish & Wildlife Service (USFWS or Service) and funded by the U.S. Bureau of Reclamation (BoR). The hatchery propagates four distinct runs of fish: fall Chinook salmon (FCS), late fall Chinook salmon (LFCS), winter Chinook salmon (WCS), and steelhead (STT). Annual production goals for Coleman NFH are 12 million fall Chinook salmon, 1 million late fall Chinook salmon, and 600,000 steelhead. In addition to these mitigation production goals, Coleman NFH is rearing winter Chinook salmon on a provisional basis as part of an effort to reintroduce the endangered fish to the Battle Creek drainage.

The hatchery is situated on 75 acres of land, and an additional 63 acres exist in perpetual easements. The hatchery has three water intake structures on Battle Creek, allowing for uninterrupted delivery of rearing water to the facility. Water treatment at Coleman NFH is accomplished through a combination of settling, filtration, and ozonation. There are 2 settling ponds that are used to reduce suspended solids prior to filtration. A four bay Dual Media Filter system capable of filtering 45,000 gallons per minute further reduces levels of suspended solids. The Ozone Treatment Plant is capable of treating 30,000 gallons per minute and greatly reduces the risk of fish pathogens being introduced into the facility.

The hatchery operates a barrier weir spanning the entire width of Battle Creek, capable of diverting fish through a fish ladder and into several large broodstock holding ponds. The Spawning Building contains a cross-channel equipped with a hydraulic fish-crowder connecting the primary holding ponds. A tower containing a vertical fish lift and an anesthetizing tank connects the cross-channel with the sorting area in the spawning building.

The facility has a combination of 28 15x150ft raceways and 30 8x80ft raceways for juvenile rearing. The Incubation Building houses heath stack incubation trays and early-rearing tanks. Other buildings on the property include: The Administration Building, Shop Building, Vehicle Storage Building, Fabrication Shop/Maintenance Building, Feed Storage Building, 3 Residences, Chiller Building, and the Emergency Generator Building.

Also located on the facility is the CA/NV Fish Health Center that consists of two former residences converted into offices and lab spaces, and a wet lab located on the south side of the hatchery. Located on the hatchery grounds adjacent to the wet lab is the Anderson Field Office, which is a satellite workstation of the Red Bluff Fish and Wildlife Office (Red Bluff FWO).

STATION HIGHLIGHTS

Funding
Coleman NFH is fully funded by the BoR.

Personnel
At the end of the fiscal year Coleman NFH was staffed with a Project Leader, a Deputy Project Leader, a Supervisory Facility Operations Specialist, an Administrative Officer, a Fisheries Program Assistant, a Supervisory Fish Biologist, 2 Fish Biologists, an Information and Education Specialist, a Motor Vehicle Operator, 6 Animal Caretakers, 3 Electronic Industrial Control Mechanics, an Electrician, 2 Maintenance Mechanics, and a Maintenance Worker.

At the end of the fiscal year Livingston Stone NFH was staffed with a Fish Biologist, a Motor Vehicle Operator, and a Biological Science Technician.

Summary of significant staffing changes during fiscal year 2022: Norm Daniels (Electronic Industrial Control Mechanic) retired on 18 December 2021. Cody Thomas was promoted from Animal Caretaker to Electronic Industrial Control Mechanic on 30 January 2022. Spencer Gutenberger (Motor Vehicle Operator) resigned on 12 February 2022. Justin Ericson (Electronic Industrial Control Mechanic) was hired on 13 February 2022. David Costas (Animal Caretaker) transferred on 26 March 2022. Clay Hines (Animal Caretaker) resigned on 21 May 2022. Tadonisha Campos Mejia, Sue Lynn Hanson, Christina Sullivan, and William Worley were all hired as new Animal Caretakers on 31 July 2022. Michael Estes (Motor Vehicle Operator) was hired on 14 August 2022. Taylor Lipscomb (Supervisory Fish Biologist) transferred on 27 August 2022. Alexandra Santos (Biological Science Tech) was hired on 11 September 2022. Travis Webster (Fish Biologist) transferred on 24 September 2022.See Appendix A for a complete list of station personnel.

FISH PRODUCTION SUMMARY

Fall Chinook Salmon Brood Year 2021 (CSA-FBW-21-COL)

Broodstock Collection and Spawning

The fish ladder was opened for collection of FCS broodstock on 1 October 2021. The first spawning take occurred on 5 October 2021 (Table 1); over 50% of female FCS handled were found to be ripe, green females were banked in Pond 5, green and extra males were banked in Ponds 3 and 4. Spawning continued with sufficient numbers of broodstock returning to meet spawning targets.

Incidence of pre-spawn mortality (DIPS) was unusually high this year (Table 2). In anticipation of a storm event the weekend of 23-24 October 2021, that was considered capable of producing flows that would likely permit fish to ascend above the barrier weir, it was decided to allow a larger than normal number of broodstock to enter the hatchery. The increased number of broodstock in the holding ponds and the high turbidity from the storm likely created the conditions that led to the increased pre-spawn mortality.

The last take (15) occurred on 4 November 2021, a total of 4,132 crosses were made and 16,260 FCS were collected throughout the spawning season.

Table 1. Fall Chinook salmon brood year 2021 number of female, male, and jack broodstock spawned at Coleman NFH by date and take

		Number Spawned			
Date	Take	Female	Male	Jack	Total
10/5/2021	1	206	202	7	415
10/7/2021	2	181	175	8	364
10/8/2021	3	146	145	1	292
10/12/2021	4	357	340	25	722
10/13/2021	5	359	349	15	723
10/14/2021	6	373	364	24	761
10/15/2021	7	180	175	5	360
10/19/2021	8	486	444	31	961
10/20/2021	9	241	235	12	488
10/21/2021	10	476	431	45	952
10/22/2021	11	200	185	15	400
10/26/2021	12	364	347	19	730
10/28/2021	13	428	422	17	867
11/2/2021	14	107	85	22	214
11/4/2021	15	28	22	3	53
	Total	4,132	3,921	249	8,302

Table 2. Fall Chinook salmon brood year 2021 disposition and number of fish collected at Coleman NFH from 5 October 2021 through 7 December 2021

Disposition	Female	Male	Jack	Total
Spawned	4,132	3,921	249	8,302
Excessed	828	1,821	985	3,634
DIPS[1]	1,799	2,123	402	4,324
Total	6,759	7,865	1,636	16,260

1. Dead in Pond Salmon (pre-spawn mortality)

Incubation

Each year the spawning plan is designed to harvest more eggs than are needed to meet production goals in order to hedge against a lack of ripe fish later in the spawning season and/or poor survival of earlier egg-takes. After inventory, eggs from each take are reduced to aggregates that will populate one or more ponds while attempting to both maintain a normal distribution (bell shaped curve) of eggs over time to mimic the run/spawn timing of the natural population and to retain enough eggs to achieve the production goal of releasing 12 million FCS smolts.

In addition to the hatchery production target of releasing 12,000,000 FCS, this year additional eggs were taken for an unfed fry release. Eggs for the fry release were taken exclusively on 3 separate days to allow for genetic parentage assignment sampling by staff from the Red Bluff FWO. The genetic sampling will be used to evaluate the survival and return of fish from the unfed fry release groups. Additional eggs were also taken for the final year of a 3-year experimental paired on-site and off-site (Butte City) release.

Inventorying of FCS eggs began in late October and was completed during mid-December. Eggs were culled from several takes prior to inventorying (Table 3); this occurred due to the observation of trays with exceptionally low survival just prior to inventory.

Survival of harvested eggs to the 'eyed egg stage' was moderate (population mean = 81.1%). Volumetric sampling estimated the total number of eyed eggs at the time of inventory was 16,680,433. These eggs were further reduced to an estimated 15,753,344 eggs to meet production goals (Table 4).

Table 3. Fall Chinook salmon brood year 2021 crosses culled prior to inventory and estimated green eggs culled by take

Take	Number Of Crosses Culled	Estimated Green Eggs
8	1	5,000
10	1	5,000
11	6	30,000
Total	8	40,000

Table 4. Fall Chinook salmon brood year 2021 numbers of green eggs, eyed eggs, post-reduction eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage by date spawned and take

Date Spawned	Take	Green Eggs	Eyed Eggs	Post-Reduction Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
10/5/2021	1	957,528	751,608	686,817	4,788	79.2	78.5
10/7/2021	2	966,623	802,879	686,817	5,370	76.2	83.1
10/8/2021	3	760,366	647,817	647,817	5,244	77.6	85.2
10/12/2021	4	1,780,884	1,486,744	1,452,150	4,947	76.4	83.5
10/13/2021	5	1,855,138	1,537,372	1,452,150	5,153	76.6	82.9
10/14/2021	6	1,947,558	1,691,048	1,452,150	5,410	76.6	86.8
10/15/2021	7	866,422	669,472	650,689	4,813	78.8	77.3
10/19/2021	8	2,374,757	1,803,442	1,803,442	4,979	76.4	75.9
10/20/2021	9	1,263,216	1,057,738	1,057,738	5,263	79.0	83.7
10/21/2021	10	2,324,472	1,835,670	1,835,670	4,956	79.5	79.0
10/22/2021	11	904,234	639,584	639,584	4,661	79.0	70.7
10/26/2021	12	1,690,614	1,353,079	1,353,079	4,696	79.4	80.0
10/28/2021	13	2,194,030	1,864,910	1,551,221	5,102	77.4	85.0
11/2/2021	14	516,085	409,570	354,520	4,869	78.9	79.4
11/4/2021	15	162,368	129,500	129,500	5,412	82.2	78.8
Total/Avg.		20,564,295	16,680,433	15,753,344	5,044	78.2	81.1

Juvenile Rearing

Take 1 was transferred from the incubation stacks to Raceways 1 and 30 (ponding, past: ponded) on 13 December 2021. A portion of fry (n = 405,534) from takes 1 and 2 were ponded in the 8x80ft raceways for use in an experimental offsite release study. The study is at the request of the Golden State Salmon Association (GSSA) and the NorCal Guides Association to evaluate the practice of trucking and releasing FCS smolts offsite at the Scotty's Landing Boat Ramp on the Sacramento River. The study was scheduled to have a 3 year duration and began with FCS BY18; however, due to the covid pandemic the offsite release of BY19 FCS fry was cancelled in the previous year. This will be the third and final year of the study.

Typically, the spawning plan is designed so that each spawning event yields enough eggs to populate one or more ponds. This year several takes had to be combined to yield full ponds. A portion of Take 9 was ponded in Raceway 15 with Take 8; similarly, a portion of Take 13 was ponded in Raceway 23 with Take 12. Takes 14 and 15 were not large enough to form a single pond and as a result, they were ponded together in Raceway 28. In-pond screens were used to increase the initial density of single pond takes and larger two pond takes were split with a pump and electronic fish counter prior to reaching a density index (DI) of 0.30.

FCS fry were fed the BioOregon BioVita line (high energy) of fish feeds after ponding. FCS were initially fed at 1% body weight per day for the first 1-5 days, then increased to 2% for approximately 2 weeks, and finally increased from 2.4-3.0% body weight (later takes received a higher ration to 'catch-up'. Feed conversion and growth were initially good in December and

January before slowing to lower than normal rates of feed conversion from February through April. The slower rate of feed conversion may have been related to fish health problems arising from thiamine deficiency syndrome.

Both BY19 and BY20 FCS fry had increased levels of mortality after ponding and were diagnosed with thiamine deficiency syndrome. Adult salmon may develop a thiamine deficiency if their diet composition is heavily comprised of prey fish containing high concentrations of thiaminase (an enzyme that degrades thiamine). Furthermore, the ova developing within thiamine deficient adult female salmon may not contain adequate levels of the nutrient for early ontogeny of salmon fry prior to the start of exogenous feeding. Testing of eggs from BY21 FCS indicated that the eggs were even more deficient in thiamine than in the previous year. FCS fry had significantly elevated levels of mortality after ponding and fish exhibited symptoms consistent with thiamine deficiency syndrome (lethargic, laying on their side, and corkscrew-swimming behavior). No thiamine treatments were administered to BY21 FCS.

Table 5. Summary by month of number brood year 2021 juvenile fall Chinook salmon in raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

			Mean				
Month	Number In Raceways	Mortality	(Fish/lb)	Length (in)	Density Index (DI)	Feed Conversion (FCR)	Feed Fed (lbs)
December	5,704,833	24,947	980.3	1.4	0.13	0.63	638
January	13,492,073	257,561	521.4	1.8	0.22	0.58	9,684
February	13,177,800	105,651	243.9	2.3	0.21	1.08	24,517
March	3,458,561	49,861	125.7	2.7	0.23	0.79	27,608
April[1]	3,450,727	434	108.2	3.0	0.26	0.76	3,797

1. Size at release

Marking and Tagging

Coded wire tagging (CWT; tagging) and adipose-fin clipping (marking) fall Chinook salmon commenced during the last week of February and was completed on 13 April 2022. The production release group of FCS were marked and tagged at a 25% constant fractional rate, with each raceway receiving a unique CWT code. FCS reared for the paired onsite and Butte City release study were marked and tagged at a 100% rate. The FCS released for the unfed fry study received no marks or tags; however, these fish are all progeny of adults that were genetically sampled so that returning adults can be identified through parental assignment.

In previous years, Pacific States Marine Fisheries Commission (PSMFC) staff have enumerated all FCS in each raceway and applied marks and CWT to 25% of the fish as they pass through the tagging trailer. This year due to staffing shortages and a desire to tag and release fish before in-river conditions deteriorated from ongoing draught, Coleman NFH staff enumerated fish in each raceway using a Vaki fish counter. PSMFC staff were then provided with the number of fish in each raceway and applied marks and CWT to 25% of the fish that were counted, this process greatly decreased the amount of time required to mark and tag each raceway.

Release

There were 3 releases of BY21 FCS button-up fry totaling 1,859,029 (Table 6). At the time of release, fry were transferred from the stacks to forklift tanks loaded into the bed of pickup trucks. Maintenance staff fabricated a bracket that both ensures the lid of the tank remains tightly shut and aids in securing the tank to the bed of the truck. All of the releases were at the Ball's Ferry Boat Ramp on the Sacramento River. At the release site 6 inch irrigation piping was setup to aid in releasing fish into moving water. A flexible piece of hosing attached to each tank and nested within the irrigation pipe. Extra water was transported in the trucks for flushing of the tank and pipe. These releases were at the request of the NorCal Guides and Sportsman's Association and the GSSA.

Due to ongoing extreme drought conditions FCS growth was accelerated as much as possible to allow for earlier production releases to occur before environmental conditions in the migration corridor deteriorated further. There were 5 production releases into Battle Creek, totaling 11,803,236.

In addition to the button-up fry and production releases of BY21 FCS; a paired offsite (Butte City) and onsite experimental release occurred. This release was part of a 3-year study at the request of the GSSA and the NorCal Guides Association. The study began in 2019 with paired releases of BY18 FCS; however, the study was cancelled the following year in 2020 due to the covid pandemic. The aim of the study is to evaluate the relative survival and return of fish released onsite into Battle Creek and those released into a net pen at Scotty's Landing on the Sacramento River. Last year at the time of release, it was determined that the water was too shallow at Scotty's Landing to accommodate the net pens and the fish were instead released directly into the Sacramento River at the Butte City Boat Ramp. Due to similar low flows this year it was decided to again use the Butte City Boat Ramp site for release. A total of 339,092 fish were released for the study (167,770 at Butte City; 171,322 at Battle Creek).

Table 6. Fall Chinook salmon brood year 2021 number released, location, fish/lb, and total weight by date and cwt

Date	CWT	Total Released	Release Location	(Fish/lb)	Total Weight (lbs)
12/17/2021	None	615,426	Ball's Ferry	1,250.0	492
12/30/2021	None	635,998	Ball's Ferry	1,250.0	509
1/11/2021	None	607,605	Ball's Ferry	1,200.0	506
3/15/2022	056599	407,190	Battle Creek	125.8	3,237
3/15/2022	056601	401,033	Battle Creek	126.5	3,170
3/15/2022	056602	423,656	Battle Creek	149.4	2,836
3/15/2022	056603	335,106	Battle Creek	151.0	2,219
3/15/2022	056604	485,725	Battle Creek	164.3	2,956
3/15/2022	056605	419,110	Battle Creek	159.6	2,626
3/15/2022	056606	387,841	Battle Creek	147.2	2,635
3/18/2022	056607	444,573	Battle Creek	155.9	2,852
3/18/2022	056608	417,645	Battle Creek	168.1	2,485
3/18/2022	056609	378,596	Battle Creek	178.4	2,122
3/18/2022	056610	446,550	Battle Creek	152.9	2,921
3/18/2022	056611	418,371	Battle Creek	188.3	2,222
3/18/2022	056612	450,080	Battle Creek	181.9	2,473
3/18/2022	056613	425,332	Battle Creek	195.0	2,181
3/31/2022	056614	418,986	Battle Creek	122.6	3,418
3/31/2022	056615	386,150	Battle Creek	119.2	3,240
3/31/2022	056616	442,715	Battle Creek	115.9	3,820
3/31/2022	056617	386,787	Battle Creek	121.8	3,176
3/31/2022	056618	405,606	Battle Creek	118.2	3,432
3/31/2022	056619	393,706	Battle Creek	127.2	3,095
3/31/2022	056620	416,843	Battle Creek	136.7	3,049
4/1/2022	056621	449,339	Battle Creek	155.0	2,899
4/1/2022	056622	449,437	Battle Creek	143.0	3,143
4/1/2022	056623	436,800	Battle Creek	151.7	2,879
4/5/2022	056629	87,174	Battle Creek	79.0	1,104
4/5/2022	056630	84,148	Battle Creek	69.9	1,204
4/7/2022	056628	87,442	Butte City	72.9	1,200
4/7/2022	056631	80,328	Butte City	73.7	1,090
4/14/2022	056624	430,480	Battle Creek	102.5	4,200
4/14/2022	056625	423,927	Battle Creek	108.6	3,904
4/14/2022	056626	449,251	Battle Creek	110.4	4,069
4/14/2022	056627	472,401	Battle Creek	123.4	3,828
Total/Avg.		14,001,357		153.5	91,192

Late Fall Chinook Salmon Brood Year 2021 (CSA-LBW-21-COL)

Juvenile Rearing

At the beginning of the fiscal year there were 1,039,639 juvenile brood year 2021 LFCS on station with a mean size of 24.0 fish/lb. Mean feed conversion rates for October through December were moderate (Table 7); however, individual conversion rates deviated substantially from the monthly means. In November, feed conversion rate ranged from a low of 0.35 to a high of 2.17. Often aberrant feed conversion rates are observed during smoltification, likely due to changes in the condition factor of fish during the parr smolt transformation.

Table 7. Summary by month of number brood year 2021 juvenile late fall Chinook salmon in raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

			Mean				
Month	Number In Raceways	Mortality	(Fish/lb)	Length (in)	Density Index (DI)	Feed Conversion (FCR)	Feed Fed (lbs)
October	1,037,660	1,979	16.5	5.7	0.15	0.94	11,974
November	798,059	487	12.3	6.3	0.18	0.89	13,524
December	77,325	96	10.1	6.7	0.21	0.89	5,349
January[1]	0	5	10.1	6.7	-	-	159

1. Size at release

Release

On 8 November 2021, there was a partial production release of 3 LFCS raceways (Table 8). The release coincided with a storm event which increased flow and turbidity along the migratory corridor. Releases during periods of increased flow and turbidity provide cover for smolts from predators and increase rates of downstream migration.

On 11 December 2021, there was a second production release of 8 LFCS raceways. In addition to the 2 production releases, there were 3 separate ‘Spring Surrogate’ releases of LFCS in December and January. Spring Surrogate releases of juvenile LFCS are used to help estimate take of natural-origin spring Chinook salmon associated with water pumping and conveyance projects in the Sacramento River Delta.

Table 8. Late fall Chinook salmon brood year 2021 number released, location, fish/lb, and total weight by date and cwt

Date	CWT	Total Released	Release Location	(Fish/lb)	Total Weight (lbs)
11/8/2021	056465	78,049	Battle Creek	13.5	5,781
11/8/2021	056466	82,143	Battle Creek	15.2	5,404
11/8/2021	056473	75,318	Battle Creek	22.2	3.393
12/11/2021	056467	44,199	Battle Creek	11.7	3,778
12/11/2021	056469	75,832	Battle Creek	12.4	6,117
12/11/2021	056475	64,151	Battle Creek	11.2	5,728
12/11/2021	056472	75,798	Battle Creek	11.1	6,829
12/11/2021	056474	72,116	Battle Creek	9.6	7,512
12/11/2021	056476	69,270	Battle Creek	10.9	6,355
12/11/2021	056477	73,895	Battle Creek	10.1	7,316
12/11/2021	056478	78,095	Battle Creek	10.7	7,299
12/15/2021	056468	84,267	Battle Creek	15.9	5,305
12/22/2021	056470	82,626	Battle Creek	11.0	7,511
1/6/2022	056471	77,320	Battle Creek	9.9	7,810
Total/Avg.		1,033,079		12.0	86,138

Late Fall Chinook Salmon Brood Year 2022 (CSA-LBW-22-COL)

Broodstock Collection and Spawning

The Fish Ladder was opened intermittently between FCS broodstock collection and the beginning of LFCS spawning to allow for passage of natural-origin LFCS, natural-origin STT, and WCS. The ladder was opened for the start of LFCS collection on 21 December 2021. The first take of LFCS occurred on 29 December 2021. Spawning targets were reached despite fairly low numbers of broodstock returning. The last take (11) occurred on 23 February 2022, a total of 687 crosses were made (Table 9) and 2,137 LFCS were handled throughout the spawning season (Table 10).

LFCS spawning is managed as an integrated program, with natural-origin broodstock collected weekly from the Keswick Dam Fish Trap and included in spawning crosses. Previously during spawning of BY21 LFCS, the Keswick Dam Fish Trap was unavailable for use due to undergoing inspection and maintenance. This year the Keswick Dam Fish Trap is again being operated and natural-origin broodstock are being included in crosses of LFCS. Natural-origin LFCS are crossed 1:1 with hatchery-origin broodstock.

Table 9. Late fall Chinook salmon brood year 2022 numbers of hatchery-origin and natural-origin, male, female, and jack broodstock spawned at Coleman NFH by date and take

		Hatchery-Origin			Natural-Origin			
			Male			Male		
Date	Take	Female	Adult	Jack	Female	Adult	Jack	Total
12/29/2021	1	36	32	0	1	3	0	72
1/5/2022	2	61	53	2	0	6	0	122
1/12/2022	3	70	80	2	0	0	0	150
1/19/2022	4	208	202	4	3	2	0	418
1/26/2022	5	113	113	4	2	3	0	235
2/2/2022	6	74	73	2	4	1	0	154
2/9/2022	7	29	31	0	3	2	0	65
2/16/2022	8	62	24	0	0	1	0	87
2/23/2022	9	34	13	0	1	0	0	48
	Total	687	621	14	14	18	0	1354

Table 10. Late fall Chinook salmon brood year 2022 disposition of fish returning to Coleman NFH

Disposition	Female	Male	Jack	Total
Spawned	688[1]	621	13	1,322
Excessed	36	43	5	84
DIPS	259	408	42	709
Passed Upstream	11	10	1	22
Total	994	1,082	61	2,137

1. Includes 1 natural-origin LFCS inadvertently euthanized during broodstock sorting

Incubation

An estimated 3,602,367 green eggs were harvested over the course of the LFCS spawning season. At inventory there were a total of 3,027,493 eyed eggs (2,865,899 hatchery-origin and 161,594 natural-origin) (Tables 11 &12), survival to the eyed egg stage was 84.0%. Each year the spawning plan is designed to harvest more eggs than are needed to meet production goals in order to hedge against an early diminishing run of fish or poor survival of earlier egg takes. Excess eggs are later reduced if sufficient eggs are obtained in later takes to achieve production goals; eggs from natural-origin crosses are never reduced. A total of 1,316,000 eyed eggs were retained for production purposes (Table 13).

Table 11. Late fall Chinook salmon brood year 2022 numbers of hatchery-origin green eggs, eyed eggs, post-reduction eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage by date spawned and take

Date Spawned	Take	Green Eggs	Eyed Eggs	Post-Reduction Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
12/29/2021	1	184,171	147,726	74,598	5,581	80.99	80.2
1/5/2022	2	286,177	242,976	156,509	5,203	79.56	84.9
1/12/2022	3	375,782	333,982	188,000	5,010	83.60	88.9
1/19/2022	4	1,032,359	870,680	159,668	5,111	76.99	84.3
1/26/2022	5	544,330	446,590	76,488	4,948	81.45	82.0
2/2/2022	6	349,176	300,926	156,285	4,988	77.20	86.2
2/7/2022	7	156,030	140,650	66,642	5,779	76.90	90.1
2/16/2022	8	287,849	225,091	185,938	4,963	76.07	78.2
2/23/2022	9	196,598	157,278	90,278	5,782	71.49	80.0
	Total/Avg.	3,412,472	2,865,899	1,154,406	5,041	78.25	84.0

Table 12. Late fall Chinook salmon brood year 2022 numbers of natural-origin green eggs, eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage by date spawned and take

Date Spawned	Take	Green Eggs	Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
12/29/2021	1	23,183	19,402	5,796	82.21	83.7
1/5/2022	2	34,943	31,491	5,824	84.20	90.1
1/19/2022	4	32,490	28,332	5,111	76.99	87.2
1/26/2022	5	26,064	17,512	5,213	81.45	67.2
2/2/2022	6	33,229	31,715	6,646	72.08	95.4
2/9/2022	7	29,187	27,358	5,837	73.15	93.7
2/16/2022	8	3,241	2,062	3,241	98.20	63.6
2/23/2022	9	7,558	3,722	7,558	57.26	49.2
	Total/Avg.	189,895	161,594	5,653	78.20	78.8

Table 13. Late fall Chinook salmon brood year 2022 numbers of hatchery-origin and natural-origin green eggs, eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage

Broodstock Origin	Green Eggs	Eyed Eggs	Post-Reduction Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
Hatchery	3,412,472	2,865,899	1,154,406	5,041	78.25	84.0
Natural	189,895	161,594	161,594	5,653	78.19	78.8
Total/Avg.	3,602,367	3,027,493	1,316,000	5,447	78.22	84.0

Juvenile Rearing

The first take of LFCS was ponded in the 8x80ft raceways on 24 March 2022**,** subsequent takes followed as they reached the "button-up" fry stage; the last take (9) was ponded on 2 May 2022. This year all LFCS were ponded as 'single-ponds' with in-pond-screens set to maintain an acceptable minimum density. In the past, larger takes were ponded as 'doubles' and split at approximately 225 fish/lb when they were vaccinated for enteric redmouth disease (*Yersinia ruckerii*). This year the enteric redmouth vaccine is being discontinued to reduce handling and because enteric redmouth has rarely, if ever, been observed in LFCS at Coleman NFH. Therefore, it was decided to pond the LFCS in single pond increments so that they would not have to be re-handled until marking and tagging.

Marking (adipose-fin clipping) and tagging (CWT) of LFCS began 23 May 2022 and was completed 15 June 2022. LFCS were tagged from the 8ftx80ft raceways to the 15ftx150ft raceways. The AutoFish System™ used in the marking process provides an accurate census of the fish population in each raceway. The difference between the hatchery inventory number and the tagging census for all 14 raceways was exceptionally large -332,190 fish (~26%). The difference between the two numbers can be attributed to the loss that occurs in between egg inventory and ponding that hatchery staff cannot easily enumerate. Analysis of BY22 eggs indicated high levels of thiamine deficiency, perhaps leading to higher levels of mortality during post-inventory incubation.

In both April and May LFCS had higher than normal levels of mortality. The CA/NV Fish Health Center examined the fish and found no pathogens. Thiamine deficiency was suspected as the cause of the increased mortality. Beginning in late May, mortality began to moderate.

Later in June columnaris (*Flavobacterium columnare*) was confirmed in the LFCS raceways and was responsible for a moderate increase in mortality. Typically, staff at Coleman have used feed top-coated with oxytetracycline (OTC) along with chloramine-T to treat columnaris. This year it was decided that Romet-30 (Romet), an antibacterial treatment for animals, would be used as a first response if there was an early infection that was not yet causing large amounts of mortality. The reasoning for using Romet early-on in the infection cycle is that it has been suggested to be effective for treating columnaris before it becomes systemic and begins infected the fish internally. Fish feed was top-coated with Romet at a dosage of 50mg/kg of fish and administered from 26

June 2022 through 1 July 2022 (Table 14). Romet was considered moderately successful and reduced mortality during and briefly after the treatment period.

In July, columnaris and *Ichthyophthirius multifiliis* (ich) infections coupled to produce elevated rates of LFCS mortality once again. A subset of the most heavily affected raceways (4,8,9,10,11,12,14) were selected for treatment with chloramine-T and salt. The effect of the chloramine-T and salt treatment was inconclusive and all LFCS raceways were treated with feed top-coated with OTC (10g/100lbs) from 27 July 2022 through 9 August 2022. The OTC treatment was considered successful, and mortality decreased following treatment. There was another increase in mortality during late August. A second chloramine-T (3 days) and salt treatment (2 days) was given to all LFCS raceways from 24 August 2022 to 26 August 2022. The treatment was considered inconclusive; however, further treatment of LFCS was not necessary.

Table 14. Summary by date of brood year 2022 late fall chinook salmon treatments, dosage, and rearing units/groups treated

Dates	Treatment	Dosage	Rearing Units/ Group Treated
6/26/2022-7/1/2022	Romet	50mg/kg Fish	Raceways 1-14
7/12/2022-7/14/2022	Chloramine-T	20 mg/L	Raceways 4,8,9,10,11,12,14
7/12/2022-7/14/2022	Salt	750 ppm	Raceways 4,8,9,10,11,12,14
7/27/2022-8/9/2022	OTC	10g/100 lbs	Raceways 1-14
8/24/2022-8/26/2022	Chloramine-T	20 mg/L	Raceways 1-14
8/25/2022-8/26/2022	Salt	900 ppm	Raceways 1-14

At the end of the fiscal year there were 880,478 LFCS on station with a mean size of 22.1 fish/lb (Table 15).

Table 15. Summary by month of number brood year 2022 juvenile late fall Chinook salmon in raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

	Number In Tanks/		Mean				
Month	Raceways	Mortality	(Fish/lb)	Length (in)	Density Index (DI)	Feed Conversion (FCR)	Feed Fed (lbs)
March	282,000	0	1,225.5	1.4	0.09	0.93	24
April	1,167630	54,370	714.6	1.7	0.15	0.69	920
May	1,176,588	24,118	160.8	2.7	0.15	0.71	3,835
June	902,002	3,320	87.5	3.3	0.04	0.92	3,945
July	886,913	15,089	52.3	3.9	0.06	0.77	5,070
August	882,580	4,333	40.8	4.2	0.07	2.29	8,133
September	880,478	2,102	22.1	5.2	0.10	0.55	9,308

Steelhead Brood Year 2021 (CVS-WBW-21-COL)

Juvenile Rearing

Brood year 2021 juvenile steelhead (STT) converted feed at moderate to slow rates. There were no fish health issues with the STT from the beginning of the fiscal year through release and rates of mortality were low (Table 16).

Table 16. Summary by month of number brood year 2021 juvenile steelhead in raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

			Mean				
Month	Number In Raceways	Mortality	(Fish/lb)	Length (in)	Density Index (DI)	Feed Conversion (FCR)	Feed Fed (lbs)
October	611,014	175	7.1	7.4	0.15	0.97	19,827
November	610,911	103	5.0	8.4	0.19	0.80	27,323
December[1]	610,872	39	4.5	8.7	0.21	1.11	12,912

1. Size at release

Release

Steelhead release protocols have been modified several times in recent years, the following is a synopsis of recent changes to release protocols and relevant considerations. In the past, Coleman NFH released juvenile STT at Bend Bridge on the Sacramento River during the first week in January regardless of environmental conditions. In years of extreme low flow when the Bend Bridge boat ramp was not accessible for release, juvenile steelhead were trucked to the Sycamore Grove boat ramp at the former Red Bluff Diversion Dam site. These sites were selected due to their relative close proximity to the hatchery, as releasing juvenile salmonids close to the hatchery minimizes risks of straying from trucking. Furthermore, releasing juvenile steelhead onsite into Battle Creek could lead to a large number of fish residualizing within Battle Creek, especially during releases that occur during low flow.

In 2020, the Service received approval from the National Marine Fisheries Service (NMFS) and the California Department of Fish and Wildlife (CDFW) to release fish from Coleman NFH earlier (December) if there are good environmental conditions for release (*i.e.*, a storm event with increased flow and high turbidity). In 2022, the Service received further approval from NMFS and CDFW to release juvenile STT onsite into Battle Creek. Releasing STT onsite allows for the entire production to be released in a single day, whereas trucking takes approximately 1 week to complete. Furthermore, releasing STT onsite allows for quick targeted releases during and just prior-to storm events, whereas trucking requires much greater time and is much more logistically challenging with respect to timing a production release with a quickly materializing storm event.

STT were released onsite into Battle Creek on 12 and 13 December 2021. STT were crowded to the front of each raceway and pumped through an agriculture pipe into Battle Creek below the Coleman NFH weir. A total of 610,475 juvenile STT were released into Battle Creek. (Table 17).

Table 17. Steelhead brood year 2021 number released, location, fish/lb, and total weight by date and raceway

Date	Total Released	Raceway	Release Location	(Fish/lb)	Total Weight (lbs)
12/12/2021	44,725	15	Battle Creek	4.5	9,917
12/12/2021	45,124	16		4.4	10,350
12/12/2021	43,999	17		4.8	9,263
12/12/2021	45,302	18		4.3	10,634
12/12/2021	42,434	19		5.0	8,487
12/12/2021	42,617	20		4.1	10,420
12/13/2021	43,854	21		4.5	9,767
12/13/2021	35,861	22		4.6	7,745
12/13/2021	44,962	23		4.7	9,506
12/13/2021	44,100	24		4.3	10,232
12/13/2021	41,735	25		4.1	10,081
12/13/2021	46,263	26		4.1	11,367
12/13/2021	47,832	27		4.6	10,467
12/13/2021	41,837	28		4.4	9,487
Total/Avg.	610,645			4.5	137,722

Steelhead Brood Year 2022 (CVS-WBW-22-COL)

Broodstock Collection and Spawning

This year, a change was made to the way that steelhead broodstock are collected and held for spawning. Steelhead broodstock are classified as 'early' or 'late' if they enter the hatchery during FCS or LFCS collection respectively. Early returning steelhead, collected October through mid-December are transferred to the pre-release pond upon initial sorting. Later the pre-release pond is seined and all, or a portion of those fish are transferred to Pond 5 for use as broodstock. In past years late returning STT would be held in Pond 4 for spawning; keeping early and late returning STT in separate holding ponds allowed for spawning of nearly equal numbers of each. Starting this year, a weekly collection target was developed based upon a hypothesized run-timing distribution. Using the weekly collection target both early and late returning STT were transferred to Pond 5 and spawned together randomly. Using a single holding pond for early and late returning STT, allows for unripe LFCS to be banked in Pond 4. Previously green LFCS would either be euthanized or returned to Pond 3 which led to increased rates of pre-spawn mortality (due to re-handling of fish) and longer delays for natural-origin salmonids (*i.e.*, WCS and STT) to be passed upstream of the barrier weir.

Steelhead broodstock collection began in early-October when the fish ladder was opened for collection of FCS. Numbers of returning steelhead were initially low in October before increasing substantially in November. STT collection had a bimodal distribution with a peak in mid-November and a second smaller peak in mid-January. The first take of STT eggs was on 29 December 2021. Spawning continued with ample numbers of ripe fish until the last take occurred on 23 February 2022. Eggs were collected from 150 long (greater than or equal to 21.75in) and 348 short (16in to 21.75in) female STT.

Table 18. Steelhead brood year 2022 numbers of female and male, short, and long broodstock spawned at Coleman NFH by date and take

		Hatchery-Origin				
		Female		Male		
Date	Take	Short	Long	Short	Long	Total
12/29/2021	1	17	11	20	8	56
1/5/2022	2	10	20	17	13	60
1/13/2022	3	57	33	76	14	180
1/20/2022	4	49	12	50	11	122
1/27/2022	5	40	20	52	8	120
2/2/2022	6	69	21	83	7	180
2/9/2022	7	30	20	49	1	100
2/16/2022	8	59	11	66	4	140
2/23/2022	9	17	2	17	2	38
	Total	348	150	430	68	996

Broodstock Reconditioning

The STT kelt release occurred on 24 February 2022, water was lowered in the Pre-release Pond and a seine net was used release fish through the wastewater canal into Battle Creek. A total of 1,157 reconditioned broodstock were released.

Incubation

At inventory there were an estimated 513,297 eyed eggs from crosses of short females and 402,057 eyed eggs from long females (Tables 19 & 20). In order to increase the genetic diversity of hatchery-origin STT, the spawning plan incorporates twice as many broodstock as is needed to meet egg-take goals. Eyed eggs from short and long crosses were retained proportionally to the ratio at which they were collected. A total of 677,782 eyed eggs were and retained for production (Table 21).

Table 19. Steelhead brood year 2022 numbers of green eggs, eyed eggs, post-reduction eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage by date spawned and take from short females

Date Spawned	Take	Green Eggs	Eyed Eggs	Post-Reduction Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
12/29/2021	1	43,551	31,108	24,188	3,350	311.1	71.4
1/5/2022	2	17,216	10,222	10,222	1,722	269.0	59.4
1/13/2022	3	128,601	88,506	88,506	2,256	297.0	68.8
1/20/2022	4	107,055	64,233	64,233	2,230	293.3	60.0
1/27/2022	5	92,492	72,989	67,067	2,434	295.5	78.9
2/2/2022	6	153,834	112,561	29,888	2,607	312.7	73.2
2/9/2022	7	71,638	46,976	38,101	2,653	293.6	65.6
2/16/2022	8	101,666	61,968	25,285	2,259	322.8	61.0
2/23/2022	9	37,846	24,734	24,734	2,703	298.0	65.4
	Total/Avg.	753,899	513,297	372,224	2,468	299.2	68.1

Table 20. Steelhead brood year 2022 numbers of green eggs, eyed eggs, post-reduction eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage by date spawned and take from long females

Date Spawned	Take	Green Eggs	Eyed Eggs	Post-Reduction Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
12/29/2021	1	36,249	30,833	23,975	3,625	208.3	85.1
1/5/2022	2	72,624	31,679	31,679	3,631	215.5	43.6
1/13/2022	3	99,280	63,664	63,664	3,008	222.6	64.1
1/20/2022	4	51,255	34,170	34,170	4,271	251.3	66.7
1/27/2022	5	97,395	84,258	77,422	5,126	226.5	86.5
2/2/2022	6	85,593	68,827	18,275	5,035	220.6	80.4
2/9/2022	7	55,783	42,100	34,147	4,291	210.5	75.5
2/16/2022	8	45,249	41,014	16,714	5,028	222.9	90.6
2/23/2022	9	6,572	5,512	5,512	3,286	212.0	83.9
	Total/Avg.	550,000	402,057	305,558	4,145	222.1	73.1

Table 21. Steelhead brood year 2022 numbers of green eggs, eyed eggs, eggs per female, eggs per ounce, and percent survival to the eyed egg stage from short and long females

Broodstock Origin	Green Eggs	Eyed Eggs	Post-Reduction Eyed Eggs	Eggs per Female	Eggs per oz	Percent Survival to Eyed Egg Stage
Short	753,899	513,297	372,224	2,468	299.2	68.1
Long	550,000	402,057	305,558	4,145	221.1	73.1
Total/Avg	1,303,899	915,354	677,782	3,306	260.2	70.2

Juvenile Rearing

The first take of STT was transferred from the incubation stacks to the early-rearing tanks (tanking past: tanked) on 3 March 2022, tanking continued until the last take was tanked on 11 April 2022. Fish were started on a high percent body weight diet, and feed conversion rates (FCR) were very good (Table 22) while in tanks. Fish were closely monitored, and tanks were split as needed to maintain acceptable density indices.

Takes 7 and 9 both had fewer eggs at inventory than needed to populate a pond. Extra eggs were retained in take 8 and allocated to be combined with each take. Feed rates were manipulated so that fish could be combined when they reached a similar size.

In the past, STT were reared in tanks until they reached a size of approximately 225 fish/lb and were then vaccinated for enteric red mouth disease, weighed, and transferred to the 8x80ft raceways. This year the enteric redmouth vaccine is being discontinued for use on STT to reduce handling and because enteric redmouth has rarely, if ever, been observed in STT at Coleman NFH. This year STT were not weighed as they were transferred from the tanks to the 8x80ft raceways, decreasing fish stress and decreasing the amount of time and work required to complete the

process. Take 1 was transferred from the tanks to the 8x80ft raceways on 21 April 2022, the last take (9) was transferred on 26 May 2022.

Marking of STT commenced on 10 May 2022. In addition to marking, the AutoFish System™ used by PFMFC provides an accurate count of fish populations in each raceway processed. Marking was completed on 9 June 2022 and the final difference between the hatchery inventory number and the census taken from the marking trailer was -65,433 fish (~ 10.5 %). This difference represents the mortality between egg inventory and ponding (after-hatch loss) which would be very difficult to enumerate independently. STT were pumped from the 8x80ft raceways to the 15x150ft raceways on 2 separate days (2 & 9 June 2022).

During June and July mortality of STT was slightly elevated due to infection with columnaris. In August levels of mortality had risen to where treatment was deemed necessary. All 14 raceways were treated with feed top-coated with OTC at a dosage of 10g/100lbs of fish for 14 days (Table 22). The treatment was considered successful at reducing mortality. Further treatments were not necessary to control columnaris.

At the end of the fiscal year there were 615,143 steelhead on station with a mean size of 11.5 fish/lb (Table 23).

Table 22. Summary by date of brood year 2022 steelhead treatments, dosage, and rearing units/groups treated

Dates	Treatment	Dosage	Rearing Units/ Group Treated
8/4/2022-8/17/2022	OTC	10g/100 lbs	Raceways 15-28

Table 23. Summary by month of numbers of brood year 2022 juvenile steelhead in tanks and raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

			Mean				
Month	Number In Tanks/ Raceways	Mortality	(Fish/lb)	Length (in)	Density Index (DI)	Feed Conversion (FCR)	Feed Fed (lbs)
March	533,289	4,539	1,674.3	1.3	0.23	0.57	123
April	696,006	9,388	445.9	2.0	0.20	0.56	1,082
May	634,179	2,039	101.8	3.1	0.11	0.82	3,525
June	623,063	3,053	45.1	4.1	0.05	0.68	5,239
July	620,087	2,976	29.0	4.7	0.06	1.19	8,125
August	617,890	2,197	18.2	5.5	0.08	0.96	11,864
September	615,143	2,747	11.5	6.34	0.11	0.86	16,353

Winter Chinook Salmon Brood Year 2021 (WCS-WBD-21-LIV)

Egg and Fry Transfers (To Coleman NFH and Mount Lassen Trout Farm)
Transferring of eggs from Livingston Stone NFH to Mount Lassen Trout Farm (MLTF) began in August 2021 and was completed in October 2021 (Table 24). Eggs were transferred in laundry bags suspended in 5 gallon sports drink coolers.

On 4 October 2021, progeny of WCS broodstock collected from Battle Creek that had not previously been transferred to MLTF were transferred from Livingston Stone NFH to Coleman NFH. WCS were hauled in tanks mounted on 3 separate trucks (CA/NV Fish Health Center Truck, Red Bluff FWO Truck, and Coleman NFH Crew Cab). Fresh flows were not used due to concerns regarding entrainment of fish within the intakes; supplemental oxygen was used on trucks where it was available. At Coleman NFH, WCS were netted from the trucks into early-rearing tanks in the Incubation Building. WCS were hauled at very low densities and appeared healthy following transport.

Table 24. Lot, take, date spawned, numbers of eyed eggs, life stage at transfer, number transferred, transfer dates, and rearing facility for progeny of winter Chinook captive brood stock spawned at the Livingston Stone NFH and transferred to the Coleman NFH and Mount Lassen Trout Farm

CWT	Take	Date Spawned	Eyed Eggs	Life Stage At Transfer	Date Transferred	Rearing Facility
Progeny of (Anadromous) Battle Creek Broodstock						
056596	1	5/20/2021	7,038	Fed-fry	10/4/2021	CNFH
	2	6/3/2021	14,856	Fed-fry	10/4/2021	CNFH
	3	6/10/2021	5,112	Fed-fry	10/4/2021	CNFH
	4	6/21/2021	12,568	Fed-fry	10/4/2021	CNFH
	5	6/28/2021	13,305	Fed-fry	10/4/2021	CNFH
	6a	7/6/2021	14,516	Fed-fry	10/4/2021	CNFH
	7a	7/12/2021	1,812	Fed-fry	10/4/2021	CNFH
056597	8a	7/15/2021	4,893	Fed-fry	10/4/2021	CNFH
	9	7/26/2021	9,306	Fed-fry	10/4/2021	CNFH
056598	6b	7/6/2021	4,925	Eyed Eggs	8/3/2021	MLTF
	7b	7/12/2021	7,948	Eyed Eggs	8/5/2021	MLTF
	8b	7/15/2021	5,494	Eyed Eggs	8/5/2021	MLTF
Progeny of Captive Broodstock						
055891	10	8/18/2021	9,626	Button-up Fry	10/27/2021	CNFH
	11	8/25 & 8/26/2021	29,200	Button-up Fry	11/2/2021	CNFH
	12	9/1 & 9/2/2021	20,713	Button-up Fry	11/10/2021	CNFH
056532	13	9/8/2021	13,648	Eyed Eggs	10/6/2021	MLTF
	14	9/15/2021	11,099	Eyed Eggs	10/14/2021	MLTF
	15	9/22/2021	2,897	Eyed Eggs	10/19/2021	MLTF
		Total	188,956			

On 27 October 2021, the first group of captive broodstock progeny were transferred to the Coleman NFH as button-up fry. These fish were hauled in PVC live cars within a tank mounted on a pickup truck. The remaining 2 groups of captive broodstock progeny were transferred to Coleman NFH in November in a similar manner.

Juvenile Rearing (Coleman NFH)
All WCS fry were started in early-rearing tanks inside the incubation building. The WCS fry were fed BioOregon BioVita Fish Feed (High Energy Diet). Growth was manipulated by feed rate to combine the takes into 3 lots that each received a unique CWT. Fish converted feed at moderate to slow rates (Table 25).

Elevated mortality in Takes 8/9 (anadromous progeny) and take 12 (captive broodstock progeny) were observed and reported to the CA-NV Fish Health Center during early rearing. No infectious diseases were found in either take. A portion of take 8 was transferred to MLTF and also had higher than normal mortality; however, a definitive diagnosis was not made and nothing infectious was found. Examination of take 12 revealed bilateral cataracts in all clinical fish.

All WCS released from Coleman NFH and MLTF are tagged with CWT and marked with an adipose and left pelvic fin clip so that they may be differentiated from LFCS upon return. Takes 1-7 were combined to form a release group and were marked and tagged during the second week of December. Takes 8 and 9 comprised a second release group of Battle Creek Broodstock progeny and were marked and tagged the second week of January. Takes 10-12 (captive broodstock progeny) were marked and tagged in late February and early March and combined to form a third release group.

Table 25. Summary by month of number brood year 2021 winter Chinook salmon reared at Coleman NFH in tanks and raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

			Mean				
Month	Number In Tanks/ Raceways	Mortality	(Fish/lb)	Length (in)	Density Index (DI)	Feed Conversion (FCR)	Feed Fed (lbs)
October	74,477	1,059	546.2	1.9	0.19	0.95	97
November	113,081	5,045	467.4	2.2	0.17	1.26	197
December	108,841	977	342.4	2.3	0.19	1.13	271
January	106,415	819	201.1	2.6	0.21	1.45	399
February	102,619	1,787	117.1	3.1	0.22	1.31	397
March[1]	-	227	95.9	3.3	0.16	3.34	350

1. Size at release

Juvenile Rearing (Mount Lassen Trout Farm)
Eggs were incubated in hatching baskets contained within early-rearing tanks. Fry reared in the same tanks after hatching. The WCS fry were fed BioOregon BioVita Fish Feed (High Energy Diet). Feed conversion rates (FCR) were better for WCS at MTLF than those reared at Coleman NFH (Tables 25 & 26).

Early in rearing it was noted that there were many fish in Take 8 that were lethargic and/or laying on their side in the tank. The CA/NV Fish Health Center initially suspected thiamine deficiency syndrome and a thiamine bath treatment was administered to the fry on 27 September 2021. Mortality remained elevated after treatment and a diagnosis of coagulated yolk was made. The health of these fish gradually improved over rearing, and all fish appeared healthy prior to release.

Marking (adipose and left-pelvic fin clipping) and tagging (CWT) of WCS at Mt. Lassen Trout Farms (MLTF) was accomplished during February and March 2022.

Table 26. Summary by month of number brood year 2021 winter Chinook salmon reared at Mount Lassen Trout Farm in tanks and raceways, total mortality, mean weight, length, DI, FCR and total pounds of feed fed

Month	Number In Tanks/ Raceways	Mortality	(Fish/lb)	Length (in)	Feed Conversion (FCR)	Feed Fed (lbs)
September	14,456	3,911		1.3	1.0	3
October	36,734	5,366		1.4	1.14	7
November	34,961	1,773		1.8	0.47	17
December	34,693	268		2.2	0.69	39
January	33,069	109		2.6	1.03	62
February	31,799	40		3.2	0.45	79
March[1]	-	10		3.2	-	13

1. Size at release

Release (Coleman NFH and Mount Lassen Trout Farm)
The entire production release of BY21 WCS occurred on 16 March 2022. WCS at Coleman NFH were netted from raceways and tanks and loaded into tanks mounted on pickup trucks. WCS were released on the North Fork Battle Creek (Coglitore family property; Latitude 40°25'0.13"N, Longitude 121°56'44.00"W). Three separate trucks made 3 trips each to the release site. Several lengths of 4 inch flexible hose were used to release the fish directly into Battle Creek.

The production release of BY21 WCS raised at MLTF occurred on 16 March 2022 concurrently with the WCS release from Coleman NFH. MLTF staff loaded fish into a tank mounted on a pickup truck and released fish at the 'Trout Farm' site on North Fork Battle Creek. A roll of collapsible tubing was used to release fish from the tank directly into Battle Creek (Table 27).

Table 27. Winter Chinook salmon brood year 2021 reared at CNFH and MLTF, number released, CWT, fish/lb, weight, and release location by date and cwt

Date	Number Released	CWT	Size (Fish/lb)	Weight (lbs)	Release Location
Production Releases of Winter Chinook Salmon reared at CNFH					
3/16/2022	50,517	056596	45.1	1,120	North Fork Battle Creek[1]
3/16/2022	8,405	056597	73.7	114	
3/16/2022	41,202	055891	132.4	311	
Production Releases of Winter Chinook Salmon Reared at MLTF					
3/16/2022	10,486	056598	63.0	166	North Fork Battle Creek[1]
3/16/2022	21,303	056632	120.0	178	
Miscellaneous Releases					
2/2 & 2/3/2022	250	056596	65.4	4	RBDD[2]
2/23 & 2/24 2022	200	056596	54.1	4	RBDD[2]
3/17 & 3/18 2022	220	056596	45.1	5	RBDD[2]
3/28/2022	229	056632	120.0	2	North Fork Battle Creek[1]
4/29/2022	117	055891	132.4	1	Battle Creek at Coleman NFH
	Total/Mean				

1. Released on Private Property (Coglitore Family) North Fork Battle Creek, Battle Creek Bottom Road Manton, CA
2. Released at Red Bluff Diversion Dam

Winter Chinook Salmon Brood Year 2022 (WCS-WBD-22-LIV)

Broodstock Collection and Spawning

The first adult BY22 WCS collected at Coleman NFH was on 21 November 2021. The fish was bio-sampled and passed upstream. Adult WCS continued returning and were passed upstream until broodstock collection began on 16 February 2022. A quota system was developed to determine numbers of fish to be collected for broodstock and passed upstream. Fish that presented with any wounds or potential fish health issues were not retained for broodstock. WCS broodstock were transferred from Coleman NFH to Livingston Stone NFH on a weekly basis until mid-March when it was decided to cease collecting broodstock from Battle Creek. The decision to cease collection of Battle Creek WCS was made to allow for increased collection of mainstem WCS due to severe drought and expected very low survival and success of mainstem spawning WCS. The 12 adult WCS transferred from Coleman NFH to Livingston Stone NFH were used as broodstock for the mainstem recovery program. All BY22 WCS in the Battle Creek program will be progeny of captive broodstock. Spawning of captive broodstock began in July and was completed in September (Table 29).

Table 28. Winter Chinook salmon brood year 2022 disposition and number of fish passed and collected for broodstock at Coleman NFH from 16 November 2021 through 13 June 2022

Disposition	Female	Male	Unknown	Jack	Total
Passed	44	25	1	0	70
Broodstock[1]	11	1	0	0	12
Sacrificed	1	0	0	0	1
DIPS[2]	1	1	0	0	0
Total	57	27	1	0	85

1. 1 Male and 1 Female WCS were pre-spawn mortality at Livingston Stone NFH
2. Dead in Pond Salmon (pre-spawn mortality) at Coleman NFH

Table 29. Take, date spawned, numbers of eyed eggs, life stage at transfer, transfer dates, and rearing facility for progeny of winter Chinook salmon captive brood stock spawned at the Livingston Stone NFH and transferred to the Coleman NFH and Mount Lassen Trout Farm

Lot	Take	Date Spawned	Number of Females	Number Transferred	Date Transferred	Life Stage at Transfer
Captive Brood Progeny Transferred to Mount Lassen Trout Farm						
1	1a	7/27/2022	25	27,655	8/30/2022	MLTF
2	2a	8/3 & 8/4/2022	39	29,567	9/6/2022	MLTF
3	3	8/10 & 8/11/2022	46	36,934	9/13/2022	MLTF
4	4	8/17 & 8/18/2022	50	39,337	9/20/2022	MLTF
		Totals	160	133,493		
Progeny of Captive Broodstock Transferred to Coleman NFH						
5	1b	7/28/2022	5	3776		CNFH
	2b	8/3/2022	1			CNFH
6	5	8/24 & 8/25/2022	31	20,537	Fiscal Year	CNFH
	6	8/31/2022	47	35,879	2023	CNFH
7	7	9/8/2022	29	17,275		CNFH
	8	9/15 & 9/16/2022	20	14,269		CNFH
		Totals	133	91,736		

CYCLICAL MAINTENANCE AND CONSTRUCTION

Maintenance Activities

Water Treatment and Delivery
From 9 – 11 October 2021, Johnson Controls was onsite for a service inspection and to update the ozone building.

During October 2021, Norm Daniels and Randy Busjahn (both Electronic Industrial Controls Mechanics) continued repairs and installed additional parts on filters 3 and 4.

On 25 October 2021, Joe Livesay (Electrician) repaired the claw at intake 3, which had lost power. The program logic controller needed to be reset which has happened twice in the last two months.

On 27 October 2021, Norm Daniels and Randy Busjahn repaired one of the raw water pumps.

During November 2021, Randy Busjahn made repairs on filters 2 and 4.

On 29 November 2021, Ralph Winstead (Maintenance Mechanic) and Lonnie Sullivan (Maintenance Mechanic) rebuilt a water pump on the canal.

On 6 January 2022, Randy Busjahn, Ralph Winstead, and Lonnie Sullivan performed corrective maintenance on the sand filter bridge.

On 10 January 2022, Randy Busjahn repaired raw water pump 4.

On 11 January 2022, Randy Busjahn and Lonnie Sullivan exchanged a motor and repaired air handler 3 in the ozone building. They also continued on repairs to filters 2 and 4.

From 12 through 13 January 2022, Randy Busjahn and Lonnie Sullivan repaired the bridge crane gear box mounting brackets on filter 2.

On 25 January 2022, Lonnie Sullivan, Ralph Winstead, and Randy Busjahn installed a new canal pump.

On 26 January 2022, Lonnie Sullivan, Ralph Winstead, and Randy Busjahn installed new sand filter festoon cabling.

On 2 February 2022, Randy Busjahn and Cody Thomas (Electronic Industrial Controls Mechanic) repaired filter 4.

On 3 February 2022, Lonnie Sullivan and Ralph Winstead installed a new canal pump.

On 7 February 2022, Coleman maintenance staff installed and serviced a canal pump.

On 11 February 2022, Ralph Winstead and Cody Thomas completed the additional concrete pad for the new chillers in the ozone building.

On 7 March 2022, Lonnie Sullivan repaired a raw water pump.

On 17 March 2022, Ralph Winstead and Lonnie Sullivan cleared built up organic matter at the outfall of the abatement pond to prevent it from overflowing.

On 28 March 2022, the ozone filters were chlorinated per specifications.

Beginning on 4 April 2022, ozone staff chlorinated filter bay 3 and made necessary repairs.

Beginning on 18 April 2022, ozone staff chlorinated filter bay 1 and made necessary repairs

The annual cleaning of the Coleman canal and pump station began on 16 May 2022 and was completed. All of the maintenance staff participated in the cleaning effort. The canal was finished on 19 May 2022.

Coleman NFH staff cleaned out the sand traps from the 13 – 16 June 2022.

On 28 July 2022, water treatment staff performed annual chiller cleaning.

During August and September, ozone and maintenance staff rebuilt multiple valves on the oxygen pipe assembly.

On 28 & 29 September 2022, Johnson Controls was onsite to perform an Ozone program update.

Fish Ladder and Spawning Building
On 17 October 2021, Lonnie Sullivan and Ralph Winstead replaced a ball valve and serviced other equipment in the spawning building.

On 1 November 2021, Lonnie Sullivan and Jason Fookes (Maintenance Worker) repaired the pond 5 crowder.

On 19 January 2022, Lonnie Sullivan replaced the air supply line on the air spawn pedal.

On 17 February 2022, Ralph Winstead, Lonnie Sullivan, and Jason Fookes installed the partitions for the video weir in the fish ladder.

Beginning at 10am on 19 April 2022, A-1 Crane removed the fish ladder bulkhead to allow upstream passage for non-salmonid species that are have difficulty ascending the fish ladder. The fish ladder bulkhead was replaced at 8 am on 20 April 2022

On 13 June 2022, the spawning building was shut down.

On 1 August 2022, A1 Crane installed the bulkhead back in the fish ladder.

On 26 September 2022, Ozone staff watered up the spawn building. Fish staff were present to learn the process.

On 29 September 2022, Ralph Winstead and Ozone staff replaced a broken cable on the fish tower in the spawning building.

Fish Distribution Trucks
On 17 November 2021, Lonnie Sullivan performed maintenance on the water tank for the white distribution truck. The tank water pump was found to be defective during the process and a new one has been ordered.

On 30 November 2021, Ralph Winstead and Lonnie Sullivan installed a generator on the white distribution truck.

On 5 January 2022, Ralph Winstead and Lonnie Sullivan traveled to Ceres California to pick up the white distribution truck following repairs.

Other Government Vehicles
On 1 October 2021, Joe Livesay re-wired the fresh flows on the Fish Health Center truck.

On 22 October 2021, Joe Livesay repaired the horn on the egg buggy.

On 8 December 2021, Lonnie Sullivan and Ralph Winstead set up the stocking trucks for fry releases.

On 15 December 2021, Lonnie Sullivan and Ralph Winstead repaired and prepared forklifts and fish tanks for the upcoming fry releases.

On 27 September 2022, Ralph Winstead and Jason Davis (Animal Caretaker) began building a new transport cabinet for the egg buggy.

Electrical
On 9 November 2021, Joe Livesay began performing lighting and electrical modifications at the Red Bluff FWO.

On 1 December 2021, Joe Livesay installed electronics and a cord reel at the Red Bluff FWO.

On 2 March 2022, Joe Livesay installed new light fixtures in the Anderson Field Office storage building.

Permits and Reporting
On 8 March 2022, Hans Miller (Supervisory Facility Operations Specialist) and Joe Livesay performed an environmental compliance audit.

JAO Safety Officer Jimmy Lopez-Beniquez performed safety inspections at Coleman NFH, Livingston Stone NFH, and the CA/NV Fish Health Center from 19 – 20 April 2022.

On 22 September 2022, Hans Miller escorted a county official around the facility for a Hazmat Inspection. This inspection is a requirement every 3 years.

HVAC
On 9 December 2021, Mike's Heating and Air was onsite to install a new economizer control unit on the HVAC system in the incubation building.

On 15 June 2022, a new HVAC system was installed in the administration building by Mike's HVAC.

Renovations
Also on 8 July 2022, Randy Busjahn, Cody Thomas, and Justin Erickson (Electronic Industrial Controls Mechanic) began repainting the main floor in the ozone building.

On 22 July 2022, water treatment staff completed painting the floor in the main ozone building.

Beginning on 25 August 2022, Joe Livesay and fish staff cleaned out garage bay next to the crew room building. A new racking system was installed to better organize hatchery equipment.

Telecommunications
On 12 July 2022, Bryan Derrickson from Global Com, performed a site assessment for new fiber optic internet service, which is being funded by headquarters.

Mount Lassen Trout Farm (MLTF)
On 2 December 2021, Joe Livesay coordinated manual tagging trailer repairs and set up for the MLTF tagging operations.

On 8 December 2021, Joe Livesay and Jason Fookes delivered and assisted with setting up the manual tagging trailer for MLTF.

On 5 January 2022, Joe Livesay completed the hookup of the manual tagging trailer at MLTF for the second round of tagging.

On 7 January 2022, Joe Livesay, picked up a generator and delivered it to MLTF. He set up the new generator and tested it for future use. He also delivered fuel to the transfer tank on-site.

On 24 February 2022, Joe Livesay again transported and connected a generator at Mount Lassen Trout Farm.

On 1 March 2022, Joe Livesay transported and installed a generator at MLTF for the final round of marking and tagging operations.

Livingston Stone NFH
On 20 October 2021, Joe Livesay traveled to Livingston Stone NFH to install a relay in each temporary chiller control cabinet to ensure that when there is a hard power failure, an alarm will be triggered.

On 6 December 2021, Joe Livesay uninstalled the alarm circuit for the temporary chillers that were removed from Livingston Stone NFH.

On 28 December 2021, Joe Livesay connected a permanent generator/generator hookup for the hatchery house at Livingston Stone NFH.

On 6 January 2022, Joe Livesay completed electrical supply installation and connection of the manual transfer switch and generator inlet at Livingston Stone NFH. He also tested the Lincoln Ranger 225 welder/generator that is used for backup power.

On 20 April 2022, Joe Livesay installed a malachite pump at Livingston Stone NFH in preparation for the upcoming installation of the carbon filtration system.

Ralph Winstead and Lonnie Sullivan installed water supply piping and an outdoor sink/counter for the new spawning building at Livingston Stone NFH beginning on the 23 June 2022 and completed on 28 June 2022.

Other Maintenance
On 11 October 2021, Jason Fookes helped Bundy's Tree Service remove trees from around the administration building and onsite houses.

On 28 October 2021, Lonnie Sullivan and Randy Busjahn replaced fan motors and repaired exhaust fans in the incubation building.

On 8 November 2021, Joe Livesay completed the installation of emergency egress overhead safety signs.

On 12 January 2022, Randy Busjahn repaired the heater in the maintenance building.

Beginning on 7 June 2022, Lonnie Sullivan and Ralph Winstead repaired multiple sprinkler water lines that had failed.

On 8 July 2022, Ralph Winstead and Lonnie Sullivan began planting maple trees around the hatchery to replace trees that died or needed to be removed.

On 3 August 2022, 15' x 150' raceway dam gates that were damaged or not functioning correctly were replaced. On 4 August 2022, Ralph Winstead and Lonnie Sullivan began cutting steal to build several new dam gates.

OUTREACH, INFORMATION, AND EDUCATION
There was no Return of the Salmon Festival in October this year due to COVID-19 pandemic.

During October 2021, Laura Mahoney (Information and Education Specialist) performed salmon dissections for six 4th and 5th grade classes at Antelope Elementary School.

Also, during October 2021, the hatchery coordinated with, and provided fish to, the Shasta Wildlife Rescue organization for use in the rehabilitation of two Osprey.

On 14 October 2021, Laura Mahoney read books and provided a fish craft at the Anderson Library Story Hour.

Additionally, Laura Mahoney also provided fish to multiple schools for dissections in their classrooms, worked with staff from the Bay-Delta office on talking points for a documentary film, and posted and monitored multiple social media posts highlighting hatchery operations during October.

In November 2021, Laura Mahoney attended a career fair for 8th grade students in Tehama County.

During December 2021, a Boy Scout working on a badge spent a day at Coleman NFH working with staff to learn more about operations.

Also, During December 2021, Laura Mahoney provided both photos and videos to internal and external cooperators for use in articles and social media.

During January 2022, Laura Mahoney attended the annual training and introduction, put on by CDFW, for the "Trout in the Classroom" program for schools in Tehama County.

On 12 January 2022, a documentary filmmaker visited Coleman NFH to film FCS spawning and other hatchery processes. Laura Mahoney and Brett Galyean both provided interviews for the film which is currently schedule for release in late-2022 or early-2023.

In February 2022, Coleman NFH provided eyed steelhead eggs to four schools in Tehama County for use in the "Trout in the Classroom" program.

Also, during February 2022, Laura Mahoney attended a career fair at the Northern Summit Academy for students in K-12th grades.

Laura Mahoney worked with Turtle Bay Exploration Park during February 2022, on the release of the fall Chinook salmon that they had on display at the museum for the past year. Turtle Bay timed their release to occur on the same day as a winter Chinook salmon release.

The new DRUPAL websites went live in February 2022, giving a much needed facelift to the hatchery website.

During March 2022, Coleman provided two fish for dissection to Kirkwood Elementary School in Corning; the classroom was participating in the Trout in the Classroom (TITC) program and was learning about the life cycle of salmon.

Also, during March 2022, staff from the Turtle Bay Exploration Park in Redding collected 200 fall Chinook salmon to place into an exhibit. These fish will be on display for the next year and will help educate the public about salmon in our area.

On 7 April, 2022 Laura Mahoney and Patty Dolittle attended the "Week of the Young Child" event at the Anderson Library where they provided handouts to the families and had "Landon the Salmon" greeting people.

During April 2022, Laura Mahoney went to Bend School and gave a lesson on salmon life history and made fish print t-shirts with the kindergarten students.

Also, during April 2022, Laura Mahoney also attended the release of fish from the Trout in the Classroom Program in Red Bluff, CA and provided an activity for the students at the release site.

In May 2022, Laura Mahoney read a book, shared information about the life cycle of fish, and did a fish craft with the students at the Cottonwood Creek Charter School.

In June 2022, Laura Mahoney gave a presentation for High School students participating in the Upward Bound program at Shasta College. The students also played a game that helped them to learn about healthy river systems.

In July 2022, Laura Mahoney read a book at the Anderson Library for "Story Hour" and talked about the life cycle of salmonids.

Also, in July 2022, staff at Coleman NFH provided tours to staff from Whiskeytown National Recreation Area on two separate days.

In August 2022, quilt squares were finished and sent off for the 150th Anniversary Celebration for Fish and Aquatic Conservation (FAC). The quilt squares will be added to quilt squares designed by other facilities and displayed at the D.C. Booth Historic National Fish Hatchery.

During September 2022, the hatchery hosted a volunteer orientation for volunteers who will be providing school tours to students.

MEETINGS, TRAINING, AND OTHER EVENTS

On 1 October 2021, the fish ladder was opened.

On 4 October 2021, Brett Galyean (Project Leader) participated in a meeting with Javier Linares (Fish Biologist), Robert Clark (Fisheries Program Supervisor), and Dr. Taylor Lipscomb (Supervisory Fish Biologist) discussing the Delta Smelt budget.

On 6 October 2021, Brett Galyean had a quarterly meeting with the Pit River tribe.

On 13 October 2021, Mike Mangas of KRCR News Channel 7 visited the hatchery to do his yearly story on hatchery spawning operations.

On 15 October 2021, Robert Clarke and members of the GSSA visited the hatchery to observe the collection of brood genetics for the new fry release program.

Also on 15 October 2021, Brett Galyean had a quarterly meeting with Derrick Rupert (BoR) to coordinate upcoming issues.

On 18 October 2021, Kris Kannarr of Portland Water Operations was on site to examine the water right measuring devices.

On 22 October 2021, Brett Galyean, Robert Null (Deputy Project Leader), and Ron Stone (Supervisory Fish Biologist) participated in a call with NMFS to discuss upcoming experimental fish requests.

There was a precipitation event known as an atmospheric river the weekend of 24 & 25 October 2021. A large amount of rain fell and flows in Battle Creek reached 3,000 cubic feet/second. In preparation for this event the fish ladder was opened more fish than usual were allowed into pond 3 (> 4,000). After the creek receded there were very few fish left in Battle Creek.

On 25 October 2021, Brett Galyean was interviewed by Jennifer Harrison of Sacramento Valley Water.

On 29 October 2021, hatchery staff participated in a call with the regional office and Red Bluff FWO to discuss future Butte City/Scotty's Landing experimental releases.

On 1 November 2021, Coleman staff participated in an all hands meeting with Kaylee Allen (Assistant Regional Director) and Bob Clarke.

On 4 November 2021, Brett Galyean and PG&E had their 4 plus 1 meeting.

On 5 November 2021, the pinnacle generator cell alarm was triggered. The alarm was the result of cell block 13 not being open.

Beginning on 15 November 2021, U.S. Fish and Wildlife staff from around the area were present for an acoustic tag surgery training.

On 16 November 2021, a federal contractor from the Infrastructure Management Division inspected the bridge on the Coleman Canal. There was nothing significant to report.

Also on 16 November 2021, Brett Galyean participated in a greater Battle Creek work group meeting.

On 19 November 2021, Norm Daniels (Industrial Electronic Controls Mechanic) retired from the service.

On 30 November 2021, a senior staff meeting was held.

On 1 December 2021, Brett Galyean, Bob Null, and Ron Stone participated in a call with the Red Bluff FWO, the Regional Office, and the CA/NV Fish Health Center to discuss a request to increase fish production numbers.

On 2 December 2021, Brett Galyean and Pacific Gas and Electric had their 4 + 1 call.

Also on 2 December 2021, Kaylee Allen and Robert Clarke made a site visit.

On 3 December 2021, Brett Galyean traveled to Mount Lassen Trout Farm (MLTF) to check on the WCS.

On 6 December 2021, Brett Galyean had a meeting with the Red Bluff fishing stakeholders to discuss STT production.

On 7 December 2021, the spawning building was cleared of fish and the fish ladder was closed.

Also on 7 December 2021, Dr. Christine Parker-Graham (Veterinary Medical Officer) was on site for a tour of the facility. Dr. Parker-Graham may be assisting Coleman NFH with prescription medication needs.

On 8 December 2021, Bob Null participated in a grant call with CDFW.

Also on 8 December 2021, Lonnie Sullivan, Spencer Gutenberger, and staff from Livingston Stone NFH tested the Keswick Dam fish trap in preparation for upcoming broodstock collection of late-fall Chinook salmon.

On 9 December 2021, a fry release meeting was held outside of the administration building.

Also on 9 December 2021, Brett Galyean participated in a Battle Creek reintroduction meeting.

On 16 December 2021, Brett Galyean participated in a Battle Creek priority meeting with CDFW and NMFS.

On 17 December 2021, there was a FCS fry release at Balls Ferry boat launch.

On 30 December 2021, representatives for the GSSA and NorCal guides and sportsman association attended the second FCS fry release at Balls Ferry boat launch.

On 2 January 2022, fish were collected from the Keswick fish trap. Keswick trips will continue every Tuesday during late-fall Chinook salmon spawning.

On 6 January 2022, Brett Galyean participated in a Battle Creek 4 +1 meeting.

On 14 January 2022, Brett Galyean had a meeting with NMFS and UC Davis representatives to discuss LFCS sampling for thiamine.

On 19 January 2022, reporters from the Los Angeles Times newspaper were onsite for a guided tour led by Brett Galyean.

On 21 January 2022, Brett Galyean met with Derrick Rupert during the quarterly coordination meeting.

On 26 January 2022, staff from UC Davis and NMFS were onsite to collect eggs from LFCS for analysis of thiamine level.

On 27 January 2022, Lonnie Sullivan, Ralph Winstead, and Brett Galyean visited a piece of private property on Battle Creek for a potential winter Chinook salmon release site.

On 31 January 2022, Cody Thomas was promoted from an Animal Caretaker to an Industrial Electronic Controls Mechanic.

On 2 February 2022, Randy Busjahn and Cody Thomas repaired filter 4.

On 3 February 2022, Lonnie Sullivan and Ralph Winstead installed new canal pump.

On 7 February 2022, Coleman maintenance staff did a complete install and service of a canal pump.

On 11 February 2022, Ralph Winstead and Cody Thomas completed the additional concrete pad for the new chillers in the ozone building.

On 17 February 2022, Ralph Winstead, Lonnie Sullivan, and Jason Fookes installed the partitions for the video weir in the fish ladder.

Also on 17 February 2022, Ralph Winstead and Lonnie Sullivan pulled two raceway pumps and took them to be rebuilt and balanced.

On 1 March 2022, staff began clearing pond 3 of fish 5 days per week.

Also, on 1 March 2022, Brett Galyean (Project Leader) attended a BoR budget meeting.

On 2 March 2022, Brett Galyean participated in a CDFW salmon forecast meeting.

On 4 March 2022, Bob Null participated in a salmon release meeting with the California Department of Water Resources and the CDFW.

On 8 March 2022, Hans Miller participated in a virtual environmental compliance audit.

On 14 March 2022, Brett Galyean, Taylor Lipscomb (Supervisory Fish Biologist), Kevin Niemela (Supervisory Fish Biologist), and Scott Foot (Project Leader, CA/NV Fish Health Center) had a meeting to coordinate potential drought actions.

On 15 March 2022, Alex Jones (Fish Biologist) from the Sacramento office came up to help with Fall Chinook Releases.

17 March 2022, was David Costas' (Animal Caretaker) last day at Coleman NFH.

On 22 March 2022, Brett Galyean had a meeting with the BoR regarding drought actions for Livingston Stone NFH.

On 28 March 2022, Coleman NFH announced multiple job openings for Animal Caretakers and Motor Vehicle Operators.

On 30 March 2022, Brett Galyean participated in a hatchery operations briefing with Paul Souza (Regional Director) and Ernest Conant (Regional Director, BoR) regarding future drought impacts.

On 31 March 2022, Brett Galyean completed the 2021 water right report for Coleman NFH and submitted it to the state water resource board.

On 5 April 2022, Brett Galyean (Project Leader) had a meeting with the of BoR regarding actions and projects in response to the ongoing drought. There are plans to install water chillers at the Livingston Stone NFH. These meetings will take place every two weeks.

On 6 April 2022, Brett Galyean participated in a virtual meeting with the Pit River tribe.

Also on 6 April 2022, the Coleman Powerhouse went down, and the hatchery went on intake 2.

On 7 April 2022, Brett Galyean and Bob Null had a meeting with the Red Bluff FWO senior staff regarding emergency drought actions.

On 12 April 2022, Brett Galyean gave an update on Coleman NFH and Livingston Stone NFH operations to the Tehama Fish and Game Commission.

On 14 April 2022, Brett Galyean had a meeting with the State Water Research Board regarding Livingston Stone NFH.

On 18 April 2022, Hans Miller, Sonia Thomas (Administrative Officer), Taylor Lipscomb, and Brett Galyean had a meeting with the asset management staff from the Portland regional office regarding new equipment procedures.

On 20 April 2022, Brett Galyean had a quarterly meeting with Derrick Rupert.

On 25 April 2022, Brett Galyean was interviewed by a Sacramento Bee reporter during a release of WCS into Battle Creek.

A senior staff meeting was held on 26 April 2022.

Administrative Professionals Day was celebrated on 27 April 2022.

On 28 April 2022, there was a Region 8 Town Hall meeting.

On 3 May 2022, Brett Galyean coordinated a meeting with the Service and the BoR to discuss drought actions to be taken at Livingston Stone NFH.

On 5 May 2022, Brett Galyean, Hans Miller, Randy Busjahn, Cody Thomas, and Justin Erikson gave Red Bluff FWO staff a tour of Coleman NFH water intakes.

On 9 May 2022, The Regional Director and Assistant Regional Director toured Livingston Stone NFH. Brett Galyean traveled to Livingston Stone NFH to give part of the tour.

Brett Galyean and Bob Null attended a Project Leader meeting in Sacramento from 10-12 May 2022.

On 10 May 2022, a Regional Office awards dinner was held for the Rachel Carson award winners which included current and former staff from Coleman NFH and Livingston Stone NFH. The award recipients were:

- *U.S. Fish and Wildlife Service Employees*- **Scott Foott**, **Scott Freund**, **Robert Null**, **Ronald Stone**, **Marc Provencher**, **Jeff Freund**, **Travis Webster**, **William Hopkins**, **William Ardren**, **Dan Castleberry**, **Brandt Becnel**, **Emily Van Seeters**, **Taylor Lipscomb**, **Kaitlin Dunham**
- **Rachel Johnson**, NMFS
- **Dale Honeyfield** and **Donald Tillit**, U.S. Geological Survey
- **Jacques Rinchard**, State University of New York- Brockport
- **Esteban Soto**, University of California- Davis
- **Kevin Kwak**, CDFW

On 13 May 2022, Clayton Hines (Animal Caretaker) celebrated his last day at Coleman NFH.

Also on 13 May 2022, Patty Doolittle (Animal Caretaker) celebrated her last day before beginning her maternity leave.

On 17 May 2022, Brett Galyean had a budget meeting with John Ridilla (Budget Analyst) and Sonia Thomas (Administration Officer).

On 19 May 2022, Brett Galyean participated in a call with NMFS and CDFW to discuss reintroducing WCS into the McCloud River.

On 26 May 2022, Brett Galyean called in to a Wage Grade Committee Workshop.

On 27 May 2022, Brett Galyean gave a presentation to the Northern California water Association regarding drought actions at Livingston Stone NFH.

On 1 June 2022, Brett Galyean participated in an External Affairs call to discuss upcoming summer projects.

On 6 June 2022, Brett Galyean participated in a call involving Service staff and UC Davis regarding a second captive brood location for Winter run Chinook Salmon at UC Davis.

On 10 June 2022, Brett Galyean and Taylor Lipscomb were interviewed by Judy Silber for a podcast discussing Livingston Stone NFH operations.

On 22 June 2022, Brett Galyean participated in a meeting with Livingston Stone NFH staff and BoR engineers for the upcoming infrastructure review.

On 23 June 2022, Brett Galyean participated in a Wage Grade Committee call.

On 28 June 2022, Coleman NFH senior staff had a meeting

On 29 June 2022, Brett Galyean had a Microsoft Teams meeting with Joanna Gilkeson (External Affairs media contact) to discuss upcoming events at Coleman NFH.

On 30 June 2022, Brett Galyean and Bob Null took part in a half day kick off meeting to review potential hatchery locations for upper Battle Creek.

Also, on 30 June 2022, Justin Erikson, Cody Thomas, and Hans Miller received critical training for trouble shooting, removal, and installation of ozone modules from the manufacturer (Pinnacle).

On 1 July 2022, Josh Stewart (Joint Administrative Operations) visited the hatchery for a tour and Brett Galyean also discussed recent feed orders and the feed order process.

On 7 July 2022, Brett Galyean had a Battle Creek 4 plus 1 meeting.

On 19 July 2022, Brett Galyean participated in a call with the CDFW grant technical team.

On 21 July 2022, Wilson Walker of CBS San Francisco visited Livingston Stone NFH. Brett Galyean and Taylor Lipscomb gave Mr. Wilson a tour and sat down for an interview.

On 22 July 2022, Brett Galyean had a quarterly meeting with Derrick Rupert discussing funding, infrastructure needs, and fish production.

On 29 July 2022, Taylor Lipscomb and Brett Galyean participated in a call with NMFS to discuss their Sacramento River temperature forecast model.

On 31 July 2022, the hatchery leg of the fish ladder was closed until FCS collection begins in October.

On 1 August 2022, The Coleman powerhouse was powered down for maintenance. The hatchery water supply was provided by intakes 2 and 3 for the entire month.

Beginning on 9 August 2022, a technical team toured 10 sites on Battle Creek for potential future hatchery locations. Marc Provencher (Fish Biologist) represented Coleman NFH on 10 August 2022, and Brett Galyean represented Coleman for the other tour dates (9,10,11 August).

On 15 – 19 August 2022, Brett Galyean and Bob Null attended a Recirculating Aquaculture Systems (RAS) class.

On 23 August 2022, Brett Galyean and Bob Clarke had a meeting with Damon Goodman (CalTrout) to tour Coleman NFH's water intakes and discuss screening or designing new water intakes.

Also on 23 August 2022, All Hands meeting was held. Bob Clarke and Kaylee Allen were in attendance. This meeting was also a potluck get together to celebrate Taylor Lipscomb's departure from Livingston Stone NFH.

On 25 August 2022, Brett Galyean participated in a Wage Grade Committee meeting.

Also on 25 August 2022, a Battle Creek grant meeting was held with Brett Galyean, CDFW and Service staff.

On 26 August 2022, Brett Galyean had a meeting with Regional Office staff discussing the addition of new infrastructure at Livingston Stone NFH for the Delta Smelt program.

Also on the 26 August 2022, Taylor Lipscomb celebrated his last day at Livingston Stone NFH.

APPENDIX A
COLEMAN NFHC STATION PERSONNEL

NAME	FUNCTIONAL TITLE	GRADE	PERIOD WORKED	REMARKS
Brett Galyean	Project Leader	GS-0482-14	10/01/2021–09/30/2022	
Robert Null	Deputy Project Leader	GS-0482-13	10/01/2021–09/30/2022	
Hans Miller	Supervisory Facility Op Sec	GS-1640-12	10/01/2021–09/30/2022	
Taylor Lipscomb	Supervisory Fish Biologist	GS-0482-12	10/01/2021-08/27/2022	Transferred
Sonia Thomas	Administrative Officer	GS-0341-11	10/01/2021-09/30/2022	
Terrera Hopkins	Fisheries Program Assistant	GS-0303-06	10/01/2021-09/30/2022	
Ron Stone	Supervisory Fishery Biologist	GS-0482-12	10/01/2021-09/30/2022	
Marc Provencher	Fish Biologist	GS-0482-11	10/01/2021-09/30/2022	
Matt Peckham	Fish Biologist	GS-0482-07	10/01/2021-01/15/2022	
Matt Peckham	Fish Biologist	GS-0482-09	01/16/2022-09/30/2022	Promoted
Laura Mahoney	Information & Ed. Specialist	GS-1001-11	10/01/2021-09/30/2022	
Travis Webster	Fish Biologist	GS-0482-09	10/01/2021-09/24/2022	Transferred
Kaitlin Gooding	Fish Biologist	GS-0482-11	10/01/2021-09/30/2022	
Alexandra Santos	Biological Science Tech	GS-0404-07	09/11/2022-09/30/2022	Hired
Joe Livesay	Electrician	WG-2805-10	10/01/2021-09/30/2022	
Lonnie Sulivan	Maintenance Mechanic	WG-4749-10	10/01/2021-09/30/2022	
Ralph Winstead	Maintenance Mechanic	WG-4749-10	10/01/2021-09/30/2022	
Jason Fookes	Maintenance Worker	WG-4749-08	10/01/2021-09/30/2022	
Randy Busjahn	Electronic Control Mechanic	WG-2606-10	10/01/2021-09/30/2022	
Norm Daniels	Electronic Control Mechanic	WG-2606-10	10/01/2021-12/18/2022	Retired
Cody Thomas	Animal Caretaker	WG-5408-05	10/01/2021-01/29/2022	
Cody Thomas	Electronic Control Mechanic	WG-2606-10	01/30/2022-09/30/2022	Promoted
Justin Erickson	Electronic Control Mechanic	WG-2606-10	02/13/2022-09/30/2022	Hired
William Hopkins	Animal Caretaker	WG-5048-05	10/01/2021-05/21/2022	
William Hopkins	Motor Vehicle Operator	WG-5703-08	05/22/2022-09/30/2022	Promoted
Michael Estes	Motor Vehicle Operator	WG-5703-08	08/14/2022-09/30/2022	Hired
Patty Doolittle	Animal Caretaker	WG-5408-05	10/01/2021-09/30/2022	
Jason Davis	Animal Caretaker	WG-5048-05	10/01/2021-09/30/2022	
Tadonisha Campos Mejia	Animal Caretaker	WG-5048-05	07/31/2022-09/30/2022	Hired
Sue Lynn Hanson	Animal Caretaker	WG-5048-05	07/31/2022-09/30/2022	Hired
Christina Sullivan	Animal Caretaker	WG-5048-05	07/31/2022-09/30/2022	Hired
William Worley	Animal Caretaker	WG-5048-05	07/31/2022-09/30/2022	Hired
Spencer Gutenberger	Motor Vehicle Operator	WG-5703-08	10/01/2021-02/12/2022	Resigned
Clay Hines	Animal Caretaker	WG-5408-05	10/01/2021-05/21/2022	Resigned

NAME	FUNCTIONAL TITLE	GRADE	PERIOD WORKED	REMARKS
David Costas	Animal Caretaker	WG-5048-05	10/01/2021-03/26/2022	Transfer
Amy Kart	Animal Caretaker	WG-5408-05	10/10/2021-03/12/2022	Seasonal

APPENDIX B
LOT DESIGNATOR CODES

RUN NAME	SPECIES CODE	STRAIN CODE	STATION CODE	SAMPLE DESIGNATOR CODE	LEGACY
Fall Chinook salmon - Battle Creek	CSA	FBW	COL	CSA-FBW-19-COL	FCS-BCW-19
Late Fall Chinook salmon - Battle Creek	CSA	LBW	COL	CSA-LBW-19-COL	LFS-BCW-19
Central Valley Steelhead - Battle Creek	CVS	WBW	COL	CVS-WBW-19-COL	STT-BCW-19
Winter Chinook salmon - Battle Creek (Captive broodstock)	WCS	WBD	LIV	WCS-WBD-19-LIV	WCS-BCW-19
Winter Chinook salmon - Sacramento River	WCS	WSW	LIV	WCS-WSW-19-LIV	WCS-SRW-19
Winter Chinook salmon - Battle Creek (Anadromous broodstock)	WCS	WBW	LIV	WSR-WBW-20-LIV	NA

APPENDIX C
STATION PHOTOS

Fish Culturists Amy Kart (left) and Patricia (Patty) Doolittle (right) Spawn FCS

Clay Hines (Fish Culturist) poses with a FCS

A student volunteer spawns LFCS

Fish Culturists Cody Thomas (right) and Jason Davis (left) spawning LFCS

Motor Vehicle Operator Spence Gutenberger loads fall Chinook fry into a tank for an unfed fry release

Fish Culturists Clay Hines (left) and David Costas (right) load FCS fry for the unfed fry release

The new Fish Distribution Truck with a refurbished tank.

Juvenile steelhead trout

Newly hired fish culturists Chrissy Sulivan (left) and Tadonisha Campos Mejia (right)