

Lahontan Cutthroat Trout Conservation Hatchery: Building on Success and Improving Fish Culture Efficiencies

Lahontan National Fish Hatchery
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Nevada



Located in Gardnerville, NV



All waterways are covered and enclosed



Tank Room

- New staff at the hatchery affords rare opportunities
- Ground-up lot histories
- Work schedules
- Monthly logs
- Weekly updates
- Sustainable communication

Blank Slate

- Weekly updates are a constant stream of communication going both directions
- Covers daily/weekly changes
- Current status
- Planning goals
- Provides a backbone for any discussion about hatchery operations or directional changes

Weekly updates

- Task 1: spawning
- Task 2: no re-use, plan for alternatives
- Using the hatchery constants, spreadsheets became the main tool for calculating fish loads, single-use water capacities and density limits given different scenarios

Big Questions

RW	take	% of target	# fish from rw	f/lb	keep	stocking number for verdi/pyr	stocking lbs	DI
2	5L	30.17%	1,396	2.75	1,396	0		
3	123L	50.00%	2,876	2.93	2,182	694	237	0.10
4	4	100.00%	2,154	3.08	2,161	0		
5	123S	50.00%	4,208	4.74	2,182	2,026	428	0.17
7	5S	61.94%	2,866	4.06	2,866	0		0.08
8	6S	59.20%	4,176	4.74	3,312	864	182	0.11
9	7S	50.00%	6,635	6.98	2,529	4,106	588	0.13
10	6L	40.80%	2,283	2.94	2,283	0		
11	7L	50.00%	3,844	3.49	2,529	1,315	377	0.12
14								
15	10S	41.11%	1,647	4.87	1,647	0		0.11
16								
17	8s	50.10%	3,753	4.80	3,753	0	0	0.13
18	9	37.82%	3,586	3.62	3,586	0		
19								
20	8L	0.00%	3,634	4.80	0	3,634	757	0.10
21	8L	50.01%	3,746	3.24	3,746	0		0.13
22	marlette							
23	10L	58.89%	3,026	3.56	2,360	666	187	0.08
29	12L	50.00%	2,046	2.44	781	1,265	519	0.07
30	12S	50.00%	5,366	4.46	781	4,585	1,027	0.13
31	11S	50.00%	3,641	6.26	888	2,753	440	0.07
32	11L	50.00%	3,321	2.44	888	2,433	998	0.12

Stocking ratios

2017 extra fish calculation takes 1-5					
TAKE	TROUGH	FISH	KEEP 20%	EXTRA FISH TO MOVE OFF STATION	running total
1	1	17,481	3,500	13,000	13,000
2	14,17	34,223	6,800	27,000	40,000
3	4,5	40,462	8,100	32,000	72,000
4	6,7,19,20	79,044	15,800	63,000	135,000
5	15,18	46,008	26,600 (needs inventory)	19,000	154,000
6	?	There will be extra fish from the future brood crosses. This can be approximated this week, but for now we can consider this number similar to take 5			

Predictive math for planning

Well GPM	1,500	DI limit TR	0.5		
Brood GPM req	600	DII limit RW	0.2		
GPM	900	Flow Index	1		
Fish count	212,000	lbs	69,347	end count	
Fish length at biomass limit	100	f/lb	3.06		
	Tank room		Raceway		
Volume per unit	56		960		
Max GPM per unit	30		150		
Units suppliable at max flow per unit	24		6		
Max units available	18		3		
Total volume 1st use max	1,008		2,880	Note: Re-use	
Biomass limit	50,400		57,600		
Fish count	154,078		176,089		

**How many fish can we hold
without re-use?**

- Flow Index
- Density Index
- Testing

Pushing limits

Setup Marlette Tank	Moderate: by 9/1					
		Replace screen drain	Remove and scrape off old silicon. Install new screen with 100% silicon	1 person 2 hours	2	
		Scrub and disinfect	Use bleach, let sit for at least 1 hour before rinsing	1 person 1 hour	1	
		Move to designated NB13	Verify count before moving fish	2 people 1 hour	2	
		Re-clean prior to moving fish	got dirty from NB cleaning		2	done
Deck 1/2 salting						done
	preventive before morts increase	Treat at 3% for 3 days	13 bags per rw with 15 gpm and 6" initial level	2 people days	36	
Move Marlette fish	Moderate by 9/4	move to NB13	confirm ready, report move in front log and to record-keeper. No counting/weighing required	2 people 1 hour	2	done
Split RW6	High by 10/19					done
		50% move to RW5	Sample count, weigh and move 50% of 29k fish into RW5, split feed 50%	1 person 3 hours	3	
Prepare for re-use operation	before uv bulbs arrive at the end of October					
		Scrub UV tanks	hand scrubbing tanks and crystals	2 people 4 days	48	done
		Clean Bioreactor bldg headbox	Flush with hose, shovel and bucket out muck	3 people 2 days	36	done
		Clean media	rake and hose media	2 people 4 days	48	done
		Clean channels and tail boxes	flush with hose and brooms	3 people 4 days	72	done
	Assist in bulb replacement			1 person 2 days	12	

Hatchery schedule

- SUMIFS('Take 1-5'!C:C,'Take 1-5'!A:A,Summary!A9,'Take 1-5'!N:N,"*INV)
- The genetic program at Lahontan requires tracking the equivalent of 13+ different species of fish per year-class that then need to be accounted for in a summary year-class

13-16 lot histories per year-class

2010 LCT summary

Date	lot	#	Weight	Morts	f/lb	length	Fish xfer (+/-)	Growth (in)	Growth/ day	lb gain	Fish Stocked	lbs stocked	Survival %	Overall survival %
4/1/2010	Cut-ppw-10-lah/fr													
5/1/2010	Cut-ppw-10-lah/fr	96,811	29	3,533	3,338.310	0.95	99,600						96.5%	98.2%
6/1/2010	Cut-ppw-10-lah/fr	202,767	183	7,880	1,107.313	1.37	104,900	0.42	0.014	127.1			96.3%	97.3%
7/1/2010	Cut-ppw-10-lah/fr	201,541	733	2,654	275.087	2.18	4,000	0.81	0.027	557.9			98.7%	96.7%
8/1/2010	Cut-ppw-10-lah/fr	200,856	1,662	685	120.837	2.87		0.69	0.022	935.2			99.7%	96.5%
9/1/2010	Cut-ppw-10-lah/fr	169,437	1,754	329	96.610	3.09		0.22	0.007	352.3			99.8%	96.2%
10/1/2010	Cut-ppw-10-lah/fr	39,592	694	38	57.049	3.69	-137,372	0.59	0.020	1,019.2	137,372	2,157	99.9%	96.2%
11/1/2010	Cut-ppw-10-lah/fr	31,255	617	25	50.656	3.84	-8,300	0.15	0.005	66.4	8,300	143	99.9%	96.2%
12/1/2010	Cut-ppw-10-lah/fr	31,053	980	136	31.687	4.48		0.65	0.022	368.6			99.6%	96.2%
1/1/2011	Cut-ppw-10-lah/fr	30,889	1,252	164	24.672	4.87		0.39	0.013	278.6			99.5%	96.1%
2/1/2011	Cut-ppw-10-lah/fr	29,577	1,852	31	15.970	5.63		0.76	0.025	653.9			99.9%	96.1%

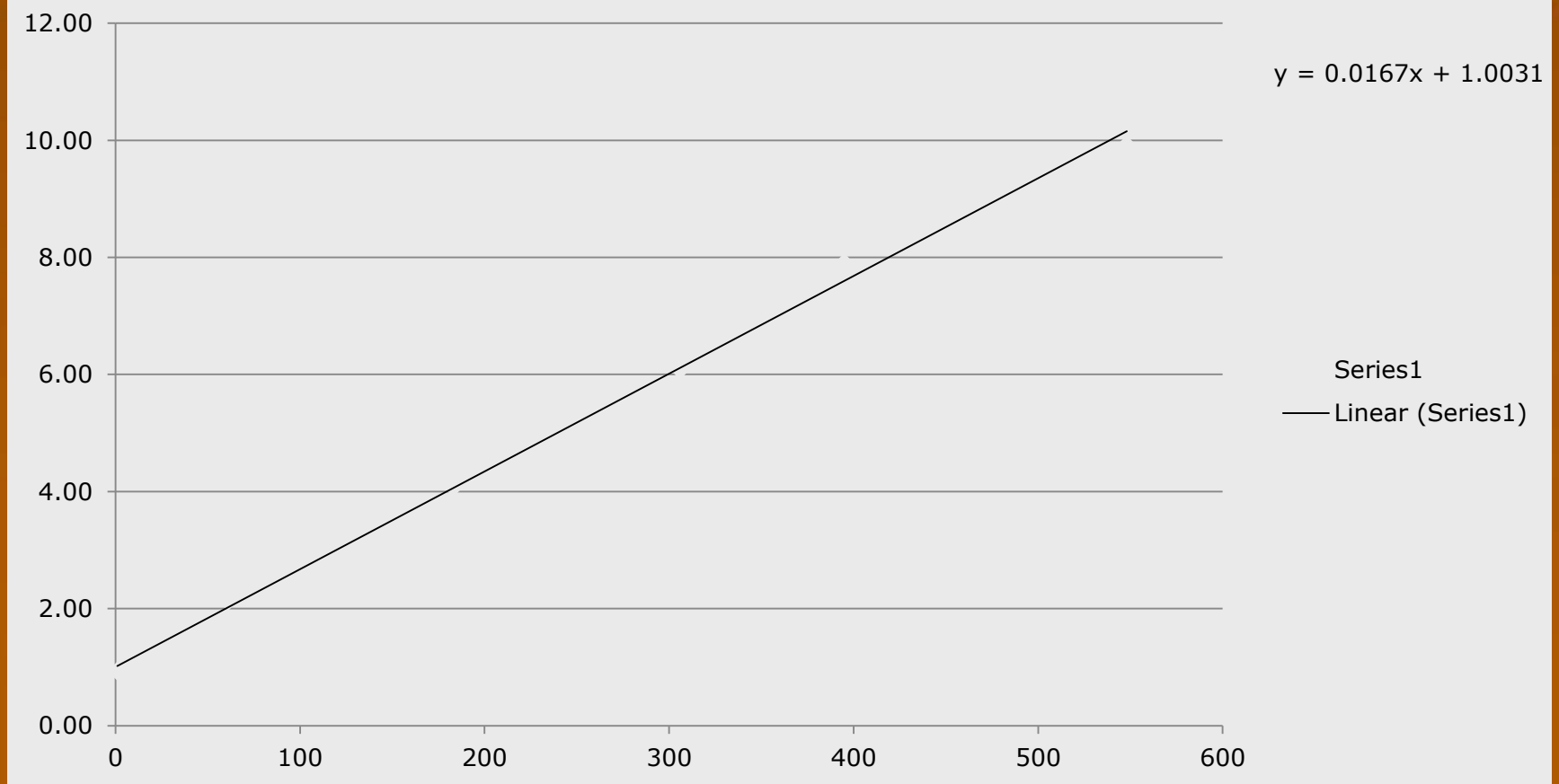


Microsoft Excel
Worksheet

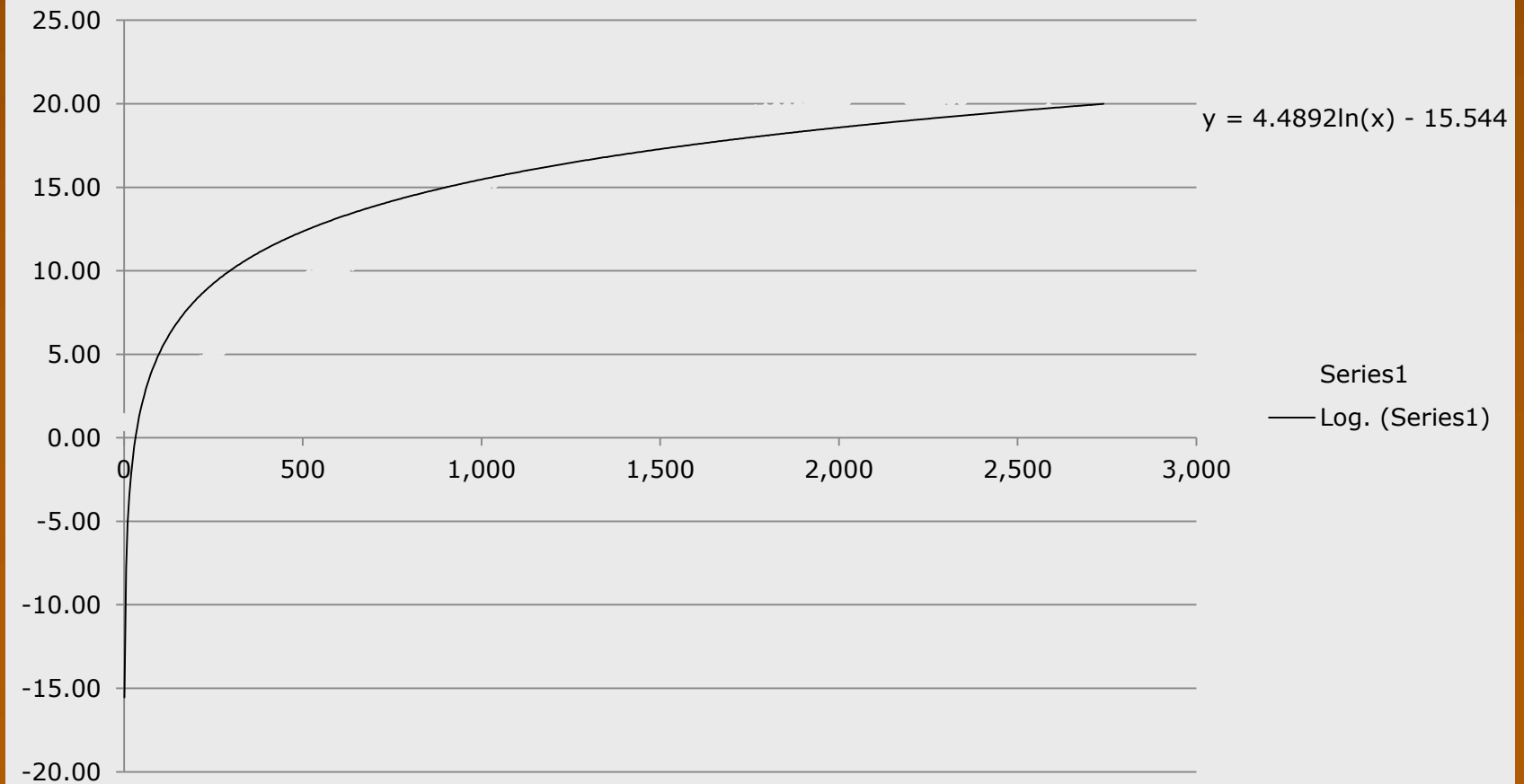
Lot history

Days from IF			Lenghts (in)							
	AVG		2010	2011	2012	2013	2014	2015	2016	2017
1	0.93	0.00	0.95	1.11	0.98	0.86	0.83	0.8	0.9	0.99
30	1.24	0.00	1.37	1.41	1.29	1.08	1.02	1.02	1.36	1.39
61	2.12	0.00	2.18	2.56	2.83	1.81	1.84	1.84	1.83	2.08
91	2.70	0.01	2.87	2.97	3.37	2.52	2.43	2.49	2.53	2.4
122	3.22	0.01	3.09	3.33	3.86	3.22	3.25	3.11	3.03	2.86
153	3.65	0.02	3.69	3.48	4.13	3.57	3.84	3.76	3.49	3.29
183	4.07	0.02	3.84	3.76	4.56	4.08	4.33	4.29	3.98	3.69

Example of use for compiled data



Linear growth through 10"



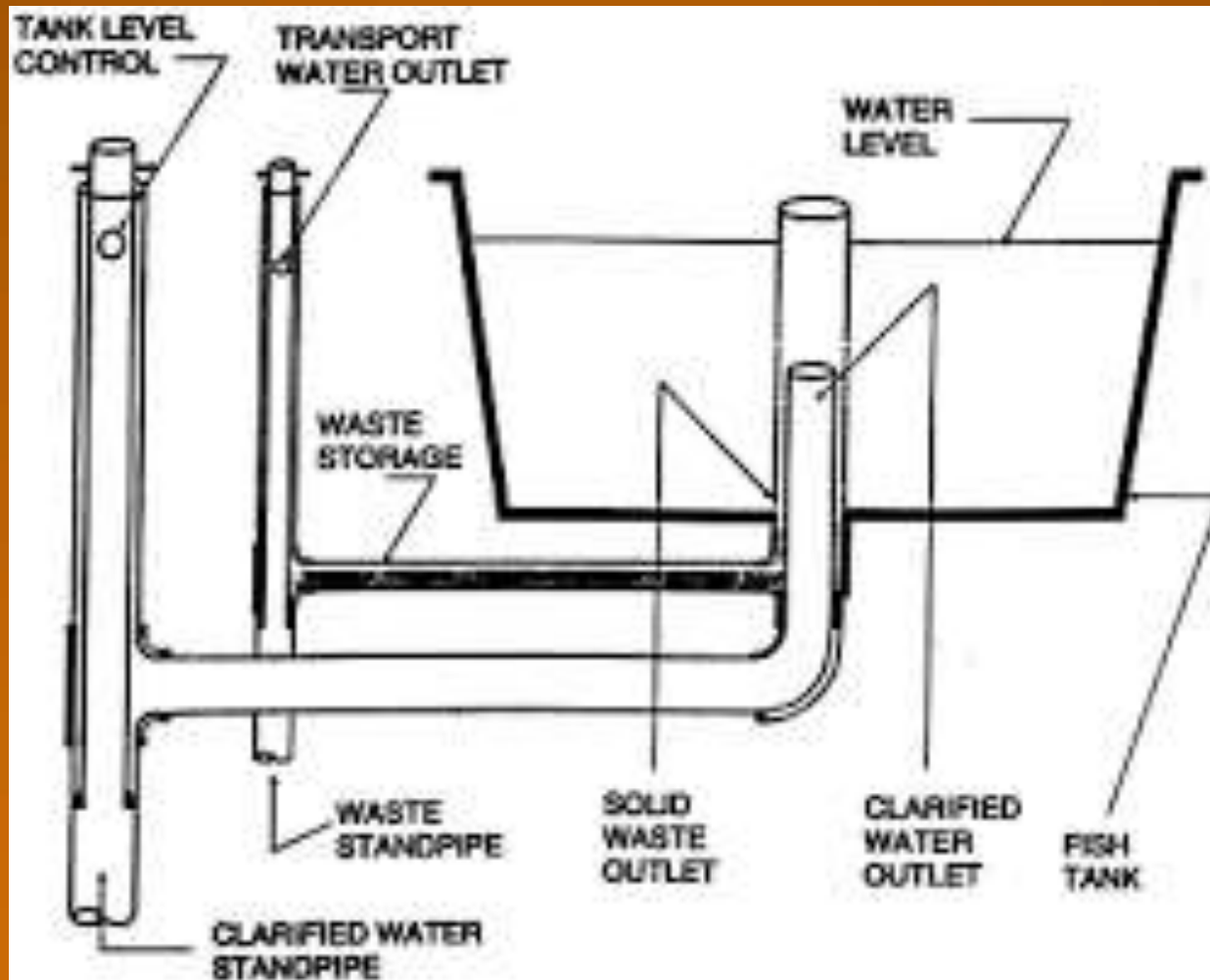
Growth formula

- Feed options
- Covers
- Tanks
- Safety standpipes
- Long-term data study and culture refinement

Next Tasks



Belt feeders on raceways



Safety standpipe



Cover prototype

- Special thanks to everyone at the Lahontan NFH Complex whose teamwork and dedication are the core force behind the Lahontan Hatchery

Questions