

VIII.—REPORT OF OPERATIONS AT THE U. S. SALMON AND TROUT STATIONS ON THE McCLOUD RIVER, CALIFORNIA, FOR THE YEAR 1885.

By LIVINGSTON STONE.

SALMON.

Everything at this station remains in very much the same condition as at the close of my last report, active operations not having been carried on here during this year.

All parties agree in reporting a very small run of salmon in the river this year. Indeed, salmon appear to have been scarcer than ever before in the McCloud River. This scarcity was probably caused partly by the illegal small-mesh fishing of the Chinese and Portuguese in the Sacramento, partly by the great number of sea-lions at the mouth of the Sacramento River, and partly by the great draft upon the salmon supply which is made by the numerous canneries on the river.

The effect of these destructive agencies upon the supply of salmon in the river was not felt so long as it was being offset by artificial propagation; but now that this has been suspended or nearly suspended for two or three years, the diminution of salmon in the Sacramento is becoming alarmingly apparent, and unless something is speedily done on a large scale, in the way of hatching salmon and placing them in the Sacramento or its tributaries, the river will soon be depleted of its most valuable fish.

TROUT.

After the date of my last report (October 1, 1884) nothing of special interest occurred at the United States trout-breeding station on the McCloud River until about Christmas time, when one of those terrific rain-storms peculiar to the west slope of the Sierra Nevada range visited the McCloud River. It rained in such torrents and the river and trout-pond creek rose so rapidly as to cause considerable alarm for the safety of the trout and the station. Mr. Green, the superintendent of the station, in a letter written on the spot, speaks of the storm as follows:

"December 25, 1884.—It has rained all the time since I wrote you before, and indications are of another flood. The water in the river is getting up near the house, the large rocks in front are all covered, and

great trees, root and branch, are passing every minute. The creek runs through one corner of the hatching-house. We have not shut our eyes for two days and nights, and to-night will be much the worst of any yet. We—my brother, myself, and two men—have been out in the pouring rain all day, and this afternoon, as I write, at 3 o'clock, have managed to save everything, with the exception of one trap and perhaps one boat. The traps are all some ten feet under water, but, as far as I can see, are still there. There is also one boat—one of the small ones—that we cannot get to. I do not know whether it is gone or not. It is very dangerous crossing the creeks, especially after dark. The water comes into the pond thick with mud; the fish all seem very uneasy, and are jumping continually, but I think they are all right as yet. One of our best dogs attempted to cross the creek this afternoon on a log, but for some reason slipped off and fell into the water, when he was immediately taken under and carried to the river. He kept his head up for about a mile. We started down the bank as fast as we could run, but could not keep in sight of him, and the last we saw he was sinking. Should the rain continue hard until to-morrow morning, it will reach the high mark made in 1881. Since commencing this letter the river has risen a foot. I will write more in the morning. Expect a very severe night, as the ponds require our constant attention.

*"Later (midnight).—*It is still raining, but not so hard. The water has been at a standstill since 10 p. m. The water in the ponds is thick with mud, and the fish are all gathered under the fall where it pours in. I am running as little water through the ponds as possible to-night, so as to keep out all the mud I can. The creek is fearfully high, but as yet I think the trap is safe, although it is impossible to be sure. I have never seen the McCloud so high except once before, and that was in the flood of 1881.

*"Later (December 26, 9 a. m.).—*It began raining harder about 2 a. m., and continued until nearly daylight; but since light, although it has been very dark and cloudy, it has not rained. The creek keeps about the same, but the water in the river has fallen two feet or more, so I think the danger of a flood is passed. The ponds are about six inches deep with mud, and we are now busy getting it out. Some eight or ten trout have died, but the rest look well, and just as soon as the water gets clear I shall take some eggs. Should have overhauled the fish before this had the weather been good; but being as it was, I dared not take eggs, for they would all have died at once when the mud struck them. We shall get no mail now for several days, as no boats can cross the river."

The worst of the storm was over by the next day, and on the day following (December 27) the spawning season began with the taking of 15,000 eggs. This storm was succeeded by one of the driest winters ever known in Northern California. This was unfavorable to the taking of eggs, because it kept the river trout from running up the creeks

to spawn, so that very few spawning trout were caught in the traps, of which Mr. Green had several in the creeks; and, besides this, it brought the spawning season to a sudden and very unexpected close in March, only 12,300 eggs being taken after the 1st day of April. A total, however, of 313,600 eggs was secured during the season, which appears to be very creditable, considering the circumstances.

One lot shipped to Washington was frozen in transit, but the temperature that week at various places on the overland route was 27° below zero, which, with some possible lack of attention on the part of the agents of the express company, readily accounts for the disaster.

In speaking of this shipment, Mr. Green says: "They were the best eggs ever taken here, and I got splendid moss and packed them with great care myself. I then made nice crates, exactly as always before, and had ice put on them in Redding; sent them from here to Redding on a spring wagon. The first lot was shipped in two crates. The box the eggs were in was 15 inches square and 7 inches high, and I made the crates 22 inches square and 2 feet high. The second box was 14 inches square and 7 inches wide, and crate 21 inches square and 2 feet high. They were one inch larger than I generally make them."

It accordingly appears that Mr. Green took sufficient care to get this lot of eggs through safely in ordinary weather, but the extreme cold on the way would freeze eggs in any kind of packing, if exposed to it, which was probably the case with this lot. The eggs generally, which were sent East, arrived, with the above-mentioned exception, in good order, as the following letters to Mr. Loren W. Green indicate:

"I am in receipt of your letter of the 9th announcing the transmission of an additional supply of trout eggs. It gives me pleasure to find the station so productive this year and to receive the eggs in such good condition. With the exception of the first lot, which was comparatively worthless, nearly everything has come to hand in an entirely satisfactory condition." [SPENCER F. BAIRD.]

"The trout eggs came safely to hand here on the 31st of March, and were immediately shipped to the hatchery at Allentown. The superintendent reports them in good order. Only 224 out of the 10,000 were dead, which, considering the circumstances, we think very good." [A. M. SPANGLER, Philadelphia, Pa., April 3, 1885.]

"I am very sorry you could not send us the full complement of eggs. They came through very nicely, and were in excellent condition, and I do not think there were twenty dead ones in the lot. Your mode of packing cannot be excelled." [OTTO GRAMM, Laramie City, Wyo., April 7, 1885.]

A circumstance occurred during the spawning season sufficiently extraordinary, I think, to entitle it to a brief notice here. It is a singular fact that the central line of the total solar eclipse of March 16, 1885, passed within six miles of the trout-breeding station. Mr. Green wrote

to me of it, and of the singular manner in which the Indians took it, as follows:

"*March 17, 1885.*—Our weather is still hot and very dry. Not a cloud has been seen the past two weeks, and there are no signs of rain. Yesterday was the day of the great eclipse of the sun, and it was the grandest sight I ever saw. The moon crossed the sun between 8 and 9 a. m., and it was dark as evening. I stood on the bank of the McCloud, just as near the line as possible. The water in the river showed the colors of the rainbow, and trees that stood near the water, their shadows reflecting back in the water, looked as though their limbs were edged with all the different colors. I never expect to see anything half so beautiful again. Just before the eclipse I happened to go over the river, and there were six of the old Indians gathered together, Old Kloochoy among them. I told them it was going to be dark pretty soon, and they all laughed and said, "Chipcalla" (bad), but I persuaded them to come up on the flat near the river and wait a little while. Then I told them to watch the sun and it would soon grow dark. I had some smoked glass, and could already see the black moon very plainly. They were all jabbering away, laughing and having a great time, but very soon it commenced growing visibly dark, and they noticed it. Then their fun was over. They were all very quiet for awhile and watched the sun closely. It grew dark very rapidly, and the first thing I knew they were all on their feet, and had begun to dance and scream, and of all the noises I ever heard they made the worst. They said they were all going to die. Very soon I noticed a change in them. They all stopped and talked very fast for a moment. Then two of them started for the house. It was dark as evening. Pretty soon they returned, bringing all their bows and arrows, flints, beads, and almost everything they had. Then they took the oldest squaw and laid her out as though she was dead; placed the trinkets all around her, and then began that awful cry and wail again. By this time the eclipse was passing away, and I told them it would soon be light again. It kept growing lighter and lighter. Soon the sun was clear again, and although they let the old woman up, it was some time before they would believe they were going to live."

The weather continued warm and very dry till the last eggs were taken, which was on the 29th of April.

During the summer several improvements were made about the station, the principal of which was an addition to the dwelling-house, which was very much needed, the original house being small, unfinished, and made chiefly of shakes.

Towards the latter part of the summer the trout were observed to be dying, both in the pond and in the McCloud River. There was no apparent cause for it, and it was hoped at first that it was only a temporary trouble,* caused by something unwholesome in the water, the

* See F. C. Bulletin, 1885, p. 472.

streams being very low; but it did not pass away, and on October 6 Mr. Green wrote me that the trout were continuing to die and that the disease was as destructive in the river as in the ponds. Some of the features of this singular mortality among the fish are presented in the following letters from Mr. Green :

"I have some five or six large trout now in a pond by themselves, which have showed no signs of life, save their breathing, for the past five days. They lie perfectly still on their sides, and when disturbed or taken from the water they seem to shake or quiver, and will splash around quite lively for a moment, then lie back on the bottom and remain perfectly still for days; and while keeping so quiet, sediment from the water gathers in their gills. They sometimes linger for six or eight days, just in this way. It is my opinion that the disease was brought to our ponds by the fish caught in the river. Our fish were all perfectly healthy until we commenced fishing this fall; we lost but very few fish during the summer, and they were all fat and nice. The first I noticed were those dying in the river, and I also noticed that some of the fish that died first in our ponds were those lately put in. I have examined a number of those dying in the river, as well as those from the ponds, and all that I can find is that the stomachs seem hard and drawn up, and that in some of them there is a yellowish fluid around the heart. The first symptom of the fish, before taken, is that it turns a very dark color. I can now tell some three or four days in advance those that are going to be taken with it, for they turn so dark. The fish seem in no pain; only seem stupid. I have seen hundreds of trout die from old age or from fungus, bruises, or something of that kind, but I never saw a trout sick before that would lie on the bottom. They almost invariably keep near the top and keep falling back against the back screen; but not so with these; they are strong until they die. I wish I could send you one for examination. I think hereafter I shall never mix again the trout caught in the river with those wintered in our ponds, for it is almost certain to me that the disease is one that is catching, and was brought from the river. What seems more sure than anything else is that I have one pond containing nothing but large females. It is the new pond, or last one made. Water runs in it directly from the flume before running over any other fish. I wished to keep the females separate, and for this reason have put no other fish in this pond at all, and strange to say, the fish in this pond have not been troubled.

"Our small fish have also suffered but little. However, the loss has been very heavy, and unless we have unusually good luck with our traps I am afraid we must fall short somewhat of our usual amount of eggs.

"We are fishing now every day and having fair luck, and, had we not had this loss, would have taken a splendid lot of eggs. The water in the river is much lower than I have ever known before, and the snow

on Mount Shasta seems greatly reduced. The river has been of a milky, muddy color all summer long, until about a week ago the weather got cool, and it is now clear. The temperature of the water while the trout have been dying has been 58 or 60 degrees Fahr.

"There is not a salmon to be seen in the river, and there have been but very few fish up here at all. I have kept a very close watch on them, and have tried in all ways to get eggs to fish with for bait, but have succeeded during the whole season in getting the eggs from only five salmon. The last reports from Hat Creek were that there were no salmon there yet."

"*September 15, 1885.*—Our weather is still hot and very dry, and our water supply is very low. Our fish have been dying considerably lately, from what cause I cannot tell. I have taken great pains with them, and they look splendidly. They are all fat. The first we notice of their being sick we find them lying in the ponds on their sides, with not a mark of any kind; great, large, bright fish, and they are fat as can be. They refuse to eat perhaps a day before they are taken; up to that time they eat heartily. Some of them seem to cramp and their bodies will be crooked, and it is almost impossible to straighten them. They lie in the ponds in this way, breathing faintly for three or four days, and then die. It is something never known here before. I have given them quantities of earth, salt, and everything I could think of, but to no account. It attacks only the large fish. I have one pond of two-year-old trout, that has five hundred or so in it, which has not been troubled at all. Fish in the river are just the same. I found three large trout this morning lying in the bottom of the river, not any of them dead. I went up and caught them, and after rousing them they would swim off a short distance and then turn on their sides. The water has never been so low by half since we were here. I thought once I should be obliged to build ponds in the river, but that would have caused a great loss of fish, as it is almost impossible to build a wall along the river secure from minks and otters, and they are very plentiful here. I am afraid our egg supply will be rather short next winter. Fish in the river are very scarce. I have been fishing the past four or five days and have caught only two large trout. Can catch plenty of small ones, but they will not spawn this season."

"*September 18, 1885.*—The trout still continue to die, and from what cause I cannot tell. I have just taken out eight very large, fat trout, with not a single spot on any of them. Their eyes and gills are perfectly healthy and the females are full of eggs. It is something never known before here, and it has caused a great loss of fish. For two or three days after they are taken they lie on their sides and do not move unless touched. If taken from the water they tremble and quiver. I am doing the best I can to save those not yet sick. Strange to say, none but the very large fish are troubled. The yearlings and two-year-

olds are perfectly healthy. I sometimes think they were poisoned by some one, yet I have no idea who could have done such a thing."

"*September 23, 1885.*—Since I last wrote, there has been no great loss of life. I got up very early one morning, I think the next after I wrote you, and went to the ponds, and there were several in each pond lying on their sides, but they were not dead. I got them all up, and then cut some fresh venison up fine and soaked it in lard and fed it to the fish that would eat, and since that they seem to have brightened up wonderfully, and I think now the danger is mostly passed. The only cause that I could find for their dying was in their stomach. There was not a single spot on any of them; eyes were bright and gills perfectly natural, and they were all fat fish, but their stomachs seemed hard and drawn up. The fish that died I think suffered but little. They would be taken suddenly, and perhaps for one day would lie on the bottom very still, but right side up, then the next day they would lie on their sides, but breathe rather more quickly than was natural. If disturbed, they would swim a short distance as though all right, only some of them seemed cramped, and their heads were crooked to one side. They would remain in this state sometimes three or four days, and then die. Our water supply seems a little on the rise now, and the remaining fish look splendidly, and I think now with good care we shall bring the rest through. Our young fish are in good condition and we have just added a nice lot—75 yearlings and two-year-olds—to our ponds. Fish in the river are very scarce; we have been fishing now some time, but have only succeeded in capturing small fish. The water in the river has been very muddy all summer and is still so. We have had a loss of large fish this time that it will take some time to replace, yet, if no more die now, we can get along."

"*November 14, 1885.*—I have thought all along that as soon as the rains began there would be a change in the mortality of the trout; but it seems not. There are six in one pond this morning that refuse food and have turned the dark color, and are resting on the ground. We have been at work very hard, catching trout, and adding to our ponds from the river; but it seems of little use, as the ones caught from the river die very fast. Some of the smaller fish have died lately. Professor Baird has written that he has asked Prof. S. A. Forbes, of Champaign, Ill., to forward me a preserving fluid, and wished me to send some of the diseased specimens direct to him. Professor Baird says that Professor Forbes is preparing a general report for the Commission upon the subject of the diseases of fish. He also says that the fish of Wisconsin have died in great numbers, and that Professor Forbes had traced the disease to the immense development of bacteria, called micrococci, congesting the liver and spleen of the fish."

At present the prospect is rather discouraging for a good yield of trout eggs during the season of 1885-'86; but a considerable number of young fish are coming on, and perhaps next year's harvest may make up for the deficiencies of this season.

Appended to this report will be found memoranda from Mr. Green's diary, relating to the weather, &c., from September 24, 1884, to April 20, 1885, and tables of statistics as follows:

1. Record of trout caught.
2. Record of trout eggs taken.
3. Distribution of trout eggs.
4. Temperatures of air and water.

CHARLESTOWN, N. H., *December 31, 1885.*

Memoranda relating to the weather, &c., at McCloud River Station from September 24, 1884, to April 20, 1885.

Date.	Condition of weather.	Date.	Condition of weather.
1884.		1884.	
Sept. 24	Weather warm and clear.	Dec. 21	Raining very hard, with heavy wind and thunder; trees breaking down; river very high and rising fast.
26	Strong north wind and cool.	22	Raining hard; heavy wind; river 8 feet above usual summer level. In evening 10 feet above, and rising
27	Warmer.	23	Still raining hard; water very high and muddy.
28	Quite warm.	24	Raining slowly all day; water at a stand-still; very high and river full of logs; water in the ponds clearing, and fish looking and feeding well.
29	Do.	25	Raining very hard; water rising fast; very muddy; traps are covered and under water, and trout running over top; one trap gone out; wind blowing; trees falling on all sides; heavy tree fell across one of the ponds; no damage.
30	Raining all the afternoon.	26	Still raining; water 18 feet above low-water mark; fish running over traps.
Oct. 1	Heavy hail-storm.	27	Clear, and heavy frost; water falling fast.
2	Very cool, but clear.	28	Raining slowly, and very dark; water falling.
4	Very cool.	29	Clear, and ground frozen.
5	Do.	30	Clear and warmer.
6	Raining all day.	31	Cloudy and quite warm.
7	Do.	1885.	
8	Warmer and clear.	Jan. 1	Raining hard all day.
9	Warm and clear.	2	Clear and warm.
10	Do.	3	Warm and cloudy; no fish.
11	Do.	4	Raining hard all day; very warm; no wind.
12	Raining hard all day and cool.	5	Very cloudy; no rain; warm.
13	Raining hard; water rising rapidly.	6	Clear and warm; water falling.
14	Very dark and cloudy; no rain; water 3 feet above low-water mark.	8	Cloudy and misty; very dark; no trout running.
15	Morning clear and frosty.	9	Cloudy and warm; snow melting fast on mountains; water rising fast.
16	Clear and warmer.	10	Raining all day; creeks and river rising fast.
17	Morning clear and cool; evening cloudy and showery.	11	Clear and warm.
18	Cloudy and showery.	12	Clear and cool in morning; trout eggs taken advancing slowly, but doing splendidly; no dead ones.
19	Clear and warm.	13	Clear and cool.
20	Do.	15	Clear and warmer.
21	Lost 26 trout by Indians.	16	Cloudy; raining hard in afternoon; warm.
22	Had Indians arrested; weather clear and warm.	17	Clear and warm; eggs doing splendidly; no dead ones yet.
23	Weather warm.	18	Clear and warm.
24	Clear and warm.	21	No trout running; very warm, and water getting very low.
25	Do.	22	Clear and warm; trout and eggs doing splendidly.
26	Clear, warm, and very dry.	23	Heavy frost this morning; day clear and warm.
27	Do.	24	Clear, and getting dry.
28	Do.	25	Very warm; eggs doing splendidly; very few dead ones.
30	Very cloudy; south wind.		
31	Raining slowly.		
Nov. 1	Clear and warm; north wind.		
5	Cloudy and warm.		
9	Clear and hot.		
14	Clear and warm; very still.		
16	Trout biting very poorly.		
17	Clear and warm.		
26	Very warm.		
27	Beautiful day.		
28	Clear and warm; very still.		
29	Clear and warm.		
30	Cloudy and cool.		
Dec. 1	Clear and warm.		
2	Cool wind.		
6	Frost last night.		
7	Cold and clear; north wind.		
13	Very cool and windy.		
14	Very cloudy.		
15	Showery and cold.		
17	Hard snow and rain all day.		
18	Four inches of snow, and cold.		
19	Snow and rain; warmer.		
20	Trees heavily loaded with snow.		
	Raining very hard; water rising and muddy.		

Memoranda relating to the weather, &c., at McCloud River Station, &c.—Continued.

Date.	Condition of weather.	Date.	Condition of weather.
1885.		1885.	
Jan. 26	Warm and dry; trout in ponds spawning well.	Feb. 27	Warm and dry; water very low.
27	Cloudy and warm.	28	Clear and warm.
29	Raining hard all day.	Mar. 1	Water low, and trout spawning freely in the river.
30	Cloudy; no rain.	2	Warm and clear.
31	Clear and warm.	3	Strong north wind.
Feb. 2	Raining hard; water 1 foot high; some of the trout caught had already spawned.	5	Strong north wind, and very dry.
3	Raining hard all day.	6	Clear and warm.
4	Forenoon cloudy and misty; afternoon clear and warm.	7	Fish nearly done spawning.
5	Water falling, and quite warm.	8	Warm and clear.
6	Clear and very warm.	9	Warm, cloudy, and a little rain.
7	Clear and warm.	11	Clear and warm.
8	Warmer, and water low.	13	Very dry.
9	Clear and warm.	17	Very clear and hot; ground dry.
12	Eggs doing nicely, and fish feeling well.	25	Clear, warm, and very dry.
13	Eggs doing splendidly.	26	Strong north wind; fish about done spawning.
16	Warm and dry.	27	Warm and dry.
18	Clear, warm, and very dry.	30	Strong north wind.
21	Raining hard all day, but very warm.	31	Clear and very hot; no wind.
22	Quite cool; strong north wind.	Apr. 1	Cloudy, and north wind.
23	Warm and pleasant.	6	Very cloudy, and a little rain.
25	Strong north wind.	8	Clear and hot.
26	Trout spawning slowly; eggs doing splendidly.	9	Do.
		19	Gave the fish a mud bath.
		20	Fish doing better; looking much brighter.

TABLE I.—Record of trout caught at McCloud River Station during the season of 1884-'85.

Date.	Number caught.	Date.	Number caught.	Date.	Number caught.	Date.	Number caught.
1884.		1884.		1884.		1884.	
Sept. 24	6	Oct. 10	15	Nov. 4	17	Dec. 28	16
Sept. 25	17	Oct. 11	15	Nov. 7	20	1885.	
Sept. 26	11	Oct. 16	32	Nov. 8	15	Jan. 10	3
Sept. 27	7	Oct. 17	17	Nov. 10	15	Jan. 11	13
Sept. 28	3	Oct. 18	20	Nov. 11	10	Feb. 2	15
Sept. 29	4	Oct. 24	20	Nov. 13	3	Feb. 3	7
Sept. 30	4	Oct. 27	10	Nov. 20	5	Feb. 4	4
Oct. 2	8	Oct. 28	10	Nov. 29	12	Feb. 5	3
Oct. 3	8	Oct. 29	15	Dec. 21	2	Feb. 6	9
Oct. 4	8	Oct. 30	10	Dec. 22	25		
Oct. 8	14	Oct. 31	10	Dec. 23	24	Total	490
Oct. 9	8	Nov. 3	10	Dec. 25	1		

TABLE II.—Record of trout eggs taken at McCloud River Station during the season of 1884-'85.

Date.	Females.	Eggs.	Date.	Females.	Eggs.	Date.	Females.	Eggs.
1884.			1885.			1885.		
Dec. 27	14	15,000	Feb. 6	6	6,500	Mar. 10	10	9,100
Dec. 28	35	35,200	Feb. 10	27	25,250	Mar. 20	6	5,000
1885.			Feb. 11	10	10,200	Mar. 21	10	10,150
Jan. 2	18	16,200	Feb. 14	5	15,800	Apr. 1	9	7,000
Jan. 5	5	*5,000	Feb. 17	21	20,300	Apr. 9	5	4,300
Jan. 10	18	18,200	Feb. 22	6	16,000	Apr. 16	6	3,000
Jan. 15	8	*8,000	Feb. 26	10	10,200	Apr. 24	2	2,000
Jan. 20	32	30,500	Mar. 5	5	*5,500	Apr. 29	3	3,000
Jan. 24	13	12,100	Mar. 8	11	10,200			
Jan. 28	7	*7,000	Mar. 13	3	*3,200	Total	324	313,600
Feb. 2	19	20,200						

*Hatched for river.

†Hatched for ponds.

TABLE III.—*Distribution of trout eggs from McCloud River Station during the season of 1885.*

Date.	Sent to—	Number of eggs.
1885.		
Jan. 14	Prof. S. F. Baird, Washington, D. C.	50,000
21	do	16,000
25	do	18,000
Feb. 4	do	30,000
11	do	12,000
19	do	20,000
25	do	25,000
	Gordon Land, Denver, Colo.	10,000
Mar. 4	Prof. S. F. Baird, Washington, D. C.	20,000
12	do	10,000
23	A. M. Spangler, Philadelphia, Pa.	10,000
30	Otto Gramm, Laramie City, Wyo.	10,000
Apr. 6	B. E. B. Kennedy, Omaha, Nebr.	15,000
	Total	246,000

TABLE IV.—*Temperatures of air and water at noon at McCloud River Station during the season of 1884-'85.*

Day of month.	June, 1884.		July, 1884.		Aug., 1884.		Sept., 1884.		Oct., 1884.		Nov., 1884.		Dec., 1884.		Jan., 1885.	
	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.
1	68	58	82	60	88	60	80	58	58	54	60	53	52	48	48	46
2	68	58	82	60	88	60	80	58	58	54	70	53	46	48	48	46
3	78	60	82	60	88	60	84	58	68	53	74	53	48	46	50	48
4	78	60	82	60	90	60	74	56	66	53	68	53	52	46	52	48
5	78	60	84	60	91	60	68	56	66	53	66	53	48	44	56	48
6	76	58	80	60	92	60	60	56	70	53	60	53	46	44	58	48
7	75	58	72	60	92	60	60	56	72	53	62	53	46	44	60	50
8	74	58	80	60	92	60	62	56	66	53	60	53	42	44	64	50
9	74	56	82	60	90	60	60	56	60	53	62	53	40	44	64	50
10	62	56	82	60	94	60	58	56	60	52	60	53	44	44	60	50
11	62	56	82	60	92	60	50	56	60	52	60	53	46	44	62	50
12	68	56	84	60	96	60	64	56	64	52	60	53	48	44	64	50
13	58	58	82	60	92	60	54	56	60	52	60	54	42	44	50	50
14	66	58	84	60	86	60	58	56	58	52	58	54	44	44	44	50
15	68	58	80	60	84	60	52	56	64	52	50	54	40	44	50	60
16	74	60	72	60	82	60	56	56	70	52	48	53	30	44	51	52
17	75	60	82	60	82	60	60	58	72	52	50	53	34	44	00	52
18	82	62	74	60	86	60	64	58	73	52	53	52	42	44	58	52
19	82	62	78	60	88	60	70	58	74	52	54	52	40	44	54	52
20	84	62	84	60	84	60	72	57	70	52	55	51	44	44	50	52
21	80	60	84	60	80	60	74	57	73	52	48	51	50	44	56	52
22	82	60	84	60	90	60	70	57	76	52	50	51	55	45	50	52
23	72	58	84	60	89	60	68	57	78	52	48	51	58	46	52	52
24	56	58	86	60	89	60	68	57	80	52	48	50	64	46	54	51
25	72	60	84	60	86	60	64	57	70	52	52	50	54	46	58	51
26	70	60	80	60	80	60	60	55	72	52	50	50	60	40	56	51
27	78	60	84	60	86	60	60	55	78	52	48	50	54	46	50	51
28	78	60	86	60	88	60	60	55	78	52	46	50	44	44	51	51
29	70	60	88	60	88	60	60	55	80	53	48	50	44	44	52	51
30	82	60	88	60	90	60	60	55	80	53	48	51	48	44	56	51
31	82	60	90	60	90	60	82	53	53	53	53	53	50	44	58	51