

SakhalinRybVod

Report of the Reydovo Salmon Hatchery for the 1st half of 2007

**Reydovo
Reydovo Salmon Hatchery
2007**

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I.Hatchery target for young salmon release and its achievement

The Reydovo Salmon Hatchery has been releasing young salmon since 1961, with particular emphasis on two species: pink and chum salmon.

During the 2006 – 2007 hatchery cycle, 67700.3 thousand young salmon were released, including 41664.9 thousand pink salmon young and 26035.4 thousand chum salmon young. The 2007 salmon release plan was 62.6 million fish, including 38.1 million pink salmon young and 24.4 million chum salmon young. This plan was met by 108.15 %. The average weight of released pink salmon young was 308.8 mg, and the average weight of released chum salmon young was 1100.4 mg.

In the reporting year, the numbers of eggs incubated and young salmon released corresponded to the designed capacity of the hatchery. Chum Salmon was set out to hatch and grow in 62 (2356 m²) channels, and Pink Salmon in 54 (2052 m²).

Information on the extent to which the plan was met during the last six years is presented in Table 1 of the Appendix.

In 2007, the chum and pink salmon young were fed with various formulations of the Danish Fish food pellets, "ALLER AQUA" (Table 11). The feed coefficient for pink salmon was 1.04, and for chum salmon was 0.7 (Tables 10.1-10.2 of the Appendix).

II. Description of the conditions of egg incubation and sac-fry holding

A. Hydrometrological Observations

The weather conditions for the past six month period were characterized by a moderate amount of precipitation at the beginning of winter (December-January) and by an increase in February-March. Throughout the winter, thaws occurred on a regular basis. The onset of snow cover during the reporting period occurred during the beginning of December, in keeping with the normal time frame.

The weather during the entire month of **January** 2007 was overcast and unstable, with moderate north-west winds. There were only two sunny days during the entire month. On 09JAN07, a typhoon passed through the area, with strong NW and W winds and blizzard conditions, as a result of which the mouth of the base rivers, Rey-dovaya and Argunj, was washed out and wind damaged.

In **February** the weather was predominantly overcast, with winds from the northwest and snowstorms of various intensity. In February there were two strong blizzards (02FEB and 14FEB) with winds of more than 20 meters per second, as well as several thaws, when the air temperature was between 0 and +5 °C, accompanied by wet snow and rain. The surface flow of water in the river during this winter never stopped, which made it possible to supply the nursery with river water during the entire period of pink salmon incubation.

During the first twenty days of **March**, the weather was predominantly overcast and unstable, with southeast and northwest winds. There were 4 days of sunshine. During the last ten days of March, the weather was predominantly sunny and calm. Chum salmon young first appeared at the spawning grounds during the first ten days of March.

During **April**, cold, overcast weather predominated with precipitation in the form of rain and wet snow, and there were six sunny days recorded for the month. Snow melt occurred gradually, without causing the water level in the river to increase very much.

During **May** the weather was predominantly overcast with drizzling rain and moderate southeast and northwest winds. During the month there were four days of sunshine. The water level in the river varied by 0.5 - 2.0 meters. Sea water temperature at the end of the month was 4.2 degrees C. *Beginning on 30 April, water was added from the well shaft (with an average temperature of 8.2 °C) to warm the water up, and such pumping was halted on 10 June.*

For the entire month of **June** the weather was predominantly sunny and variable, with no significant precipitation. There was no flooding during the month, and *the release of the young salmon was accomplished during favorable hydrological conditions both in the river and at sea.*

Data on the temperature regimes are presented in Tables 3.1 – 3.5 of the Appendix.

B. Placing of eggs in incubators

During the reporting year, the incubation of pink salmon eggs occurred in 78 "BOX" incubators and 8 "ATKINS" cells. An average of 555.0 thousand eggs were incubated in the "BOX" units, and each cell of the "ATKINS" unit held 153.6 thou-

sand eggs. For the incubation of chum salmon eggs, 62 "BOX" units were used, with an average of 416.8 thousand eggs, and 36 "ATKINS" incubators, with an average of 114.2 thousand eggs in each cell. Altogether in 2006 there were 140 "BOX" incubators and 11 ATKINS units. The hatchery has a total of 144 "BOX" incubators and 12 "ATKINS" units (each having 4 cells).

C. Incubation of eggs

Altogether during the 2006 season, 73490.9 thousand salmon eggs were collected, including 44711.5 thousand pink salmon eggs and 28779.4 thousand chum salmon eggs. All pink and chum salmon eggs were collected on the base river – the Reydovaya.

Egg die-off during incubation (including as a result of transport) for **pink salmon** was 2869.9 thousand, or 6.4%. The percentage of fertilized eggs was 95.5%. Saprolegniosis of the eggs was insignificant. Prophylactic cleaning was done on the second day following collection, after the dead eggs were removed from the incubators using Malachite Green. Dead eggs were removed from the incubators at an age of from 300 to 450 degree days using JX egg removers. Before the dead eggs were removed, the eggs were first stressed by pouring them from one basin into another. Water consumption for the incubation period was set at 50 liters per minute at the start of incubation, and 70 liters per minute at the end of incubation. The water was supplied from groundwater from 18SEP through 16NOV06, then was subsequently shifted to the infrared drainage water supply. Mass hatching occurred on days 86 – 113 at 467.3– 561.4 degree days in the period from 22DEC through 30JAN07.

Egg die-off for **chum salmon** was 2626.1 thousand, or 9.1 %. No transport die-off was removed. The percentage of fertilized eggs was 95.2%. Eggs were treated with Malachite Green on the second day after placement and before removal of dead eggs from the incubators. After stressing the eggs (as with the pink salmon eggs), dead eggs were removed from the incubators at an age of from 300 to 450 degree days using JX egg removers. Water consumption for the incubation period was set at 50 liters per minute at the start of incubation, and 70 liters per minute at the end of incubation. The water was supplied from groundwater from 15OCT through 21NOV, from the infrared supply from 22NOV through 20DEC, and then subsequently from a mixture of infrared and groundwater. Mass hatching occurred on days 90 – 99, at 483.9 – 506.5 degree days in the period from 12JAN through 17FEB07.

The eggs were subjected to washing and declumping during the incubation period. Egg washing before the "eye-spot" stage was accomplished by draining water from the incubators, and subsequently the water drainage was accompanied by active declumping by hand.

Information on egg incubation is presented in Tables 6 and 7 of the Appendix.

Characteristics of hatchery production capacities

Item #	Description	Qty.	sq. m.	Dimensions, cm.	Changes
1.	Far-East type incubators	-	-	-	Fully removed from use in SEP99.
2.	Box-type incubator units – "Box".	144	-	-	Placed into use in 1998
3.	Box-type incubator units – "Atkins"	12	-	-	Placed into use in 1998
4.	Far-East type nursery (Line)	-	-	-	Fully removed from use in 2000
5.	Nursery channels	39	1482	1900x200	Placed into use in 1998. Used for chum salmon
6.	Nursery channels	23	874	1900x200	Placed into use in 1999. Used for chum salmon
7.	Nursery channels	54	2052	1900x200	Placed into use in 2000. Used for pink salmon
8.	Rearing ponds: ™ concrete	-	-	-	Fully removed from use in 2000
	™ pit-type	-	-	-	Fully removed from use in 2000
9.	Mesh spawner holding pen	2	12	200x300	None

Egg development compared with parent generation

Lot, year collected	Average temperature, °C	Mass Hatching Date	Days in incu- bators	Age, deg. dy.
<u>Pink Salmon</u> <u>2005</u>				
First	5.6	10JAN06	91	512.7
Middle	5.2	29JAN06	96	498.9
Last	4.7	16FEB06	104	489.6
<u>Pink Salmon</u> <u>2006</u>				
First	6.2	22DEC06	96	561.4
Middle	4.9	10JAN07	104	510.7
Last	4.2	30JAN07	113	467.3
<u>Chum Salmon</u> <u>2002</u>				
First	5.2	25JAN02	96	498.0
Middle	4.9	13FEB02	103	507.9
Last	4.9	27FEB02	104	513.2
<u>Chum Salmon</u> <u>2006</u>				
First	5.6	12JAN07	90	506.5
Middle	5.3	30JAN07	95	501.2
Last	4.9	17FEB07	99	483.9

D. Hatching and holding of sac-fry

Pink Salmon eggs were placed for hatching:

⇒ In **54** channels (2052 m²) in an amount of 42074.5 thousand at a density of 20.9 thousand/m². The fry were held in black tubular Japanese substrata in 26 channels and white substrata in 28 channels.

Altogether 42074.5 thousand pink salmon eggs were placed for hatching, of which 41841.6 thousand hatched (minus dead eggs after trays were removed).

The holding period for the free embryos continued from 19DEC06 through 13MAY07. The fry began swimming on day 220 – 225 at 783.6 – 840.4 degree days. Shading was stopped in the period from 25APR through 13MAY07.

Water supply:

- ◆ Water supplied to the pink salmon portion of the plant was a mixture of infrared and river water. Temperature was between 1.8 and 6.4 degrees C

Chum salmon eggs were placed in **62** nursery channels (2356 m²) in the amount of 26237.2 thousand, of which 26153.3 thousand hatched (minus dead eggs after trays were removed), which comprised a density of 10.6 thousand/m². The fry were held in gray tubular Japanese substrata. The holding period for the chum salmon

free embryos was 10JAN through 11MAY07. The fry began swimming on day 178 - 185 at 863.2 – 929.1 degree days in the period from 16APR through 07MAY. Water temperature during the holding period varied between 3.7 and 6.7 degrees C.

Water consumption per channel for pink and chum salmon was as follows: at hatching, depending upon the egg placement density, from 120 to 150 liters per minute, after hatching was over and trays were removed - 60 liters per minute per channel, then gradually was increased and at the end of the holding period was 120 – 150 liters per minute per channel. The water level in the channel was 9 centimeters (one shutter panel).

Data on characteristics of young during the holding period are presented in Tables 7 and 8 of the Appendix.

Size and weight characteristics of young salmon at the time of mass hatching in 2007 :

Age group	Date of analysis	AC, mm	AD, mm	Weight, mg	Weight yolk, mg	Remain main-ing yolk,%	Remaining yolk against P, mg
Pink Salmon							
First	01JAN07	22.0	20.0	141.4	67.3	100	47.6
Middle	26JAN07	21.7	19.7	143.8	72.8	100	50.5
Last	08FEB07	21.1	19.3	150.4	84.9	100	56.4
Chum Salmon							
First	20JAN07	23.8	21.8	267.6	159.9	100	59.6
Middle	09FEB07	24.7	22.7	295.1	165.3	100	55.9
Last	26FEB07	23.2	21.1	272.6	175.3	100	64.1

III.Shift of fry to swimming and active feeding, growth

In the reporting year, the pink salmon fry shifted to the swimming stage as follows: once a portion of the fry (around 50 %) began to swim freely in the water, a second 9-centimeter shutter-panel was added (for a water level of 18 cm.) and water consumption was increased to 120-150 liters per minute and lighting was gradually increased by raising the curtains. After three days, the curtains were removed and feeding of the fry was begun.

This year, the chum salmon fry shifted to the swimming stage as follows: first, the water level was raised to 18 centimeters, the shading was removed, and at the same time the water consumption per channel was increased from 60 to 120 liters per minute. The substrata was removed the next day, the dead eggs were removed, and feeding of the fry was begun.

Shift of young to natural food:

Fish species, Lot	Date	Age, days/deg.d y.	Temp. of water	Characteristics of young				
				AC, mm	P, mg	Py, mg	Yolk sack, %	Remaining yolk against P %
Pink Salmon								
1 Lot	01MAY	226/863.5	5.0	31.9	212.7	14.8	22	7.0

13 (mid.)	14MAY	228/857.0	5.7	32.4	218.2	12.9	17.7	5.9
23 (last)	16MAY	219/800.9	5.8	31.7	210.4	15.8	18.6	7.5
Chum Salmon								
1 Lot	20APR	188/951.2	5.5	37.7	416.0	17.8	11.1	4.2
14 (mid.)	28APR	183/901.0	5.4	37.2	396.1	26.7	16.2	6.6
23 (last)	11MAY	182/889.5	6.7	37.0	391.3	19.5	11.1	4.9

The substrata for pink salmon was lifted on day 5-6 of feeding, after all of the fry had left the substrata.

Feeding of the **Chum Salmon** fry was begun on 20APR with a ration that corresponded to the percent of feeding fry. Feeding was done with fish feeders and by hand from 8:00 to 19:00. Hand broadcasting of fish food was done eight times per day. Upfeeding was begun with a 25 % ration, which was increased daily by 5-10 %. We bring the ration up to the amount indicated in the instructions that come with the Danish fish food of 70 % (of a 100% ration) — usually we begin giving the fish the full ration on day 8-9 after beginning feeding. Every day, we make a visual check on how well the fry is eating the fish food, and adjust the ration accordingly.

The channels are swept twice per day: in the morning from 8:00 to 9:00 we sweep the channels with brushes and drain the water from the channels, and at 19:00 in the evening we drain the water from the channels.

The water temperature varied during the feeding period from 4.8 to 7.2 °C, however during the greater portion of the feeding period, it was maintained between 6.3 – 6.8 °C. Water consumption varied from 120 liters per minute at the start of feeding to 300 liters per minute per channel at the end.

The total duration of the feeding period was 66 days. During this period, the fry increased in biomass by 18114.2 kg, with 12643 kg of fish food pellets consumed, yielding a feed coefficient of 0.7.

Feeding of the **Pink Salmon** fry was begun on 01MAY using Aller Futura fish food size 00 pellets (diameter of pellets 0.1-0.3 mm) at a temperature of 5.0 °C. The first two days of feeding was done above the substrata, then, when the fry began leaving the substrata and actively feeding, the substrata was removed. Feeding was done with MAXI mechanical fish feeders and hand feeding from 8:00 to 19:00. Hand broadcasting of the food was done 12 times per day, with the amount of fish food given depending on the water temperature and the percent of feeding fry.

The pink salmon channels were swept 1 time per day, with the screens being cleaned twice per day, morning and evening. The Aller Futura fish food was broadcast by hand, and Aller 514-Oil (diameter of pellets 0.2-0.6 mm) was fed using the upper fish feeders.

The total duration of the feeding period was 50 days. During this period, the fry increased in biomass by 3932.7 kg, with 4077.0 kg of fish food pellets consumed, yielding a feed coefficient of 1.04.

Information on feeding is presented in Tables 10.1 and 10.2 of the Appendix.

A. Information on fish food

Feed for the 2006-2007 hatchery cycle was purchased in the fall of 2006 and delivered to the island in March 2007. The total amount of feed acquired for the Reydovo Salmon Hatchery was 16.15 MT, plus the previous year's 16.75 MT. Altogether during the feeding period the following amounts of feed were consumed: for pink salmon – 4077 kg, for chum – 12643 kg, for masu – 30 kg. Detailed data are presented in Table 10.2 of the Appendix. All of the fish food was consumed.

IV. Diseased eggs and salmon fry and treatment methods

During the 2006-2007 hatchery cycle, the eggs and salmon fry were subjected to scheduled treatment with Malachite Green and Formalin. The first treatment was performed on the eggs following their collection, with subsequent treatment conducted if symptoms were evident (incidence of saprolegniosis). The fry were treated to suppress the development of parasitic infusers of the genus Trichodina.

The following prophylactic measures were conducted throughout the hatchery cycle at the Reydovo Salmon Hatchery:

Date conducted	Purpose of treatment	Target				Concentration	Duration	Preparation	
		Eggs, fry, young	Incubators, nursery channels					Name	Amount
			Qty.	S, m ²	V, m ³				
Pink Salmon									
20SEP-10OCT06	Prevention of saprolegniosis	Eggs 44711.5 thousand	78 B, 4 A			1:800	30 minutes	Formalin	51 lit.
11NOV-29NOV06	Treatment of saprolegniosis	Eggs 43649.1 thousand	64 B			1:800	30 minutes	Formalin	46 liters
01MAY07	Prophylactic treatment of trichodiniosis	Young 9409.3 thousand	13 channels	494	98.8	1:800000	2 hours	Malachite Green	117 grams
30MAY07	Treatment of initial stage of trichodiniosis	Young 18197.5 thousand	26 channels	988	197.6	1:800	20 minutes. (bath)	Formalin	65 lit.
31MAY07	Treatment of initial stage of trichodiniosis	Young 42450.7 thousand	54 channels	2052	410.4	1:800	1.5 hr. Drip method	Formalin	216 lit.
Total for pink salmon								Formalin	378 lit.
								Malachite Green	117 g
Chum Salmon									
17OCT-11NOV06	Prophylactic treatment of saprolegniosis	Eggs 28779.4 thousand	62 B, 36 A			1:800	30 minutes	Formalin	48 liters
22-29NOV06	Treatment of saprolegniosis	Eggs 21870.6 thousand	53 B			1:800	30 minutes	Formalin	18 liters
02DEC06	Treatment of saprolegniosis	Eggs 26607.1	60 B			1:800	30 minutes	Formalin	27 liters

		<i>thousand</i>	36 A			1:800	30 minutes	Formalin	
11DEC06	Treatment of saprolegniosis	Eggs 26607.1 thousand	60 B			1:800	30 minutes	Formalin	27 liters
			36 A			1:800	30 minutes	Formalin	
19DEC06	Treatment of saprolegniosis	Eggs 2172.3 thousand	5 B			1:800	30 minutes	Formalin	2 liters
06JAN07	Treatment of saprolegniosis	Eggs 845 thousand	2 B			1:800	30 minutes	Formalin	1 liters
20JAN07	Treatment of saprolegniosis	Eggs 2573.2 thousand	6 boxes			1:800	30 minutes	Formalin	2 liters
18APR - 08MAY07	Prophylactic treatment of trichodiniosis	Young 26070 thousand	62 channels	2356	471.2	1:800000	2hours	Malachite Green	558 grams
11MAY07	Prophylactic treatment of trichodiniosis	Young 783.3 thousand	2 channels	76	15.2	1:800	20 minutes. (bath)	Formalin	5 liters
14MAY - 28MAY	Treatment of trichodiniosis	Young 16000 thousand	40 channels	1520	304	1:800000	2 hours	Malachite Green	435 grams
04JUN- 14JUN	Prophylactic treatment	Young 15750 thousand	35 channels	1330	266	1:800000	2 hours	Formalin	115 liters
Total for chum salmon								Formalin	245 lit.
								Malachite Green	993 g
Total for pink salmon and chum								Formalin	623 lit.
								Malachite Green	110 g

V. Release of young

During the reporting year, 41664.9 thousand pink salmon young and 26035.4 thousand chum salmon young were released, for a total release of 67700.3 thousand young salmon.

Release of **pink Salmon** young was begun as planned, on 06JUN. The beginning of the release is timed to correspond to the beginning of the decline in the numbers of mass downstream migration among the natural pink salmon young. The qualitative characteristics of young is presented in the Table on page 13. The average measured weight of young salmon was 308.8 mg. At the time of release, water temperatures varied between 5.1-13.0 degrees C in the river and between 5.2-9.4 degrees C at sea. The young salmon was released during the evening hours (after 20:00). The mesh barriers on the nursery channels were removed, allowing the young to descend by itself. 95 % of the young salmon departed within two days, after which time the shutter panels were removed and the remaining young was released. At the time of

pink salmon release no flooding was noted. Data on release are presented in Table 2 of the Appendix.

The release of young chum salmon was begun on 07JUN at a rate of 1.0 – 2.0 million per day. The release occurred during the evening hours (beginning at 20:00). The qualitative characteristics of the young salmon is presented on page 13. At the time the young salmon was released, no significant flooding was noted. On the whole, the downstream migration occurred under normal hydrological conditions in the river, and there were no storms at sea. Water temperatures in the river at the time of release were between 6.4 – 13.4 degrees C, and at sea 5.4 - 9.4 degrees C.

Data on release are presented in Table 2 of the Appendix.

VI. Experimental work

During the 2006 – 2007 period, the following experimental work was conducted:

1. Young masu collected in 2006 was grown, and on 24JUN 5.723 thousand young were released with an average weight of 3005.7 mg
2. 7 individual taymen were held at the facility (they were artificially fed)
3. 20 lots of chum salmon eggs were hatched and their sac-fry were held in gravel incubators(Canadian-style boxes), with the young being grown in ponds.

A report on the results of the experimental work will be presented by 01 SEPT 2007.

The qualitative characteristics of released young in 2007

Pink Salmon

Class intervals	180-200	201-220	221-240	241-260	261-280	281-300	301-320	321-340	341-360	361-380	381-400	401-420	421-440	441-460	461-480	481-500
%	8.7	3.9	5.6	6.7	10.6	11.1	10.6	11.0	8.4	5.9	5.4	4.3	2.7	2.4	0.9	0.4
Thousand	3630.8	1636.8	2351.1	2797.5	4434.3	4612.9	4434.3	4583.1	3482.0	2470.1	2232.1	1785.6	1130.9	1011.9	357.1	178.6
Class intervals	501-520	521-540	541-560	561-580	581-600	601-620										
%	0.6	0.2	0.3	0.1	0.1	0.1										
Thousand	267.9	59.5	119.0	29.8	29.8	29.8										

Chum Salmon

Class intervals	601 - 650	651 - 700	701 - 750	751 - 800	801 - 850	851 - 900	901 - 950	951-1000	1001-1050	1051-1100	1101-1150	1151-1200	1201-1250	1251-1300
%	0.1	0.9	1.1	3.0	6.6	6.6	6.1	8.0	10.2	10.1	9.2	7.9	7.4	5.1
Thousand	28.9	245.9	2893	781.1	1706.8	1706.8	1591.1	2082.3	2646.9	2632.5	2401.0	2068.4	1938.2	1330.7
Class intervals	1301-1350	1351-1400	1401-1450	1451-1500	1501-1550	1551-1600	1601-1650	1651-1700	1701-1750	1751-1800	1801-1850	1851-1900	1901-1950	1951-2000
%	3.9	4.7	2.6	2.3	1.7	1.4	0.3	0.4	0	0	0.1	0.1	0.1	0.1
Thousand	1027.0	1229.4	665.3	607.5	433.9	361.6	72.3	101.2	0	0	28.9	14.5	28.9	14.5

VII. Measures undertaken to enhance aquaculture efficiency

1. Thermal regulation for the pink salmon in the reporting year differed from the standard:

- During the entire period that the pink salmon was held, the water supply was a mixture of infrabed and river water with an average temperature by month of 1.1-2.3⁰C at the beginning of the holding period to 4.6⁰C at the end.
- In order to create the optimum temperature conditions (5 – 5.5⁰C for pink salmon and 6.5-7.0⁰C for chum salmon) during the feeding period, water was pumped from a shaft well, by which a lack of even daily fluctuations in water temperature was achieved, and decreased during the snow melt period.

2. In the reporting year, there were two types of fish food used: Aller Futura, with an enhanced vitamin content, and Aller Oil, with lower fat content (fish food composition is presented in Table 11.1 of the Appendix). At the beginning of the feeding period, following prophylactic treatment and before release, the young were fed with Aller Futura, while the majority of the feeding was accomplished using Aller Oil.

Feeding was also carried out with the recommendations of the fish food manufacturer in mind: the fish food comprised 50-70% of the full ration (which comprised 1.5-1.8% of the young salmon's biomass).

This feeding regime allowed us to achieve a feeding coefficient of Cf = 0.7 for chum and to carry the feeding out efficiently.

3. Workers were assigned specific areas, within which they were responsible for all of the operations associated with the feeding of the fry (cleaning, feeding, maintaining the preliminary records). This allocation of workers allowed us to enhance the level of worker's interest and improve the quality of work accomplished during the feeding period.

VIII. Hatchery preparation for the next season

During preparation for the next season, the following must be done:

- Perform repair and prepare the equipment for the egg collection stations
- Prepare the incubators and the documentation for egg placement
- Prepare the egg transportation equipment
- Clean out the nursery channels, discharge and feed chutes after release
- Disinfect the water supply system, nursery channels and fish hatchery tools and supplies

IX. Analysis of operations over the first six months. Conclusions and suggestions

During the first six months of the year, chum and pink salmon eggs were incubated, sac-fry was held, and the young salmon was fed and released. A total of 67700.3 thousand young salmon were released, including 41664.9 thousand young pink salmon and 26035.4 thousand young chum salmon. The average measured

weight of the released young was as follows: 308.8 mg for pink salmon, 1100.4 mg for chum salmon.

During the first six months of the year, in order to regulate the temperature for **holding** the fish, we used river water, infrabed water and groundwater.

- ✓ A mixture of river and infrabed water was used for holding the pink salmon. For growth: initially a combination of ground water and infrabed water was used, and beginning on 10JUN , a mixture of infrabed and river water.
- ✓ Chum salmon development proceeded under planned temperature regimes using a mixture of infrabed water and ground water, with water added from the shaft well.

During the reporting year, we purchased high-efficiency pelletized fish food manufactured by the Danish company "Aller Aqua", which allowed us to feed the chum and pink salmon and release healthy, active young.

This year, warm water in the coastal zone allowed us to release the young pink and chum salmon at the planned time. At the time of young salmon release, no flooding or storms occurred, and the downstream migration proceeded under favorable conditions.

Based on the results of operations during the first six months of 2007, we can draw the following conclusions:

1. The use of water from the shaft well allowed us to carry out a good quality feeding operation of the pink and chum salmon young at stable temperatures above 5⁰C .
2. We determined that the main thrust of feeding should be the use of hand broadcasting of the fish food, with the fish feeders accomplishing a secondary role. This allows the fish food to be used more efficiently and to decrease the variability of the weights of the young salmon.
3. The technological process at the Reydovo Salmon Hatchery may be considered to be well worked out.

The staff and workers at the Reydovo Salmon Hatchery met their assigned goals, and in 2007 the young pink and chum salmon was healthy, active and released under optimal conditions in the river and at sea.

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T.P. Mizina

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L.E. Molchanov

APPENDIX

Table 1

Achievement of release targets over the past six years

#	Year	Planned release of young, million			Actual release of young, thous.			Percent achieved	Average weight, mg	
		Total	Pink Salmon	Chum Salmon	Total	Pink Salmon	Chum Salmon		Pink Salmon	Chum Salmon
1	2002	63.2	42.1	21.1	68584.3	45847.2	22737.1	108.5	251.9	1160.6
2	2003	63.7	42.0	21.7	65912.0	42793.8	23118.2	103.5	250.7	1136.9
3	2004	63.7	42.0	21.7	67475.5	44171.4	23304.1	105.9	292.1	1118.1
4	2005	61.9	40.3	21.6	67562.1	43767.2	23794.9	109.2	274.9	1148.1
5	2006	61.9	40.3	21.6	64119.2	40655.8	23463.4	103.6	342.7	1086.0
6	2007	62.6	38.1	24.4	67700.3	41664.9	26035.4	108.2	308.8	1100.4

Table 2

Release of young salmon in the reporting year by size and weight and age group

Release period		Young released		Size and weight characteristics			
From-Through	Days	Thousand	%	Weight, mg	Length AC, mm	Length AD, mm	Cup.f.
1	2	3	4	5	6	7	8
<u>Pink Salmon</u>							
06.-07JUN07	1	2634.3	6.3	317.8	37.4	33.3	0.84
07.-08JUN07	1	2914.6	7.0	314.4	37.6	33.6	0.81
08.-09JUN07	1	2942.0	7.1	311.0	37.3	33.2	0.83
09.-10JUN07	1	2585.3	6.2	311.3	37.6	33.5	0.82
10.-11JUN07	1	2586.7	6.2	307.7	36.6	32.9	0.85
11.-12JUN07	1	2738.7	6.6	306.6	37.3	33.3	0.81
12.-13JUN07	1	3190.2	7.7	309.3	36.9	33.0	0.85
13.-14JUN07	1	3310.1	7.9	304.7	37.0	33.0	0.84
14.-15JUN07	1	3430.9	8.2	310.2	37.4	33.4	0.82
15.-16JUN07	1	3452.3	8.3	296.4	37.0	33.1	0.81
16.-17JUN07	1	3486.5	8.3	305.5	36.9	32.9	0.84
17.-18JUN07	1	3442.0	8.3	306.5	36.8	32.8	0.85
18.-19JUN07	1	2463.0	5.9	311.5	37.0	33.1	0.85
19.-20JUN07	1	2488.3	6.0	316.1	37.3	33.4	0.83
Total:	14	41664.9	100	308.8	37.1	33.2	0.84
<u>Chum Salmon</u>							
07JUN-08JUN07	1	1491.4	5.7	1197.7	51.7	47.0	1.14
08JUN-09JUN07	1	1112.2	4.3	957.2	48.5	44.1	1.07

08JUN-09JUN07	1	915.3	3.5	1194.3	52.4	47.8	1.08
09JUN-10JUN07	1	1535.9	5.9	1181.5	51.5	46.8	1.14
10JUN-11JUN07	1	1486.4	5.7	881.1	47.7	43.4	1.07
11JUN-12JUN07	1	1332.2	5.1	1177.2	52.4	47.9	1.06
12JUN-13JUN07	1	1548.9	5.9	1161.7	51.2	46.5	1.14
13JUN-14JUN07	1	1606.0	6.2	1099.6	51.0	46.3	1.10
14JUN-15JUN07	1	1560.3	6.0	1100.1	51.1	46.5	1.09
15JUN-16JUN07	1	1504.3	5.8	1102.8	51.1	46.4	1.10
16JUN-17JUN07	1	1151.5	4.5	1115.7	51.6	46.9	1.07
17JUN-18JUN07	1	1184.6	4.5	1101.0	51.0	46.4	1.09
19JUN-20JUN07	1	1849.7	7.1	1111.2	51.3	46.4	1.10
20JUN-21JUN07	1	1904.0	7.3	1066.3	50.4	45.8	1.11
21JUN-22JUN07	1	1734.3	6.7	1069.7	49.6	44.7	1.18
22JUN-23JUN07	1	1415.6	5.4	1092.9	50.2	45.4	1.16
23JUN-24JUN07	1	1420.6	5.5	1100.7	50.4	45.5	1.16
24JUN-25JUN07	1	1282.2	4.9	1115.7	50.6	46.0	1.13
Total	17	26035.4	100	1100.4*	50.7*	46.1*	1.13
*Average measured weight, length							

Table 3.1

Information on air temperatures

10-day period	September	October	November	December	January	February	March	April	May	June
1	17.4	11.3	8.2	-2.6	-2.6	-3.8	-1.6	3.2	7.3	15.6
2	17.6	9.2	4.5	-1.7	-5.6	-2.8	0.8	2.3	7.1	19.3
3	14.1	7.4	2.6	-1.4	-4.6	-2.8	2.1	5.5	8.4	
Average	16.4	9.3	5.1	-1.9	-4.3	-3.1	0.4	3.7	7.6	
min	11.0	1.2	-2.3	-5.6	-19.0	-14.0	-7.8	-2.0	0.8	
max	23.7	19.0	16.8	5.3	2.8	5.0	8.0	14.0	17.7	

Table 3.2

Information on temperatures in Reydovaya River

10-day period	September	October	November	December	January	February	March	April	May	June
1	12.6	10.0	7.3	1.0	0.6	0.4	1.0	4.9	3.6	7.7
2	12.2	8.3	5.4	1.5	0.9	0.6	1.9	4.8	5.1	9.6
3	11.1	7.0	3.6	1.0	0.8	0.9	3.3	5.3	5.4	
Average	12.0	8.4	5.4	1.2	0.6	0.6	2.1	5.0	4.7	
min	9.9	5.1	2.0	0.1	0.1	0.1	0.1	1.2	0.9	
max	15.0	12.6	8.6	3.1	1.8	2.3	6.3	8.8	10.0	

Table 3.3

Information on temperature regime in pink salmon plant

10-day period	September	October	November	December	January	February	March	April	May	June
1	-	7.4	7.0	2.6	1.2	1.2	1.5	4.4	5.2	7.4
2	7.6	7.1	6.5	2.7	1.3	1.4	2.1	4.4	5.6	8.4
3	7.6	7.0	5.5	1.8	1.1	1.4	3.0	5.1	5.7	-
Average	7.6	7.2	6.3	2.4	1.2	1.3	2.2	4.6	5.5	7.9
min	7.5	7.0	5.1	0.8	0.2	0.7	0.5	1.2	3.6	4.5
max	7.8	7.7	7.2	3.5	2.6	2.2	5.5	7.8	8.1	11.5

Table 3.4

Information on temperature regime in the chum salmon plant

10-day period	September	October	November	December	January	February	March	April	May	June
1	-	-	7.0	4.4	4.5	4.2	4.1	4.8	6.4	6.8
2	-	7.1	6.9	4.2	5.1	4.2	4.3	5.1	6.5	7.0
3	-	7.0	5.6	4.5	4.7	4.0	4.6	5.6	6.6	7.1
Average	-	7.0	6.5	4.4	4.8	4.1	4.3	5.2	6.5	7.0
min	-	7.0	5.1	3.8	4.1	3.7	3.8	4.6	5.3	6.5
max	-	7.1	7.0	5.0	5.6	4.8	4.7	6.5	6.9	7.2

Table 3.5.

Information on temperatures at sea

10-day period	September	October	November	December	January	February	March	April	May	June
1	-	-	-	-	-	-	-	-	-	5.9
2	-	-	-	-	-	-	-	-	4.2	8.3
3	-	-	-	-	-	-	-	-	4.1	8.6
Average	-	-	-	-	-	-	-	-	4.1	7.6
min	-	-	-	-	-	-	-	-	2.2	2.9
max	-	-	-	-	-	-	-	-	5.6	9.4

Table 4

Information on water consumption by use (month end)

Month	Water consumption, liters per minute		
	Pink Salmon Plant	Chum Salmon Plant	Total
September	423	-	423
October	1614	438	2052
November	1605	1401	3006
December	4643	1621	6264
January	5998	5280	11278
February	4765	5178	9943
March	6168	3462	9630
April	6192	4686	10884
May	7320	10473	17793
June	5904	9648	15552

Table 5

Information on oxygen content of water supplied to the plants

Month	Pink Salmon Plant				Chum Salmon Plant			
	Inflow		Outflow		Inflow		Outflow	
	mg/lit.	%	mg/lit.	%	mg/lit.	%	mg/lit.	%
September	11.2	97	10.7	92	-	-	-	-
October	11.2	96	10.5	90	11.2	95	10.9	93
November	11.1	94	10.4	89	11.3	96	10.7	91
December	12.5	95	11.7	90	11.7	93	11.0	87

