

STATE OF CALIFORNIA
The Resources Agency
DEPARTMENT OF FISH AND GAME

STANDING STOCKS OF FISHES IN SECTIONS
OF LITTLE LAST CHANCE CREEK PLUMAS COUNTY, 2000

by

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INTRODUCTION

The Department of Water Resources (DWR) initiated an instream flow program in 1976 to identify streams that would benefit from flow enhancement and to assess instream values. The Northern District of the DWR selected Little Last Chance Creek below Frenchman Reservoir (Figure 1) as one of the streams to study under this program.

Department of Fish and Game (DFG) biologists studied trout populations in Little Last Chance Creek in late summer or early fall of 1976, 1981, 1986, 1988, and 1991 through 1997. Brown trout (*Salmo trutta*) was the only game fish caught every year. Sacramento suckers (*Catostomus occidentalis*) were also caught every year (Brown 1976, Bumpass et al. 1989, Brown 1991, Brown 1992a, Brown 1992b, Brown 1993, Brown 1994, Brown 1995, Brown 1996, Brown 1997). This report documents the results of sampling conducted in 1997.

The purpose of the long-term study is to collect data that may be used to evaluate the effects of the operation of Frenchman Reservoir on populations of trout in Little Last Chance Creek through the periodic sampling of fish at established stations in that creek. These data may also be used to measure the recovery of trout in Little Last Chance Creek following the rotenone treatment that the DFG conducted in June, 1991 to kill northern pike (*Esox lucius*) in Frenchman Reservoir (Brown 1992b).

METHODS

Standing stocks of fishes were estimated at three stations in Little Last Chance Creek in Plumas County in September, 2000. Stations were intentionally selected to be near stations sampled in previous DFG studies and are described in Appendix 1. Markers had previously been placed in trees along the stream to identify station boundaries. Stations varied in length from 47.2 to 50 m. The length and average width of each station was measured. Fish were captured with a battery-powered backpack electroshocker in stream sections blocked by seines. Captured fish were removed from the net-enclosed section on each pass. Standing stock estimates of trout were developed using the two-count method of Seber and LeCren (1967) or the multiple-pass method of Leslie and Davis (1939) with limits of confidence computed using a formula proposed by DeLury (1951).

The weight of each trout was determined by displacement. Fork length (FL) of each fish was measured to the nearest millimeter. Scale samples were taken for trout.

The distribution of fish caught is listed according to location. Standing stocks of brown trout and rainbow trout (*Oncorhynchus mykiss*) were calculated by station.

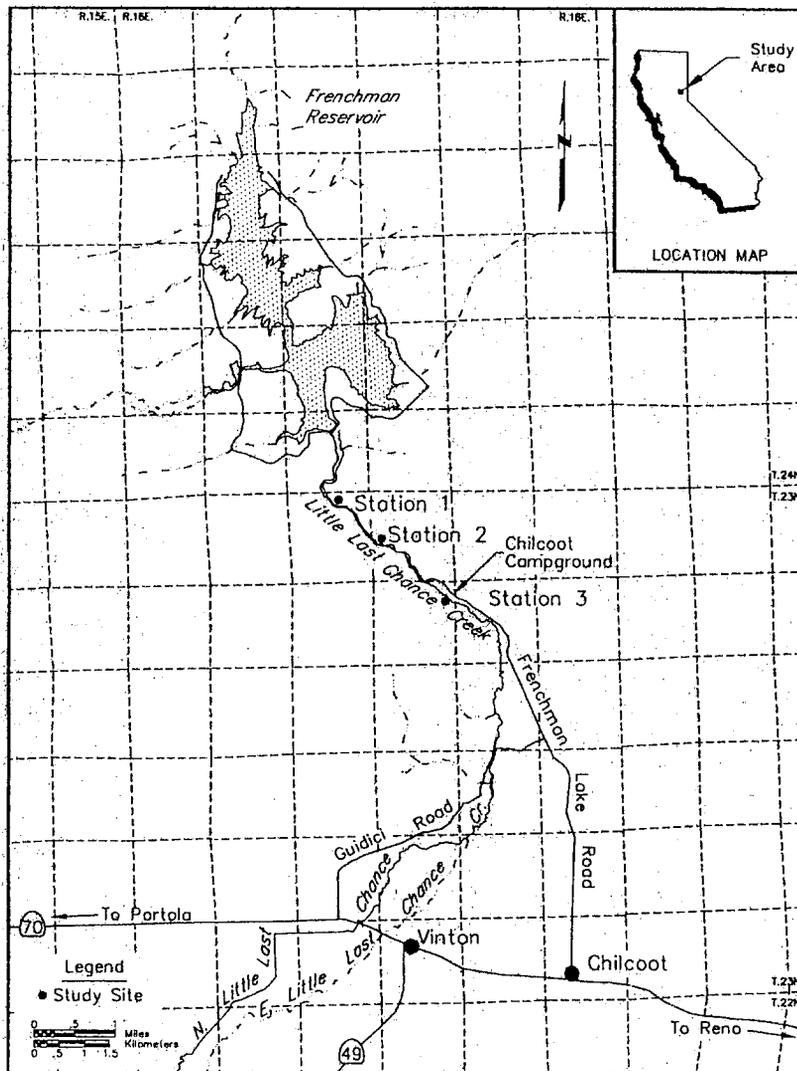


Figure 1. Map of sampling stations in Little Last Chance Creek, Plumas County, 2000.

RESULTS

Brown trout and rainbow trout were caught at each station (Table 1).

Table 1. Fishes caught in selected sections of Little Last Chance Creek, Plumas County, 2000.

	Station Number		
	1	2	3
Distance below Frenchman Reservoir (km)	1.6	3.2	4.4
Brown trout	X	X	X
Rainbow trout	X	X	X

Brown trout ranged in size from 90 to 395 mm FL (Figure 2). Brown trout biomass averaged 6.5 g/m² at three stations. An estimated 19 brown trout large enough for anglers to catch and keep (≥ 127 mm FL) were present in the stations that we sampled (Table 2).

Table 2. Estimate of brown trout standing crop in Little Last Chance Creek, Plumas County, 2000.

Distance below Frenchman Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m ²)	Estimate of Catchable Trout (≥ 127 mm FL)	Biomass of Catchable Trout (g/m ²)
1.6	11	11-13	10.6	8	10.5
3.2	10	10-13	2.8	3	2.5
4.4	16	16-19	6.0	8	5.5

Rainbow trout ranged in size from 60 to 291 mm FL (Figure 3). Rainbow trout biomass averaged 4.9 g/m² at three stations. An estimated 31 rainbow trout large enough for anglers to catch and keep (≥ 127 mm FL) were present in the stations we sampled (Table 3).

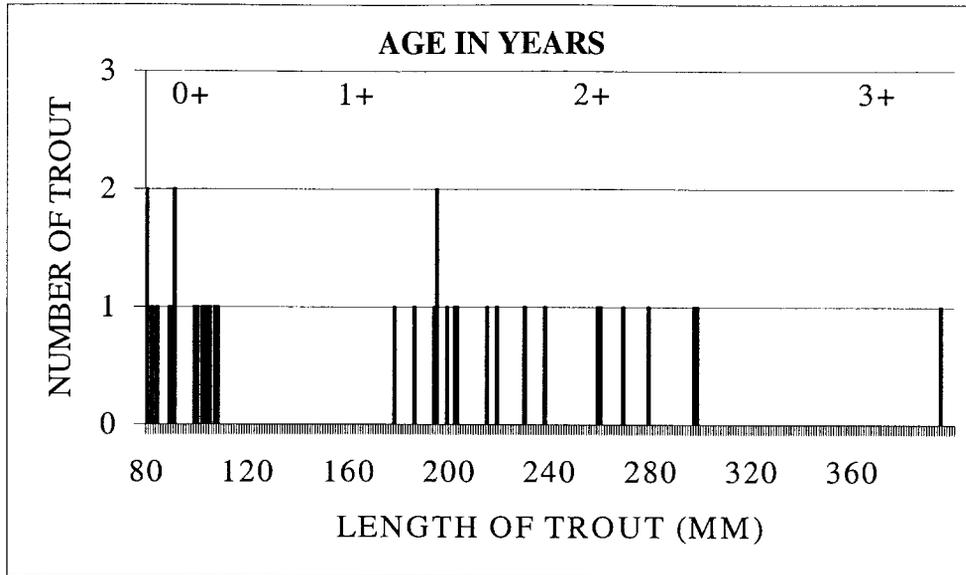


Figure 2. Length, observed frequency, and age of brown trout caught in Little Last Chance Creek, Plumas County, 2000.

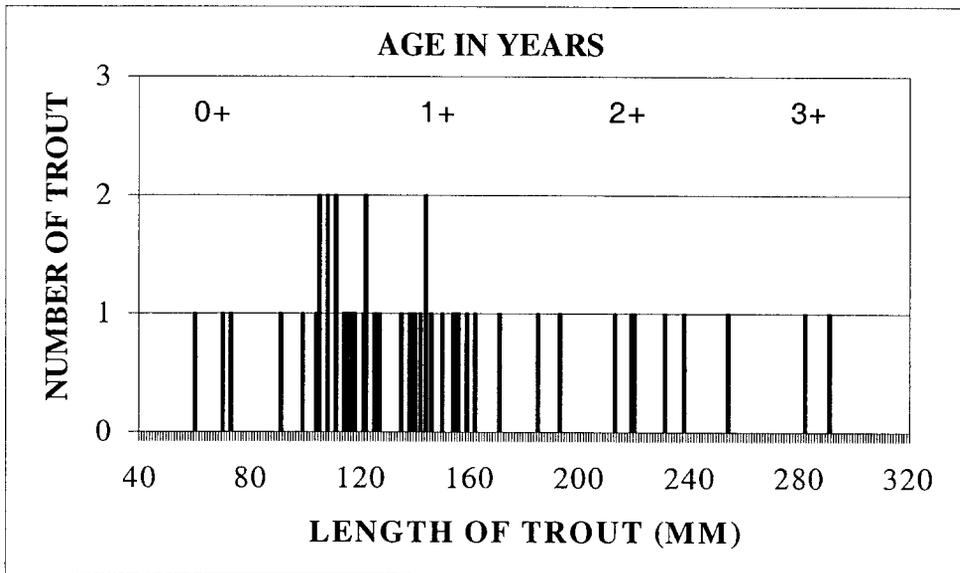


Figure 3. Length, observed frequency, and age of rainbow trout caught in Little Last Chance Creek, Plumas County, 2000.

Table 3. Estimate of rainbow trout standing crop in Little Last Chance Creek, Plumas County, 2000.

Distance below Frenchman Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m ²)	Estimate of Catchable Trout (≥127 mm FL)	Biomass of Catchable Trout (g/m ²)
1.6	42	28-42	9.4	19	8.8
3.2	8	8-9	4.1	8	4.0
4.4	10	10-13	1.2	4	0.7

The relationship between fork length (FL) and weight (W) of brown trout is:

$$\text{Log}_{10} W = -5.0 + 3.1 \text{Log}_{10} \text{FL}$$

$$r^2 = 0.99$$

N = 35 (Figure 4 and Appendix 2)

The relationship between fork length (FL) and weight (W) of rainbow trout is:

$$\text{Log}_{10} W = -4.9 + 3.0 \text{Log}_{10} \text{FL}$$

$$r^2 = 0.99$$

N = 48 (Figure 5 and Appendix 3)

Age and Growth

The formula $\text{FL} = 4.68 + 0.14 S$ describes the relationship between the fork length and enlarged scale radius (S) of 9 brown trout caught in Little Last Chance Creek. The coefficient of correlation (r^2) is 0.69. The formula $\text{FL} = -0.76 + 0.10 S$ describes that same relationship for 38 rainbow trout, while the value for r^2 is 0.78.

Population growth was greater for rainbow trout while mean individual growth was greater for brown trout (tables 4 and 5).

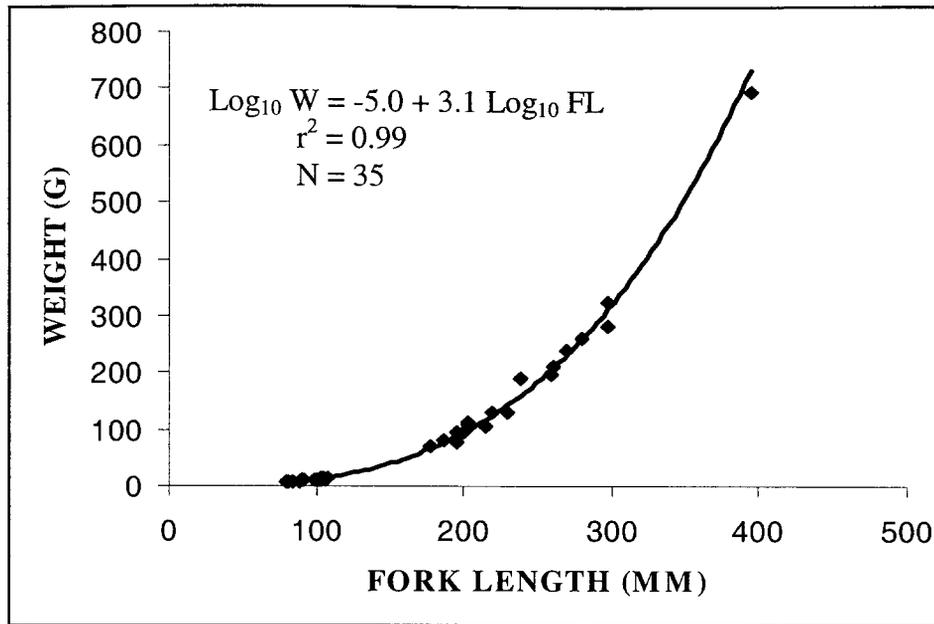


Figure 4. The relationship between length and weight of brown trout caught in sections of Little Last Chance Creek, Plumas County, 2000

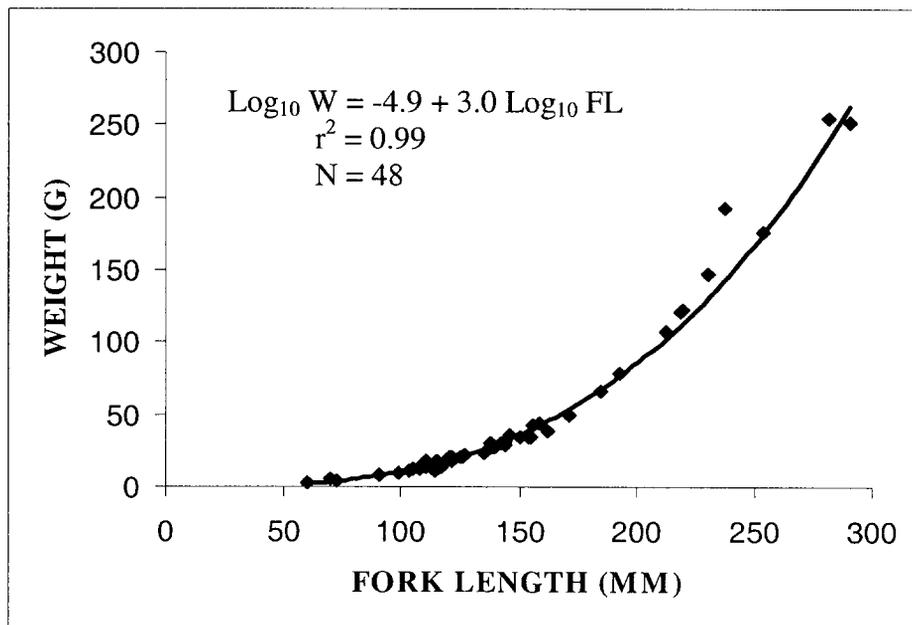


Figure 5. The relationship between length and weight of rainbow trout caught in sections of Little Last Chance Creek, Plumas County, 2000.

Table 4. Growth rates for brown trout caught in Little Last Chance Creek, 2000.

Age	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx
1-2	83-153	0.612	1.835	82-153	0.624	1.872
2-3	153-215	0.304	0.912	141-215	0.422	1.266

Table 5. Growth rates for rainbow trout caught in Little Last Chance Creek, 2000.

Age	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx
1-2	64-144	0.813	2.439	82-144	0.565	1.695
2-3	144-204	0.345	1.035	145-204	0.340	1.020

Age 1+ and age 2+ brown trout averaged 182 mm and 229 mm FL, respectively. Age 3+ brown trout averaged 285 mm FL (Table 6). Age 1+ rainbow trout averaged 138 mm and age 2+ rainbow trout averaged 219 mm FL. Age 3+ rainbow trout averaged 287 mm FL (Table 7).

Table 6. Calculated average fork length of brown trout from Little Last Chance Creek, 2000.

Age	Number of Fish	Length at Capture	Length at Successive Annulus		
			1	2	3
1	2	182	83		
2	13	229	82	153	
3	3	285	78	141	215
Number of back-calculations			18	16	3
Weighted means (mm)			81	150	215
Increments (mm)				69	65

Table 7. Calculated average fork length of rainbow trout from Little Last Chance Creek, 2000.

Age	Number of Fish	Length at Capture	Length at Successive Annulus		
			1	2	3
1	29	138	64		
2	7	219	82	144	
3	3	287	89	145	204
Number of back-calculations			39	10	3
Weighted means (mm)			69	145	204
Increments (mm)				75	59

Coefficient of Condition

The average coefficient of condition for 35 brown trout was 1.233 (Table 8) and 1.095 for 48 rainbow trout (Table 9). Brown trout had slightly higher coefficients of condition than rainbow trout.

Table 8. Condition of brown trout in Little Last Chance Creek, Plumas County, 2000.

Age Group	Number of Fish	Coefficient of Condition	95% Confidence Interval
1+	16	1.170	0.938-1.401
2+	16	1.313	0.576-2.051
3+	3	1.143	1.029-1.257
Combined	35	1.233	0.690-1.776

Table 9. Condition of rainbow trout in Little Last Chance Creek, Plumas County, 2000.

Age Group	Number of Fish	Coefficient of Condition	95% Confidence Interval
0+	10	1.113	0.848-1.378
1+	28	1.033	0.817-1.248
2+	10	1.139	0.930-1.348
Combined	48	1.095	0.828-1.315

DISCUSSION

Populations of rainbow and brown trout have been increasing as a result of trout that the DFG planted (Table 10). Rainbow trout populations are also increasing because Frenchman Reservoir has spilled in the winter and spring. Rainbow trout migrate downstream over the spillway into Little Last Chance Creek during spills. Few brown trout migrate during spills. Brown trout population estimates before treatment averaged 5 trout while after treatment averaged 21 trout. Biomass averaged 2.9 g/m² before treatment and 9.3 g/m² after treatment. Rainbow trout population estimates averaged 42 trout before treatment and 15 trout after. Biomass averaged 3.7 g/m² before treatment and 2.4 g/m² after (Table 11).

Table 10. Records of trout planting in Little Last Chance Creek following initial treatment with rotenone in June 1991.

Year	Rainbow Trout		Brown Trout	
	Catchable	Fingerling	Catchable	Fingerling
1991	500	0	1,300	0
1992	1,000	0	0	0
1993	1,540	0	0	3,000
1994	0	0	0	5,240
1995	0	0	1,250	0
1996	0	0	0	3,000
1997	0	1,500	0	1,631

Some of the trout we caught each year were planted by the DFG. The DFG planted trout in the summer of 1991 and spring and summer of 1992 through 1997. The DFG planted catchable rainbow trout in 1991, 1992, and 1993. Catchable brown trout were planted in 1991 and 1995. Twenty brown trout broodstock were also planted in 1991. Fingerling brown trout were planted in 1993, 1994, 1996, and 1997 (Table 10) (Ron DeCoto, Fishery Biologist, DFG, personal communication).

Trout populations have largely recovered in Little Last Chance Creek from the treatment of rotenone that was used to kill northern pike in June, 1991. The DFG killed northern pike in this watershed to prevent them from migrating downstream into the Sacramento River and Sacramento-San Joaquin Delta. The DFG feels that pike could become established in the Sacramento River and become significant predators on juvenile salmonids (Brown 1992).

We caught seven large brown trout (259-395 mm FL) that were nearly ripe. They would probably spawn in October or November. We have observed that spawning gravel is concentrated above station 1 (Figure 1). That is where we expect most trout to spawn. Spawning was mildly successful last year. We found age 0+ trout in all stations we sampled.

Table 11. Average standing crop and biomass for brown and rainbow trout in Little Last Chance Creek, 1976-1997.

Year	Brown trout		Rainbow trout	
	Population estimate	Biomass (g/m ²)	Population estimate	Biomass (g/m ²)
1976	1	0.5	10	3.6
1981	6	2.7	17	4.0
1986	10	3.7	96	3.6
1988	20	4.7	43	3.7
Average	9	2.9	42	3.7
1991	1	0.2	0	0
1992	4	0.1	1	0.1
1993	11	1.1	0	0
1994	27	10.6	0	0
1995	34	26.2	1	0.1
1996	41	14.9	41	3.6
1997	27	12.3	63	12.7
2000	12	6.5	20	4.9
Average	20	9.0	16	2.7

While our periodic sampling of trout in Little Last Chance Creek has allowed us to observe the prolonged effects of rotenone on trout populations and their recovery, the main purpose of our study has not changed. We plan to continue to evaluate the effects of the operation of Frenchman Reservoir on trout populations in Little Last Chance Creek.

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APPENDIX 1

PERMANENT FISH POPULATION STATIONS FOR LITTLE LAST CHANCE CREEK, PLUMAS COUNTY SEPTEMBER, 2000.

Station 1 - Located 1.6 km below Frenchman Dam just downstream from the first bridge at elevation of 1659 m MSL in NW 1/4 of NE 1/4, Section 4, T23N, R16E. This station begins in a riffle beneath the bridge carrying Frenchman Lake Road, then enters a pool with a deeply undercut room-sized boulder on the right bank. The remainder of the station is a short riffle and a shallow pool/run. About 55 percent of the station is pool and 45 percent riffle. Substrate is boulder, rubble, and sand. The station is 47.2 m long with a surface area of 231.3 m² at a flow of 0.4 cms.

Station 2 - Located 3.2 km below Frenchman Dam adjacent to the upper end of a large turnout at an elevation of 1610 m MSL in NW 1/4 of SW 1/4, Section 3, T23N, R16E. This station begins in a large plunge pool followed by two shallow pool/run areas and two short riffles. About 45 percent of the station is pool and 55 percent riffle. Substrate is boulder, rubble, and sand. The station is 49.1 m long with a surface area of 284.8 m² at a flow of 0.4 cms.

Station 3 - Located 4.4 km below Frenchman Dam adjacent to the cutoff road in the center of Chilcoot Campground at an elevation of 1561 m MSL in NE 1/4 of NE 1/4, Section 10, T23N, R16E. This station begins in a steep rapid followed by a long pool with undercut right bank, then a short riffle, a short pool, and finally, another steep riffle. The station is 40 percent pool and 60 percent riffle. Substrate is boulders, rubble, and sand. The station is 50 m long with a surface area of 255 m² at a flow of 0.4 cms.

Appendix 2

Length and Weight of Brown Trout Caught in Little Last Chance Creek, 2000

Fork Length (mm)	Weight (g)	Fork Length (mm)	Weight (g)
80	6	194	80
80	7	195	76
82	7	195	95
84	6.5	199	94
89	8.5	202	108
90	10	203	113
91	9	215	107
91	9	219	132
99	10	230	332
100	12	238	190
102	12	259	198
103	14	260	213
104	11	269	238
105	14	279	260
107	12	297	283
108	13	298	323
178	70	395	695
186	82		

Appendix 3

Length and Weight of Rainbow Trout Caught in Little Last Chance Creek, 2000

Fork Length (mm)	Weight (g)	Fork Length (mm)	Weight (g)
60	2.5	138	30
70	5	139	27
73	4.5	140	27
91	8	142	30
99	9	144	29
104	11	144	32
105	13	146	36
105	13	150	35
108	13	154	34
108	14	155	34
111	14	156	42
111	18	159	44
114	11	162	39
115	18	171	49
116	17	185	66
117	14	193	78
118	16	213	108
121	21	219	121
122	18	220	122
122	20	231	147
125	20	238	192
126	20	254	176
127	22	282	255
135	24	291	252