DESCHUTES RIVER

SPAWNING GRAVEL STUDY

VOLUME II

A P P E N D I C E S

I - XIV

FINAL REPORT

by

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Beaverton, Oregon

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BONNEVILLE POWER ADMINISTRATION
Division of Fish & Wildlife

Dale Johnson, Project Manager

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September, 1985

LIST OF APPENDICES

Appendix I	Aerial photographs with spawning gravel bar locations for the lower Deschutes River, Oregon, 1983-84.
Appendix II	Photo representation of stations sampled for gravel permeability and gravel composition in the lower Deschutes River, Oregon, 1983-84.
Appendix III	Locations of stations and survey hubs within stations in the lower Deschutes River, Oregon which were sampled for gravel permeability in Fall 1983.
Appendix IV	Methods used in 1983 and 1984 to sample gravel quality at gravel bars in the lower Deschutes River, Oregon.
Appendix V	Locations of benchmarks and temporary survey hubs for each sampling station in the lower Deschutes River, Oregon sampled for gravel composition, 1983-84.
Appendix VI	Sample point locations for gravel composition sampling, lower Deschutes River, Oregon, 1983-1984.
Appendix VII	Surface area, usability, and surface gravel composition of gravel bars in the lower Deschutes River, Oregon, 1983-1984.
Appendix VIII	Selected photographs of vegetative encroachment or sedimentation at gravel bars in the lower Deschutes River, Oregon.
Appendix IX	OSGC methodology used to estimate **usable** spawning gravel area in the lower Deschutes River, Oregon.

LIST OF APPENDICES (Continued)

Appendix X	Comparisons of historical and recent data on the amount of salmonid spawning gravel present in the lower Deschutes River, Oregon.
Appendix XI	Sample point locations, prevailing conditions, and gravel permeability data for 23 stations sampled in the lower Deschutes River, Oregon in Fall 1983.
Appendix XII	Gravel quality parameters for depth subsamples of chinook spawning gravel collected at 10 stations in the lower Deschutes River, Oregon, 1983.
Appendix XIII	Values of each gravel quality parameter for each depth subsample of chinook spawning gravel, lower Deschutes River, Oregon, 1983.
Appendix XIV	Values of each gravel quality parameter for each depth subsample of steelhead spawning gravel collected at the lower Deschutes River, Oregon, 1984.
Appendix XV	Gravel quality parameters for depth subsamples of steelhead spawning gravel collected at the lower Deschutes River, Oregon, 1984.
Appendix XVI	Summary of steelhead and resident rainbow trout redds counted, by bar and river mile, in the lower Deschutes River, Oregon, 1984.
Appendix XVII	River cross-sections for the Deschutes River at USGS transect sites near the Pelton and Moody gages, lower Deschutes River, Oregon.

APPENDIX I

AERIAL PHOTOGRAPHS WITH SPAWNING GRAVEL BAR LOCATIONS FOR THE LOWER DESCHUTES RIVER, OREGON, 1983-84.

This appendix contains air photos of the lower Deschutes River, Oregon with the outlines of deposits of spawning gravel identified in 1983 and 1984 superimposed. Benchmarks for stations which were sampled for gravel permeability or composition are shown as hollow triangles on the photos and identified by a station number given in parentheses.

SECTION I

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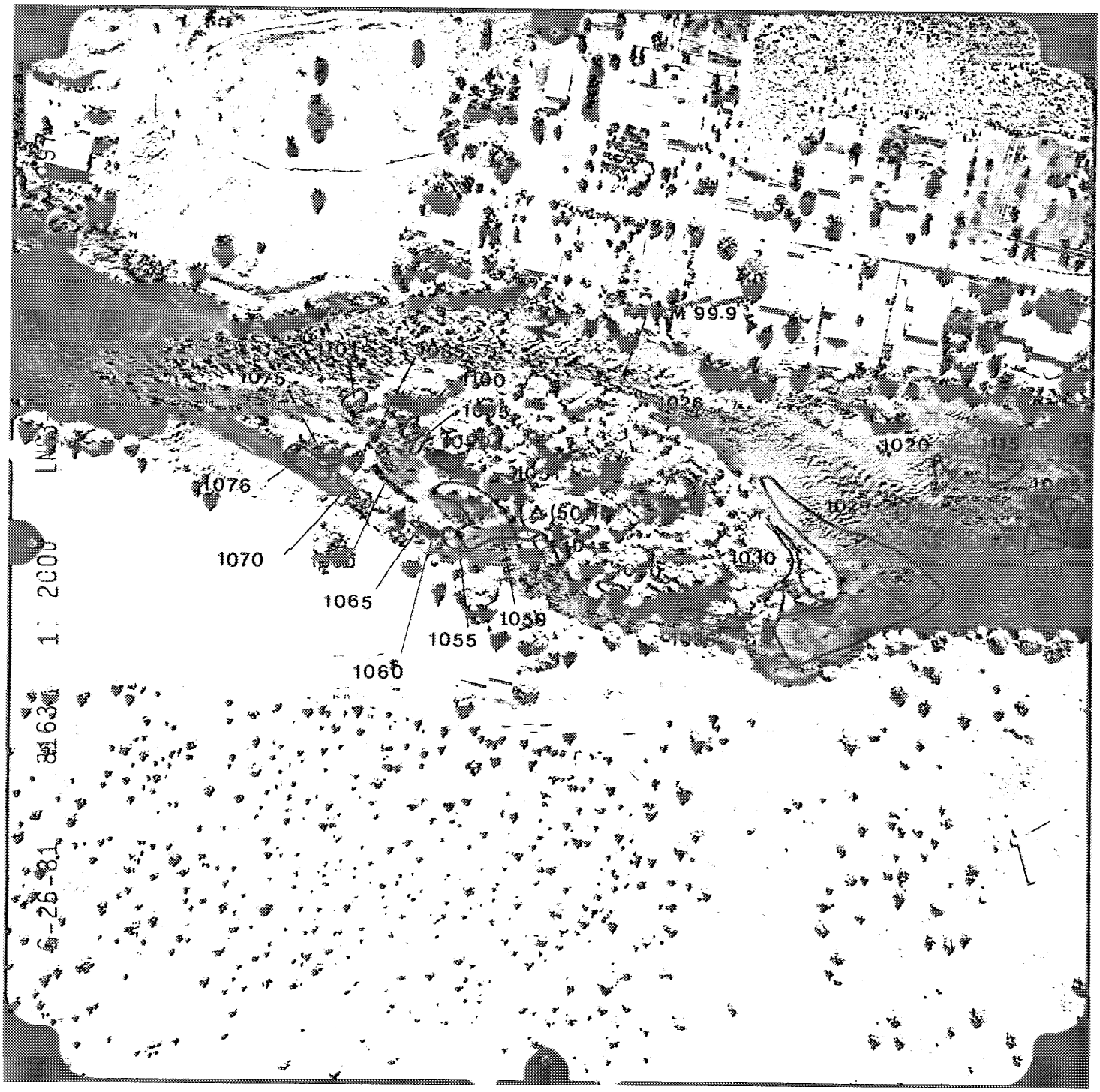

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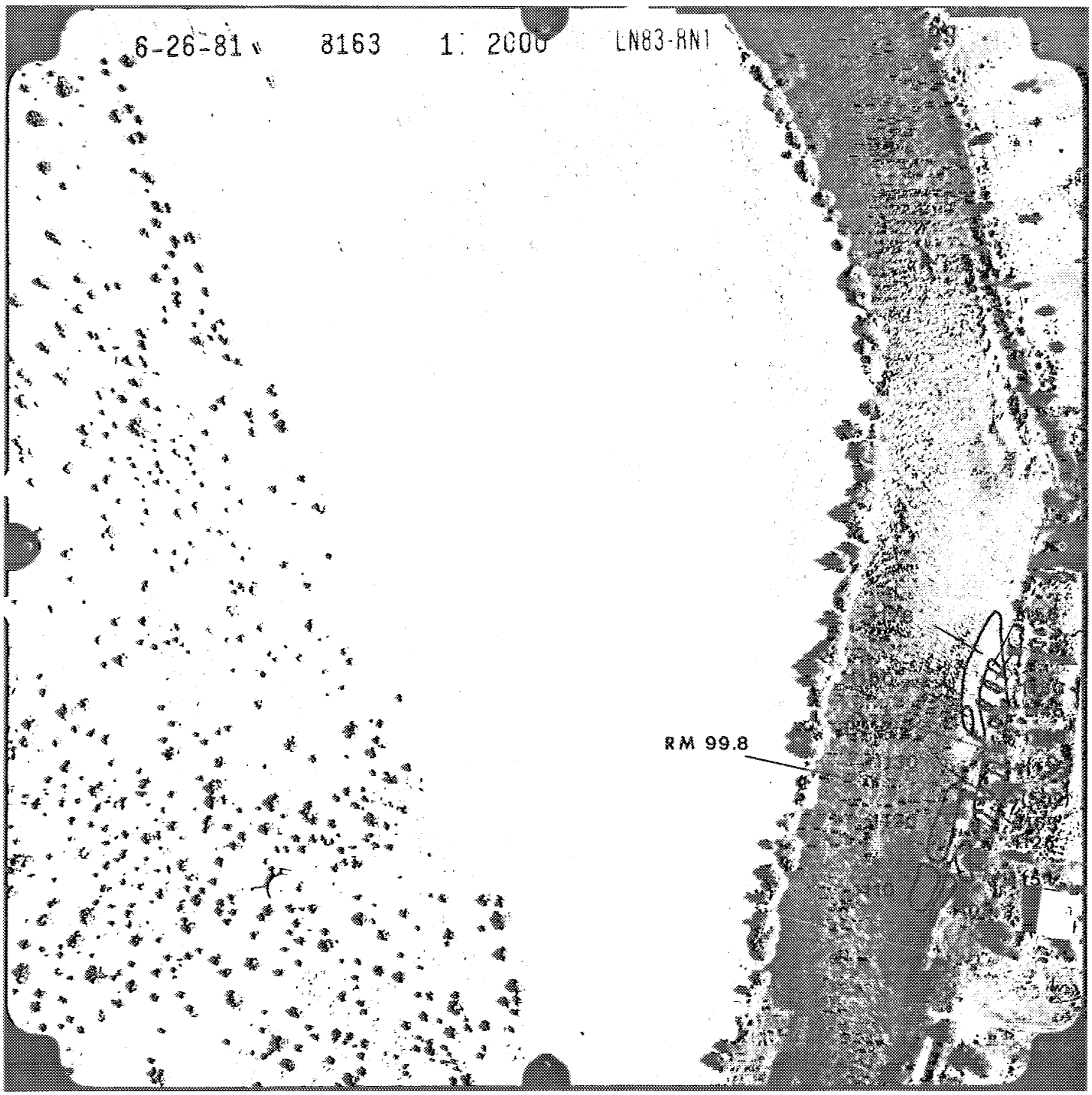
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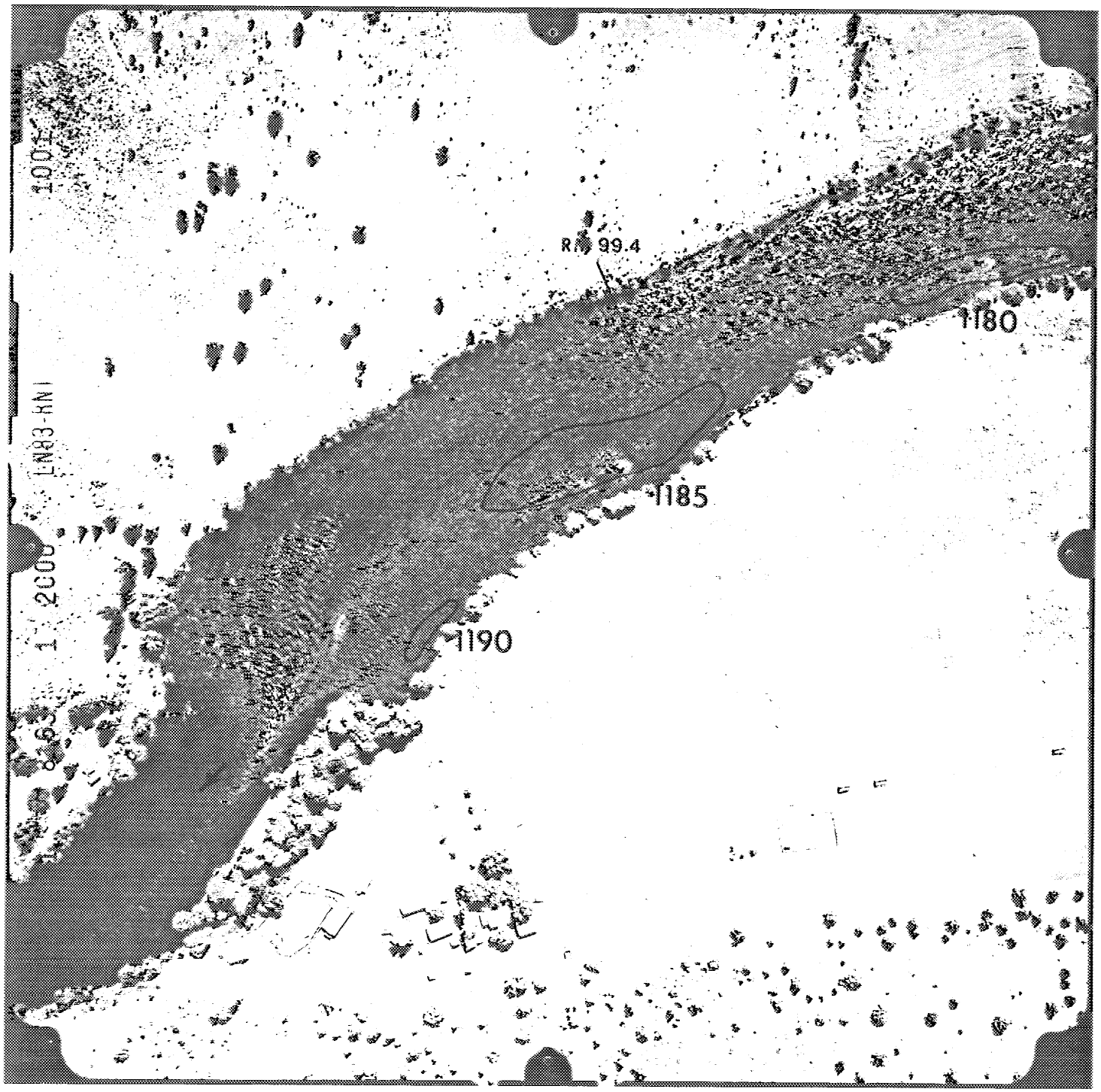

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1190
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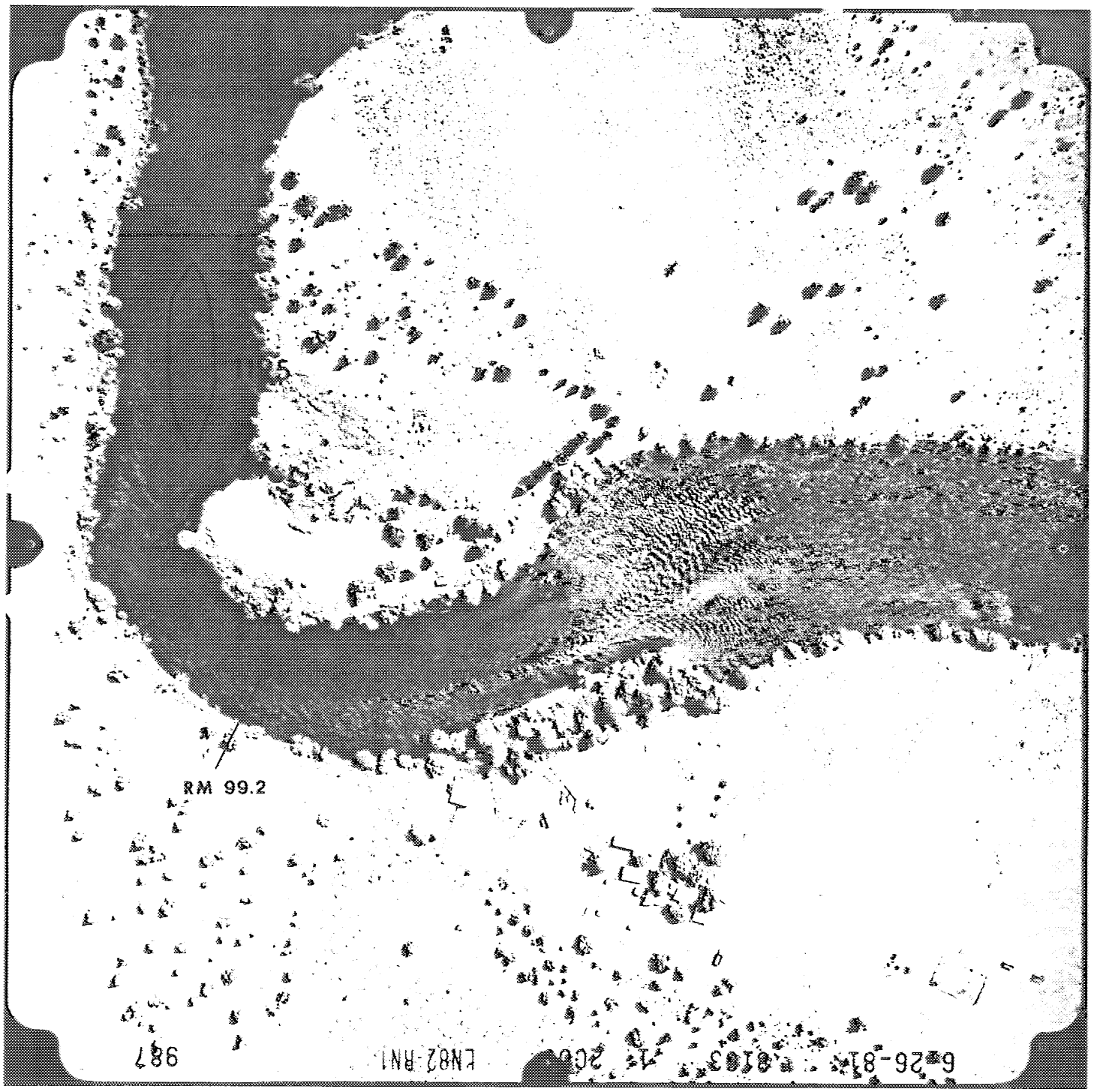
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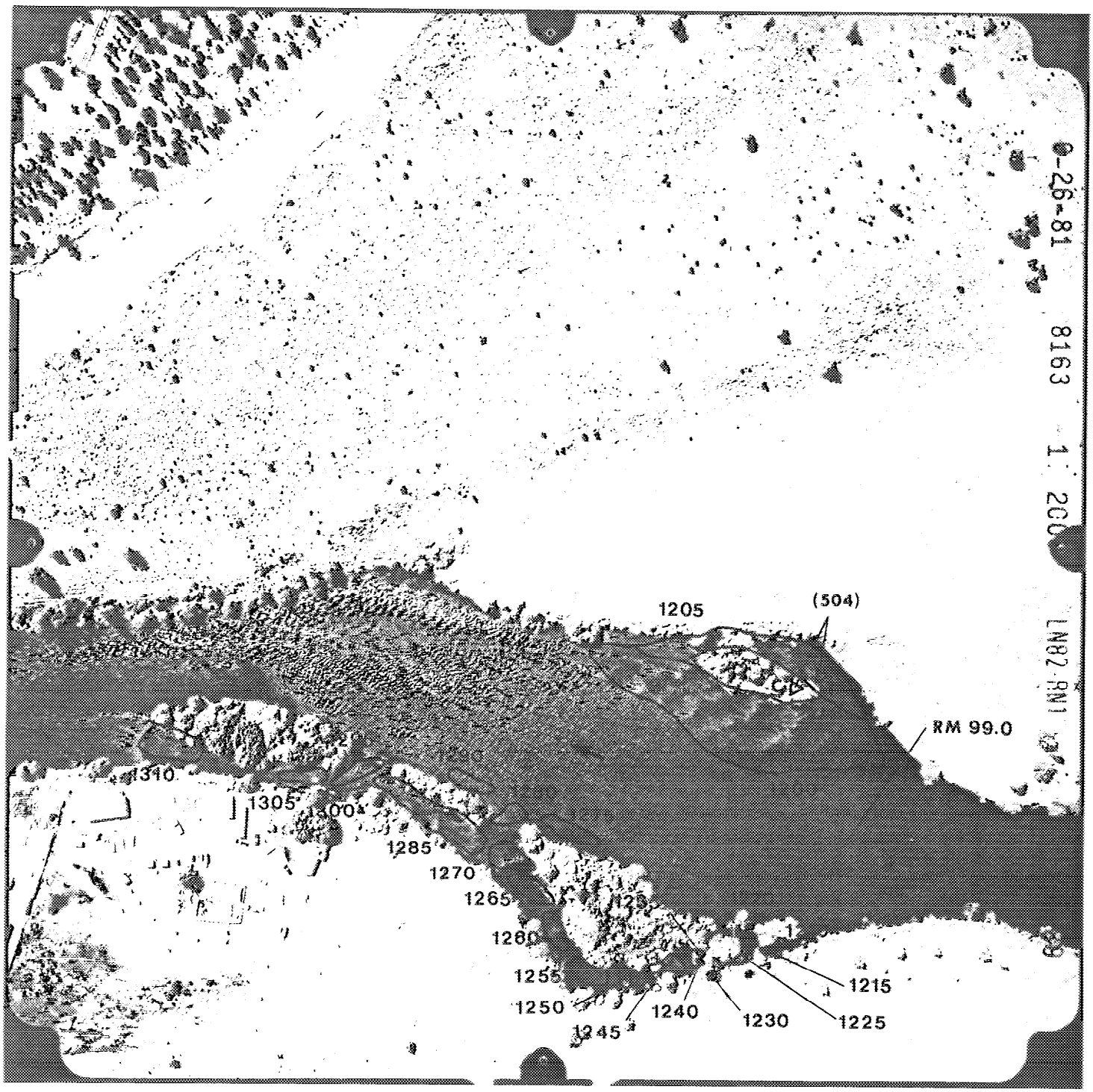
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1300
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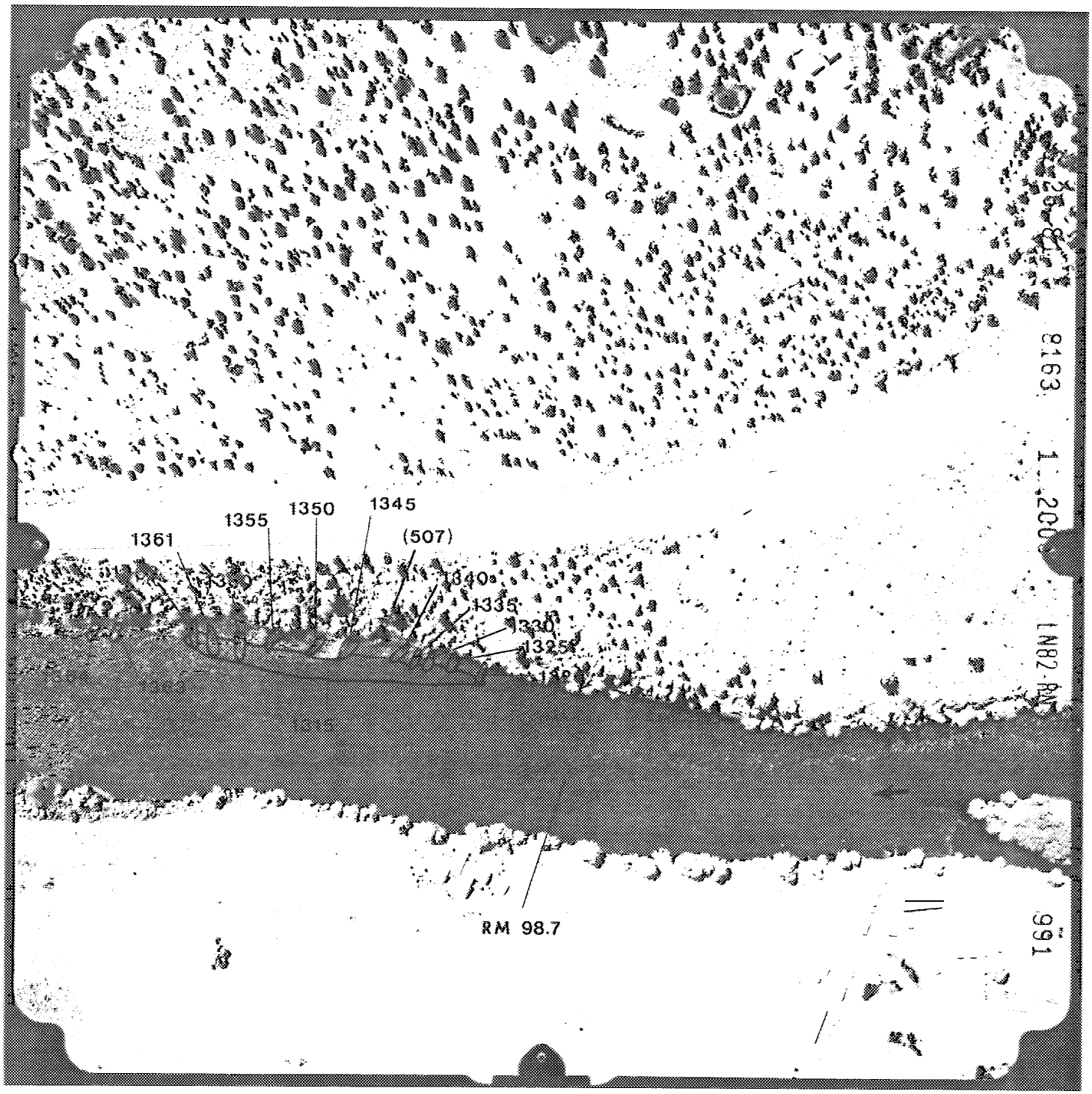
1230
1225
1215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1345
(507)
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LN82-RN
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967
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6-26-81
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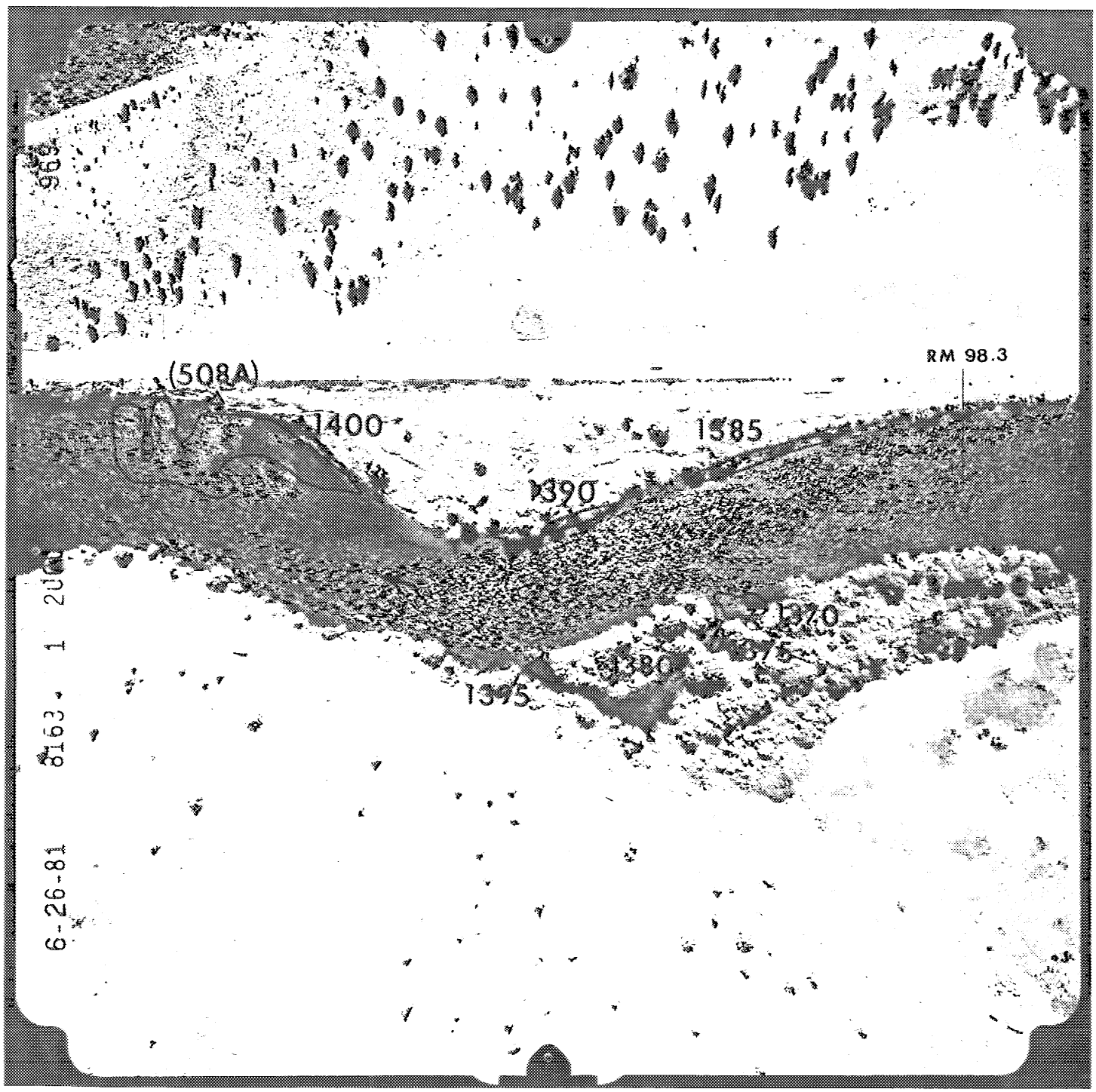
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1400
1585
1390
1370
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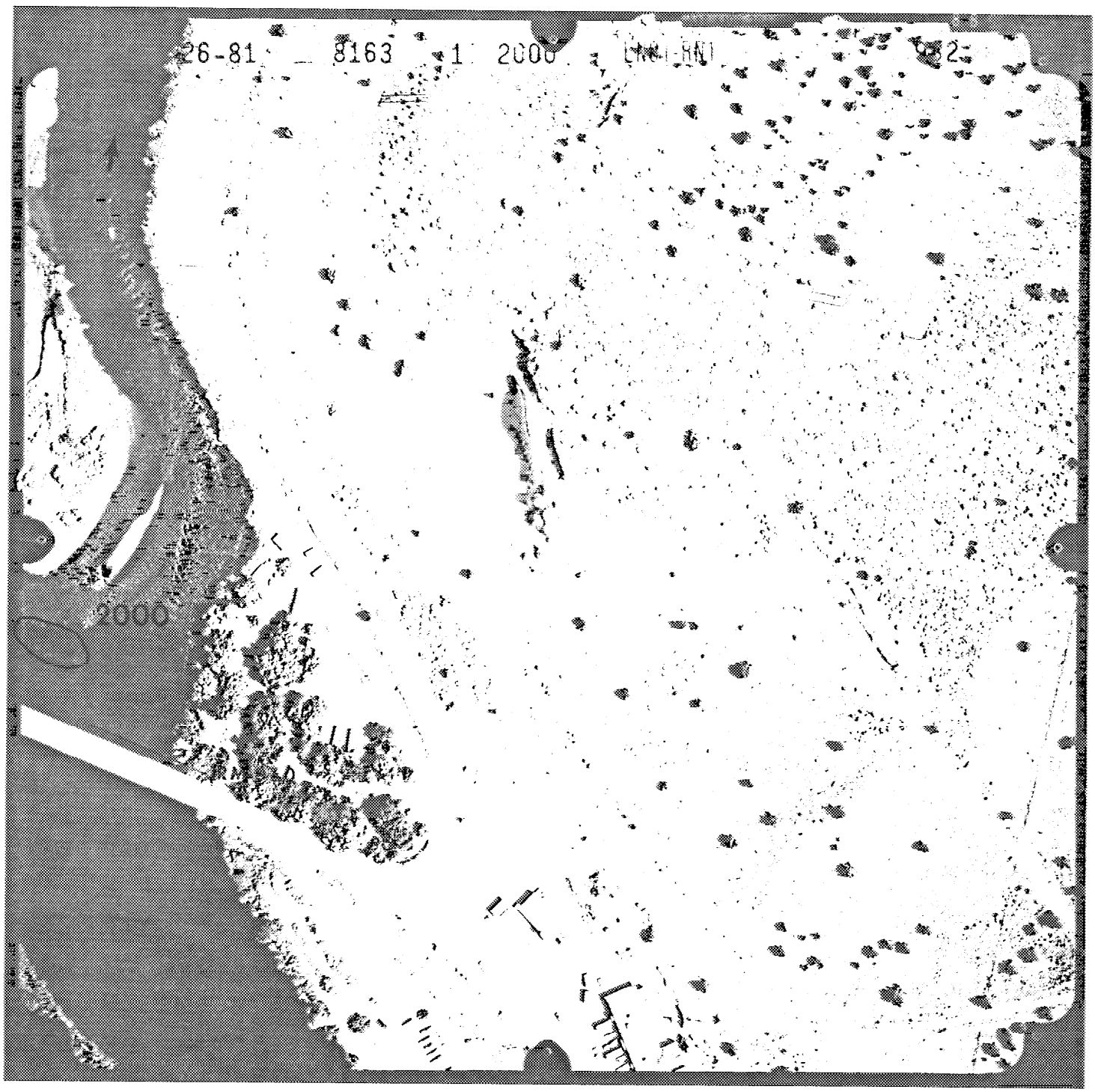
1395
6-26-81 8163 1 2000

1405
6-26-81
8163
1 2000

RM 97.5
1415

SECTION II


26-81 8163 1 2000
2000'

26-81
LN80-RN1
959

6-26-81
RM 96.5

RM 96.5
(II-5)
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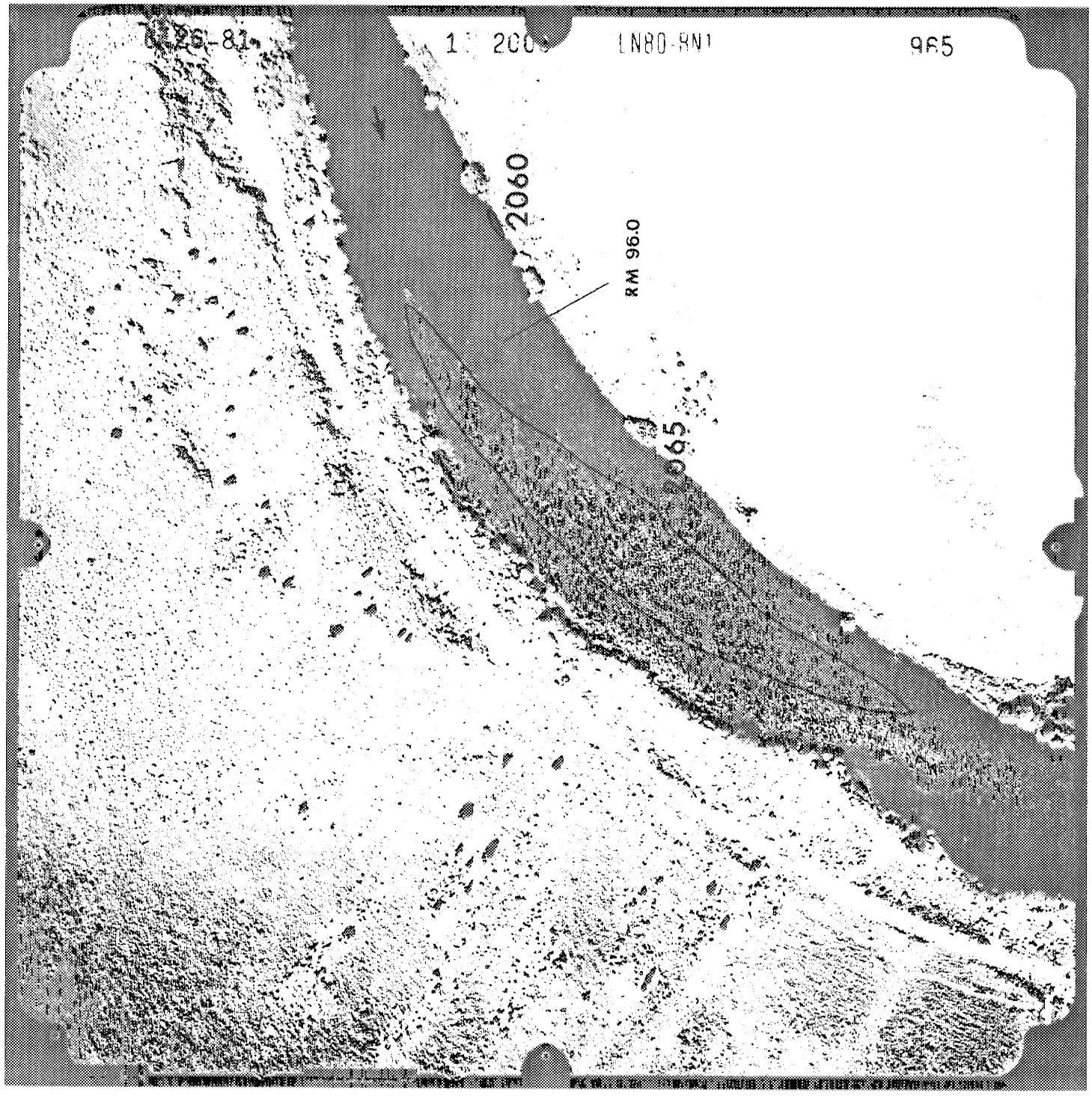
2050
8163
6-26-81

6-26-81
8163 ✓ 1. 200
2055
RM 96.3
963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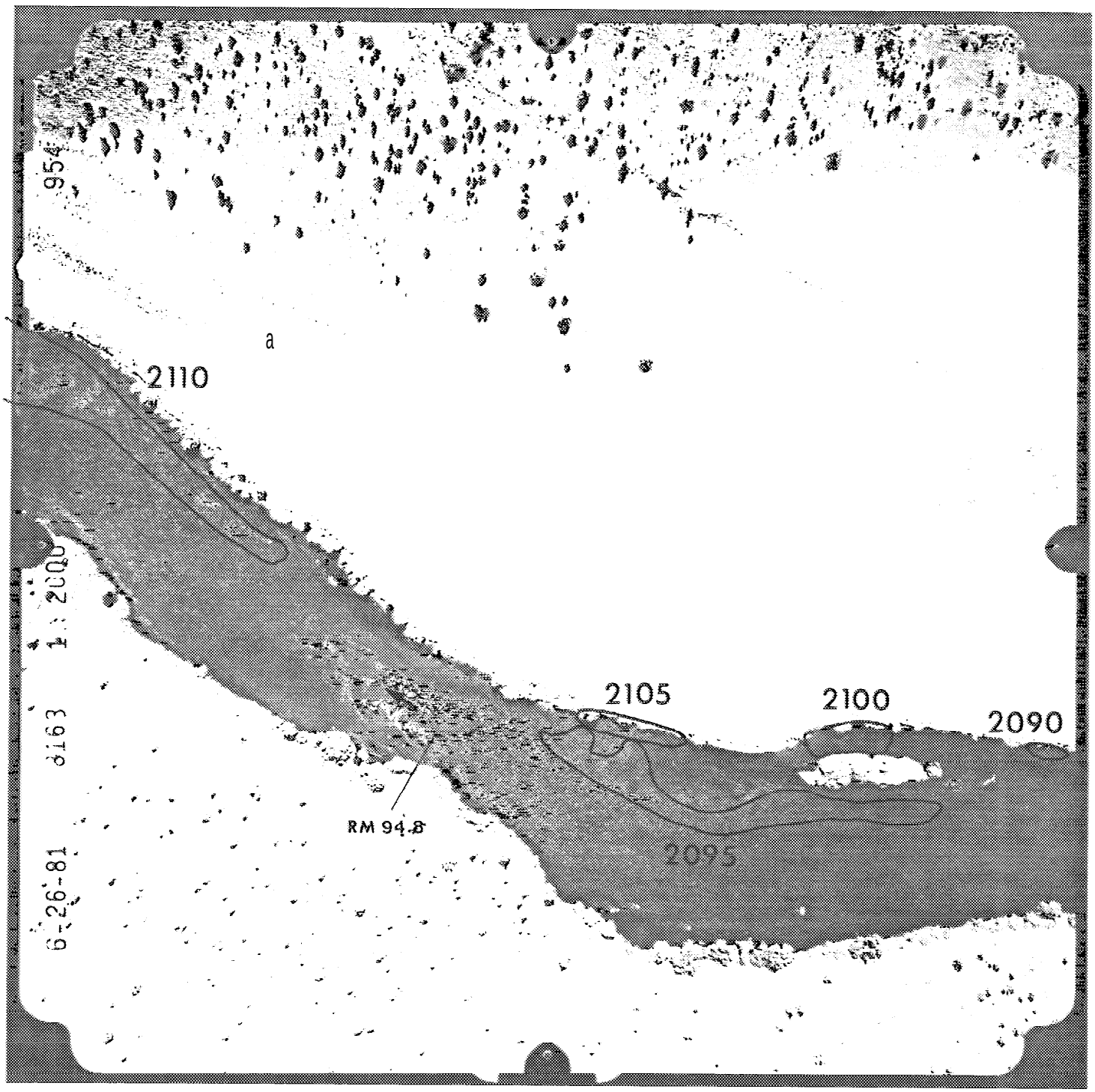
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6-26-81

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6-26-81
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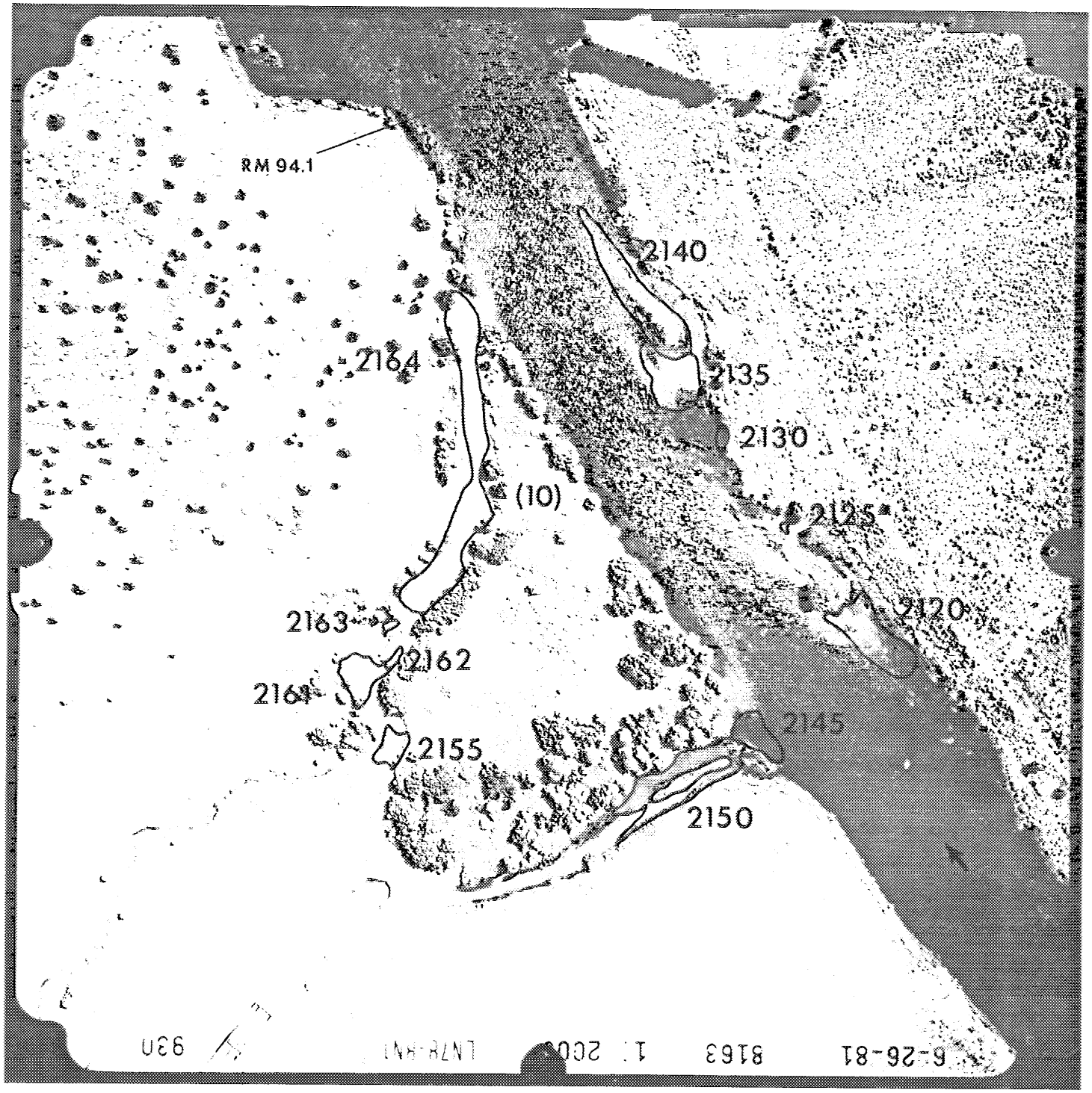
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(10)
2125
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2163
2162
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6-26-81
8163
1: 200
LN78-BN1
930

(10A)

6-26-81
8463
1 240
(11)
2170
RM 93.1
938

RM 92.7
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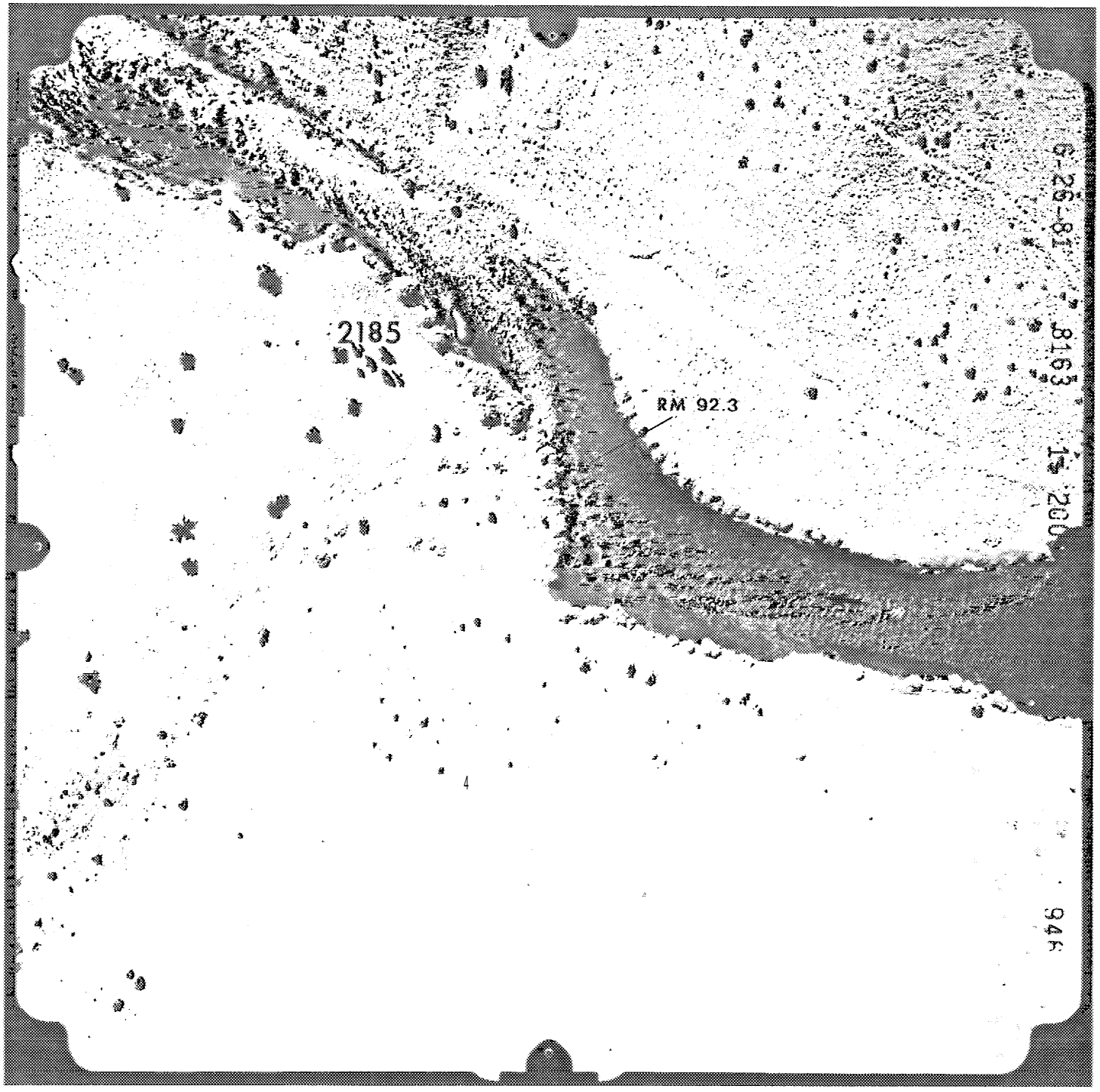
9-26-81
8453
942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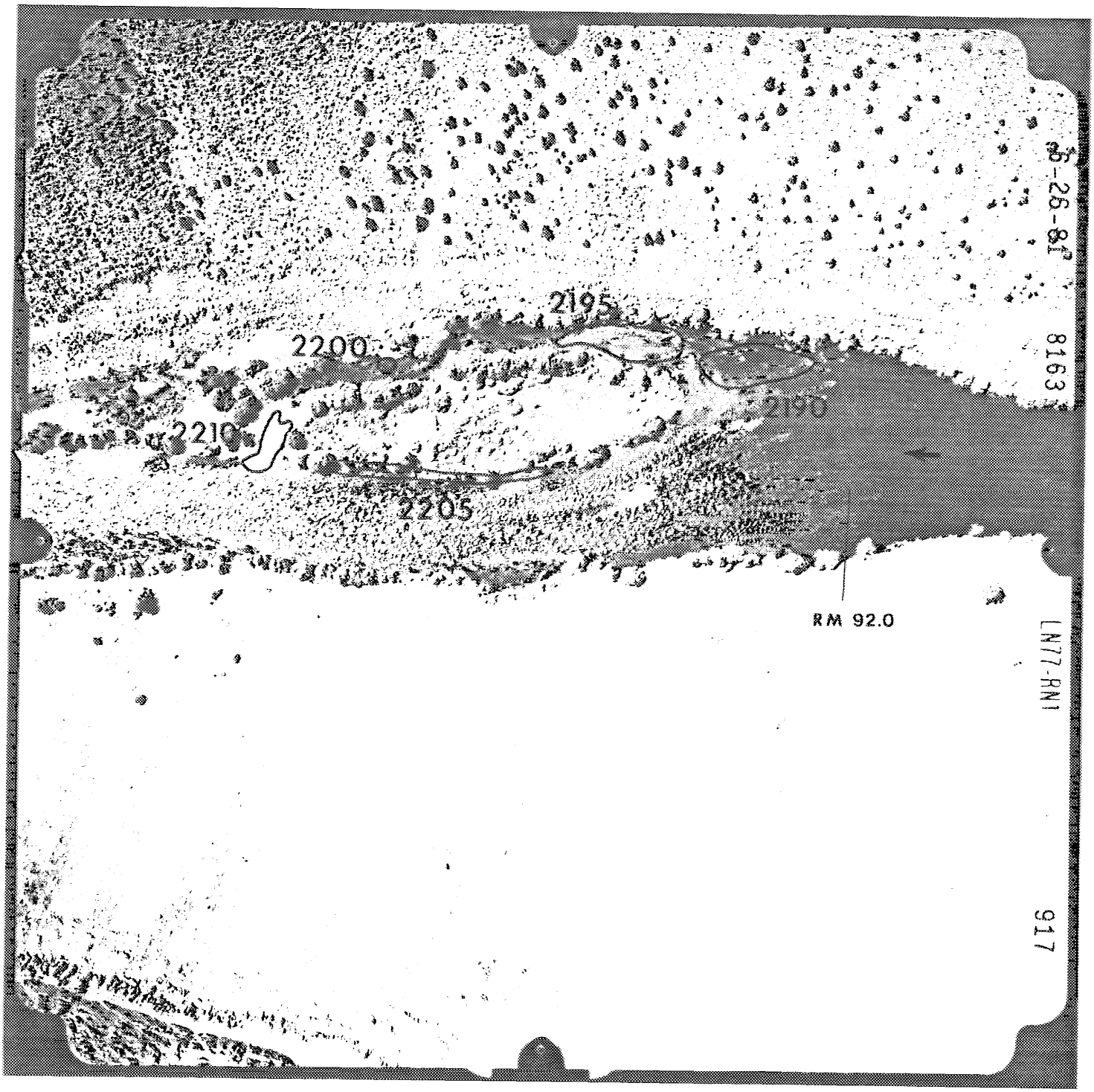

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LN77-RN1
917

6-26-81
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RM 91.5
2220
2215
LN77-RN1
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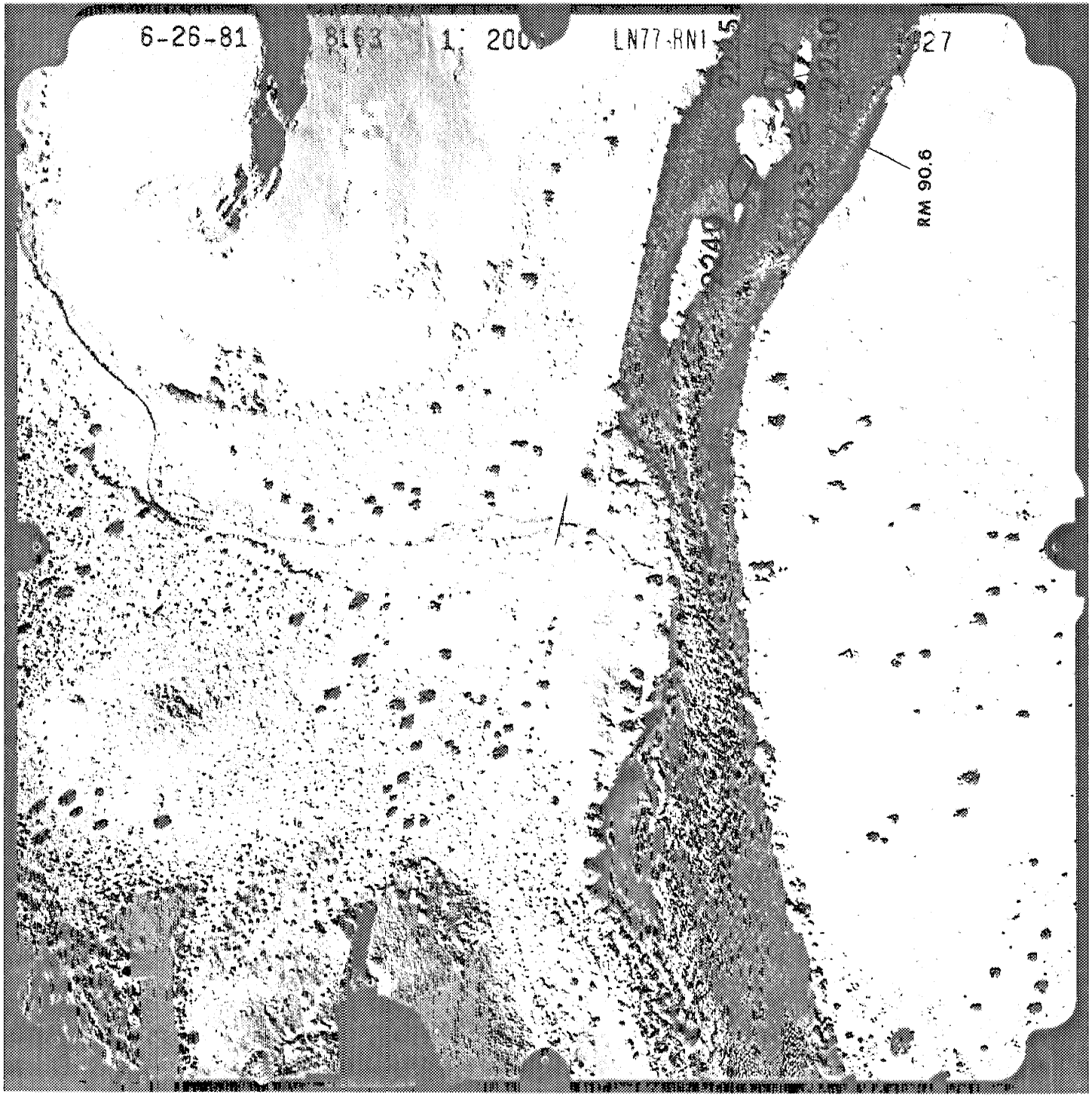
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6-26-81
RM 90.4
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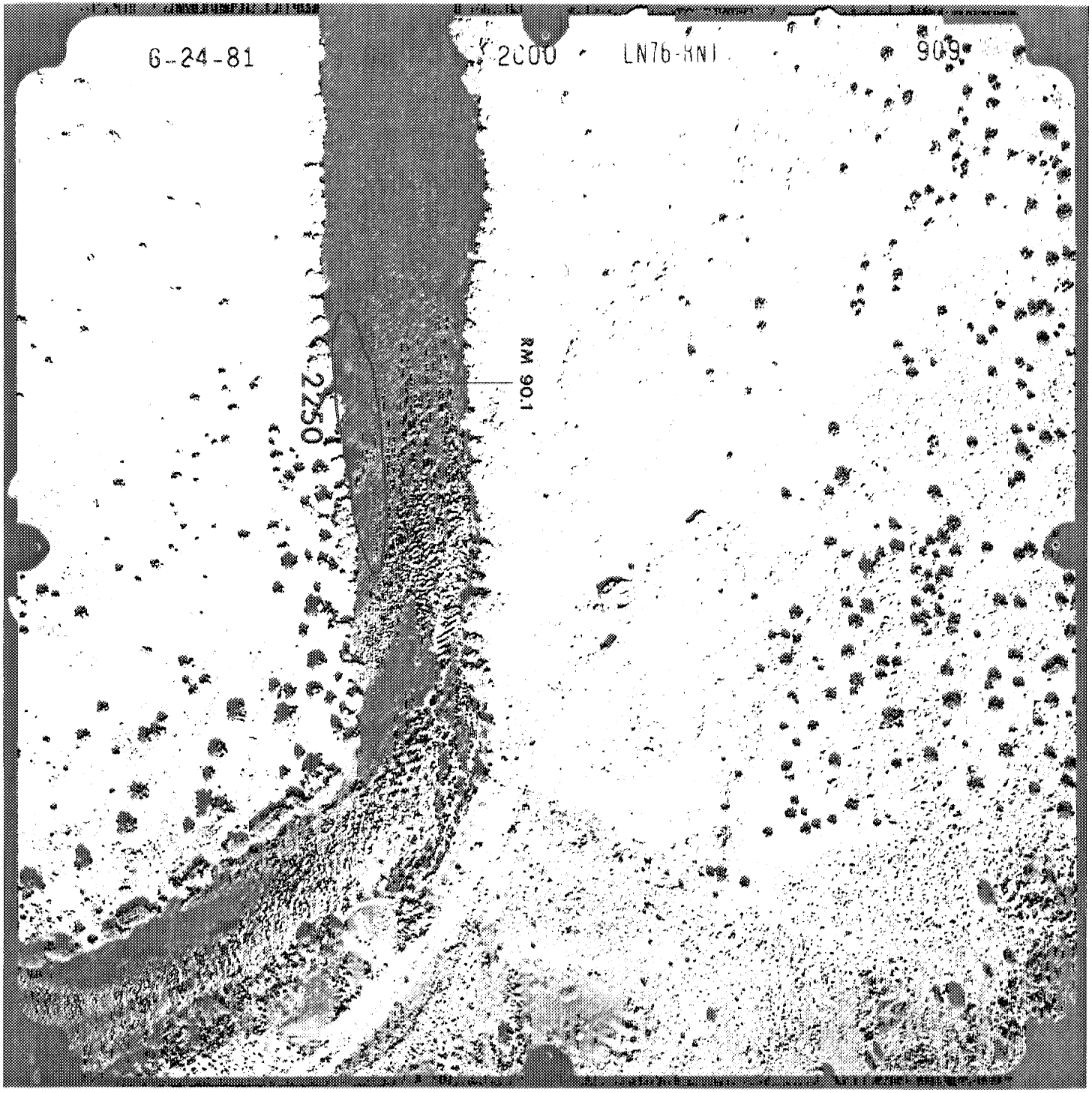
928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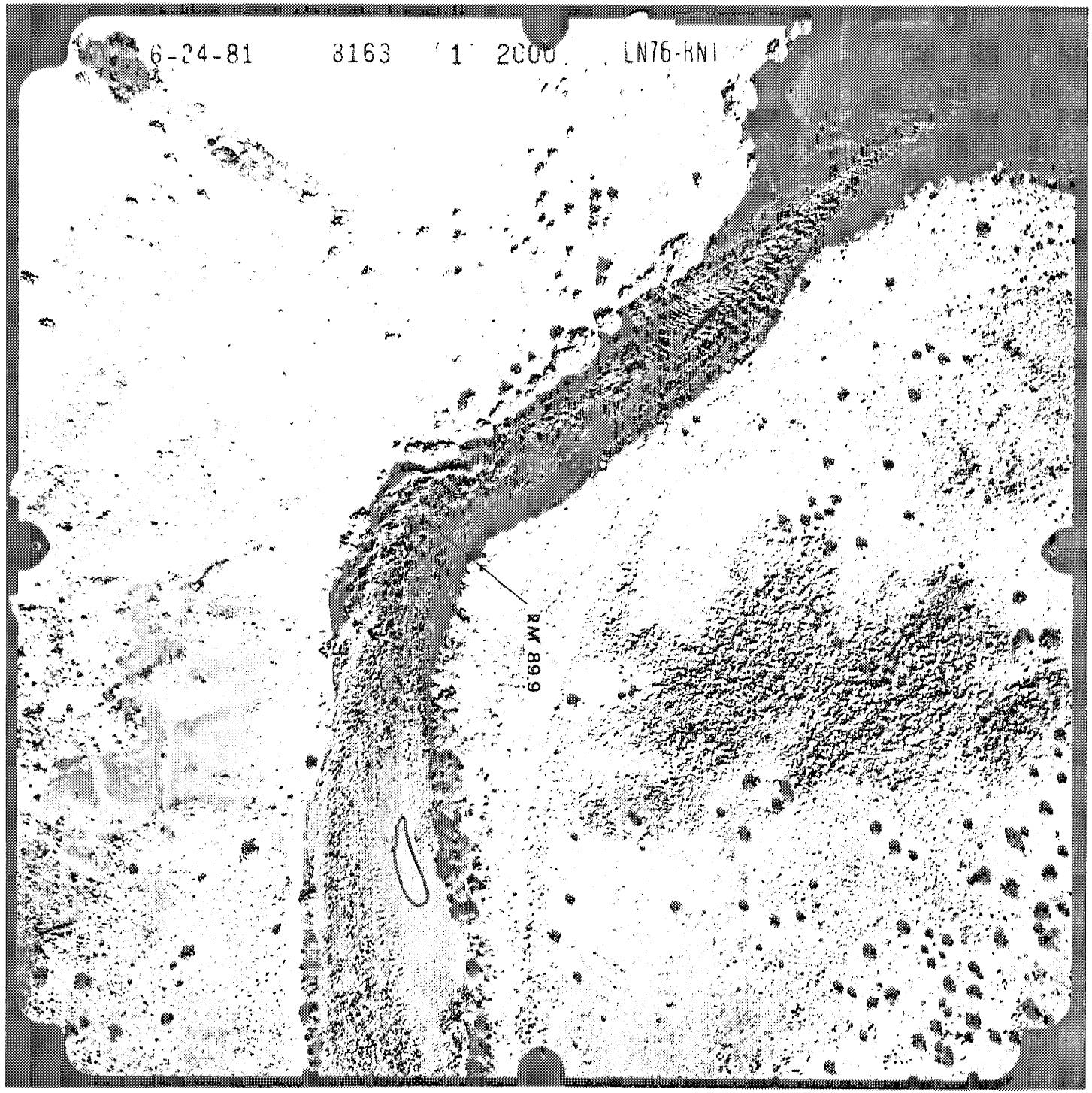
LN76-RNI
909
2250
RM 90.1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RM 869

6-24-81 8163 1
RM 89.0
2220
LN75-RA1
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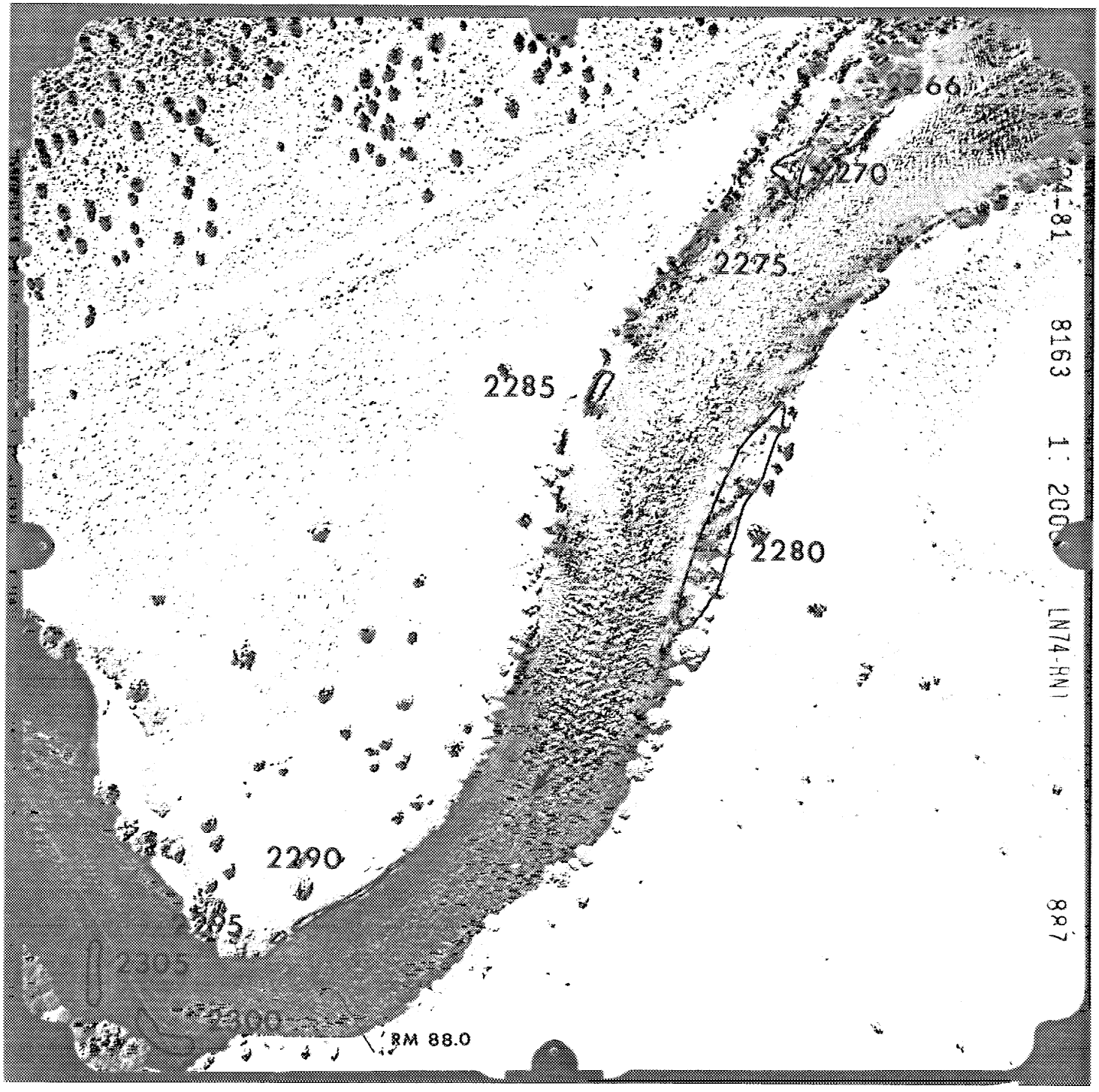
6-24-81
8163
1 2000
RM 88.4
2265
(19)
906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LN74-RN1
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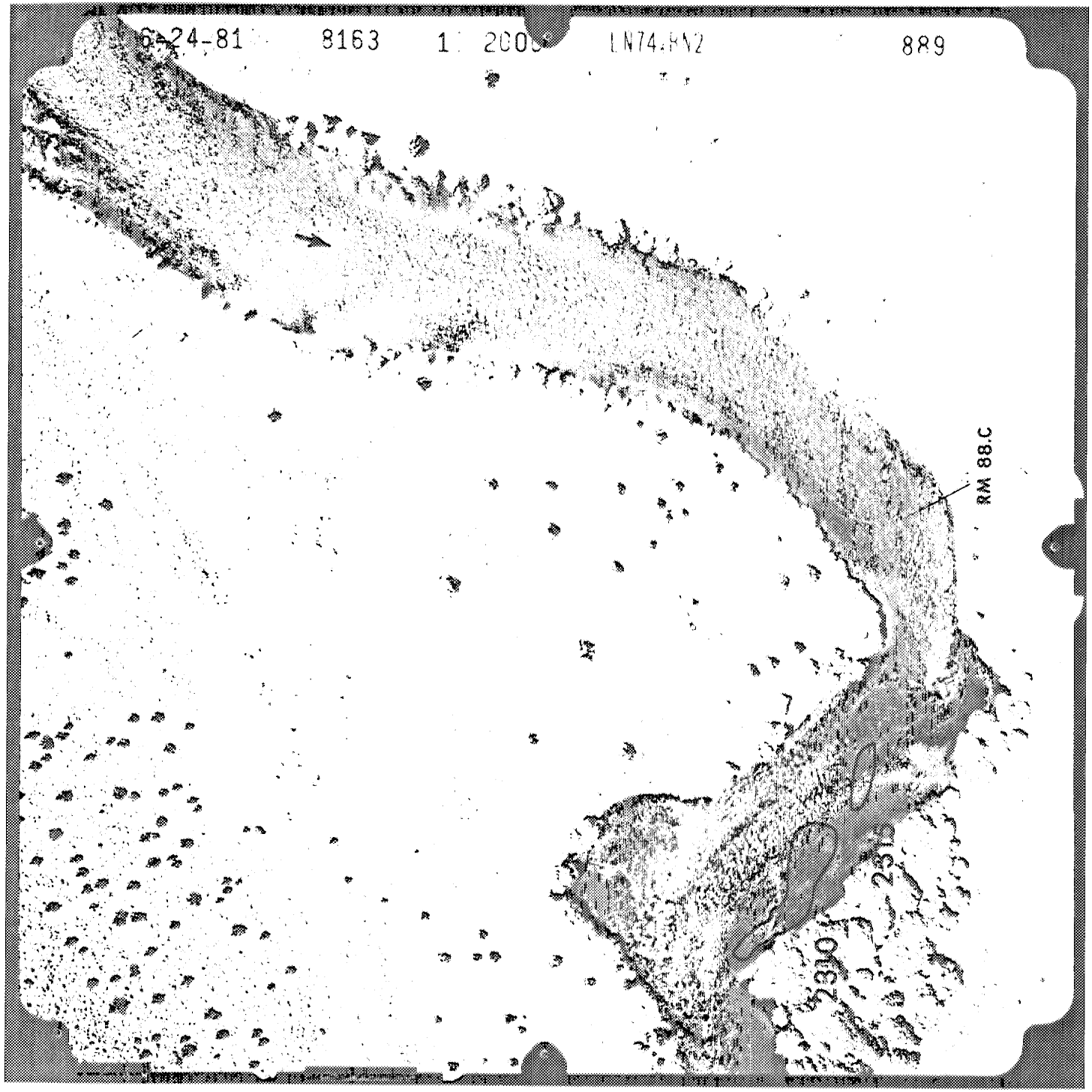
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1
LN74.RN2
889
RM 88.C
330
251

882
LN73-HN1
1 2000
2320
RM 87.3
6-24-81

6-24-81
(615)
2335
2330
RM 86.9
2325
876

859
LN7I-RN2
1: 2000
RM 86.1
2360
2355

865
RM 85.4
2370
2365
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1
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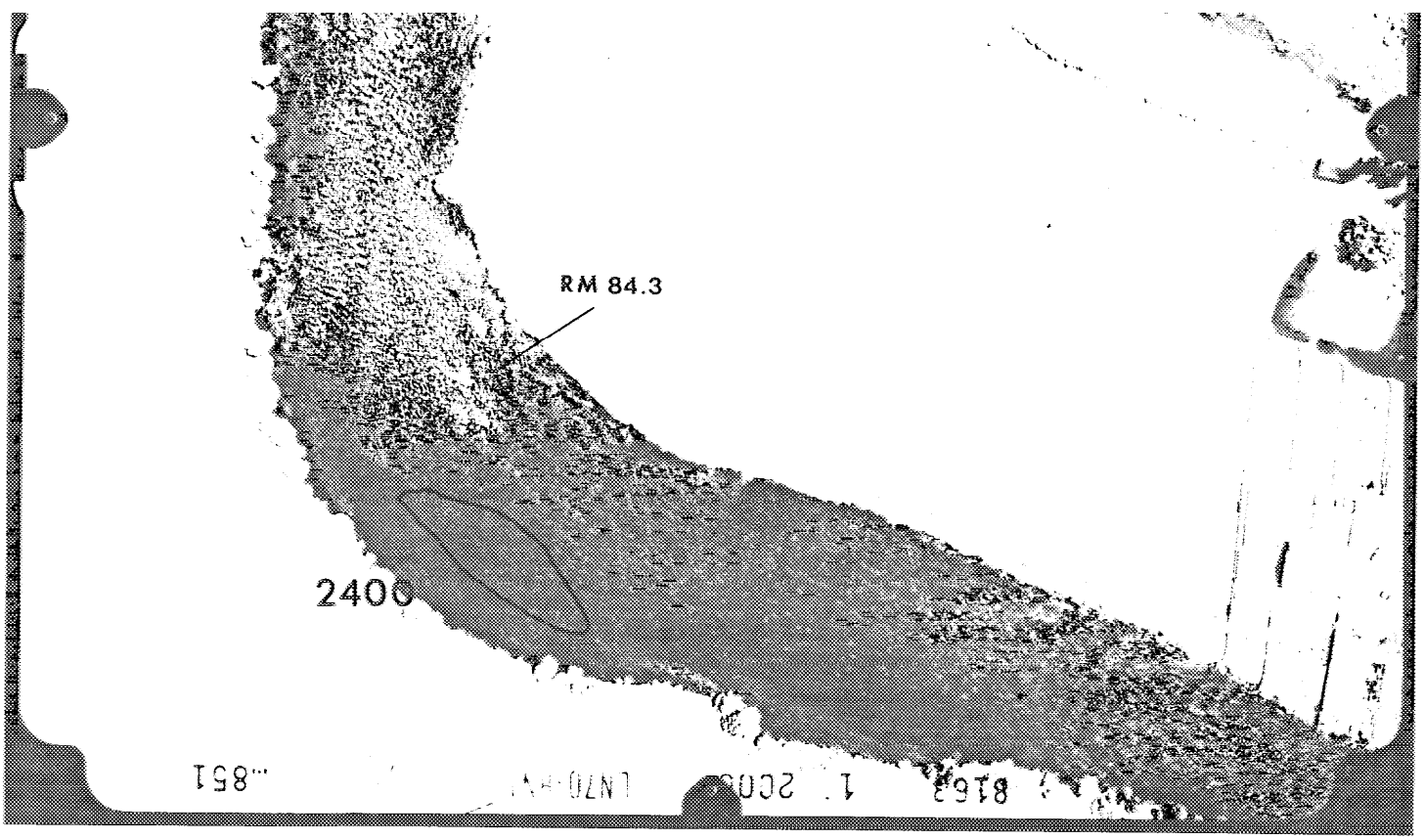
867
2385
2390
2395
RM 85.1
6-24-81
8163
1' 2000


RM 84.3
2400

SECTION III

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RM 83.7
3000
855
8163
6-24-81

838
2000
3030
3025
3020
301
RM 83.0
6-24-81

84n
LN69-RN2
RM 82.8
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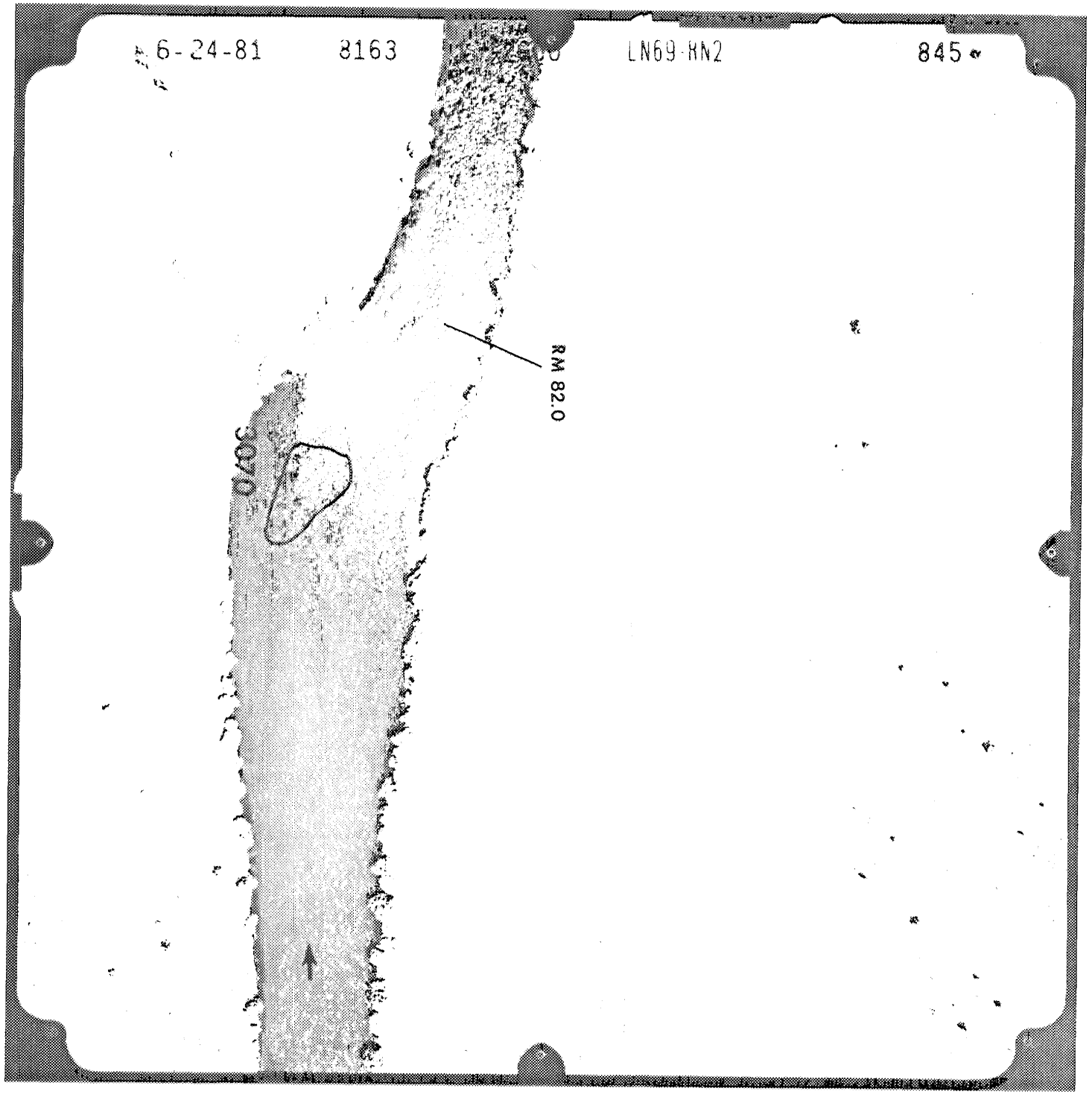
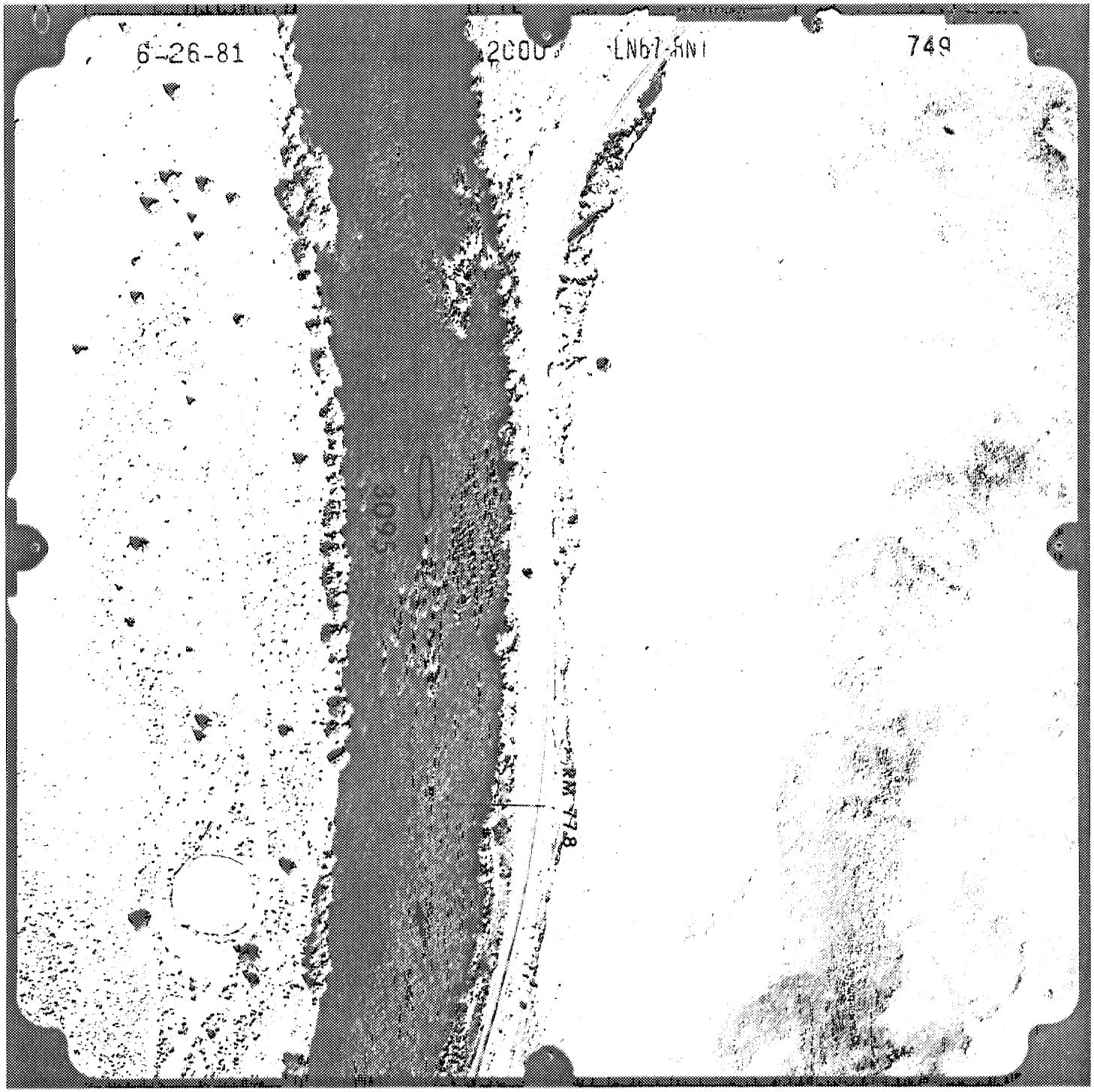
3040
3035
3050
3065
3055
3060
6-24-81


6-24-81
8163
LN69-RN2
845
RM 82.0
3070

760
LN68 RN1
2000
3080
3075
R 80.9

6-26-81
3085
RM 8

LN68-RN
2000'
RM 80.3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2000
LN67-RN1
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RM 778

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751
LN67-RN1
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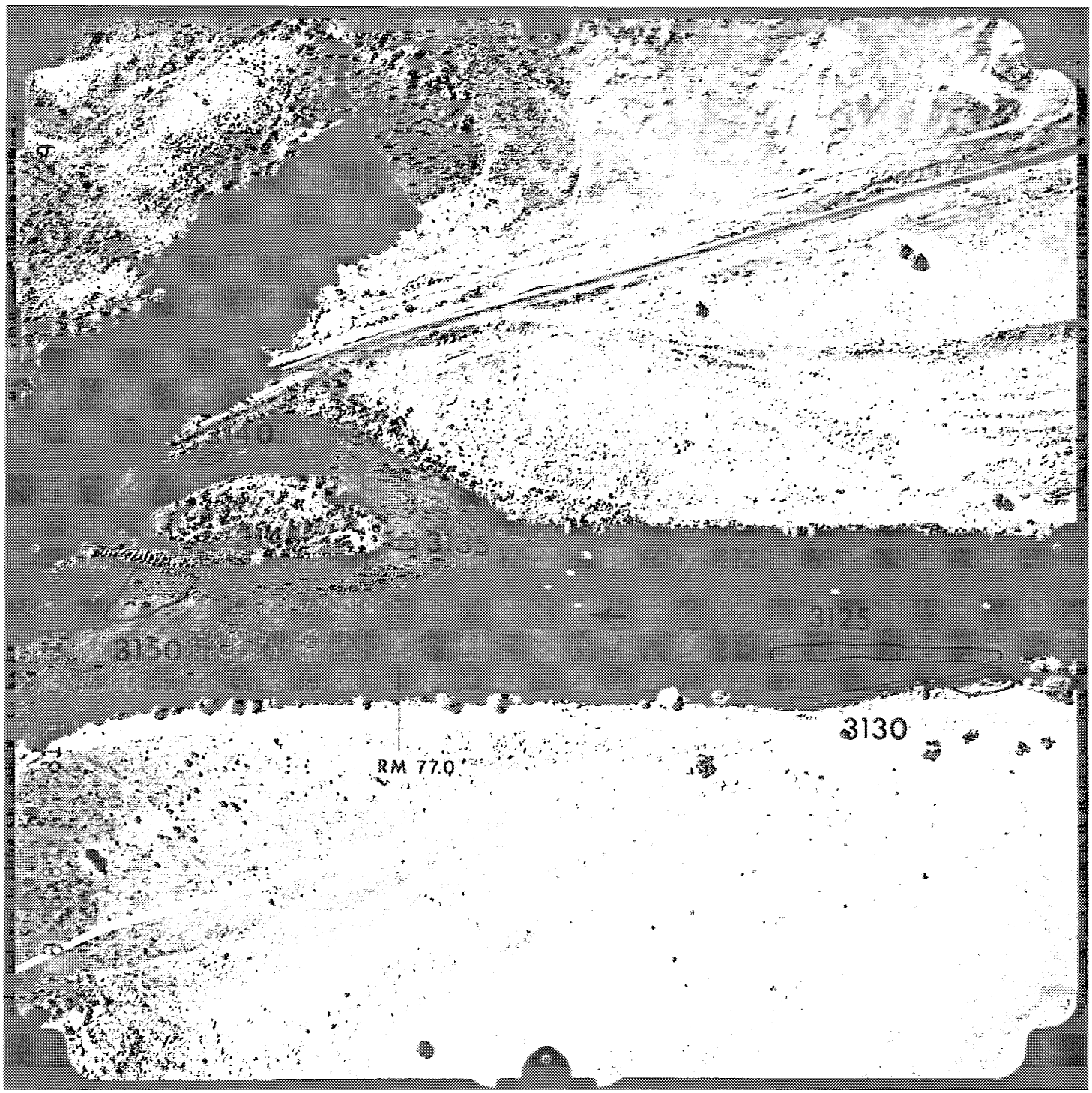
3163
6-26-81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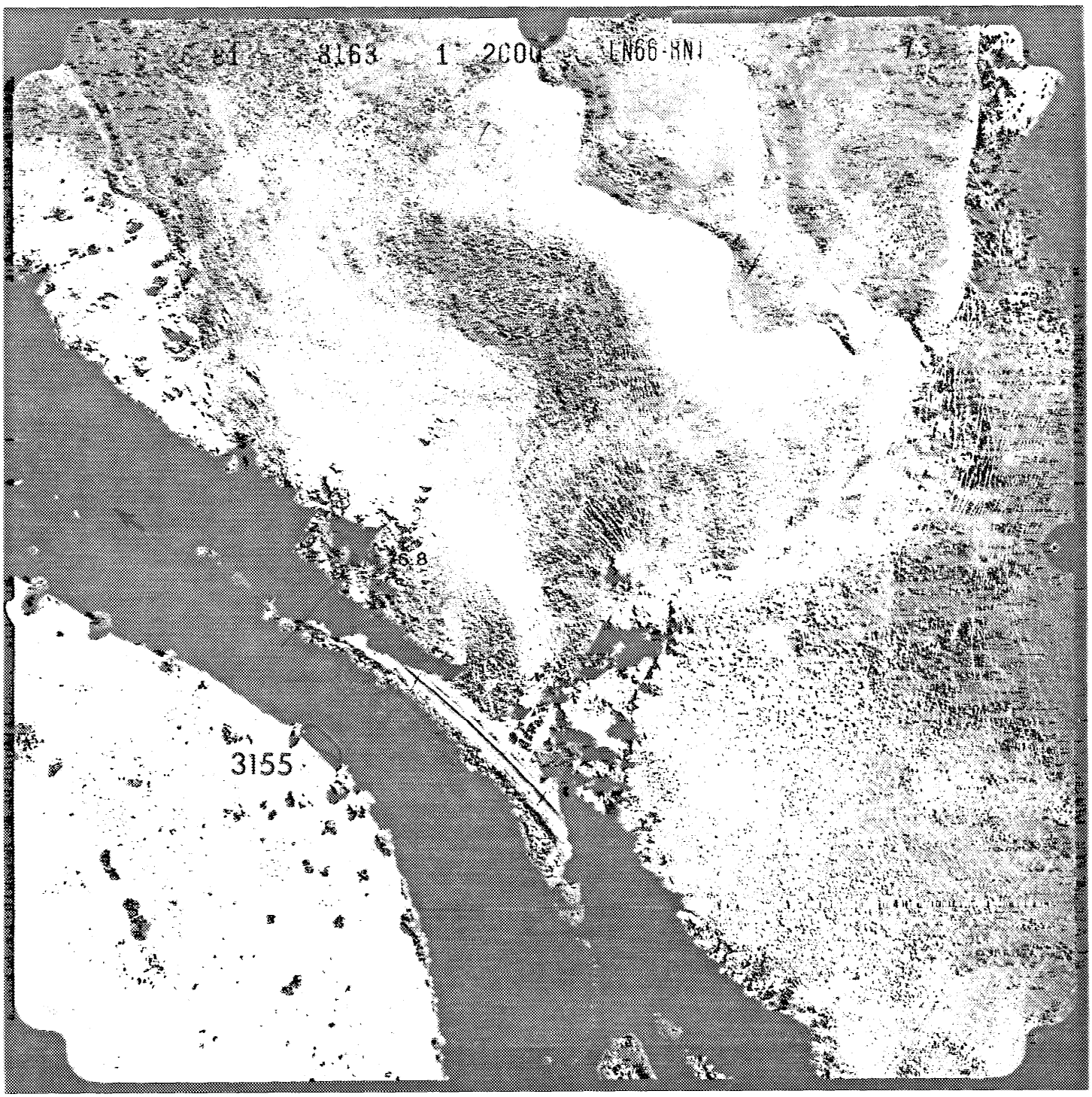
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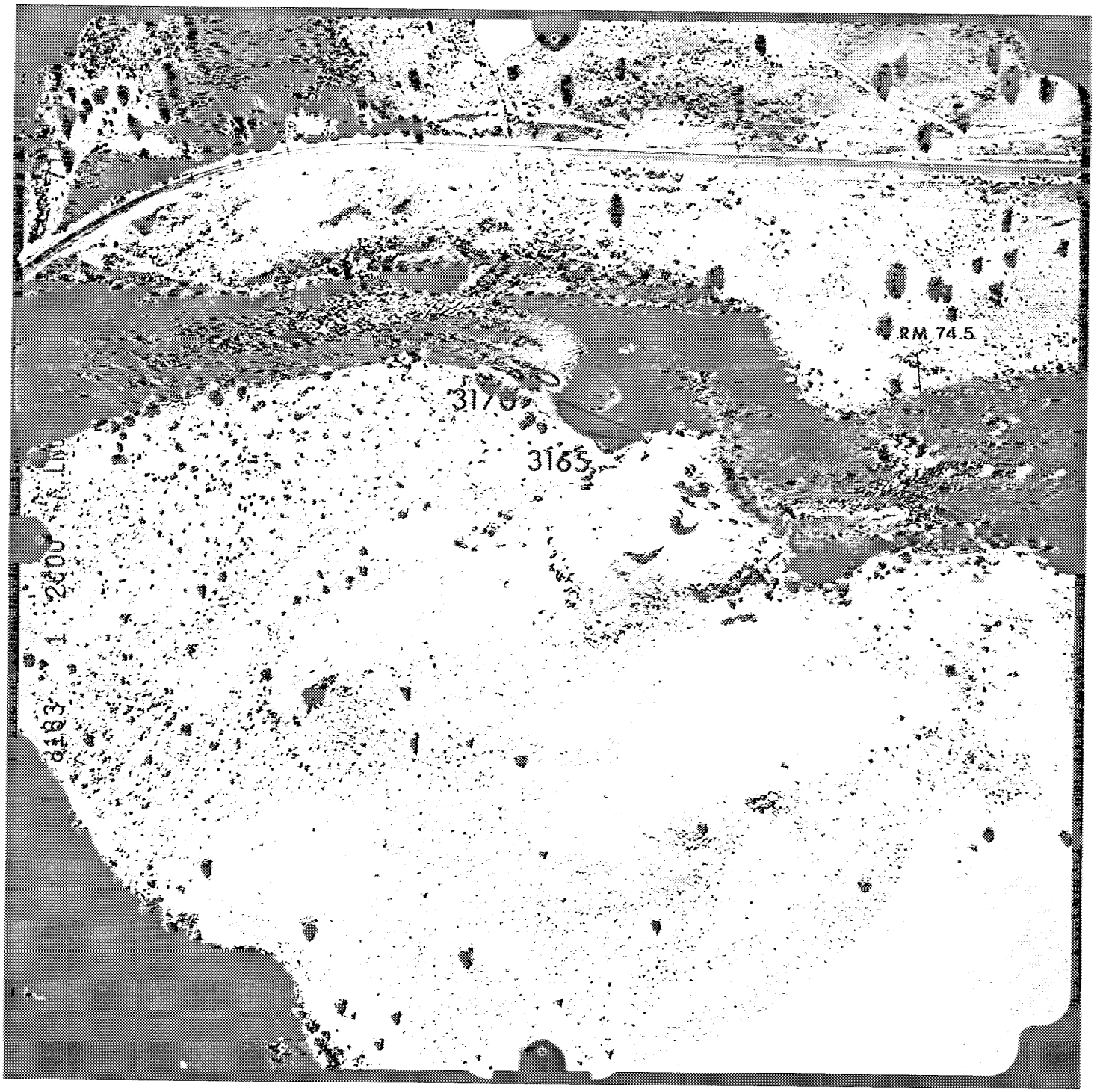
316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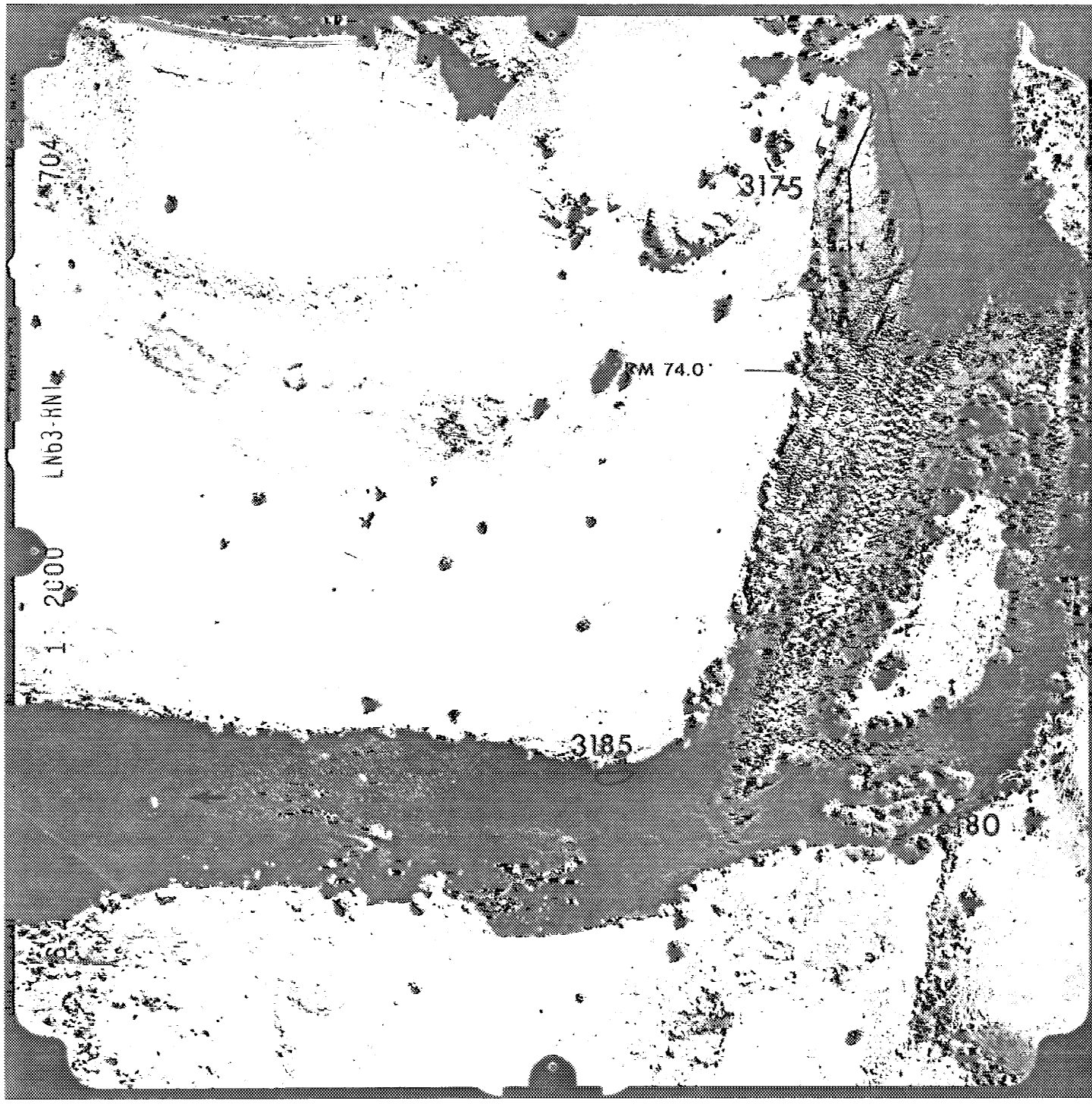

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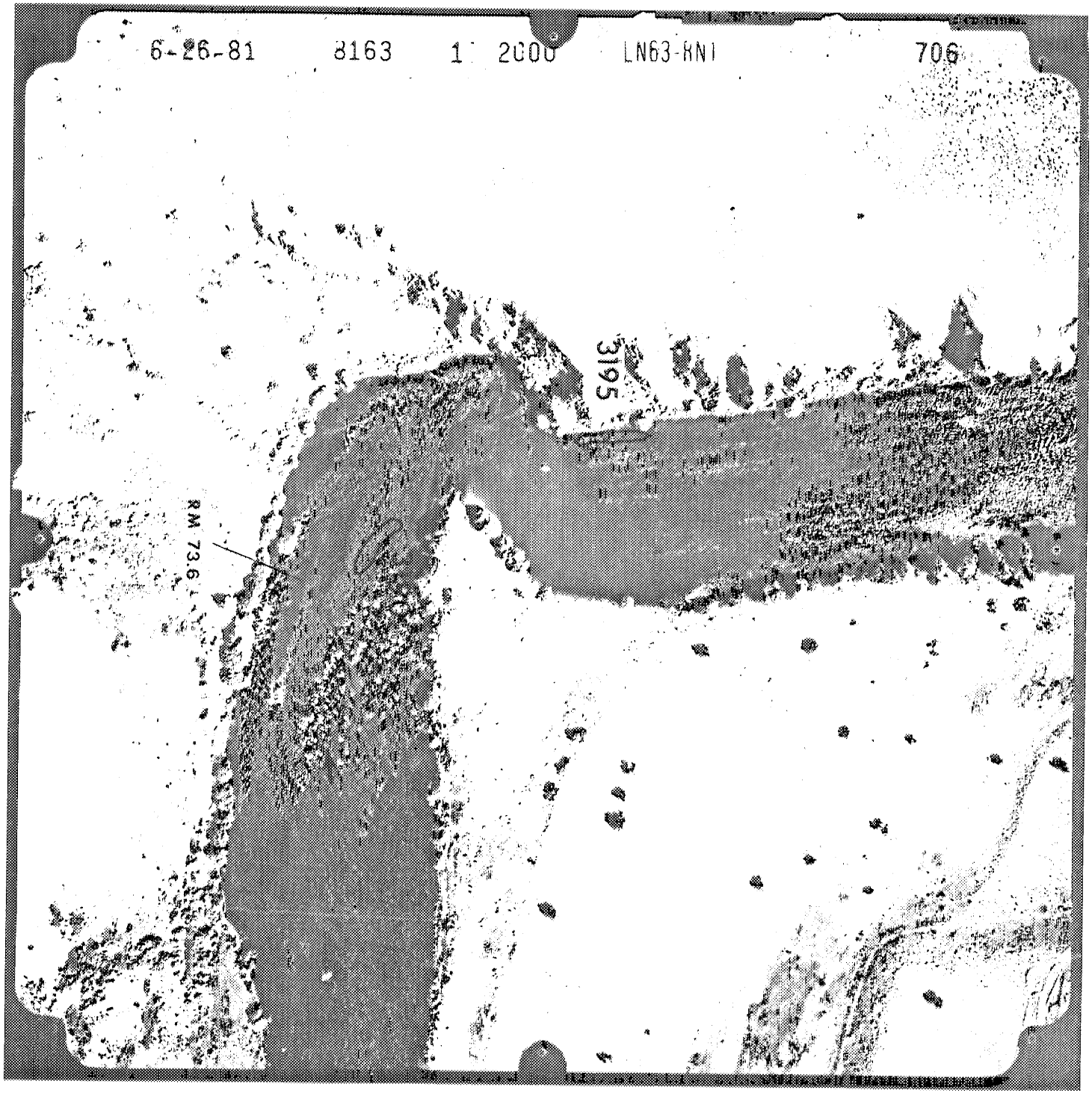
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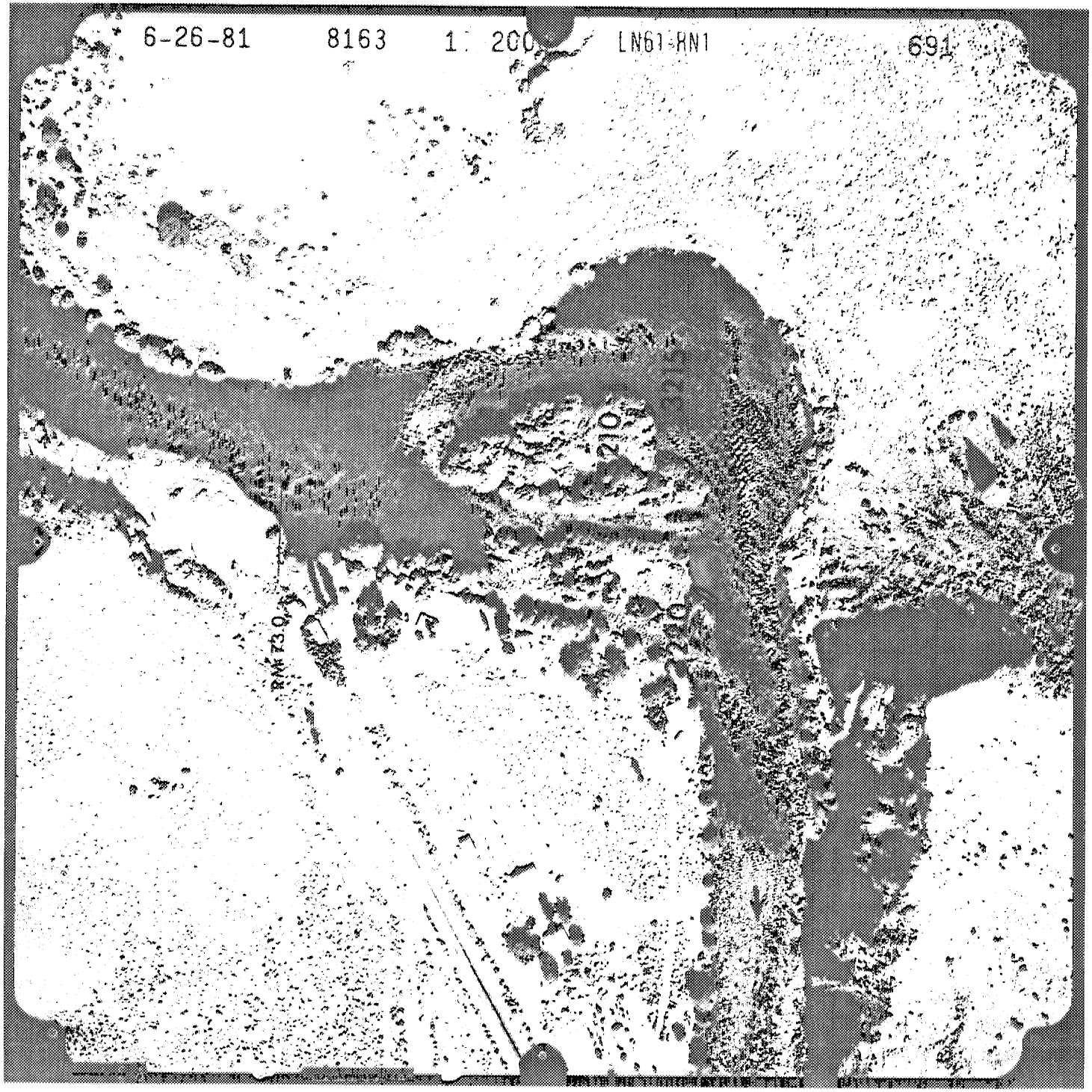
RM 73.6

6-28-81
8163
69°
RM 73.3

M 73.0
700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LN61-RN1
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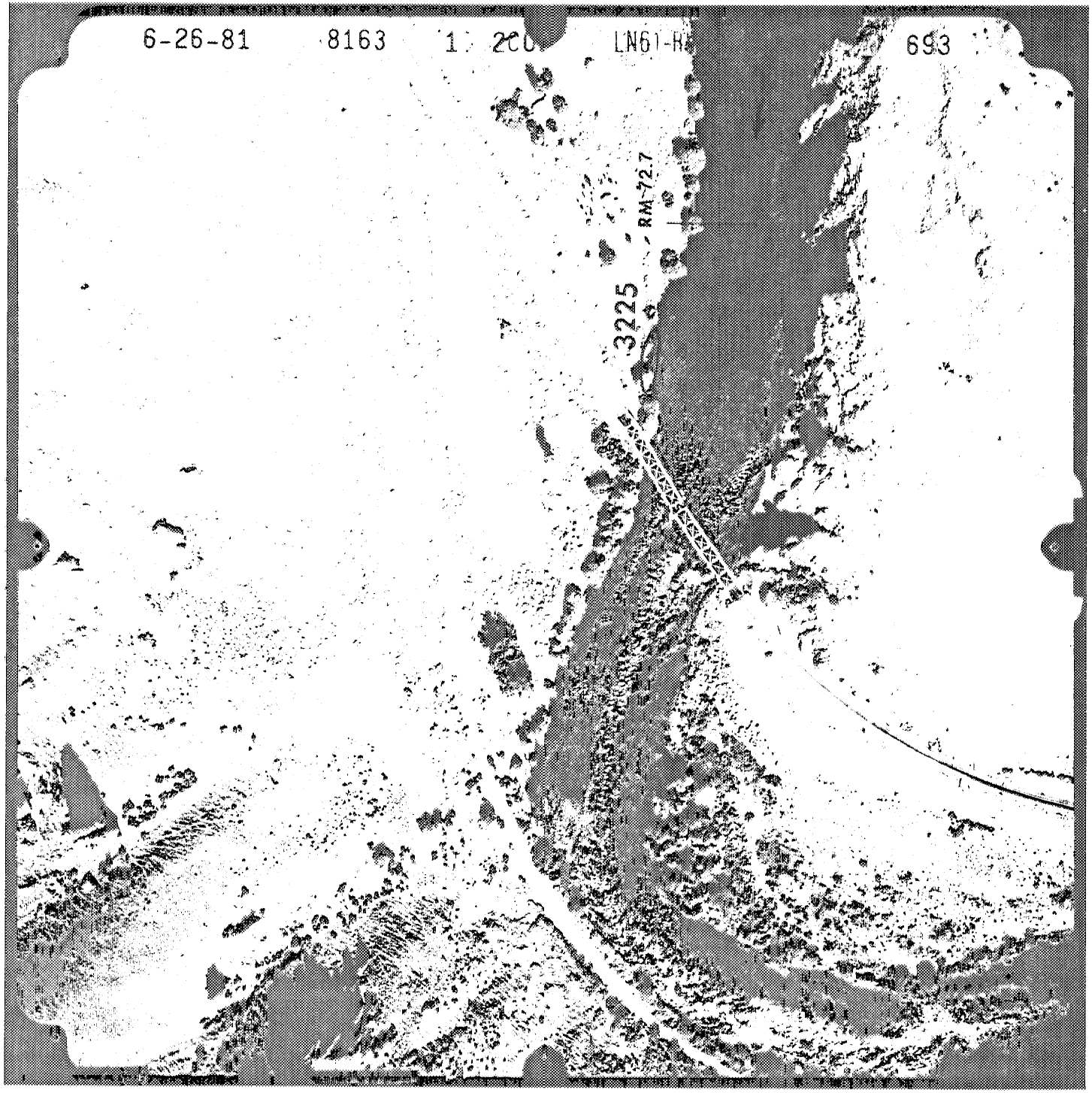
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LN61-R
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RM 72.5
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6163 1 2000

3235
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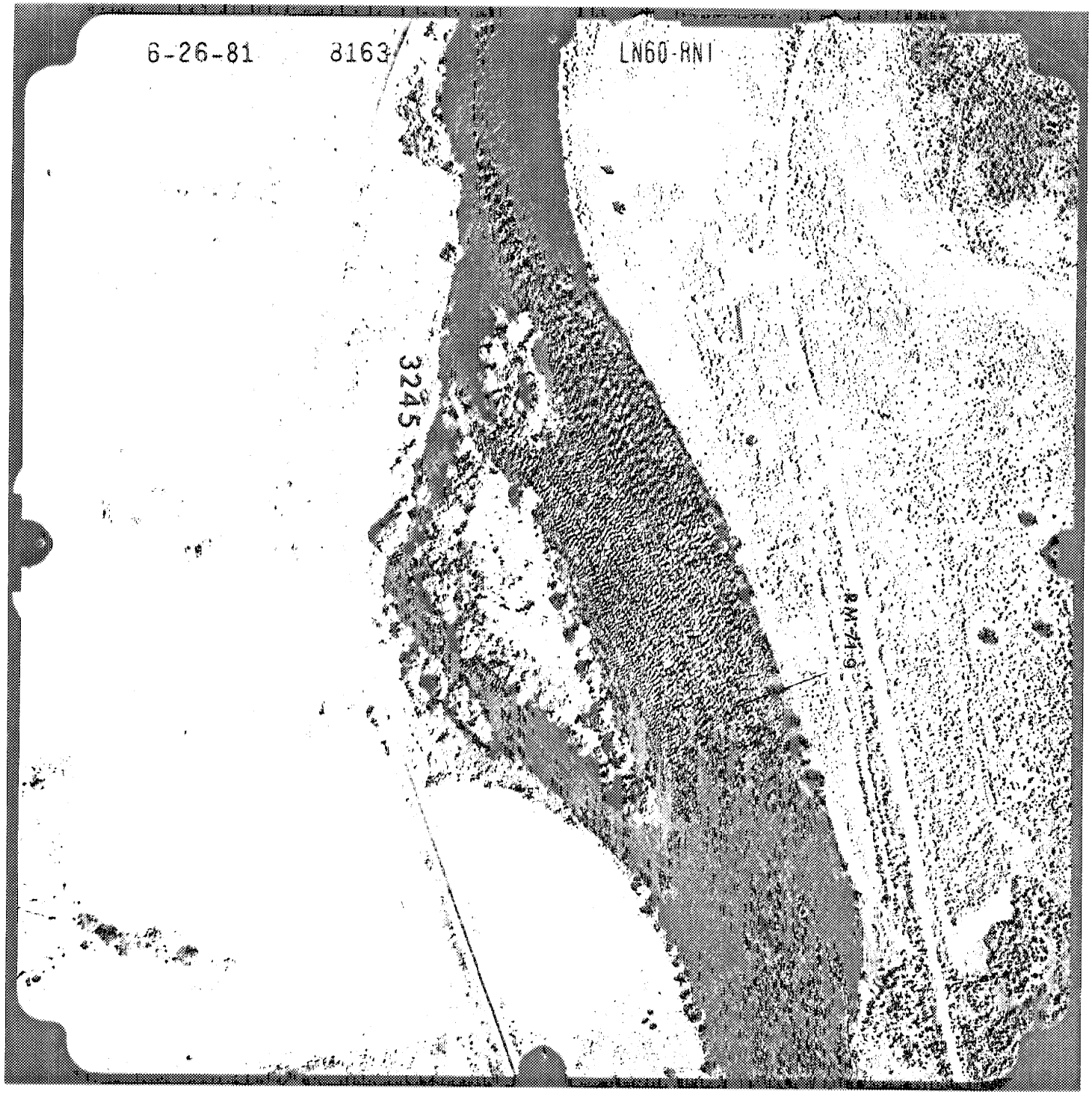
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RM-74-9

RM 71.0
6-26-81
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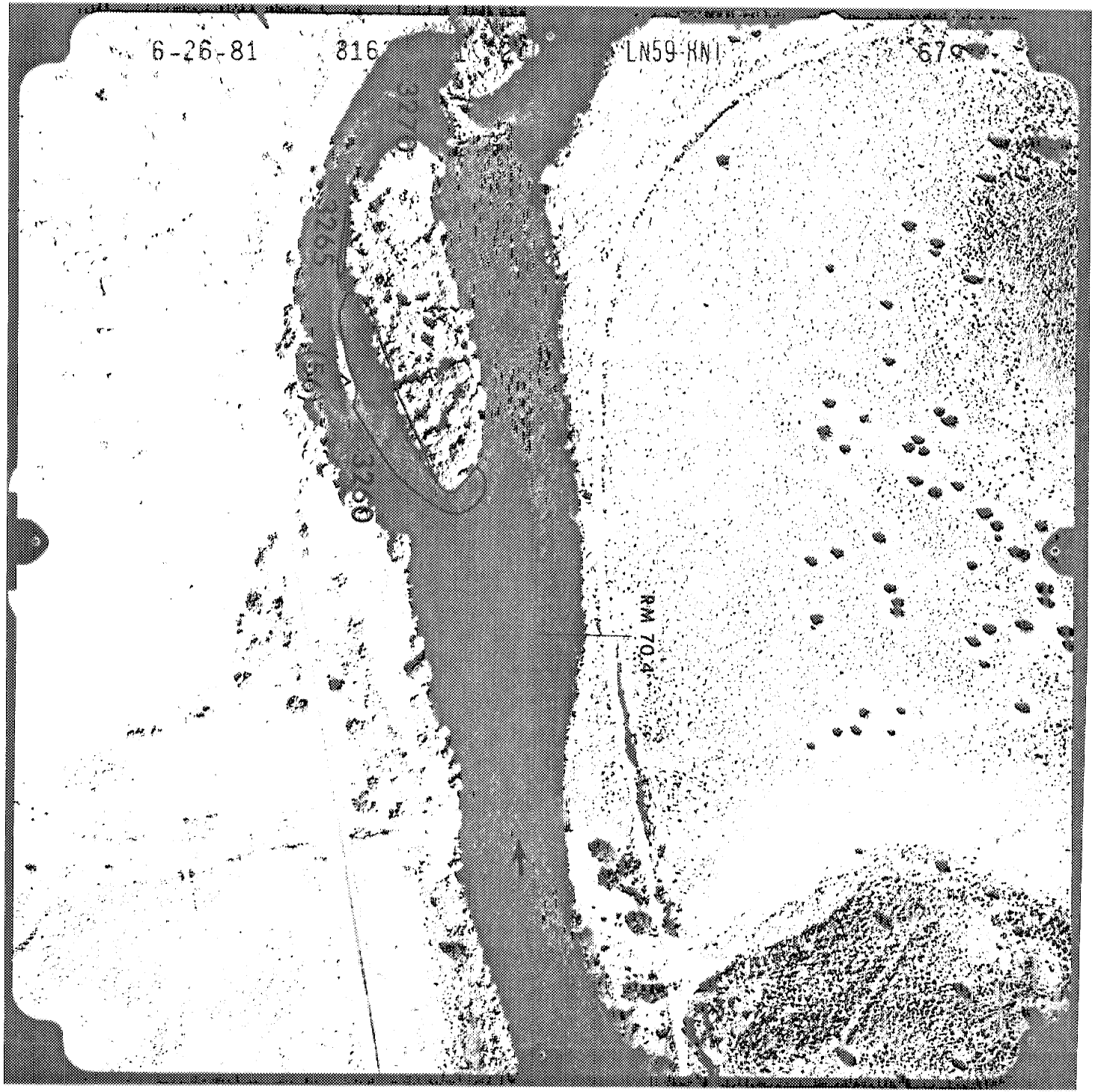
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654
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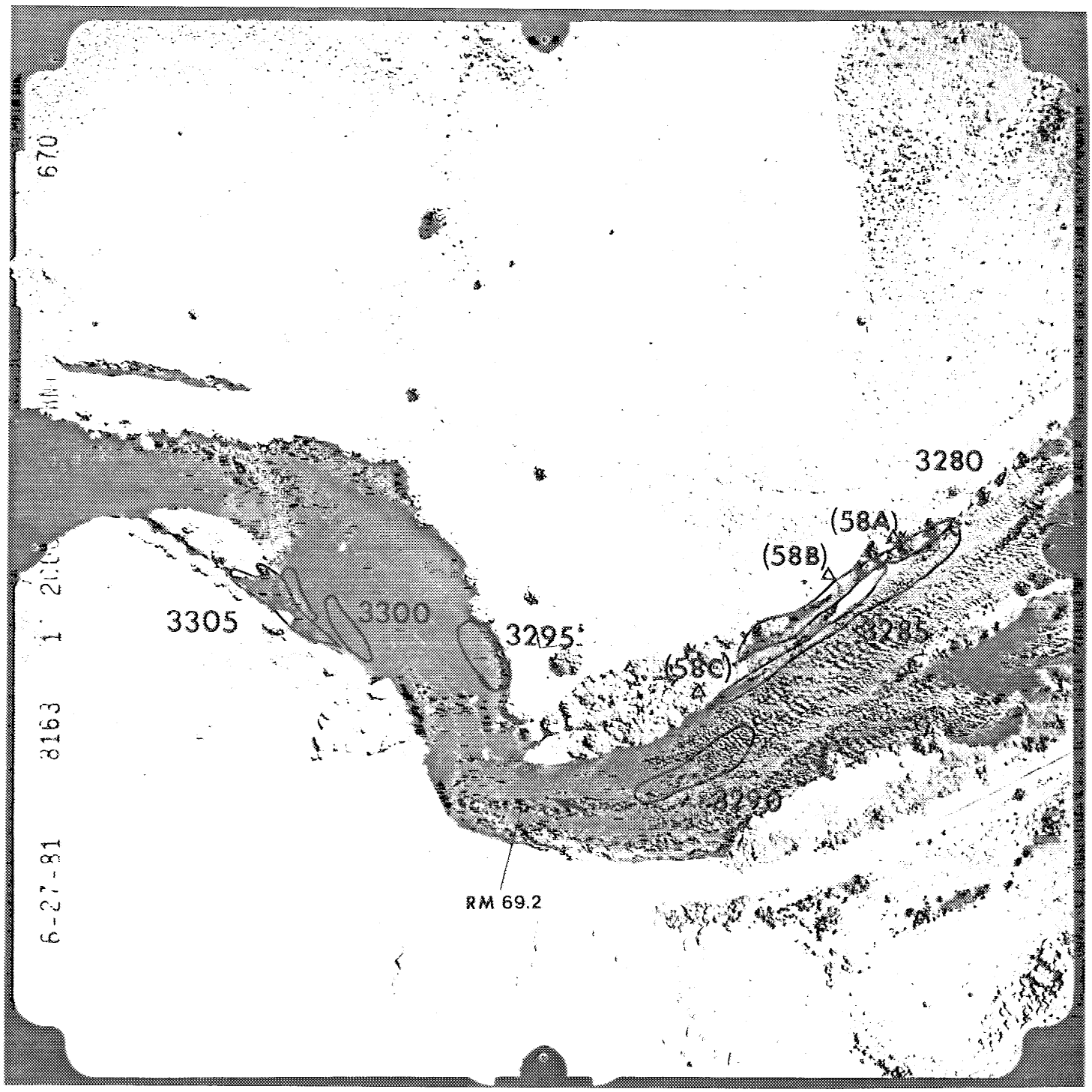

670
6-27-81
3163
3280
(58A)
(58B)
(58C)
3305
3300
3295
3290
RM 69.2

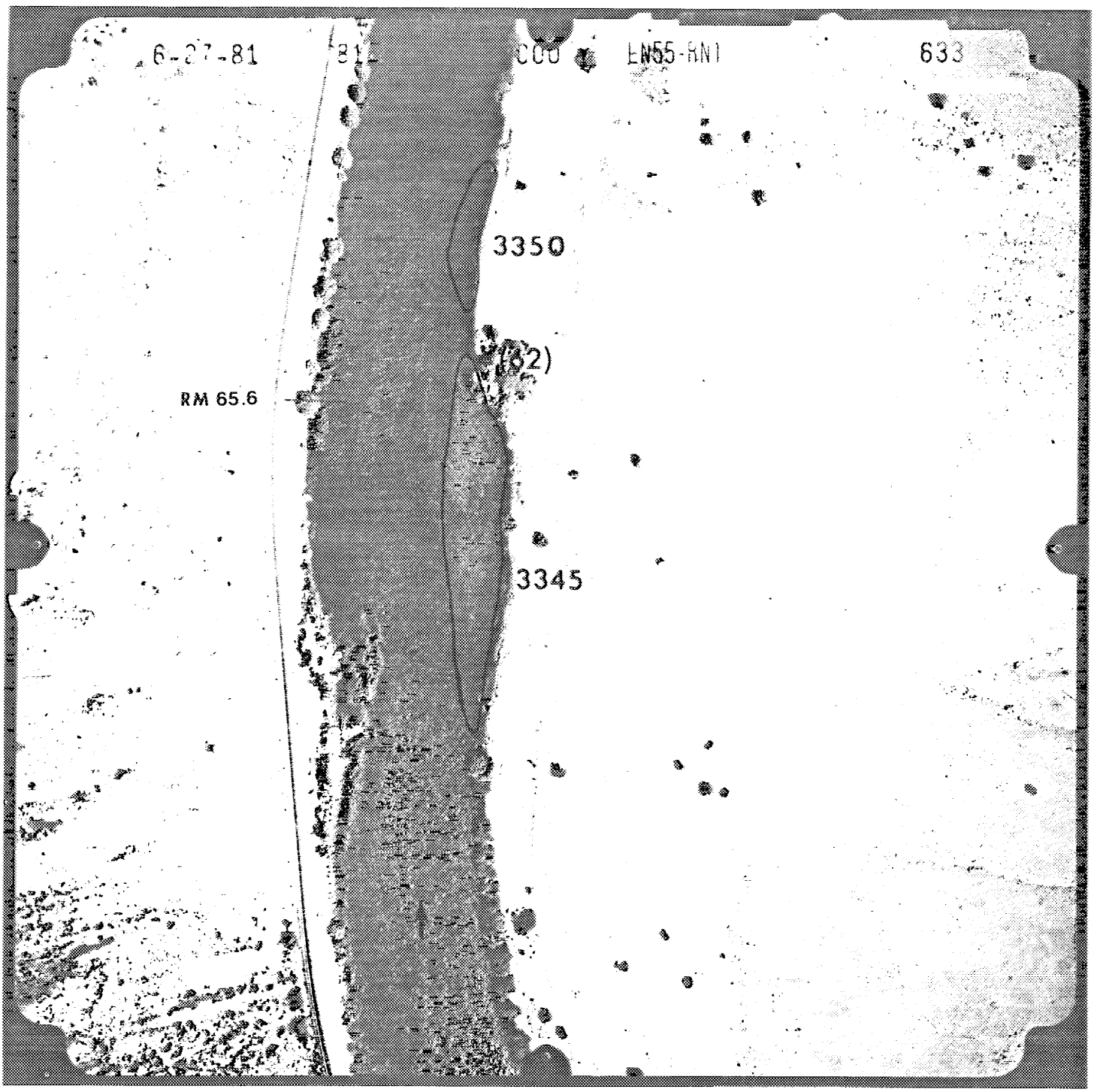
RM 68.6
3310
3315

3320
RM 68.0

650
3930
RM 67.5

6-27-81 8163 1 2000 LN57-RN1 652
RM 670
3335

643
RM 66.5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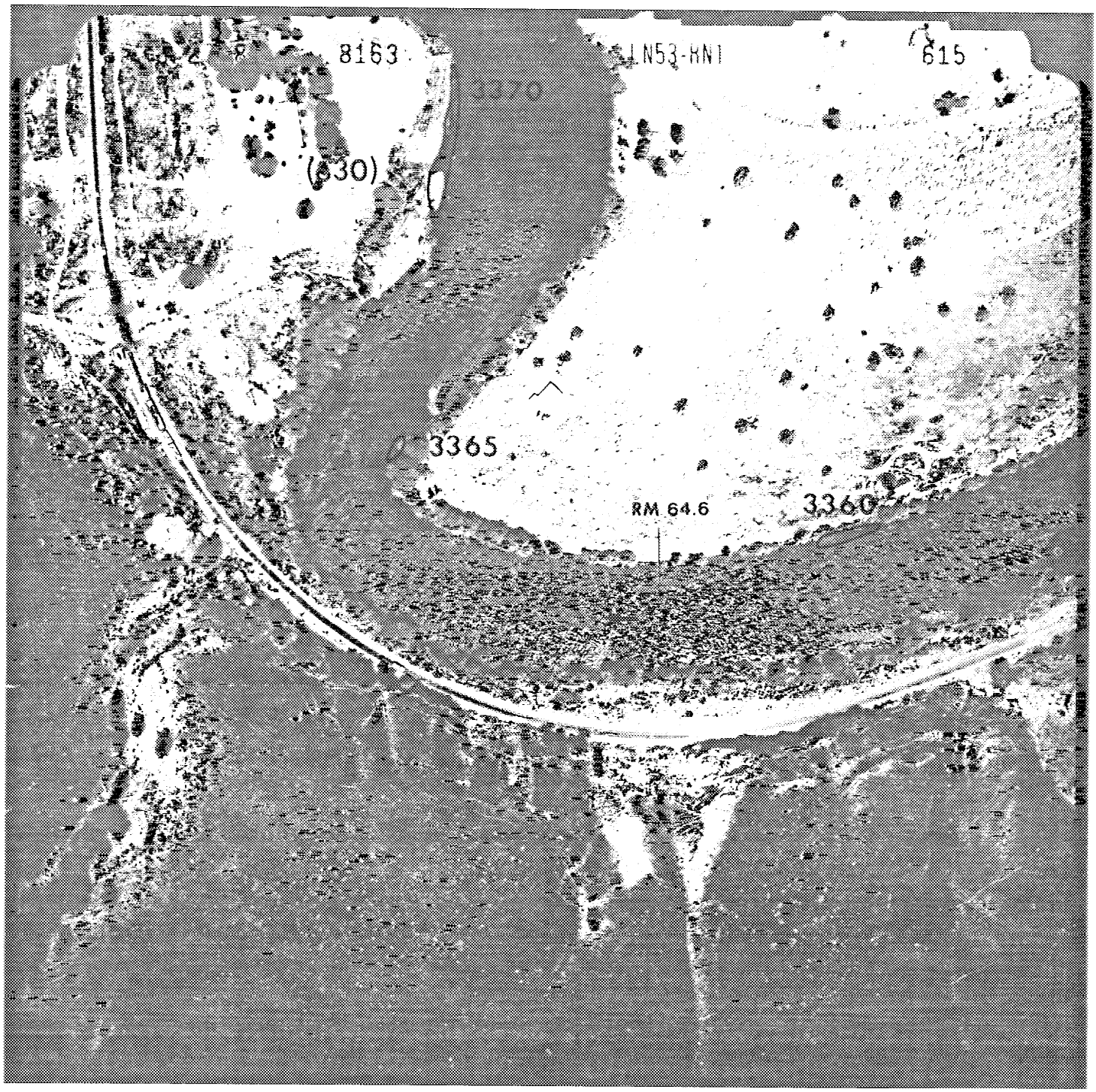
CCO
EN55-RN1
633
3350
(62)
RM 65.6
3345

6-27-81
RM 65.9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LN53-KN1
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(830)
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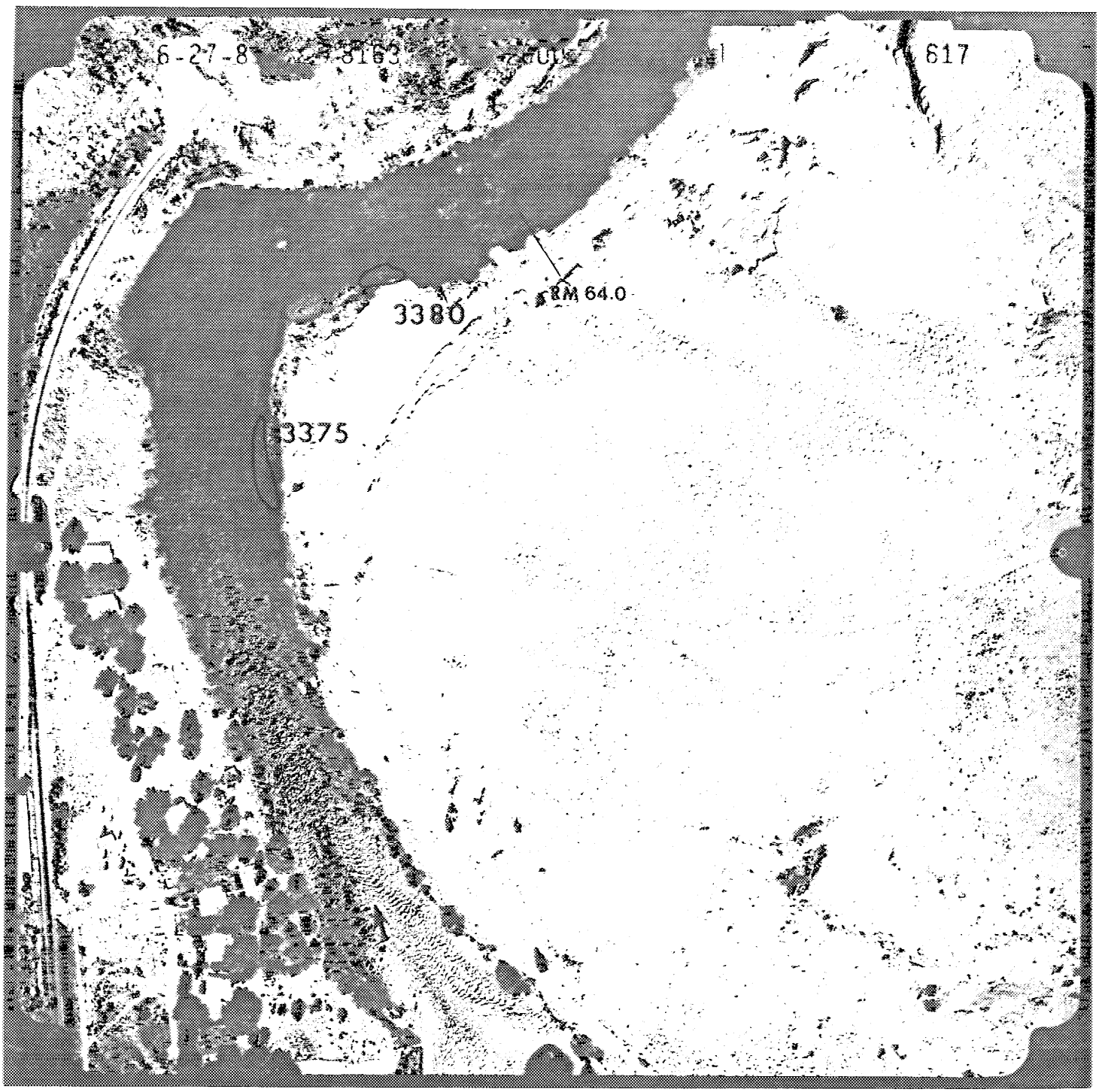
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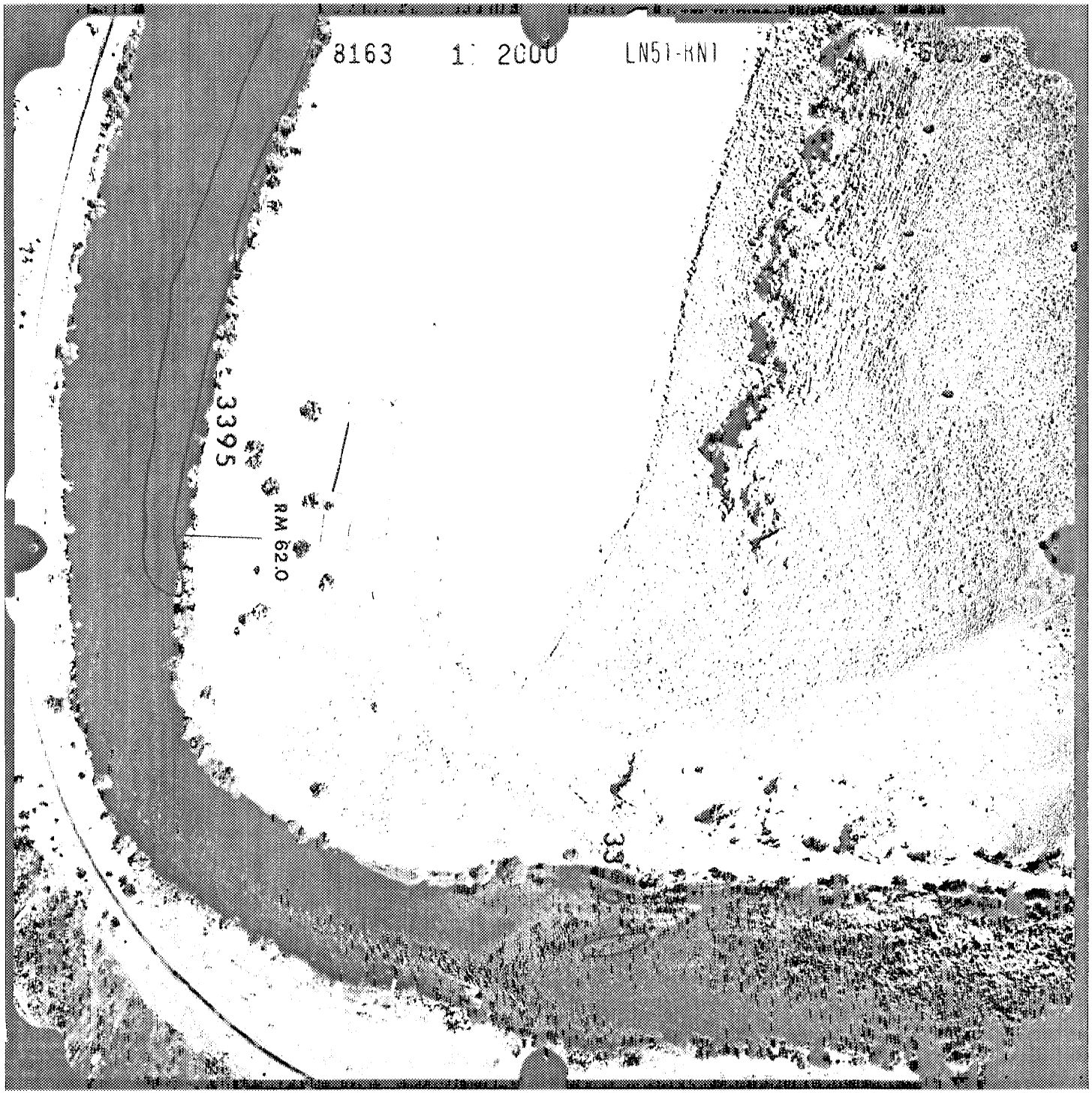
3375

RM 63.0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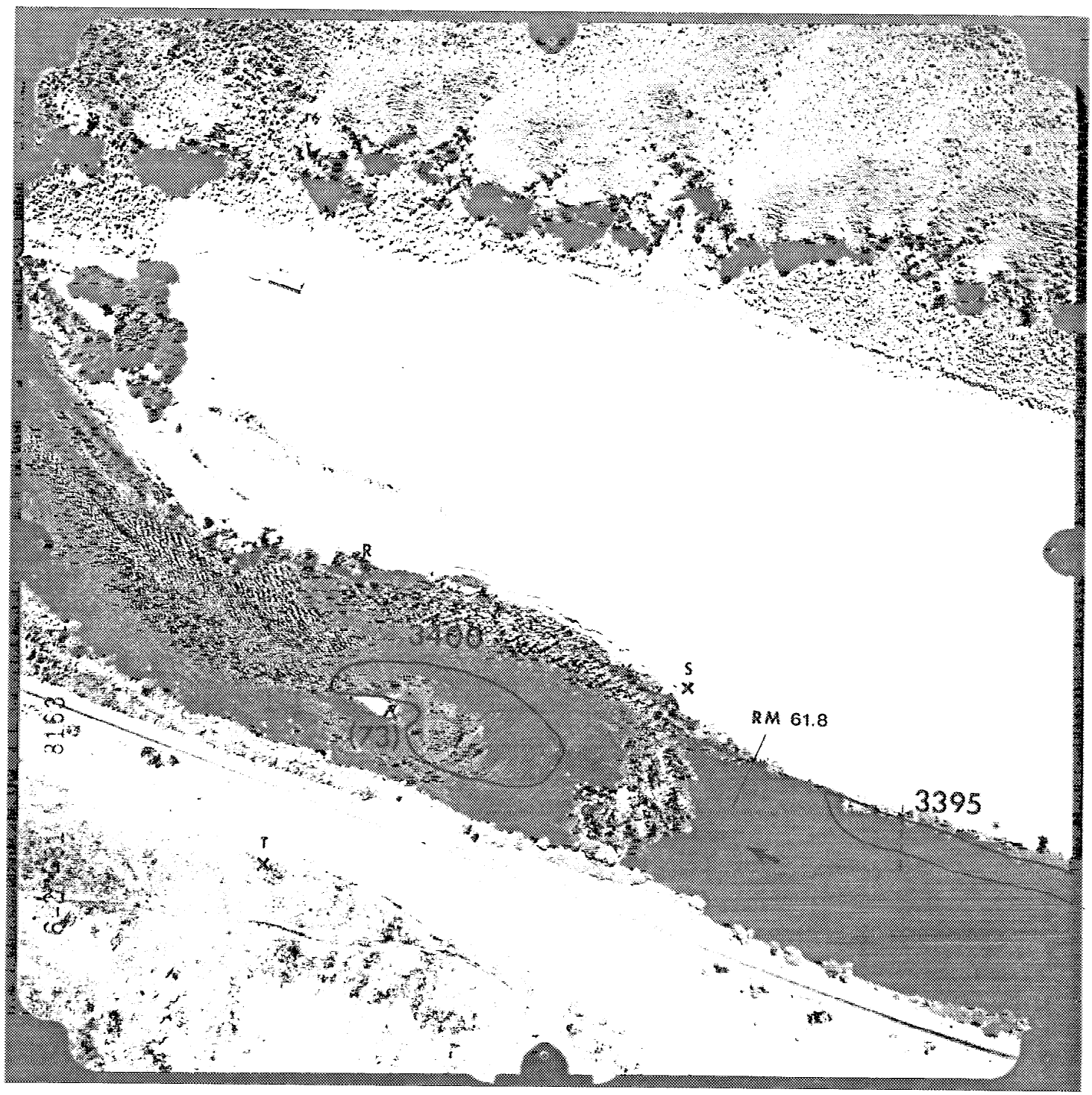
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S
R
RM 61.8
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T

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LN5U-RN1
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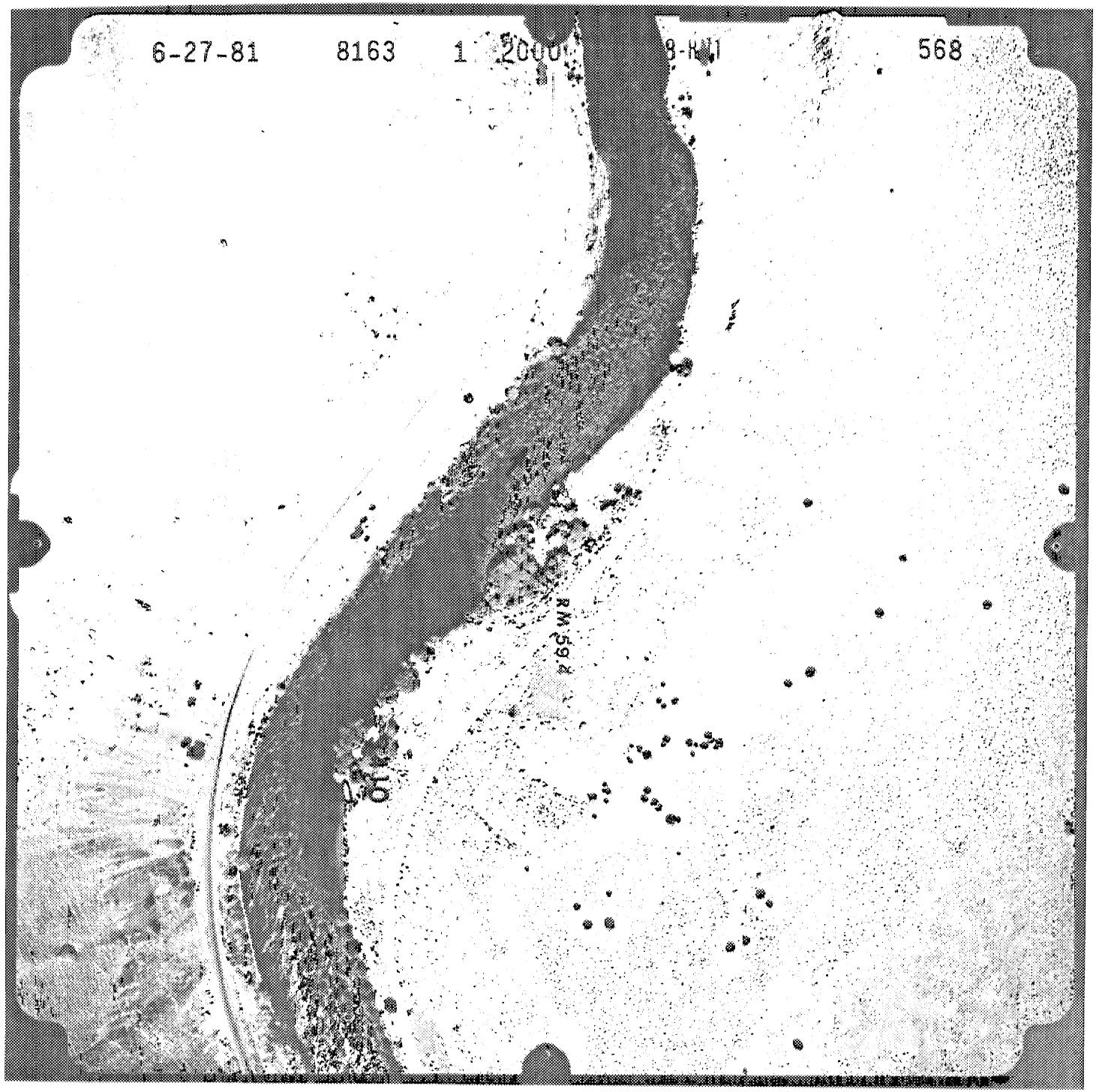
RM 60.6
3405
81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1
2000
568
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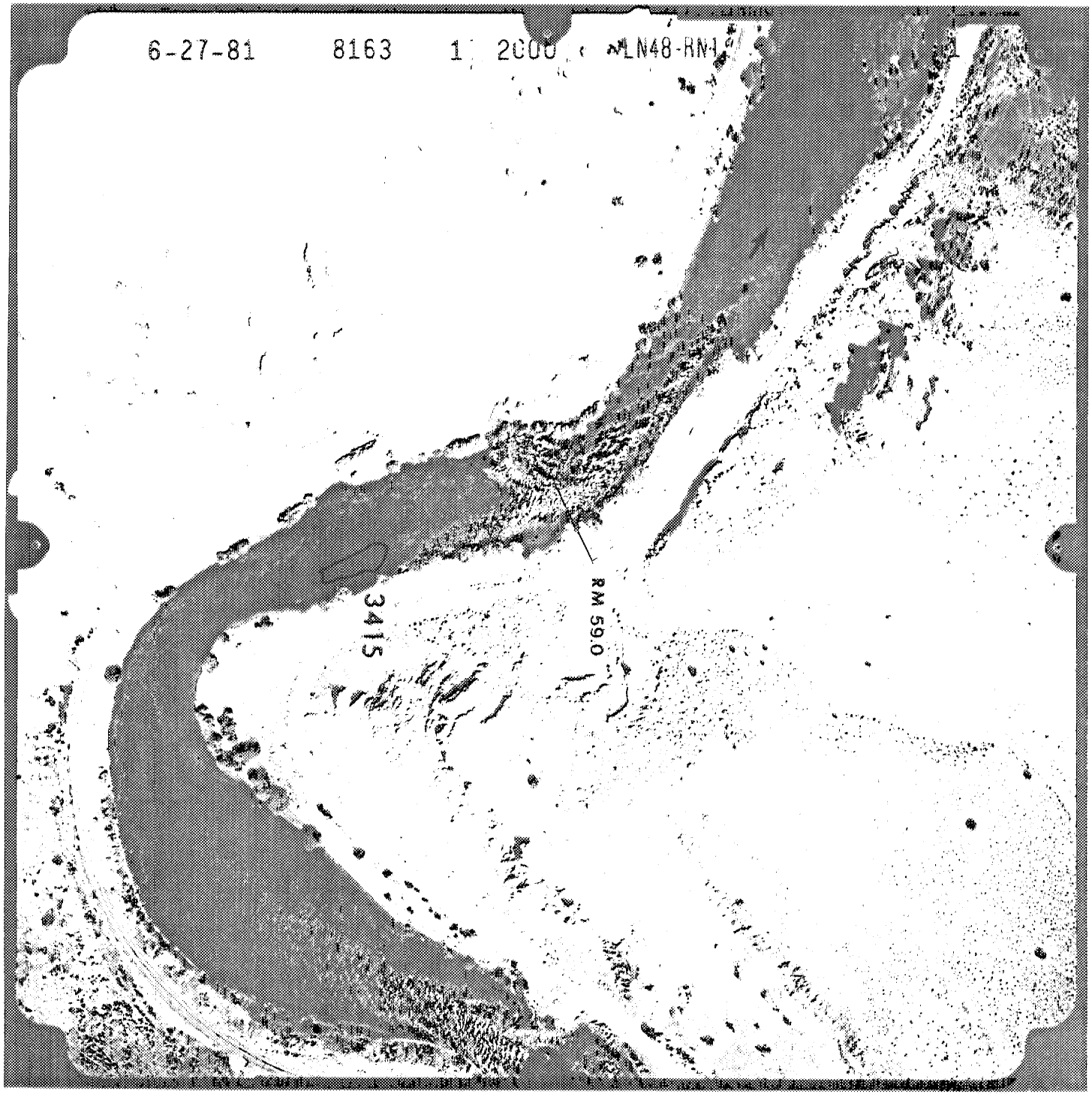
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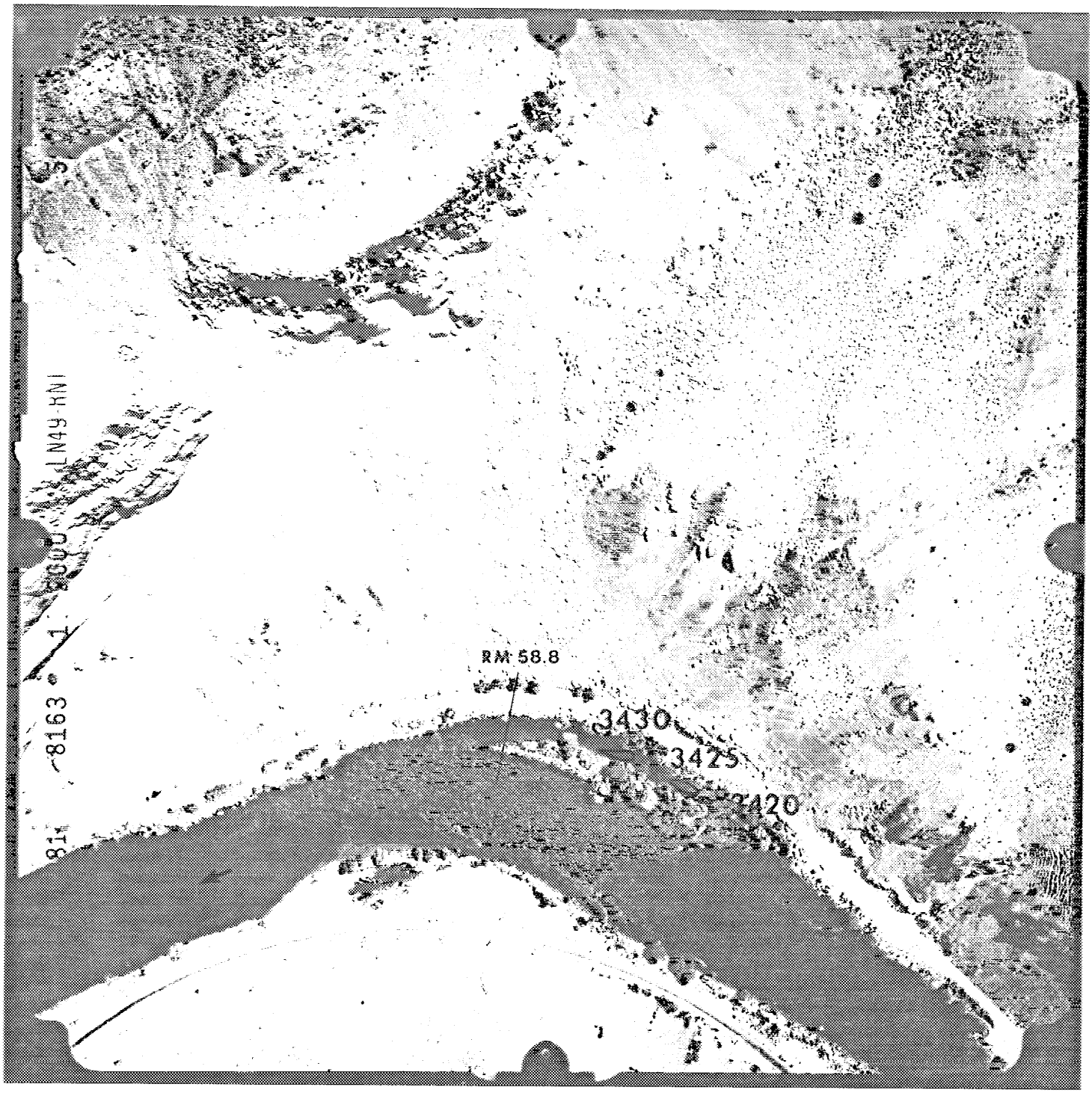
RM 590


RM 58.8
3430
3425
3420
8163
LN49-RNI

RM 58.6
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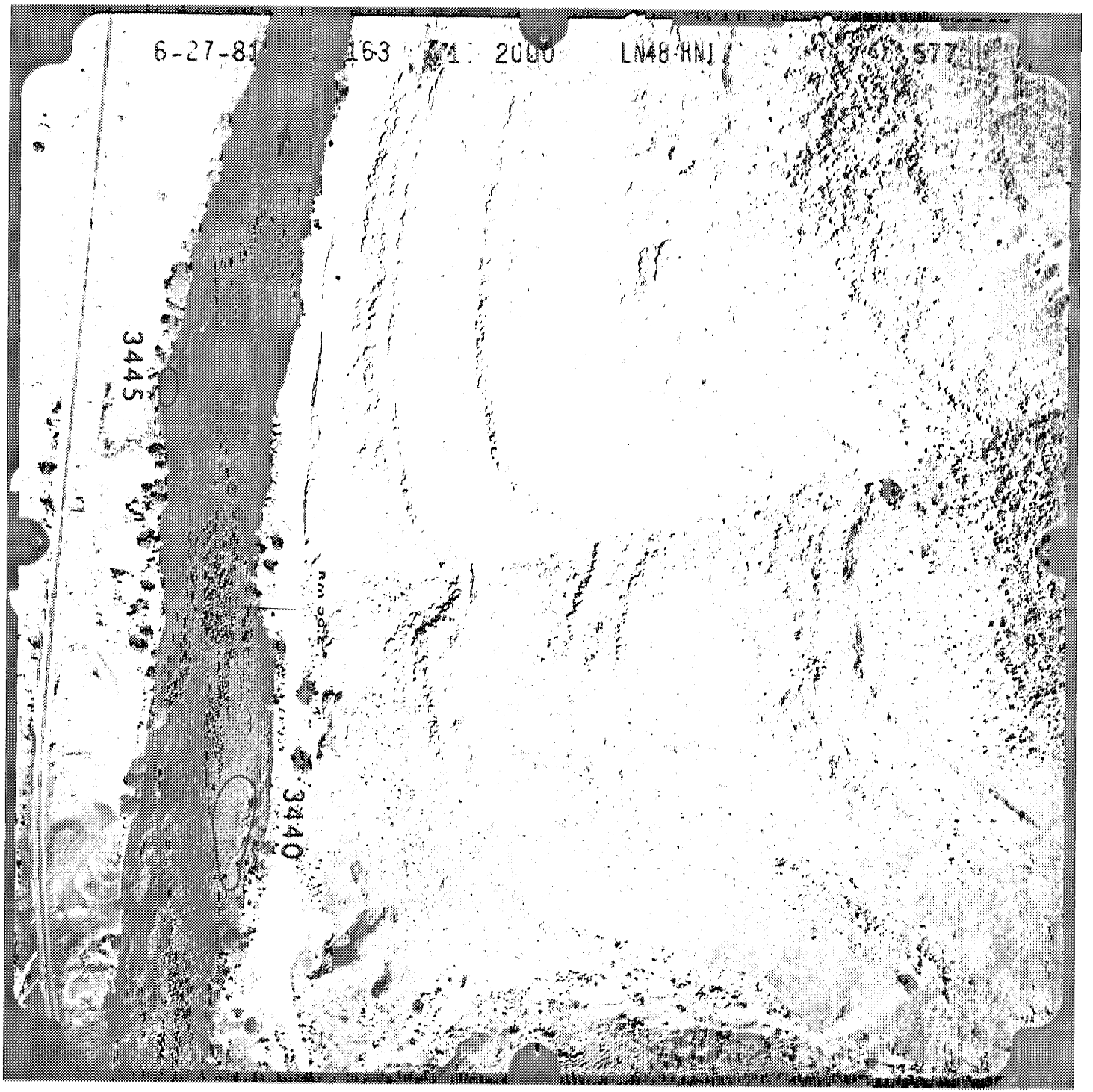
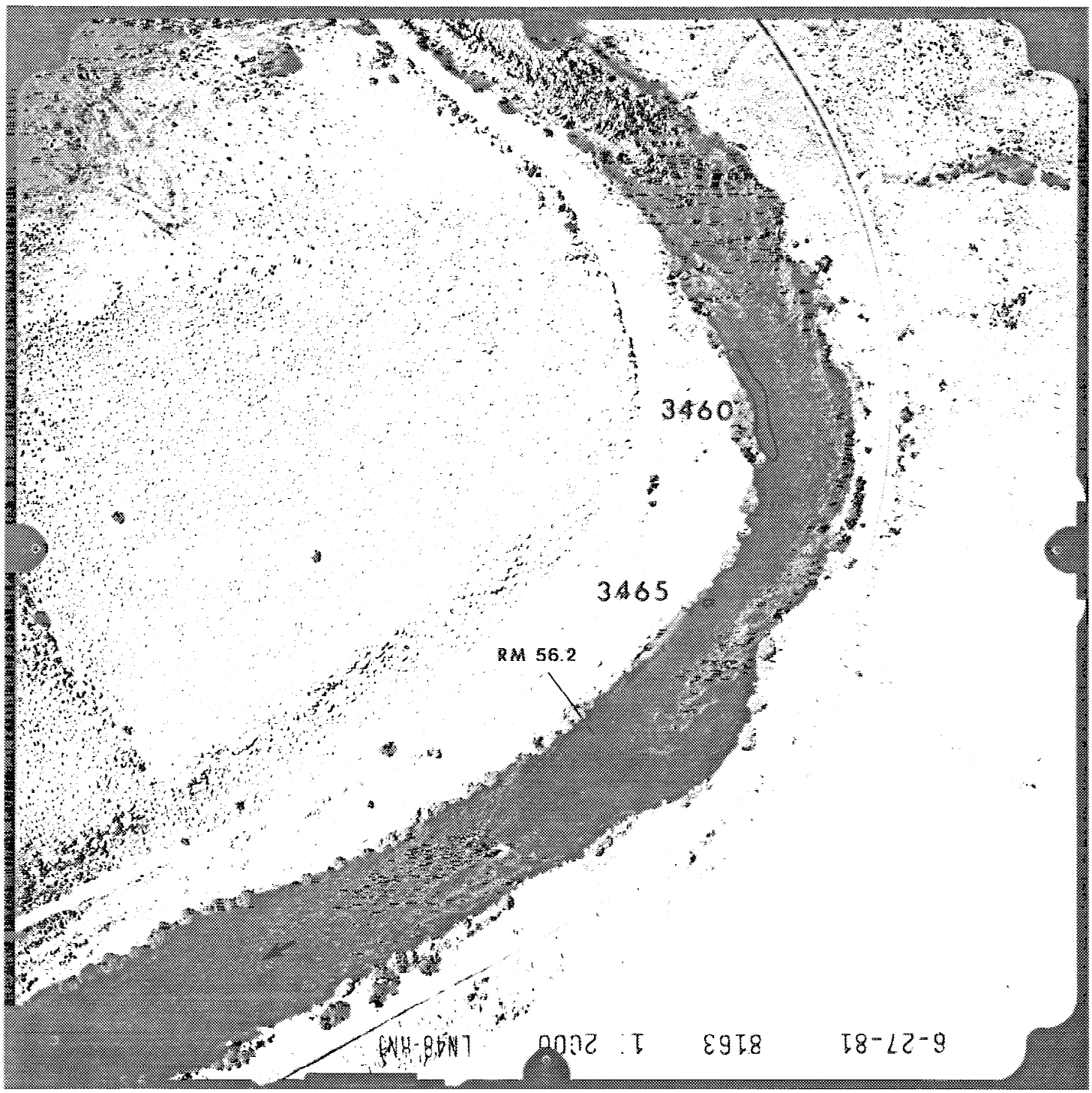
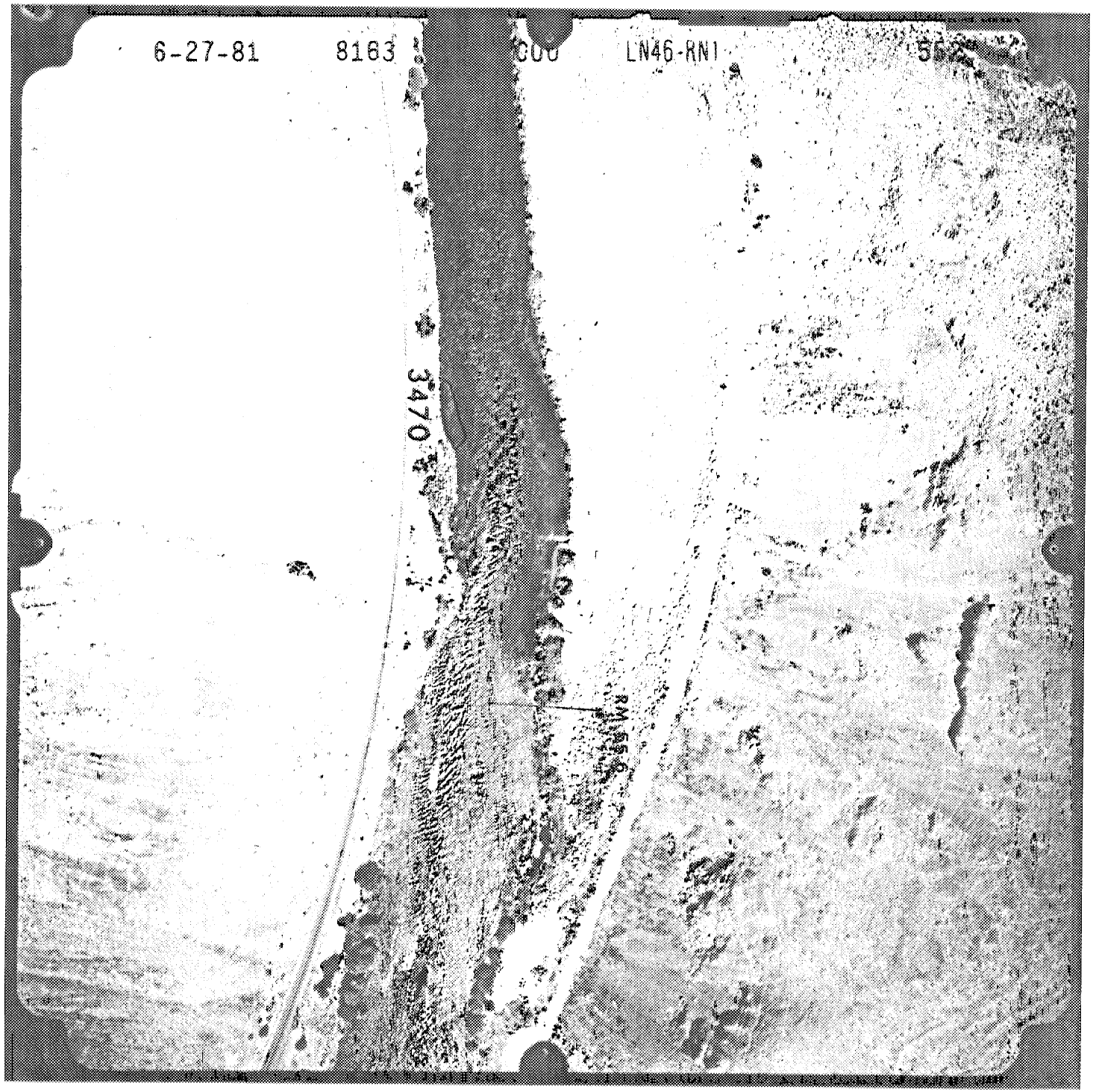
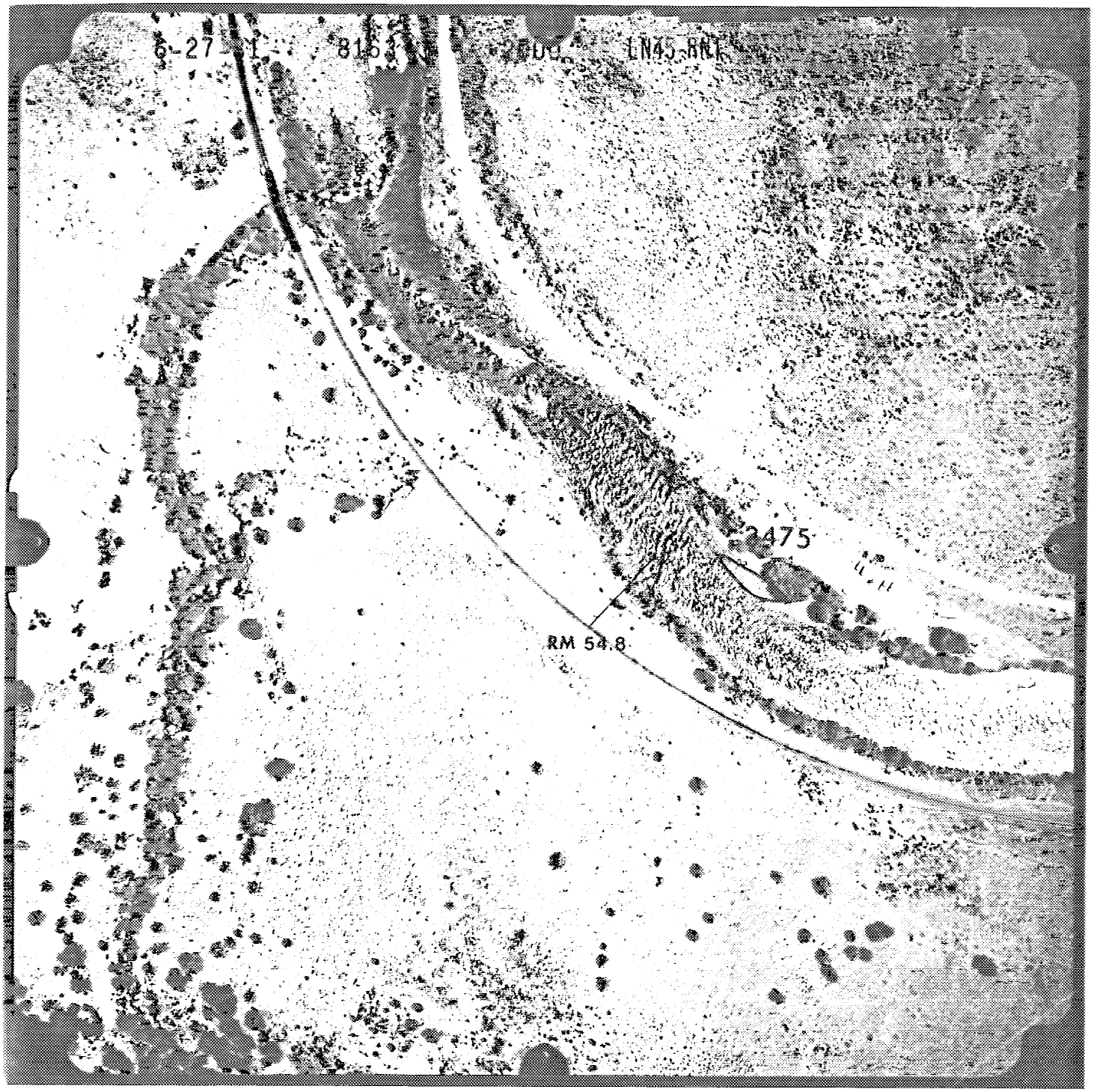

6-27-81
163
1
2000
LN48-RN1
577
3445
3440

5795
LN48-RN1
2000
3450
RM 58.0
6-27-81

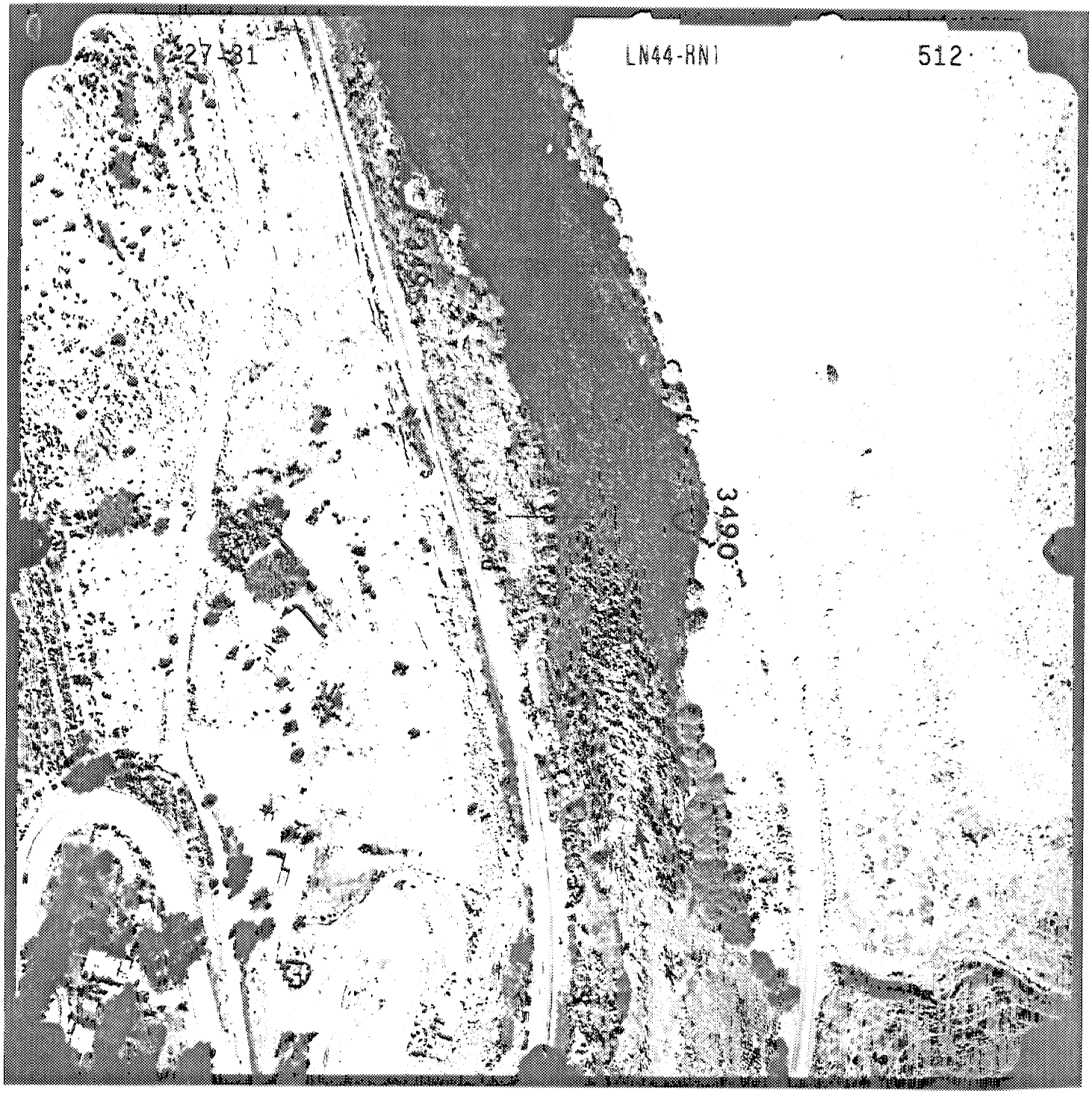
LN48-RM1
RM 57.5
3455
6-27-81
8163


3460
3465
RM 56.2
6-27-81 8163 1: 2000 LN48-RM3

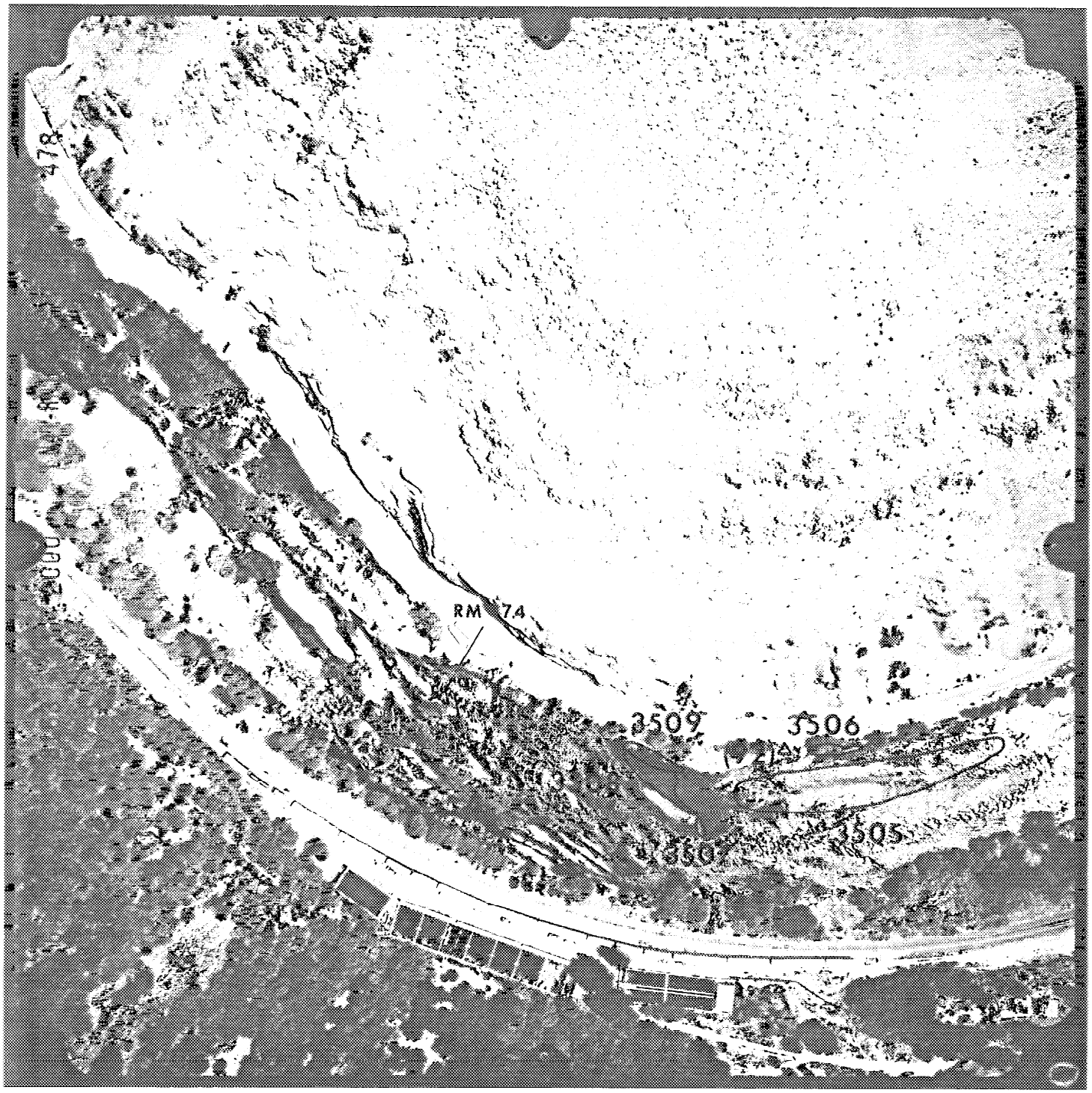

6-27-81
8163
LN46-RNI
3470
RW556

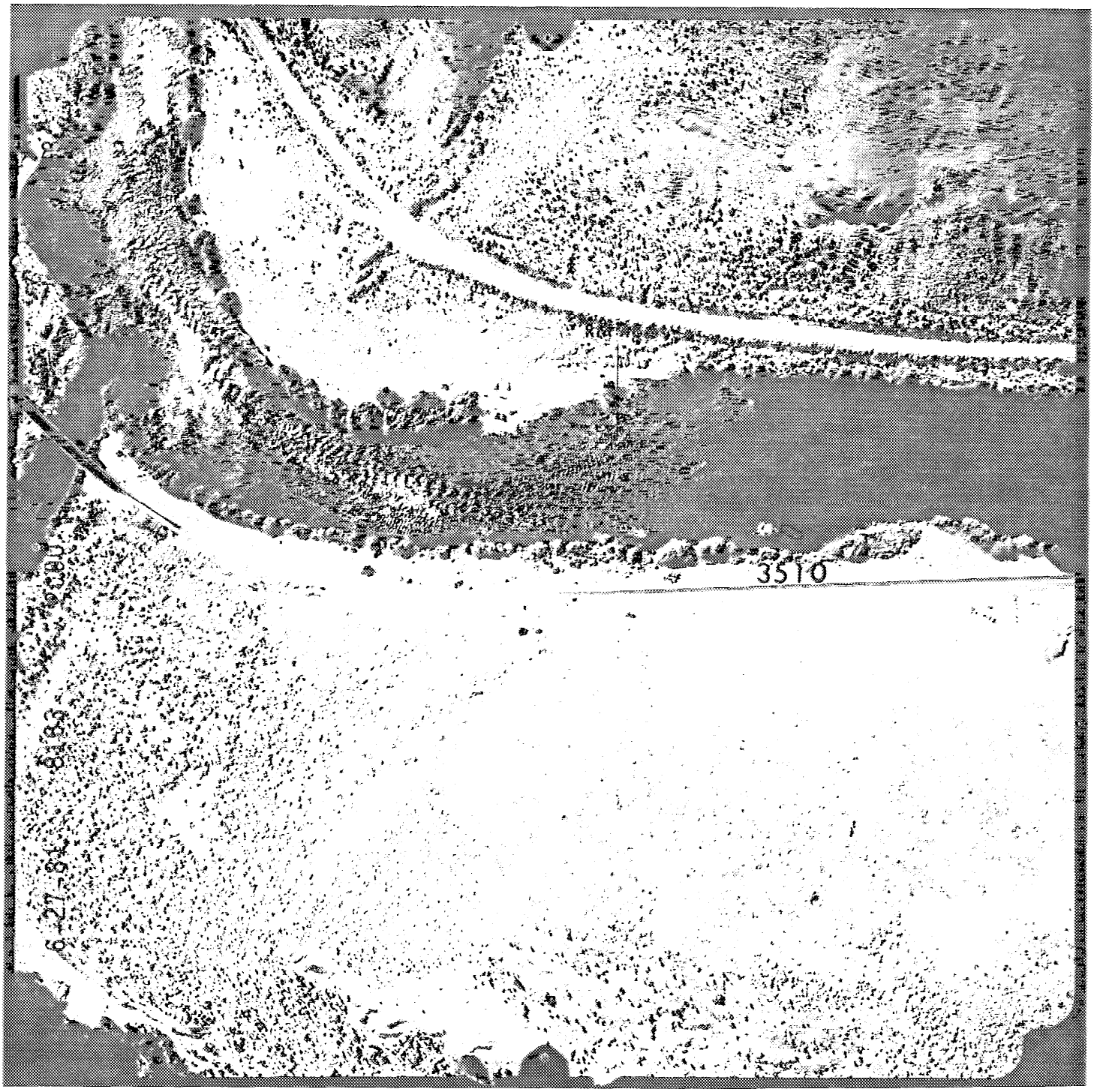

6-27
LN45 RNT
2475
RM 54.8

539
RM 52.5
3485
3480
6-27-81
8163
1

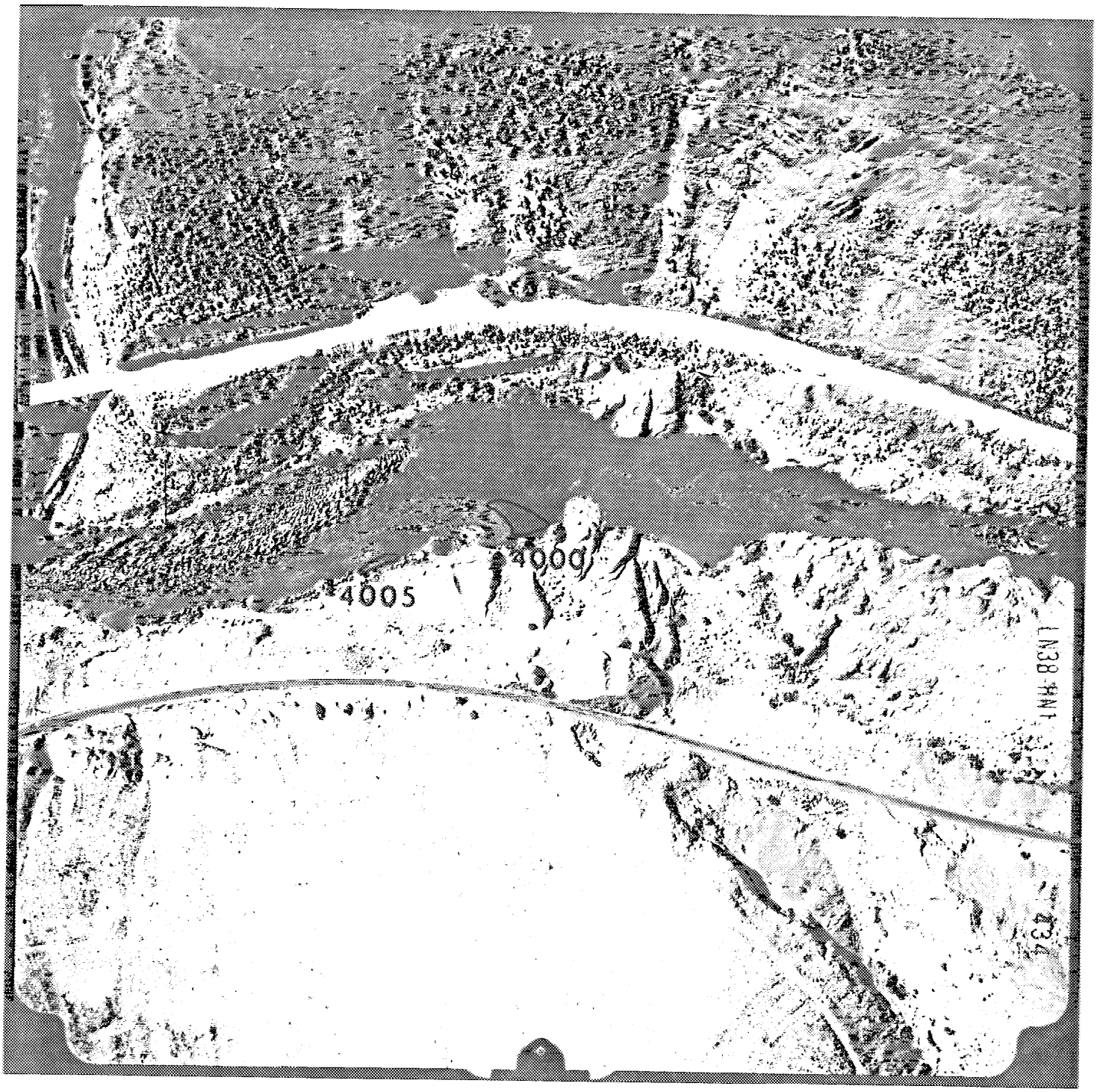

27-31
LN44-RN1
512
3490'
POST

RM 48.3
LN42-RM
1500


RM 7.4
3509
3506
3505
3504


3510

SECTION IV


4005
4006
LN38-HNT

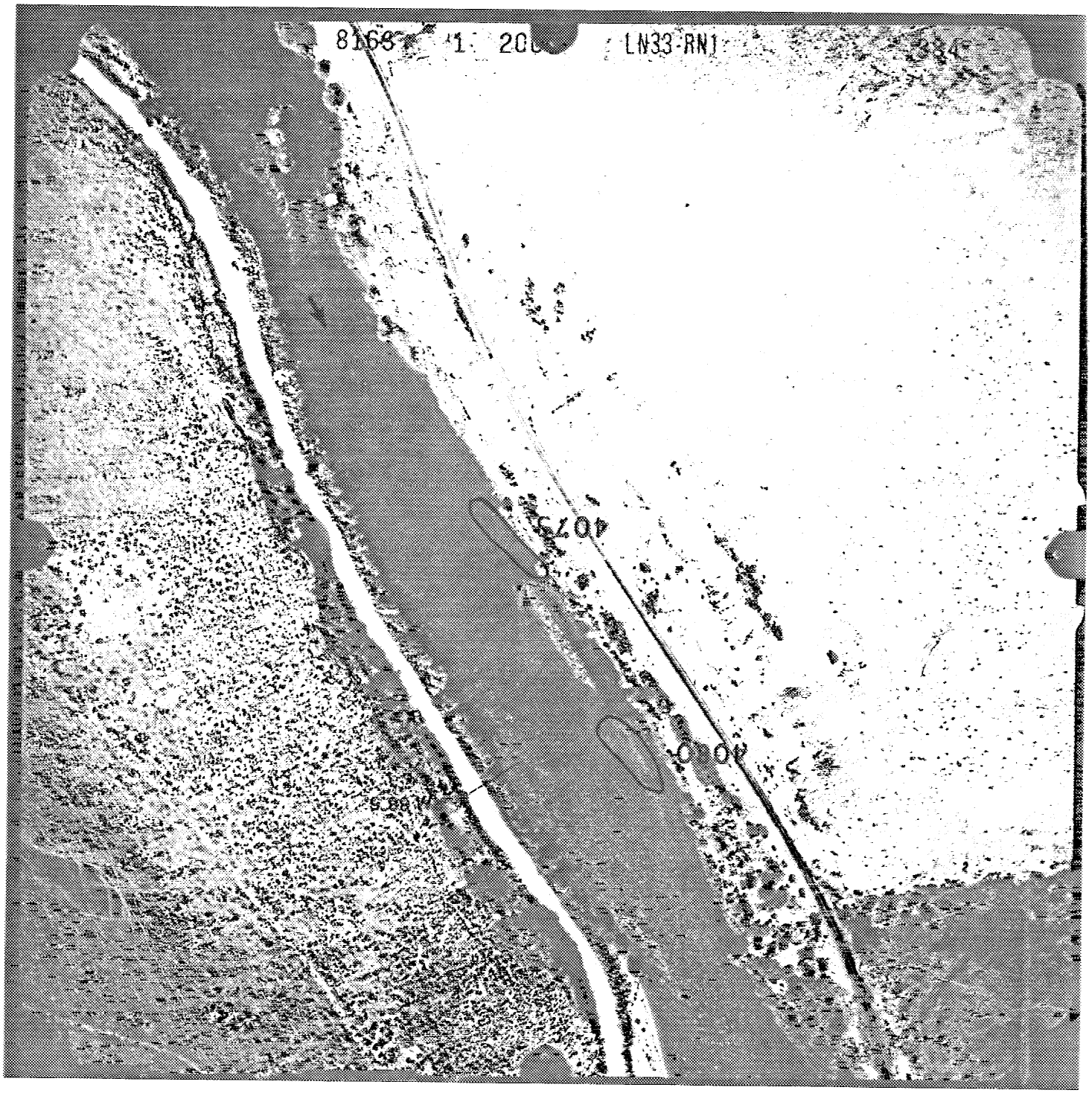
6-27-81
8163
409

4025
4020
4015
4040

4055

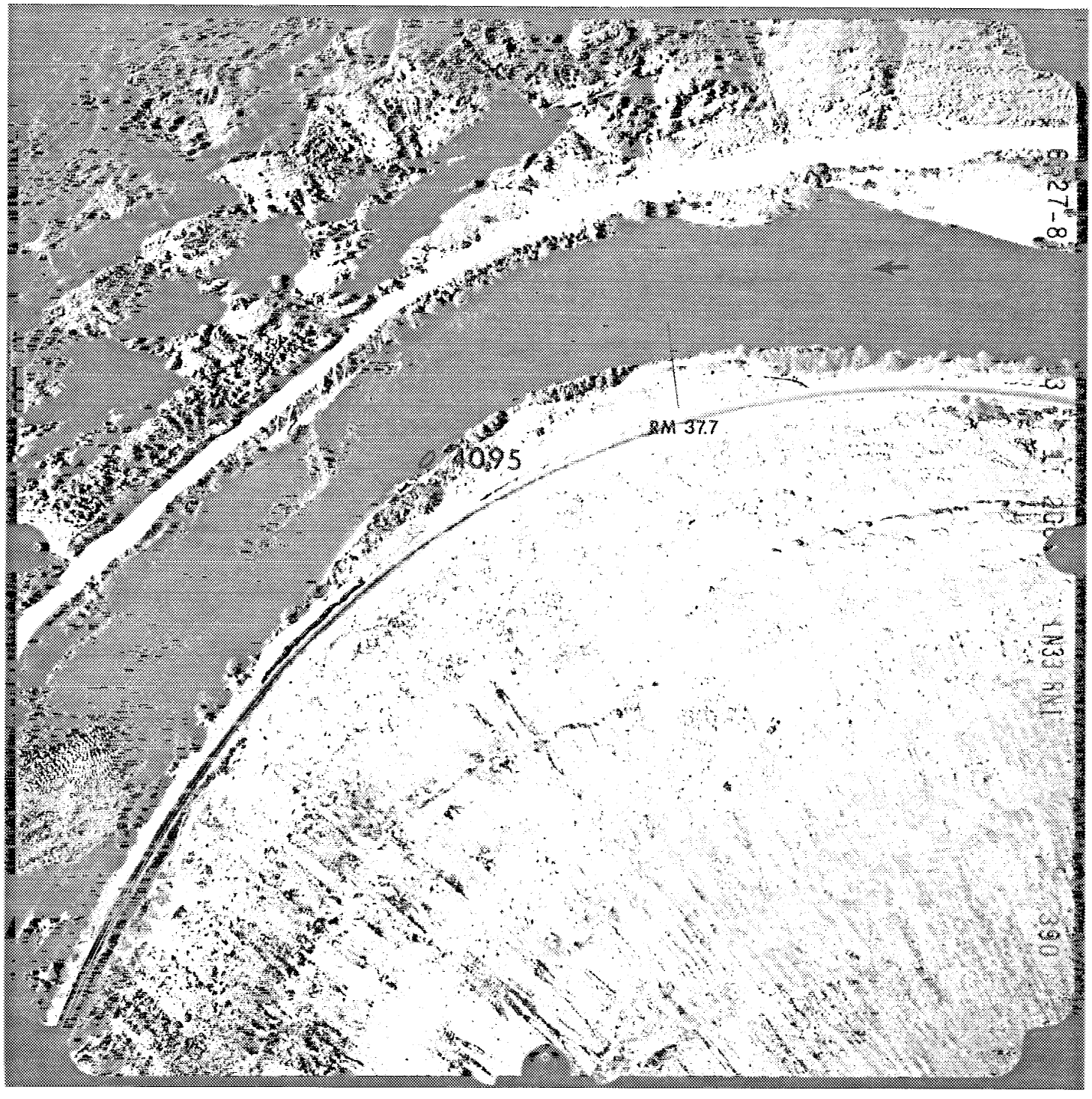
AM 89.0
4060
6-27-81

6-27-81
8163
8-NW
4065


8168 1 200 LN33-RN1
4075
4080

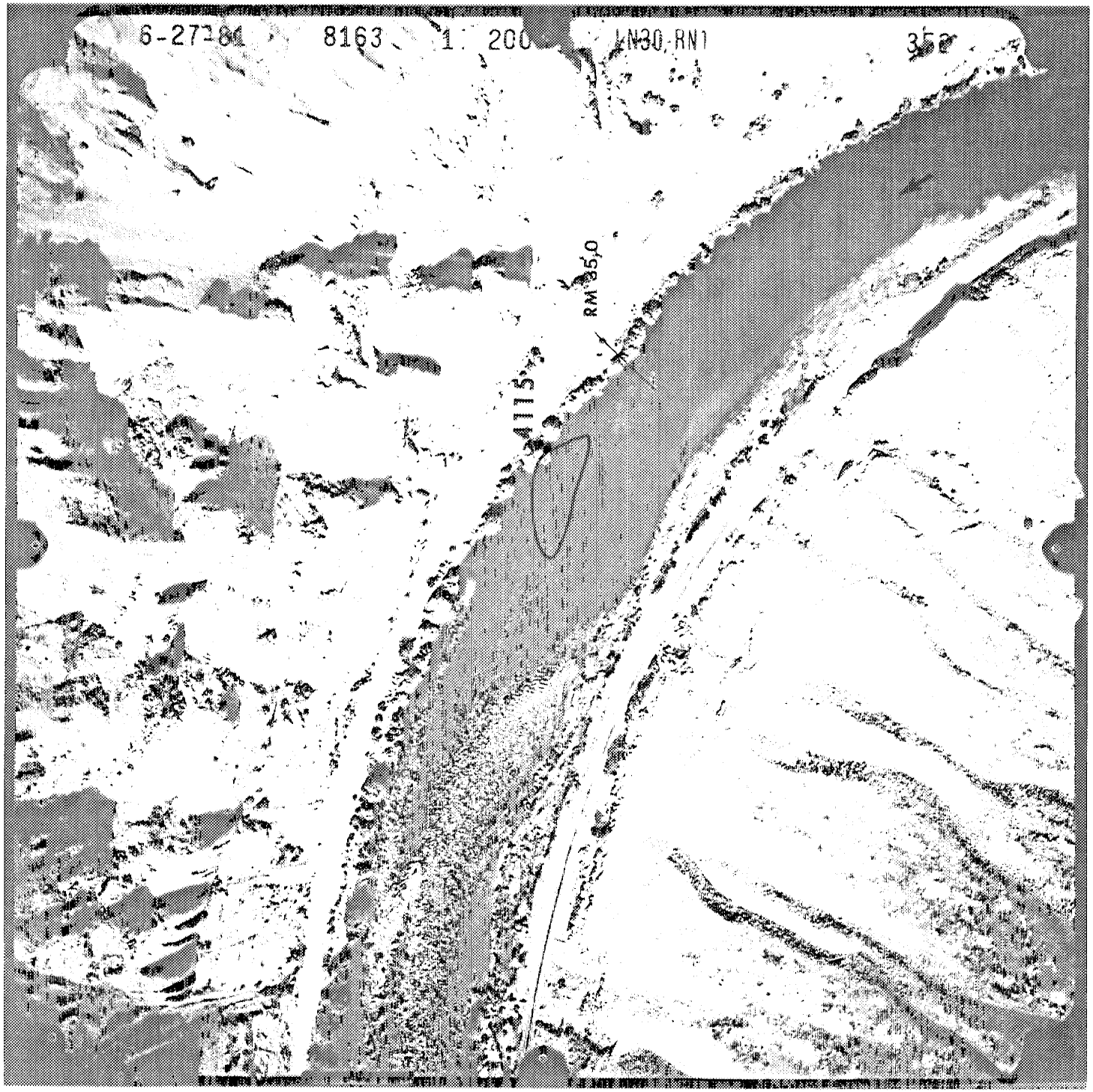
6-27-81
816
PM 38.0
4090

6-27-81 8163 1 2000


RM 37.7
4095

RM 371
8163

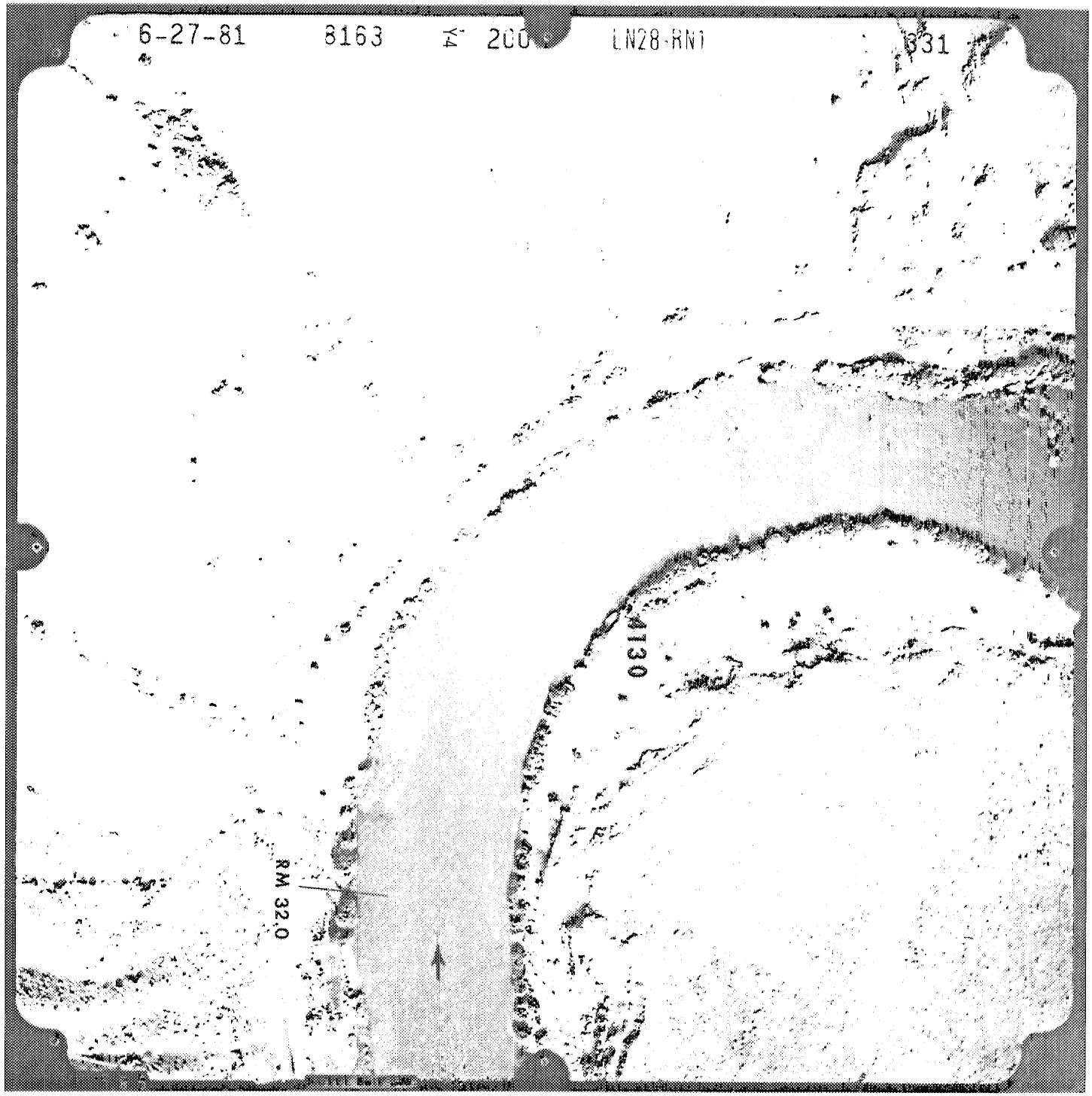
6-27-81
8163
RM 356
411.0


6-27-84
8163
1: 200
LN30-RN1
35a
RM 35.0
4115'

RM 34.2
LN30-RN1

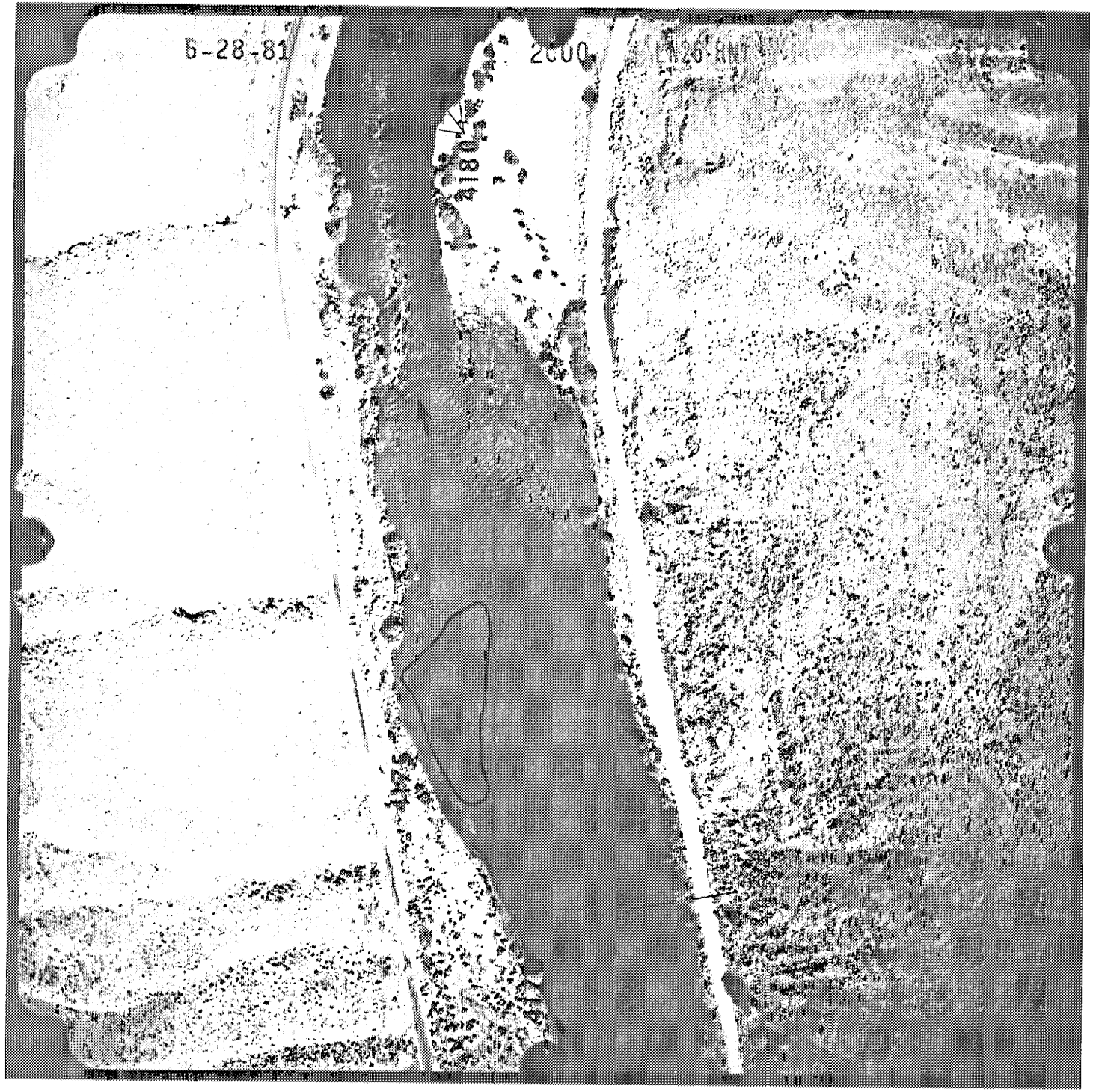
6-27-81
8163
A123
RM 33.1

LN29-n4
4125
1: 2000
8163
6-27-81


6-27-81
8163
LN28-RN1
RM 32.0
4130

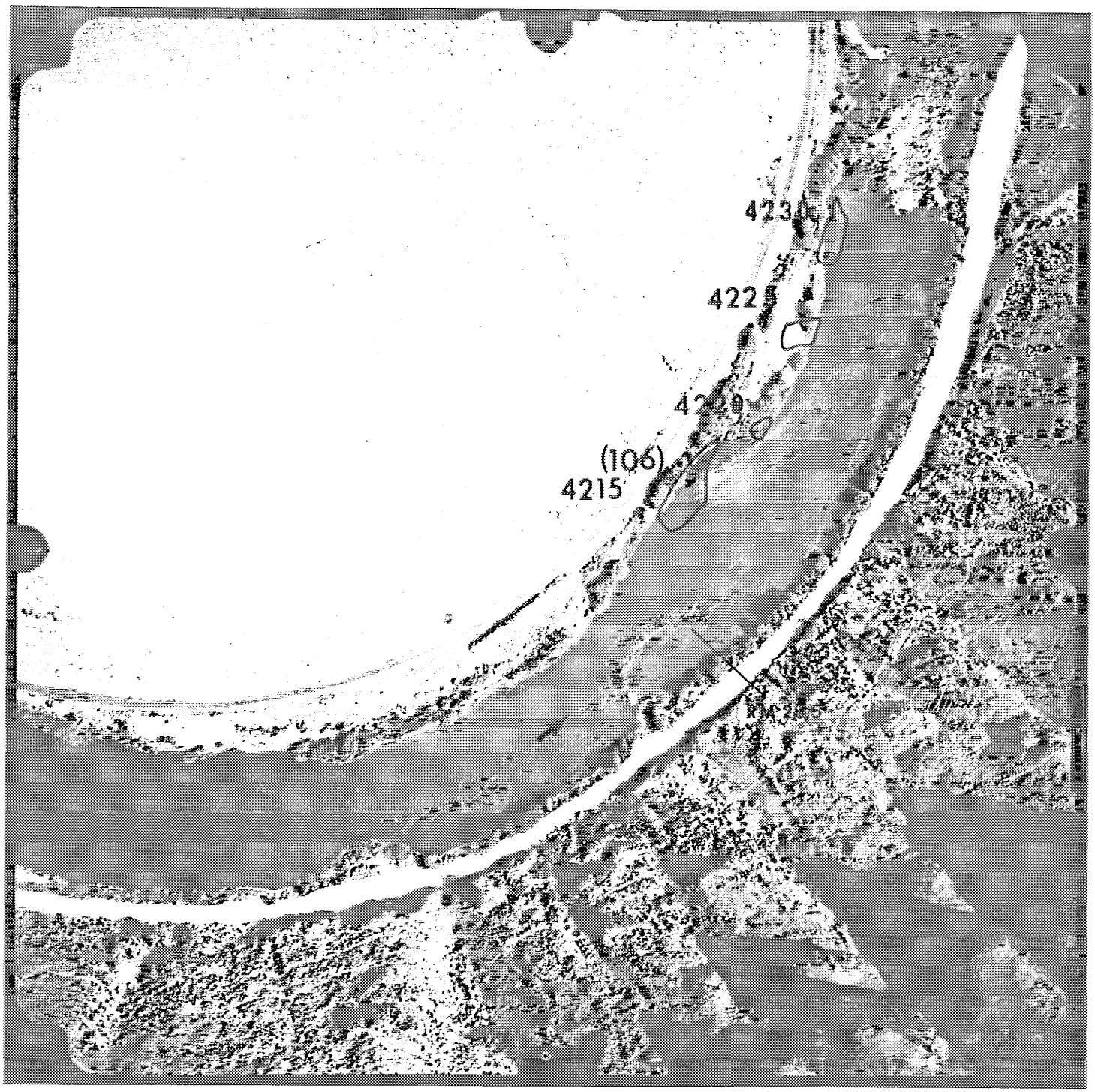
8163
LM27-BN1
RM 310

KM 31.0
4165
6-27-91

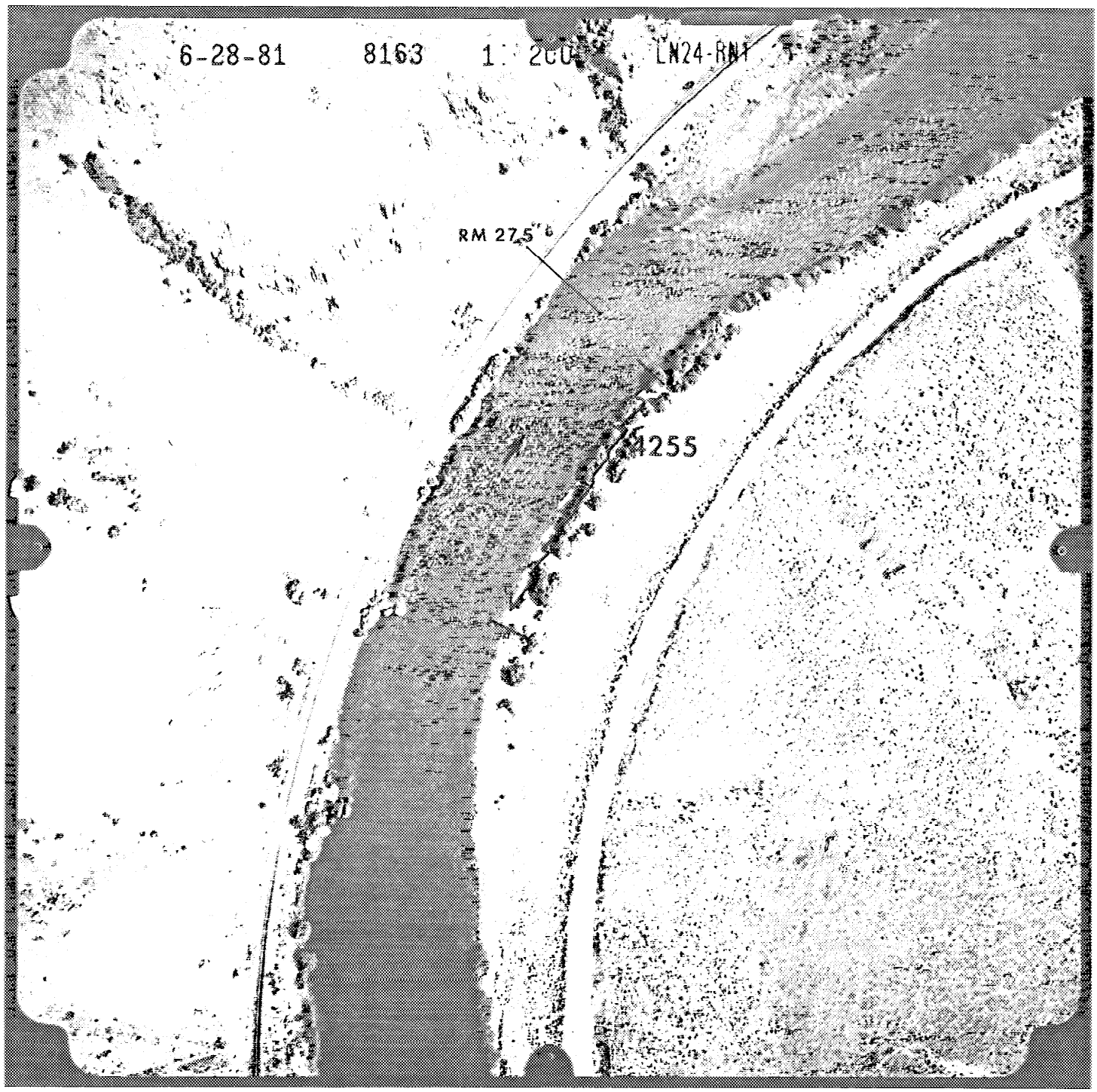

6-28-81
2000
LN26 RNT
4180

KM 29.3
4195
4190
4185

6-28-81
8163
RM 28.8
4210

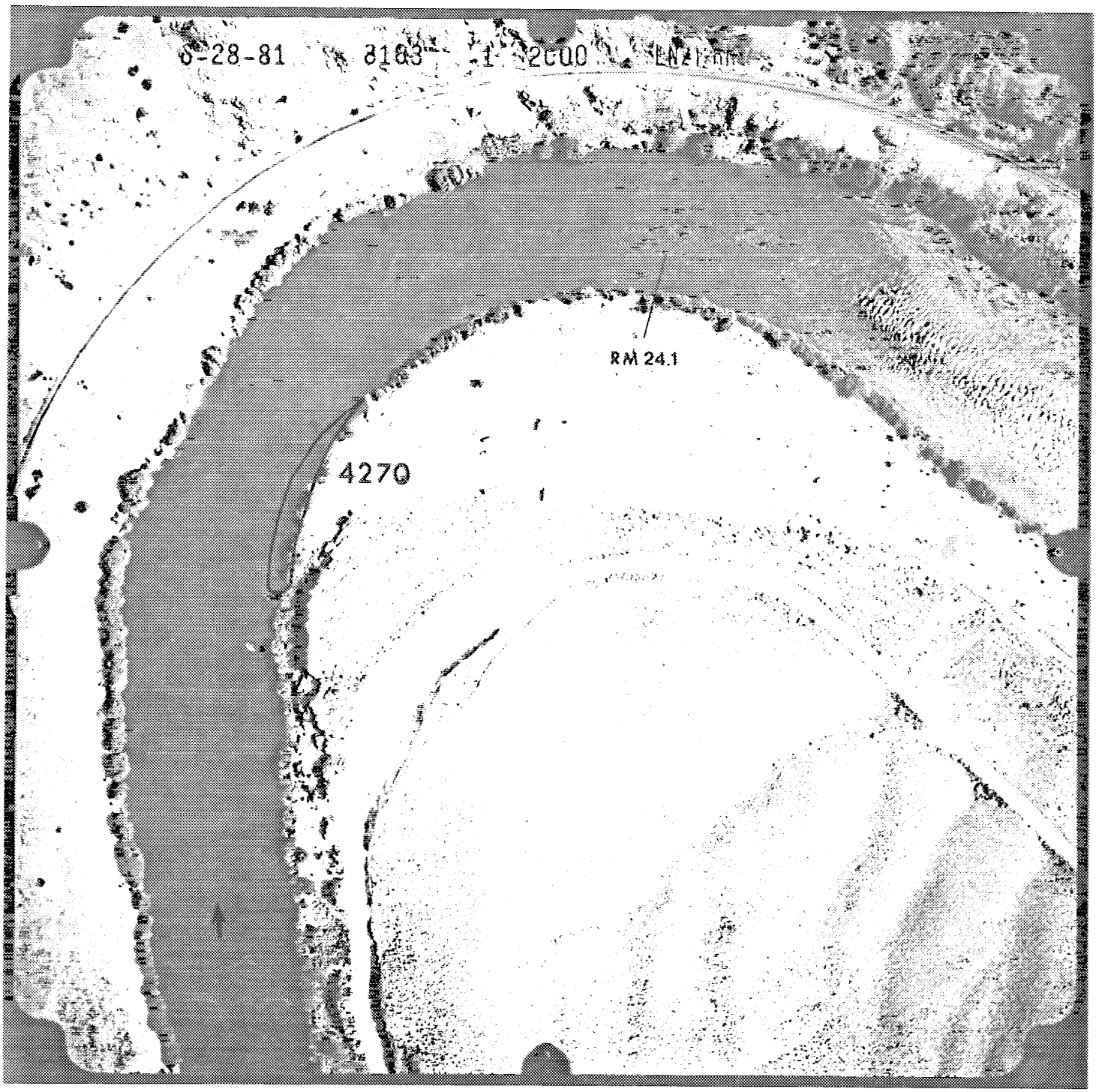

4230
4225
4229
(106)
4215

6-28-81
8163
4240
4245
4250
35
S 28.1


6-28-81
8163
LM24-RM1
RM 27.5
4255

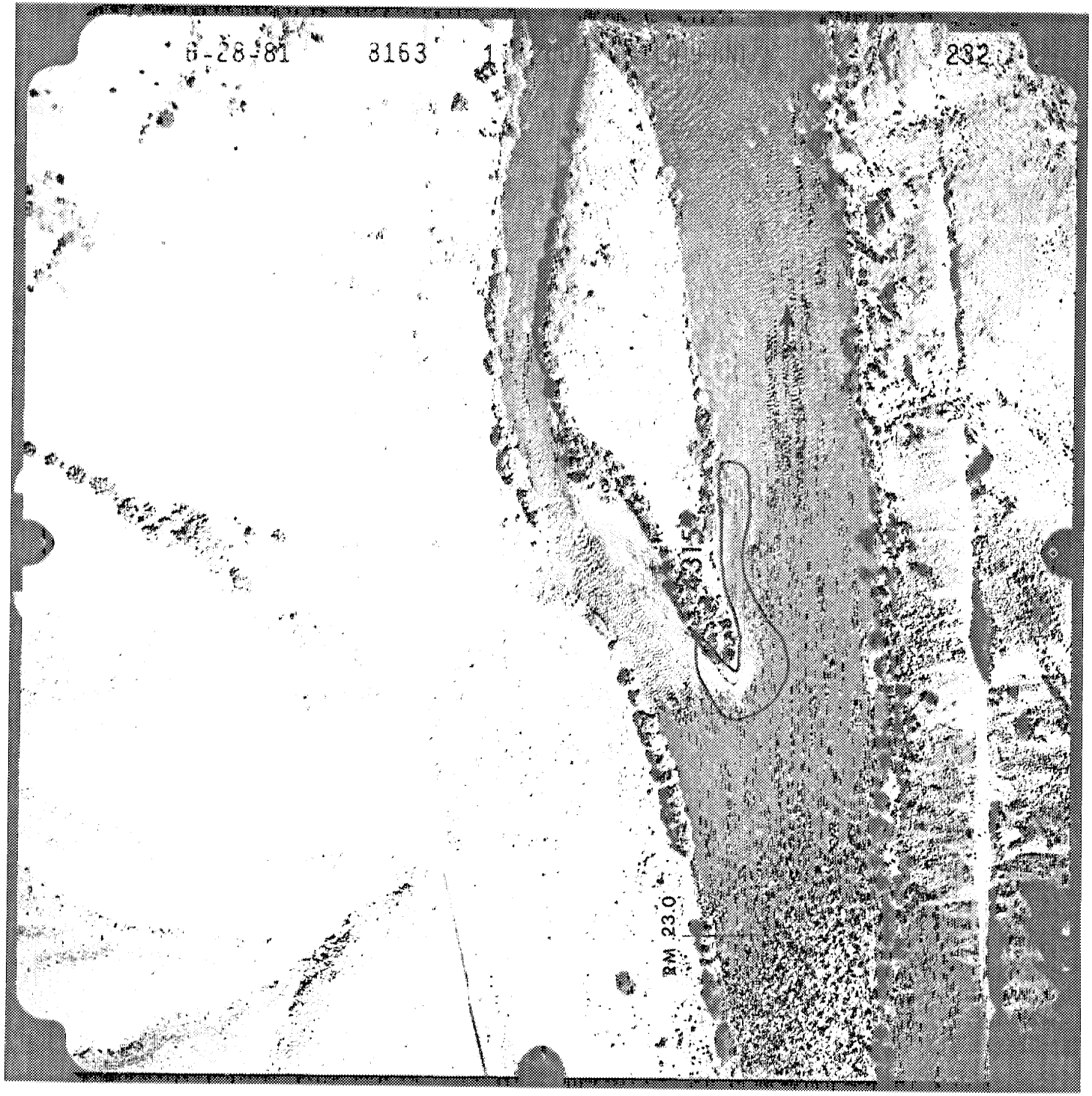
6-28-81
8163
4260
RM 26.2
LAN27-RM
279

6-28-81
8163
RM 25.7
1 4265


6-28-81
RM 24.1
4270

RM 24.0
4275
4285
4280
6-28-81
8163
1: 2000

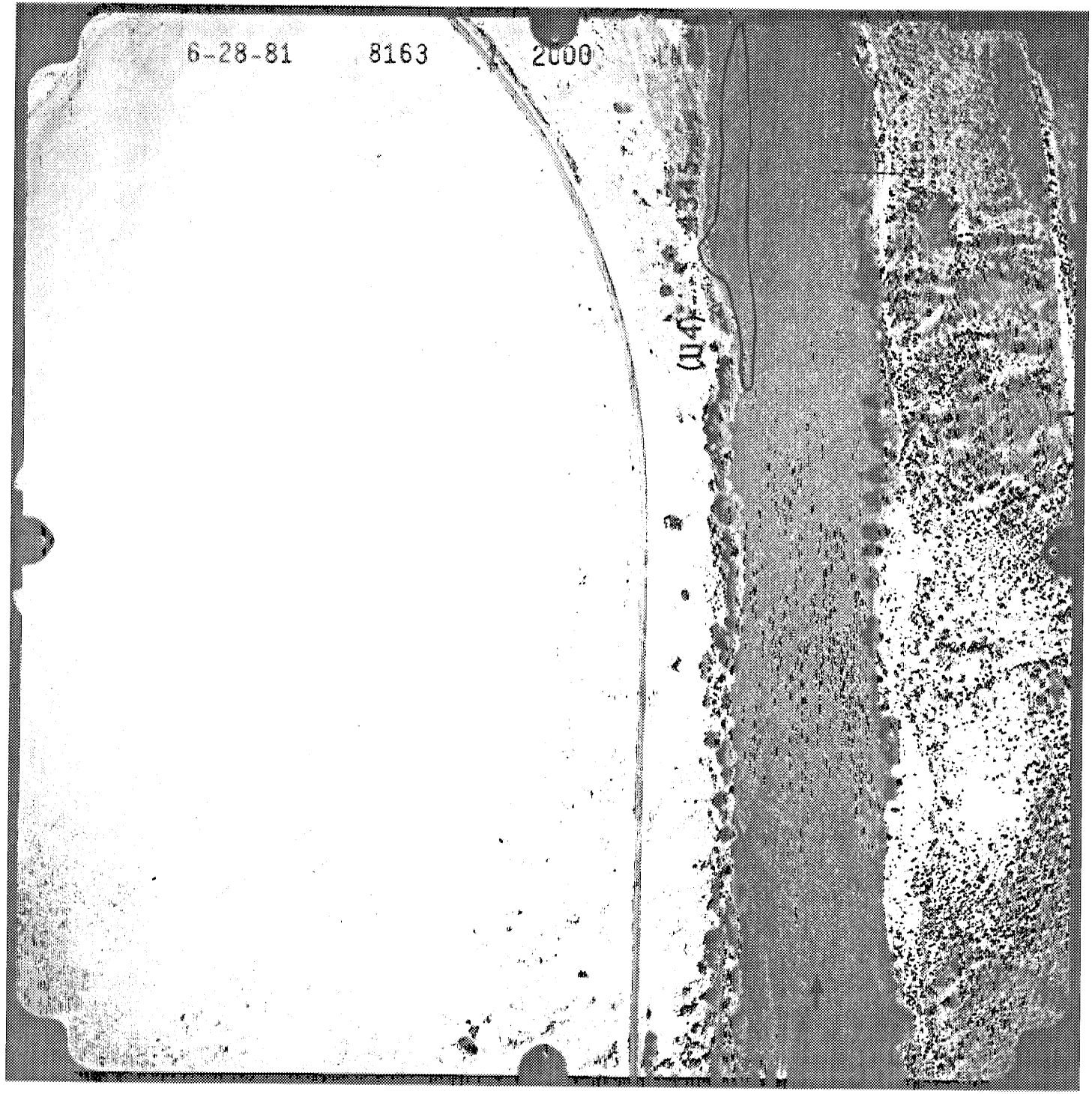
255
RM 23.7
4290
4305
4300
4310
4295
8163
6-28-81


6-28-81
8163
1
232
RM 23.0

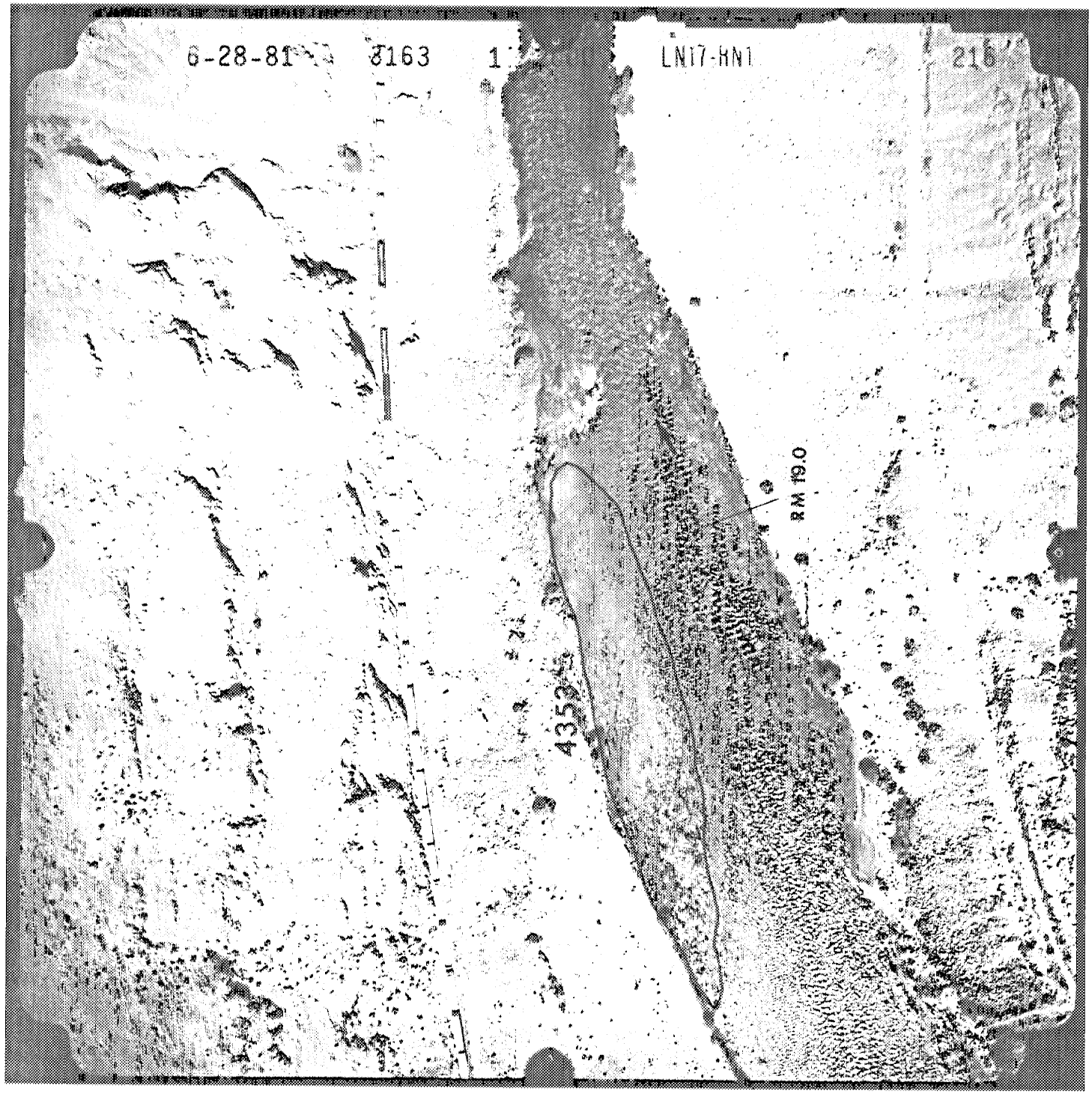
6-28-81
8163
RM 22.7
4325
4320
4330
4318

6-28-81
8153
4335
RM 22.1

RM 21.9
4340
6-28-81

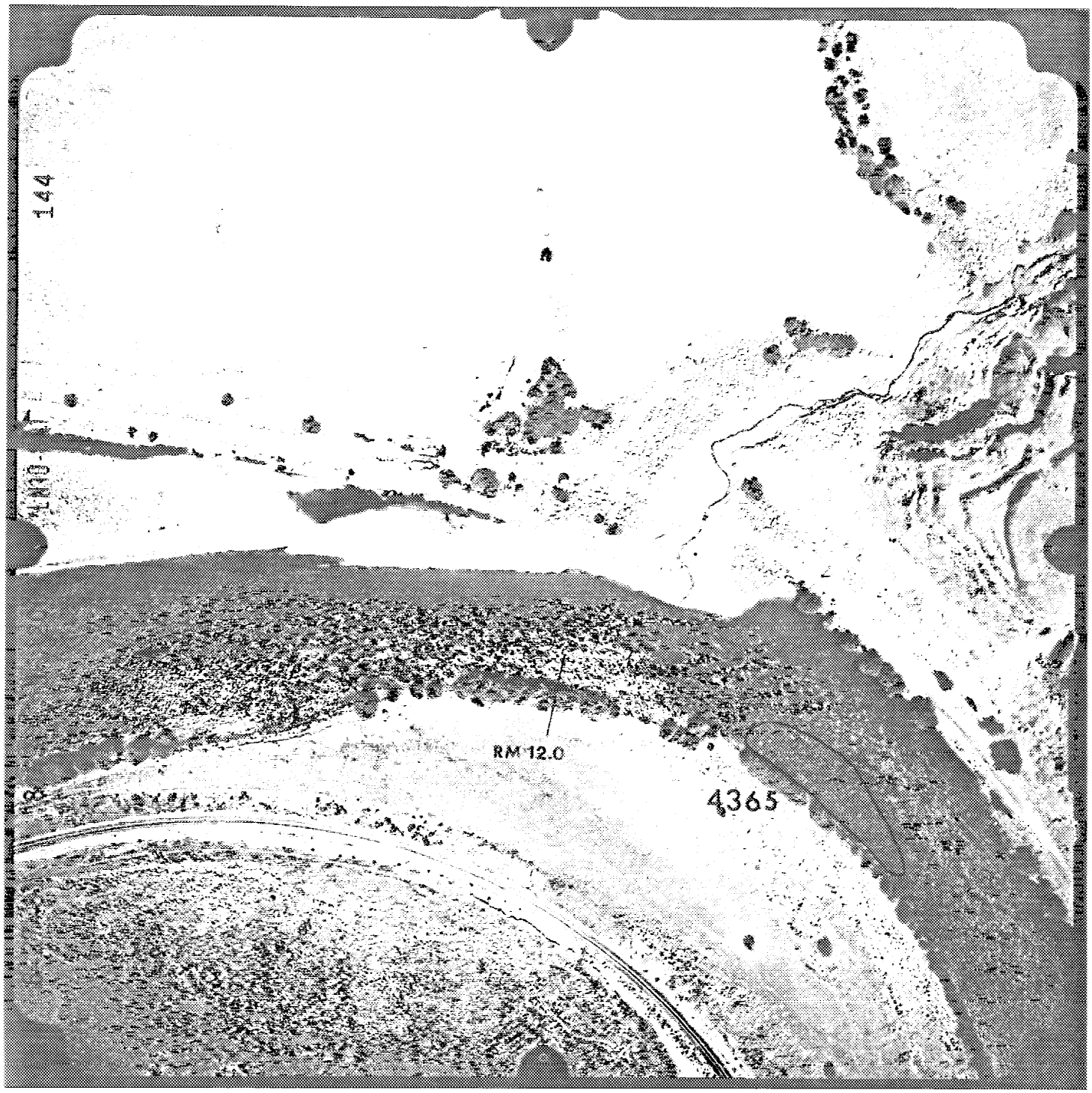

6-28-81 8163 2000

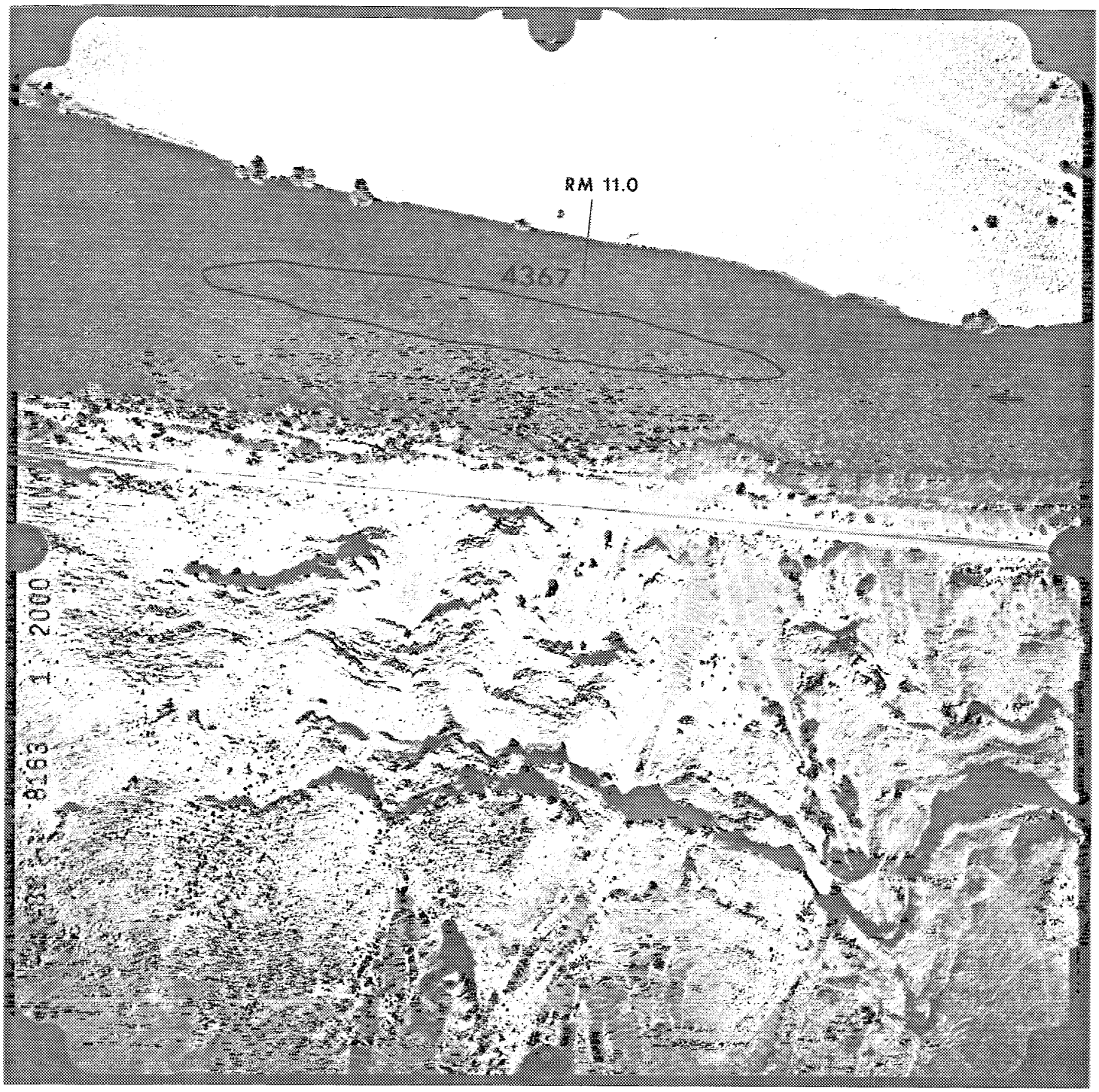
8163
1 2000
LN18-RN1
222
RM204
4350


6-28-81
8163
LN17-HN1
216
RM 19.0
4353

RM 17.4
435
435

210
RM 17.2
4361
4360
6-28-81
8163


144
RM 12.0
4365


RM 11.0
4367
8163 1 2000

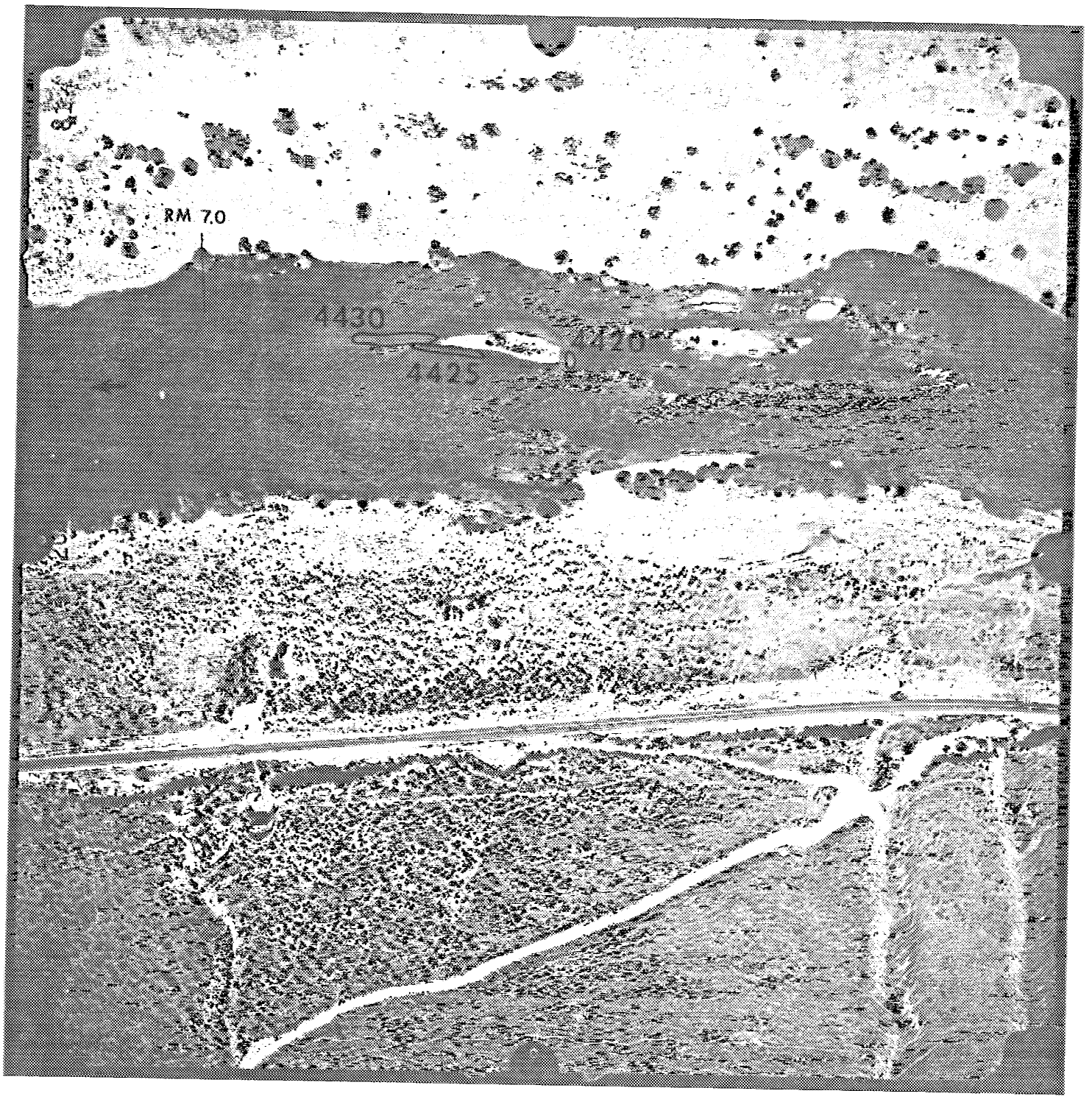
126
LN9-RN1
RM 10.8
6-26-81 8163
4368

4395 (123)
4390
4385
4380
4375
6-26-81
8163
1" 2000

120
(123A)
4400
4405
LOG-HN1
2000
RM 10.0
6-26-81

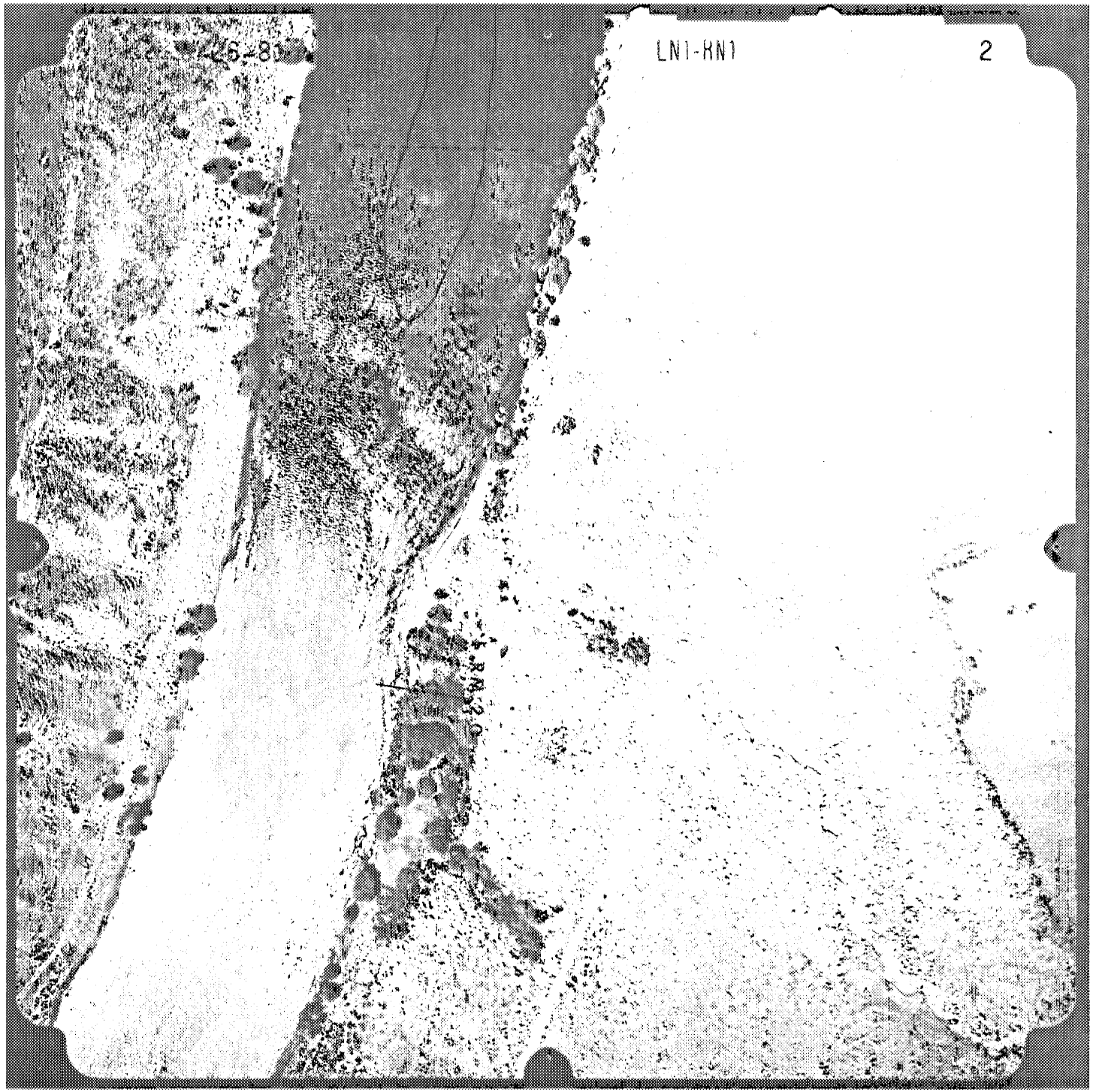
6-26-81
163
1: 2000
LN8-RN1
114
RM 0.4
4410

RM 7.4
443


RM 7.0
4430
4420
4425

62
RM 5.6
LAN5-HN2
63

2000
LN3-RN1
RM 3.4
1455
1450
1440
1460


LN1-RN1
2

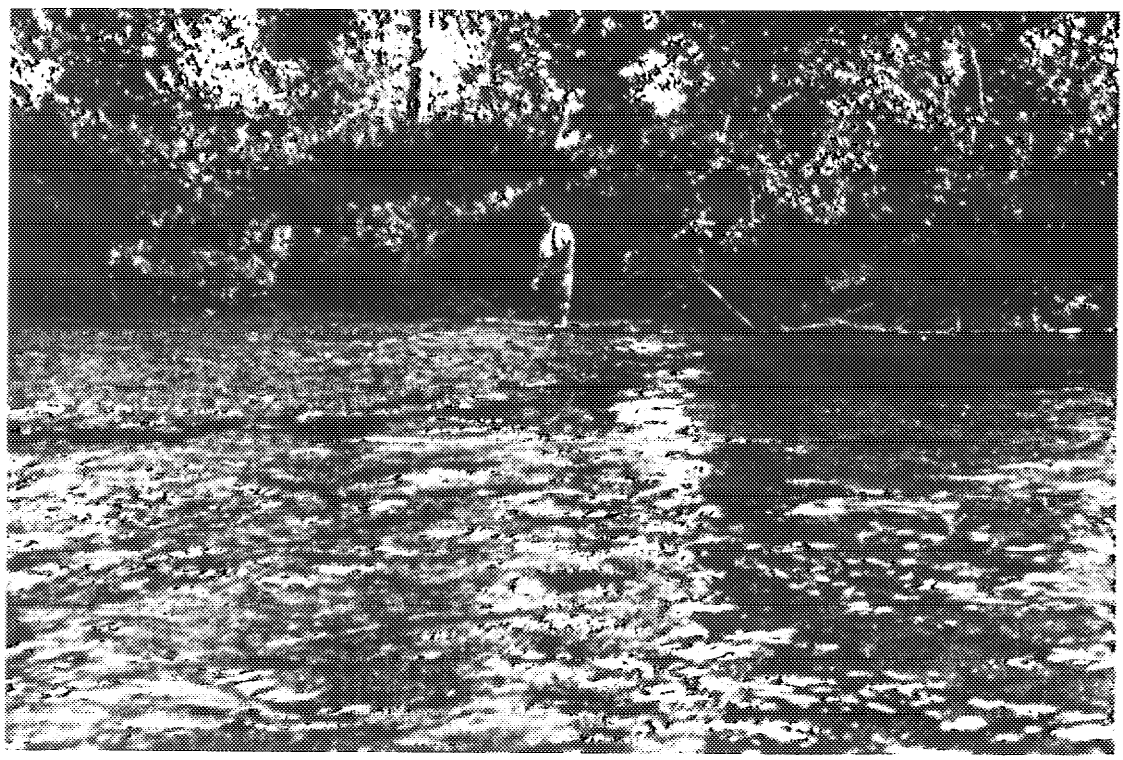
4
RM 1.7
6-26-81

APPENDIX II

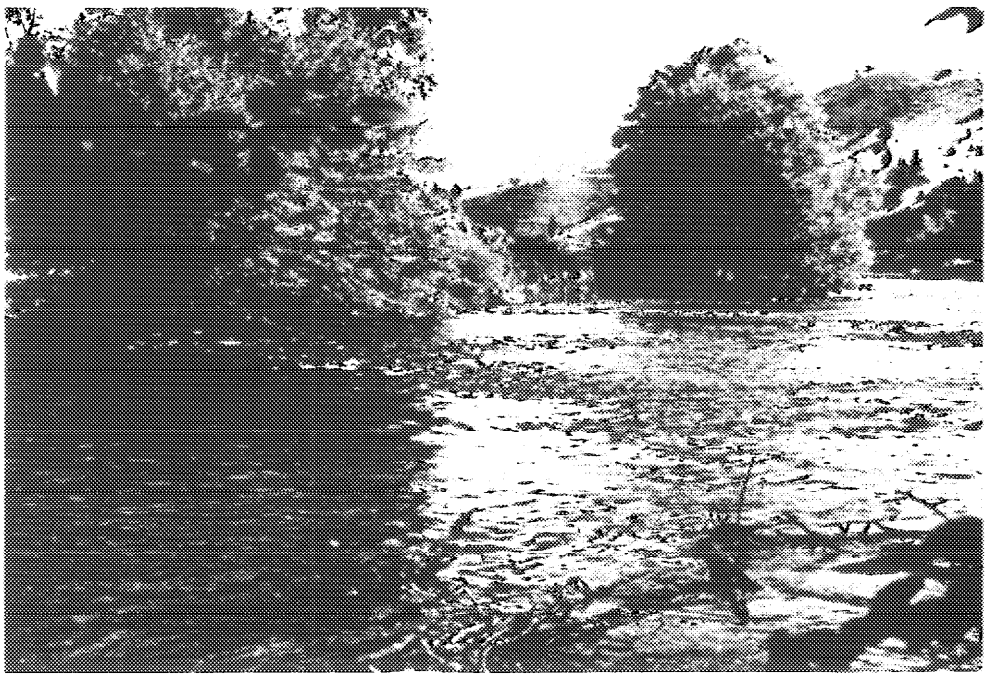
PHOTO REPRESENTATION OF STATIONS SAMPLED FOR GRAVEL PERMEABILITY AND GRAVEL COMPOSITION IN THE LOWER DESCHUTES RIVER, OREGON 1983-84

The photos presented in this appendix provide documentation of conditions prevailing during this study at the stations sampled for gravel quality. Photos are presented in order of decreasing proximity to the Pelton/Round Butte hydroelectric complex.

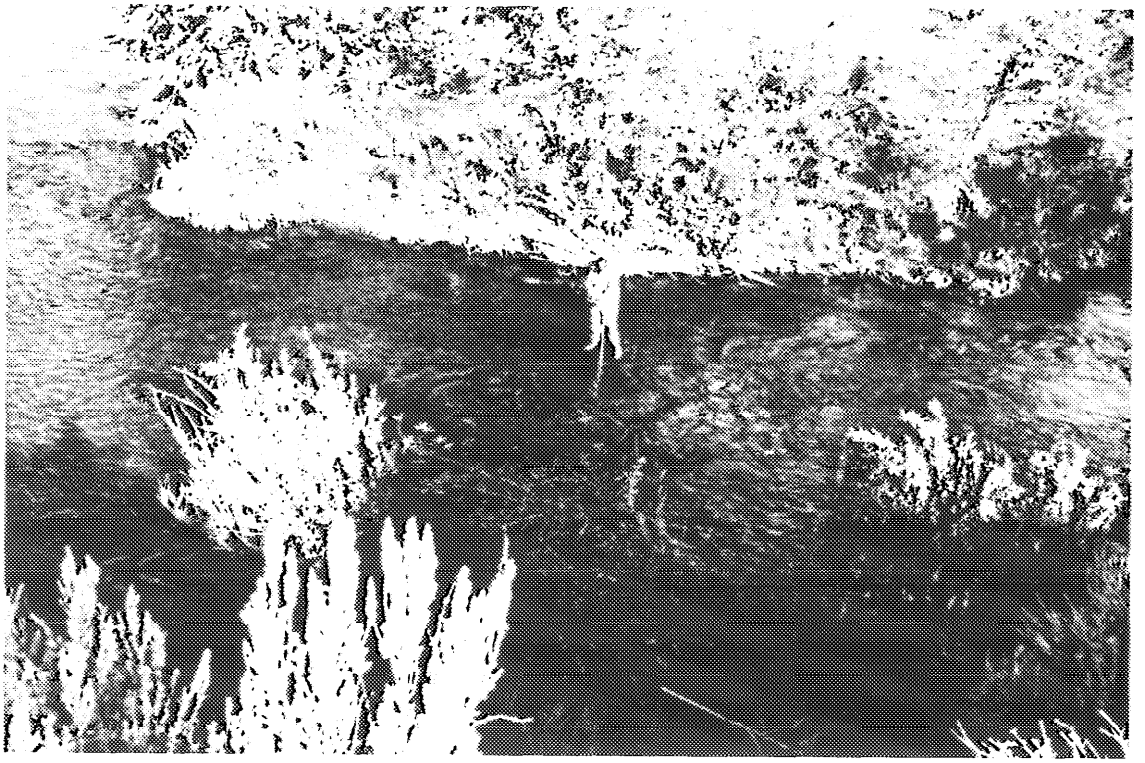
SECTION I



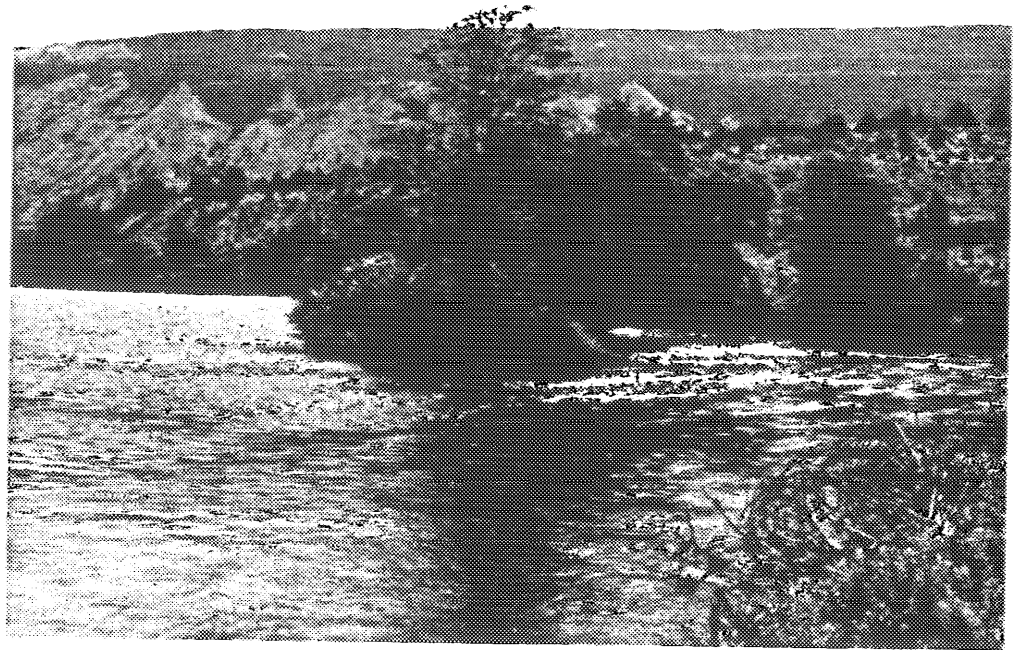
Station 501 (Jackson's) .



Station 501 (Jackson's).



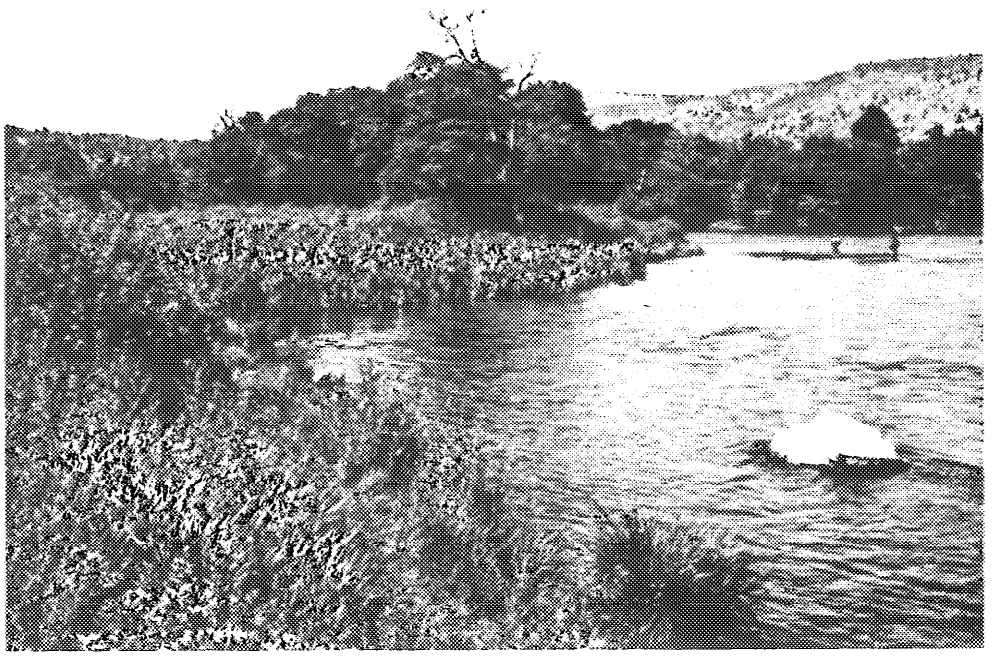
Station 502 (Valve).



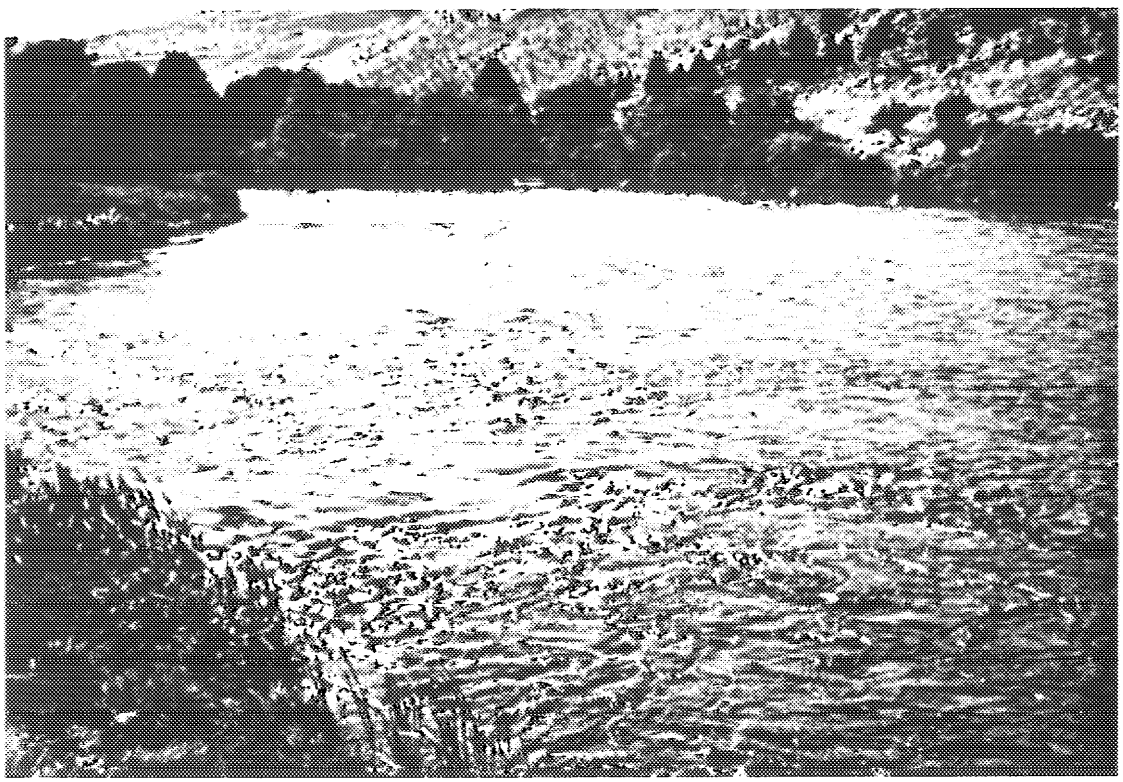
Station 504 (Disney).

Station 504 (Disney).

Station 507A (Guard Rail).

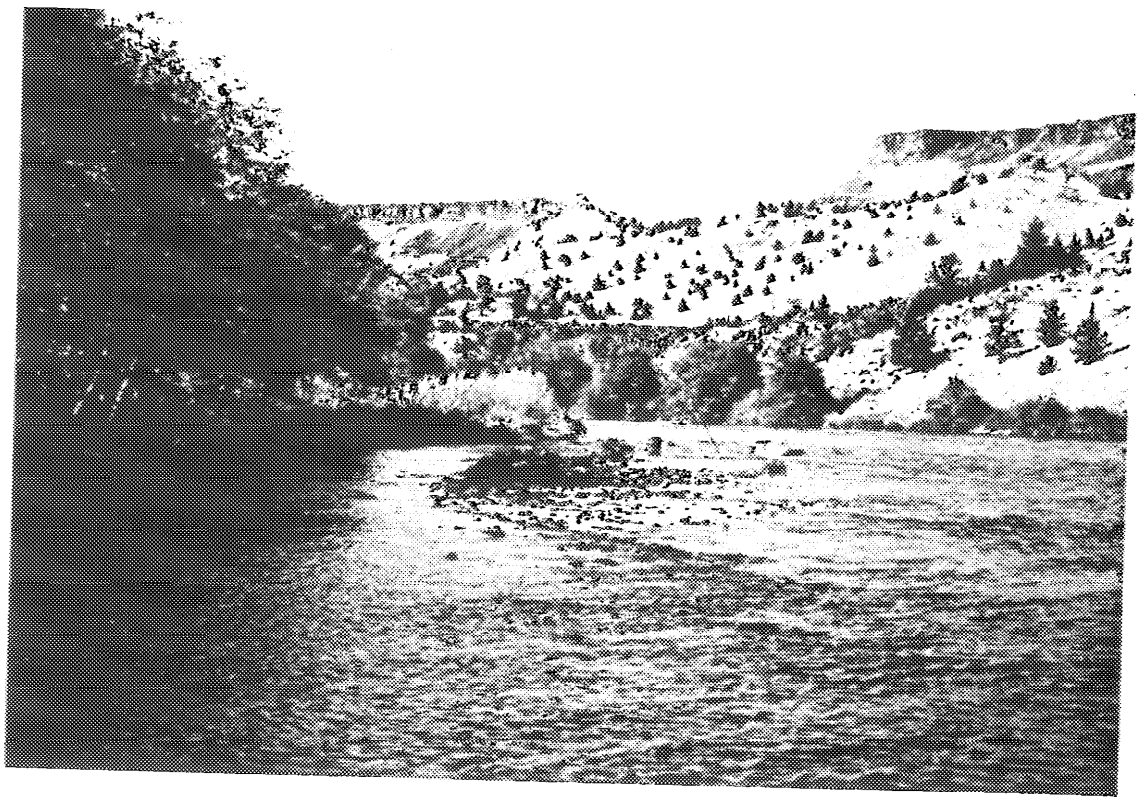


Station 508A (Paxton).



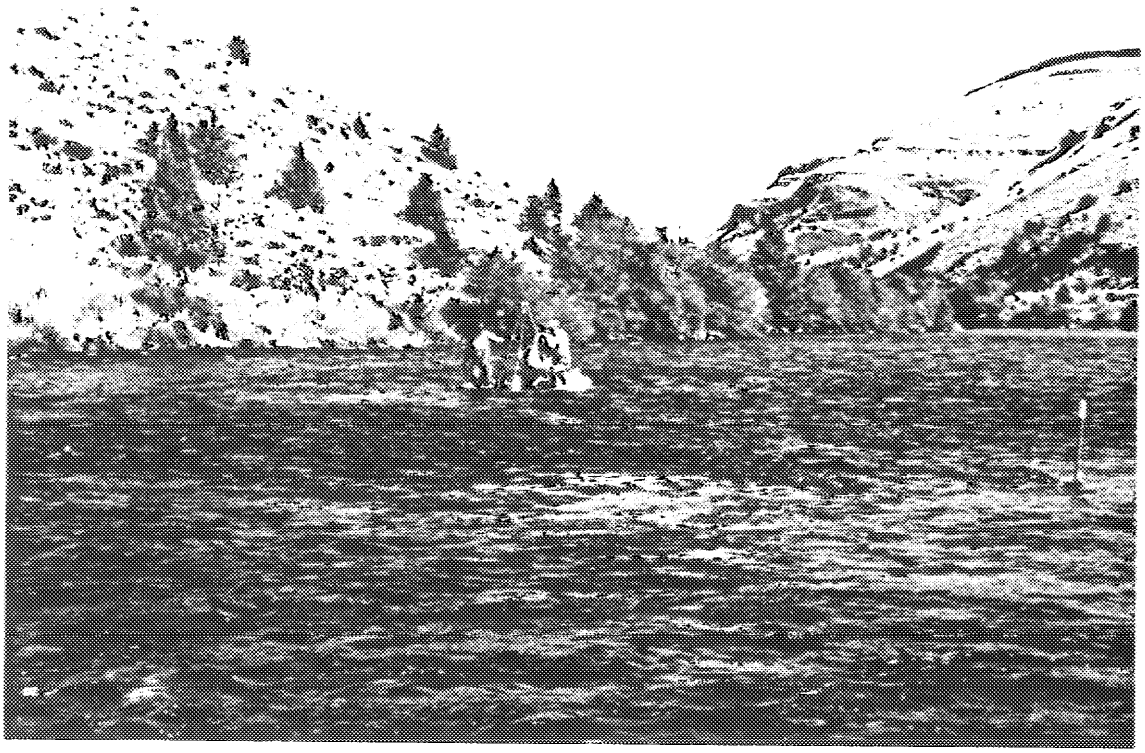
Station 508A (Paxton)

SECTION II

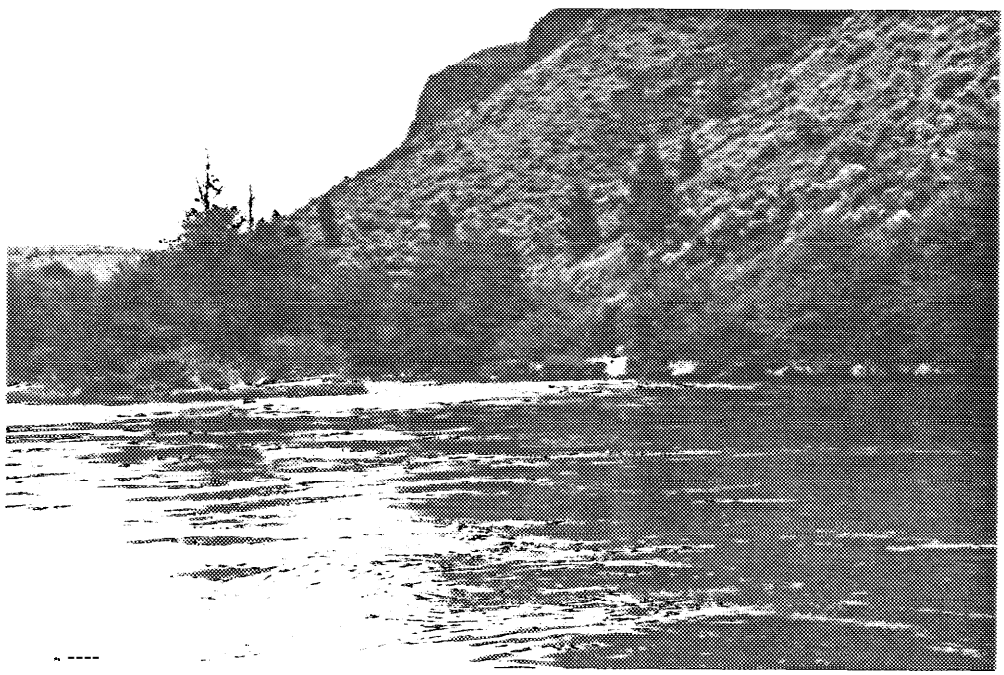


Station II-5 (Morrison's)

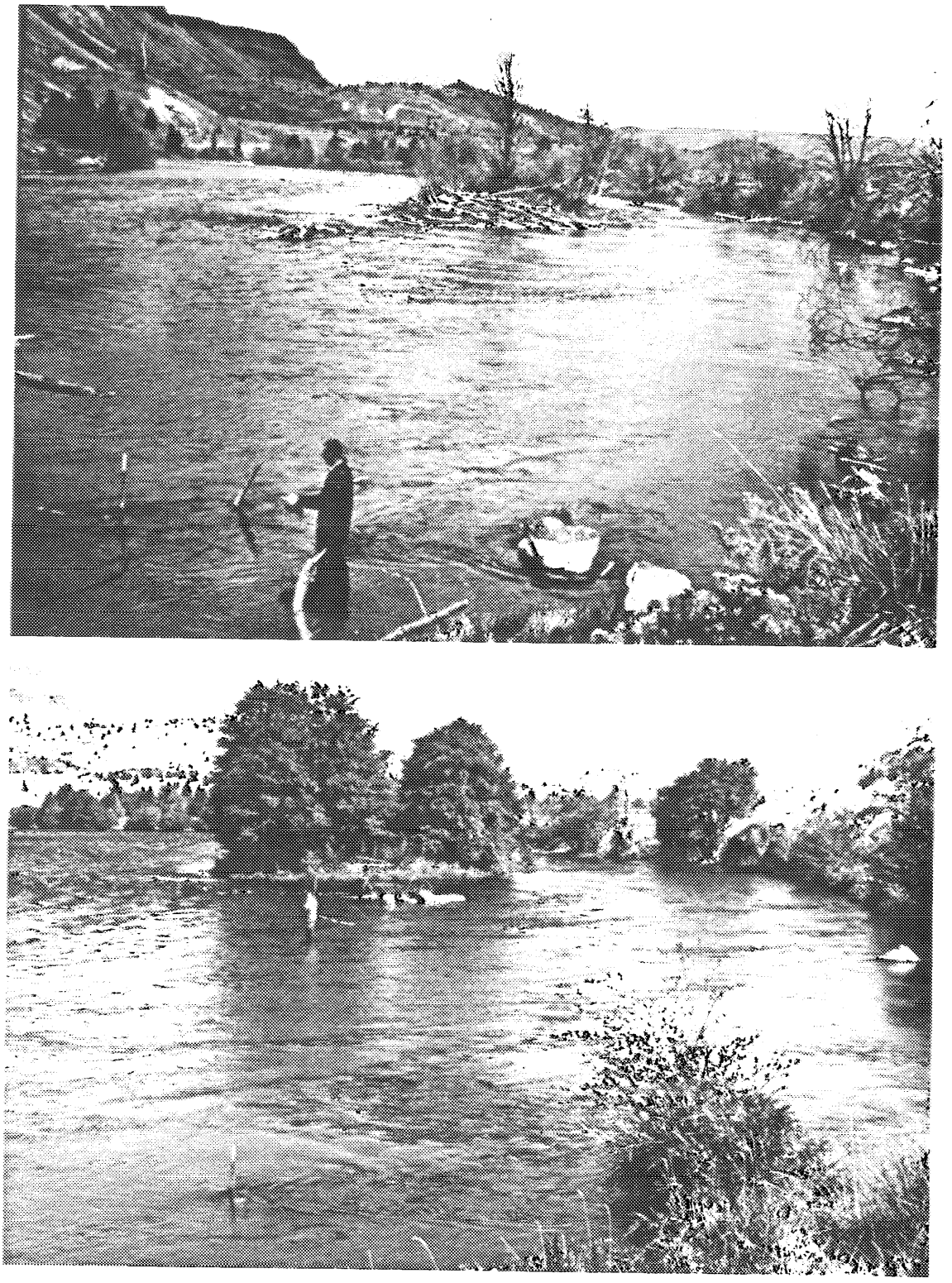
Station 10 (Dry Creek Side Channel)



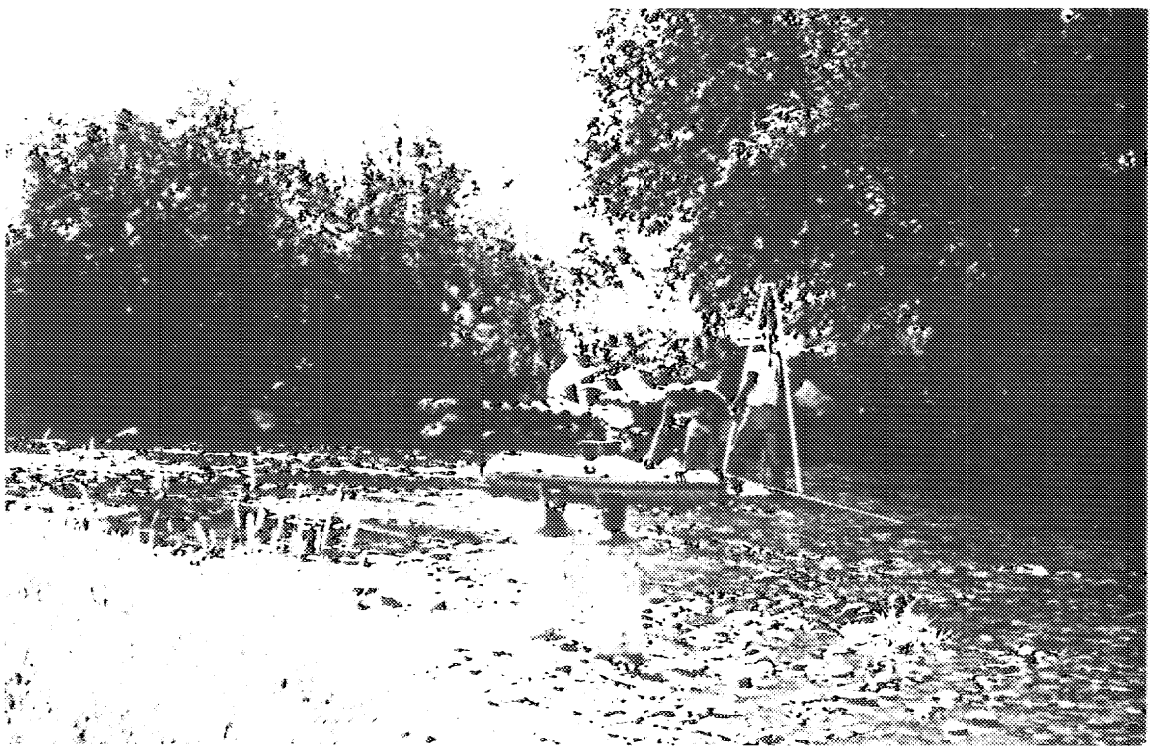
Station 10A (Below Dry Creek Channel)



Station 11 (Juniper) ,

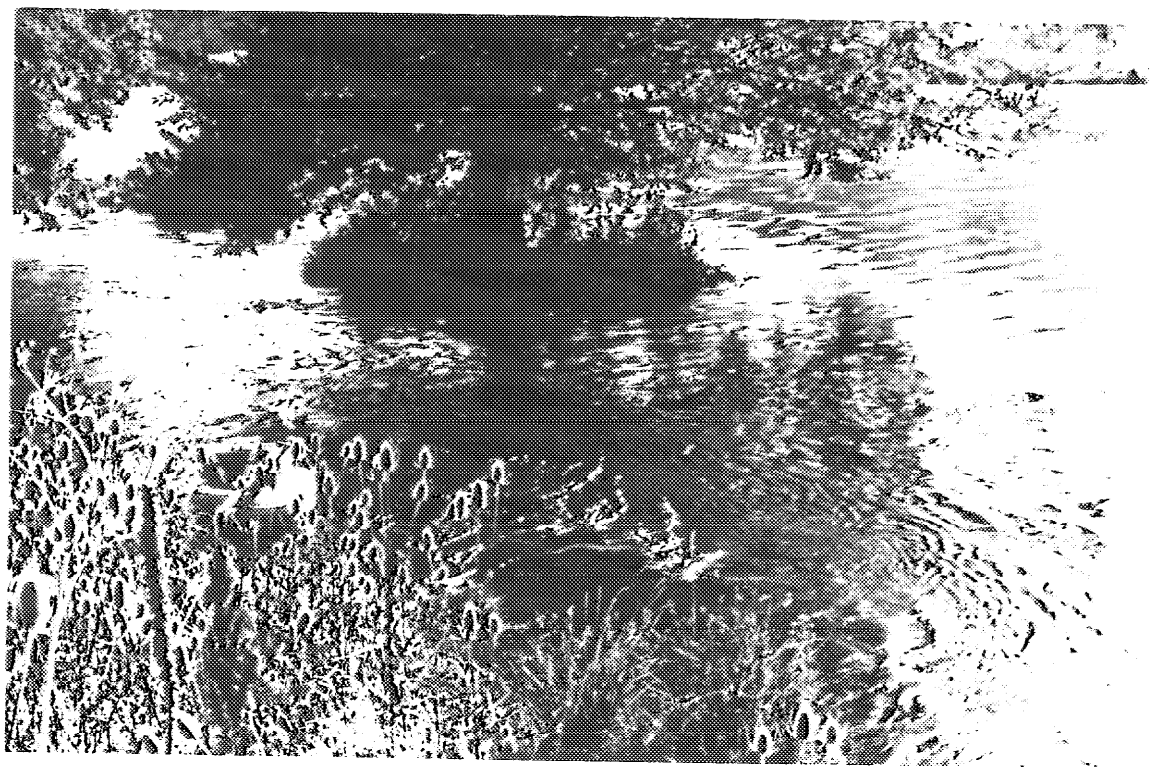


Photographs taken of Station 19 (Trout Creek) in 1964 (top> and 1983 (bottom).

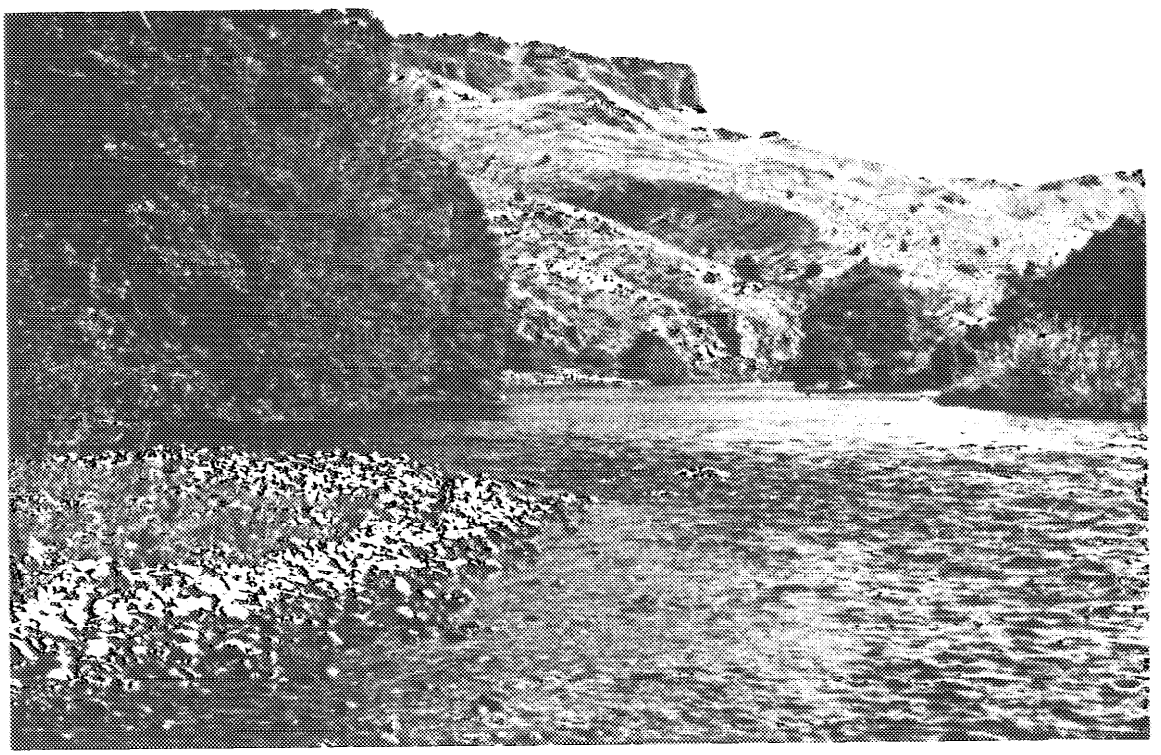


Station 615 (Below Trout Creek Rapids)

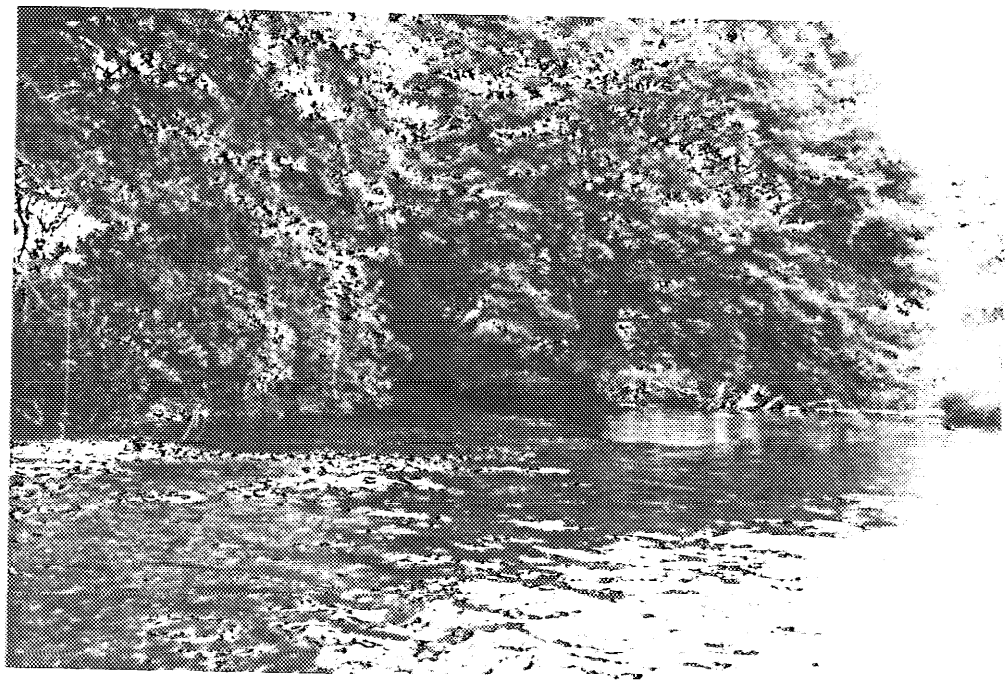
SECTION III



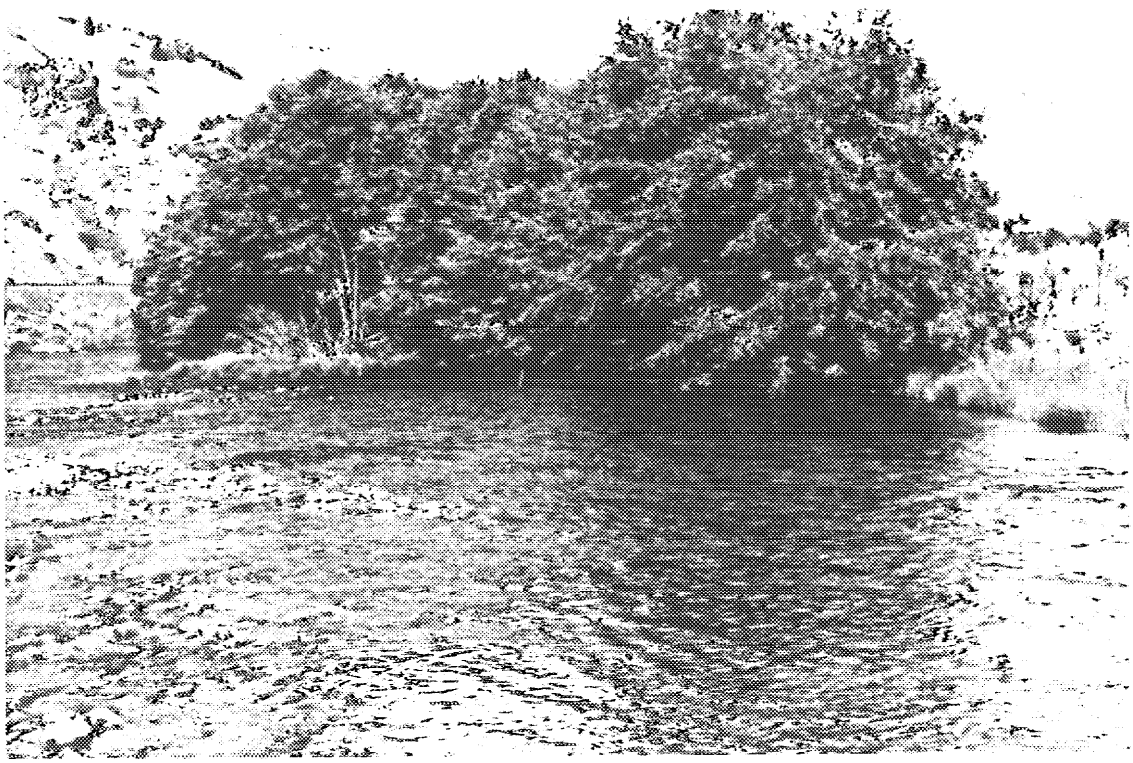
Station 47 (Whiskey Dick)



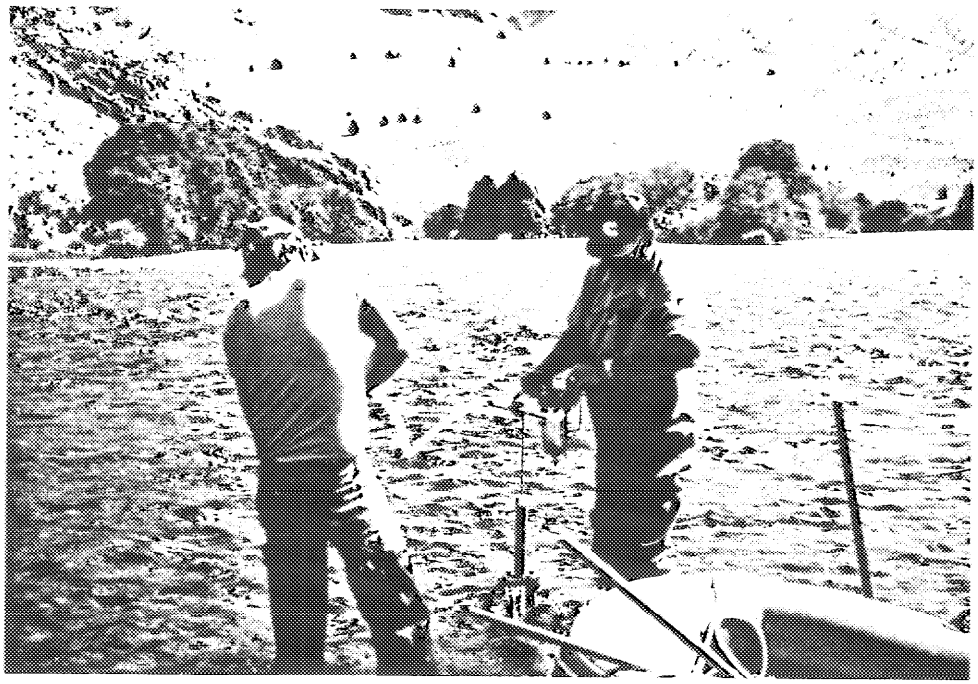
Station 56 (Newton's Island).



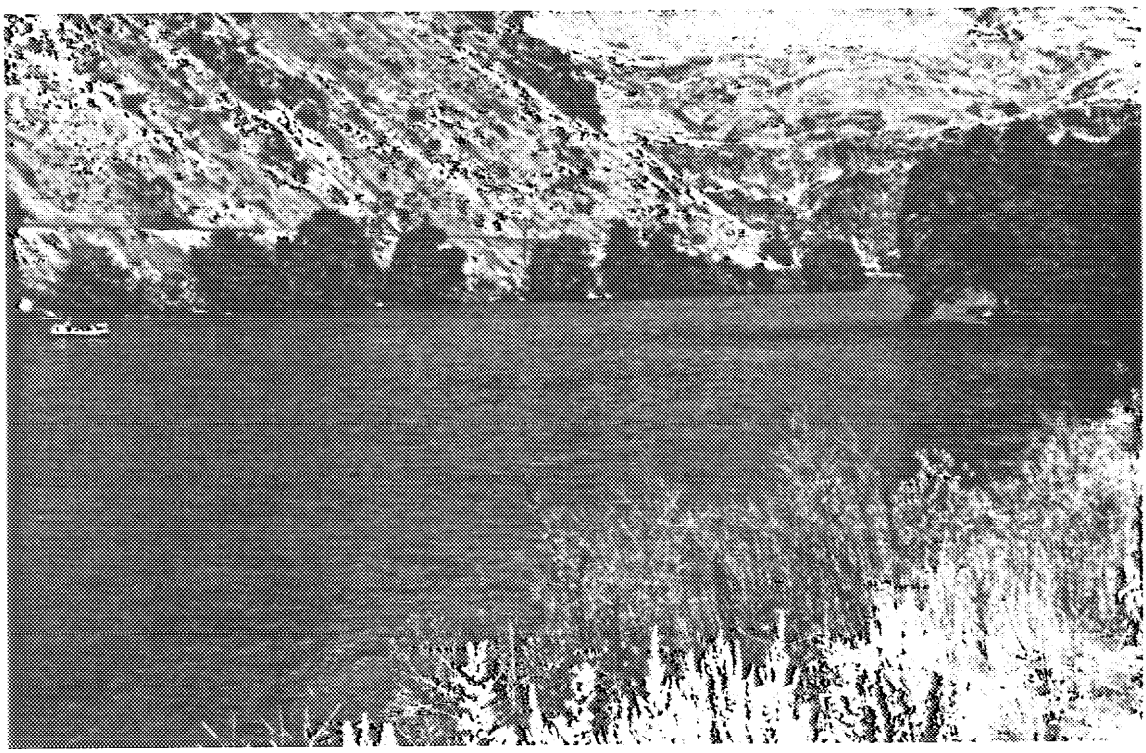
Station 58A (Elm **Rock** Chateau).



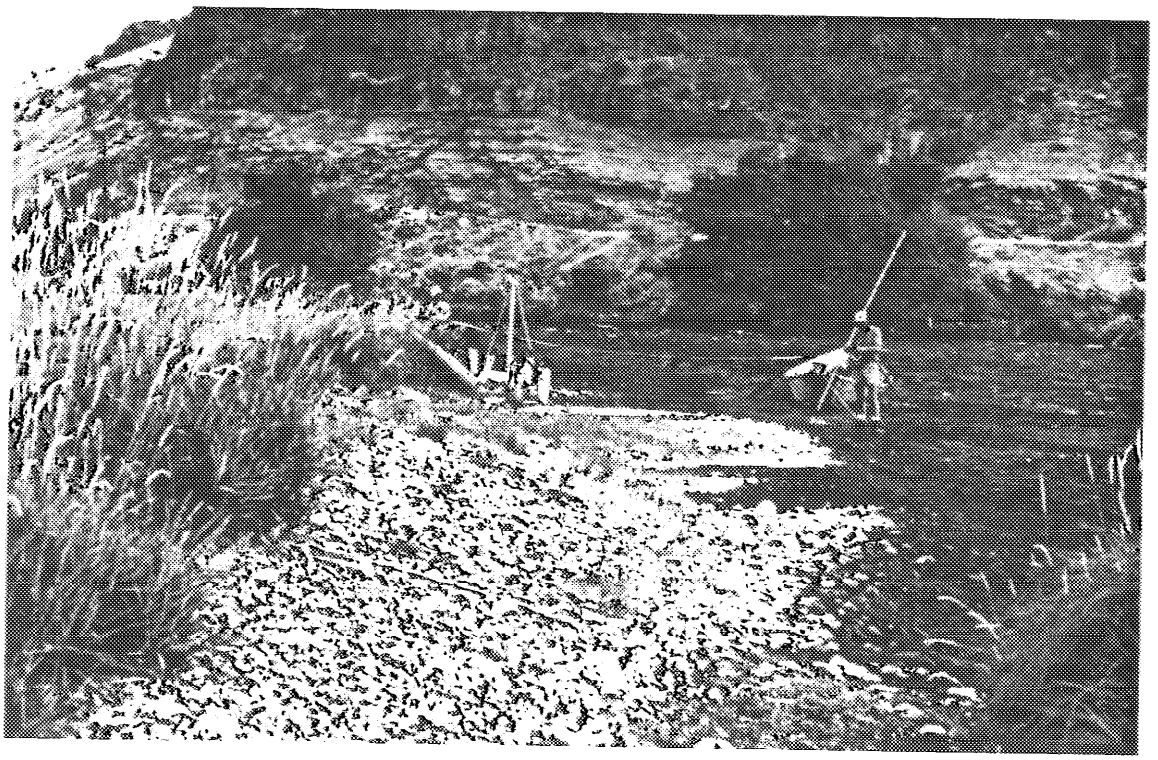
Station 58B (Rim Rock Chateau),



Station 58C (Rim Rock Chateau)



Station 62 (Windy Flat).



Station 630 **(Mouth of** Eagle **Creek).**

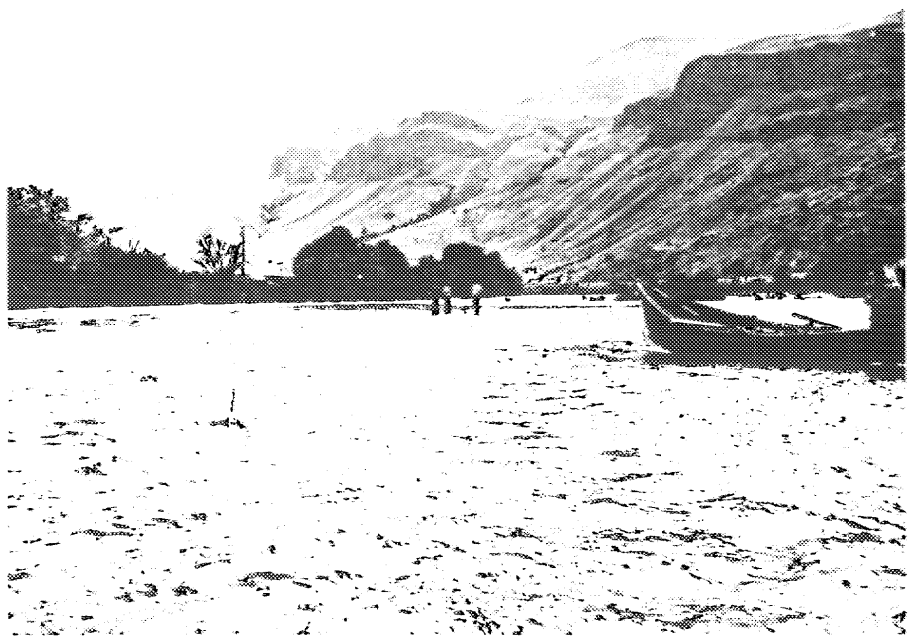
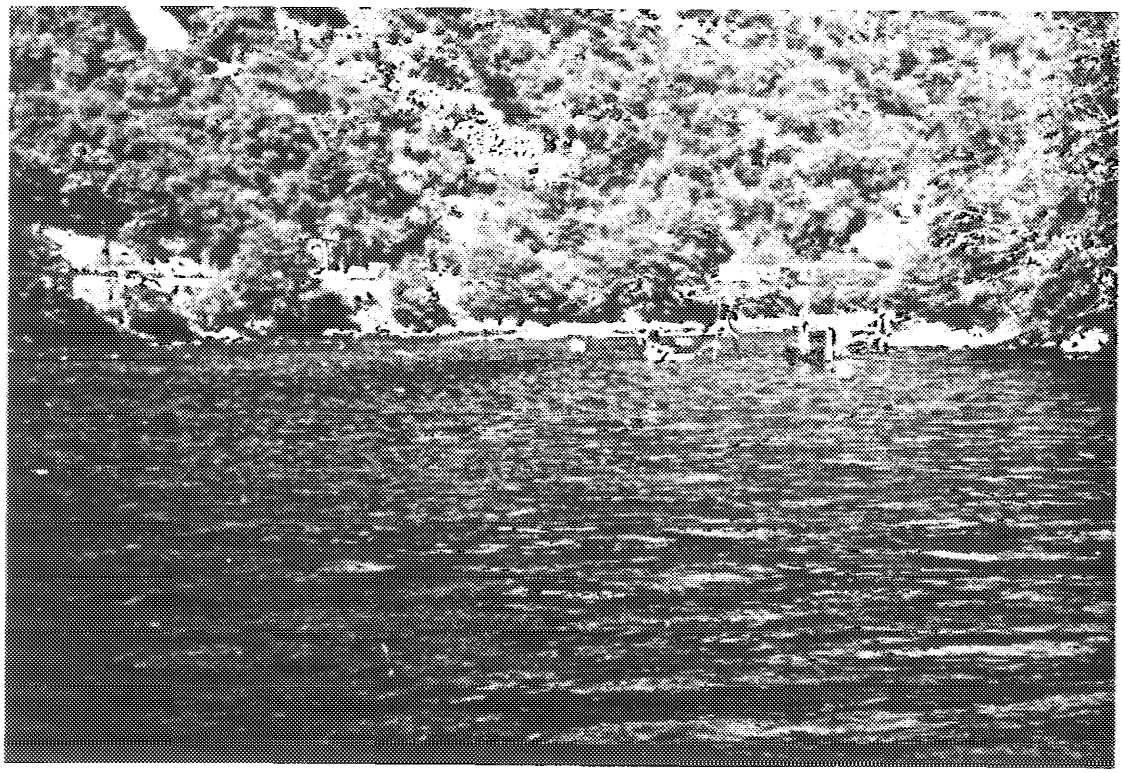


Photo of Station 73 taken by the Oregon State Game Commission (OSGC) in the mid-1960's.

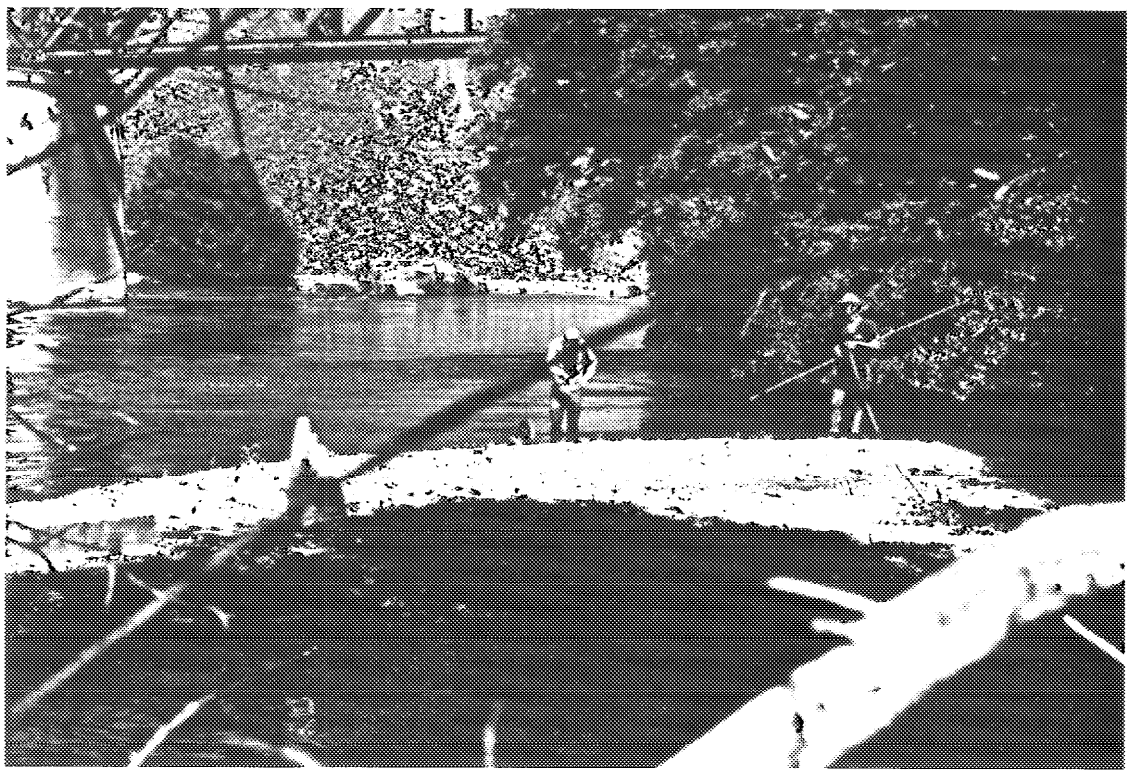
Photo of Station 73 taken in 197'4 from a small island which has developed at a point just upstream of the location of the drift boat shown in the OSGC photograph on the preceding page.

Station 92 (Oak Springs).

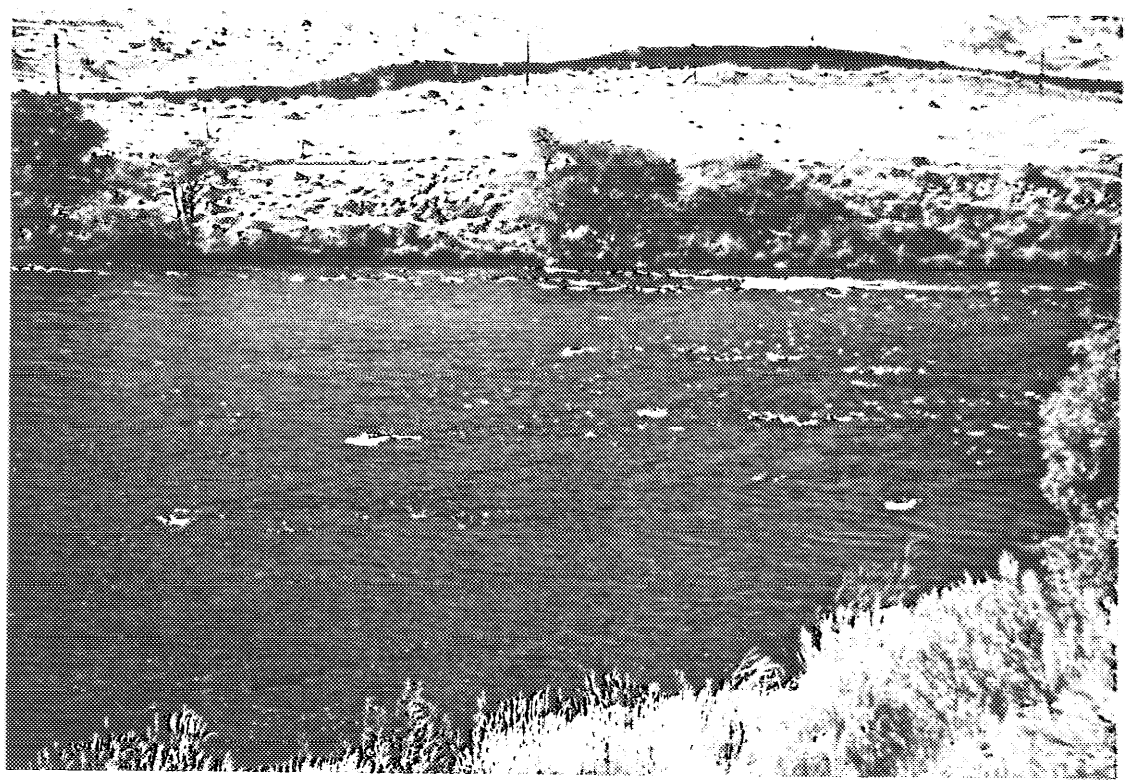


Station 92 (Oak Springs)

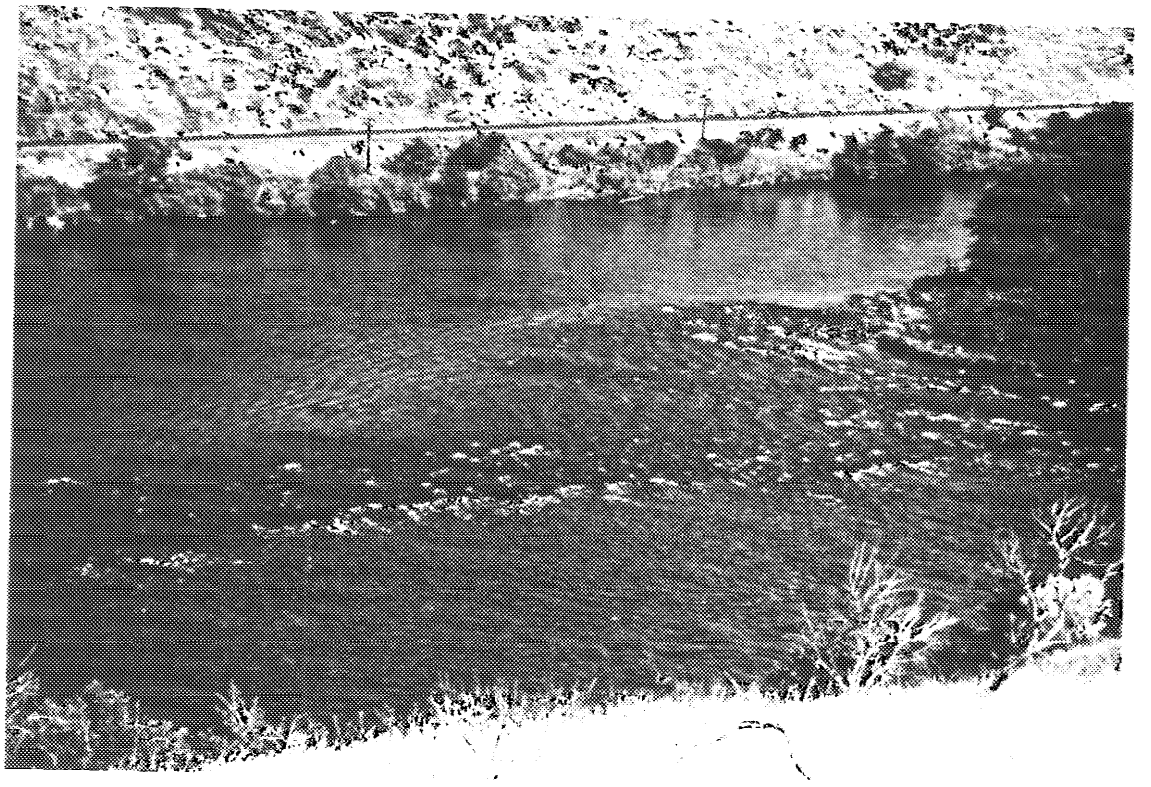
SECTION IV



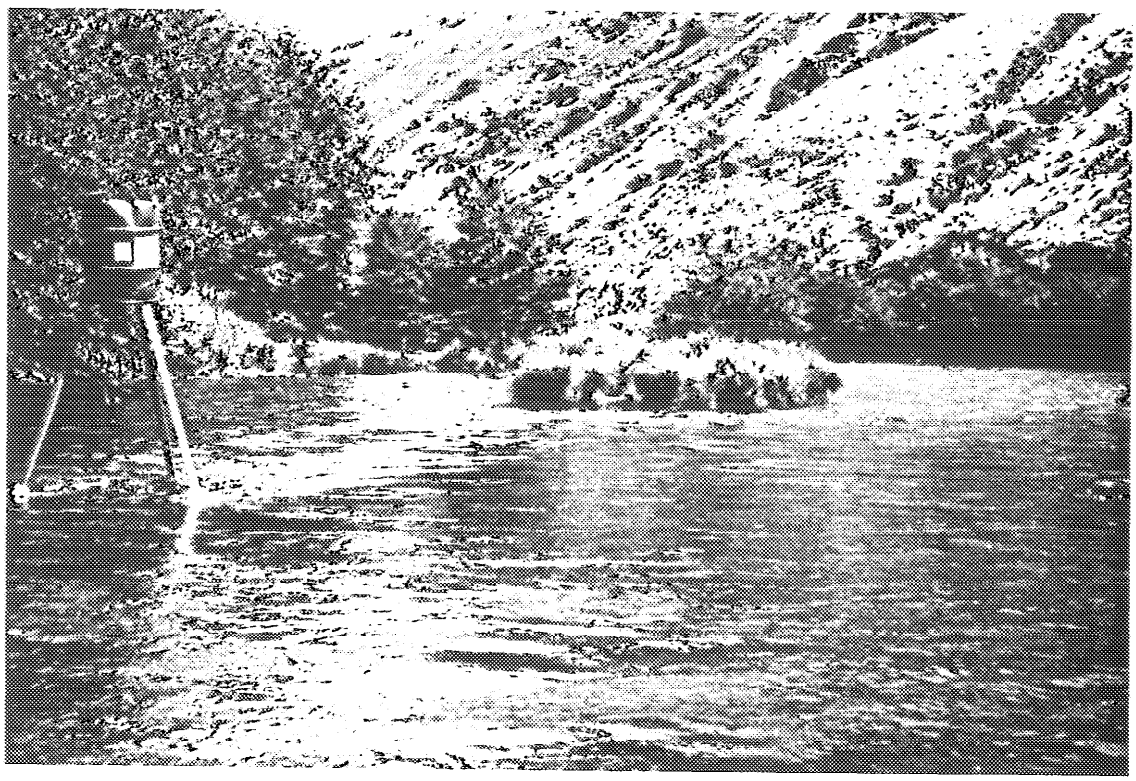
Station 95 (Trestle).



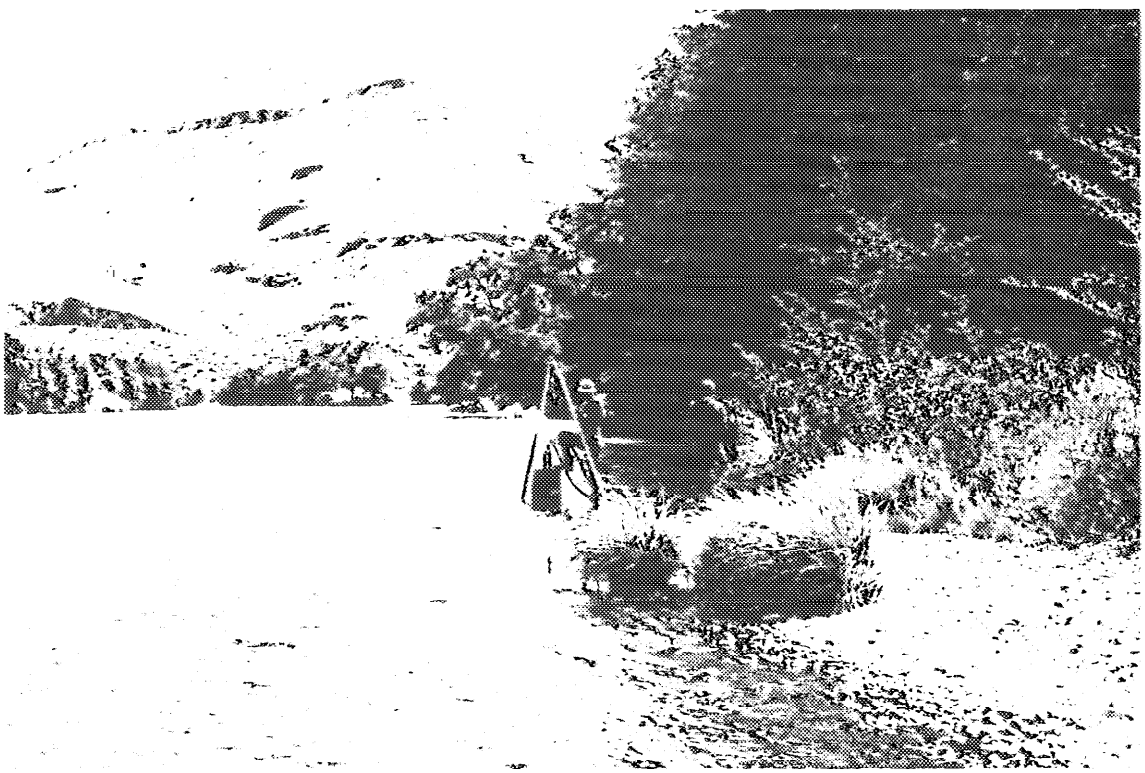
Station 102 (Jones Canyon)



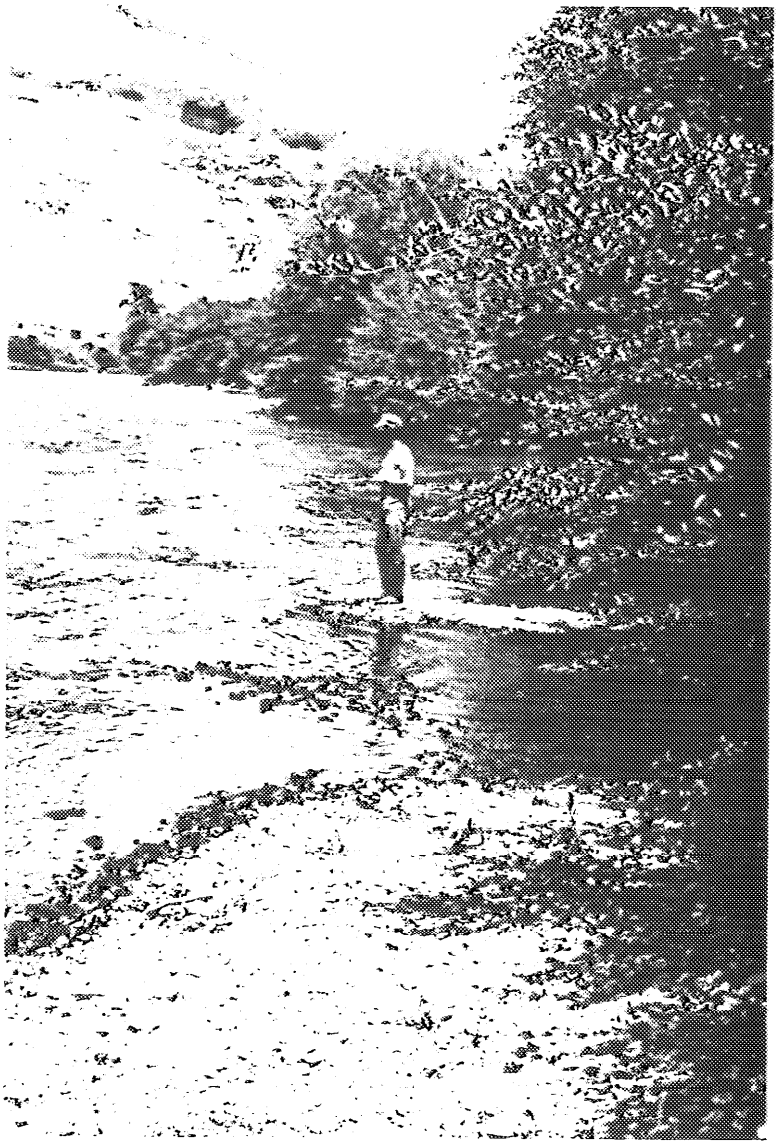
Station 104 **(Cedar Island)**



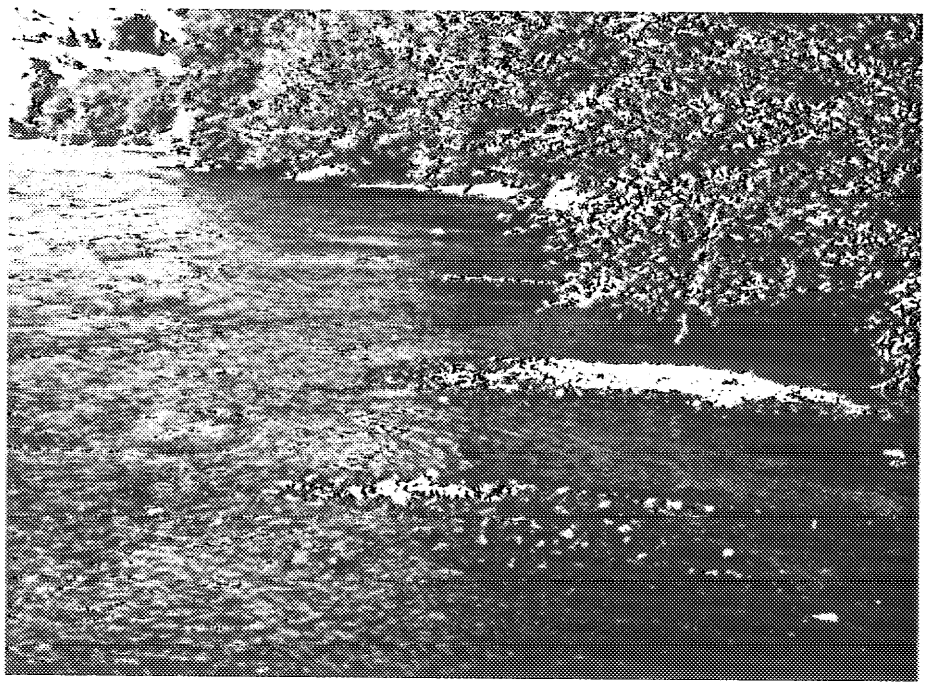
Station 106 (Aney #106).



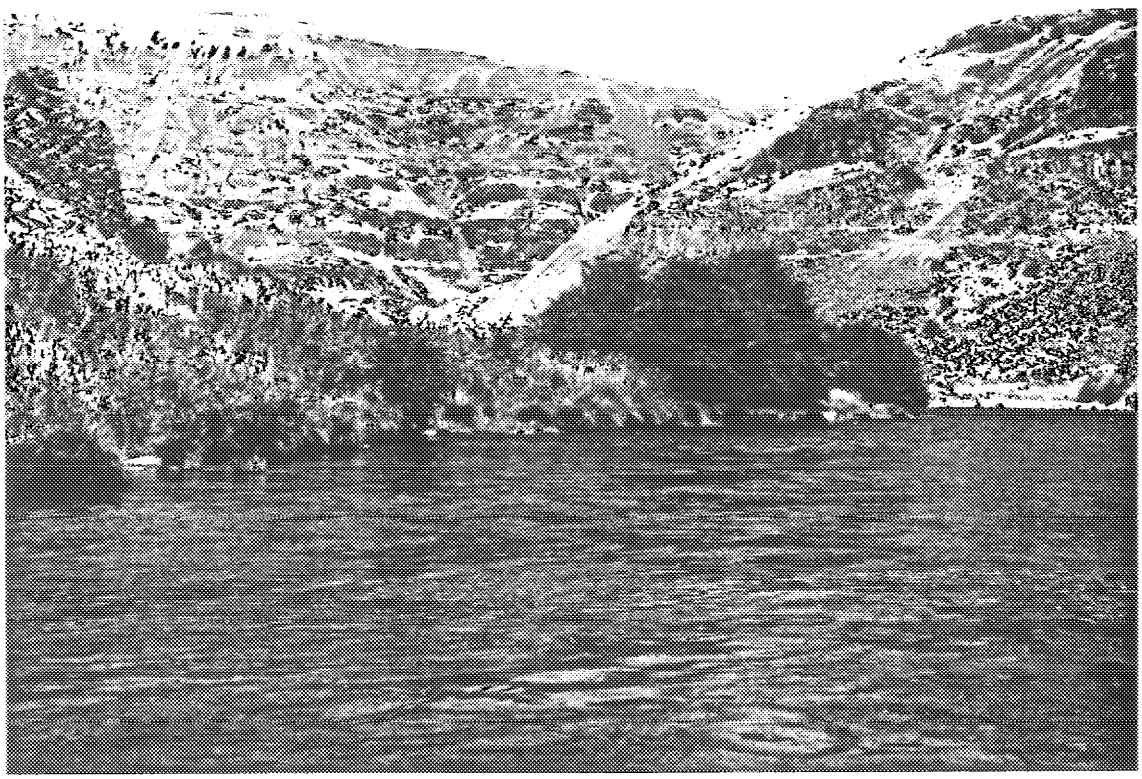
Station 109B.



Station 143 (X-Dike Siding).

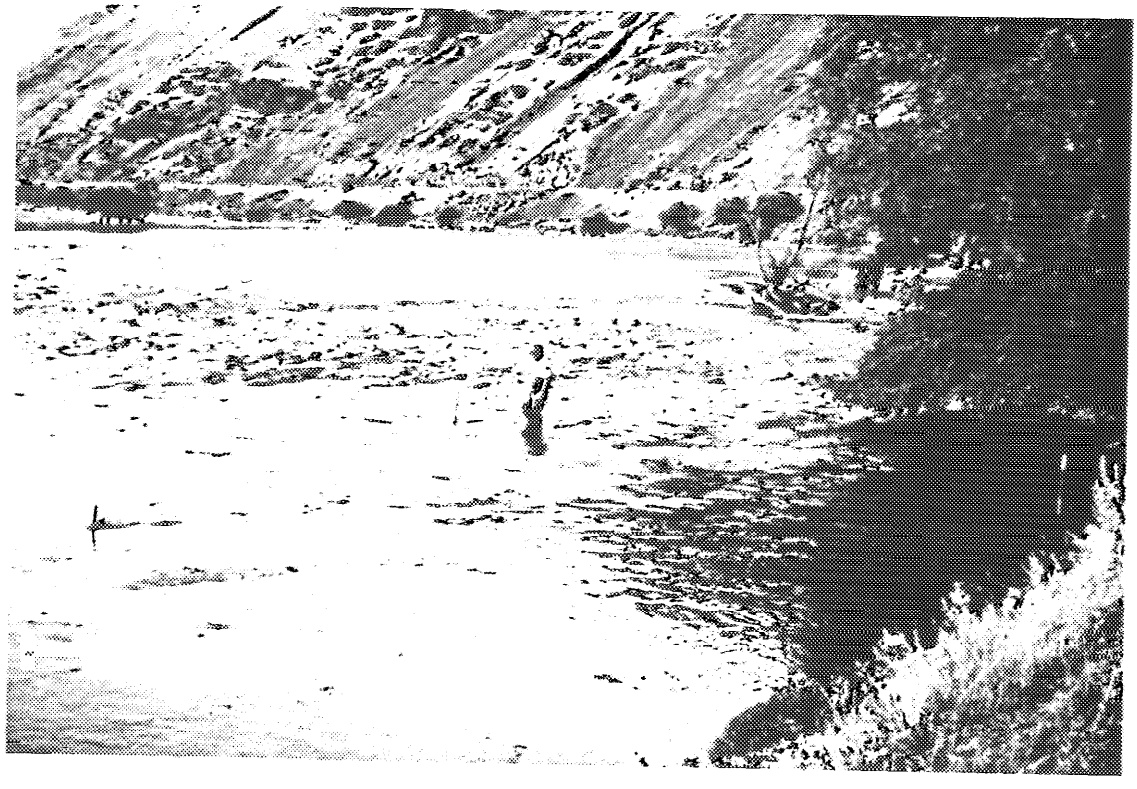


Station 113 (X-Dike Siding).

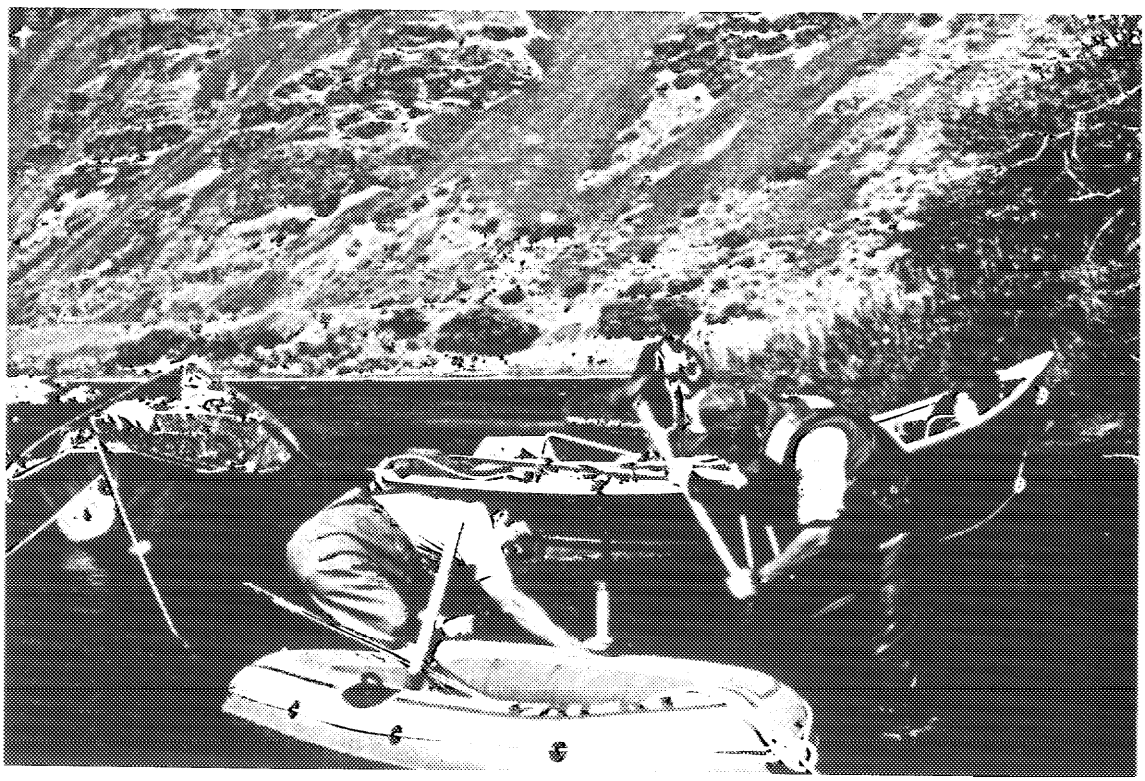


Station 114 (Dike).

Station 144 (Dike),

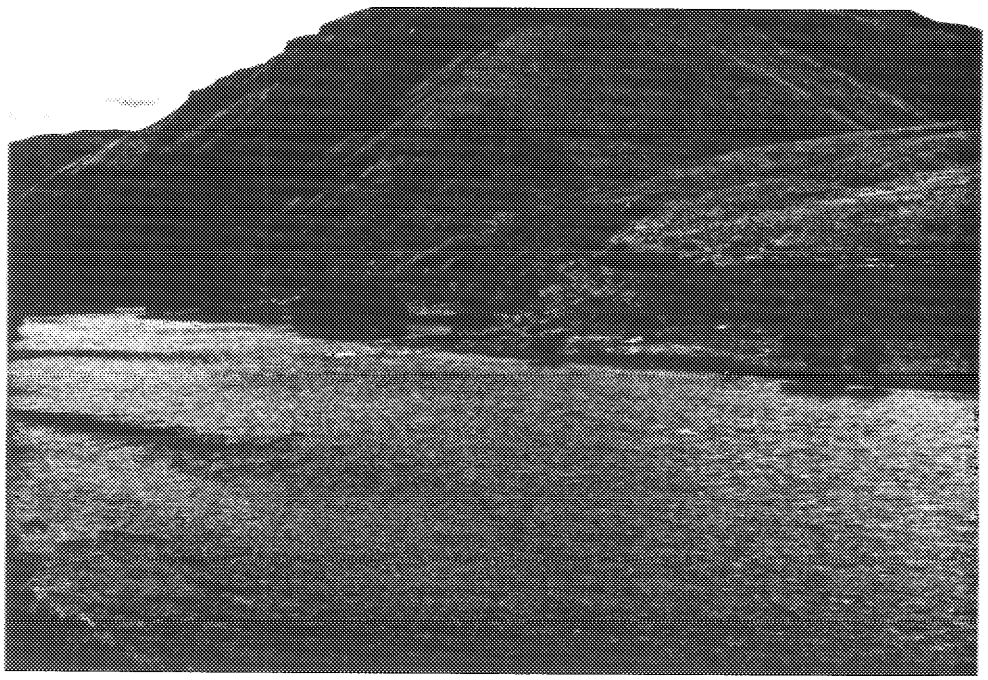


Station **423 (Fall Canyon East)**



Station 122 (Fall Canyon **West**),

Station 122 (Fall Canyon West)



Station 123A (Fall **Canyon North),**

APPENDIX III

LOCATIONS OF STATIONS AND SURVEY HUBS WITHIN STATIONS IN THE DESCHUTES RIVER, OREGON WHICH WERE SAMPLED FOR GRAVEL PERMEABILITY IN FALL 1983.

This appendix contains information on the locations of benchmarks and survey hubs used to establish the exact location of sampling points at each spawning area in the lower Deschutes sampled for gravel permeability in Fall 1983.

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey hub Locations

Station: Jackson's (#501)
Study Section: I
River Mile: 99.8
Date: 9/22/83

Benchmark: Fencepost on right bank across from fence at Zane Jackson's, Benchmark is 107 feet at 136 degrees (mag az) from stream side end of fence at the north end of Jackson's lawn.

Hub	Mag AZ	Distance	From
1	360	69.2'	Benchmark
2	34	86.5'	"
3	18	144.5'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Valve (#502)
Study Section: I
River Mile: 99.6
Date: 9/22/83

Benchmark: Fencepost on right bank at the base of a tree approximately half way down the side channel.

Hub	Mag Az	Distance	From
1	232	74.0'	Benchmark
2	290	37.3'	"
3	358	112.0'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Disney (X504)
Study Section: I
River Mile: 98.9
Date: 9/21/83

Benchmark: Fencepost near head of the island marked "c" on air photo.

Hub	Mag AZ	Distance	From
1	277	96.5	Benchmark
2	290	41.3	"
3	20	62.7	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Guard Rail (#507A)
Study Section: I
River Mile: 98.5
Date: 9/20/83

Benchmark: Fencepost in water along right bank approximately one-third of the way downriver from the upper end of the spawning area.

Hub	Mag Az	Distance	From
1	282	52.0'	Benchmark
2	10	52.0'	"
3	38	157.5'	

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Paxton's (#508A)
Study Section: I
River Mile: 98.1
Date: 9/20/83

Benchmark: Fencepost on right bank near large rock.

Hub	Mag Az	Distance	From
1	247	103.0	Benchmark
2	272	82.5	"
3	326	62.0	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Morrison's (#II-S)
Study Section: II
River Mile: 96.4
Date: 9/30/83

Benchmark: Fencepost on right bank, downriver from Morrison's near "no fishing" sign.

Hub	Mag AZ	Distance	From
1	325	84.0	Benchmark
2	340	62.0	"
3	80	178.0	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Dry Creek (#10)
Study Section: II
River Mile: 94.2
Date: 9/23/83

Benchmark: Fencepost on right bank of side channel across from fire pit and camp site.

Hub	Mag Az	Distance	From
1	266	116.5	Benchmark
2	280	96.3	"
3	350	41.7	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Below Dry Creek (#lOA)
Study Section: II
River Mile: 94.1
Date: 9/29/83

Benchmark: Fencepost on left bank where a footpath drops down to the river from the Dry Creek Road. Marker is relatively close to a small island that is an area of slack water near the west bank.

Hub	Mag Az	Distance	From
Pivot	108		Benchmark
Pivot	85	From "No Fishing" Sign	
1	270	31.0'	Pivot
1	110		Benchmark
2	60	21.5'	Pivot
2	100		Benchmark
3	45	84.0'	Pivot
3	94		Benchmark

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Juniper (#ll)
Study Section: II
River Mile: 93.2
Date: 9/29/83

Benchmark: Fencepost on right bank in streamside riprap at upper end of spawning area.

Hub	Maq Az	Distance	From
1	336	34.5'	Benchmark
2	4	51.0'	"
3	12	72.5'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Trout Creek Camp (#19)
Study Section: II
River Mile: 88.3
Date: 9/27/83

Benchmark: OSGC Benchmark above island near right bank, Benchmark is an old staff gauge.

Hub	Maq Z	A	Distance	From
1	360		105.0'	Benchmark
2	355		145.0'	"
3	360		182.5'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Whiskey Dick (#47)
Study Section: III
River Mile: 77.3
Date: 9/26/83

Benchmark: OSGC stake on left bank, just above the very small island which is at the lower end of this small station.

Hub	Mag Az	Distance	From
1	360	21.0	Benchmark
2	80	37.0	"
3	74	63.0	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Newton's Island (#56)
Study Section: III
River Mile: 70.2
Date: 9/12/83

Benchmark: Fencepost on small grassy island to west of main Newton's island. Benchmark sighted in from a more secure fence post on Newton's Island at 220 degrees and 89.1 feet.

Hub	Mag Az	Distance	From
1	40	59.0′	Benchmark
2	105	63.0'	"
3	120	96.0′	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Rimrock Chateau (#58A)
Study Section: III
River Mile: 69.2
Date: 9/02/83

Benchmark: Fencepost on right bank, approximately 45 yards up river from barbed wire fence (same as 58B).

Hub	Mag Az	Distance	From
1	204	65.0'	Benchmark
2	108	100.0'	

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Rimrock Chateau (#58B)
Study Section: III
River Mile: 69.2
Date: 9/02/83

Benchmark: Fencepost on right bank, approximately 45 yards up river from barbed wire fence (same as 58A).

Hub	Mag Az	Distance	From
1	204	65.0'	Benchmark

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Rimrock Chateau (#58C)
Study Section: III
River Mile: 69.1
Date: 9/14/83

Benchmark: Fencepost on right bank, at the base of a large alder.

Hub	Maq Az	Distance	From
1	250	111.0'	Benchmark
2	350	33.0'	Hub 1
3	320	66.7'	Hub 1

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Windy Flat (#62)
Study Section: III
River Mile: 65.7
Date: 8/31/83

Benchmark: Fencepost on right bank at base of large tree near old snag.

Hub	Maq Az	Distance	From
Pivot	164	349	Benchmark

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Oak Springs (#92)
Study Section: III
River Mile: 47.5
Date: 10/28/83

Benchmark: Fencepost on right bank.

Hub	Mag Az	Distance	From
1	146	179.0'	Benchmark
2	156	85.5'	"
3	206	46.2'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Jones Canyon (#102)
Study Section: IV
River Mile: 34.2
Date: 10/31/83

Benchmark: Fencepost on right bank near road. See air photo overlay for location.

Hub	Mag Az	Distance	From
1	86	192'	Benchmark
2	100	180'	"
3	103	154'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Cedar Island (#l04)
Study Section: IV
River Mile: 31.2
Date: 9/09/83

Benchmark: Fencepost on right bank near road. See air photo overlay for location.

Hub	Mag Az	Distance	From
1	294	314'	Benchmark
2	284	178'	Hub 1
3	280	136'	Hub 2

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Dike (#114)
Study Section: IV
River Mile: 21.1
Date: 10/11/83

Benchmark: Fencepost on left bank at the base of a large tree slightly upriver from the gravel bar.

Hub	Mag Az	Distance	From
1	15	85.3'	Benchmark
2	3	97.0'	"
3	1	128.0'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Fall Canyon West (#122)
Study Section: IV
River Mile: 10.4
Date: 10/12/83

Benchmark: Fencepost on island; right bank of side channel near largest red alder.

Hub	Mag Az	Distance	From
1	251	59.1'	Benchmark
2	209	41.1'	"
3	183	53.3'	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Fall Canyon East (#123)
Study Section: IV
River Mile: 10.3
Date: 10/24/83

Benchmark: OSGC marker stake on right bank near bush-like tree.

Hub	Mag Az	Distance	From
1	174	43.0'	Benchmark
2	250	43.3'	"
3	262	56.0	"

PERMEABILITY SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Fall Canyon North (#123A)
Study Section: IV
River Mile: 10.2
Date: 10/24/83

Benchmark: Fencepost on right bank, well above maximum high water line.

Hub	Mag Az	Distance	From
1	176	160'	Benchmark
2	219	164'	"
3	240	220'	"

APPENDIX IV

METHODS USED (1983-1984) TO SAMPLE GRAVEL QUALITY AT GRAVEL BARS IN THE LOWER DESCHUTES RIVER, OREGON.

Presented in this appendix are some of the methods and procedures used during 1983 and 1984 to document gravel quality at spawning areas in the lower Deschutes River, Oregon.

PERMEABILITY SAMPLING

At each point sampled, the Mark VI standpipe (Terhune 1957) was driven 18 to 20 cm (7-8 in) into the gravel using an inside driving rod and a sledgehammer. Once the pipe had been driven into the substrate 18-20 cm, the driving rod was removed, and a hole near the base of the standpipe was plugged with a rubber stopper after the water level inside the standpipe had reached the surface elevation of the river. The rubber gasket often used to prevent slippage of water down the sides of the standpipe and through the gravel was not used in order to be consistent with methods used by the Oregon State Game Commission in the mid-1960%.

Next, a metal aspiration tube connected via a flexible plastic tube to a hand operated bilge pump and water trap was lowered slowly into the standpipe while the hand pump was operated. When the tube reached the water surface inside the standpipe (indicated by a slurping sound), pump operation was halted and a sliding "T"-shaped stop was positioned at the top of the standpipe and tightened to the

aspiration tube. The lower end of the metal tube was then dropped precisely 2.5 cm (one inch) below the river surface level by allowing the stop to slip into the standpipe.

Permeability measurements were obtained by operating the hand pump until a slurping sound was again heard. This indicated that a 2.5 cm head had been created between the water column inside the standpipe and the surface of the river. Pump operation was continued to maintain this head while the water entering the standpipe from the surrounding gravel was sucked from the standpipe and directed into a plastic reservoir via a two way valve. This water was collected for a period of five seconds and then redirected to the hand pump via the two-way valve.

Operation of the hand pump was then discontinued. Water which had been drawn into the collection reservoir over the five second period was then dispensed into a cylinder with 2 ml graduations. The total volume of water collected (ml) **was divided by five to yield the** rate of water flow into the standpipe in ml/second.

Two replicate inflow measurements (ml/sec) were taken each time a Mark VI standpipe was driven into a gravel bar. These rates of inflow were recorded in the field along with the date, station, water temperature, sample point locations, water depths at the points sampled, and any significant comments relating to samples.

The replicate inflow rates comprising each sample were directly related to gravel permeabilities (cm/hr). Conversions were made using the inflow-permeability relationship for Mark VI standpipes given in Table IV-l. Gravel permeabilities were then standardized to a water temperature of 10°C by applying the conversion factors in Table IV-22. This temperature adjustment was necessary to account for differences in water viscosity at different temperatures (Terhune, 1958).

Table IV-l.

Inflow-permeability relationship for the Mark VI groundwater standpipe(a).

Inflow (ml/sec)	Permeability (cm/hr)	Inflow (ml/sec)	Permeability (cm/hr)	Inflow (ml/sec)	Permeability (cm/hr)
1	35	42	5,900	83	23,700
2	100	43	6,200	84	24,600
3	170	44	6,450	85	25,500
4	260	45	6,700	86	26,400
5	360	46	7,000	87	27,300
6	460	47	7,250	08	28,200
7	550	48	7,500	89	29,100
8	640	49	7,750	90	30,000
9	730	50	8,000	91	31,200
10	830	51	8,300	92	32,400
11	950	52	8,600	93	33,600
12	1,070	53	8,900	94	34,800
13	1,180	54	9,200	95	36,000
14	1,290	55	9,500	96	37,200
15	1,400	56	9,800	97	38,400
16	1,520	57	10,100	98	39,600
17	1,640	58	10,400	99	40,800
18	1,760	59	10,700	100	42,000
19	1,880	60	11,000	101	44,100
20	2,000	61	11,400	102	46,300
21	2,150	62	11,800	103	48,400
22	2,300	63	12,200	104	50,600
23	2,450	64	12,600	105	52,700
24	2,600	65	13,000	106	54,900
25	2,750	66	13,400	107	57,000
26	2,900	67	13,800	108	59,200
27	3,059	68	14,200	109	61,300
28	3,200	69	14,600	110	63,500
29	3,350	70	15,000	111	65,600
30	3,500	71	15,600	112	67,800
31	3,670	72	16,200	113	69,900
32	3,850	73	16,800	114	71,100
33	4,040	74	17,400	115	73,200
34	4,230	75	18,000	116	75,140
35	4,420	76	18,600	117	77,600
36	4,610	77	19,200	118	79,800
37	4,800	78	19,800	119	82,000
38	5,000	79	20,400	120	84,200
39	5,200	80	21,000	121	86,800
40	5,400	81	21,900	122	89,200
41	5,650	82	22,800	123	91,600
				124	94,000

aTerhune, L.B.D. 1958. The Mark VI groundwater standpipe for measuring seepage through salmon spawning gravel. J. Fish. Res. Bd. Canada, 15(5):1027-1063.

Table IV-2.

Calibration factors used to correct gravel permeabilities for water viscosity differences due to water temperature. The calibration factors standardize permeability readings to 10°C.

Water Temperature (°C)	K_t(a)	Water Temperature (°F)	K_t(a)
1	1.324		
2	1.279	41	1.161
3	1.238	42	1.141
4	1.199	43	1.122
5	1.161	44	1.102
6	1.126	45	1.086
7	1.092	46	1.066
8	1.060	47	1.051
9	1.029	48	1.032
10	1.000	49	1.017
11	0.972	50	1.000
12	0.945	51	0.983
13	0.920	52	0.969
14	0.895	53	0.953
15	0.872	54	0.940
16	0.850	55	0.925
17	0.828	56	0.913
18	0.807	57	0.898
		58	0.886
		59	0.872
		60	0.860
		61	0.848
		62	0.835
		63	0.823
		64	0.811

[a]Factors are based on the viscosity of pure water (H_2O) at various temperatures as given in the Handbook of Chemistry and Physics, 42nd edition.

FREEZE-CORE SAMPLING

Freeze-core sampling of the composition of gravel within salmonid spawning areas in the Deschutes River, Oregon was conducted using methods reported by Everest et al. (1980). Cores of spawning gravel were obtained by first driving a triad of sample probes (freezing tubes) approximately 40 cm (16 inches) into the riverbed through a template which kept the tubes roughly parallel to one another. A tripod and winch used to extract frozen gravel cores were then positioned over the freezing tubes and attached to the template. Next, liquid CO2 from specially modified 20 lb. fire extinguisher bottles (with draft tubes) was delivered to the freezing tubes in the substrate through a set of tubular manifolds fitted with an array of small nozzles near the tip. The manifolds slowed the rate of CO2 delivery and thus increased freezing efficiency. The substrate sample was frozen while liquid CO2 vaporized upon entering the freezing tubes and drew heat through the walls of the freezing tubes from the surrounding gravel.

When all the liquid CO2 in a 20-lb. fire extinguisher bottle had been delivered to the tubes, the manifolds were removed. The tripod and winch were then used to extract the frozen core of spawning gravel from the river bed.

The cryogenic equipment used to collect gravel samples was initially constructed according to the specifications of Everest et al. (1980). However, the composition of the gravels sampled and conditions under which sampling was performed made considerable modification of the equipment necessary in order to obtain good samples. All freeze-tube surfaces exposed to water above the substrate surface were insulated with removable foam sleeves to increase the freezing capacity of the equipment. Also, a metal cylinder was placed around the cluster of tubes during the freezing and extraction process to divert flowing water around the sampling device. This produced quiescent conditions, both increasing freezing capacity and preventing erosion of cores as they were extracted. Finally, the legs of an aluminum tripod used to extract gravel cores were reinforced with 1/4" X 1 1/2" angled aluminum bar to prevent buckling of the tripod.

The modifications just outlined helped to create equipment which performed well under difficult circumstances. However, the sampling probes (freezing tubes) continually bent when driven into the riverbed and required frequent restraightening during the study.

APPENDIX V

LOCATIONS OF BENCHMARKS AND TEMPORARY SURVEY HUBS FOR EACH STATION IN THE LOWER DESCHUTES RIVER, OREGON SAMPLED FOR GRAVEL COMPOSITION, 1983 - 1984.

This appendix contains information on the locations of benchmarks and survey hubs used to establish the exact location of sampling points at each spawning area in the lower Deschutes sampled for gravel composition in Fall 1983.

CHINOOK

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Jackson's (#501)
Study Section: I
River Mile: 99.8
Date: 9/15/83

Benchmark = Right bank across from fence at Jackson's place: BM= 107 @ 136 degrees, from bankside fencepost at the north end of Jackson's lawn.

Hub	Mag Az	Distance	From
1	360	69.2'	Benchmark
2	34	86.5'	"
3	18	144.5'	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Disney (#504)
Study Section: I
River Mile: 98.9
Date: 9/21/83

Benchmark = Benchmark is a fencepost on the island at this station and is marked with a "C" on the air photo overlay.

Hub	Mag Az	Distance	From
1	271	96.5'	Benchmark
2	290	41.3'	"
3	20	62.7'	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Morrison's(#II-5)
Study Section: II
River Mile: 96.4
Date: 10/04/83

Benchmark = Fencepost on right bank near "No Fishing" sign.

Hub	Mag Az	Distance	From
1	325	84.0'	Benchmark
2	340	62.0'	"
3	80	178.0'	

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Below Dry Creek (#lOA)
Study Section: II
River Mile: 94.1
Date: 9/28/83

Benchmark = Fencepost on the left bank where a footpath drops down to the river from the Dry Creek road. Marker is relatively close to a small island that is in an area of slack water near the west bank.

Hub	Mag Az	Distance	From
Pivot	108		Benchmark
Pivot	85		From "No Fishing" Sign
1	270	31.0'	Pivot
1	110		Benchmark
2	060	21.5'	Pivot
2	100		Benchmark
3	45	84.0	Pivot
3	94		Benchmark

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Whiskey Dick (#47)
Study Section: III
River Mile: 77.3
Date: 10/05/83

Benchmark = OSGC fencepost on left bank, just above very small island which is at the lower end of this station.

Hub	Mag Az	Distance	From
1	95	21.0'	Benchmark
2	80	37.0'	"
3	74	63.0'	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Newton's Island (#56)
Study Section: III
River Mile: 70.2
Date: 9/13/83

Benchmark = BFencepost on small grassy island to west of main Newton's Island. Benchmark sighted in from a more secure reference point on Newton's Island at 220 degrees and 89.1 ft.

Hub	Mag Az	Distance	From
1	40	59.0'	Benchmark
2	105	63.0	"
3	120	96.0	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Windy Flat (#62)
Study Section: III
River Mile: 65.7
Date: 8/31/83

Benchmark = Fencepost on right bank at base of large tree near old snag.

Hub	Mag Az	Distance	From
1	196	100.0'	Benchmark

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Oak Springs (X92)
Study Section: III
River Mile: 47.5
Date: 10/28/83

Benchmark = Fencepost on right bank.

Hub	Mag Az	Distance	From
1	146	179.0'	Benchmark
2	156	85.5'	"
3	206	46.2'	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Cedar Island (#lO4)
Study Section: IV
River Mile: 31.2
Date: 9/08/83

Benchmark = Fencepost at head of island at the base of a large red alder.

Hub	Mag Az	Distance	From
1	294	314'	Benchmark
2	284	178'	"
3	280	136'	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey hub Locations

Station: Fall Canyon N. (#123A)
Study Section: IV
River Mile: 10.2
Date: 10/14/83

Benchmark = Fencepost on right bank above maximum high water mark.

Hub	Mag Az	Distance	From
1	176	160'	Benchmark
2	210	164'	"
3	240	220'	"

STEELHEAD

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Jackson (#501)
Study Section: I
River Mile: 99.8
Date: 7/18/84

Benchmark = Fencepost on right side channel at base of large tree almost directly across from Jackson's fence

1	34	36' 0"	Benchmark
2	46	57' 7"	"
3	73	42' 0"	"
4	74	57' 5"	"
5	57	97' 0"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Disney (#504)
Study Section: I
River Mile: 98.9
Date: 7/16/84

Benchmark = Fencepost marked "T" on air photo: old OSGC fencepost near head of island on side channel side

Hub	Mag Az	Distance	From
1	244	40' 3"	Benchmark
2	104	35' 3"	"
3	74	49' 7"	"
4	90	62' 4"	"
5	98	72' 0"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: **Paxton (#508A)**
Study Section: I
River Mile: 98.0
Date: **8/01/84**

Benchmark = Fencepost on riverbank near large streamside rock on right bank.

Hub	Mag Az	Distance	From
Pivot	230	152' 0"	Benchmark
1	155	21' 8"	Pivot
2	110	20' 0"	"
3	92	30' 0"	"
4	58	46' 0"	"
5	38	34' 5"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Morrison's (11-5)
Study Section: II
River Mile: 96.4
Date: 7/31/84

Benchmark: Base of fifth (from upstream end) red alder in row lining the river bank at the station

Hub	Mag Az	Distance	From
Pivot	48	111' 6"	Benchmark
1	252	114' 0"	Pivot
2	244	52' 3"	"
3	167	20' 5"	"
4	108	73' 7"	"
5	100	114' 9"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Dry Creek (#10)
Study Section: II
River Mile: 94.2
Date: 7/19/84

Benchmark = Fencepost at base of right bank red alder across side channel from campground

Hub	Mag Az	Distance	From
1	271	160' 0"	Benchmark
2	267	126' 8"	"
3	278	95' 0"	"
4	321	36' 9"	"
5	23	71' 5"	"

FREEZE CORE SAMPLING

Benchmark, Pivot and Survey Hub Locations

Station: Below Trout Creek Rapids (#615)
Study Section: II
River Mile: 86.7
Date: 7/26/84

Benchmark: Base of largest right bank alder

Hub	Mag Az	Distance	From
Pivot	0	55' 5"	Benchmark
1	200	45' 3"	Pivot
2	213	32' 5"	"
3	162	26' 2"	"
4	109	29' 6"	"
5	53	72' 4"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Rim Rock Chateau (#58A)
Study Section: III
River Mile: 69.2
Date: 7/24/84

Benchmark = Fencepost at base of small "Tree of Heaven" on right bank

Hub	Mag Az	Distance	From
Pivot	228	59' 2"	Benchmark
1	95	65' 2"	Pivot
2	99	53' 4"	"
3	36	31' 5"	"
4	4	42' 0"	"
5	342	62' 0"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Mouth of Eagle Creek (#630)
Study Section: III
River Mile: 64.5
Date: 8/09/84

Primary Benchmark = Large Ponderosa Pine on left bank
Secondary Benchmark = "No Trespassing" sign on left bank.

Hub	Mag Az	Distance	From
Pivot	24	170' 0"	Primary Benchmark
II	34	28' 9"	Secondary Benchmark
1	110	19' 9"	Pivot
2	33	12' 0"	II
3	352	19' 6"	II
4	344	27' 2"	II
5	339	40' 0"	II

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Palmer's (#73)
Study Section: III
River Mile: 61.8
Date: 8/02/84

Benchmark = Fencepost on small island at downriver end of gravel bar

Reference Points for Benchmark (magnetic azimuths):

Q = 229 degrees; to large rock at tail of island upstream.
R = 103 degrees; to upstream end of trees on East bank.
S = 198 degrees; to power pole w/transformers on east bank.
T = 334 degrees: to large rock knob on west bank.

Hub	Mag Az	Distance	From
1	210	247' 0"	Benchmark
2	208	212' 0"	"
3	200	174' 0"	"
4	190	138' 0"	"
5	220	138' 0"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Trestle (# 95)
Study Section: IV
River Mile: 41.0
Date: 8/15/84

Benchmark = Fencepost at base of dead left bank red alder

Hub	Mag Az	Distance	From
1	336	45' 10"	Benchmark
2	6	69' 0"	"
3	344	56' 0"	"
4	326	45' 6"	"
5	318	36' 6"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Aney (#106)
Study Section: IV
River Mile: 28.5
Date: 8/08/84

Benchmark = Fencepost in angular rock above but near high water line on left bank. Fencepost is positioned at the base of a large red alder.

Hub	Mag Az	Distance	From
1	146	41' 9"	Benchmark
2	112	29' 1"	"
3	102	42' 9"	"
4	94	38' 0"	"
5	70	42' 6"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: Mack's Canyon (#109B)
Study Section: IV
River Mile: 23.9
Date: 8/14/84

Benchmark = Fencepost at base of 5 year old red alder near head of island.

Hub	Mag Az	Distance	From
Pivot	352	75' 9"	Benchmark
1	240	31' 6"	Pivot
2	244	44' 4"	"
3	204	34' 8"	"
4	130	82' 6"	"
5	132	152' 1"	"

FREEZE CORE SAMPLING
Benchmark, Pivot and Survey Hub Locations

Station: X-Dike Siding (#113)
Study Section: IV
River Mile: 21.9
Date: 8/24/84

Benchmark = Right bank; behind row of streamside red alders

Hub	Mag Az	Distance	From
Pivot	80	46' 11"	Benchmark
1	110	27' 6"	Pivot
2	83	25' 9"	"
3	75	17' 0"	"
4	17	30' 7"	"
5	31	32' 7"	"

APPENDIX VI

SAMPLE POINT LOCATIONS FOR GRAVEL COMPOSITION SAMPLING, LOWER DESCHUTES RIVER, OREGON 1983 - 1984.

This appendix contains information on the exact locations of points sampled for gravel composition at each sampling station in the lower Deschutes River, Oregon, 1983-84.

CHINOOK

FREEZE CORE SAMPLING
Study Section I

Station: Jackson's (#501)
River Mile: 99.8
Date: 9/15/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (deg.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	9.0	340	1.1		
2	1	4.5	320	1.3		
3	1	4.2	174	0.7		
4	1	16.0	178	1.2		
5	2	2.0	200	0.6		
6	2	8.0	44	0.6		
7	2	24.0	20	0.8		
8	3	25.0	188	0.7		
9	3	3.0	340	0.9		
10	3	15.0	312	1.2		

FREEZE CORE SAMPLING
Study Section I

Station: Disney (#504)
River Mile: 99 | 9
Date: 9/21/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	10.8	168	0.8	1.7	
2	1	9.2	99	0.8	2.2	
3	1	21.2	47	1.2	3.1	
4	2	6.0	320	0.8	2.6	
5	2	6.7	211	0.6	3.2	
6	2	20.9	179	0.9	1.2	
7	2	37.0	300	1.3	5.2	
8	3	15.0	111	1.3	3.2	
9	3	24.9	158	0.6	2.8	
10	3	22.5	191	1.3	2.0	

FREEZE CORE SAMPLING
Study Section II

Station: Morrison's (#I I-5)
River Mile: 96.4
Date: 10/04/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	7.3	103	1.3		
2	1	9.7	60	1.0		
3	1	8.0	134	0.9		
4	2	9.0	273	0.7		
5	2	6.0	211	0.5		
6	2	3.0	93	0.7		
7	2	10.0	81	0.6		
8	3	7.0	265	0.5		
9	3	9.0	5	0.6		
10	3	13.5	83	0.8		

FREEZE CORE SAMPLING
Study Section II

Station: Below Dry Creek (#10A)
River Mile: 94.2
Date: 9/28/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	10.0	156	1.5	2.4	
2	1	8.3	256	1.3	3.1	
3	1	9.3	315	1.7	2.8	
4	2	4.8	270	1.4	4.2	
5	2	12.7	330	1.0	3.0	
6	2	13.7	42	1.1	3.6	
7	3	3.0	340	1.4	3.1	
8	3	9.0	268	1.5	3.0	
9	3	10.7	318	1.5	2.2	
10	3	17.0	216	1.5	3.6	

FREEZE CORE SAMPLING
Study Section III

Station: Whiskey Dick (#47)
River Mile: 77.3
Date: 10/05/83

Sample	survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	5.0	330	1.5	2.6	
2	1	3.3	100	1.6	2.7	
3	1	5.0	20	1.5	3.0	
4	2	6.0	260	1.2	2.2	
5	2	5.0	190	1.6	2.0	
6	2	7.7	100	1.4	3.1	
7	3	4.3	44	1.6	2.9	
8	3	5.5	250	1.4	2.7	
9	3	4.7	130	1.2	2.4	
10	3	6.0	15	1.5	2.7	

FREEZE CORE SAMPLING
Study Section III

Station: Newton's Island (#56)
River Mile: 70.2
Date: 9/13/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	6	211	1.8	2.6	
2	1	10	122	1.8	2.3	
3	1	9	185	1.8	2.2	
4	1	10	10	1.2	2.1	
5	2	8	54	1.3	1.2	
6	2	10	144	1.0	1.9	
7	2	7	304	0.9	1.9	
8	3	6	13	1.6	1.8	
9	3	8	140	1.2	2.2	
10	3	7	80	1.4	2.8	

FREEZE CORE SAMPLING
Study Section III

Station: Windy Flat (#62)
River Mile: 65.7
Date: 8/31/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	Benchmark	45.0	240	1.8		
2	"	50.0	240	1.8		
3	"	60.0	240	2.0		
4	"	65.0	240	2.0		
5	1	12.0	240	1.3		
6	1	17.0	240	1.4		
7	1	22.0	240	1.7		
8	1	60.0	178	1.6		
9	1	70.0	178	1.7		
10	1	80.0	178	1.8		

FREEZE CORE SAMPLING
Study Section III

Station: Oak Springs ∞92
River Mile: 47.5
Date: 10/28/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	4.0	65	1.6	2.8	
2	1	9.0	155	1.5	3.2	
3	1	8.5	300	1.1	2.8	
4	2	16.0	165	1.0	3.0	
5	2	8.5	285	0.9	3.4	
6	2	3.5	120	1.1	2.7	
7	2	14.0	140	1.2	3.4	
8	3	10.0	176	0.8	2.4	
9	3	12.5	260	0.7	2.3	
10	3	18.5	196	1.1	1.9	

FREEZE CORE SAMPLING
Study Section IV

Station: Cedar Island (#104)
River Mile: 31.2
Date: 9/08/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	8.0	220			
2	1	9.0	260			
3	1	21.0	95			
4	1	16.0	80			
5	2	19.0	86			
6	2	26.0	12s			
7	2	14.0	15			
8	3	8.0	310			
9	3	14.0	148			
10	3	25.0	128			

FREEZE CORE SAMPLING
Study Section IV

Station: Fall Canyon N (#123A)
River Mile: 10.2
Date: 10/14/83

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	9.8	235	0.9	2.1	
2	1	5.0	10	0.6	1.7	
3	1	11.0	300	0.8	1.4	
4	2	7.0	320	0.7	2.5	
5	2	12.5	60	0.6	2.0	
6	2	16.0	85	1.0	1.7	
7	2	15.0	315	0.6	2.5	
8	3	8.5	65	0.6	3.2	
9	3	7.5	270	1.0	3.1	
10	3	22.0	295	1.1	2.9	

STEELHEAD

FREEZE CORE SAMPLING
Study Section I

Station: Jackson (#501)
River Mile: 99.9
Date: 7/18/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	2' 10"	68	I/II	0.9	2.5	big rock @ 11-12"
2	1	11'7"	44	II	0.8	2.3	hard to extract - slim
3	1	17'5"	281	II/III	0.8	1.7	hard to extract - lim
4	2	4'4"	20	II	0.6	3.7	well used area
5	2	3'6"	178	II	0.7	2.8	" "
6	2	7' 10"	220	II/III	0.3		" "
7	3	5' 3"	318	II	0.5		mlim sample
8	3	6'8"	358	II	0.8	1.0	very slim
9	3	6' 9"	108	I	0.3		in old redd
10	4	3'8"	260	II	0.5	.7	redd pockets
11	4	5'0"	70	11	0.3		"
12	4	6' 3"	23	I	0.3		"
13	5	5'0"	198	II	0.8	1.5	very soft
14	5	5'6"	284	II	0.9	2.3	"
15	5	5'0"	23	II	0.7	1.9	"

Field Notes

1. This station is heavily used by trout.
2. There is a substantial quantity of organize material in the samples from this station. Many samples have a rich "earthy" smell to them when extracted.
3. All of the samples taken from this station were extracted from gravels which lppaarrd tohave boon disturbed by spawners this year. There was no alternative to sampling disturbed gravel here to cause all gravel of a site suitable for trout spawning had been utilized by spawners.

FREEZE CORE SAMPLING
Study Section I

Station: Disney (#504)
River Mile: 98.9
Date: 7/16/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	5'8"	285	II	1.6	1.3	slim
2	1	2'3"	149	I	1.1	1.7	exc. core
3	1	2'7"	63	II	1.0	2.7	veg.
4	2	4'10"	240	II	1.0	1.9	
5	2	12'1"	290	II	1.7	0.8	
6	2	11'5"	90	II	0.5	2.3	
7	3	2'11"	266	II	0.5	1.9	
8	3	6'0"	40	II	0.5	1.3	
9	3	8'3"	103	II	0.6	1.3	
10	4	10'4"	18	II	0.8	1.5	slim
11	4	4'0"	60	II	0.6	1.1	slim
12	4	10'0"	80	II	0.9	2.5	
13	5	5'6"	210	II	0.9	2.1	
14	5	4'8"	359	II	0.7	3.0	
15	5	24'8"	30	II	1.0	2.7	

Field Notes

1. Heavily used by resident and steelhead trout. Good sthd habitat.
2. Vegetation enroaching heavily at the upper end of the side channel (ppl)
3. All gravel samples were taken from areas recently disturbed steelhead or resident trout redd digging acticity. All Class II and Class I gravel at this station has been dug up by spawners.

FREEZE CORE SAMPLING
Study Section I

Station: Paxton (#508A)
River Mile: 98.0
Date: 8/01/84

Sample	Survey Hub (#) ---	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	12'0"	240	II	1.9	1.0	usable habitat, diff. dr.
2	1	6'0"	4	II/III	1.5	1.6	redd; mod. driving
3	1	3'5"	173	II	1.2	1.3	redd; easy driving
4	2	4'2"	210	II/III	1.5	1.3	usabl e; heavy f i nes/om2
5	2	7'9"	12	II	1.5	1.7	redd;
6	2	4'0"	72	II	1.1	1.1	mound heavy
7	3	2'6"	260	II	1.5	1.3	redd; easy driving
8	3	5'8"	352	II	1.5	2.5	usable habitat - workmd
9	3	4'0"	76	II	1.0	1.7	mound
10	4	4'6"	158	II	1.7	1.9	usable habitat; soft
11	4	7'6"	190	II/III	1.5	1.6	dune; l oft
12	4	6'2"	52	II/III	1.6	2.1	dune; soft
13	5	5'6"	240	II	1.7	1.3	mound; soft
14	5	4'2"	10	II/III	1.3	1.4	dune; rof t
15	5	4'6"	156	II	1.6	1.5	mound; l oftl f ine orgs.

Field Notes

1. Vegetation encroaching on bar (e.g. Ceratophyllum)
2. Organics in a fmw l amples were "smelly" and in one case l mmociatmd with a number of dead eggs.
3. Thir bar is protected by a bend in the river and is 'not l smociatod with a side channel.
4. Gravel here is quite loose and is rof t in areas where the veloci ty and depth tend to be greater (eg PP4) (sand)?
5. Appears to be used extensively by spawning steelhead and redsides in the areas of smal lor gravel toward the riqht bank.
6. Gravel seems very permeable.

FREEZE CORE SAMPLING
Study Section II

Station: MOAAJCON' | (II-5)
River Mile: 96.4
Date: 7/SI /84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	4'3"	Z66	II	1.2	1.4	usable hab. between mounds
Z	1	5'0"	11	II	0.9	1.0	Ag | redd pit |
S	1	4'0"	76	II	0.5	2.4	redd pit |
4	Z	6'4"	263	II	0.9	1.0	mound/redd pit |
S	Z	4'5"	46	II	0.5	1.8	redd
6	Z	4'2"	184	II	0.6	1.6	Mound
7	S	6'8"	SSO	II	0 | 1		Mound
8	S	6'0"	110	II	0.6	0.9	redd
9	S	6'1"	ZOO	II	0.6	0.9	Mound
10	4	6'0"	306	II	0.2		redd
11	4	8'5"	S6	II	0.S		redd/worked
1Z	4	9'9"	142	II	0.9	0.5	redd
1S	S	6'1"	234	II	0.7	0.9	mounded
14	S	10'6"	SO	11	0.6	0.9	redd
1S	S	3'0"	60	II	0.6	1.6	redd

Field Notes

1. Without a doubt, this bar is more heavily used by steelhead than any other bar on the river. It literally gets pulverized.
2. The water level fluctuation problem noted at this bar last fall came up again while sampling in AM on 7/31/84. H2O dropped about 4" over a period of 2 hours.
3. Dominant gravel in channel to right side exposed gravel bar is Class II, but larger II dominant and w/less I than most other areas of Class II gravel.
4. Gravel very "fishy" smelling.
5. Much greater steelhead spawner use of this bar in 1984 and 1983. Probably due to overall spawner numbers.
6. Very evident that spawners used the area below the exposed gravel bar more heavily this year than they did in 1983.
7. Gravel loose at this station, with no significant embeddedness.
8. Gravel is loose, but only "soft" in side channel area along exposed gravel bar where spawning activity has been most intense.

FREEZE CORE SAMPLING
Study Section II

Station: Dry Creek (#10)
River Mile: 94.2
Date: 7/19/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	5'6"	258	II/III	1.2	0.7	not mounded
2	1	7'8"	332	II	0.6	0.4	mounded (eyed & dead | qqm)
3	1	6'0"	110	II	1.0	1.3	| dgm of mounded area
4	2	6'0"	262	II	1.3	0.8	edge of mound (sand @ C)
5	2	6'0"	351	II	1.5	0.6	| dge of mound (sand @ 6")
6	3	6'0"	344	II	0.8	1.2	rounded
7	2	7'0"	160	II	1.1	1.5	rounded area, | yod | gqm
8	3	6'0"	133	II	0.7	1.2	rounded | qqm @ "8"
9	3	6'0"	262	II	0.8	0.7	rounded @ few | yod eggs
10	4	5'0"	60	II/III	1.5	1.3	flat not dug
11	4	6'0"	290	II	1.0	1.7	edge mound
12	4	5'0"	230	II	1.4	2.1	duq no mound
13	5	6'6"	260	II	0.9	1.5	
14	5	8'6"	50	II	0.8	2.5	
15	5	11'9"	84	II	1.3	2.0	

Field Notes

1. Depressions loft when cores are removed are full of sand at survey hubs 1 and 2 - less sand in extraction holes at hubs 3, 4, and 5.
2. Fair numbers of redsides were seen at the station over spawning gravel prior to \| ampling.
3. This gravel bar is heavily used by spawning trout. Moot of the gravel here ham been worked up in moundm.
4. Gravel here generally finer than @ \| trtionm 501 and 504. No chinook spawning gravels.
5. Gravel at this station is relatively shallow, often with a sub- 1 \| yer of sand present as shal low am 6" beneath the \| urf ace.

FREEZE CORE SAMPLING
Study Section II

Station: Below Trout Creek Rapids (#615)
River Mile: 86.7
Date: 7/26/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	9'10"	264	II/III	0.8	1.3	mounded, dead eggs A & B
2	1	4'3"	156	II	0.2	1.2	worked gravel
3	1	4'0"	352	II	0.6	1.4	mounded old (recent) redd
4	2	6'5"	240	II	0.5	1.3	worked gravel; susp. redds
5	2	5'4"	36	II	0.5	1.3	worked gravel
6	2	6'0"	104	II	0.5	1.5	worked gravel
7	3	4'11"	200	II	0.6	1.9	worked gravel
8	3	4'11"	340	II	0.6	1.1	redd
9	3	7'10"	70	II	0.7	1.9	worked gravel
10	4	8'8"	284	II	0.2		worked gravel
11	4	5'8"	16	II	0.3		worked gravel
12	4	3'3"	180	II	0.8	2.3	worked gravel
13	5	6'0"	190	II	0.8	1.5	Sthd. redd
14	5	6'10"	40	II	0.4		redside redd on poss sthd redd
15	5	6'0"	114	II	0.5	≥.4	worked gravel

Field Notes

N. Most gravel very loose at this station.
Gravel have very heavily used by trout (saw trout during redd counts and mounds/dunes suggest steelhead use.)

3. Middle and lower side channel somewhat armored and embedded slightly w/sand except for a few patches (small ones) of usable spawning gravel for trout (res. or anad.).
Gravel "soft" and well sorted.

UP. Much of station mass-spawned, at least by resident trout.

FREEZE CORE SAMPLING
Study Section III

Station: Rim Rock Chateau (#58A)
River Mile: 69.2
Date: 7/24/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Orivel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	4'6"	250	II	0.1		worked by fish, Judging
2	1	4'8"	346	II	0.2		from appearance. Heavy
3	1	6'6"	156	II	0.3		fines below "A" in 1+2. gravel not bright.
4	2	2'0"	208	II/III	0.2		usable habitat
5	2	4'8"	274	II/III	0.?		worked, not redd
6	2	2'6"	0	II/III	0.3		usable habitat
7	3	5'6"	116	II	1.0	1.5	usable habitat
8	3	S'S"	292	II	1.2	1.7	appears worked
9	3	7'0"	348	II	0.6	1.9	appears worked
10	4	3'7"	100	II	1.1	0.5	between "waves"
11	4	4'0"	260	II	0.9	1.2	top "wave"
12	4	6'5"	320	II	0.0	2.3	top "wave"
13	5	5'8"	194	II/III	1.0	1.2	fairly good sorting but
14	5	4'0"	260	II	0.0	2.4	could, be due to H2O.
15	5	4'6"	334	II	1.0	2.4	Recant fish use very possible but uncertain.

Field Notes

1. Most Portod qravrl seems worked by fimh.
2. Gravel easy to drive freeze core tubes into at momt pointm.
3. Station seems well used by fish.
4. Gravel size both increases and decreases with depth, depending upon the locationi predicting subsurface quality very difficult.
5. Both steelhead and resident trout were known to use this mite in the 1960'0. Our redd Purveym indicated that both Steelhead and redsides still spawn here. Many redsides were seen on thr gravel bar in June.
6. Finer gravel sits in this area because the river flow is deflected by a rocky point just upstream.
7. This is a relatively small gravel bar.
8. Extenaive over hanging vegetation makes this a very desirable spawning area.
9. Frozen cores extracted from this station were robumt except for the last three which were taken from Somewhat "tight" gravel around pp5. The material at pp5 was loose near the surface but compacted in the "B" and "C" horizons.
10. Sampling Subsurface gravels often Showm why points on a particular bar that look suitable for Spawner use are not used by fish. Many points on some Deschutes River bars have shallow gravels and have gravel compomitionm which change dramatically with depth.
11. No eggs wore seen in any of the freeze core Samples taken at Station #58A.

FREEZE CORE SAMPLING
Study Section III

Station: Mouth of Eagle Creek (#630)
River Mile: 64.5
Date: 8/09/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	3'9"	82	II	0.2		
2	1	2'2"	118	II	0.1		
3	1	3'6"	355	II	0.2		
4	2	3'0"	194	II	0.1		on mounds
5	2	5'8"	296	II	0.1		on mounds
6	2	5'9"	344	II	0.2		on mounds
7	3	2'10"	214	II	0.2		worked - 1 tube in fully
8	3	1'4"	348	II	0.3		"
9	3	2'5"	32	II	0.3		"
10	4	3'0"	180	II	0.3		mounds
11	4	4'9"	74	II	0.1		"
12	4	2'6"	30	II	0.4		"
13	5	2'10"	177	II	0.5	0.8	
14	5	1'8"	310	II	0.6	0.5	very slim sample
15	5	1'9"	72	II	0.9	1.4	slim sample

Field Notes:

1. The gravel at this station is angular and relatively shallow.
2. A number of fish were observed spawning on this gravel bar in 1984.

FREEZE CORE SAMPLING
Study Section IV

Station: Palmer's (#73)
River Mile: 61.0
Date: 8/02/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	5'8"	106	II	1.8	2.5	slim sample "A", hi v l cour
2	1	9'8"	300	II	1.2	3.6	slim l ample "A", hi v sear
3	1	8'10"	332	II	1.0	3.8	slim l ample "A", hi v scour
4	2	6'5"	132	II	1.0	3.3	good cores
5	2	6'10"	235	II	1.8	3.7	good cores
6	2	6'0"	10	II	0.7	3.7	good cores
7	3	3'7"	224	II	1.4	2.5	l ngul l r rock
8	3	9'8"	30	II	1.4	2.2	l ngul l r rock
9	3	6'0"	104	II	1.6	2.3	l ngul l r rock
10	4	7'4"	154	II	1.7	1.9	very ml im 90 deg. angle
11	4	5'6"	268	II	1.3	2.4	
12	4	4'6"	340	I/II,III	1.4	2.3	
13	5	6'8"	162	II	0.8	2.4	near or behind
14	5	5'8"	308	II/I	0.5	1.9	regular mounds
15	5	7'7"	30	II	1.0	2.4	

Field Notes

1. Gravel l omewhat angular and wel 1 worked by f ish.
2. Current velocities over this grovel bar may be lower at high flow due to an overflow channel to the left bank side of rocky island just upriver from the gravel bar.
3. Nearly all gravel on bar l ppearm to have been worked by steelhead and/or redsides this past winter and l pring. This bar is a major l pawning area for fish this far downstream from the reregul at i on dam.
4. To sample bar, put boat in just above the Gatekeeper's hay corral and pull the boat out just above the Gatekeeper's garden.
5. Some of the smaller gravel and pebbles on this bar migrate as soon as the bar's l urface is di l turbed.

FREEZE CORE SAMPLING
Study Section IV

Station: Below Trestle (#95)
River Mile: 41.0
Date: 8/15/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	3'0"	40	II	0.8		
2	1	2'8"	170	II	0.5	2.1	
3	1	2'0"	296	II	1.0	2.2	
4	2	4'5"	42	II	1.0	1.8	
5	2	2'0"	204	II	0.9	1.8	
6	2	2'0"	28	II	1.3	2.0	
7	3	3'0"	20	II	1.5	0.3	
8	3	2'10"	134	II	0.8	1.0	
9	3	1'0"	276	II	1.5	1.0	
10	4	2'10"	94	II	1.0	1.8	
11	4	2'8"	210	II	1.1	2.3	
12	4	2'4"	342	II	1.5	2.1	
13	5	2'10"	16	II	0.6	2.7	
14	5	1'8"	144	II	0.3	1.4	
15	5	3'3"	262	II	1.0	2.4	

Field Notes

1. Bar very sandy and gravel quite loose.
2. Bar formed in back H20 area below rocky point beneath railroad bridge.

FREEZE CORE SAMPLING
Study Section IV

Strtron: Aney #106 (#106)
River Mile: 28.5
Date: 8/08/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class mm (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	6'0"	196	II	2.1	1.1	all usable habitat patches
2	1	6'8"	302	II	2.1	2.3	prtchem of II-dominant
3	1	6'8"	46	II	1.8	0.7	material sampled.
4	2	4'0"	238	II	1.9	2.4	" "
5	2	2'0"	314	II	2.0	1.7	" "
6	2	3' 7"	92	II	1.7	2.3	" "
7	3	2' 10"	234	II	1.5	1.7	" "
8	3	4'0"	345	II	1.5	1.9	" "
9	3	4'2"	94	II	1.5	2.4	" "
10	4	4'8"	200	II	1.6	1.9	" "
11	4	4'6"	304	II	1.6	2.9	" "
12	4	2' 9"	88	II	1.5	1.1	" "
13	5	7'0"	2.10	If	1.6	2.2	" "
14	5	3'3"	354	II	1.3	2.5	" "
15	5	3' 11"	80	fi	1.2	2.0	" "

Field Notes

1. bar ham moderate sorting and lots of sand.
2. A few pointm on the bar have the vague appearance of old and flattened out reddm.
3. Velocity good at present flowm. Oravel size suggemtm that the sand, etc. buffer the bar against large increases in a current velocity am discharge increamem.
4. Driving freeze core tubes rnto the bottoms was generally easy.
5. Momt of bar is II or III dominant rock. Class II wi clams II and a little Class IV .
6. Heavy sand and friction and an apparently low silt fraction could suggest good fish use and removal of the finest material.
7. Gravel im loose.
8. Perhapm the sands contributed to the Deschutes by White River tend to mettle out in the upper reaches of Section IV while the milts mettle out primarily in the river's lowest reaches. Thim might explain apparently limited milt, clay fractronm at station 106 and the strongly compacted nature of a number of bars further downri ver (e.g. Fall Canyon Wemt).
9. Thim station is below Rattlesnake Canyon and im on the inside of a bend at the head of a small gravel bar isl and.

FREEZE CORE SAMPLING
Study Section IV

Station: Mack's Canyon (#109B)
River Mile: 23.9
Date: 8/14/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	2'10"	328	II	1.0	0.2	head of isl.
2	1	1'10"	106	II	0.7	0.4	"
3	1	2'0"	198	II	0.7	0.7	"
4	2	2'2"	306	II	1.2	1.5	"
5	2	2'9"	56	II	1.1	1.9	"
6	2	2'8"	208	II	1.0	1.5	"
7	3	3'5"	322	II	0.6	0.9	"
8	3	3'4"	60	II	0.5	1.5	"
9	3	3'8"	172	II	0.3		"
10	4	4'0"	260	II	0.4	0.5	side isl. 6"rock disc. A
11	4	2'7"	4	II	0.6	1.2	" tubes splayed
12	4	3'11"	136	II	0.5	0.4	"
13	5	5'4"	288	II	0.2		"
14	5	3'10"	40	II	0.5	1.4	" robust sample
15	5	7'0"	135	II	0.2		"

Field Notes

1. Near the head of the island the smaller (e.g. cl II) gravels overlay larger gravels in spots.
2. Gravel loose with moderate quantities of sand.
3. Fish use of this bar is very likely and a few portions of the bar look very much like they were worked by steelhead last winter.
4. Gravel tends to be shallow at this station and thus driving the freeze core tubes into the bar tends to be rather difficult.

FREEZE CORE SAMPLING
Study Section IV

Station: X-Dike Siding (#113)
River Mile: 21.9
Date: 8/24/84

Sample	Survey Hub (#)	Distance from Hub (Ft.)	Azimuth from Hub (mag.)	Gravel Class (I-IV)	Water Depth (Ft.)	Water Velocity (fps)	Remark
1	1	3'4"	67	II			Angular
2	1	4'9"	350	II			"
3	1	4'11"	298	II			"lots org @"A"
4	2	1'10"	154	II			"
5	2	1'11"	263	II			"
6	2	1'11"	80	II			"
7	3	1'8"	182	II			"
8	3	2'11"	216	II			"
9	3	2'9"	353	II			"
10	4	2'9"	134	II			"
11	4	2'4"	287	II			"
12	4	2'0"	43	II			"
13	5	2'0"	190	II			"
14	5	1'2"	242	II			"
15	5	2'0"	80	II			"

Field Notes

1. Gravel angular.
2. Driving moderately difficult, but not bad at all considering rock angularity.
3. CWH & JWB agree that steelhead use it. Steve Williams and Bob Lindsay reserve judgement. It would be nice to check for fish use in winter or early spring.
4. Considerable quantities of silts relative to other stations sampled.
5. Finer gravels overlay large angular rock in some locations.
6. Gravel bar contours have the distinctive appearance of spawning dunes.

APPENDIX VII

SURFACE AREA, USABILITY, AND SURFACE GRAVEL COMPOSITION OF GRAVEL BARS IN THE LOWER DESCHUTES RIVER, OREGON, 1983 - 1984.

This appendix contains gravel survey forms completed during the inventory of spawning gravel in the lower Deschutes River, Oregon which was conducted from August 1983 through November 1984.

CODES FOR SPANNING GRAVEL SURVEY FORMS

1. Data Code
   - 0 - new habitat
   - 1 - additional, associated habitat not previously quantified
   - 2 - new surface area figures with other adjustments for previously quantified gravel bar
   - 3 - more precise breakdown of habitat at this gravel bar than previously recorded.
   - 4 - gravel composition adjustment for gravel bar.

2. Location Code
   - 1 - side channel
   - 2 - tail of island
   - 3 - side of island
   - 4 - head and side of island
   - 5 - head of island
   - 6 - main channel against bank (protected)
   - 7 - main channel against bank (exposed)
   - 8 - mid channel tail out
   - 9 - mid channel glide or riffle

3. Spawner Use Code (two digits, chinook code followed by steelhead code)
   - 0 - use uncertain
   - 1 - dunes (use uncertain)
   - 2 - use verified
   - 3 - use suspected
   - 8 - habitat between dunes
   - 9 - no use suspected

4. Gravel Quality Code (two digits, chinook code followed by steelhead code)
   - 1 - excellent
   - 2 - good
   - 3 - good/fair
   - 4 - fair (gravel could be used by spawners with a reasonable chance for egg survival)
   - 5 - fair/poor (use of gravel unlikely)
   - 6 - poor (use of gravel very unlikely)
   - 7 - absolutely unusable gravel or no substrate of appropriate size

5. Gravel Usability Code (percentage for chinook then percentage for steelhead; six digits total)

6. Gravel Limitations Code (five digit code, one for each of five factors)

Factor	Limitations			
	none	slight	moderate	severe
Depth/velocity/position	0	1	2	3
Sedimentation/embeddedness	0	1	2	3
Compaction/angularity	0	1	2	3
Vegetation	0	1	2	3
Armoring	0	1	2	3

SPAWNING GRAVEL SURVEY 4210

Stream DESCHUTES RIVER Date 10-04-83 Discharge _____ Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
700A	1000	100.0	0	2	93	044	033	01452	2 2	100100	00000			100				
700B	1005	100.0	0	8	39	015	034	00510	2 2	100000	00000				100			
700C	1010	100.0	0	8	39	065	032	01010	2 2	100000	00000				100			
700D	1015	100.0	0	8	39	018	017	00306	2 2	100000	00000					100		
700E	1020	100.0	0	8	39	022	040	00880	2 2	100000	00000				100			
701	1025	099.9	0	5	29	030	012	00360	2 2	090000	00001				035	065		
701	1025	099.9	1	5	29	022	027	00594	2 2	090000	00001				035	065		
701	1025	099.9	1	5	19	105	080	08400	1 1	090090	00001			005	090	005		
701	1025	099.9	1	5	29	080	063	05040	1 1	090000	00001				040	050	010	
701	1025	099.9	1	5	29	080	058	04640	1 1	090000	00001				010	080	010	
701	1025	099.9	1	5	29	240	039	09360	2 2	090000	10001				030	070		
702	1030	099.9	0	1	33	023	018	00414	2 2	090000	20000				100			
703	1035	099.9	0	3	93	100	013	01300	2 2	090090	00000			035	065			
709	1040	099.9	0	1	33	033	025	00825	3 3	090090	00000			030	040	030		
705	1045	099.9	0	1	33	097	031	02618	2 2	100100	00000			010	060	030		
706	1050	099.9	0	1	11	101	087	04720	2 2	090000	00000			015	070	010	005	
707	1055	099.9	0	1	29	032	063	02016	2 2	100000	00000				030	070		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY 4210

Stream DESCHUTES RIVER Date 10-06-83 Discharge _____ Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
725	1145	099.8	0	2	19	011	035	00385	2 2	100020	00000				100			dunes
726	1150	099.8	0	2	19	008	032	00652	2 2	100020	00000				100			dunes
727	1155	099.8	0	2	19	008	032	00652	2 2	100020	00000				100			dunes
728	1160	099.8	0	2	19	040	026	01040	2 7	100 000	00000				060	040		dunes
722A	1165	099.8	0	1	88			01515	4 4	100 100	20000			060		040		velocity? between dunes
729A	1170	099.8	0	1	88			02865	4 4	100 100	20000			020	020	060		velocity? between dunes
726A	1175	099.8	0	2	08			01010	4 4	000100	20000			100				velocity? between dunes
729	1180	099.3	0	7	09	250	041	10250	5 7	080 000	00202				050	040	010	embedded, compacted
730	1185	099.2	0	8	29	184	046	08464	5 7	100 000	00202				075	020	005	embedded, armoured
731	1190	099.2	0	8	99	071	015	01065	5 7	100 000	00202				015	075	010	
731.5	1195	099.0	0	9	99			09696	1 7	000000	30000				075	025		outstanding chinook gravel with velocities of 5fps @ hfhw [illegible]
732	1200	098.9	0	4	19			36757	2 2	090000	00010				085	015		
733	1205	098.9	0	1	91	343	035	12005	2 2	000090	01020		005	075	020			vegetation limits some [illegible] ? gravel loose
734	1210	098.9	0	1	19	006	027	00162	2 2	100 000	01000				100			
735	1215	098.9	0	1	39	018	017	00306	2 2	100 000	01000				100			
736	1220	098.9	0	2	39	014	014	00196	4 4	100 000	01000				100			
737	1225	098.9	0	1	33	053	022	01166	4 4	100100	01000		010	080	010			

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY 4210

Stream DESCHUTES RIVER Date 10-06-83 Discharge _____ Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
737A	1230	098.9	0	1	13	008	005	00040	2 2	000100	00000		010	080	010			gravel skeletonized habitat
737B	1235	098.9	0	1	9	025	015	00375	2 2	100000	00000				050	050		dunes
737C	1240	098.9	0	1	9	060	020	01200	2 2	100 000	10000				050	050		dunes
738	1245	098.9	0	1	9	027	023	00621	2 2	00 000	10000				050	040	010	dunes
739	1250	098.9	0	1	9	019	035	00665	2 2	100 000	10000				050	040	010	dunes
740	1255	098.9	0	1	9	041	024	00984	2 2	100 000	10000				050	040	010	dunes
741	1260	098.9	0	1	9	054	025	01350	2 2	100 000	10000				050	040	010	dunes
742	1265	098.9	0	1	9	100	034	03400	2 2	100 000	10000				050	040	010	dunes
743	1270	098.9	0	1	9	100	054	05400	2 2	100 100	10000		010		040	050		dunes
744	1275	098.9	0	1	09	008	010	00180	4 4	100 000	00002				050	050		
745	1280	098.9	0	1	09	020	035	00700	3 3	100 000	00002				050	050		
746	1285	098.9	0	1	9	300	035	10500	2 2	055 000	20000				090	010		dunes; hi velocity
747	1290	098.9	0	3	09	018	004	00072	3 3	100 000	00001				100			
748	1295	098.8	0	1	09	021	074	01554	2 2	100 000	00002				050	050		
748A	1300	098.8	0	1	09	008	017	00136	4 4	100 000	00002					100		
749	1305	098.8	0	1	09	048	015	00720	3 3	100000	00002					100		
750	1310	098.8	0	1	12	090	050	04500	2 2	085 085	20000			015	085			hi velocity, shallow dunes, channel

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, l ridmce of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY 4210

Stream DESCHUTES RIVER Date 10-06-83 Discharge _____ Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
751	1315	098.6	0	7	29			16512	4 7	100000	00002				050	050		Chinook dunes here may be too armoured for use, at least in some places
751A	1320	098.6	0	7	19	006	026	00156	4 7	100000	00002				050	050		dunes
751B	1325	098.6	0	7	19	011	028	00308	4 7	100000	00002				065	035		
751C	1330	098.6	0	7	19	013	042	00546	4 7	100000	00002				040	060		
751D	1335	098.6	0	7	19	017	050	00850	4 7	100000	00002				050	050		
751E	1340	098.6	0	7	19	023	043	00989	4 7	100000	00002				035	065		
751F	1345	098.6	0	7	19	029	032	00928	4 7	100000	00002				050	050		
751G	1350	098.6	0	7	19	012	017	00204	2 7	100000	00002				080	020		
751H	1355	098.6	0	7	19	014	029	00406	2 7	100000	00002				060	040		
751I	1360	098.6	0	7	19	008	018	00144	2 7	100 000	00002				050	050		
752	1365	098.3	0	7	09	125	034	04250	4 7	100 000	00202				035	065		
753A	1370	098.1	0	5	00	079	042	03318	4 4	065 065	00102			015	055	030		top of SC
753B	1375	098.1	0	1	03	040	024	00960	4 4	100 100	00000			040	050	005	005	SC
753C	1380	098.1	0	1	03	018	006	00108	4 4	100100	00000			030	070			SC
728A	1176	099.8	0	3	19			04027	2 7	100000	10002				040	060		
751J	1361	098.6	0	8	19			00450	2 7	000000	00002					100		[illegible]
751K	1362	098.6	0	8	19			00450	2 7	000000	00002					90	10	↓ ↓ ↓

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-11-83/10-12-83 Discharge 4570 Survey by CWH, SW, DG

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
301	4330	022.8	0	9	99	050	020	01000	6 6	100 000	22102				100			
302	4335	021.9	0	6	93	207	038	07866	4 4	000100	02200			100				
303	4345	021.1	0	6	99	092	032	02944	5 6	100 000	02200			015	080	005		
304	4350	020.3	0	7	99	180	023	04140	6 6	035 000	02301			005	075	015	005	
305	4355	017.4	0	7	29	130	032	04160	4 6	100 000	12000				050	050		
306	4360	017.2	0	8	19			10280	3 6	100 000	12001			020	070	010		
307	4370	010.3	0	1	90	026	016	00416	6 6	000 100	03100		050	050				
308	4375	010.3	0	1	19	140	030	04200	4 6	100 000	02300		010	045	045			dones abandoned?
309	4380	010.3	0	3	29	076	020	01520	6 6	100 000	03303				075	025		
310	4385	010.3	0	5	99	047	032	01504	6 6	050 000	12203				035	065		
311	4390	010.3	0	6	39	080	034	02720	4 6	100 000	03101				050	050		
312	4395	010.3	0	1	09	055	010	00550	6 6	100 000	03201				080	020		
313	4400	010.2	0	2	99	030	010	00300	4 6	020 000	22200				100			
314	4405	010.2	0	8	29	290	053	15370	3 6	085 000	11101				065	035		
315	4410	009.4	0	5	99			24775	7 7	000 000	03203				050	050		
316	4415	007.4	0	9	99	045	020	00900	5 6	050 000	22000				070	030		
317A	4420	007.1	0	5	99	012	018	00216	4 6	100 000	22000				100			

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-13-83 Discharge 4620 Survey by OWH, SW, DG

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Accessibility	Location/Amount	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
31B	4425	007.1	0	3	99	135	015	02025	47	100000	22000				100			
31C	4430	007.1	0	2	99	120	018	02160	47	100000	22000				100			
31B	4435	006.0	0	5	09	215	035	07525	47	100000	21000				090	010		
31A	4440	003.3	0	2	90	036	013	00468	75	000100	22000			100				
31B	4445	003.3	0	2	09	042	014	00588	47	100 000	22000				100			

*GRAVEL CLASSES: 0 – less than ¼" diam. (silt and sand)
I – ¼ to 1" diam. (fine gravel)
II – 1" to 3" diam. (medium gravel)
III – 3" to 6" diam. (coarse gravel)
IV – 6" to 10" diam. (cobbles)
V – over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY I II

Stream DESCHUTES RIVER Date 10-18-83 Discharge 4060/4110 Survey by CWH, DG, JC.

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
1	1385	098.1	0	7	99	155	010	01550	47	00000	00002					100		
2	1390	098.1	0	7	99	085	012	01020	47	00000	00002					100		
3A	1400	098.0	0	6	10			20096	22	060060	21000			030	070			Parton very loose
3B	1400	098.0	0	6	92	018	072	0296	22	000095	01010		015	085				
4	1405	097.9	0	6	19	050	025	01250	55	100000	10000				070	030		high velocity, clr reddishness
5	1410	097.7	0	7	99	030	008	00240	67	000000	10203					075	025	
6	2000	097.0	0	8	29			05168	44	080000	10100			010	090			just below Warm Springs Br. to
7	2005	096.8	0	6	03	097	023	02231	33	100100	12000			040	060			old sled (?) redds seen
8	2010	096.8	0	5	09	020	020	00400	67	030000	20003					060	040	
9	2015	096.7	0	3	23	130	113	14690	33	090090	10000			040	060			
10	2020	096.6	0	5	09	025	012	00300	67	035000	20003					070	030	
11	2025	096.5	0	2	93	030	018	00540	72	000060	01000		080	020				loose
12	2030	096.5	0	2	00	067	030	02010	22	100100	01000			020	080			loose
13	2035	096.5	0	1	90	020	010	00200	44	060060	21000			060	040			hi velocity
14	2040	096.5	0	2	30	030	010	00300	44	100100	01000			050	050			
15A	2045	096.4	0	6	91	324	014	04536	71	000090	01000		085	015				Mexicans
15B	2050	096.4	0	7	22	655	040	26200	22	080080	10001			005	040	045	010	

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinant.

SPAWNING GRAVEL SURVEY

Stream Deschutes River Date 10-18-83 Discharge 4110 Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	Factors Affecting Gravel Use: Quality	Usability	Limitations	Gravel Classes* (Per Cent): 0	I	II	III	IV	V	Remarks**
16	2065	095.6	0	9	09			71130	37	100 000	21000				075	025		high velocity
17	2070	095.4	0	6	00	070	030	02100	33	100 000	01000				090	010		
18	2075	095.4	0	9	09	011	028	00308	33	100 000	01000				090	010		
19	2080	095.4	0	4	09	120	024	02880	37	100 000	10002				060	040		
20	2085	095.4	0	2	19	270	020	05400	37	100 000	11000				060	040		chinook dunes below island (Upper Mecca Isl)
21	2095	095.0	0	2	19	651		20900	27	100 000	10011				045	045	010	
22	2110	094.8	0	8	19			31309	27	085000	10102				040	060		chinook dunes
23	2115	094.6	0	8	19			26460	37	100 000	10102				040	060		chinook dunes
24	2120	094.3	0	5	09			06740	47	085 000	11021				030	070		vegetative encroachment
25	2135	094.2	0	6	00	100	030	03000	22	100 100	01000			030	065	005		
26	2145	094.3	0	1	00			02360	44	100100	11112		005	025	060	010		
27	2150	094.3	0	1	92			06740	44	090090	11110		010	075	015			Professional
28	2155	094.3	0	1	92			01180	74	000090	02000		005	095				
29	2160	094.2	0	1	92			26460	74	000090	02001		020	080				
29A	2165	094.1	0	9	29			06740	44	025000	022121				080	020		very high velocity, lot of vegetation
30	2125	094.0	0	7	30	008	016	00128	11	100100	00000			010	090			
31	2170	093.1	0	5	09	090	020	01800	47	090000	01102				010	080	010	

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-18-83 Discharge 4110 Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
32A	2175	092.7	0	8	30			10280	33	090090	01100			030	055	015		
32B	2180	092.7	0	9	99			08765	47	080000	30002				010	090		[illegible]
33	2190	092.0	0	5	90			07585	66	060060	01102		010	025	005	050	010	little to no sorting
34	2195	092.0	0	1	00			06575	44	055 055	01101			010	055	025	010	poor sorting
35	2210	091.9	0	1	99	090	030	02700	66	060 060	21101			010	060	030		poorly positioned
36	2215	091.5	0	1	30	006	018	00108	22	100100	01200			050	040	010		most of side channel locked up
37	2220	091.5	0	1	30	065	010	00650	22	100100	01200			050	050			most of side channel locked up"
38	2235	090.6	0	3	93	012	004	00048	11	000100	01100			100				
39	2240	090.6	0	3	09	018	012	00216	66	100 000	01300				100			most gravel near thousand - complex are very compacted
40	2255	089.9	0	6	09	080	040	03200	77	000 000	01300				100			tightly compacted, looks like old [illegible] spawning habitat
41	2280	088.2	0	7	09	310	056	17576	57	100 000	11200				070	030		might be used in late fall w/ higher velocities - long [illegible] waves?

Small [illegible] waves in gravel

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-19-83 Discharge 4290 Survey by CWH, DG, JC.

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
42	2265	088.3	0	5	03	175	045	06235	43	040040	11031		010	035	030	020	005	
43	2266	088.3	0	1	09	020	010	00200	37	100 000	11010				060	040		
44	2270	088.3	0	1	09			02020	57	045 000	20120				035	060	005	low velocity, poorly positioned, lots of vegetation
45	2275	088.2	0	6	00	013	008	00104	55	100100	20001			010	040	050		poorly sorted, loose
46	2285	088.2	0	6	00	020	007	00140	55	085085	20000			050	050			poorly sorted, loose
47	2290	088.0	0	6	00	126	011	01386	55	085085	20001			030	055	015		poorly sorted, loose
48	2295	088.0	0	6	99	020	012	00240	27	100 000	20002					100		poorly positioned fine IV rock
49	2300	088.0	0	9	09	075	018	01350	27	085 000	10002				020	080		
50	2305	088.0	0	9	99	078	010	00780	47	095 000	10003					080	020	
51	2310	087.9	0	7	99	165	015	02475	57	080 000	10003					010	090	
52	2315	087.9	0	9	99	095	025	02375	47	060 000	10003					010	090	
53	2320	087.3	0	8	92	126	041	05166	33	000100	11000		050	030	020			Trout Creek bar
54	2325	086.9	0	2	03	215	036	07740	42	090090	11000		010	025	065			
55	2330	086.7	0	6	99			08090	67	000000	23010				095	005		poor sorting, low velocity, heavy fines
56	2335	086.7	0	1	93	091	015	01365	73	000090	01000		010	090				
57	2345	086.1	0	3	30	060	015	00900	44	100100	00100			030	070			
58	2355	086.0	0	2	09	045	009	00405	57	100 000	00201				050	050		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-19-83 Discharge 4300 (II) / 4550 (III) Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
59	2365	085.4	0	8	29			99999	57	100000	11001				070	030		Annie Dick
59	2365	085.4	1	8	29			21696	57	100000	11001				070	030		dunes which show up in a's photo can no longer
60	2370	085.3	0	5	09			10115	37	100000	10002				065	035		be identified - blown out by high water?
61	2375	085.3	0	2	92	030	010	00300	74	000100	02000		100					redsides spawn here en masse
62	2380	085.3	0	2	92	060	010	00600	44	100100	11000			050	050			quite loose; III on sH. angle
63	2385	085.3	0	5	00	110	020	02200	44	090090	11100			010	090			sorting
64	2390	085.3	0	1	99	054	008	00432	47	060000	11101				070	030		access blocked from below armoring + sorting
65	2395	085.2	0	1	00	020	018	00360	44	100000	11100				100			
66	3000	083.8	0	6	99	035	018	00630	67	100000	11302				070	030		just below the mouth of Warm Springs River BAD
67	3010	083.0	0	5	99	080	040	03200	57	085000	21001				070	030		low velocity for pred gravel size
68	3020	083.0	0	1	92	165	030	04950	33	100080	01000		025	065	010			lots of probable steelhead redds
69	3025	083.0	0	1	09	136	032	04352	37	100100	01000				080	020		
70	3015	083.0	0	5	99	060	012	00720	67	070000	20302				030	070		tight material!
71	3030	082.9	0	2	03	170	032	05440	44	100100	01010			010	070	020		
72	3035	082.7	0	3	09	035	090	03150	57	075000	10302				050	050		tight gravel
73	3040	082.7	0	3	09	030	040	01200	37	100000	10102				060	040		
74	3045	082.7	0	3	09	060	012	00720	37	085000	10102				015	085		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-19-83 Discharge 4550 Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
75	3050	082.7	0	2	00	030	014	00420	44	100100	01200			005	090	005		tight gravel
76	3055	082.7	0	1	39	018	030	00540	44	085000	01200				090	010		
77	3060	082.7	0	1	33	040	012	00480	44	080080	01200			010	080	010		
78	3065	082.7	0	1	03	045	020	00900	44	075075	01200			080		020		
78.5	3070	082.0	0	8	29			10950	47	100000	01102				015	085		Jim Newton (ODFW) confirmed chinook use
79	3075	079.5	0	9	99	030	010	00300	67	050050	11302			005	070	020	005	
80	3085	079.7	0	9	29			02025	57	060000	10202				050	050		poorly sorted, CHN redd here
80.5	3090	079.0	0	5	29			04228	37	090000	00102				050	050		"wing dam" 6 or 7 CHN redds here Oct '83

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-20-83 Discharge 4750 Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
81	3095	077.5	0	9	00	075	025	01875	44	075 075	21001			010	080	010		set up below lg rocks
82	3100	077.3	0	6	03	025	015	00375	43	085 085	01000		020	060	020			
83	3105	077.2	0	5	32	075	028	02100	22	090 090	10000			020	080			
84	3110	077.2	0	1	02	025	014	00350	22	100 100	10000			020	080			
85	3115	077.2	0	1	02	090	012	01080	22	080 080	10000		010	010	080			
86	3125	077.1	0	9	03			06740	33	090 090	11010			010	080	010		
87	3130	077.1	0	6	93			02190	44	075 075	21010			020	080			
88	3135	077.0	0	5	99	035	016	00560	67	100 100	11112				090	010		POOR sorting, heavily dirty fill
89	3140	076.9	0	1	39	030	012	00360	22	075 000	11010				100			
90	3145	076.9	0	3	99	023	006	00138	65	100 100	12211			030	065	005		poor sorting
91	3150	076.9	0	9	29	165	106	17490	37	100 000	10000				100			too L V for redd in water numerous (Hs) redds 10-83
92	3155	076.6	0	9	00	065	020	01300	44	090 090	11101			010	090			
93	3165	074.5	0	6	02	135		02185	21	090 090	21000		010	070	020			partially exposed gravel bar at lower flows
94	3170	074.5	0	9	99	040	012	00480	47	080 000	20101				080	020		
92.5	3160	076.3	0	6	02			01010	43	090 090	12000			010	090			just above white horse Rapids' retaining shelf
95	3175	074.0	0	8	00			19215	44	050050	20002			010	075	015		
96	3180	073.9	0	8	99	015	010	00150	47	070000	10002					100		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-20-83 Discharge 4750 Survey by CWH, DG, JC

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
97	3185	073.9	0	8	29	065	030	01950	27	050 000	01001				050	050		
98	3190	073.7	0	9	29	099	033	03267	47	100 000	21001				080	020		Amazing! 2 car-sized redds [illegible]
99	3195	073.6	0	6	91	136	029	03944	72	000095	01000		025	065	010			good for trout + stlhd!!
100	3200	073.3	0	8	09			09100	37	090 000	00002				070	030		
101	3205	073.2	0	8	99	015	015	00225	47	100 000	20002					100		not likely used
102	3210	072.9	0	3	92	030	008	00240	44	100100	12000			060	040			
103	3220	072.9	0	3	92	005	035	00175	44	100100	12000			050	050			

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occ -+no- of aquatic vegetation, evidence of previous spawning, water velocities etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-26-83 Discharge 5500 Survey by CWH, SW, DG

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
150	3310	068.8	0	7	23			11125	44	080080	12020			060	040			gravel not very good but is used by [illegible]
151	3315	068.5	0	6	03			01855	44	070070	12020			010	080	010		vegetative encroachment a significant problem here
152	3320	067.9	0	5	29			14160	47	080000	21102				080	020		chinook redd seen here 10-83
153	3325	067.8	0	9	99	150	060	09000	47	080080	21101			010	060	030		unsorted, but loose w/ lots of sand present
154	3330	067.5	0	7	39			05730	44	080080	11100			010	080	010		
155	3335	066.9	0		99			01350	66	080080	12201			030	040	030		
156	3350	065.6	0	7	00			06235	55	080080	12201			010	060	030		
157	3355	065.0	0	5	99			02360	47	020 000	20102				040	060		pockets in rubble use weldsly
158	3360	064.7	0	7	20	075	020	01500	44	100 100	11101			030	060	010		trout spawning observed in [illegible] by state [illegible]
159	3365	064.5	0	8	00	030	015	00450	44	100 000	11100				100			high velocity; under tree
160	3370	064.5	0	6	92	055	010	00550	44	100 100	11201			030	070			rock angular & mod compacted well used by sthd ?
161	3375	064.1	0	7	09			02530	44	100 100	12100			035	065			
162	3380	064.0	0	7	00			01350	44	100 000	22000				100			deep; high velocity
163	3390	062.2	0	9	99			04045	47	050 000	10102				060	040		
164	3395	062.0	0	7	99			45680	66	000 100	22210		005	010	005			
165	3400	061.8	0	4	92			21070	64	000 100	12010		020	080				freeze core station — "Palmers"
155.	3345	065.7	0	7	29			31612	57	030 000	12313	002	004	002	032	040	020	Windy Flat - COMPACTED shallow, etc. one CHN redd in Oct. 1983!!!

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and rud)
I - ¼ to ½ diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - oter 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, I rldence of previous spawning, water velocities, [illegible] if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 10-27-83 Discharge 5470 Survey by IWH, SW, DG

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Bar Dimensions (feet) Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Accessibility	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
200	3415	058.9	0	8	99			02190	66	020 020	12200		010	025	025	035	05	
201	5440	058.5	0	7	09			06910	47	085 000	20002			005	075	020		appears to have been used more time -
202	3445	058.3	0	8	39			01575	47	075000	00102				075	025		
203	3450	057.8	0	8	90			02190	66	000 160	03000		035	060			05	lots of fines, scattered boulders
204	3455	057.4	0	1	03	025	015	00375	33	100100	11000			030	070			
205	3460	056.3	0	7	99			03035	66	100100	12200			010	080	010		low velocity in fall; lots of fines
206	3465	056.2	0	7	99	015	010	00150	66	100100	12200			010	080	010		low velocity in fall; lots of fines
207	3470	055.7	0	6	00			01515	44	100025	22000		005	075	020			most of habitat too deep; fall for trout
208	3475	055.0	0	7	09			02360	44	100 000	02101				070	030		
209	3480	052.5	0	8	29			24970	37	100000	01101				050	050		Channel was fairly deep [illegible]
210	3485	052.5	0	7	09	014	008	00112	37	100 000	11102				050	050		slightly on angle
211	3490	050.9	0	9	19			00505	27	100 000	01000				090	010		deep @ HW dune
212	3500	048.2	0	8	39			01350	37	100 000	01100				095	005		well sorted (fish use?)
213	3505	047.5	0	8	30			14495	44	100100	21100			005	090	005		Oak fringe
2005	3435	058.7	0	9	39			05395	47	100 000	10102				070	030		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobble)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 05-31-84 Discharge 6030 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE: Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
701A	1030	099.9	1	1	92			00545	2 2	000100	11000		005	075	020			chinook spawning habitat & riffle; ok, is barrier on temp. and velo
701B	1026	099.9	0	3	92			00030	7 4	000100	11100			100				small pocket of fine gravel
706	1051	099.9	0	1	92			01818	7 2	000100	02010	030	030	040				vegetation and limbs trimmed & burned in pockets
706	1050	099.9	1	1	29			01010	2 7	100 000	00000				050	050		
706	1050	099.9	1	1	29			01212	2 7	100 000	00002				025	075		
711A	1076	099.9	0	1	92			01313	7 4	160 000	12100	020	040	030	005	005		poorly sorted fine gravel bed (silt) & cobble, have to travel to find gravel
716A	1101	099.9	0	2	19			00303	2 7	100 000	00001				060	040		chinook done
730	1185	099.2	2	8	29			27889	3 7	100 000	10202				040	055	005	some dunes @ top of bar
2A	1395	098.1	0	2	91			00303	7 2	000100	11000		020	080				front/silt & dunes & rocks
3	1400	098.2	1	1	92			05050	2 2	100100	21000	010	005	015	060	010		
5.5	1415	097.3	0	7	19			08457	3 7	100000	00102				060	040		well sorted, dunes, but dunes not fairly given

*GRAVEL CLASSES: 0 – less than ¼" diam. (silt and sand)
I – ¼ to 1" diam. (fine gravel)
II – 1" to 3" diam. (medium gravel)
III – 3" to 6" diam. (coarse gravel)
IV – 6" to 10" diam. (cobbles)
V – over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

WARM SPRINGS TO TROUT CREEK

2/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 06-01-84 Discharge 5720 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
9	2015	096.7	1	2	92			06060	33	000100	20100			010	090			new gravel too shallow for chinook except in spring
16.5	2060	095.7	0	7	03	040	015	00600	33	100100	21000			020	060	020		
20.5	2090	095.1	0	6	03	05	015	00750	72	000100	01000			100				
15B	2050	096.4	4	7	22	655	040	26200	22	080080	10001			030	030	035	005	only the gravel composition has been stay

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

WARM SPRINGS TO DUFUR MAP

3/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 06-14-84 Discharge 5740 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Accessibility	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
606	2185	092.2	0	6	93	045	030	01350	6 2	100100	11200			040	060			chinook gravel tight + clean
34.5	2200	091.1	0	1	90	007	014	00098	4 4	100100	21100			040	060			small pocket of gravel

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fins gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobble;)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel clam predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

WARM SPRINGS TO WAPINITIA

CH

4/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 07-04-84 Discharge 5080 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quantity	Quality	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
600	2055	096.0	0	7	03	060	015	00900	22	100100	11000		005	070	020	05		
20	2085	095.4	1	2	19			05656	27	100 000	10001				025	015		
601	2100	095.0	0	1	02	090	052	04680	22	000100	10120			015	085			Gravels recently reworked last fall but silted over this spring; inadequate for spawning
602	2105	095.0	0	6	02	045	008	00360	33	000100	10201			040	020			chinook gravel not shallow enough & too small - low velocity
22	2110	094.8	1	7	19			05858	27	100000	01001				060	050		
22	2110	094.8	1	7	92			00222	22	000070	10100			015	085			chinook gravel not usable at low flows - vel. & depth
602	2130	094.2	0	6	92			00101	27	000100	01000		050	050				
604	2140	094.2	1	6	92			07684	11	000100	20000			015	075	010		not wetted w/adequate H_2O for chinook in fall
29A	2165	094.2	1	9	00	050	010	00500	44	100100	22000			050	050			in deeper H_2O below main gravel loss
32A	2175	092.7	1	7	92			02222	74	000100	12000		020	040				lots of fines
32A	2175	092.7	1	5	99			01212	27	000000	31000				100			not available in the fall due to low H_2O
607	2205	091.9	0	3	93	027	313	08451	43	100100	01100			070	030			
608	2215	091.5	1	1	00	061	050	03050	44	100100	22100			020	070	010		loosened up this last winter & enlarged width
609	2220	091.5	1	1	00	090	015	01350	22	100100	01100			020	080			loosened up this last winter & enlarged width
610	2225	090.6	0	9	09	015	024	00336	44	100100	10102			005	065	030		
611	2230	090.6	0	9	09	025	036	00900	47	100100	10102				050	050		
612	2240	090.6	2	2	92	044	020	00880	22	100100	00100			050	050			

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

WARM SPRINGS TO WAPINITIA

5/18

SPAWNING GRAVEL SURVEY See 2 See 3

Stream DESCHUTES RIVER Date 07-04-84 Discharge 5080 / 5390 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Quantity	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
613	2245	090.3	0	6	92	022	104	02288	7 4	000100	02100		050	050				below Fly Springs Canyon
613.5	2250	090.0	0	6	09			13332	6 7	100 000	11202				045	045	010	Tailed scrapie clearly like pool, f. mod, flow
40.5	2260	089.0	0	5	29			03524	4 7	100 000	00201				050	050		
614	2265	088.3	1	4	02			10105	7 4	000040	12030		075	025				patches of fines/silt spawning look bit in weeds
53	2270	087.3	2	8	92			06565	7 2	000100	01000		025	070	005			
615	2340	086.7	0	4	92			04242	7 3	000100	11100		020	055	025			
616	2350	086.1	0	2	92			00500	7 2	000100	02000			100				
617	2360	086.0	0	6	92			13331	4 2	000100	21010			045	045	010		
67	2380	085.3	2	2	92	105	024	02520	3 3	000100	12000		015	080	005			
618	2385	085.3	1	1	92			03020	4 2	000080	21020		010	065	025			
65.5	2400	084.3	0	8	29			11981	4 7	100 000	00202				050	050		
61[69]	3010	083.0	1	5	92			00941	7 4	000100	02200		025	075				
77	3060	082.7	2	1	00			01176	4 4	100100	11200		005	065	030			
620	3080	079.5	0	1	92			05151	7 5	000050	23000		100					heavy fines ref. Heart Tract gully
	2244	090.3	0	8	09			08155	5 7	100000	20102				025	075		uncertain composition but middle of river dark bar
66.5	3005	083.6	0	3	92			0208	7 21	000100	01000		050	050				

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, [illegible] ridoneo of previous spawning, water velocities, etc., if pertinent.

WARM SPRINGS TO WAPINITIA

cw

6/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 07-05-84 Discharge 5270 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
82	3100	077.3	2	6	03		1	01135	3 4	095085	21001			005	060	035		
621	3120	077.2	0	2	03			01651	4 4	065065	12020			085	015			
222	3160	076.3	1	6	02	113	024	02205	4 2	000100	11100		010	070	020			
93	3165	074.5	1	6	02	144	045	01296	2 2	000090	21000		005	075	020			
623	3215	072.9	0	6	02	017	006	00102	3 3	100100	12000		010	040	050			
624	3225	072.7	0	6	02	083	028	02324	4 5	100100	11201		010	060	030			
625	3230	072.4	0	6	02			01616	4 5	100100	11101			010	080	010		
114A	3260	070.3	2	4	22			17876	2 2	080080	11002			005	035	055	005	
627	3280	069.3	0	6	92			00200	7 2	000100	02000		060	040				
119	3295	069.1	2	6	92	124	050	06200	6 5	100100	13000		065	030	005			heavy sand
628	3305	069.1	1	6	92			02828	6 3	100100	12000		050	045	005			
629	3340	066.6	0	7	02			03434	4 4	100100	11101		005	010	045	040		
630	3370	064.5	0	6	92	180	025	04343	4 4	015100	11201			050	050			
631	3385	062.9	0	9	92			00250	7 4	000100	12030		075	025				
165	3400	061.8	1	5	92			01212	7 4	000100	12100		025	075				
165	3400	061.8	1	5	09			02424	3 7	100000	21000				100			
165	3400	061.8	1	5	92			05050	7 4	000100	12100			100				

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

WARM SPRINGS TO WHANNITIA

SPAWNING GRAVEL SURVEY

7/18

Stream DESCHUTES RIVER Date 07-05-84 Discharge 5270 Survey by CWH, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Quantity	Accessibility	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
632	3405	060.6	D	2	92	035	012	02420	7	5	000100	12000			100			
633	3410	059.4	O	6	02	004	025	00100	4	4	100100	10100		005	025	070		
	3235	072.1	O	5	92			00250	3	3	000100	21100			050	050		Williams + Newton (ODFW) identified this site.
	3272	069.9	O	6	93			00250	7	3	000100	12000			050	050		
	3420	058.7	O	1	33			00201	2	2	100100	11000			020	080		Spawning habitat formed by the confluence of the adjacent tributaries and the mainstem of the Deschutes River
	3425	058.7	O	1	33			00138	2	2	100100	11000			020	080		
	3430	058.7	O	1	33			00758	2	2	100100	11000			020	080		
	3460	056.3	1	6	92			01410	7	3	000100	11000		050	050			Identified by Williams + Newton (ODFW)

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

DRY CREEK AREA

8/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 07-20-84 Discharge 1760 Survey by CWH, TT, MS

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
27	2150	094.3	2	1	92			06666	63	100100	01200		010	065	015	010		a number of steelhead redds here
28	2155	094.3	2	1	92			01616	73	000100	22000			100				redds of trout or steelhead here
29.1	2161	094.2	3	1	92			02929	53	100100	22000		010	085	005			ditto
29.2	2162	094.2	3	1	92			00404	72	000100	02100		095	005				redds of trout
29.3	2163	094.2	3	1	92			00162	53	100100	12100			080	020			redds of trout &/or steelhead
29.4	2164	094.2	3	1	92			14901	73	000100	12100		025	075				ditto

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bu area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, I ridoncr of previous spawning, water velocities, etc., if pertinent.

TWIN TUNNELS AREA

9/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 07-25-84 Discharge 5020 Survey by CWH, MS, TT

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE: Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
IV-10	4010	041.0	0	6	93	078	040	03120	55	050075	22000		010	025	045	020		loose; hi [sand]
IV-11	4015	040.9	0	2	09	018	010	00180	57	100000	21100				050	050		used CHN?
IV-12	4020	040.9	0	8	90	030	017	00510	75	000100	12000			100				heavy sand
IV-13	4025	040.9	0	1	90	130	007	00910	55	000100	22000			090	010			heavy sand
IV-14	4030	040.9	0	1	90			00020	75	000100	22000			100				heavy sand
IV-15	4035	040.9	0	3	99			02222	77	000 000	23300	010	010	050	030			loose; very heavy fines
IV-16	4040	040.7	0	3	09	085	018	01530	33	100100	12000			020	070	010		loose; sandy
IV-17	4045	040.1	0	2	99	045	009	00405	66	100100	12201			040	060			
IV-18	4050	040.1	0	2	99	036	010	00360	55	100100	12200			085	015			
IV-19	4055	039.9	0	7	22			02020	74	000100	02000		050	050				

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, [illegible] rJdmcr of previous spawning, water velocities, [illegible] if pertinent.

SECTION IV

10/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 08-01-84 Discharge 4950 Survey by CWH

Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE			Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
4000	094.0	0	6	99			02727	77	000 000	13001		005	010	020	065		very heavy fines
4005	094.0	0	6	99			01010	77	000 000	13101		005	040	040	015		very heavy fines

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

PINE TREE TO BEAVERTAIL

SPAWNING GRAVEL SURVEY

11/18

Checked w/ SW 18-23-84

Stream DESCHUTES RIVER Date 08-16-84 Discharge 4760 Survey by CWH, MS, TT,

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
900	4060	039.1	0	9	39			08080	47	100 000	12001				035	065		sandy
901	4065	038.8	0	8	39			07676	44	100 100	12001			005	035	060		sandy
902	4070	038.8	0	2	00			00606	47	100 000	12000				090	010		sandy
903	4080	038.4	0	5	39			04141	47	100 000	11101				070	030		one CHN dune @ top to V
904	4075	038.4	0	2	09			03434	47	100 000	11101				030	070		
905	4085	038.0	0	3	02	043	014	00602	43	015100	20000			003	077	020		
906	4090	038.0	0	3	09	086	015	01290	57	010000	21100				030	060	010	not all wetted low velocity @ fall flow
907	4095	037.6	0	6	29	006	010	00060	37	100 000	01000				100			excellent sorting
908	4100	037.6	0	8	39			15654	47	100 000	11001				070	030		moderate sorting
910	4105	037.0	0	8	19			07878	27	080000	01001				060	040		heavily dumped/mounded by CHN; some boulders
911	4110	035.7	0	8	09			03535	47	040 000	20001				080	020		partially wetted, on angle
912	4115	035.0	0	8	09			10049	47	100 000	12001				070	030		
918	4145	031.6	0	7	29			07676	37	100 000	01000				060	040		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

MISC. BELOW MAUPIN

12/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 08-17-84 Discharge 4650 Survey by CWH

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
215	3495	050.8	0	1	92	008	003	00024	7	6	000100	03100	020	020	030	030		2 stkd redds here ?!*
214	3510	046.5	0	5	09			00444	5	5	00100	21200			002	078	020	old crusty dune augmented rock; mixed results

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

PINE TREE TO BEAVERTAIL

13/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 08-23-84 Discharge 4690 Survey by CWH, TT, JWB, SW

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Quantity	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
913	4120	034.2	0	8	19			17513	37	100000	01010				075	025		Jones Canyon; well used CHN
914	4125	033.0	0	9	19			99999	27	100000	01010				050	050		Geer Canyon; well used CHN dunes
914	4125	033.0	1	9	19			55185	27	100000	01010				050	050		↑ di Ho ↓
915	4130	032.0	0	6	92			00303	56	000100	02200		005	080	015			STHD redds here
916	4135	031.7	0	3	09	150	012	01800	66	100100	22200			025	070	005		
917	4140	031.7	0	3	09	040	018	00720	67	100000	22201				085	015		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

BEAVERTAIL TO MACKS CANYON

SPAWNING GRAVEL SURVEY

14/18

Stream DESCHUTES RIVER Date 08-06-84 Discharge 4970 Survey by CWH, TT, MS

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
919	4150	031.1	0	5	20			40399	37	100000	11000				090	010		Beavertail; possible [illegible]
920	4155	031.0	0	3	99	015	005	00075	57	000000	31000				100			barely wetted
921	4160	031.0	0	3	29	010	020	00200	57	100000	12100				070	030		hi fine sediment; one CHN redd
922	4165	031.0	0	3	09	045	022	00990	57	100000	12100				100			hi fines
923	4170	029.9	0	7	90	008	003	00024	74	000100	11100			100				
924	4175	029.8	0	8	29			22219	37	100000	11000				075	025		well sorted; obviously used by CHN
925A	4180	029.7	0	7	00	090	012	01080	44	085085	11100			020	060	020		intrusions of fines
925B	4180	029.7	1	7	02	015	004	00060	44	085085	11100			020	060	020		1+thd redds intrusions of fines
925C	4180	029.7	1	7	00	010	003	00030	44	085085	11100			020	060	020		intrusions of fines
926	4185	029.3	0	6	93			01414	55	070100	11100			020	070	010		mud, well sorted; thd use suspected; full [illegible]
927	4190	029.2	0	6	90	045	026	01170	76	000065	22200		030	050	020			
928	4195	029.2	0	6	99			00100	76	000000	32101		050	050				1.5 ft. hi+dry (patches)
II-21A	4200	029.0	0	7	99			04343	67	080000	11201				070	030		heavy fines; angular
II-21B	4205	029.0	0	7	99			01515	67	030000	11202				030	070		↑ ditto ↑
929	4210	028.7	0	8	09			14745	67	100000	03100				075	025		Area 105 B - one CHN use [illegible] very heavy fines
930A	4215	028.5	0	5	03			04296	44	100100	12000			025	065	010		lots fines
930B	4220	028.4	0	1	09	015	030	00450	37	100000	11100				100			fines

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)

Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

TAILRACE TO MACKS CANYON

SPAWNING GRAVEL SURVEY

15/18

Stream DESCHUTES RIVER Date 08-06-84 Discharge 4970 Survey by CWH, TT, MS

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Quantity	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
930C	4225	028.4	0	1	90	083	027	07241	44	900100	21101			020	080			
930D	4230	028.4	0	6	09			04191	47	100000	02000				100			
931A	4235	028.3	0	5	00			01313	44	100100	11001			035	065			
931B	4240	028.3	0	1	09			00808	47	100 000	01101				100			
931C	4245	028.7	0	1	39			01818	37	100000	01101				100			mod. sorting
931D	4250	028.2	0	1	39			02525	37	100000	01101				040	060		mod. sorting
932	4255	027.5	0	6	99			00465	75	000000	31101			040	060			scattered unmarked patches on RB
933	4260	026.1	0	3	79	035	015	00525	47	100000	01101				100			Aney 107 - Sinamox
934	4265	025.7	0	7	19			01616	37	100000	01001				050	050		dry dunes @ Ferry Canyon

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt And sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" dim. (cobbler)
V - over 10" diam. (rubble and boulderr)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, rto., if pertinent.

MACKS CANYON TO MOUTH

16/18

SPAWNING GRAVEL SURVEY

Stream DESCHUTES RIVER Date 08-11-84 Discharge 4830 Survey by CWH, TT, JB

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
IV-B4	4270	024.2	0	7	19			08484	37	080000	00000				050	050		CHNK redds in August? Macks Canyon but rainy
IV-B3	4275	023.9	0	5	03			04343	33	080100	01000			035	065			loose, mud fines
IV-B3A	4280	023.9	0	3	40			00168	75	000 100	02000			100				3 small patches hi fines 3'x6'; 15'x5', 15'x5'
IV-B3A	4285	023.9	0	3	09	044	007	00308	47	100 000	11000				030	070		
IV-B4A	4290	023.8	0	3	99	105	010	01050	55	000 025	21000			090	010			sandy; Gravelly Wedge of fine fines
IV-B4B	4295	023.8	0	1	99	008	005	00040	55	100100	12201			030	035	035		poorly sorted
IV-B4C	4300	023.8	0	3	99	043	016	00688	57	100 000	02200				035	065		hi fines
IV-B4D	4305	023.8	0	3	99	030	021	00630	67	000000	02300				065	035		heavy fines
IV-B4E	4310	023.8	0	3	99	050	015	00750	57	100 000	02200				040	060		fines
IV-B7	4315	022.9	0	4	29			07676	47	100000	01100				100			fines
IV-B7A	4320	022.8	0	3	00	018	004	00072	44	100100	02100			030	070			
IV-B12	4325	022.8	0	3	00	035	012	00420	47	100 000	02100				065	035		
IV-B13	4335	021.9	2	6	03			08282	55	100 080	03220		020	070	010			heavy fines Dike Siding
IV-B13	4340	021.9	0	6	01	095	022	02090	55	100100	02302	030	005	040	020	015		X-Dike Siding stkd redds dewat; eggs/alv
IV-B15	4345	021.1	1	6	03			00606	66	100100	03020	030	020	040	010			heavy fines, used by resident trout
IV-B9	4315	022.9	1	4	39			9666	47	100 000	00101				050	050		
	4318	022.8	0	5	39			1108	47	100 000	01101				050	050		

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

Macks Canyon to Mouth

17/18

SPAWNING GRAVEL SURVEY

Stream Deschutes River Date 08-12-84 Discharge 4850 Survey by CWH, TT, JB

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	Factors Affecting Gravel Use: Quality	Usability	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
131	4365	012.2	0	7	09			17164	67	050 ? 000	12200				050	050		Just above Harris Canyon
132	4450	003.3	0	2	90	042	015	00630	66	075 075	02020			050	050			
133	4455	003.3	0	2	99			01010	55	100 100	22020			075	025			100SC
134	4460	003.3	0	2	99			08282	55	000100	22020			010	090			bar [illegible]; sthd maybe?

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY see 3 see 4 18/18

Stream DESCHUTES RIVER Date 09-13-84 Discharge 4430/4560 Survey by CWH TWB

Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE QUALITY	USABILITY	LIMITATIONS	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
3506	47.5	0	7	92			00350	74	000100	02100		050	050				[illegible]
3507	47.5	0	6	92			00250	33	100100	01100			070	030			a steelhead/dune here
3508	47.5	0	8	09			02819	47	000000	22001				100			very [illegible]
3509	47.5	0	7	92			01460	73	000100	01100			095	005			some steelhead [illegible]
4055	39.8	0	7	29			20,137	47	100000	02100				050	050		lots of sand* use verified by PN (cross) (P.H)

* NOTE: The habitat at Oak Springs is strongly affected by changes in discharge (i.e. % usability fluctuates considerably)

*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

SPAWNING GRAVEL SURVEY *

Stream Deschutes R. Date 11/84 Discharge — Survey by CWH

	Station No.	River Mile	Location in Stream			Bar Dimensions (feet) Length	Width	Total Bar Area (sq. ft.)	FACTORS AFFECTING GRAVEL USE Quality	Quantity	Limitations	Gravel Classes* (Per Cent) 0	I	II	III	IV	V	Remarks**
751L	1363	098.6	0	8	19			00500	47	000 000	00003	000	000	000	000	050	050	very coarse dune use unlikely
751M	1364	098.6	0	8	19			00500	77	000 000	00003				000	000	100	"
701	1025	099.9	1	8	29			03644	27	100 000	00001				025	075	000	coarse but apparently used by CHN
303	4345	021.1	1	8	29			11972	47	100 000	02202				050	050	000	15 + CHN redds 11/84
IE-99	4368	010.9	0	8	29			06246	47	100 000	02201				050	050		one CHN redd "
305A	4356	017.4	0	7	29			01562	47	100 000	02002				050	050		a few CHN redds "
306A	4361	017.2	0	8	29			02603	47	100 000	02201				050	050		numerous CHN redds "
IE 100	4367	011.1	0	9	29			55694	47	100 000	02101				050	050		23 CHN redds 11/84
914	4125	033.0	1	9	39			47887	47	100 000	02111				050	050		scattered CHN use suspected by ODFW

* ADJUSTMENTS TO PHOTOS BASED UPON PLANIMETRY OF AIR PHOTOS FOLLOWING SUPPLEMENTAL RECONNAISSANCE FROM A HELICOPTER (SECTION IV) AND FROM GROUND LEVEL (SECTION I)

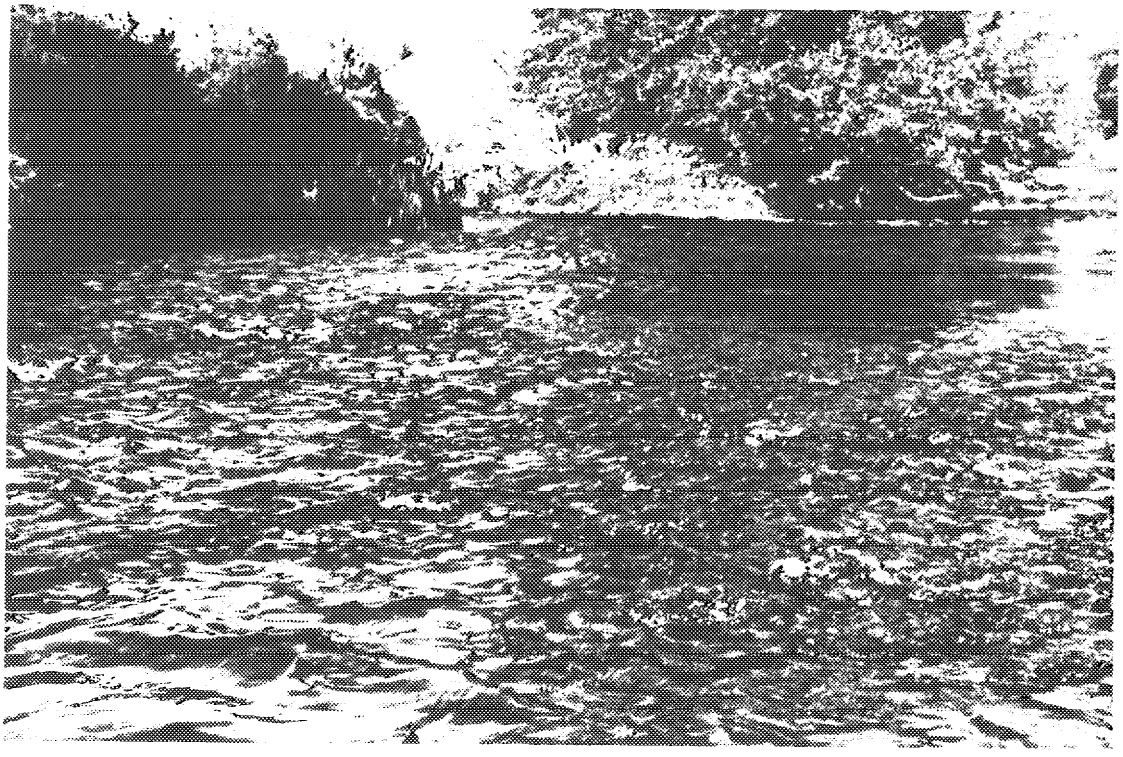
*GRAVEL CLASSES: 0 - less than ¼" diam. (silt and sand)
I - ¼ to 1" diam. (fine gravel)
II - 1" to 3" diam. (medium gravel)
III - 3" to 6" diam. (coarse gravel)
IV - 6" to 10" diam. (cobbles)
V - over 10" diam. (rubble and boulders)
Estimate percent of total gravel bar area in which each gravel class predominates.

**REMARKS: Note gravel compactness, occurence of aquatic vegetation, evidence of previous spawning, water velocities, etc., if pertinent.

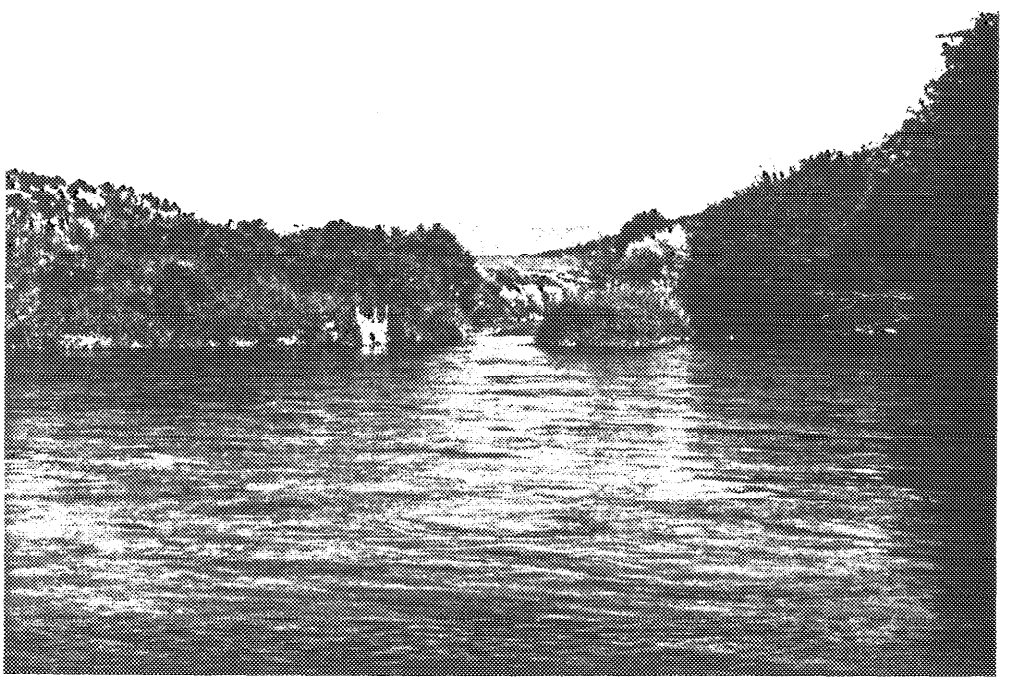
APPENDIX VIII

SELECTED PHOTOGRAPHS OF VEGETATIVE ENCROACHMENT OR SEDIMENTATION ON GRAVEL BARS IN THE DESCHUTES RIVER, OREGON.

This appendix contains photographs of sedimentation or vegetative encroachment at gravel bars in the Deschutes River, Oregon. The photos were taken by Buell & Associates personnel during the 1983 and 1984 sampling seasons.

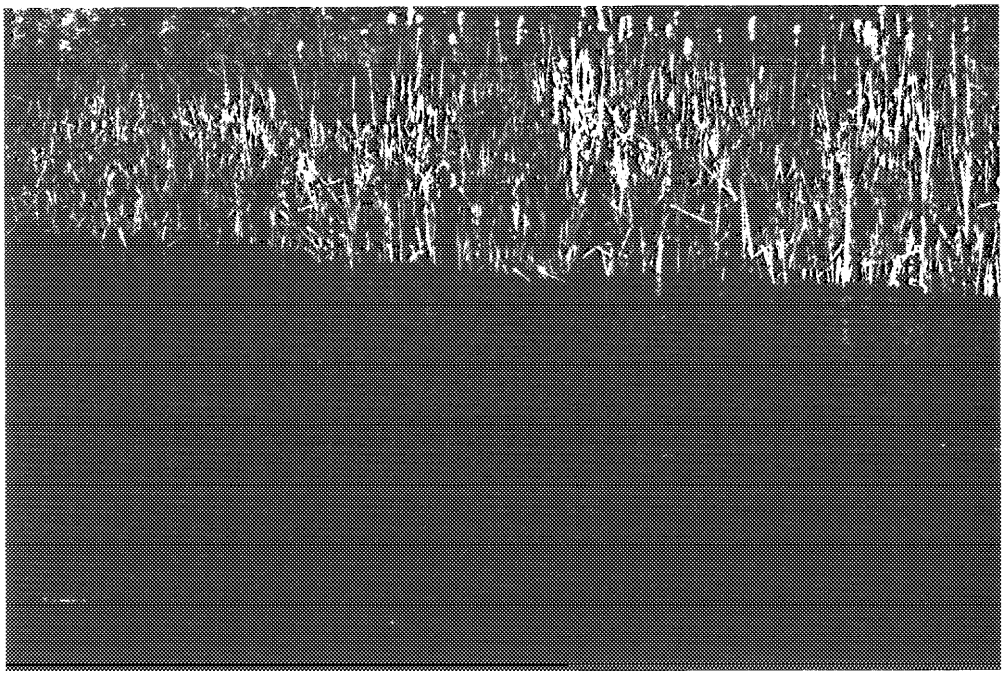


The upper left portion of this photo shows rooted emergent vegetation encroach-in upon a side channel in Study Section I.

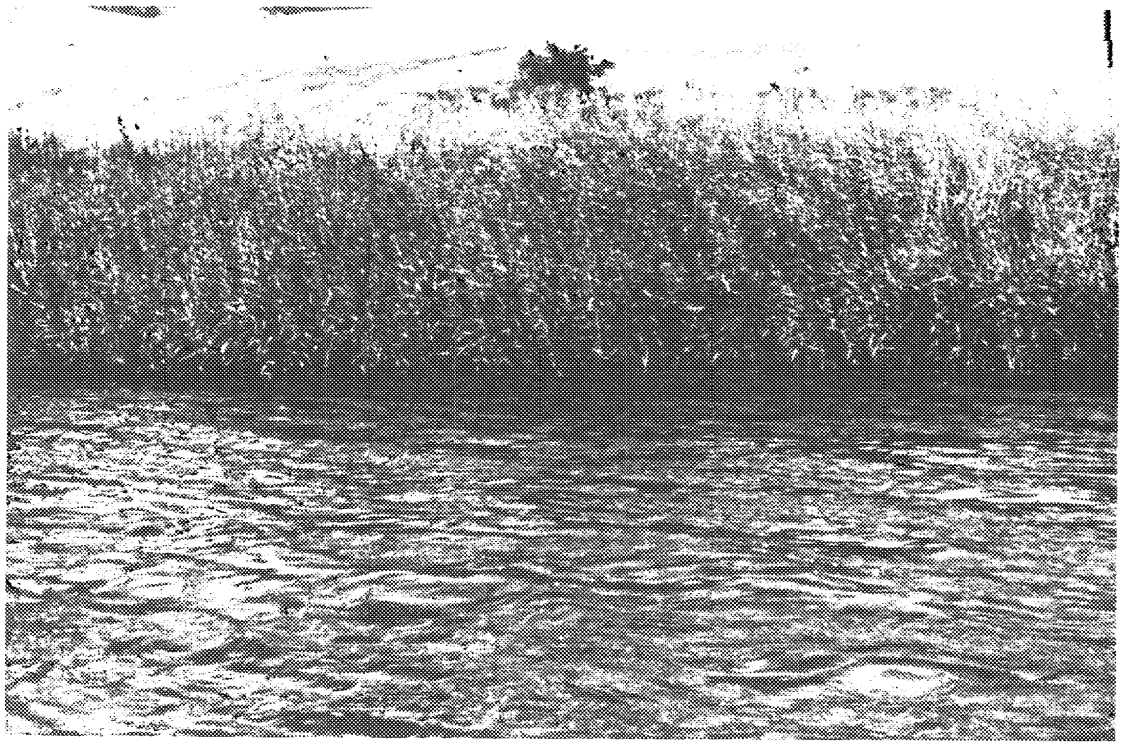


The small grassy island in this photo of the head of a side channel in Study Section II is the remnant of a large silt bar deposited by the 1964 flood.

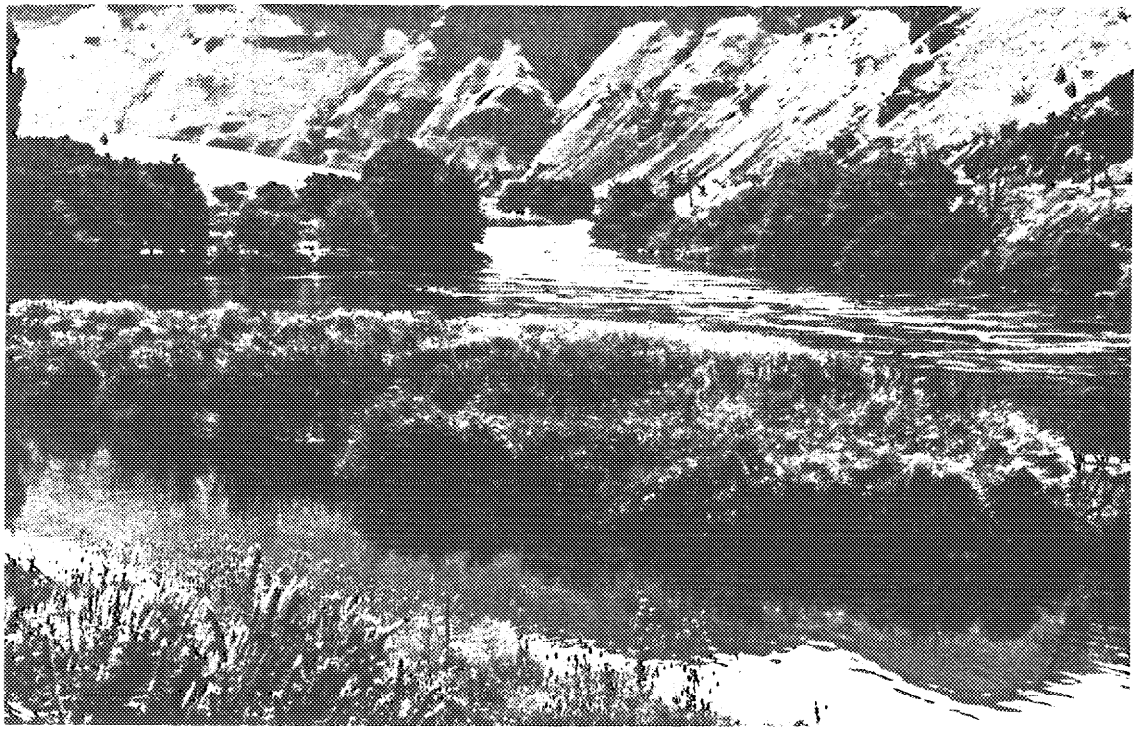
Aquatic vegetation can be found growing on a number of gravel bars in the lower Deschutes and was particularly abundant at this gravel bar (Station 19) in Study Section II.



Cattails encroaching on the Deschutes River channel in Study Section TI.



Riparian vegetation encroaching upon the Deschutes River channel in Study Section III.



This small island in Study Section III was once a gravel bar identified by the Oregon State Game Commission as a spawning area used by salmonid during the mid-1960's.

Deposits of sand and silt downstream from boulders in a depositional reach of the Deschutes River in Study Section IV.

APPENDIX IX

OSGC METHODOLOGY USED TO ESTIMATE USABLE SPAWNING GRAVEL AREA IN THE LOWER DESCHUTES RIVER, OREGON

The following algorithm summarizes the method used by the OSGC to estimate the surface area of usable spawning gravel present in Study Sections II, III and IV during the baseline study.

(1) Five one-mile reaches of the Deschutes River were inventoried for spawning gravel after the 1964 flood.

(2) During the inventory, a total of 25 gravel bars were counted in the five one-mile reaches.

(3) During the entire OSGC study, 38 gravel bars were identified in these same five one-mile reaches.

(4) The exact location of the five one-mile reaches is no longer known.

(5) "Usable spawning gravel" was defined as greater than 0.5 feet in water depth and had particle diameters "between 1/4 and 6-inch dominant." "Dominant" in this case means "dominating the size composition of surface gravels." According to the ODFW gravel classification scheme, this would include class I, class II and class III gravel.

(6) The surface area of usable spawning gravel in the "typical" or "average" spawning bar in the Deschutes River was calculated as the average of that present at the 25 gravel bars in (2).

(7) The mean surface area of usable spawning gravel found at the hypothetical "average" Deschutes River spawning bar was calculated to be approximately 4.050 square feet.

(8) Once the "average" spawning gravel bar in the Deschutes was defined, the area of usable spawning gravel in each Study Section was extrapolated using a mathematical expansion based on the number of gravel bars thought to be present in each Section.

(9) The equation used for the mathematical expansion of "usable spawning gravel" from the hypothetical "average" bar to a particular Study Section was:

N_i = (25/38) (4,050 ft2) ni

where,

N_i = estimated "usable spawning gravel" for Study Section "i"

n_i = number of gravel bars identified or located in Study Section "i" during the course of the ODFW baseline study.

(10) The "25/38" factor in (9)represents the proportion of all gravel bars in the five one-mile reaches after the 1964 flood that were found during the gravel inventory (see (2) and (3)). The factor accounts for the fact that not all of the gravel bars seen in a particular reach were present at any one particular time. During the OSGC Study new bars were formed and old ones disappeared. The "25/38" factor accounts for events like the 1964 flood.

(11) During the OSGC Study 79 gravel bars were identified in Study Section II, 124 in Section III, and 83 in Section IV.

(12) The "usable gravel area" calculations made for the lower three Study Sections were:

Section II NII = NII = (25/38) (4,050) (79) = 210,493 = 211,000sqft

Section III NIII= (25/38) (4,050) (124)= 330,395 = 331,000sqft

Section IV NIV = (25/38) (4,050) (83) = 221,151 = 221,000sqft

APPENDIX X

COMPARISON5 OF HISTORICAL AND RECENT DATA ON THE AMOUNT OF SALMONID SPAWNING GRAVEL PRESENT IN THE LOWER DESCHUTES RIVER, OREGON.

This appendix contains two tables which summarize compilations which were made of historical OSGC field data on the approximate surface areas of gravel deposits in the lower Deschutes River, Oregon. Table X-l contrasts the results of a compilation of the OSGC data based on subreaches of the river with similarly compiled results of the gravel inventory conducted in 1983 and 1984. Table X-2 compares historical estimates of the surface area of individual spawning gravel bars to current (1983-1984) estimates of the amount of spawning gravel at the same locations.

Table X-l. Estimates of the surface area (in square feet) of gravel suitable for use by spawning salmonids[a] in the lower Deschutes River based upon field data collected by the OSGC in the mid-1960's and upon the spawning gravel inventory conducted during this study (1983-1984)

Study Section	Reach	OSGC Field Data 1961-64	OSGC Field Data 1965	This Study 1983-84
II	Shitike Cr.-Trout Cr. (RM 96.8-87.2)	723,000	508,000	362,000
	Trout Cr-Warm Spr. River (RM 87.2-83.8)	446,000	216,000	184,000
III	Warm Spr. River-Whitehorse Rapids (RM 83.8-76.0)	155,000	382,000	81,000
	Whitehorse Rapids-Eagle Creek (RM 76.0-64.5)	512,000	172,000	126,000
	Eagle Creek- Nena Creek (RM 64.5-57.8)	306,000	142,000	52,000

a l/4 - 10" diameter materials dominant

Table X-2. Comparisons between OSGC field data on the surface area of spawning gravel present at specific Deschutes River locations before (1961-64) and after (1965-66)the 1964 flood, and with current estimates of the surface area of suitable spawning gravel present at these locations.

			SURE'ACE AREA (sq ft)		
			OSGC		
Section	Bar Number	RM	Pre-Flood (1961-64)	Post-Flood (1965-66)	Buell & Assoc. (1983-84)
II	4	95.6	27,700*	30,000*	500
	5	95.5	110,700*	7,400*	2,880
	8	94.9	33,200*	36,900*	26,460
	9	94.5	4,400*	9,100*	6,740
	10A	94 .0	13,600*	29,500*	3,240
	11	93.2	7,400*	29,500*	1,458
	15	91.0	14,800*	15,000*	3,899
	16	90.5	33,200*	15,000"	8,155
	19	88.5	18,200*	7,400*	4,282
	26	86.8	3,700*	2,100*	4,282
III	37	82.1	40,600*	20,000*	10,950
	43	80.4	25,800*	15,000*	0
	49	76.5	4,400*	10,000*	2,774
	50	74.9	6,600*	2,500*	0
	52C	72.9	29,500*	2,000*	0
	54	71.7	11,800*	440*	100
	58A	69.4	4,240*	1,100*	8,222
	68	64.5	4,400*	700*	0
	69	64.1	5,900*	1,250*	0
	73	61.7	92,300*	110,700*	27,332
	75	60.3	29,500*	400*	420
	78	58.6	18,500*	22,500*	0
I V	103	31.7	8,200*	2,200*	0
	104	31.3	196,800*	103,300*	40,399
	105B	28.8	131,200*	5,535*	0
	106A	28.2	12,300*	16,400*	3,939
	106B	28.1	28,700*	1,700*	2,525
	122	10.4	13,200*	4,400*	3,780

* The OSGC data presented here may be inaccurate because they were generally visual approximations of spawning area and not the result of direct measurements of gravel bar dimensions.

APPENDIX XI

SAMPLE POINT LOCATIONS, PREVAILING CONDITIONS, AND GRAVEL PERMEABILITY DATA FOR 23 STATIONS SAMPLED IN THE DESCHUTES RIVER, OREGON IN FALL 1983.

This appendix contains data collected when sampling gravel permeability in the lower Deschutes River, Oregon during 1983.

COLUMN DEFINITIONS FOR GRAVEL PERMEABILITY DATA

1. Station Code (5 digits)
   1 Study Section
   2-5 Station

2. Station (3 digits)
   l-3 Station

3. Date (6 digits)
   l-2 year
   3-4 month
   5-6 day

4. Temperature (3 digits)
   l-3 water temperature 10 x ^{o}C

5. Discharge (4 digits)
   l-4 CE'S

6. Sample (2 digits)
   l-2 sample number

7. Depth (3 columns)
   l-3 water depth to 0.1 ft.

8. Inflow (4 columns)
   l-4 inflow to 0.1 ml/sec.

9. Uncorrected Perm. (5 dig.)
   l-5 perm. in cm/hr

10. Corrected Perm. (5 dia.)
    l-5 perm. calibrated to $10^{o}C$

11. Remarks (3 digits)
    1 in redd (2); redd in dune (3); dune (4)
    2 no slurp (1); no slurp and turbid (2); turbid (3)
    3 next to veg. (1); in veg (2); high vel. (8); subsurface mud lens (9)

12. Location (9 columns)
    l-9 sample location = distance, ___, magnetic azimuth, origin

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
20100	013	631022	115	3350	1	0.5	0.8	35	34		
20100	010	631322	115	3950	2	1.1	10.3	900	863		
20100	010	631022	115	3950	3	1.4	1.7	68	65		
23133	010	631322	115	3950	4	1.2	0.4	18	17		
20133	010	631022	115	3 0 5 0	5	0.9	1.3	35	34		
20100	010	631022	115	3950	6	0.9	4.9	360	345		
20103	310	631322	115	3950	7	1.4	1.6	6d	65		
23733	010	631022	115	3950	8	0.9	9.8	a33	730		
20103	010	631022	115	3953	3	1.3	10.8	950	911		
20100	010	631022	115	3950	13	1.2	7.8	640	614		
20100	010	631322	115	3950	11	0.7	13.0	840	806		
20100	013	631022	115	3950	12	3.9	15.7	1520	1458		
20100	310	631022	175	3950	13	0.8	5.3	410	393		
20100	010	631022	115	3950	14	0.4	1.9	100	96		
20100	010	631022	115	3950	15	0.5	4.6	310	297		
20100	010	631322	115	3950	16	0.4	0.0	0	0		
20100	010	631022	115	3350	17	0.6	0.0	0	0		
20100	010	631022	115	3950	18	0.8	17.7	1760	1688		
20100	010	631022	115	3950	19	0.7	1.5	68	65		
20100	010	631322	115	3950	20	0.4	3.0	0	0		
20700	010	631022	115	3950	21	1.8	3.7	18	17		
20130	010	631022	115	3950	22	1.7	6.0	460	441		
20100	010	631022	115	3950	23	1.4	0.0	0			
20100	010	631022	115	3953	24	1.6	1.1	35	34		
20100	010	613324	130	3150	10	1.5	11.5	1010	923		
20100	010	640924	130	3150	7	0.3	0.0	0	0		
20100	010	640924	130	3150	Y	1.3	22.5	2390	2199		
20100	010	640924	133	3150	1	1.4	3.0	170	156		
20100	010	640924	130	3150	6	0.3	1.0	35	32		
20100	010	640924	130	3150	d	1.5	0.5	18	17		
20100	010	640924	130	3150	11	1.3	13.0	1175	1081		
20100	010	640924	130	3150	3	1.8	2.0	100	92		
20100	010	643424	130	3150	5	0.4	1.0	50	46		
20100	010	640924	130	3150	4	1.0	10.0	840	773		
20190	014	631022	120	3950	1	0.9	0.5	18	17		
20190	019	631022	120	3950	2	1.0	27.2	3050	2882		
20190	019	631022	120	3950	3	1.4	10.6	890	841		
20150	319	631322	120	3950	4	1.8	0.2	0	0		
20190	019	631022	120	3950	5	0.4	9.9	780	737		
20190	019	631022	120	3950	6	0.7	10.4	795	751		
20190	013	631022	120	3950	7	0.5	3.0	180	170		
213190	019	631322	120	3950	8	0.4	0.4	18	17		
20150	019	631022	123	3950	9	0.6	a.4	685	647		
20140	019	631022	120	3950	10	0.4	11.3	1010	954		
20190	019	631022	123	3950	11	0.6	2.3	135	128		
20190	019	631022	120	3450	12	0.7	0.2	0	0		
20130	019	631022	120	3950	13	0.5	0.0	-	0		
20190	019	631022	120	3950	14	0.7	1.6	68	64		
23190	013	641332	135	3200	1	0.6	4.0	260	236		
20190	019	641302	135	3200	2	0.0	20.0	2015	1830		
20130	013	641002	135	3200	3	0.0	14.5	1350	1226		
20190	019	641032	135	3200	4	3.0	14.0	1293	1171		
20190	014	641002	135	3200	5	0.0	2.5	148	134		
20190	019	641002	135	3200	o	0.0	0.0	3	0		
20190	019	641002	135	3233	7	0.0	0.0		0		
20193	019	641002	135	3200	8	0.0	1.3	50	45		
23133	019	641002	135	3200	9	0.0	8.5	685	622		

STATION CODE	STATION	DATE	TEMPERATUFE	DISCHACGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
20190	019	64 1002	135	3200	10	0.0	0.0	0			
20190	019	641002	135	3200	11	0.0	0.0	0			
30470	047	b31111	90	5200	1	1.6	15.0	1405	1446		
30470	047	631111	90	5200	2	1.9	4.3	310	319		
30470	047	031111	90	5200	3	0.5	4.3	310	319		
30470	047	631111	90	5230	4	1.4	14.3	1350	1339		
30470	ou7	631111	93	5200	5	1.5	5.4	410	422		
30470	047	631111	YO	5230	6	1.5	23.1	2450	2521		
30470	047	631111	90	5200	7	1.2	3.8	260	268		
30470	347	031111	90	5200	8	1.3	18.8	1880	1935		
30470	047	631111	90	5200	9	1.6	1.7	68	70		
30479	047	631111	90	5233	10	1.5	6.3	505	520		
30470	047	631111	90	5200	11	1.6	0.7	18	19		
30470	047	631111	90	5200	12	1.2	1.7	100	103		
30470	047	631111	90	5200	13	1.4	18.9	1880	1935		
30470	047	631111	90	5200	14	1.8	8.6	685	705		
30470	047	631111	90	5200	15	1.8	34.6	4325	4450		
30470	047	631111	90	5200	16	1.8	27.1	3050	3138		
30470	047	631111	90	5200	17	1.7	62.2	12000	12348		
30470	047	631111	90	5200	18	1.8	47.6	7400	7615		
30470	347	631111	90	5200	19	1.8	32.8	3980	4395		
30470	047	631111	90	5200	20	1.7	29.7	3425	3524		
30470	047	640925	140	3350	1	0.8	0.5	18	16		
30470	347	640925	143	3350	2	0.7	3.0	130	161		
30470	047	640925	140	3350	3	0.5	2.0	103	92		
30470	047	640925	140	3353	4	0.7	70.0	15800	14141	110	
30470	047	640925	140	3350	5	0.8	12.0	1060	949		
30470	047	040925	140	3350	6	1.5	19.0	1880	1633		
30470	047	640925	140	3350	7	0.7	49.5	7875	7048	100	
30473	047	640925	140	3350	8	0.9	39.0	5200	4654		
30470	047	640925	140	3350	9	0.7	6.5	505	452		
30470	047	640925	140	3350	10	0.3	5.5	410	367		
30470	047	640925	140	3350	11	0.4	1.0	50	45		
30581	058A	631002	145	4353	1	0.5	3.5	215	190		
06581	058A	631002	145	4350	2	0.2	2.1	100	88		
30581	0588	631002	145	4350	3	0.9	8.7	685	606		
30581	0588	631002	145	4350	4	0.5	17.3	1700	1503		
30581	058A	631002	145	4350	5	0.8	6.8	545	482		
30581	058A	631002	145	4350	6	1.1	18.5	1820	1609		
30581	058A	631002	145	4350	7	1.0	3.8	2b0	230		
30581	058A	631302	145	4350	8	1.3	32.5	3945	3487		
30581	05dA	637332	145	4350	9	1.7	15.4	1460	1241		
30581	058A	631302	145	4350	10	1.1	13.0	1180	1043		
30581	058A	631302	145	4350	11	1.2	30.3	3525	3116		
30581	058A	631302	145	4350	12	0.6	16.2	1525	1348		
30581	058A	631002	145	4350	13	0.8	0.0	0	0		
30581	058A	631002	145	4350	14	0.7	3.8	240	212		
30581	0588	631002	145	4350	15	0.6	5.7	460	437		
30581	058A	631002	145	4350	16	0.7	22.9	2375	2130		
30581	058A	640930	120	3100	1	0.2	3.0	180	170		
30581	058A	640930	120	3100	2	0.7	1.5	as	80		
30581	058A	640930	120	3100	3	1.1	16.0	1530	1446		
30581	058A	640930	123	3100	4	1.5	20.0	2000	1890		
30581	0588	640930	1213	310C	s	0.7	0.0				
30581	058A	640930	120	3100	6	0.5	0.0				
305dl	058A	640930	123	3100	7	0.4	12.0	1065	1066		
30581	05dA	640930	120	3100	1	0.9	5.i	410	387		

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
30581	058A	640930	120	3130	2	1.2	25.0	2750	2599		
30581	058A	640930	120	3100	3	0.3	2.0	100	94		
30581	058A	640930	120	3100	4	0.8	6.0	460	435		
30581	058A	640930	120	3130	5	1.5	17.5	1700	1606		
30581	058A	640930	120	3100	6	1.3	10.5	a90	841		
30581	058A	64 0330	120	3100	7	0.4	2.3	100	94		
30581	058A	640930	120	3100	a	0.4	4.5	310	293		
30581	058A	640930	120	3100	9	1.4	0.5	18	17		
30581	058A	640930	120	3100	10	1.2	45.0	6725	6355		
30581	058A	640333	120	3133	11	1.3	22.5	2375	2244		
30582	0586	631002	145	4350	1	0.2	0.0	0	0		
30582	058D	631002	145	4350	2	1.3	15.4	1465	1295		
30582	058B	631002	145	4350	3	1.1	11.9	1070	946		
30582	058B	631002	145	4350	4	1.0	11.3	950	840		
30582	058B	631002	145	4350	5	1.4	4.1	260	230		
30582	0588	631002	145	4350	6	0.8	0.0	0	0		
30582	058B	631002	145	4350	7	0.7	0.0	0	0		
30582	058B	631002	145	4350	8	0.5	12.0	1070	946		
30582	058B	631002	145	4350	9	0.5	1.1	68	60		
30582	058B	631002	145	4350	10	0.5	5.6	460	407		
30582	058B	631024	110	4250	1	0.3	2.2	100	97		
30582	058B	631024	110	4250	2	1.1	8.7	735	714		
30582	058B	631024	110	4250	3	1.1	38.2	5000	4860		
30582	058B	631024	110	4250	4	3.9	5.6	410	399		
30582	058B	631024	110	4250	5	1.2	13.5	1235	1200		
30582	058B	631024	110	4250	6	0.5	1.8	100	97		
30582	058B	631024	110	4250	7	0.7	1.8	100	97		
30582	058B	631024	110	4250	8	0.5	12.3	1125	1094		
30582	058B	631024	110	4250	9	0.1	0.1	0	0		
30582	058B	631024	110	4250	10	0.5	5.7	410	399		
30582	058B	640930	123	3100	1	0.1	4.5	310	293		
30582	0588	643930	120	3100	2	1.3	15.0	1405	1328		
30582	058B	640930	120	3100	3	0.6	0.5	18	17		
30582	058B	640930	120	3130	4	0.7	8.5	685	647		
30582	058B	640930	120	3130	5	1.0	8.0	640	605		
30582	058B	640930	120	3100	6	0.2	0.5	18	17		
30582	058B	640930	120	3100	7	0.5	1.5	68	64		
30582	058B	640930	120	3130	8	0.3	1.5	68	64		
30582	058B	640930	120	3100	9	0.0	5.0	370	350	030	
30582	058B	640930	120	3130	10	0.3	2.0	100	94		
30582	0588	651022	110	4300	2	0.2	3.0	0	0		
30582	058B	651022	110	4300	4	0.7	6.5	505	491		
30582	058B	651022	110	4300	6	0.7	2.0	100	97		
30583	058C	631024	110	4250	1	1.1	3.9	265	258		
30583	058C	631024	110	4250	2	1.2	4.9	360	350		
30583	058C	631024	110	4250	3	1.1	1.4	68	66		
30583	058C	631024	110	4250	4	1.2	3.7	230	224		
30583	058C	631324	110	4250	5	1.1	0.8	35	34		
30583	058C	631024	110	4250	6	1.1	0.9	35	34		
30583	058C	631024	110	4250	7	1.0	3.5	215	209		
30583	058C	631024	110	4250	8	1.1	0.0	0	0		
30583	058C	631024	110	4250	9	0.9	2.4	135	131		
30583	058C	631024	110	4250	10	1.0	3.9	265	258		
30583	058C	631024	110	4250	11	0.9	1.2	68	66		
30583	058C	631024	113	4250	12	1.0	16.8	1640	1594		
30583	058C	631024	110	4250	13	1.2	lu.8	1400	1301		
30583	0535	631024	110	4250	14	1.1	3.3	180	17s		

STATION CODE	S TATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
30583	35aC	631324	113	4250	15	1.0	6.2	460	447		
30583	058C	63 1024	110	4250	16	1.7	7.5	595	578		
30583	058C	631024	110	4250	17	1.4	7.0	550	535		
30583	058C	631024	110	4250	18	1.2	12.2	1120	1039		
30583	058C	631024	110	4250	19	1.2	30.5	3585	3485		
30583	058C	631024	110	4250	20	1.4	4.9	360	350		
30584	058D	631324	110	4250	1	1.8	10.5	890	865		
30584	058D	631024	110	4250	2	1.7	1.5	68	66		
30584	058D	631324	110	4250	3	1.6	1.6	68	66		
30584	058D	631024	110	4250	4	1.4	4.0	260	253		
30584	058D	631024	110	4250	5	1.6	36.3	4720	4588		
30584	05dD	631024	110	4250	6	1.3	58.8	10550	10255	010	
30584	058D	631024	110	4250	7	1.0	58.0	13400	10109	010	
30584	058D	631024	110	4250	8	1.4	0.2	0	0		
30584	058D	631024	110	4250	9	1.0	31.3	3790	3684		
30584	0580	631024	110	4250	10	1.0	64.2	12600	12247	010	
30584	058D	631024	110	4250	11	1.6	64.0	12600	12247		
30584	058D	631024	110	4250	12	1.0	38.5	5100	4957		
30584	058D	631024	110	4250	13	0.8	4.1	265	258		
30584	058D	631024	110	4250	14	1.2	0.5	18	17		
30584	058D	631024	110	4250	15	0.8	24.7	2750	2673		
30584	058D	631024	110	4250	16	0.3	62.3	11800	11470	010	
30584	058D	640930	135	3100	1	1.4	11.0	950	863		
30584	058D	640930	135	3100	2	1.3	0.5	435	443		
30584	058D	640930	135	3100	3	1.0	33.0	4040	3668		
30584	058D	640930	135	3100	4	0.5	22.0	2300	2088		
30584	058D	640930	135	3100	5	0.9	2.0	130	118		
30584	058D	640930	135	3130	6	0.4	22.5	2390	2170		
30584	058D	640930	135	3100	7	1.5	18.5	1823	1653		
30610	061	643930	135	3100	1	0.7	3.0	170	154		
30610	001	640930	135	3100	2	0.6	2.5	135	123		
30610	001	640930	135	3100	3	0.7	3.5	215	195		
30610	061	640930	135	3100	4	0.5	2.0	100	91		
30610	061	040930	135	3100	s	0.7	5.0	370	336		
30610	061	640930	135	3100	6	0.7	6.5	505	459		
30610	061	640930	135	3100	7	0.8	0.0	0	0		
30610	061	640930	135	3100	8	0.7	0.0	0	0		
30730	073	651022	115	4300	1	0.7	24.5	2675	2565		
30730	073	651022	115	4300	5	0.7	17.5	1700	1630		
30730	073	651022	115	4300	6	1.3	7.0	550	527		
30730	073	651022	115	4300	10	1.0	1.0	50	48		
30890	089	631023	115	4300	1	1.6	27.5	3125	2997		
30890	089	631023	115	4300	2	1.8	57.1	10100	9686	010	
30890	089	631023	115	4300	3	1.5	20.1	2015	1932		
30890	089	631023	115	4300	4	1.4	16.9	1580	1515		
30890	089	631023	115	4300	5	1.5	19.9	18a0	1803		
30890	089	631023	115	4300	6	1.6	10.3	830	736		
41140	114	631025	110	4380	1	0.4	11.0	955	928		
41140	114	631025	110	4380	2	0.5	7.4	595	578		
41140	114	631025	110	4380	3	0.5	0.8	35	34		
41140	114	631025	110	4380	4	0.4	4.6	310	301		
41140	114	631025	110	4380	5	0.4	1.4	68	66		
41140	114	631325	110	4380	6	0.5	1.9	100	97		
41140	114	631025	110	4380	7	0.6	0.0	0	0		
41143	114	631025	110	4330	8	0.4	5.8	410	399		
41140	114	631025	110	4380	9	0.6	3.6	215	209		
41143	114	631325	110	4380	10	0.9	1.9	100	97		

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
41140	114	631325	110	4380	11	3.7	3.0	183	175		
41140	114	631025	110	4380	12	0.6	0.1	0	0		
41140	114	631025	113	4380	13	0.8	b.8	550	535		
41140	114	631025	110	4380	14	1.1	0.0	3	0		
41140	114	031325	110	4380	15	1.0	6.6	505	491		
41140	114	631025	110	4380	16	0.8	5.1	360	350		
41140	114	631325	113	4380	17	1.2	33.5	5300	5152		
41140	114	631025	110	4380	18	0.9	4.0	260	253		
41140	114	631025	110	4380	19	1.4	9.1	730	710		
41140	114	631025	110	4380	20	1.7	4.4	315	306		
41143	114	631025	110	4380	21	1.3	3.7	215	209		
41140	114	631025	110	4380	22	1.0	5.3	360	353		
41140	114	631025	110	4380	23	1.3	2.4	135	131		
41140	114	631025	110	4380	24	1.4	16.9	1640	1594		
41140	114	631325	110	4380	25	1.0	(3.4	18	17		
41140	114	631025	110	4380	26	0.8	0.8	50	49		
41140	114	631025	110	4380	27	0.9	3.3	170	165		
41140	114	631025	110	4380	28	0.7	0.0	0	0		
41140	114	641301	135	0	1	0.2	2.0	100	91		
41140	114	641001	135	0	2	0.2	6.0	460	418		
41140	114	641001	135	0	3	0.3	4.5	310	28 1		
41140	114	641001	135	0	4	0.2	3.5	215	195		
41140	114	641001	135	0	5	0.5	2.0	100	91		
41140	114	641001	135	0	6	0.7	5.5	405	368		
41140	114	641001	135	0	7	0.9	6.5	505	459		
41140	114	641001	135	0	8	0.4	1.5	68	62		
41220	122	631025	115	4380	1	0.7	15.0	1400	1343		
41220	122	631025	115	4380	2	0.6	13.5	1235	1184		
41220	122	631025	115	4380	3	0.6	1.3	68	65		
41220	122	631025	115	4380	4	0.8	0.1	0	0		
41220	122	631025	115	4380	5	0.6	2.5	135	129		
41220	122	631025	115	4380	6	0.7	0.0	0	0		
41220	122	631025	115	4380	7	1.3	2.8	180	173		
41220	122	631025	115	4380	8	0.8	0.2	0	0		
41220	122	631025	115	4380	9	1.4	0.8	35	34		
41220	122	631025	115	4380	10	0.0	0.1	0	0		
41220	122	631025	115	4380	11	0.6	0.9	35	34		
41220	122	631025	115	4380	12	1.0	1.4	35	34		
41220	122	631025	115	4380	13	0.8	14.3	1350	1295		
41220	122	631025	115	4380	14	1.4	5.6	460	441		
41220	122	631025	115	4380	15	1.5	6.8	550	527		
41220	122	631025	115	4380	16	1.7	68.0	14600	14001		
41220	122	631025	115	4383	17	1.5	13.6	1235	1184		
41220	122	641001	140	0	1	0.3	0.5	18	16		
41220	122	641001	140	0	2	0.2	2.0	103	92		
41220	122	641001	140	0	3	0.5	3.5	230	206		
41220	122	641001	140	0	4	0.2	3.0	170	152		
41220	122	641001	140	0	5	0.3	5.5	410	367		
41220	122	641001	140	0	6	0.4	0.0	0	0		
41220	122	641001	140	0	7	0.2	5.0	373	331		
41220	122	641301	140	0	8	0.5	0.0	0	0		
41230	123	631112	100	5400	1	1.3	47.0	7250	7250		
41230	123	631112	100	5400	2	1.1	9.8	830	830		
41230	123	631112	100	5400	3	1.3	4.7	360	360		
41230	123	631112	100	5400	4	1.5	23.5	2525	2525		
41230	123	631112	100	5400	5	1.0	7.8	640	640		
41230	123	631112	100	5400	6	1.5	15.6	1460	1460		

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
41230	123	631112	100	5400	7	1.2	5.4	363	360		
41230	123	631112	100	5400	8	1.3	10.2	840	840		
41230	123	631112	100	5400	9	1.2	3.1	180	180		
41230	123	631112	100	5400	10	1.4	1.4	68	68		
41230	123	631112	103	5400	11	0.13	6.5	500	500		
41230	123	631112	100	5400	12	1.3	3.8	260	260		
41230	723	631112	100	54J0	13	1.4	2.1	100	100		
41230	123	631301	140	0	1	0.6	6.5	505	452		
41230	123	641001	140	0	2	0.8	4.5	315	282		
41230	123	641301	143	0	3	0.3	5.5	410	367		
41230	123	641001	140	0	4	0.1	4.5	310	277		
41230	123	641001	140	0	5	0.4	3.0	170	152		
41230	123	641001	140	0	6	0.5	4.5	315	282		
41230	123	641001	140	0	7	0.4	4.5	315	282		
41230	123	641001	143	0	a	0.6	3.0	183	161		
41230	123	641001	140	0	9	1.0	5.0	300	322		
15010	so1	643924	130	0	1	0.3	0.3	0	0		
15010	501	640924	130	0	2	0.0	15.0	1405	1293		
15010	501	640924	133	0	3	3.0	20.5	2105	1937		
15010	501	640924	130	0	4	0.0	21.5	2225	2047		
15010	501	640924	130	0	5	0.0	42.0	6000	5520		
15010	501	643324	130	0	6	0.0	1.5	68	63		
15010	501	640924	130	0	7	0.0	6.0	460	423		
15010	531	640924	130	0	10	0.0	3.0	180	166		
15010	501	040924	130	0	11	0.0	30.5	3585	3298		
15010	501	651020	115	0	1	1.3	13.0	1180	1132	200	
15310	501	651020	115	0	2	1.7	11.5	1005	964		
15010	501	651020	115	0	3	1.0	28.0	3200	3069	200	
15010	501	651023	115	0	4	1.1	35.0	4420	u239		
15010	501	651020	115	0	5	1.1	49.0	777s	7456	230	
15010	501	651020	115	0	6	0.7	4.5	310	297		
15010	501	651020	115	0	7	1.4	30.5	3585	3438		
15010	501	651020	115	0	8	1.4	22.0	2300	2206		
15010	501	051020	115	0	9	1.0	6.0	460	441		
15010	501	651020	115	0	13	0.7	72.0	16200	15536	200	
15010	501	830522	140	4570	1	1.0	43. a	6450	5773	410	4_250P1
15010	501	830922	140	4570	2	1.1	21.4	2240	2005	430	4_323P1
15010	501	830922	140	4570	3	1.0	40.5	5525	4945	410	8_323P1
15010	501	830922	140	4570	4	1.1	6.5	505	452	400	4_118P1
15010	501	830922	140	4570	5	0.8	5.3	405	362	400	8_118P1
15010	501	830922	140	4570	6	1.2	12.6	1180	1056	400	4_184P1
15010	501	830922	140	4570	7	1.1	7.5	595	533	400	8_184P1
15010	501	830922	140	4570	8	0.8	12.2	1120	1002	400	4_10P2
15010	501	830922	140	4570	9	1.0	11.6	1010	904	400	8_10P2
15010	501	830922	143	4570	10	0.8	4.3	310	277	400	12_10P2
15010	501	830922	140	4570	11	0.7	34.8	4425	3960	430	16_10P2
15010	501	830922	140	4570	12	0.7	4.4	310	277	400	6_185P2
15010	501	8309 22	140	4570	13	0.5	24.5	2715	2430	430	10_185P2
15010	501	830922	140	4570	14	0.4	19.2	1895	1696	400	14_185P2
15010	501	830922	143	4570	15	1.1	48.5	7625	6824	410	10_90P3
15010	501	830922	140	4570	16	0.7	40.8	5725	5124	410	14_90P3
15010	501	830922	143	4570	17	0.7	34.8	4375	3916	430	18_90P3
15010	501	830922	140	4570	18	1.1	24.4	2675	2394	430	10_60P3
15010	501	830922	140	4570	19	0.8	16.9	1580	1414	400	14_60P3
15010	501	830322	140	4570	20	0.9	27.9	3125	2797	430	18_60P3
15020	502	833322	145	4570	1	1.6	23.4	2000	1768	uoo	4_100P1
15323	502	830922	145	4570	2	1.5	47.2	7250	6409	410	8_100P1

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
15020	502	830922	145	4570	3	1.9	13.4	1235	1092	400	12_100P1
15020	502	830922	145	4570	4	1.9	7.8	595	526	400	16_100P1
15020	502	830922	145	4570	5	1.5	13.2	1235	1092	400	20_100P1
15020	502	830922	145	4570	6	1.3	6.2	460	407	400	24_100P1
15020	502	830922	145	4570	7	0.9	26.8	3050	2696	330	28_100P1
15020	502	830922	145	4570	8	1.8	8.6	685	606	400	4_110P2
15020	502	830922	145	4570	9	1.5	25.3	2750	2431	400	8_110P2
15020	502	830922	145	4570	10	1.2	8.7	735	650	400	12_110P2
15020	502	830922	145	4570	11	1.2	44.9	6700	5923	410	16_110P2
15020	502	830922	145	4570	12	1.5	47.5	7375	6520	410	20_110P2
15020	502	830922	145	4570	13	1.8	42.4	6050	5348	410	24_110P2
15020	502	830922	145	4570	14	2.0	5.1	360	318	000	28_110P2
15020	502	830922	145	4570	15	2.1	41.0	5650	4995	410	3_306P3
15020	502	830922	145	4570	16	2.0	15.6	1460	1291	000	7_306P3
15020	502	830922	145	4570	17	1.6	46.3	7125	6299	410	11_306P3
15020	502	830922	145	4570	18	1.9	8.6	685	606	400	4_70P3
15020	502	830922	145	4570	19	2.0	42.6	6050	5348	400	8_70P3
15020	502	830922	145	4570	20	2.2	38.0	5000	4420	400	_P3
15040	504	830921	145	4230	1	0.9	5.8	455	402	000	22_158P3
15040	504	830921	145	4230	2	0.6	21.2	2150	1901	030	26_158P3
15040	504	830921	145	4230	3	0.8	22.3	2375	2100	000	27_180P3
15040	504	830921	145	4230	4	1.2	5.1	360	318	000	23_180P3
15040	504	830921	145	4230	5	1.2	7.0	550	486	000	19_180P3
15040	504	830921	145	4230	6	1.3	43.4	6325	5591	010	15_180P3
15040	504	830921	145	4230	7	1.3	6.2	460	407	030	11_180P3
15040	504	830921	145	4230	8	1.0	9.3	780	690	430	6_354P2
15040	504	830921	145	4230	9	0.9	16.0	1520	1344	430	10_354P2
15040	504	830921	145	4230	10	0.9	16.8	1580	1397	430	14_354P2
15040	504	830921	145	4230	11	1.4	7.6	640	566	430	18_354P2
15040	504	830921	145	4230	12	0.6	14.7	1410	1246	400	4_136P2
15040	504	830921	145	4230	13	0.8	9.6	780	690	400	8_136P2
15040	504	830921	145	4230	14	0.5	41.0	5650	4995	310	12_136P2
15040	504	830921	145	4230	15	1.1	10.8	890	787	400	10_168P1
15040	504	830921	145	4230	16	1.0	28.6	3275	2895	400	14_168P1
15040	504	830921	145	4230	17	0.8	2.9	170	150	400	18_168P1
15040	504	830921	145	4230	18	1.6	44.1	6450	5702	411	9_100P1
15040	504	830921	145	4230	19	0.8	39.8	5325	4707	430	13_100P1
15040	504	830921	145	4230	20	0.8	1.1	35	31	400	17_100P1
15071	507A	830920	140	4230	1	2.2	41.2	5800	5191	410	16_172P1
15071	507A	830920	140	4230	2	2.2	24.6	2675	2394	400	4_145P1
15071	507A	830920	140	4230	3	1.8	6.0	460	412	400	8_145P1
15071	507A	830920	140	4230	4	1.6	50.5	8225	7361	410	4_50P1
15071	507A	830920	140	4230	5	1.3	26.7	2975	2663	400	8_50P1
15071	507A	830920	140	4230	6	2.4	9.8	840	752	400	4_356P1
15071	507A	830920	140	4230	7	1.8	29.1	3375	3021	400	8_356P1
15071	507A	830920	140	4230	8	1.1	34.0	4235	3790	400	4_18P2
15071	507A	830920	140	4230	9	1.6	7.8	640	573	400	8_18P2
15071	507A	830920	140	4230	10	1.2	24.3	2675	2394	400	4_130P2
15071	507A	830920	140	4230	11	1.0	16.0	1520	1360	430	8_130P2
15071	507A	830920	140	4230	12	1.4	6.4	460	412	400	4_170P2
15071	507A	830920	140	4230	13	1.6	42.0	5900	5280	400	8_170P2
15071	507A	830920	140	4230	14	1.7	14.9	1350	1208	400	12_170P2
15071	507A	830920	140	4230	15	1.8	11.4	1010	904	400	4_180P3
15071	507A	830920	140	4230	16	2.1	51.6	8450	7563	400	8_180P3
15071	507A	830920	140	4230	17	1.7	15.8	1465	1311	000	4_330P3
15071	507A	830920	140	4230	18	1.7	3.4	215	192	000	8_330P3
15071	507A	830920	140	4230	19	1.6	8.4	640	573	400	4_150P3

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
15071	507A	830920	140	4230	20	1.5	45.1	6725	6019	410	8_150P3
15081	508A	830920	140	4230	1	1.6	18.9	1895	1696	000	4_170P1
15081	508A	830920	140	4230	2	1.8	1.1	35	31	000	8_170P1
15081	508A	830920	140	4230	3	1.3	27.8	3200	2864	000	4_115P1
15081	508A	830920	140	4230	4	1.6	46.2	6975	6243	010	8_115P1
15081	508A	830920	140	4230	5	1.7	16.7	1580	1414	000	12_115P1
15081	508A	830920	140	4230	6	1.7	13.1	1180	1056	000	16_115P1
15081	508A	830920	140	4230	7	1.8	6.3	460	412	000	20_115P1
15081	508A	830920	140	4230	8	1.5	16.0	1520	1360	000	4_116P2
15081	508A	830920	140	4230	9	1.6	10.9	950	850	000	8_116P2
15081	508A	830920	140	4230	10	1.9	10.2	830	743	000	4_272P2
15081	508A	830920	140	4230	11	2.0	25.0	2750	2461	000	8_272P2
15081	508A	830920	140	4230	12	1.7	10.7	890	797	000	4_352
15081	508A	830920	140	4230	13	1.8	22.4	2375	2126	000	4_210P2
15081	508A	830920	140	4230	14	2.0	10.9	950	850	000	8_210P2
15081	508A	830920	140	4230	15	2.3	33.7	4230	3786	400	4_75P3
15081	508A	830920	140	4230	16	1.8	12.9	1180	1056	400	8_75P3
15081	508A	830920	140	4230	17	1.6	38.2	5000	4475	410	12_75P3
15081	508A	830920	140	4230	18	1.5	31.1	3760	3365	400	16_75P3
15081	508A	830920	140	4230	19	1.5	20.1	2045	1830	400	20_75P3
15081	508A	830920	140	4230	20	1.6	45.7	6850	6131	400	24_75P3
20050	II5	830930	140	5075	1	1.4	18.6	1820	1629	000	4_360P1
20050	II5	830930	140	5075	2	1.4	25.8	2900	2595	000	8_360P1
20050	II5	830930	140	5075	3	1.1	23.4	2525	2260	030	4_200P1
20050	II5	830930	140	5075	4	1.0	28.5	3275	2931	030	8_200P1
20050	II5	830930	140	5075	5	1.0	21.6	2255	2018	000	4_120P1
20050	II5	830930	140	5075	6	1.1	13.1	1180	1056	000	8_120P1
20050	II5	830930	140	5075	7	1.1	45.8	6975	6243	210	6_30P2
20050	II5	830930	140	5075	8	0.7	14.8	1400	1253	000	4_182P2
20050	II5	830930	140	5075	9	0.6	12.0	1070	958	030	8_182P2
20050	II5	830930	140	5075	10	1.0	16.9	1580	1414	030	4_270P2
20050	II5	830930	140	5075	11	1.1	13.2	1235	1105	000	8_270P2
20050	II5	830930	140	5075	12	1.0	26.0	2900	2595	000	4_360P2
20050	II5	830930	140	5075	13	1.3	30.0	3525	3155	000	8_360P2
20050	II5	830930	140	5075	14	1.1	22.8	2375	2126	030	4_266P3
20050	II5	830930	140	5075	15	1.0	19.0	1880	1683	000	4_194P3
20050	II5	830930	140	5075	16	1.0	14.0	1290	1155	030	8_194P3
20050	II5	830930	140	5075	17	1.1	19.0	1880	1683	000	4_360P3
20050	II5	830930	140	5075	18	1.2	21.4	2225	1991	000	8_360P3
20050	II5	830930	140	5075	19	1.0	22.2	2300	2058	030	4_102P3
20050	II5	830930	140	5075	20	1.1	21.0	2150	1924	030	8_102P3
20100	010	830923	140	5035	1	1.0	0.7	35	31	000	4_210P1
20100	010	830923	140	5035	2	1.2	2.1	100	89	000	8_210P1
20100	010	830923	140	5035	3	1.5	1.2	35	31	000	4_290P1
20100	010	830923	140	5035	4	1.2	2.1	100	89	000	8_290P1
20100	010	830923	140	5035	5	1.6	1.7	68	61	000	4_20P1
20100	010	830923	140	5035	6	1.4	6.2	505	452	000	8_20P1
20100	010	830923	140	5035	7	1.5	0.9	35	31	000	4_85P1
20100	010	830923	140	5035	8	1.1	6.4	460	412	000	4_160P2
20100	010	830923	140	5035	9	1.2	2.9	170	152	000	8_160P2
20100	010	830923	140	5035	10	1.2	6.0	460	412	000	4_280P2
20100	010	830923	140	5035	11	0.9	4.5	310	277	200	8_280P2
20100	010	830923	140	5035	12	1.0	1.9	100	89	000	4_80P2
20100	010	830923	140	5035	13	1.1	2.6	170	152	000	8_80P2
20100	010	830923	140	5035	14	1.6	14.3	1290	1155	000	4_140P3
20100	010	830923	140	5035	15	1.8	1.3	68	61	000	8_140P3
20100	010	830923	140	5035	16	1.5	2.7	170	152	000	4_50P3

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
20100	010	830923	140	5035	17	1.5	4.1	260	233	000	8_50P3
20100	010	830923	140	5035	18	1.1	1.2	35	31	200	6_325P3
20100	010	830923	140	5035	19	1.8	0.7	35	31	000	4_245P3
20100	010	830923	140	5035	20	1.5	3.6	215	192	000	8_245P3
20101	10A	830929	140	5150	1	1.4	1.0	35	31	000	4_220P1
20101	10A	830929	140	5150	2	1.5	2.1	100	89	000	4_300P1
20101	10A	830929	140	5150	3	1.5	18.9	1820	1629	000	8_300P1
20101	10A	830929	140	5150	4	1.0	2.6	170	152	000	4_35P1
20101	10A	830929	140	5150	5	1.4	7.0	550	492	000	8_35P1
20101	10A	830929	140	5150	6	1.3	1.9	100	89	000	4_120P1
20101	10A	830929	140	5150	7	1.4	1.9	100	89	000	8_120P1
20101	10A	830929	140	5150	8	1.1	1.4	35	31	000	4_300P2
20101	10A	830929	140	5150	9	1.2	2.4	100	89	000	8_300P2
20101	10A	830929	140	5150	10	1.2	17.0	1640	1468	030	4_250P2
20101	10A	830929	140	5150	11	1.2	2.3	100	89	000	8_250P2
20101	10A	830929	140	5150	12	1.3	10.6	890	797	000	4_140P2
20101	10A	830929	140	5150	13	1.3	8.1	640	573	000	8_140P2
20101	10A	830929	140	5150	14	1.4	2.3	100	89	000	4_250P3
20101	10A	830929	140	5150	15	1.3	19.0	1880	1683	000	8_250P3
20101	10A	830929	140	5150	16	1.4	1.7	100	89	000	4_310P3
20101	10A	830929	140	5150	17	1.3	10.3	830	743	000	8_310P3
20101	10A	830929	140	5150	18	1.4	8.6	685	613	000	4_120P3
20101	10A	830929	140	5150	19	1.2	10.1	830	743	000	4_45P3
20101	10A	830929	140	5150	20	1.4	8.4	685	613	000	8_45P3
20110	011	830929	140	5150	1	2.6	4.3	260	233	000	4_360P1
20110	011	830929	140	5150	2	2.6	7.0	550	492	000	8_360P1
20110	011	830929	140	5150	3	2.4	20.7	2090	1871	000	4_42P1
20110	011	830929	140	5150	4	1.8	14.2	1290	1155	000	8_42P1
20110	011	830929	140	5150	5	2.5	24.2	2675	2394	000	4_101P1
20110	011	830929	140	5150	6	2.7	16.9	1640	1468	000	8_101P1
20110	011	830929	140	5150	7	2.2	39.0	5255	4703	020	4_241P2
20110	011	830929	140	5150	8	2.2	38.8	5275	4721	020	8_241P2
20110	011	830929	140	5150	9	2.1	24.4	2600	2327	000	4_312P2
20110	011	830929	140	5150	10	2.1	23.2	2525	2260	000	8_312P2
20110	011	830929	140	5150	11	1.9	18.5	1820	1629	030	4_8P2
20110	011	830929	140	5150	12	2.0	26.1	2900	2595	030	8_8P2
20110	011	830929	140	5150	13	2.1	21.1	2150	1924	030	4_125P2
20110	011	830929	140	5150	14	1.5	19.1	1910	1709	000	4_324P3
20110	011	830929	140	5150	15	1.5	25.8	2825	2528	000	8_324P3
20110	011	830929	140	5150	16	1.7	19.7	1940	1736	000	4_133P3
20110	011	830929	140	5150	17	1.6	5.8	460	412	000	4_60P3
20110	011	830929	140	5150	18	1.7	8.6	685	613	000	8_60P3
20110	011	830929	140	5150	19	1.8	32.9	3980	3562	030	4_334P3
20110	011	830929	140	5150	20	1.9	15.7	1520	1360	030	8_334P3
20190	019	830927	140	5090	1	1.4	8.1	685	613	001	4_270P1
20190	019	830927	140	5090	2	1.4	3.5	215	192	000	8_270P1
20190	019	830927	140	5090	3	1.1	2.5	135	121	000	4_30P1
20190	019	830927	140	5090	4	1.2	0.4	0	0	002	8_30P1
20190	019	830927	140	5090	5	1.2	12.4	1120	1002	030	4_215P1
20190	019	830927	140	5090	6	1.3	1.0	35	31	001	8_215P1
20190	019	830927	140	5090	7	0.9	3.6	215	192	000	4_110P1
20190	019	830927	140	5090	8	0.8	17.7	1700	1521	000	4_295P2
20190	019	830927	140	5090	9	1.0	17.4	1700	1521	000	8_295P2
20190	019	830927	140	5090	10	0.7	10.2	830	743	000	4_360P2
20190	019	830927	140	5090	11	0.7	3.2	180	161	001	4_85P2
20190	019	830927	140	5090	12	0.7	0.3	0	0	002	8_85P2
20190	019	830927	140	5090	13	0.8	1.4	35	31	000	_P2

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
20190	019	830927	140	5090	14	0.8	0.2	0	0	000	4_205P2
20190	019	830927	140	5090	15	0.7	25.9	2825	2528	000	4_80P3
20190	019	830927	140	5090	16	0.7	14.1	1295	1159	000	8_80P3
20190	019	830927	140	5090	17	1.0	30.3	3585	3209	020	4_285P3
20190	019	830927	140	5090	18	1.1	46.6	7100	6354	010	8_285P3
20190	019	830927	140	5090	19	1.0	16.5	1580	1414	000	4_220P3
20190	019	830927	140	5090	20	1.1	13.4	1235	1105	030	8_220P3
30470	047	830926	140	5085	1	2.6	28.4	3275	2931	000	4_240P1
30470	047	830926	140	5085	2	2.7	6.5	505	452	000	8_240P1
30470	047	830926	140	5085	3	2.0	6.0	460	412	000	4_330P1
30470	047	830926	140	5085	4	1.7	1.1	35	31	000	8_330P1
30470	047	830926	140	5085	5	2.1	3.6	260	233	000	4_50P1
30470	047	830926	140	5085	6	1.8	28.9	3350	2998	000	8_50P1
30470	047	830926	140	5085	7	2.0	37.0	4815	4309	010	4_149P2
30470	047	830926	140	5085	8	1.9	18.5	1820	1629	000	4_238P2
30470	047	830926	140	5085	9	2.2	16.7	1585	1419	000	8_238P2
30470	047	830926	140	5085	10	1.9	0.8	35	31	000	4_320P2
30470	047	830926	140	5085	11	2.0	4.0	260	233	000	8_320P2
30470	047	830926	140	5085	12	1.7	25.8	2825	2528	000	4_60P2
30470	047	830926	140	5085	13	1.5	33.4	4055	3629	030	8_60P2
30470	047	830926	140	5085	14	1.6	34.4	4325	3871	000	4_214P3
30470	047	830926	140	5085	15	1.5	50.1	8150	7294	010	8_214P3
30470	047	830926	140	5085	16	1.4	32.2	3850	3446	030	4_149P3
30470	047	830926	140	5085	17	1.8	46.4	7100	6354	010	8_149P3
30470	047	830926	140	5085	18	1.6	8.3	685	613	000	4_44P3
30470	047	830926	140	5085	19	1.8	5.7	460	412	000	4_318P3
30470	047	830926	140	5085	20	1.9	6.6	550	492	000	8_318P3
30560	056	830912	155	5060	1	1.8	7.5	595	512	000	4_90P1
30560	056	830912	155	5060	2	1.6	6.5	505	435	000	8_90P1
30560	056	830912	155	5060	3	1.4	10.3	830	715	000	4_346P1
30560	056	830912	155	5060	4	1.5	12.0	1070	921	000	8_346P1
30560	056	830912	155	5060	5	1.8	8.2	640	551	000	4_258P1
30560	056	830912	155	5060	6	1.8	7.4	595	512	000	8_258P1
30560	056	830912	155	5060	7	1.7	6.1	460	396	000	8_160P1
30560	056	830912	155	5060	8	1.2	4.7	360	310	000	4_290P2
30560	056	830912	155	5060	9	1.2	2.9	170	146	000	8_290P2
30560	056	830912	155	5060	10	1.2	4.3	260	224	000	4_180P2
30560	056	830912	155	5060	11	1.3	44.4	6600	5683	010	8_180P2
30560	056	830912	155	5060	12	1.3	8.6	685	590	000	4_95P2
30560	056	830912	155	5060	13	1.3	6.4	460	396	000	8_95P2
30560	056	830912	155	5060	14	1.4	4.9	360	310	000	8_30P2
30560	056	830912	155	5060	15	1.5	11.6	1010	870	000	4_165P3
30560	056	830912	155	5060	16	1.5	3.4	215	185	030	8_165P3
30560	056	830912	155	5060	17	1.5	5.6	460	396	000	4_110P3
30560	056	830912	155	5060	18	1.5	8.8	730	629	000	8_110P3
30560	056	830912	155	5060	19	1.5	8.2	685	590	000	4_25P3
30560	056	830912	155	5060	20	1.5	5.8	460	396	000	8_25P3
30581	58A	830902	155	5175	1	1.3	36.0	4615	3974	000	140_108P1
30581	58A	830902	155	5175	2	1.3	11.9	1065	917	000	145_108P1
30581	58A	830902	155	5175	3	1.4	16.9	1640	1412	000	150_108P1
30581	58A	830902	155	5175	4	1.5	10.8	900	775	000	155_108P1
30581	58A	830902	155	5175	5	1.3	11.7	1010	870	000	160_108P1
30581	58A	830902	155	5175	6	0.7	16.5	1580	1360	000	_P2
30581	58A	830902	155	5175	7	0.7	15.8	1520	1309	000	5_350P2
30581	58A	830902	155	5175	8	0.7	9.2	730	629	000	10_350P2
30581	58A	830902	155	5175	9	0.7	4.3	310	267	000	15_350P2
30581	58A	830902	155	5175	10	0.7	10.8	950	818	000	20_350P2

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
30581	58A	830902	155	5175	11	0.8	22.7	2450	2109	000	5_36P2
30581	58A	830902	155	5175	12	1.0	24.9	2675	2303	000	10_36P2
30581	58A	830902	155	5175	13	1.2	9.8	780	672	000	15_36P2
30581	58A	830902	155	5175	14	1.5	5.4	360	310	000	20_36P2
30581	58A	830902	155	5175	15	1.7	0.5	18	15	000	25_36P2
30581	58A	830902	155	5175	16	0.8	21.7	2225	1916	000	5_94P2
30581	58A	830902	155	5175	17	0.8	25.2	2750	2368	000	10_94P2
30581	58A	830902	155	5175	18	0.7	12.3	1070	921	000	15_94P2
30581	58A	830902	155	5175	19	0.6	9.5	780	672	000	20_94P2
30581	58A	830902	155	5175	20	0.6	4.9	360	310	000	25_94P2
30582	58B	830902	155	5175	1	1.0	8.8	685	590	000	75_322P1
30582	58B	830902	155	5175	2	1.0	10.5	890	766	000	80_322P1
30582	58B	830902	155	5175	3	1.0	9.9	830	715	000	85_322P1
30582	58B	830902	155	5175	4	1.0	7.4	595	512	000	90_322P1
30582	58B	830902	155	5175	5	0.8	13.4	1235	1063	000	95_322P1
30582	58B	830902	155	5175	6	0.7	0.7	35	30	000	145_310P1
30582	58B	830902	155	5175	7	0.8	0.0	0	0	000	150_310P1
30582	58B	830902	155	5175	8	0.7	2.0	100	86	000	155_310P1
30582	58B	830902	155	5175	9	0.7	3.3	170	146	000	160_310P1
30582	58B	830902	155	5175	10	0.7	11.1	950	818	030	165_310P1
30582	58B	830902	155	5175	11	0.8	15.4	1460	1257	030	170_310P1
30582	58B	830902	155	5175	12	0.8	2.9	170	146	000	175_310P1
30582	58B	830902	155	5175	13	0.8	7.0	550	474	000	180_310P1
30582	58B	830902	155	5175	14	0.8	2.1	100	86	000	185_310P1
30582	58B	830902	155	5175	15	0.9	8.0	640	551	000	190_310P1
30582	58B	830902	155	5175	16	0.6	38.5	5100	4391	010	141_282P1
30582	58B	830902	155	5175	17	0.7	35.8	4610	3969	010	151_282P1
30582	58B	830902	155	5175	18	0.7	45.5	6850	5898	010	161_282P1
30582	58B	830902	155	5175	19	0.8	45.6	6850	5898	010	171_282P1
30582	58B	830902	155	5175	20	0.8	44.6	6575	5661	010	181_282P1
30582	58B	830902	155	5175	21	1.0	1.9	100	86	000	148_310P1
30583	58C	830914	155	4445	1	1.0	29.6	3500	3014	000	4_14P1
30583	58C	830914	155	4445	2	1.0	2.5	135	116	000	12_14P1
30583	58C	830914	155	4445	3	1.0	42.0	5900	5080	010	4_90P1
30583	58C	830914	155	4445	4	1.0	7.1	550	474	000	8_90P1
30583	58C	830914	155	4445	5	1.0	44.4	6450	5553	010	4_270P1
30583	58C	830914	155	4445	6	1.0	39.3	5255	4525	010	4_55P1
30583	58C	830914	155	4445	7	1.0	20.6	2150	1851	000	8_55P1
30583	58C	830914	155	4445	8	1.0	16.4	1580	1360	000	4_90P2
30583	58C	830914	155	4445	9	1.0	8.0	640	551	000	8_95P2
30583	58C	830914	155	4445	10	1.3	14.0	1290	1111	000	4_343P2
30583	58C	830914	155	4445	11	1.3	2.0	100	86	000	8_347P2
30583	58C	830914	155	4445	12	1.0	29.6	3425	2949	000	4_294P2
30583	58C	830914	155	4445	13	1.2	32.8	3950	3401	030	8_290P2
30583	58C	830914	155	4445	14	1.1	16.8	1640	1412	030	12_289P2
30583	58C	830914	155	4445	15	1.2	3.0	180	155	000	4_46P3
30583	58C	830914	155	4445	16	1.2	13.8	1290	1111	000	8_45P3
30583	58C	830914	155	4445	17	1.2	36.6	4705	4051	000	4_120P3
30583	58C	830914	155	4445	18	1.1	40.7	5550	4779	010	8_120P3
30583	58C	830914	155	4445	19	1.1	15.4	1460	1257	030	4_162P3
30583	58C	830914	155	4445	20	1.0	27.6	3125	2691	030	8_162P3
30620	062	830831	160	5200	1	1.8	2.9	170	145	000	48_240BM
30620	062	830831	160	5200	2	1.7	1.0	35	30	000	53_240BM
30620	062	830831	160	5200	3	1.7	1.4	68	58	000	75_309BM
30620	062	830831	160	5200	4	1.7	2.4	100	85	000	58_240BM
30620	062	830831	160	5200	5	1.8	2.7	135	115	000	63_240BM
30620	062	830831	160	5200	6	1.9	3.7	260	221	000	68_240BM

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
30620	062	830831	160	5200	7	1.5	1.6	100	85	000	54_178BM
30620	062	830831	160	5200	8	1.4	0.5	18	15	000	129_178BM
30620	062	830831	160	5200	9	1.3	7.5	595	506	000	139_178BM
30620	062	830831	160	5200	10	1.4	5.6	410	349	000	149_178BM
30620	062	830831	160	5200	11	1.5	6.3	460	391	000	159_178BM
30620	062	830831	160	5200	12	1.5	15.1	1405	1194	000	169_178BM
30620	062	830831	160	5200	13	1.8	0.8	35	30	000	185_164BM
30620	062	830831	160	5200	14	2.0	7.6	595	506	000	205_164BM
30620	062	830831	160	5200	15	1.8	3.8	260	221	000	21_256PP
30620	062	830831	160	5200	16	1.8	10.8	890	757	000	26_256PP
30620	062	830831	160	5200	17	2.0	5.0	360	306	000	31_256PP
30620	062	830831	160	5200	18	1.7	7.1	550	468	000	36_256PP
30620	062	830831	160	5200	19	1.8	10.7	890	757	000	41_256PP
30620	062	830831	160	5200	20	1.9	1.8	100	85	000	46_256PP
30920	092	831028	120	5010	1	0.6	12.8	1180	1115	000	4_248P3
30920	092	831028	120	5010	2	0.6	38.0	5035	4758	000	8_248P3
30920	092	831028	120	5010	3	0.9	10.5	890	841	030	4_30P3
30920	092	831028	120	5010	4	1.0	11.0	950	898	000	8_30P3
30920	092	831028	120	5010	5	0.8	10.3	890	841	030	4_140P3
30920	092	831028	120	5010	6	0.6	24.8	2750	2599	030	8_140P3
30920	092	831028	120	5010	7	0.7	4.6	310	293	030	4_12P2
30920	092	831028	120	5010	8	0.7	15.6	1460	1380	000	8_12P2
30920	092	831028	120	5010	9	0.7	16.7	1580	1493	000	4_115P2
30920	092	831028	120	5010	10	0.6	11.0	950	898	000	8_115P2
30920	092	831028	120	5010	11	0.6	10.7	950	898	000	4_182P2
30920	092	831028	120	5010	12	0.5	7.1	550	520	000	8_182P2
30920	092	831028	120	5010	13	0.8	25.4	2825	2670	000	4_275P2
30920	092	831028	120	5010	14	1.3	46.3	7100	6709	000	4_115P1
30920	092	831028	120	5010	15	1.2	22.4	2375	2244	000	8_115P1
30920	092	831028	120	5010	16	1.4	42.3	6050	5717	000	4_40P1
30920	092	831028	120	5010	17	1.4	51.2	8475	8009	010	8_40P1
30920	092	831028	120	5010	18	1.1	16.3	1580	1493	030	4_285P1
30920	092	831028	120	5010	19	0.8	29.2	3350	3166	000	8_285P1
30920	092	831028	120	5010	20	0.7	16.1	1520	1436	000	4_195P1
41020	102	831031	110	6330	1	1.5	13.4	1180	1147	000	4_218P1
41020	102	831031	110	6330	2	1.6	11.6	1070	1040	000	8_218P1
41020	102	831031	110	6330	3	1.6	45.6	6975	6780	000	4_304P1
41020	102	831031	110	6330	4	1.5	55.2	9650	9380	010	8_304P1
41020	102	831031	110	6330	5	1.5	13.6	1235	1200	000	4_134P1
41020	102	831031	110	6330	6	1.6	21.5	2225	2163	000	8_134P1
41020	102	831031	110	6330	7	1.5	49.3	7975	7752	010	4_48P1
41020	102	831031	110	6330	8	1.0	20.1	2030	1973	000	4_218P2
41020	102	831031	110	6330	9	1.1	14.8	1405	1366	000	8_218P2
41020	102	831031	110	6330	10	1.0	55.0	9500	9234	010	4_295P2
41020	102	831031	110	6330	11	1.3	24.2	2600	2527	000	8_295P2
41020	102	831031	110	6330	12	1.1	53.4	8900	8651	010	4_142P2
41020	102	831031	110	6330	13	1.1	53.0	8900	8651	010	8_142P2
41020	102	831031	110	6330	14	1.0	40.4	5600	5443	000	4_27P2
41020	102	831031	110	6330	15	1.0	5.0	360	350	000	4_248P3
41020	102	831031	110	6330	16	1.0	34.4	4230	4112	030	8_248P3
41020	102	831031	110	6330	17	1.5	5.6	460	447	000	4_158P3
41020	102	831031	110	6330	18	1.4	10.2	890	865	000	8_158P3
41020	102	831031	110	6330	19	1.3	4.7	310	301	000	4_70P3
41020	102	831031	110	6330	20	1.5	5.5	410	399	000	8_70P3
41040	104	830909	150	4050	1	1.6	5.0	360	314	000	4_80P3
41040	104	830909	150	4050	2	1.8	2.1	135	118	000	8_80P3
41040	104	830909	150	4050	3	1.6	1.4	68	59	000	4_110P3

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
41040	104	830909	150	4050	4	1.6	0.9	35	31	000	8_110P3
41040	104	830909	150	4050	5	1.3	44.3	6600	5755	010	4_150P3
41040	104	830909	150	4050	6	1.2	0.5	18	16	000	8_150P3
41040	104	830909	150	4050	7	1.2	1.9	100	87	000	4_220P3
41040	104	830909	150	4050	8	1.0	0.6	35	31	000	8_220P3
41040	104	830909	150	4050	9	1.4	4.8	360	314	000	4_100P2
41040	104	830909	150	4050	10	1.4	2.2	100	87	000	9_100P2
41040	104	830909	150	4050	11	1.3	16.9	1640	1430	000	4_160P2
41040	104	830909	150	4050	12	1.3	16.8	1640	1430	000	8_160P2
41040	104	830909	150	4050	13	1.4	6.7	505	440	000	4_220P2
41040	104	830909	150	4050	14	1.3	5.8	460	401	000	8_220P2
41040	104	830909	150	4050	15	1.4	13.9	1290	1125	000	4_100P1
41040	104	830909	150	4050	16	1.4	20.5	2075	1809	000	8_100P1
41040	104	830909	150	4050	17	1.2	5.1	360	314	000	4_220P1
41040	104	830909	150	4050	18	1.2	5.5	410	358	000	8_220P1
41040	104	830909	150	4050	19	1.5	1.4	35	31	000	4_300P1
41040	104	830909	150	4050	20	1.3	9.6	795	693	000	8_300P1
41140	114	831011	140	4570	1	2.6	5.1	360	322	000	4_285P1
41140	114	831011	140	4570	2	2.6	4.6	310	277	000	8_285P1
41140	114	831011	140	4570	3	2.2	2.5	135	121	000	4_205P1
41140	114	831011	140	4570	4	2.4	4.1	260	233	000	8_205P1
41140	114	831011	140	4570	5	2.1	6.1	460	412	000	4_5P1
41140	114	831011	140	4570	6	2.1	3.1	180	161	000	8_5P1
41140	114	831011	140	4570	7	1.5	4.4	260	233	000	4_345P2
41140	114	831011	140	4570	8	1.5	0.2	0	0	000	8_345P2
41140	114	831011	140	4570	9	1.4	0.5	18	16	000	4_89P2
41140	114	831011	140	4570	10	1.8	13.0	1180	1056	000	4_20P2
41140	114	831011	140	4570	11	1.7	1.6	68	61	000	8_20P2
41140	114	831011	140	4570	12	1.3	1.5	68	61	000	4_293P2
41140	114	831011	140	4570	13	1.0	0.6	18	16	000	8_293P2
41140	114	831011	140	4570	14	0.7	3.2	170	152	000	4_270P3
41140	114	831011	140	4570	15	0.6	0.8	35	31	000	8_270P3
41140	114	831011	140	4570	16	0.8	0.9	35	31	000	4_0P3
41140	114	831011	140	4570	17	0.6	5.8	460	412	000	8_0P3
41140	114	831011	140	4570	18	1.0	11.7	1010	904	000	4_110P3
41140	114	831011	140	4570	19	1.4	3.7	260	233	000	8_110P3
41140	114	831011	140	4570	20	1.0	3.5	215	192	000	4_194P3
41220	122	831012	140	4570	1	0.8	5.2	360	322	000	4_223P2
41220	122	831012	140	4570	2	0.5	0.7	35	31	000	4_309P2
41220	122	831012	140	4570	3	0.5	0.9	35	31	000	8_309P2
41220	122	831012	140	4570	4	0.7	4.5	310	277	000	4_157P2
41220	122	831012	140	4570	5	0.7	2.2	100	89	000	8_157P2
41220	122	831012	140	4570	6	0.5	6.1	505	452	000	4_62P2
41220	122	831012	140	4570	7	0.5	1.7	68	61	000	8_62P2
41220	122	831012	140	4570	8	0.7	7.4	550	492	000	4_100P1
41220	122	831012	140	4570	9	0.8	2.8	170	152	000	8_100P1
41220	122	831012	140	4570	10	0.9	10.2	830	743	000	4_250P1
41220	122	831012	140	4570	11	1.0	51.1	8450	7563	110	8_250P1
41220	122	831012	140	4570	12	0.8	40.4	5530	4949	210	12_265P1
41220	122	831012	140	4570	13	0.7	17.1	1640	1468	100	4_344P1
41220	122	831012	140	4570	14	0.5	1.3	68	61	000	8_344P1
41220	122	831012	140	4570	15	0.7	1.5	68	61	000	4_20P3
41220	122	831012	140	4570	16	0.6	10.0	780	698	000	8_20P3
41220	122	831012	140	4570	17	1.2	8.6	685	613	000	4_167P3
41220	122	831012	140	4570	18	1.3	5.8	460	412	000	8_167P3
41220	122	831012	140	4570	19	1.1	6.4	505	452	000	4_255P3
41220	122	831012	140	4570	20	1.0	4.4	310	277	000	8_255P3

STATION CODE	STATION	DATE	TEMPERATURE	DISCHARGE	SAMPLE	DEPTH	INFLOW	UNCORRECTED PERMEABILITY	CORRECTED PERMEABILITY	REMARKS	LOCATION
41230	123	831024	140	5660	1	1.0	3.9	260	233	000	4_342P2
41230	123	831024	140	5660	2	1.0	0.4	18	16	000	8_342P2
41230	123	831024	140	5660	3	1.2	2.0	100	89	000	4_224P2
41230	123	831024	140	5660	4	1.4	0.2	0	0	000	8_224P2
41230	123	831024	140	5660	5	1.2	3.8	260	233	000	4_157P2
41230	123	831024	140	5660	6	1.4	1.6	100	89	000	8_157P2
41230	123	831024	140	5660	7	1.0	18.4	1820	1629	230	4_70P2
41230	123	831024	140	5660	8	1.3	0.3	0	0	000	4_65P1
41230	123	831024	140	5660	9	1.3	0.0	0	0	000	8_65P1
41230	123	831024	140	5660	10	1.3	1.7	68	61	000	12_65P1
41230	123	831024	140	5660	11	1.4	8.8	730	653	000	4_134P1
41230	123	831024	140	5660	12	1.6	10.7	890	797	000	8_134P1
41230	123	831024	140	5660	13	1.5	4.0	260	233	000	4_212P1
41230	123	831024	140	5660	14	1.8	3.6	260	233	000	8_212P1
41230	123	831024	140	5660	15	1.2	0.2	0	0	009	4_89P3
41230	123	831024	140	5660	16	1.2	0.2	0	0	009	8_89P3
41230	123	831024	140	5660	17	1.8	0.4	18	16	000	4_152P3
41230	123	831024	140	5660	18	1.5	0.9	35	31	000	8_152P3
41230	123	831024	140	5660	19	1.2	0.3	0	0	009	4_340P3
41230	123	831024	140	5660	20	1.3	0.1	0	0	000	8_340P3
41230	123	831024	140	5660	21	1.4	1.3	35	31	000	4_318P1
41231	123A	831024	140	5660	1	1.3	48.2	7500	6712	010	4_200P1
41231	123A	831024	140	5660	2	1.2	29.2	3350	2998	000	8_200P1
41231	123A	831024	140	5660	3	1.0	5.0	360	322	000	4_86P1
41231	123A	831024	140	5660	4	1.2	1.6	68	61	000	8_86P1
41231	123A	831024	140	5660	5	1.1	47.4	7375	6601	010	4_345P1
41231	123A	831024	140	5660	6	0.8	2.0	100	89	000	8_345P1
41231	123A	831024	140	5660	7	1.0	2.1	100	89	000	12_345P1
41231	123A	831024	140	5660	8	1.2	46.8	7100	6354	010	4_185P2
41231	123A	831024	140	5660	9	1.4	47.1	7250	6489	010	8_185P2
41231	123A	831024	140	5660	10	1.0	19.9	2015	1803	000	4_80P2
41231	123A	831024	140	5660	11	1.1	49.2	7750	6936	010	8_80P2
41231	123A	831024	140	5660	12	0.8	45.0	6700	5996	000	4_20P2
41231	123A	831024	140	5660	13	0.6	24.2	2600	2327	030	8_20P2
41231	123A	831024	140	5660	14	0.8	19.5	1970	1763	000	4_330P2
41231	123A	831024	140	5660	15	1.1	47.3	7250	6489	118	4_280P3
41231	123A	831024	140	5660	16	1.2	42.6	6050	5415	118	8_280P3
41231	123A	831024	140	5660	17	1.2	41.8	6055	5419	018	4_140P3
41231	123A	831024	140	5660	18	1.4	47.1	7250	6489	018	8_140P3
41231	123A	831024	140	5660	19	0.8	50.0	8000	7160	018	4_5P3
41231	123A	831024	140	5660	20	0.5	36.2	4610	4126	008	8_5P3

APPENDIX XII

GRAVEL QUALITY PARAMETERS FOR DEPTH SUBSAMPLES OF CHINOOK SPAWNING GRAVEL COLLECTED AT 10 STATIONS IN THE LOWER DESCHUTES RIVER, OREGON, 1983.

This appendix contains values of seven gravel quality parameters calculated for depth stratified samples of gravel from fall chinook spawning areas in the Deschutes River, Oregon. The following are descriptions of the data recorded here:

Station = Sampling site, with the last digit representing sample depth, the two previous to that indicating the sample number, and all digits previous to those giving the station number.

P119 = Percent by weight of sediment particles less than 1.19 mm in diameter.

P238 = Percent by weight of sediment particles less than 2.38 mm in diameter.

d25 = 25th percentile particle diameter of subsample.

d75 = 75th percentile particle diameter of subsample.

Sorting Coefficient = S_o $d25/d75$

Geometric Mean = d_g = Geometric mean particle diameter of subsample

F'redle Index = $d_{g/So}$

101.6 - 127 mm (4-5) Gravel

INCLUDED

GRAVEL QUALITY PARAMETERS--CHINOOK

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
5011	.024	.059	12.146	50.574	2.041	21.586	10.578
5012	.022	.048	22.743	54.167	1.543	28.304	18.340
5013	.101	.191	3.787	28.710	2.753	9.726	3.532
5014	.081	.150	7.058	53.971	2.765	16.920	6.119
5021	.010	.023	60.374	108.182	1.339	64.867	48.459
5022	.064	.127	6.965	51.363	2.716	16.598	6.112
5023	.033	.056	22.467	59.887	1.633	29.708	18.196
5024	.062	.113	8.786	34.865	1.992	15.590	7.826
5031	.008	.018	44.814	78.527	1.324	51.712	39.065
5032	.108	.197	3.665	30.704	2.894	10.056	3.474
5033	.068	.099	30.659	105.489	1.855	39.462	21.274
5034	.037	.060	34.722	108.677	1.769	50.465	28.525
5041	.014	.032	27.033	104.846	1.969	47.636	24.188
5042	.046	.083	16.971	105.998	2.499	39.397	15.764
5043	.063	.107	11.974	100.954	2.904	27.919	9.615
5044	.054	.089	14.119	59.589	2.054	24.000	11.682
5051	.021	.049	17.147	102.445	2.444	36.492	14.929
5052	.087	.172	4.231	42.339	3.163	12.063	3.813
5053	.140	.240	2.610	22.129	2.912	7.042	2.418
5054	.142	.235	2.788	24.929	2.990	7.729	2.585
5061	.040	.095	8.519	38.100	2.115	16.170	7.646
5062	.073	.149	5.389	36.285	2.595	13.035	5.023
5063	.063	.125	7.772	48.939	2.509	16.315	6.502
5064	.096	.177	4.316	35.232	2.857	10.644	3.726
5071	.037	.071	16.500	59.968	1.906	26.569	13.936
5072	.044	.087	15.026	101.203	2.595	33.937	13.077
5073	.024	.043	48.049	105.261	1.480	54.923	37.108
5074	.092	.162	5.636	50.310	2.988	14.240	4.766
5081	.044	.077	17.065	53.538	1.771	23.766	13.418
5082	.072	.138	8.217	53.287	2.547	17.482	6.865
5083	.063	.108	12.238	58.439	2.185	21.992	10.064
5084	.048	.078	16.292	58.160	1.889	24.974	13.218
5091	.010	.025	19.447	90.787	2.161	35.604	16.478
5092	.053	.107	9.328	40.392	2.081	16.621	7.987
5093	.081	.132	8.157	41.039	2.243	15.645	6.975
5094	.031	.046	41.194	64.531	1.252	38.725	30.941
5101	.023	.040	26.418	99.671	1.942	43.874	22.588
5102	.057	.105	12.181	59.976	2.219	23.056	10.391
5103	.086	.155	5.957	36.762	2.484	13.360	5.378
5104	.110	.166	5.981	55.690	3.051	15.242	4.995
10011	.020	.031	54.819	107.919	1.403	60.006	42.767
10012	.132	.170	7.035	46.546	2.572	13.176	5.122
10013	.096	.123	11.998	58.459	2.207	19.774	8.958
10014	.164	.219	3.180	18.437	2.408	6.537	2.715
10021	.007	.010	83.788	112.596	1.159	77.887	67.189
10022	.065	.102	9.305	39.310	2.055	16.203	7.883
10023	.167	.221	3.337	27.202	2.855	8.176	2.864
10024	.184	.224	3.687	29.412	2.824	8.755	3.100
10031	.006	.014	29.614	61.718	1.444	37.852	26.220
10032	.052	.105	8.352	48.766	2.416	17.371	7.189
10033	.085	.135	10.257	51.292	2.236	17.874	7.993
10034	.047	.062	24.926	86.912	1.867	35.690	19.114
10041	.061	.092	10.407	46.536	2.115	18.222	8.617
10042	.147	.197	4.438	31.670	2.671	10.441	3.908
10043	.170	.212	4.863	55.707	3.385	14.705	4.344
10044	.081	.100	22.339	58.081	1.612	24.156	14.981
10051	.028	.042	21.880	49.844	1.509	27.404	18.156

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
10052	.196	.226	5.267	88.839	4.107	17.824	4.340
10053	.162	.199	4.966	47.588	3.096	11.777	3.804
10054	.134	.167	5.072	29.350	2.406	9.513	3.954
10061	.030	.055	17.251	56.810	1.815	26.695	14.711
10062	.068	.096	26.105	101.767	1.974	36.948	18.713
10063	.177	.216	4.294	53.053	3.515	12.901	3.670
10064	.070	.085	78.936	110.979	1.186	49.649	41.873
10071	.021	.036	39.606	99.439	1.585	49.979	31.542
10072	.098	.141	7.122	33.896	2.182	12.872	5.900
10073	.122	.164	6.010	34.233	2.387	11.512	4.824
10074	.106	.136	11.093	50.457	2.133	17.139	8.036
10081	.012	.018	29.099	60.542	1.442	37.796	26.203
10082	.041	.063	29.778	107.428	1.899	45.955	24.195
10083	.077	.101	16.866	91.476	2.329	29.179	12.529
10084	.146	.181	6.768	50.126	2.721	13.482	4.954
10091	.039	.053	20.511	48.916	1.544	25.160	16.292
10092	.063	.086	21.061	97.784	2.155	34.150	15.849
10093	.133	.154	10.026	69.104	2.625	16.826	6.409
10094	.107	.127	14.641	58.489	1.999	20.283	10.148
47011	.021	.028	38.347	63.572	1.288	35.484	27.559
47012	.111	.141	5.008	43.802	2.957	12.240	4.139
47013	.143	.170	3.899	26.320	2.598	7.911	3.045
47014	.172	.223	2.814	13.491	2.190	4.908	2.241
47021	.047	.062	12.452	89.470	2.681	26.049	9.718
47022	.076	.091	11.646	58.153	2.235	21.230	9.501
47023	.058	.073	7.740	33.767	2.089	14.801	7.086
47024	.053	.064	9.229	59.282	2.534	21.997	8.679
47031	.036	.052	10.423	33.734	1.799	16.805	9.341
47032	.099	.125	5.014	28.860	2.399	10.127	4.221
47033	.090	.105	8.125	51.081	2.507	16.686	6.655
47034	.114	.134	4.677	18.762	2.003	8.135	4.062
47041	.028	.039	15.528	67.972	2.092	26.536	12.683
47042	.055	.070	13.750	52.911	1.962	21.112	10.763
47043	.089	.104	9.557	38.759	2.014	16.209	8.049
47044	.062	.074	17.474	52.086	1.726	22.407	12.978
47051	.029	.053	11.590	40.297	1.865	19.695	10.562
47052	.045	.062	23.820	94.602	1.993	35.842	17.985
47053	.144	.158	8.327	58.376	2.648	16.351	6.175
47054	.042	.050	17.213	58.262	1.840	25.983	14.123
47061	.008	.018	24.909	60.218	1.555	33.572	21.592
47062	.054	.093	11.043	36.086	1.808	17.170	9.498
47063	.046	.070	15.825	39.579	1.581	20.067	12.688
47064	.044	.068	21.550	60.695	1.678	26.944	16.055
47071	.037	.056	10.873	31.287	1.696	15.839	9.337
47072	.084	.111	7.552	37.292	2.222	14.884	6.698
47073	.082	.102	9.955	54.243	2.334	18.825	8.065
47074	.110	.118	13.490	57.233	2.060	19.092	9.269
47081	.032	.050	17.173	53.364	1.763	24.358	13.818
47082	.060	.093	9.496	41.652	2.094	17.123	8.176
47083	.048	.069	10.636	44.566	2.047	18.616	9.094
47084	.045	.059	20.268	53.862	1.630	24.620	15.103
47091	.008	.018	24.720	59.047	1.546	33.861	21.909
47092	.043	.080	12.611	51.889	2.028	20.579	10.145
47093	.041	.065	17.425	42.861	1.568	21.174	13.501
47094	.030	.048	15.688	55.248	1.877	24.309	12.954
47101	.029	.039	24.663	97.396	1.987	40.006	20.131
47102	.101	.125	8.045	55.052	2.616	17.506	6.692

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
47103	.073	.083	20.862	92.731	2.108	30.929	14.670
47104	.163	.189	3.890	25.249	2.548	7.686	3.017
56011	.015	.029	16.968	55.399	1.807	27.821	15.397
56012	.052	.088	11.708	54.339	2.154	20.633	9.577
56013	.040	.067	18.425	101.951	2.352	37.302	15.858
56014	.047	.078	17.712	60.641	1.850	20.433	14.285
56021	.078	.121	7.180	52.957	2.716	15.934	5.867
56022	.107	.161	6.306	36.081	2.392	13.805	5.771
56023	.088	.124	12.484	52.687	2.054	18.640	9.073
56024	.125	.178	5.765	33.631	2.415	11.994	4.966
56031	.064	.102	9.353	43.012	2.144	17.425	8.126
56032	.080	.125	8.446	42.219	2.236	15.231	6.812
56033	.104	.165	5.761	37.253	2.543	13.717	5.394
56034	.058	.094	13.257	58.853	2.107	22.887	10.863
56041	.014	.025	17.267	51.259	1.723	26.663	15.475
56042	.085	.132	6.596	27.029	2.024	10.846	5.358
56043	.092	.130	8.553	53.109	2.492	16.473	6.611
56044	.096	.144	6.240	35.449	2.383	13.061	5.480
56051	.075	.114	9.943	73.043	2.710	22.145	8.170
56052	.102	.147	6.732	49.723	2.718	15.636	5.754
56053	.097	.138	9.888	47.266	2.186	16.411	7.506
56054	.053	.075	27.449	62.544	1.509	30.319	20.085
56061	.060	.098	8.994	53.215	2.432	18.833	7.742
56062	.064	.096	16.158	75.759	2.165	27.621	12.756
56063	.134	.181	6.494	36.194	2.361	12.927	5.476
56064	.090	.122	13.228	56.753	2.071	20.494	9.894
56071	.094	.145	5.774	44.097	2.764	12.571	4.549
56072	.137	.198	4.130	34.245	2.879	10.524	3.655
56073	.077	.106	12.070	99.694	2.874	30.174	10.499
56074	.072	.098	16.046	103.350	2.538	32.468	12.793
56081	.046	.075	8.982	30.008	1.828	14.291	7.819
56082	.053	.073	27.382	90.495	1.818	36.781	20.232
56083	.108	.152	7.798	45.817	2.424	15.263	6.297
56084	.068	.102	15.122	91.907	2.465	29.348	11.905
56091	.006	.013	31.795	109.067	1.852	57.457	31.023
56092	.029	.049	24.277	59.678	1.568	30.589	19.510
56093	.059	.094	15.753	58.697	1.930	24.141	12.506
56094	.066	.102	13.682	59.321	2.082	23.237	11.160
56101	.064	.108	8.685	48.955	2.374	16.987	7.155
56102	.019	.019	47.063	66.488	1.189	51.722	43.515
56103	.119	.169	5.894	35.748	2.463	12.016	4.879
56104	.113	.167	5.094	53.825	3.251	13.265	4.081
62011	.122	.144	11.386	52.699	2.151	17.321	8.051
62012	.051	.064	48.754	106.393	1.477	49.914	33.789
62013	.152	.203	3.841	28.978	2.747	8.754	3.187
62014	.122	.180	4.134	46.665	3.360	11.101	3.304
62021	.067	.078	21.956	57.921	1.624	26.587	16.369
62022	.064	.077	19.714	58.085	1.716	25.248	14.709
62023	.067	.085	16.949	55.493	1.809	22.606	12.493
62024	.069	.092	12.960	51.827	2.000	19.505	9.754
62031	.131	.151	14.030	100.167	2.672	24.254	9.077
62032	.151	.189	6.597	34.808	2.297	11.481	4.998
62033	.047	.072	17.806	104.925	2.427	35.635	14.680
62034	.093	.141	6.723	47.424	2.656	14.212	5.351
62041	.055	.083	13.287	105.136	2.813	33.430	11.884
62042	.173	.248	2.428	18.952	2.794	6.499	2.326
62043	.112	.162	4.938	26.720	2.326	9.309	4.002

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
62044	.191	.274	2.035	17.537	2.935	5.087	1.733
62051	.036	.055	27.336	108.022	1.988	46.745	23.515
62052	.061	.089	31.017	106.282	1.851	42.109	22.748
62053	.083	.113	15.900	55.543	1.869	21.262	11.376
62054	.104	.132	10.651	52.946	2.230	17.373	7.792
62061	.196	.274	2.011	39.051	4.407	7.797	1.769
62062	.157	.197	6.163	55.947	3.013	13.826	4.589
62063	.191	.250	2.370	23.404	3.142	6.901	2.196
62064	.104	.174	4.107	54.815	3.654	13.746	3.763
62071	.074	.112	10.560	56.848	2.320	19.480	8.396
62072	.107	.152	7.726	45.194	2.419	14.401	5.954
62073	.097	.129	11.458	52.652	2.144	17.855	8.329
62074	.098	.130	9.070	30.116	1.822	12.618	6.925
62081	.099	.133	12.373	58.498	2.174	20.457	9.408
62082	.066	.088	19.639	59.249	1.737	25.128	14.467
62083	.158	.225	3.167	34.467	3.299	8.875	2.690
62084	.094	.126	16.345	61.794	1.944	22.848	11.751
62091	.071	.111	14.598	67.304	2.147	24.838	11.567
62092	.095	.126	15.515	93.875	2.460	25.932	10.542
62093	.114	.168	11.817	58.720	2.229	17.983	8.067
62094	.153	.233	2.955	33.538	3.369	9.189	2.728
62101	.080	.129	7.297	49.549	2.606	14.841	5.695
62102	.162	.204	4.499	37.811	2.899	10.627	3.666
62103	.091	.118	14.791	100.943	2.612	29.699	11.369
62104	.175	.229	3.117	20.296	2.552	6.681	2.618
92011	.028	.043	24.577	58.761	1.546	31.270	20.223
92012	.100	.148	6.482	29.875	2.147	11.531	5.371
92013	.055	.091	12.821	49.646	1.968	19.748	10.035
92014	.027	.052	22.364	58.266	1.614	28.645	17.747
92021	.066	.107	11.851	56.781	2.189	20.695	9.455
92022	.071	.125	13.150	53.951	2.026	20.403	10.073
92023	.091	.162	8.918	47.441	2.306	16.256	7.048
92024	.123	.196	6.519	52.547	2.839	14.685	5.173
92031	.049	.093	10.519	45.563	2.081	17.830	8.567
92032	.077	.148	5.551	35.973	2.546	13.262	5.210
92033	.083	.170	4.670	35.096	2.741	12.522	4.568
92034	.113	.223	3.078	30.600	3.153	9.232	2.928
92041	.026	.052	13.692	49.720	1.906	22.161	11.629
92042	.041	.077	12.519	56.443	2.123	22.300	10.503
92043	.176	.260	2.233	26.028	3.414	7.115	2.084
92044	.084	.125	11.394	55.417	2.205	19.023	8.626
92051	.052	.080	10.775	46.838	2.085	18.921	9.075
92052	.057	.078	25.962	104.605	2.007	40.161	20.008
92053	.125	.158	9.604	52.877	2.346	15.800	6.734
92054	.249	.318	1.205	16.583	3.710	4.322	1.165
92061	.024	.042	18.058	49.939	1.663	25.169	15.135
92062	.063	.102	10.185	37.958	1.931	16.934	8.772
92063	.065	.087	19.953	52.037	1.615	22.502	13.934
92064	.043	.052	38.926	89.056	1.513	42.054	27.803
92071	.029	.056	10.757	29.629	1.660	15.628	9.417
92072	.058	.097	10.669	50.211	2.169	18.859	8.693
92073	.051	.072	25.236	61.326	1.559	29.228	18.749
92074	.180	.203	5.944	42.146	2.663	10.351	3.887
92081	.052	.087	11.589	36.340	1.771	17.392	9.822
92082	.159	.269	2.169	16.785	2.782	5.988	2.153
92083	.151	.246	2.470	28.930	3.422	8.057	2.354
92084	.226	.338	1.444	17.076	3.439	4.768	1.386

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
92091	.059	.082	18.664	56.880	1.746	24.897	14.262
92092	.092	.147	7.168	49.270	2.622	15.709	5.991
92093	.117	.203	4.184	34.137	2.857	11.298	3.955
92094	.078	.110	18.104	61.242	1.839	24.761	13.463
92101	.282	.314	1.117	46.075	6.422	28.968	4.510
92102	.068	.114	13.303	94.175	2.661	27.493	10.333
92103	.077	.109	16.220	55.654	1.852	21.471	11.591
92104	.039	.058	23.616	57.450	1.560	28.273	18.127
104011	.016	.022	41.863	64.754	1.244	44.160	35.507
104012	.085	.120	19.637	55.659	1.684	21.202	12.594
104013	.045	.059	41.092	86.019	1.447	42.281	29.223
104014	.075	.095	22.207	57.773	1.613	23.909	14.823
104021	.029	.045	23.958	58.081	1.557	30.990	19.904
104022	.076	.113	20.439	48.438	1.539	20.450	13.284
104023	.045	.072	44.649	92.119	1.436	45.568	31.724
104024	.142	.203	4.151	49.624	3.458	12.470	3.606
104031	.023	.029	25.031	51.108	1.429	31.455	22.013
104032	.053	.065	30.342	73.727	1.559	36.700	23.544
104033	.075	.109	20.181	58.005	1.695	22.988	13.559
104034	.066	.108	25.642	62.009	1.555	26.198	16.847
104041	.043	.048	32.485	62.343	1.385	35.551	25.663
104042	.086	.104	21.566	60.485	1.675	24.642	14.714
104043	.104	.139	11.508	54.843	2.183	17.404	7.973
104044	.065	.088	14.458	55.047	1.951	21.336	10.935
104051	.008	.013	33.105	62.384	1.373	41.384	30.147
104052	.027	.063	6.756	31.142	2.147	13.632	6.349
104053	.060	.084	24.470	59.820	1.564	27.257	17.433
104054	.117	.151	9.502	54.192	2.388	16.113	6.747
104061	.006	.008	28.600	60.721	1.457	39.031	26.787
104062	.031	.041	26.370	59.749	1.505	33.149	22.022
104063	.170	.212	5.662	37.000	2.556	11.493	4.496
104064	.209	.261	2.133	34.388	4.015	8.469	2.109
104071	.027	.036	41.702	64.701	1.246	41.643	33.432
104072	.132	.171	13.619	50.401	1.924	16.157	8.399
104073	.078	.093	26.386	61.212	1.523	27.423	18.005
104074	.008	.011	83.212	112.404	1.162	77.163	66.392
104081	.005	.005	54.761	100.586	1.355	71.285	52.598
104082	.059	.059	38.828	63.742	1.281	36.650	28.604
104083	.144	.148	20.160	41.551	1.436	16.651	11.598
104084	.114	.120	19.321	58.857	1.745	21.457	12.294
104091	.016	.017	32.606	61.924	1.378	41.295	29.965
104092	.114	.136	11.364	49.982	2.097	16.429	7.834
104093	.060	.061	34.193	69.210	1.423	37.468	26.336
104094	.127	.130	13.443	34.495	1.602	14.276	8.912
104101	.013	.013	39.983	64.128	1.266	45.983	36.309
104102	.073	.073	24.628	54.713	1.490	26.653	17.882
104103	.076	.078	25.060	57.844	1.519	27.106	17.841
104104	.127	.145	7.879	28.264	1.894	10.443	5.514
123011	.013	.015	34.189	63.066	1.358	39.420	29.025
123012	.057	.066	37.078	99.125	1.635	43.260	26.458
123013	.052	.056	49.188	104.212	1.456	51.547	35.414
123014	.146	.162	7.731	44.597	2.402	13.849	5.766
123021	.001	.001	56.496	105.317	1.365	73.405	53.764
123022	.057	.063	62.669	108.901	1.318	55.453	42.067
123023	.044	.050	27.123	92.624	1.848	40.372	21.847
123024	.419	.458	0.458	42.697	9.652	4.059	0.421
123031	.001	.001	38.862	63.754	1.281	47.601	37.164

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
123032	.039	.043	31.352	82.044	1.618	42.935	26.541
123033	.159	.170	19.694	60.210	1.749	19.151	10.953
123034	.235	.251	2.326	49.263	4.602	9.965	2.165
123041	.006	.007	55.187	104.494	1.376	71.370	51.866
123042	.068	.088	22.174	59.609	1.640	27.028	16.485
123043	.051	.060	40.897	100.184	1.565	48.264	30.837
123044	.114	.123	15.989	61.562	1.962	22.272	11.350
123051	.004	.005	41.859	64.753	1.244	48.927	39.338
123052	.117	.129	16.108	59.294	1.919	21.237	11.069
123053	.164	.184	11.772	43.669	1.926	13.913	7.224
123054	.117	.126	19.487	39.523	1.424	18.069	12.688
123061	.002	.002	43.662	65.354	1.223	51.969	42.478
123062	.036	.039	23.109	54.776	1.540	29.647	19.257
123063	.132	.142	19.399	94.619	2.209	25.256	11.436
123064	.228	.244	3.248	41.888	3.591	10.667	2.970
123071	.000	.000	84.714	112.905	1.154	89.550	77.568
123072	.024	.032	42.527	64.976	1.236	43.834	35.462
123073	.115	.142	21.010	53.303	1.593	20.042	12.583
123074	.193	.216	8.785	53.059	2.458	14.368	5.847
123081	.024	.029	30.924	96.070	1.763	48.776	27.673
123082	.092	.105	15.287	45.415	1.724	19.435	11.276
123083	.154	.187	12.413	36.459	1.714	13.830	8.070
123084	.219	.256	2.194	29.746	3.682	8.269	2.246
123091	.020	.026	29.601	61.328	1.439	37.155	25.814
123092	.073	.088	22.531	59.093	1.619	26.232	16.198
123093	.148	.173	10.996	47.911	2.087	14.688	7.037
123094	.164	.182	7.754	54.248	2.645	14.236	5.382
123101	.057	.069	24.636	55.869	1.506	28.228	18.745
123102	.111	.128	21.404	54.863	1.601	21.320	13.316
123103	.124	.135	27.253	62.390	1.513	24.193	15.990
123104	.237	.248	2.605	55.817	4.629	11.812	2.552
501011	.004	.009	36.362	99.846	1.657	50.205	30.298
501012	.044	.064	16.764	97.851	2.416	32.940	13.634
501013	.138	.188	3.609	28.889	2.829	8.057	2.848
501014	.067	.088	10.875	104.390	3.098	29.624	9.561
501021	.002	.005	24.685	60.646	1.567	35.521	22.662
501022	.010	.027	22.356	61.306	1.656	31.537	19.044
501023	.080	.133	4.566	25.328	2.355	9.448	4.011
501024	.117	.161	4.811	28.743	2.444	9.780	4.001
501031	.008	.017	16.747	52.298	1.767	26.701	15.110
501032	.011	.028	12.856	37.304	1.703	20.773	12.195
501033	.023	.041	19.530	55.999	1.693	26.411	15.597
501034	.034	.056	21.899	61.833	1.680	28.860	17.175
501041	.012	.022	28.042	61.040	1.475	35.638	24.155
501042	.025	.046	34.658	103.015	1.724	45.944	26.649
501043	.015	.027	32.887	105.160	1.788	52.519	29.370
501044	.057	.097	10.954	56.097	2.263	20.787	9.186
501051	.002	.005	40.940	64.447	1.255	43.659	34.797
501052	.046	.091	8.286	49.163	2.436	17.650	7.246
501053	.049	.085	16.700	55.201	1.818	22.071	12.140
501054	.085	.130	7.723	58.071	2.742	17.654	6.438
501061	.000	.000	58.702	105.050	1.338	76.126	56.907
501062	.026	.039	19.368	57.252	1.719	27.624	16.067
501063	.034	.055	21.713	101.171	2.159	37.581	17.410
501064	.097	.148	5.197	32.894	2.516	11.805	4.692
501071	.000	.001	47.519	66.640	1.184	56.579	47.777
501072	.115	.157	4.512	27.624	2.474	9.347	3.778

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
501073	.072	.102	11.326	58.819	2.279	20.940	9.189
501074	.113	.170	3.642	21.295	2.418	7.126	2.947
501081	.031	.057	7.601	28.379	1.932	13.354	6.911
501082	.038	.052	40.422	99.232	1.567	44.320	28.286
501083	.040	.056	16.768	56.101	1.829	24.731	13.521
501084	.097	.582	1.566	5.948	1.949	9.491	4.871
501091	.002	.005	32.685	102.248	1.769	54.724	30.940
501092	.026	.064	12.232	57.840	2.175	23.270	10.701
501093	.059	.111	7.831	55.089	2.652	18.424	6.946
501094	.019	.027	63.705	108.408	1.304	65.156	49.947
501101	.001	.002	53.835	99.881	1.362	69.186	50.794
501102	.028	.050	16.960	54.863	1.799	24.291	13.506
501103	.062	.090	16.896	60.229	1.888	24.538	12.997
501104	.054	.083	17.826	60.534	1.843	24.721	13.415
504011	.035	.056	21.232	61.605	1.703	29.116	17.093
504012	.114	.165	4.310	43.298	3.170	12.137	3.829
504013	.168	.202	3.853	44.054	3.382	10.209	3.019
504014	.041	.058	17.563	95.298	2.329	33.891	14.549
504021	.002	.005	38.552	63.651	1.285	44.360	34.523
504022	.045	.074	10.233	56.907	2.358	21.264	9.017
504023	.095	.135	5.862	29.927	2.259	11.274	4.990
504024	.124	.163	5.325	27.818	2.286	9.621	4.209
504031	.006	.013	38.145	101.281	1.629	54.047	33.168
504032	.077	.135	4.904	46.378	3.075	14.221	4.624
504033	.044	.063	26.366	104.378	1.990	41.616	20.916
504034	.088	.118	7.099	27.984	1.985	11.222	5.652
504041	.002	.007	20.816	57.640	1.664	31.919	19.182
504042	.028	.046	35.819	107.122	1.729	52.840	30.555
504043	.075	.142	4.393	30.346	2.628	10.342	3.935
504044	.057	.072	32.449	63.031	1.394	30.711	22.035
504051	.076	.114	11.055	54.404	2.218	19.341	8.719
504052	.126	.159	7.433	52.670	2.662	15.145	5.689
504053	.033	.070	9.323	52.854	2.381	20.117	8.449
504054	.001	.003	61.316	108.454	1.330	69.703	52.410
504061	.001	.004	20.582	55.155	1.637	31.182	19.048
504062	.032	.057	10.451	71.313	2.612	24.401	9.341
504063	.047	.068	38.944	101.965	1.618	42.787	26.443
504064	.060	.081	18.076	97.188	2.319	32.157	13.868
504071	.019	.044	21.993	57.791	1.621	28.869	17.809
504072	.049	.091	9.918	94.734	3.091	27.727	8.972
504073	.049	.081	11.759	58.665	2.234	22.810	10.212
504074	.071	.111	8.364	44.395	2.304	16.464	7.146
504081	.002	.005	45.849	66.083	1.201	50.513	42.075
504082	.039	.072	9.345	46.610	2.233	18.652	8.352
504083	.048	.079	13.383	56.402	2.053	22.326	10.875
504084	.104	.166	4.322	24.823	2.397	8.477	3.537
504091	.001	.002	44.770	88.422	1.405	56.883	40.476
504092	.037	.070	16.308	61.849	1.947	26.968	13.848
504093	.125	.213	3.049	22.167	2.696	7.260	2.692
504094	.054	.079	14.831	54.453	1.916	22.097	11.532
504101	.003	.005	27.029	60.546	1.497	36.996	24.719
504102	.023	.038	25.546	91.276	1.890	39.148	20.710
504103	.103	.139	6.121	34.890	2.388	12.616	5.284
504104	.113	.128	18.281	60.386	1.817	21.167	11.646

101.6 - 127 mm (4-5 in) Gravel

EXCLUDED

GRAVEL QUALITY PARAMETERS

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
5011	.024	.059	12.146	50.574	2.041	21.586	10.578
5012	.022	.048	22.743	54.167	1.543	28.304	18.340
5013	.101	.191	3.787	28.710	2.753	9.726	3.532
5014	.081	.150	7.058	53.971	2.765	16.920	6.119
5021	.031	.070	14.554	59.072	2.015	25.552	12.683
5022	.064	.127	6.965	51.363	2.716	16.598	6.112
5023	.033	.056	22.467	59.887	1.633	29.708	18.196
5024	.062	.113	8.786	34.865	1.992	15.590	7.826
5031	.008	.018	44.814	77.363	1.314	49.934	38.005
5032	.108	.197	3.665	30.704	2.894	10.056	3.474
5033	.166	.241	2.686	47.213	4.192	10.100	2.409
5034	.121	.196	4.192	31.271	2.731	10.395	3.806
5041	.033	.076	10.640	35.031	1.814	17.194	9.476
5042	.118	.211	3.307	30.476	3.036	9.248	3.046
5043	.124	.210	3.410	23.817	2.643	8.167	3.090
5044	.054	.089	14.119	59.589	2.054	24.000	11.682
5051	.043	.102	7.085	27.123	1.957	12.185	6.228
5052	.087	.172	4.231	42.339	3.163	12.063	3.813
5053	.140	.240	2.610	22.129	2.912	7.042	2.418
5054	.142	.235	2.788	24.929	2.990	7.729	2.585
5061	.040	.095	8.519	38.100	2.115	16.170	7.646
5062	.073	.149	5.389	36.285	2.595	13.035	5.023
5063	.063	.125	7.772	48.939	2.509	16.315	6.502
5064	.096	.177	4.316	35.232	2.857	10.644	3.726
5071	.037	.071	16.500	59.968	1.906	26.569	13.936
5072	.044	.087	15.026	88.701	2.430	31.778	13.079
5073	.058	.104	14.434	58.558	2.014	23.143	11.490
5074	.092	.162	5.636	50.310	2.988	14.240	4.766
5081	.044	.077	17.065	53.538	1.771	23.766	13.418
5082	.072	.138	8.217	53.287	2.547	17.482	6.865
5083	.063	.108	12.238	58.439	2.185	21.992	10.064
5084	.048	.078	16.292	58.160	1.889	24.974	13.218
5091	.010	.025	19.447	83.493	2.072	33.975	16.397
5092	.053	.107	9.328	40.392	2.081	16.621	7.987
5093	.081	.132	8.157	41.039	2.243	15.645	6.975
5094	.031	.046	41.194	64.531	1.252	38.725	30.941
5101	.023	.040	26.418	87.935	1.824	41.235	22.601
5102	.057	.105	12.181	59.976	2.219	23.056	10.391
5103	.086	.155	5.957	36.762	2.484	13.360	5.378
5104	.110	.166	5.981	55.690	3.051	15.242	4.995
10011	.059	.093	12.447	55.024	2.103	21.040	10.007
10012	.132	.170	7.035	46.546	2.572	13.176	5.122
10013	.096	.123	11.998	58.459	2.207	19.774	8.958
10014	.164	.219	3.180	18.437	2.408	6.537	2.715
10021	.007	.010	79.994	94.398	1.086	69.238	63.737
10022	.065	.102	9.305	39.310	2.055	16.203	7.883
10023	.167	.221	3.337	27.202	2.855	8.176	2.864
10024	.184	.224	3.687	29.412	2.824	8.755	3.100
10031	.006	.014	29.614	61.718	1.444	37.852	26.220
10032	.052	.105	8.352	48.766	2.416	17.371	7.189
10033	.085	.135	10.257	51.292	2.236	17.874	7.993
10034	.047	.062	24.926	81.556	1.809	34.212	18.914
10041	.061	.092	10.407	46.536	2.115	18.222	8.617
10042	.147	.197	4.438	31.670	2.671	10.441	3.908
10043	.170	.212	4.863	55.707	3.385	14.705	4.344
10044	.081	.100	22.339	58.081	1.612	24.156	14.981
10051	.028	.042	21.880	49.844	1.509	27.404	18.156

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
10052	.293	.339	0.783	50.260	8.012	7.481	0.934
10053	.162	.199	4.966	47.588	3.096	11.777	3.804
10054	.134	.167	5.072	29.350	2.406	9.513	3.954
10061	.030	.055	17.257	56.852	1.815	26.616	14.664
10062	.136	.194	4.484	52.086	3.408	13.260	3.890
10063	.177	.216	4.294	53.053	3.515	12.901	3.670
10064	.070	.085	77.568	93.589	1.098	44.663	40.661
10071	.021	.036	39.606	87.820	1.489	46.997	31.561
10072	.098	.141	7.122	33.896	2.182	12.872	5.900
10073	.122	.164	6.010	34.233	2.387	11.512	4.824
10074	.106	.136	11.093	50.457	2.133	17.139	8.036
10081	.012	.018	29.099	60.542	1.442	37.796	26.203
10082	.072	.112	10.990	84.765	2.777	23.658	8.518
10083	.077	.101	16.866	83.838	2.230	27.819	12.478
10084	.146	.181	6.768	50.126	2.721	13.482	4.954
10091	.039	.053	20.511	48.916	1.544	25.160	16.292
10092	.111	.152	6.837	51.095	2.734	14.766	5.402
10093	.133	.154	10.026	69.104	2.625	16.318	6.216
10094	.107	.127	14.641	58.489	1.999	20.283	10.148
47011	.021	.028	38.347	63.579	1.288	35.455	27.535
47012	.111	.141	5.008	43.802	2.957	12.240	4.139
47013	.143	.170	3.899	26.320	2.598	7.911	3.045
47014	.172	.223	2.814	13.491	2.190	4.908	2.241
47021	.047	.062	12.452	82.835	2.579	24.898	9.653
47022	.076	.091	11.646	58.153	2.235	21.230	9.501
47023	.058	.073	7.740	33.767	2.089	14.801	7.086
47024	.053	.064	9.229	59.282	2.534	21.997	8.679
47031	.036	.052	10.423	33.734	1.799	16.805	9.341
47032	.099	.125	5.014	28.860	2.399	10.127	4.221
47033	.090	.105	8.125	51.081	2.507	16.686	6.655
47034	.114	.134	4.677	18.762	2.003	8.135	4.062
47041	.028	.039	15.528	67.972	2.092	25.770	12.317
47042	.055	.070	13.750	52.911	1.962	21.112	10.763
47043	.089	.104	9.557	38.759	2.014	16.209	8.049
47044	.062	.074	17.474	52.086	1.726	22.407	12.978
47051	.029	.053	11.590	40.297	1.865	19.695	10.562
47052	.045	.062	23.820	85.401	1.893	34.015	17.964
47053	.144	.158	8.327	58.376	2.648	16.351	6.175
47054	.042	.050	17.213	58.262	1.840	25.983	14.123
47061	.008	.018	24.909	60.218	1.555	33.572	21.592
47062	.054	.093	11.043	36.086	1.808	17.170	9.498
47063	.046	.070	15.825	39.579	1.581	20.067	12.688
47064	.044	.068	21.550	60.695	1.678	26.944	16.055
47071	.037	.056	10.873	31.287	1.696	15.839	9.337
47072	.084	.111	7.552	37.292	2.222	14.884	6.698
47073	.082	.102	9.955	54.243	2.334	18.825	8.065
47074	.110	.118	13.490	57.233	2.060	19.092	9.269
47081	.032	.050	17.173	53.364	1.763	24.358	13.818
47082	.060	.093	9.496	41.652	2.094	17.123	8.176
47083	.048	.069	10.636	44.566	2.047	18.616	9.094
47084	.045	.059	20.268	53.862	1.630	24.620	15.103
47091	.008	.018	24.720	59.047	1.546	33.861	21.909
47092	.043	.080	12.611	51.889	2.028	20.579	10.145
47093	.041	.065	17.425	42.861	1.568	21.174	13.501
47094	.030	.048	15.688	55.248	1.877	24.309	12.954
47101	.051	.068	14.320	42.837	1.730	19.866	11.486
47102	.101	.125	8.045	55.052	2.616	17.506	6.692

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
47103	.073	.083	20.862	84.466	2.012	29.436	14.629
47104	.163	.189	3.890	25.249	2.548	7.686	3.017
56011	.015	.029	16.968	55.399	1.807	27.821	15.397
56012	.052	.088	11.708	54.339	2.154	20.633	9.577
56013	.040	.067	18.425	89.075	2.199	34.861	15.855
56014	.047	.078	17.712	60.641	1.850	26.433	14.285
56021	.078	.121	7.180	52.957	2.716	15.934	5.867
56022	.107	.161	6.306	36.081	2.392	13.684	5.721
56023	.088	.124	12.484	52.687	2.054	18.640	9.073
56024	.125	.178	5.765	33.631	2.415	11.994	4.966
56031	.064	.102	9.353	43.012	2.144	17.425	8.126
56032	.080	.125	8.446	42.219	2.236	15.231	6.812
56033	.104	.165	5.761	37.253	2.543	13.717	5.394
56034	.058	.094	13.257	58.853	2.107	22.887	10.863
56041	.014	.025	17.267	51.259	1.723	26.603	15.475
56042	.085	.132	6.596	27.029	2.024	10.846	5.358
56043	.092	.130	8.553	53.109	2.492	16.473	6.611
56044	.096	.144	6.240	35.449	2.383	13.061	5.480
56051	.075	.114	9.943	73.043	2.710	21.469	7.921
56052	.101	.146	6.885	50.571	2.710	15.164	5.595
56053	.097	.138	9.888	47.266	2.186	16.411	7.506
56054	.053	.075	27.449	62.544	1.509	30.319	20.085
56061	.060	.098	8.994	53.215	2.432	18.833	7.742
56062	.064	.096	16.158	75.759	2.165	26.727	12.343
56063	.134	.181	6.494	36.194	2.361	12.927	5.476
56064	.090	.122	13.228	56.753	2.071	20.494	9.894
56071	.094	.145	5.774	44.097	2.764	12.571	4.549
56072	.137	.198	4.130	34.245	2.879	10.524	3.655
56073	.145	.198	3.538	46.896	3.641	10.502	2.885
56074	.072	.098	16.046	89.775	2.365	30.222	12.777
56081	.046	.075	8.982	30.008	1.828	14.291	7.819
56082	.053	.073	27.382	83.348	1.745	35.111	20.125
56083	.108	.152	7.798	45.817	2.424	15.263	6.297
56084	.068	.102	15.122	84.054	2.358	27.964	11.861
56091	.006	.013	31.795	92.634	1.707	52.274	30.625
56092	.029	.049	24.277	59.678	1.568	30.589	19.510
56093	.059	.094	15.753	58.697	1.930	24.141	12.506
56094	.066	.102	13.682	59.321	2.082	23.237	11.160
56101	.064	.108	8.685	48.955	2.374	16.987	7.155
56102	.019	.019	47.063	66.488	1.189	51.722	43.515
56103	.119	.169	5.894	35.748	2.463	12.016	4.879
56104	.113	.167	5.094	53.825	3.251	13.265	4.081
62011	.122	.144	11.386	52.699	2.151	17.321	8.051
62012	.133	.168	7.131	56.508	2.815	15.936	5.661
62013	.152	.203	3.841	28.978	2.747	8.754	3.187
62014	.122	.180	4.134	46.665	3.360	11.101	3.304
62021	.067	.078	21.956	57.921	1.624	26.587	16.369
62022	.064	.077	19.714	58.085	1.716	25.248	14.709
62023	.067	.085	16.949	55.493	1.809	22.606	12.493
62024	.069	.092	12.960	51.827	2.000	19.505	9.754
62031	.131	.151	14.030	88.184	2.507	22.769	9.082
62032	.151	.189	6.597	34.808	2.297	11.481	4.998
62033	.047	.072	17.806	90.562	2.255	33.001	14.633
62034	.093	.141	6.723	47.424	2.656	14.212	5.351
62041	.055	.083	13.287	90.666	2.612	30.952	11.849
62042	.173	.248	2.428	18.952	2.794	6.499	2.326
62043	.112	.162	4.938	26.720	2.326	9.309	4.002

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
62044	.191	.274	2.035	17.537	2.935	5.087	1.733
62051	.036	.055	27.336	92.111	1.836	42.750	23.289
62052	.061	.089	31.017	91.241	1.715	38.800	22.622
62053	.083	.113	15.900	55.543	1.869	21.262	11.376
62054	.104	.132	10.651	52.946	2.230	17.373	7.792
62061	.196	.274	2.011	39.051	4.407	7.797	1.769
62062	.157	.197	6.163	55.947	3.013	13.826	4.589
62063	.191	.250	2.370	23.396	3.142	6.905	2.198
62064	.104	.174	4.107	54.815	3.654	13.746	3.763
62071	.074	.112	10.560	56.848	2.320	19.480	8.396
62072	.107	.152	7.726	45.194	2.419	14.401	5.954
62073	.097	.129	11.458	52.652	2.144	17.855	8.329
62074	.098	.130	9.070	30.116	1.822	12.618	6.925
62081	.099	.133	12.373	58.502	2.174	20.449	9.404
62082	.066	.088	19.639	59.249	1.737	25.128	14.467
62083	.158	.225	3.167	34.467	3.299	8.875	2.690
62084	.094	.126	16.345	61.794	1.944	22.848	11.751
62091	.071	.111	14.598	67.304	2.147	24.378	11.353
62092	.095	.126	15.515	85.038	2.341	24.638	10.524
62093	.114	.168	11.817	58.720	2.229	17.983	8.067
62094	.153	.233	2.955	33.538	3.369	9.189	2.728
62101	.080	.129	7.297	49.549	2.606	14.841	5.695
62102	.162	.204	4.499	37.811	2.899	10.627	3.666
62103	.091	.118	14.791	88.572	2.447	27.828	11.372
62104	.175	.229	3.117	20.296	2.552	6.681	2.618
92011	.028	.043	24.577	58.761	1.546	31.270	20.223
92012	.100	.148	6.482	29.875	2.147	11.531	5.371
92013	.055	.091	12.821	49.646	1.968	19.748	10.035
92014	.027	.052	22.364	58.266	1.614	28.645	17.747
92021	.066	.107	11.851	56.781	2.189	20.695	9.455
92022	.071	.125	13.150	53.951	2.026	20.403	10.073
92023	.091	.162	8.918	47.441	2.306	16.256	7.048
92024	.123	.196	6.519	52.547	2.839	14.685	5.173
92031	.049	.093	10.519	45.563	2.081	17.830	8.567
92032	.077	.148	5.551	35.973	2.546	13.262	5.210
92033	.083	.170	4.670	35.096	2.741	12.522	4.568
92034	.113	.223	3.078	30.600	3.153	9.232	2.928
92041	.026	.052	13.692	49.720	1.906	22.161	11.629
92042	.041	.077	12.519	56.443	2.123	22.300	10.503
92043	.176	.260	2.233	26.028	3.414	7.115	2.084
92044	.084	.125	11.394	55.417	2.205	19.023	8.626
92051	.052	.080	10.775	46.838	2.085	18.921	9.075
92052	.131	.179	4.620	45.417	3.135	11.902	3.796
92053	.125	.158	9.604	52.877	2.346	15.800	6.734
92054	.249	.318	1.205	16.583	3.710	4.322	1.165
92061	.024	.042	18.058	49.939	1.663	25.169	15.135
92062	.063	.102	10.185	37.958	1.931	16.934	8.772
92063	.065	.087	19.953	52.037	1.615	22.502	13.934
92064	.043	.052	38.926	82.628	1.457	40.217	27.603
92071	.029	.056	10.757	29.629	1.660	15.628	9.417
92072	.058	.097	10.669	50.211	2.169	18.859	8.693
92073	.051	.072	25.236	61.326	1.559	29.228	18.749
92074	.180	.203	5.944	42.146	2.663	10.351	3.887
92081	.052	.087	11.589	36.340	1.771	17.392	9.822
92082	.159	.269	2.169	16.785	2.782	5.988	2.153
92083	.151	.246	2.470	28.930	3.422	8.057	2.354
92084	.226	.338	1.444	17.076	3.439	4.768	1.386

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
92091	.059	.082	18.664	56.880	1.746	24.897	14.262
92092	.092	.147	7.168	49.270	2.622	15.709	5.991
92093	.117	.203	4.184	34.137	2.857	11.298	3.955
92094	.078	.110	18.104	61.242	1.839	24.761	13.463
92101	.229	.255	2.137	74.099	5.889	14.965	2.541
92102	.068	.114	13.303	85.187	2.531	26.109	10.318
92103	.077	.109	16.220	55.654	1.852	21.471	11.591
92104	.039	.058	23.616	57.450	1.560	28.273	18.127
104011	.016	.022	41.863	64.754	1.244	44.160	35.507
104012	.085	.120	19.637	55.659	1.684	21.202	12.594
104013	.045	.059	41.092	81.110	1.405	40.568	28.875
104014	.075	.095	22.207	57.773	1.613	23.909	14.823
104021	.029	.045	23.958	58.085	1.557	30.978	19.895
104022	.076	.113	20.439	48.438	1.539	20.450	13.284
104023	.071	.113	32.844	63.197	1.387	28.791	20.756
104024	.142	.203	4.151	49.624	3.458	12.470	3.606
104031	.023	.029	25.031	51.108	1.429	31.455	22.013
104032	.053	.065	30.342	73.727	1.559	35.633	22.859
104033	.075	.109	20.181	58.005	1.695	22.988	13.559
104034	.066	.108	25.642	62.009	1.555	26.198	16.847
104041	.043	.048	32.485	62.343	1.385	35.551	25.663
104042	.086	.104	21.566	60.485	1.675	24.642	14.714
104043	.104	.139	11.508	54.843	2.183	17.404	7.973
104044	.065	.088	14.458	55.047	1.951	21.336	10.935
104051	.008	.013	33.105	62.384	1.373	41.384	30.147
104052	.027	.063	6.756	31.142	2.147	13.632	6.349
104053	.060	.084	24.470	59.820	1.564	27.257	17.433
104054	.117	.151	9.502	54.192	2.388	16.113	6.747
104061	.006	.008	28.603	60.739	1.457	38.970	26.743
104062	.031	.041	26.370	59.749	1.505	33.149	22.022
104063	.170	.212	5.662	37.000	2.556	11.493	4.496
104064	.209	.261	2.133	34.388	4.015	8.469	2.109
104071	.027	.036	41.702	64.701	1.246	41.643	33.432
104072	.132	.171	13.619	50.401	1.924	16.157	8.399
104073	.078	.093	26.386	61.212	1.523	27.423	18.005
104074	.008	.011	79.706	94.302	1.088	68.701	63.161
104081	.009	.010	45.183	65.858	1.207	51.344	42.528
104082	.059	.059	38.828	63.742	1.281	36.650	28.604
104083	.144	.148	20.160	41.551	1.436	16.651	11.598
104084	.114	.120	19.321	58.857	1.745	21.457	12.294
104091	.016	.017	32.606	61.924	1.378	41.295	29.965
104092	.114	.136	11.364	49.982	2.097	16.429	7.834
104093	.060	.061	34.193	69.216	1.423	36.725	25.813
104094	.127	.130	13.443	34.495	1.602	14.276	8.912
104101	.013	.013	39.983	64.128	1.266	45.983	36.309
104102	.073	.073	24.628	54.713	1.490	26.653	17.882
104103	.076	.078	25.060	57.844	1.519	27.106	17.841
104104	.127	.145	7.879	28.264	1.894	10.443	5.514
123011	.013	.015	34.189	63.066	1.358	39.420	29.025
123012	.057	.066	37.078	87.662	1.538	40.707	26.474
123013	.117	.127	16.091	60.687	1.942	21.946	11.300
123014	.146	.162	7.731	44.597	2.402	13.849	5.766
123021	.001	.001	44.297	80.514	1.348	56.396	41.831
123022	.192	.210	7.363	55.316	2.741	13.347	4.870
123023	.044	.050	27.123	84.412	1.764	38.430	21.784
123024	.419	.458	0.458	42.697	9.652	4.059	0.421
123031	.001	.001	38.862	63.754	1.281	47.601	37.164

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
123032	.039	.043	31.352	79.122	1.589	41.345	26.026
123033	.159	.170	19.694	60.210	1.749	19.151	10.953
123034	.235	.251	2.326	49.263	4.602	9.965	2.165
123041	.013	.017	39.224	63.875	1.276	45.172	35.398
123042	.068	.088	22.174	59.609	1.640	27.028	16.485
123043	.051	.060	40.897	88.192	1.468	45.307	30.853
123044	.114	.123	15.989	61.562	1.962	22.272	11.350
123051	.004	.005	41.859	64.753	1.244	48.927	39.338
123052	.117	.129	16.108	59.294	1.919	21.237	11.069
123053	.164	.184	11.772	43.669	1.926	13.913	7.224
123054	.117	.126	19.487	39.523	1.424	18.069	12.688
123061	.002	.002	43.662	65.354	1.223	51.969	42.478
123062	.036	.039	23.109	54.776	1.540	29.647	19.257
123063	.132	.142	19.399	85.409	2.098	23.968	11.423
123064	.228	.244	3.248	41.888	3.591	10.667	2.970
123071	.000	.000	80.457	94.552	1.084	79.401	73.244
123072	.024	.032	42.527	64.976	1.236	43.834	35.462
123073	.115	.142	21.010	53.303	1.593	20.042	12.583
123074	.193	.216	8.785	53.059	2.458	14.368	5.847
123081	.024	.029	30.924	86.135	1.669	46.174	27.667
123082	.092	.105	15.287	45.415	1.724	19.435	11.276
123083	.154	.187	12.413	36.459	1.714	13.830	8.070
123084	.219	.256	2.194	29.746	3.682	8.269	2.246
123091	.020	.026	29.601	61.324	1.439	37.170	25.825
123092	.073	.088	22.531	59.093	1.619	26.232	16.198
123093	.148	.173	10.996	47.911	2.087	14.688	7.037
123094	.164	.182	7.754	54.248	2.645	14.236	5.382
123101	.057	.069	24.636	55.869	1.506	28.228	18.745
123102	.111	.128	21.404	54.863	1.601	21.320	13.316
123103	.124	.135	27.253	62.390	1.513	24.193	15.990
123104	.237	.248	2.605	55.817	4.629	11.812	2.552
501011	.004	.009	36.362	88.023	1.556	47.166	30.315
501012	.044	.064	16.764	87.026	2.278	31.078	13.640
501013	.138	.188	3.609	28.889	2.829	8.057	2.848
501014	.067	.088	10.875	90.295	2.882	27.484	9.538
501021	.002	.005	24.685	60.646	1.567	35.521	22.662
501022	.010	.027	22.356	61.306	1.656	31.537	19.044
501023	.080	.133	4.566	25.328	2.355	9.448	4.011
501024	.117	.161	4.811	28.743	2.444	9.780	4.001
501031	.008	.017	16.747	52.298	1.767	26.701	15.110
501032	.011	.028	12.856	37.304	1.703	20.773	12.195
501033	.023	.041	19.530	55.999	1.693	26.411	15.597
501034	.034	.056	21.899	61.833	1.680	28.860	17.175
501041	.012	.022	28.042	61.040	1.475	35.638	24.155
501042	.054	.097	8.560	54.478	2.523	18.815	7.458
501043	.035	.064	17.436	41.790	1.548	20.991	13.558
501044	.057	.097	10.954	56.097	2.263	20.787	9.186
501051	.002	.005	40.940	64.447	1.255	43.659	34.797
501052	.046	.091	8.286	49.163	2.436	17.650	7.246
501053	.049	.085	16.700	55.201	1.818	22.071	12.140
501054	.085	.130	7.723	58.071	2.742	17.654	6.438
501061	.000	.000	58.702	90.625	1.243	70.468	56.714
501062	.026	.039	19.368	57.252	1.719	27.624	16.067
501063	.034	.055	21.713	88.686	2.021	35.193	17.413
501064	.097	.148	5.197	32.894	2.516	11.805	4.692
501071	.000	.001	47.519	66.640	1.184	56.579	47.777
501072	.115	.157	4.512	27.624	2.474	9.347	3.778

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
501073	.072	.102	11.326	58.819	2.279	20.940	9.189
501074	.113	.170	3.642	21.295	2.418	7.126	2.947
501081	.031	.057	7.601	28.379	1.932	13.354	6.911
501082	.038	.052	40.421	87.708	1.473	41.732	28.331
501083	.040	.056	16.768	56.101	1.829	24.731	13.521
501084	.068	.408	1.828	14.810	2.847	4.842	1.701
501091	.002	.005	32.685	89.224	1.652	51.101	30.929
501092	.026	.064	12.232	57.840	2.175	23.270	10.701
501093	.059	.111	7.831	55.089	2.652	18.424	6.946
501094	.019	.027	63.705	92.301	1.204	59.506	49.436
501101	.002	.003	44.537	65.643	1.214	49.318	40.623
501102	.028	.050	16.960	54.863	1.799	24.291	13.506
501103	.062	.090	16.896	60.229	1.888	24.538	12.997
501104	.054	.083	17.826	60.534	1.843	24.721	13.415
504011	.035	.056	21.232	61.605	1.703	29.116	17.093
504012	.114	.165	4.310	43.298	3.170	12.137	3.829
504013	.168	.202	3.853	44.054	3.382	10.209	3.019
504014	.069	.096	8.393	47.310	2.374	16.276	6.856
504021	.002	.005	38.552	63.651	1.285	44.360	34.523
504022	.045	.074	10.233	56.907	2.358	21.264	9.017
504023	.095	.135	5.862	29.927	2.259	11.274	4.990
504024	.124	.163	5.325	27.818	2.286	9.621	4.209
504031	.006	.013	38.145	88.741	1.525	50.599	33.174
504032	.077	.135	4.904	46.378	3.075	14.221	4.624
504033	.101	.144	5.805	37.583	2.544	13.276	5.218
504034	.088	.118	7.099	27.984	1.985	11.222	5.652
504041	.002	.007	20.816	57.640	1.664	31.919	19.182
504042	.077	.126	12.177	39.956	1.811	16.619	9.174
504043	.075	.142	4.393	30.346	2.628	10.342	3.935
504044	.057	.072	32.449	63.031	1.394	30.711	22.035
504051	.076	.114	11.055	54.404	2.218	19.341	8.719
504052	.126	.159	7.433	52.670	2.662	15.145	5.689
504053	.033	.070	9.323	52.854	2.381	20.117	8.449
504054	.001	.003	61.316	92.327	1.227	63.613	51.841
504061	.001	.004	20.582	55.155	1.637	31.182	19.048
504062	.032	.057	10.451	71.313	2.612	23.701	9.073
504063	.047	.068	38.944	89.083	1.512	39.985	26.438
504064	.060	.081	18.076	86.694	2.190	30.379	13.871
504071	.019	.044	21.993	57.791	1.621	28.869	17.809
504072	.080	.151	4.463	40.908	3.028	11.938	3.943
504073	.049	.081	11.759	58.665	2.234	22.810	10.212
504074	.071	.111	8.364	44.395	2.304	16.464	7.146
504081	.002	.005	45.849	66.083	1.201	50.513	42.075
504082	.039	.072	9.345	46.610	2.233	18.652	8.352
504083	.048	.079	13.383	56.402	2.053	22.326	10.875
504084	.104	.166	4.322	24.823	2.397	8.477	3.537
504091	.001	.002	44.770	82.311	1.356	54.437	40.148
504092	.037	.070	16.308	61.849	1.947	26.968	13.848
504093	.125	.213	3.049	22.167	2.696	7.260	2.692
504094	.054	.079	14.831	54.453	1.916	22.097	11.532
504101	.003	.005	27.029	60.543	1.497	37.011	24.730
504102	.023	.038	25.546	83.738	1.811	37.333	20.620
504103	.103	.139	6.121	34.890	2.388	12.616	5.284
504104	.113	.128	18.281	60.386	1.817	21.167	11.646

APPENDIX XIII

VALUES OF EACH GRAVEL QUALITY PARAMETER FOR EACH SUBSAMPLED DEPTH OF CHINOOK SPAWNING GRAVEL, LOWER DESCHUTES RIVER, OREGON, 1983

This appendix contains mean values and statistics of dispersion for gravel quality indices calculated for depth stratified gravel samples collected from ten fall chinook spawning areas in the Deschutes River, Oregon. All data given here are based on the particle size distribution of all sediment particles less than 127 mm in diameter. The following are descriptions of the data presented:

- "A" - gravel stratum from 0 - 101.6 mm in depth
- "B" - gravel stratum from 101.6 - 203.2 mm in depth
- "C" - gravel stratum from 203.2 - 304.8 mm in depth
- "D" - gravel stratum from 304.8 - 406.4 mm in depth
- P119 - percent fines <1.19 mm
- P238 - percent fines <2.38 mm
- D25 - 25th percentile particle size
- D75 - 75th percentile particle size
- SORTCO sorting coefficiency
- GEOMM geometric mean particle diameter
- FREDLE Fredle indix
- LNFREDLE natural-log transformation of Fredle index

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=5									
P119	10	0.02310000	0.01322834	0.00800000	0.04400000	0.00418317	0.23100000	0.00017499	57.266
P238	10	0.09890000	0.02596344	0.05100000	0.09500000	0.00821036	0.98900000	0.00067410	53.095
BZS	10	24.94630000	16.03675559	8.51900000	60.37400000	5.07126739	249.46300000	257.17752979	64.301
D75	10	78.66380000	26.08952076	38.11000000	108.18200000	8.25023087	786.63800000	680.66309373	33.177
SORTCO	10	1.90120000	0.34957973	1.32400000	2.44400000	0.11054650	19.01200000	0.12222529	18.387
GEOMM	10	36.82760000	15.31420358	16.17000000	64.86700000	4.84277639	368.27600000	234.52483116	41.583
FREDLE	10	21.12850000	13.10004502	7.64600000	48.95900000	4.14259797	211.28500000	171.61117961	62.002
LNFREDLE	10	2.92629056	0.54093953	2.15709679	3.90114404	0.17106010	29.58629264	0.29261558	18.283
STA=10									
P119	9	0.02488889	0.01739572	0.00600000	0.06100000	0.00579857	0.22400000	0.00030261	69.894
P238	9	0.03900000	0.02561738	0.01000000	0.09200000	0.00853913	0.35100000	0.00656667	65.686
BZS	9	34.10833333	22.78393152	10.40100000	83.78800000	7.59464384	306.97500000	519.10753550	66.799
D75	9	71.59111111	26.19425833	46.53600000	118.99600000	8.99809611	644.32000000	728.68998286	37.706
SORTCO	9	1.55733333	0.27140790	1.15900000	2.11500000	0.09046930	14.01600900	0.07366225	17.428
GEOMM	9	90.11122222	19.28339492	18.22200000	77.88700000	6.42779831	361.00100000	371.84931969	48.075
FREDLE	9	27.96633333	17.88524179	8.61700000	67.18900000	5.96174726	251.69700000	319.88187400	63.953
LNFREDLE	9	3.21241418	0.58514727	2.26353237	4.22228326	0.19504909	28.91172761	0.34239733	18.215
STA=47									
P119	10	0.02750000	0.01234009	0.00800000	0.04700000	0.00390228	0.27500000	0.00152290	44.873
P238	10	0.04150000	0.01579205	0.01800000	0.06200000	0.00099989	0.41500000	0.00024939	38.053
BZS	10	19.06780000	8.98613046	10.42300000	38.34700000	2.84166396	190.67800000	80.75054062	47.127
D75	10	59.63570000	21.83133859	31.28700000	97.39600000	6.90367583	596.35700000	476.60734468	36.608
SORTCO	10	1.82720000	0.37490069	1.28800000	2.61000000	0.11981892	18.27200000	0.14356573	20.737
GEOMM	10	21.22505000	6.30583079	15.83900000	40.00600000	2.62653432	272.20500000	68.98682517	30.513
FREDLE	10	15.66500000	6.57670103	9.33700000	27.55900000	2.07973547	156.65000000	43.25299644	41.983
LNFREDLE	10	2.74553305	0.38461913	2.33572969	3.35197212	0.12162725	27.45532950	0.14793188	14.009
STA=56									
P119	10	0.05160000	0.03033956	0.00600000	0.09100000	0.00959421	0.51600000	0.00092009	58.798
P238	10	0.06300000	0.04558752	0.01300000	0.14500000	0.01441604	0.63000000	0.00207822	72.389
BZS	10	12.49410000	7.77595945	5.77400000	31.79500000	2.45897829	124.94100000	60.46554543	62.237
D75	10	56.10120000	21.55589098	30.00000000	109.06700000	6.81657125	561.01200000	464.65643573	38.423
SORTCO	10	2.23500000	0.41645381	1.72300000	2.76400000	0.13169426	22.35000000	0.17343378	18.633
GEOMM	10	23.01270000	13.09713129	12.57100000	51.14570000	4.14167657	230.12700000	171.53484801	56.913
FREDLE	10	11.13230000	7.88707766	6.59900000	31.02300000	2.49411295	111.32300000	62.20599401	70.849
LNFREDLE	10	2.35764854	0.51613589	1.71361773	3.46645439	0.16321650	23.57648541	0.26639626	21.892
STA=62									
P119	10	0.09310000	0.04632362	0.03600000	0.19600000	0.01464881	0.93100000	0.00214588	49.757
P238	10	0.12700000	0.06110731	0.05500000	0.27400000	0.01900760	1.27000000	0.00361289	47.329
BZS	10	13.48340000	7.06576256	2.07100000	27.33600000	2.23439031	134.83400000	49.92500049	52.403
D75	10	69.51950000	25.21419449	39.05100000	108.02200000	7.97342940	695.19500000	635.75560383	36.269
SORTCO	10	2.49020000	0.75931867	1.62400000	4.40700000	0.24011765	24.90200000	0.57656484	30.492
GEOMM	10	21.57500000	10.72862104	7.79700000	46.74500000	3.39268786	235.75000000	115.10339933	45.508
FREDLE	10	10.57310000	5.96094783	1.76900000	23.51500000	1.88501721	105.73100000	35.53289899	56.378
LNFREDLE	10	2.31564696	0.58204263	1.01848624	3.19928539	0.18405808	23.15686962	0.33877362	25.135

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=9									
P119	10	0.06670000	0.07714208	0.0240	0.282	0.02439447	0.667	0.00595090	115.655
P238	10	0.09560000	0.07989326	0.0420	0.318	0.02526447	0.956	0.00638293	83.570
D25	10	13.15990000	6.25893334	1.1170	24.577	1.97924851	131.599	39.17424654	47.561
D75	10	47.65260000	9.19972714	29.6290	58.761	2.90920916	476.526	84.63497938	19.306
SORTCO	10	2.30690000	1.46146919	1.5460	6.422	0.46215429	23.069	2.13586588	63.352
GEOMN	10	22.29310000	5.19076266	15.6280	31.270	1.64146328	222.931	26.96401699	23.284
FREDLE	10	11.20950000	4.35615973	4.5100	20.223	1.37753866	112.095	18.97612761	38.861
LNFREDLE	10	2.44444801	0.36427207	1.7065	3.055	0.11519294	24.444	0.13269414	14.902
STA=104									
P119	10	0.01860000	0.01199259	0.00500000	0.043	0.00379239	0.186	0.00014382	64.476
P238	10	0.02360000	0.01526215	0.00500000	0.048	0.00482632	0.236	0.00023293	64.670
D25	10	35.40940000	9.33085152	23.95800000	54.761	2.95067433	354.094	87.06479004	26.351
D75	10	65.07300000	13.12231075	51.10800000	00.586	4.14963901	650.730	172.19503933	20.166
SORTCO	10	1.36900000	0.09921917	1.24400000	1.557	0.03137586	13.690	0.00984444	7.248
GEOMN	10	2.27770000	11.35877320	30.99000000	71.285	3.59195947	422.777	129.02172868	26.867
FREDLE	10	1.23250000	9.26322090	19.90400000	52.598	2.92928765	312.325	85.80726139	29.659
LNFREDLE	10	3.43926571	0.26880957	3.03994053	3.981	0.08500505	34.392	0.07225859	7.816
STA=123									
P119	10	0.0128	0.01768113	0.000	0.057	0.00559126	0.128	0.00031262	138.134
P238	10	0.0155	0.02155226	0.000	0.069	0.00681542	0.155	0.00046450	139.047
D25	10	44.0130	17.69983507	24.636	84.714	5.59717930	440.130	313.28416156	40.215
D75	10	79.2910	22.37429473	55.869	112.905	7.07537324	792.910	500.60906467	28.218
SORTCO	10	1.3709	0.17319382	1.154	1.763	0.05476870	13.709	0.02999610	12.634
GEOMN	10	53.6401	18.85441953	28.228	89.550	5.96229097	536.401	355.48913566	35.150
FREDLE	10	40.3435	17.25774915	18.745	77.568	5.45737946	403.435	297.82990583	42.777
LNFREDLE	10	3.6476	0.40495393	2.982	4.363	0.12805768	36.476	0.16398768	11.102
STA=501									
P119	10	0.00620000	0.00950789	0.000	0.0310000	0.00300666	0.062	0.00009040	153.353
P238	10	0.01230000	0.01722434	0.000	0.0570000	0.00544681	0.123	0.00029668	140.035
D25	10	34.71180000	16.17139060	7.601	58.7020000	5.11384272	347.118	261.51387396	46.588
D75	10	74.04750000	26.12755907	28.379	05.0500000	8.26225964	740.475	682.64934317	35.285
SORTCO	10	1.53060000	0.24851613	1.184	1.9320000	0.07858770	15.306	0.06176027	16.237
GEOMN	10	46.16930000	19.18175862	13.354	76.1260000	6.06580468	461.693	367.93986357	41.547
FREDLE	10	32.03510000	15.97842433	6.911	56.9070000	5.05282143	320.351	255.31008410	49.878
LNFREDLE	10	3.36152704	0.59988989	2.068	4.0588382	0.18970184	33.615	0.35986788	17.846
STA=504									
P119	10	0.01470000	0.02417552	0.001	0.076	0.00764497	0.147	0.00058446	164.459
P238	10	0.02550000	0.03632951	0.002	0.114	0.01148840	0.255	0.00131983	142.469
D25	10	29.00230000	11.92868483	11.055	55.849	3.77218136	290.023	142.29352179	41.130
D75	10	66.65780000	15.58886137	54.404	101.281	4.92963081	66.578	243.01259884	23.386
SORTCO	10	1.58600000	0.27975781	1.201	2.218	0.08846719	15.860	0.07826444	17.639
GEOMN	10	38.32260000	12.49439234	19.341	56.883	3.95107378	83.226	56.10983982	32.603
FREDLE	10	25.68120000	11.21745713	8.719	42.075	3.54727141	56.812	25.83134440	43.680
LNFREDLE	10	3.19436215	0.46437688	2.274	3.762	0.14684886	31.943	0.21564589	14.537

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STA=5									
P119	1	0.06260000	0.02414861	0.02200000	0.10800000	0.00763646	0.62600000	0.00058316	38.576
P238	1	0.12130000	0.04455471	0.04800000	0.19700000	0.01408944	1.21300000	0.00198512	36.731
D25	1	10.47160000	6.20294792	3.66500000	22.74300000	1.96154436	104.71600000	38.47656293	59.236
D75	1	57.57140000	25.87416185	30.70400000	105.99800000	8.18212840	575.71400000	669.47225138	44.963
SORTCO	1	2.48520000	0.45091285	1.54300000	3.16300000	0.14259116	24.85200000	0.20332240	18.148
GEOMN	1	21.05490000	9.87349363	10.05600000	39.39700000	3.12227283	210.54900000	97.48587654	46.894
FREDLE	1	9.08460000	5.14949454	3.47400000	18.34000000	1.62841316	90.84600000	26.51729404	56.684
LNFREDLE	1	2.19439491	0.51020265	1.49800000	2.96200000	0.16134024	21.94394910	0.26030674	23.250
STA=10									
P119	9	0.09577778	0.05207633	0.04100000	0.19600000	0.01735878	0.86200000	0.00271190	54.372
P238	9	0.13177778	0.05521272	0.06300000	0.22600000	0.01840424	1.18600000	0.00304840	41.898
D25	9	13.16255556	9.62419908	4.43800000	29.77800000	3.24139969	118.46300000	94.56004780	73.078
D75	9	66.22288889	31.76689823	31.67000000	107.42800000	10.62229941	596.00600000	1015.49920290	48.121
SORTCO	9	2.44788889	0.67597530	1.89900000	4.10700000	0.22532510	22.03100000	0.45694826	27.615
GEOMN	9	22.77111111	12.68094962	10.44100000	45.95500000	4.26031654	204.94000000	163.35267311	56.128
FREDLE	9	10.34433333	7.35437339	3.90800000	24.19500000	2.45145780	93.09900000	54.08680800	71.096
LNFREDLE	9	2.25873875	0.60227985	1.59088853	3.22654556	0.20075995	20.32854955	0.36274610	26.664
STA=47									
P119	10	0.07280000	0.02488105	0.04300000	0.11100000	0.00786808	0.72800000	0.00061907	34.177
P238	10	0.09910000	0.02574857	0.06200000	0.14100000	0.00814241	0.99100000	0.00066299	25.982
D25	10	10.79850000	5.46851969	5.00800000	23.82000000	1.72929777	107.98500000	29.90470761	50.641
D75	10	50.02990000	18.26795125	28.86000000	94.60200000	5.77683341	500.29900000	333.71804299	36.514
SORTCO	10	2.23140000	0.34504950	1.80800000	2.95700000	0.10911423	22.31400000	0.11905916	15.463
GEOMN	10	18.78130000	7.03621270	10.12700000	35.84200000	2.22504582	187.81300000	49.50828912	37.464
FREDLE	10	8.78180000	3.98532750	4.13900000	17.98500000	1.26027121	87.81800000	15.88283529	45.382
LNFREDLE	10	2.21095307	0.39159555	1.63658000	2.94349909	0.12383339	22.10953075	0.15334707	17.712
STA=56									
P119	10	0.07280000	0.03660540	0.01900000	0.13700000	0.01157564	0.72800000	0.00133996	50.282
P238	10	0.10880000	0.05422136	0.01900000	0.19800000	0.01714630	1.08800000	0.00293996	49.836
D25	10	15.87980000	13.52994564	4.13000000	47.06300000	4.27854448	158.79800000	183.05942907	85.202
D75	10	53.60560000	19.96652326	27.02900000	90.49500000	6.31396904	536.05600000	398.66205093	37.247
SORTCO	10	2.11430000	0.50507052	1.18900000	2.87900000	0.15971732	21.14300000	0.25509623	23.888
GEOMN	10	23.33880000	13.33656134	10.52400000	51.72200000	4.21739100	233.38800000	177.86386840	57.143
FREDLE	10	13.29400000	12.13600128	3.65500000	43.51500000	3.83774057	132.94000000	147.28252711	91.289
LNFREDLE	10	2.41185057	0.70355583	1.53794191	3.79586276	0.22248389	24.11850570	0.49499081	29.171
STA=62									
P119	10	0.10870000	0.04797465	0.05100000	0.17300000	0.01517092	1.08700000	0.00230157	44.135
P238	10	0.14340000	0.06384391	0.06400000	0.24800000	0.02018922	1.43400000	0.00407604	44.522
D25	10	16.20520000	14.51167850	2.42800000	48.75400000	4.58899567	162.05200000	210.58881284	89.550
D75	10	61.65960000	30.67048787	18.95200000	106.39300000	9.69885986	616.59600000	940.67882627	49.742
SORTCO	10	2.26630000	0.54534129	1.47700000	3.01300000	0.17245206	22.66300000	0.29739712	24.063
GEOMN	10	22.51650000	14.22644109	6.49900000	49.91400000	4.49879568	225.16500000	202.39162606	63.182
FREDLE	10	11.77880000	10.04925723	2.32600000	33.78900000	3.17785416	117.78800000	100.98757084	85.316
LNFREDLE	10	2.28493507	0.76293336	1.20177418	3.54900120	0.24126071	22.84935068	0.58206732	33.390

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STA=92									
P119	10	0.07860000	0.03303601	0.0410000	0.159	0.01044690	0.78600000	0.00109138	42.031
P238	10	0.13050000	0.05570009	0.0770000	0.269	0.01761391	1.30500000	0.00310250	42.682
D25	10	10.71580000	6.48790253	2.1690000	25.962	2.05165492	107.15800000	42.09287929	60.545
D75	10	52.92460000	17.39692240	16.7850000	84.605	8.66366757	529.24600000	750.59135693	51.766
SORTCO	10	2.30140000	0.31549087	1.9310000	2.782	0.09976697	23.01400000	0.09953449	13.709
GEOMN	10	19.26400000	9.45881180	5.9880000	40.161	2.99113892	192.64000000	89.46912067	49.101
FREDLE	10	8.71070000	4.82057869	2.1530000	20.008	1.52440083	87.10700000	23.23797890	55.341
LNFREDLE	10	2.16415602	0.50521496	1.1483543	3.048	0.15976300	21.64158008	0.25524215	23.345
STA=104									
P119	10	0.07360000	0.03326059	0.0270	0.132	0.01051792	0.73600000	0.00110627	45.191
P238	10	0.09450000	0.04096679	0.0410	0.171	0.01295484	0.94500000	0.00167828	43.351
D25	10	21.35490000	9.41963865	6.7560	38.828	2.97875129	213.54900000	88.72959232	44.110
D75	10	54.80380000	1.24716338	31.1420	73.727	3.55666535	548.03800000	126.49868418	20.523
SORTCO	10	1.69010000	0.28106601	1.2810	2.147	0.08888088	16.90100000	0.07899810	16.630
GEOMN	10	24.56640000	8.53762003	13.6320	36.700	2.69983251	245.66400000	72.89095582	34.753
FREDLE	10	15.52260000	7.39017289	6.3890	28.604	2.33697786	155.22600000	54.61465538	47.609
LNFREDLE	10	2.71001323	0.46705507	1.9945	3.387	0.14769578	27.10013233	0.21814044	17.234
STA=123									
P119	10	0.06740000	0.03142964	0.02400000	0.11700000	0.00993892	0.674	0.00098782	46.632
P238	10	0.07810000	0.03537246	0.03200000	0.12900000	0.01118575	0.781	0.00125121	45.291
D25	10	29.42390000	18.60846685	15.28700000	62.66900000	4.61960284	294.239	13.40730366	49.648
D75	10	68.80960000	20.88209374	45.41500000	108.90100000	6.60349785	688.096	36.06183916	30.348
SORTCO	10	1.58500000	0.19264763	1.23600000	1.91900000	0.06092053	15.850	0.03711311	12.154
GEOMN	10	33.03810000	12.36924090	19.43500000	55.45300000	3.91149742	330.381	52.99812058	37.439
FREDLE	10	21.81290000	10.57018651	11.06900000	42.06700000	3.34258647	218.129	111.72884277	48.458
LNFREDLE	10	3.03616620	0.44491882	2.40064018	3.76275704	0.14069569	30.361	0.19795276	14.654
STA=501									
P119	10	0.03690000	0.02997573	0.010	0.11500000	0.00947916	0.369	0.00089854	81.235
P238	10	0.06180000	0.03841817	0.027	0.15700000	0.01214889	0.618	0.00147596	62.165
D25	10	18.84140000	11.21818694	4.512	40.42200000	3.54750220	188.414	125.84771827	59.540
D75	10	64.54500000	26.53432550	27.624	103.01500000	8.39089048	645.450	704.07043000	41.110
SORTCO	10	1.96690000	0.36870215	1.567	2.47400000	0.11532895	19.66900000	0.13300766	18.542
GEOMN	10	27.76960000	11.39332192	9.347	45.94400000	3.60288474	277.69600000	129.80778427	41.028
FREDLE	10	15.11060000	7.78953940	3.778	28.28600000	2.46326864	151.10600000	60.67692404	51.550
LNFREDLE	10	2.66029493	0.58223421	1.564	3.37710959	0.17146951	26.60294829	0.29401794	20.382
STA=504									
P119	10	0.05700000	0.03646002	0.0230	0.126	0.01152967	0.57000000	0.00132933	63.965
P238	10	0.09070000	0.04608700	0.0380	0.165	0.01457399	0.90700000	0.00212401	50.813
D25	10	13.42670000	9.97939686	4.3100	35.819	3.15576238	134.26700000	99.58836179	74.325
D75	10	67.21570000	22.90794297	43.2980	117.122	7.24412763	672.15700000	524.77385090	34.081
SORTCO	10	2.47670000	0.52977648	1.7290	3.170	0.16753003	24.76700000	0.28066312	21.390
GEOMN	10	25.25030000	12.55783817	12.1370	52.880	3.97113585	252.50300000	157.69919912	49.733
FREDLE	10	11.49370000	8.30293407	3.8290	30.555	2.62561829	114.93700000	68.93871423	72.239
LNFREDLE	10	2.36052888	0.58429497	1.5746	3.451	0.18477026	23.60528878	0.34140050	24.753

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=5									
P119	1	0.0722	0.03304139	0.024	0.140	0.01044860	0.722	0.0010917	45.764
P238	1	0.1256	0.05897306	0.043	0.240	0.01864892	1.256	0.0034778	46.953
D25	1	15.3670	14.40958459	2.610	48.049	4.55671074	153.670	207.6361280	93.770
D75	1	60.7609	32.01882048	22.129	105.489	10.12524007	607.609	025.2048652	52.696
SORTCO	1	2.2958	0.51139435	1.480	2.912	0.16171709	22.958	0.2615242	22.275
GEOMN	1	23.6092	14.82919682	7.042	54.923	4.68940378	236.092	219.9050784	62.811
FREDLE	1	12.1062	10.68219679	2.418	37.108	3.37800723	121.062	114.1093282	88.237
LNFREDLE	1	2.3149	0.74412908	1.229	3.640	0.23531428	23.149	0.5537281	32.145
STA=10									
P119	9	0.13211111	0.03	0.077	0.177	0.01303035	1.189	0.00152811	29.590
P238	9	0.16944444	0.04	0.101	0.221	0.01481657	1.525	0.00197578	26.233
D25	9	8.06855556	4.503199	3.337	16.866	1.50106636	72.617	20.27880203	55.812
D75	9	54.23488889	18.751974	27.202	91.476	6.25065805	488.114	351.63653461	34.575
SORTCO	9	2.73722222	0.500175	2.207	3.515	0.16672505	24.635	0.25017519	18.273
GEOMN	9	15.85822222	6.148313	8.176	29.179	2.04943771	142.724	37.80175444	38.771
FREDLE	9	6.15500000	3.152614	2.864	12.529	1.05087156	55.395	9.93897925	51.220
LNFREDLE	9	1.88918071	0.412426	1.351	2.604	0.13747553	17.002	0.17009570	21.831
STA=47									
P119	1	0.08140	0.03721469	0.04100000	0.144	0.01176832	0.814	0.00138493	45.718
P238	1	0.09990	0.03713773	0.06500000	0.170	0.01174398	0.999	0.00137921	37.175
D25	1	11.23510	5.17511888	3.89900000	20.862	1.63651628	112.351	26.78185543	46.062
D75	1	48.22830	18.32903533	26.32000000	92.731	5.79614990	482.283	335.95353623	38.005
SORTCO	1	2.14940	0.38109268	1.56800000	2.648	0.12051207	21.494	0.14523160	17.730
GEOMN	1	18.15690	5.79266501	7.91100000	30.929	1.83180151	181.569	33.55496788	31.903
FREDLE	1	8.90280	3.65615614	3.04500000	14.670	1.15617809	89.028	13.36747773	41.067
LNFREDLE	1	2.22550	0.40065000	1.39748155	2.751	0.12669665	22.255	0.16052042	18.003
STA=56									
P119	1	0.0918	0.02779209	0.04000000	0.13400000	0.00878863	0.918	0.0077240	30.275
P238	1	0.1326	0.03696229	0.06700000	0.18100000	0.01140390	1.326	0.0130049	27.196
D25	1	10.3120	4.31579657	5.76100000	18.42500000	1.36477471	103.120	18.62610000	41.852
D75	1	56.8416	24.43593025	35.74800000	101.95100000	7.72731963	568.416	597.1468716	42.990
SORTCO	1	2.3679	0.26626363	1.93000000	2.87400000	0.08419995	23.679	0.7089632	11.245
GEOMN	1	19.7064	8.31339248	12.01600000	37.30200000	2.62892552	197.064	69.1249382	42.186
FREDLE	1	8.4099	3.58615190	4.87900000	15.85800000	1.13404080	84.099	12.86048543	42.642
LNFREDLE	1	2.1832	0.35138537	1.77138668	2.82482532	0.11111781	21.832	0.2347168	16.094
STA=62									
P119	1	0.11120	0.04436165	0.04700	0.191	0.01402838	1.1120	0.00196796	39.894
P238	1	0.15250	0.05961217	0.07200	0.250	0.01885102	1.5250	0.00355361	39.090
D25	1	10.30370	6.14595394	2.37000	17.806	1.94352128	103.0370	37.77274979	59.668
D75	1	54.18450	28.89313271	23.40400	104.925	9.13681081	541.8450	834.81311806	53.324
SORTCO	1	2.46040	0.49663987	1.80900	3.299	0.15705132	24.6040	0.24665116	20.185
GEOMN	1	17.86790	9.70158509	6.90100	35.635	3.06791058	178.8790	94.12075321	54.235
FREDLE	1	7.83890	4.57580197	2.19600	14.680	1.44699563	78.3890	20.93796366	58.373
LNFREDLE	1	2.03262	0.59672469	1.16190	2.752	0.18870092	20.3326	0.35608036	29.368

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=92									
P119	10	0.09910000	0.04194295	9.05 103000	0.176 00000	0.01326353	0.99 100000	0.00175921	u2.325
P238	10	0.15580000	0.06634221	0.07200000	0.26000000	0.02097925	1.35800000	0.00440129	42.582
D25	10	10.63090000	7.89894531	2.23300000	25.23600000	2.48205444	106.30900000	61.60594254	73.831
D75	13	44.31720000	12.20186713	26.02800000	61.32600000	3.87 121829	443.17200000	109.8633108.	27.621
SORTCO	10	2.40900000	0.68470237	1.55900000	3. a2200090	0.21652190	24.08000000	0.46881733	28. a34
GEOMN	10	16.39970000	6.96006889	7.11509000	29.22800000	2.20096704	163.99700000	48.48255890	42.448
FREDLE	10	9.1 05200000	5.42837477	2.08 400000	18.74900000	1.71660283	81.05200000	29.06725262	66.978
LNFREDLE	10	2.04056617	0.62596948	1.12622746	2.98310286	0.19794892	20.40566168	0.39183774	30.676
STA=104									
P119	19	0.08570000	3.34 182251	0. 04500000	0.17000000	0.01322594	0.85700000	0.00 1749 12	48.801
P238	19	0.10550000	0.04821537	0.05900900	0.21200000	0.01524704	1.05500000	0.00232972	4s. 702
D25	10	25.33610000	12.17129300	5.66200000	au. 64900000	3.80890'392	253.36100000	148.14038299	48.039
D75	10	61.76230000	17.21909652	37.00003000	92.11900000	5.01515642	617.62300000	296.49728490	27.880
SORTCO	19	1.67820090	0.38355263	1.a2300000	2.55600000	0.12128999	16.78200000	0. la71 1262	22.835
GEOMN	10	27.56390000	11.25800062	11.49300000	us. 56800000	3.56009238	275.63900000	126.74257788	40.843
FREDLE	10	17.81880000	9.99022983	4.49600000	3 1.72400000	2.89296030	178.18800000	80.82423240	so. 454
LNFREDLE	10	2.81097845	0.55851053	1.70402055	3.48810875	0.1766 1654	28.10978453	0.31193001	19.869
STA=123									
P119	10	9. 11430000	0.04763064	0.04400000	0.16400000	0.01506213	1. 14300000	0.00226860	11.672
P238	10	9.12990003	0.05997007	0.05000000	0.18700000	0.01722095	1.29900000	0.00296699	41.932
D25	10	23.97450000	12.65705817	10.99600000	49.18800000	4.00251323	239.74500000	160.20112161	52.798
D75	10	69 .558 10900	25.68209026	36. US900000	104.21200009	8.12151652	695.58100090	659.59030588	36.922
sORTCO	10	1.76600000	0.25056514	1.45600000	2.20900000	0.07923565	17.66000000	0.06278289	14.188
GEOMN	10	27.12569009	14.33957499	13.83000000	s1.54700000	4.53457177	271.25600000	205.6234 1093	52.868
FREDLE	10	16.13919000	10.05126098	7.03700000	35.41400000	3.17848780	161.39100000	101.02784721	62.279
LNFREDLE	10	2.70235089	0.54215708	2.08 405588	3. 59495332	0.17144512	27.02350885	0.29393430	20.062
STA=501									
P119	10	0.05720000	0.93519091	0.01500000	0.13800009	0.01112834	0.57200000	0.00 123800	61.521
P238	10	0.08880000	0.04807355	0.02700000	0.10800000	0.01520219	0.88800000	0.00231107	54.137
D25	10	15.18260000	8.80860264	3.60900000	32. 138700000	2.78552473	151.82600000	77.59148049	58.011
D75	13	63.19963990	25.78528877	25.32800000	105.16000000	8.15402426	601.98600000	664.88111693	42.834
sORTCO	10	2.1290900')	0.39287883	1.69300000	2.82900000	0.12123920	21.29000000	0.15435378	18.456
GEOMN	10	24.47200000	12.96277653	8.05700000	52.51900000	0.09918986	244.72000000	168.03357533	52.970
FREDLE	19	12.40290390	7.64965531	2.84800000	29.37000000	2.41903341	129.02900000	SE.51722632	61.676
LNFREDLE	13	2.43789375	0.61910498	1.34755353	3.41345528	0.195778 19	24.37883754	0.38329098	2s. 393
STA=504									
P119	10	0.07870000	0.04360186	0.03303009	a. 16800000	0.01378812	0.78700009	0.00190112	55.403
P238	10	0.11920000	0.35586850	0.06300900	0.21300000	0.01766717	1.19200000	0.00312129	16.870
D25	10	12.30513000	11.62929377	3.04900000	39.94400000	3.67750558	123.05300000	135.24047268	9U. SOL
D75	10	53.56480000	28.83297324	22.16 70000')	104.37809000	9.11775509	535.64800000	83 1.33457929	53.828
SORTCO	19	2.36290000	0.07597754	1.61893000	3.38200003	0.15048569	23.62900000	0.22645943	20.140
GEOMN	19	29.13577000	12.83116658	7.26009000	02.78737000	4.05757114	20 1.35700000	164.63883579	6 3.723
FREDLE	10	9.68150000	8.01387171	2.69200090	26. 44300000	2.53 420875	96.81500000	69.222 13983	82.77'5
LNFREDLE	10	2.14583792	0.68604533	1.33616832	3.31211113	0.21694658	21.45830923	0.470658 19	31.971

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=5									
P119	10	0.37533000	0.03527369	0.03100000	0.142	0.01115452	0.753	0.00124423	46.844
P238	10	0.12760000	0.06011692	0.04600000	0.235	0.01901064	1.276	0.00361404	47.114
D25	10	14.08920000	13.34678320	2.78800000	41.194	4.22062343	140.892	178.13662173	94.731
D75	10	54.59540000	22.91398392	24.92900000	108.677	7.24603794	545.954	525.05065893	41.971
SORTCO	10	2.36070000	0.64184111	1.25200000	3.051	0.20296798	23.607	0.41196001	27.189
GEOMM	10	21.85290000	13.36667906	7.72900000	50.465	4.22691506	218.529	178.66810921	61.167
FREDLE	10	11.43830000	10.22403054	2.58500000	30.981	3.23312234	114.383	104.53080046	89.384
LNFREDLE	10	2.25570315	0.78455090	1.27675947	3.463	0.23584767	22.557	0.5535604	33.007
STA=10									
P119	9	0.11588444	0.04532138	0.047	0.184	0.01510713	1.0390	0.00205403	39.258
P238	9	0.14455556	0.05746110	0.062	0.224	0.01915370	1.3010	0.00330178	39.750
D25	9	18.96022222	23.84446781	3.180	78.936	7.94815594	170.6420	568.55864494	125.760
D75	9	54.69366667	29.29752815	18.437	110.979	9.76584272	492.2430	858.34515550	53.567
SORTCO	9	2.12844444	0.52798606	1.186	2.824	0.17599535	19.1560	0.27876928	24.806
GEOMM	9	20.57822222	14.17714651	6.537	49.649	4.72571550	185.2040	200.99148319	68.894
FREDLE	9	12.09722222	12.56377480	2.715	41.873	4.16792493	108.8750	156.344384419	103.361
LNFREDLE	9	2.25012887	0.81869436	1.312	3.758	0.27289812	20.2511	0.67026045	36.384
STA=47									
P119	10	0.08350000	0.05249815	0.03000	0.17200000	0.01660137	0.835	0.00275606	62.872
P238	10	0.10270000	0.06176847	0.04800	0.22300000	0.01953291	1.027	0.00381534	60.145
D25	10	12.62930000	6.99224248	2.81400	21.55000000	2.21114122	126.293	48.89145490	55.365
D75	10	45.81700000	18.49689542	13.49100	60.69500000	5.84923192	458.170	342.13518022	40.727
SORTCO	10	2.00860000	0.33012092	1.63000	2.54800000	0.10439340	20.086	0.10897982	16.435
GEOMM	10	18.60810000	8.40198956	4.90800	26.98400000	2.65694239	186.081	70.59382854	45.152
FREDLE	10	9.84810000	5.20224570	2.24100	16.05500000	1.64509454	98.481	27.06336032	52.825
LNFREDLE	10	2.23921838	0.61758227	1.17588	2.83644342	0.19529666	22.392	0.38140786	27.580
STA=56									
P119	10	0.0788	0.02616529	0.04700	0.12500000	0.00827819	0.788	0.00068462	33.205
P238	10	0.1160	0.03588562	0.07500	0.17800000	0.01134803	1.160	0.00128778	30.936
D25	10	13.3595	5.70485695	5.09400	27.44900000	2.12026193	133.595	44.95510672	50.188
D75	10	61.6274	21.66975287	33.63100	103.35000000	6.85257754	616.274	469.57818938	35.163
SORTCO	10	2.2671	0.46701831	1.50900	3.25100000	0.14768416	22.671	0.21810610	20.600
GEOMM	10	22.3506	10.54329084	11.99400	32.46800000	2.38539801	223.506	56.90123671	33.750
FREDLE	10	10.5512	4.80616494	4.08100	20.08500000	1.53249191	105.512	23.48531462	45.930
LNFREDLE	10	2.3597	0.45466879	1.62550	3.04856189	0.14377890	23.597	0.20672371	19.268
STA=62									
P119	10	0.12030000	0.03966581	0.06900000	0.19100000	0.01254330	1.2030	0.00157334	32.972
P238	10	0.17110000	0.05799895	0.09200000	0.27400000	0.01834088	1.7110	0.00336368	33.898
D25	10	7.20970000	4.86228865	2.03500000	16.34500000	1.53759068	72.0970	23.64185090	67.441
D75	10	41.69580000	15.29344455	17.53700000	61.79400000	4.83621180	416.9580	233.8894618	36.679
SORTCO	10	2.65220000	0.65851800	1.82200000	3.65400000	0.20824168	26.5220	0.43364596	24.829
GEOMM	10	13.23600000	5.58481009	5.08700000	22.84800000	1.76607202	132.3600	31.19010378	42.194
FREDLE	10	5.57190000	3.37384866	1.73300000	11.75100000	1.06690462	55.7190	11.38285477	60.551
LNFREDLE	10	1.76409800	0.51555336	1.00539991	2.54560970	0.16303229	17.6409	0.26579526	29.225

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=92									
P119	10	0.11620000	0.07859149	0.02700000	0.24900000	0.02485281	1.16200000	0.00617662	67.635
P238	10	0.16750000	0.10575470	0.05200000	0.33800000	0.03344257	1.67500000	0.01118406	63.137
D25	10	13.25940000	12.30807476	1.20500000	38.92600000	3.89215498	132.59400000	151.48870427	92.825
D75	10	48.03830000	22.14011534	6.58300000	89.05600000	7.00131921	480.38300000	490.18470734	46.088
SORTCO	10	2.45350000	0.82048824	1.51300000	3.71000000	0.25946116	24.53500000	0.67320094	33.442
GEOMN	10	18.61140000	12.24296977	4.32200000	42.35400000	3.87156698	186.11400000	149.89030871	65.782
FREDLE	10	10.03050000	8.98316618	1.16500000	27.80300000	2.82807746	100.30500000	79.98022139	89.160
LNFREDLE	10	2.05956083	0.91256976	0.77202036	3.36047955	0.28857990	20.59563831	0.83278357	44.309
STA=104									
P119	10	0.18500000	0.05457716	0.[illegible]00000	0.20900000	0.01725881	1.85000000	0.00297867	51.978
P238	10	0.13120000	0.06719238	0.[illegible]11000	0.26100000	0.02131134	1.31200000	0.00454173	51.366
D25	10	20.19480000	23.41366333	2.[illegible]33000	83.21200000	7.40405045	201.94800000	548.19963062	115.939
D75	10	54.70530000	23.46563091	28.[illegible]64000	112.40400000	7.42048404	547.05300000	550.63583423	42.895
SORTCO	10	2.13830000	0.90874566	1.[illegible]62000	4.01500000	0.28737061	21.38300000	0.82581868	42.499
GEOMN	10	23.18340000	19.86830390	8.[illegible]69000	77.16300000	6.28290936	231.83400000	394.74949982	85.701
FREDLE	10	14.81790000	18.73575466	2.[illegible]09000	66.39200000	5.92476584	148.17900000	351.02850277	126.440
LNFREDLE	10	2.37972808	0.84682563	1.[illegible]34011	4.21052[illegible]3	0.26778978	23.797[illegible]84	0.71711365	35.585
STA=123									
P119	10	0.20720000	0.08801995	0.11400000	0.[illegible]0000	0.02783435	2.07200000	0.00774751	42.481
P238	10	0.22660000	0.09597129	0.12300000	0.458000000	0.03034879	2.26600000	0.00921049	42.353
D25	10	7.05770000	6.34313543	0.45800000	19.48700000	2.00587555	70.57700000	40.23536712	89.875
D75	10	47.24000000	9.35479850	29.74600000	61.56200000	2.95824703	472.40000000	87.51225489	19.803
SORTCO	10	3.70470000	2.34890391	1.82400000	9.65200000	0.74278864	37.04700000	5.51734957	63.403
GEOMN	10	12.75660000	5.09445810	4.05900000	22.27200000	1.61100911	127.56600000	25.95350338	39.936
FREDLE	10	5.13870000	4.04678394	0.42100000	12.68800000	1.27970544	51.38700000	16.37646023	78.751
LNFREDLF	10	1.61465921	0.68556996	0.35136085	2.61613[illegible]4	0.21679626	16.14652[illegible]	0.47000617	42.459
STA=501									
P119	10	0.07400000	0.03318634	0.01900000	0.11700000	0.01049444	0.74000000	0.0011013	44.846
P238	10	0.15420000	0.15722581	0.02700000	0.58200000	0.04971917	1.54200000	0.0247200	101.962
D25	10	14.81980000	18.32777583	1.56600000	63.70500000	5.79575161	148.19800000	335.9073668	123.671
D75	10	53.82130000	33.47648219	5.94800000	108.40800000	10.58619318	538.21300000	1120.6748596	62.199
SORTCO	10	2.22570000	0.53817788	1.30400000	3.09800000	0.16892188	22.25700000	0.2853460	24.000
GEOMN	10	22.50040000	17.07454772	7.12600000	65.15600000	5.39944608	225.00400000	291.5401798	75.886
FREDLE	10	12.22330000	13.99695406	2.94700000	49.94700000	4.42622551	122.23300000	195.9147229	114.510
LNFREDLE	10	2.26755[illegible]8	0.75762376	1.37235580	3.93078588	0.23958167	22.67538[illegible]77	0.5739938	33.411
STA=504									
P119	10	0.07130000	0.03705267	0.00100000	0.12400000	0.01171708	0.71300000	0.00137290	51.967
P238	10	0.09790000	0.04974256	0.00300000	0.16600000	0.01572998	0.97900000	0.00247432	50.810
D25	10	18.76260000	17.15608004	4.32200000	57.31600000	5.42522887	187.62600000	294.33108249	91.438
D75	10	60.38300000	30.83462569	24.82300000	108.45400000	9.75076480	603.83000000	950.77414156	51.065
SORTCO	10	2.00770000	0.39414268	1.33000000	2.39700000	0.12463886	20.07700000	0.15534846	19.632
GEOMN	10	25.55100000	18.11552219	8.47700000	69.70300000	5.72863111	255.51000000	328.17214422	70.899
FREDLE	10	14.65840000	14.41261043	3.53700000	52.41000000	4.55766760	146.58400000	207.72333938	98.323
LNFREDLE	10	2.47783452	0.73879493	1.51226600	3.97799799	0.23362747	24.77894[illegible]18	0.54581795	29.815

APPENDIX XIV

VALUES OF EACH GRAVEL QUALITY PARAMETER FOR EACH DEPTH SLJBSAMPLE OF' STEELHEAD SPAWNING GRAVEL COLLECTED AT THE LOWER DESCHUTES RIVER, OREGON, 1984.

This appendix contains values of seven gravel quality parameters calculated for depth stratified samples of gravel from summer steelhead spawning areas in the Deschutes River, Oregon. The following are descriptions of the data recorded herein:

Station = Sampling site, with the last digit representing sample depth, the two previous to that indicating the sample number, and all digits previous to those giving the station number.

P119 = Percent by weight of sediment particles less than 1.19 mm in diameter.

P238 = Percent by weight of sediment particles less than 2.38 mm in diameter.

d_{25} = 25th percentile particle diameter of subsample.

d75 = 75th percentile particle diameter of subsample.

Sorting Coefficient = S_o $d25/d75$

Geometric Mean = d_g = Geometric mean particle diameter of subsample

Fredle Index = $d_{g/So}$

GRAVEL QUALITY PARAMETERS--STEELHEAD

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
501011	9	.055	.106	8.144	30.578	1.938	13.586	7.011
501012	9	.081	.126	7.463	51.342	2.623	16.506	6.293
501013	9	.124	.182	4.243	53.688	3.557	12.757	3.586
501021	9	.022	.063	9.361	35.051	1.935	16.553	8.554
501022	9	.144	.231	2.733	32.440	3.445	7.765	2.254
501023	9	.173	.240	2.600	25.337	3.122	6.159	1.973
501031	9	.004	.009	16.892	33.384	1.406	23.039	16.388
501032	9	.022	.062	6.920	42.642	2.482	15.236	6.138
501033	9	.064	.107	15.373	58.263	1.947	21.845	11.221
501041	9	.011	.024	18.857	47.901	1.594	26.623	16.704
501042	9	.072	.143	5.180	50.173	3.112	14.146	4.545
501043	9	.061	.093	18.669	62.861	1.835	26.412	14.394
501051	9	.012	.028	15.626	47.215	1.738	24.180	13.910
501052	9	.043	.086	12.246	59.035	2.196	23.242	10.586
501053	9	.072	.119	9.532	49.950	2.289	16.304	7.122
501061	9	.033	.073	9.464	51.021	2.322	19.475	8.388
501062	9	.105	.188	3.696	51.187	3.721	11.534	3.099
501063	9	.096	.159	4.943	28.958	2.421	10.333	4.269
501071	9	.034	.057	12.303	55.898	2.132	22.701	10.650
501072	9	.083	.123	7.580	57.309	2.750	17.664	6.424
501073	9	.070	.108	12.303	59.159	2.193	21.512	9.810
501081	9	.023	.044	8.814	25.854	1.713	13.373	7.808
501082	9	.063	.092	6.701	28.371	2.058	11.517	5.597
501083	9	.098	.161	4.146	26.418	2.524	8.568	3.394
501091	9	.040	.083	5.625	23.466	2.042	10.354	5.069
501092	9	.058	.082	16.919	91.930	2.331	34.129	14.642
501093	9	.087	.131	5.944	33.903	2.388	11.962	5.009
501101	9	.007	.019	12.536	47.434	1.945	22.271	11.449
501102	9	.037	.057	18.761	60.876	1.801	27.534	15.286
501103	9	.104	.136	11.146	57.659	2.274	18.022	7.924
501111	9	.013	.039	7.609	25.245	1.821	12.824	7.040
501112	9	.059	.113	5.257	18.733	1.888	9.153	4.849
501113	9	.086	.121	8.110	44.539	2.343	15.280	6.520
501121	9	.079	.134	6.440	34.069	2.300	13.099	5.695
501122	9	.042	.066	28.135	90.787	1.796	39.423	21.946
501123	9	.072	.107	13.643	87.950	2.539	25.371	9.993
501131	9	.000	.006	15.521	46.294	1.727	25.337	14.671
501132	9	.033	.072	9.924	34.719	1.870	16.950	9.062
501133	9	.045	.085	12.742	50.011	1.981	20.457	10.326
501141	9	.063	.095	10.091	56.051	2.357	19.556	8.298
501142	9	.117	.155	8.892	59.147	2.579	18.075	7.008
501143	9	.058	.096	13.284	46.897	1.879	19.520	10.389
501151	9	.010	.033	10.926	36.556	1.829	19.406	10.609
501152	9	.050	.080	12.883	52.175	2.012	20.846	10.358
501153	9	.060	.086	17.232	54.192	1.773	22.845	12.657
504011	9	.050	.076	8.621	55.930	2.547	18.998	7.459
504012	9	.104	.131	6.763	35.204	2.281	12.437	5.451
504013	9	.142	.167	6.551	53.286	2.852	13.954	4.892
504021	9	.034	.047	14.742	31.803	1.469	18.316	12.470
504022	9	.049	.060	29.489	72.261	1.565	33.890	21.649
504023	9	.098	.117	13.175	57.315	2.086	19.639	9.416
504031	9	.203	.248	2.445	47.669	4.416	10.101	2.287
504032	9	.336	.359	0.494	47.260	9.783	5.817	0.595
504033	9	.091	.115	7.833	45.369	2.407	14.197	5.899
504041	9	.039	.055	13.612	84.926	2.498	26.016	10.415
504042	9	.079	.097	14.808	55.773	1.941	21.047	10.845
504043	9	.078	.097	15.184	76.179	2.240	25.180	11.241
504051	9	.016	.020	14.767	35.785	1.557	22.032	14.153
504052	9	.057	.078	9.285	32.819	1.880	15.206	8.088
504053	9	.093	.117	9.289	38.164	2.027	15.580	7.687
504061	9	.007	.015	15.947	36.985	1.523	23.578	15.482
504062	9	.023	.035	29.606	72.324	1.563	36.778	23.531

STATION	P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
501073	.072	.102	11.326	58.819	2.279	20.940	9.189
501074	.113	.170	3.642	21.295	2.418	7.126	2.947
501081	.031	.057	7.601	28.379	1.932	13.354	6.911
501082	.038	.052	40.421	87.708	1.473	41.732	28.331
501083	.040	.056	16.768	56.101	1.829	24.731	13.521
501084	.068	.408	1.828	14.810	2.847	4.842	1.701
501091	.002	.005	32.685	89.224	1.652	51.101	30.929
501092	.026	.064	12.232	57.840	2.175	23.270	10.701
501093	.059	.111	7.831	55.089	2.652	18.424	6.946
501094	.019	.027	63.705	92.301	1.204	59.506	49.436
501101	.002	.003	44.537	65.643	1.214	49.318	40.623
501102	.028	.050	16.960	54.863	1.799	24.291	13.506
501103	.062	.090	16.896	60.229	1.888	24.538	12.997
501104	.054	.083	17.826	60.534	1.843	24.721	13.415
504011	.035	.056	21.232	61.605	1.703	29.116	17.093
504012	.114	.165	4.310	43.298	3.170	12.137	3.829
504013	.168	.202	3.853	44.054	3.382	10.209	3.019
504014	.069	.096	8.393	47.310	2.374	16.276	6.856
504021	.002	.005	38.552	63.651	1.285	44.360	34.523
504022	.045	.074	10.233	56.907	2.358	21.264	9.017
504023	.095	.135	5.862	29.927	2.259	11.274	4.990
504024	.124	.163	5.325	27.818	2.286	9.621	4.209
504031	.006	.013	38.145	88.741	1.525	50.599	33.174
504032	.077	.135	4.904	46.378	3.075	14.221	4.624
504033	.101	.144	5.805	37.583	2.544	13.276	5.218
504034	.088	.118	7.099	27.984	1.985	11.222	5.652
504041	.002	.007	20.816	57.640	1.664	31.919	19.182
504042	.077	.126	12.177	39.956	1.811	16.619	9.174
504043	.075	.142	4.393	30.346	2.628	10.342	3.935
504044	.057	.072	32.449	63.031	1.394	30.711	22.035
504051	.076	.114	11.055	54.404	2.218	19.341	8.719
504052	.126	.159	7.433	52.670	2.662	15.145	5.689
504053	.033	.070	9.323	52.854	2.381	20.117	8.449
504054	.001	.003	61.316	92.327	1.227	63.613	51.841
504061	.001	.004	20.582	55.155	1.637	31.182	19.048
504062	.032	.057	10.451	71.313	2.612	23.701	9.073
504063	.047	.068	38.944	89.083	1.512	39.985	26.438
504064	.060	.081	18.076	86.694	2.190	30.379	13.871
504071	.019	.044	21.993	57.791	1.621	28.869	17.809
504072	.080	.151	4.463	40.908	3.028	11.938	3.943
504073	.049	.081	11.759	58.665	2.234	22.810	10.212
504074	.071	.111	8.364	44.395	2.304	16.464	7.146
504081	.002	.005	45.849	66.083	1.201	50.513	42.075
504082	.039	.072	9.345	46.610	2.233	18.652	8.352
504083	.048	.079	13.383	56.402	2.053	22.326	10.875
504084	.104	.166	4.322	24.823	2.397	8.477	3.537
504091	.001	.002	44.770	82.311	1.356	54.437	40.148
504092	.037	.070	16.308	61.849	1.947	26.968	13.848
504093	.125	.213	3.049	22.167	2.696	7.260	2.692
504094	.054	.079	14.831	54.453	1.916	22.097	11.532
504101	.003	.005	27.029	60.543	1.497	37.011	24.730
504102	.023	.038	25.546	83.738	1.811	37.333	20.620
504103	.103	.139	6.121	34.890	2.388	12.616	5.284
504104	.113	.128	18.281	60.386	1.817	21.167	11.646

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
504063	9	.022	.037	27.506	89.447	1.803	42.012	23.297
504071	9	.033	.066	8.402	53.434	2.522	18.897	7.493
504072	9	.095	.129	7.256	54.408	2.738	16.195	5.914
504073	9	.110	.139	8.939	51.198	2.393	15.548	6.497
504081	9	.016	.022	18.451	52.240	1.683	27.580	16.391
504082	9	.080	.116	6.783	46.858	2.628	15.224	5.792
504083	9	.109	.144	7.372	52.290	2.663	15.399	5.782
504091	9	.086	.100	15.846	59.491	1.938	22.506	11.615
504092	9	.122	.156	6.445	48.655	2.748	13.378	4.869
504093	9	.137	.161	6.825	45.905	2.593	12.040	4.643
504101	9	.013	.022	11.943	31.044	1.612	17.932	11.123
504102	9	.140	.170	5.817	34.721	2.443	11.312	4.630
504103	9	.186	.205	4.399	23.729	2.323	6.994	3.011
504111	9	.003	.005	20.241	32.147	1.260	23.439	18.599
504112	9	.088	.119	6.721	35.607	2.302	12.455	5.411
504113	9	.088	.121	7.179	38.470	2.315	13.822	5.971
504121	9	.006	.011	19.969	44.505	1.493	27.745	18.585
504122	9	.099	.135	6.518	37.798	2.408	12.885	5.351
504123	9	.150	.174	6.039	35.839	2.436	11.251	4.618
504131	9	.047	.073	11.682	53.461	2.139	20.761	9.705
504132	9	.068	.110	8.096	54.379	2.592	17.445	6.731
504133	9	.075	.117	8.421	44.822	2.307	15.623	6.772
504141	9	.061	.093	8.282	28.956	1.870	13.025	6.966
504142	9	.071	.094	14.442	53.024	1.916	20.621	10.762
504143	9	.090	.119	7.796	31.384	2.006	12.543	6.252
504151	9	.067	.087	11.546	46.918	2.016	18.146	9.002
504152	9	.092	.115	13.384	81.589	2.469	23.914	9.686
504153	9	.057	.074	29.945	62.218	1.441	30.863	21.412
508011	0	.019	.031	19.515	89.368	2.140	40.237	18.802
508012	0	.093	.116	13.214	56.417	2.066	19.375	9.377
508013	0	.123	.151	9.130	81.531	2.988	19.915	6.664
508021	9	.040	.076	8.683	29.964	1.858	14.116	7.599
508022	9	.058	.086	13.581	76.475	2.373	25.665	10.815
508023	9	.043	.061	14.326	58.451	2.020	24.626	12.191
508031	9	.044	.074	9.598	29.585	1.756	14.172	8.072
508032	9	.122	.167	4.853	46.645	3.100	11.743	3.788
508033	9	.132	.182	4.460	30.214	2.603	9.577	3.680
508041	0	.242	.269	1.551	27.905	4.242	6.072	1.432
508042	0	.518	.553	0.227	7.382	5.704	1.208	0.212
508043	0	.192	.238	2.715	30.085	3.329	7.313	2.197
508051	9	.137	.180	4.408	25.383	2.400	8.106	3.378
508052	9	.217	.263	2.054	27.001	3.626	6.369	1.757
508053	9	.156	.196	3.945	25.096	2.522	7.707	3.056
508061	9	.160	.185	5.984	42.794	2.674	11.287	4.221
508062	9	.249	.284	1.223	27.332	4.728	6.078	1.286
508063	9	.131	.154	10.171	51.070	2.241	15.154	6.763
508071	9	.009	.020	15.798	53.488	1.840	26.558	14.433
508072	9	.093	.163	4.009	18.740	2.162	8.563	3.960
508073	9	.128	.161	6.090	45.663	2.738	11.801	4.310
508081	9	.013	.035	11.876	31.823	1.637	17.993	10.992
508082	9	.086	.129	8.056	57.886	2.681	18.488	6.897
508083	9	.139	.176	6.352	52.295	2.869	13.435	4.683
508091	9	.123	.187	3.835	16.254	2.059	6.837	3.321
508092	9	.235	.284	1.556	18.486	3.447	4.835	1.403
508093	9	.205	.232	3.100	32.158	3.221	7.643	2.373
508101	0	.016	.031	20.549	58.229	1.683	29.624	17.599
508102	0	.095	.151	5.174	36.275	2.648	11.824	4.465
508103	0	.209	.253	2.309	27.371	3.443	6.732	1.956
508111	9	.029	.050	14.511	35.207	1.558	20.282	13.021
508112	9	.097	.134	8.849	39.267	2.107	15.135	7.185
508113	9	.203	.269	2.032	21.718	3.269	5.908	1.807
508121	9	.009	.018	20.119	48.042	1.545	27.600	17.861
508122	9	.071	.132	6.019	34.864	2.407	12.979	5.393
508123	9	.070	.111	12.867	86.974	2.600	24.492	9.420
508131	9	.062	.117	6.354	35.074	2.349	14.089	5.997
508132	9	.076	.108	12.758	58.134	2.135	21.302	9.979

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
508133	9	.098	.156	5.429	45.995	2.911	13.325	4.578
508141	9	.004	.014	18.798	35.649	1.377	24.294	17.641
508142	9	.052	.114	6.184	29.532	2.185	12.405	5.677
508143	9	.178	.240	2.700	25.359	3.065	7.297	2.381
508151	9	.023	.038	14.821	30.797	1.442	18.555	12.872
508152	9	.090	.123	7.916	38.623	2.209	14.187	6.423
508153	9	.279	.339	0.863	28.320	5.730	5.319	0.928
5011	0	.038	.058	12.549	38.119	1.743	19.503	11.190
5012	0	.148	.206	3.929	30.383	2.781	9.767	3.512
5013	0	.176	.236	2.845	36.112	3.563	9.181	2.577
5021	9	.039	.070	12.060	48.750	2.011	20.378	10.135
5022	9	.108	.151	7.901	69.192	2.959	17.097	5.777
5023	9	.133	.164	8.949	87.148	3.121	20.568	6.591
5031	9	.053	.085	9.898	31.360	1.780	14.893	8.367
5032	9	.114	.165	5.904	41.288	2.644	13.275	5.020
5033	9	.183	.247	2.478	31.119	3.544	8.606	2.429
5041	9	.038	.060	14.597	43.522	1.727	21.337	12.356
5042	9	.126	.181	4.998	39.107	2.797	12.289	4.393
5043	9	.189	.236	3.313	52.408	3.977	12.167	3.059
5051	9	.022	.040	15.790	34.227	1.472	21.068	14.309
5052	9	.086	.137	6.813	54.485	2.828	16.445	5.815
5053	9	.064	.096	19.961	59.515	1.727	25.156	14.569
5061	9	.025	.049	12.374	31.904	1.606	17.754	11.057
5062	9	.132	.203	3.602	30.314	2.901	9.360	3.226
5063	9	.113	.155	6.871	36.189	2.295	13.210	5.756
5071	9	.046	.075	14.497	43.640	1.735	20.896	12.044
5072	9	.150	.228	3.195	37.259	3.415	10.714	3.137
5073	9	.132	.189	5.627	52.705	3.061	14.270	4.663
5081	9	.034	.053	11.698	33.068	1.681	17.622	10.481
5082	9	.093	.132	9.379	81.415	2.946	22.613	7.675
5083	9	.090	.131	11.021	85.446	2.784	24.309	8.730
5091	9	.016	.029	14.801	36.135	1.563	21.925	14.032
5092	9	.053	.085	16.695	80.761	2.199	28.938	13.157
5093	9	.143	.200	4.342	31.595	2.698	10.518	3.899
5101	9	.013	.039	12.393	32.198	1.612	18.414	11.424
5102	9	.086	.159	5.420	31.318	2.404	11.825	4.919
5103	9	.064	.102	15.483	57.103	1.920	23.023	11.988
5111	9	.031	.056	16.351	50.934	1.765	24.237	13.732
5112	9	.092	.152	6.751	55.568	2.869	16.553	5.770
5113	9	.139	.228	2.972	27.042	3.016	8.400	2.785
5121	9	.062	.101	9.703	31.777	1.810	15.054	8.318
5122	9	.174	.242	2.600	33.858	3.608	9.009	2.497
5123	9	.211	.274	1.934	27.803	3.791	7.466	1.969
5131	9	.039	.082	10.051	32.588	1.801	15.780	8.764
5132	9	.085	.162	5.208	50.574	3.116	14.597	4.684
5133	9	.105	.179	4.617	39.442	2.923	11.737	4.016
5141	9	.112	.168	6.738	79.994	3.446	15.892	4.612
5142	9	.119	.179	6.671	50.656	2.756	15.334	5.565
5143	9	.105	.169	6.492	52.432	2.842	15.677	5.517
5151	9	.037	.064	14.535	30.913	1.458	17.581	12.056
5152	9	.099	.167	5.777	47.081	2.855	14.485	5.074
5153	9	.072	.119	11.930	56.038	2.167	20.589	9.500
10011	0	.077	.113	8.682	41.010	2.173	15.477	7.121
10012	0	.141	.188	4.743	40.436	2.920	11.865	4.063
10013	0	.155	.220	3.565	41.953	3.430	11.042	3.219
10021	9	.063	.091	7.954	23.065	1.703	11.314	6.644
10022	9	.161	.214	3.476	25.825	2.726	8.178	3.000
10023	9	.174	.230	3.038	33.705	3.331	8.796	2.641
10031	9	.087	.112	10.784	34.704	1.794	15.051	8.391
10032	9	.108	.134	11.670	63.184	2.327	19.456	8.362
10033	9	.087	.126	14.618	56.231	1.961	20.229	10.314
10041	9	.101	.127	6.180	25.680	2.038	10.095	4.953
10042	9	.202	.246	2.485	27.088	3.301	6.695	2.028
10043	9	.807	.824	0.259	0.838	1.797	0.638	0.355
10051	9	.095	.152	5.532	28.039	2.251	10.704	4.754
10052	9	.301	.368	0.926	25.088	5.206	5.094	0.978

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEONETRIC MEAN	FREDLE INDEX
10053	9	.456	.563	0.524	13.919	5.153	2.380	0.462
10061	9	.027	.043	12.415	36.916	1.724	19.496	11.306
10062	9	.072	.106	9.489	48.484	2.260	17.414	7.704
10063	9	.225	.268	1.880	27.022	3.791	6.859	1.809
10071	9	.116	.160	6.275	45.611	2.696	13.969	5.181
10072	9	.089	.118	12.664	56.646	2.115	20.223	9.562
10073	9	.147	.217	3.400	30.656	3.003	9.197	3.063
10081	9	.014	.022	17.451	34.677	1.410	22.801	16.175
10082	9	.124	.170	6.275	35.839	2.390	12.962	5.424
10083	9	.164	.208	5.330	47.479	2.985	12.753	4.273
10091	9	.020	.032	18.709	51.541	1.660	25.947	15.633
10092	9	.118	.167	6.994	52.379	2.737	15.601	5.701
10093	9	.137	.202	4.248	49.551	3.415	12.255	3.588
10101	0	.074	.096	10.666	52.643	2.222	18.399	8.282
10102	0	.115	.138	7.734	49.421	2.528	14.180	5.610
10103	0	.141	.165	6.699	31.294	2.161	10.692	4.947
10111	9	.104	.134	7.821	25.470	1.805	10.705	5.932
10112	9	.288	.322	0.884	29.851	5.812	6.222	1.070
10113	9	.136	.145	17.689	58.307	1.816	19.248	10.602
10121	9	.110	.152	4.704	18.328	1.974	8.780	4.448
10122	9	.085	.108	10.936	55.324	2.249	19.220	8.545
10123	9	.116	.141	8.753	44.872	2.264	14.598	6.447
10131	9	.110	.139	7.356	32.169	2.091	12.250	5.858
10132	9	.090	.109	15.988	85.700	2.315	26.403	11.404
10133	9	.184	.221	3.490	25.856	2.722	6.923	2.544
10141	9	.108	.144	6.683	26.648	1.997	10.466	5.242
10142	9	.171	.211	3.875	33.343	2.933	9.933	3.386
10143	9	.090	.119	10.700	49.946	2.161	17.324	8.018
10151	9	.132	.165	7.341	47.921	2.555	14.242	5.574
10152	9	.143	.170	6.996	33.932	2.202	11.613	5.273
10153	9	.187	.214	5.742	40.625	2.660	10.968	4.123
615011	9	.054	.107	8.081	27.472	1.844	12.387	6.718
615012	9	.285	.407	0.971	16.351	4.103	3.645	0.888
615013	9	.309	.354	0.615	27.229	6.654	4.856	0.730
615021	9	.019	.037	16.761	52.543	1.771	25.622	14.471
615022	9	.104	.166	4.689	34.170	2.700	11.749	4.352
615023	9	.115	.165	6.958	37.711	2.328	13.883	5.964
615031	9	.011	.027	15.882	37.673	1.540	23.131	15.019
615032	9	.050	.109	11.725	47.189	2.006	18.950	9.446
615033	9	.127	.282	2.131	15.306	2.680	5.932	2.214
615041	9	.058	.089	12.043	36.301	1.736	17.880	10.299
615042	9	.252	.315	1.179	38.199	5.691	6.983	1.227
615043	9	.161	.205	4.328	51.559	3.452	12.274	3.556
615051	9	.144	.189	4.715	29.833	2.515	9.966	3.962
615052	9	.284	.343	1.008	31.134	5.558	6.125	1.102
615053	9	.148	.193	5.503	54.082	3.135	14.255	4.547
615061	9	.068	.096	11.975	52.515	2.094	19.868	9.487
615062	9	.297	.364	0.849	25.443	5.476	4.815	0.879
615063	9	.128	.177	5.546	47.117	2.915	13.313	4.567
615071	9	.150	.223	3.179	25.034	2.806	8.108	2.889
615072	9	.311	.407	0.784	18.225	4.820	3.590	0.745
615073	9	.514	.598	0.278	8.107	5.403	1.488	0.275
615081	9	.050	.086	9.787	30.500	1.765	14.522	8.226
615082	9	.110	.164	5.339	49.050	3.031	13.539	4.467
615083	9	.140	.202	3.906	49.798	3.571	11.434	3.202
615091	9	.093	.133	7.571	30.358	2.002	12.461	6.223
615092	9	.204	.306	1.727	18.234	3.249	5.561	1.711
615093	9	.226	.352	1.420	15.426	3.296	4.382	1.330
615101	9	.028	.057	13.577	55.038	2.013	23.576	11.710
615102	9	.113	.199	3.466	30.087	2.946	9.404	3.192
615103	9	.098	.150	7.784	83.646	3.278	18.776	5.728
615111	9	.095	.134	10.177	33.670	1.819	14.716	8.091
615112	9	.194	.277	1.996	24.319	3.491	6.633	1.900
615113	9	.150	.205	4.478	52.286	3.417	13.085	3.829
615121	9	.100	.164	5.525	26.933	2.208	10.326	4.677
615122	9	.225	.345	1.442	22.020	3.907	5.451	1.395

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
615123	9	.206	.294	1.785	19.607	3.314	5.739	1.732
615131	9	.134	.189	4.725	37.825	2.829	11.557	4.085
615132	9	.185	.244	2.575	30.294	3.430	8.482	2.473
615133	9	.143	.179	6.794	57.994	2.922	15.934	5.454
615141	9	.125	.170	5.305	29.234	2.348	10.314	4.393
615142	9	.189	.232	3.215	42.181	3.622	10.870	3.001
615143	9	.137	.174	6.024	53.222	2.972	14.607	4.914
615151	9	.082	.132	9.888	43.243	2.091	16.358	7.822
615152	9	.095	.149	9.289	57.130	2.480	18.883	7.614
615153	9	.142	.308	1.964	9.286	2.174	4.023	1.850
58011	9	.045	.049	19.173	33.841	1.329	21.173	15.937
58012	9	.131	.141	15.333	53.314	1.865	17.482	9.376
58013	9	.196	.224	3.781	31.033	2.865	8.555	2.986
58021	9	.066	.096	7.254	23.732	1.809	10.808	5.976
58022	9	.256	.314	1.091	24.680	4.757	5.195	1.092
58023	9	.567	.587	0.203	9.874	6.982	1.147	0.164
58031	9	.009	.010	23.310	91.405	1.980	45.476	22.965
58032	9	.061	.074	22.921	60.195	1.621	27.269	16.827
58033	9	.074	.093	21.545	62.091	1.698	26.115	15.383
58041	0	.055	.062	21.235	37.656	1.332	22.878	17.180
58042	0	.128	.150	11.319	39.960	1.879	14.713	7.831
58043	0	.124	.146	12.444	45.360	1.909	15.992	8.376
58051	9	.023	.048	10.711	28.412	1.629	15.152	9.303
58052	9	.108	.141	6.527	30.124	2.148	10.979	5.110
58053	9	.155	.180	6.106	37.490	2.478	10.618	4.285
58061	0	.029	.036	19.711	46.264	1.532	25.575	16.694
58062	0	.083	.096	24.089	78.120	1.801	29.435	16.345
58063	0	.110	.132	13.460	49.767	1.923	17.467	9.084
58071	0	.043	.059	11.548	34.317	1.724	17.391	10.088
58072	0	.172	.206	3.970	29.436	2.723	8.614	3.163
58073	0	.191	.234	2.841	20.319	2.674	5.950	2.225
58081	5	.065	.079	11.565	37.966	1.812	17.467	9.641
58082	5	.107	.119	8.645	31.810	1.918	12.569	6.553
58083	5	.115	.125	12.773	39.907	1.768	15.890	8.990
58091	5	.051	.074	11.160	32.610	1.709	16.011	9.366
58092	5	.103	.127	9.213	36.565	1.992	14.625	7.341
58093	5	.275	.297	0.587	33.502	7.554	5.991	0.793
58101	0	.107	.134	7.483	28.531	1.953	11.079	5.674
58102	0	.103	.129	6.354	27.508	2.081	10.545	5.068
58103	0	.180	.202	4.152	19.680	2.177	6.977	3.205
58111	5	.081	.102	9.266	29.044	1.770	12.627	7.132
58112	5	.146	.181	4.918	24.903	2.250	8.593	3.819
58113	5	.118	.132	11.045	34.394	1.765	13.975	7.919
58121	5	.034	.056	10.637	31.075	1.709	16.042	9.386
58122	5	.149	.199	3.463	34.400	3.152	9.021	2.862
58123	5	.150	.177	5.123	28.819	2.372	9.290	3.917
58131	5	.032	.044	18.021	47.056	1.616	23.787	14.721
58132	5	.061	.090	7.722	42.182	2.337	15.539	6.649
58133	5	.069	.103	5.788	25.381	2.094	10.440	4.985
58141	5	.044	.061	14.947	54.349	1.907	23.194	12.163
58142	5	.118	.151	5.666	29.037	2.264	10.220	4.515
58143	5	.098	.117	8.085	30.809	1.952	12.458	6.382
58151	5	.138	.185	3.517	17.877	2.255	6.314	2.800
58152	5	.185	.239	2.610	23.721	3.015	6.150	2.040
58153	5	.095	.116	17.149	82.870	2.198	24.850	11.305
630011	0	.007	.014	16.078	35.378	1.483	23.001	15.506
630012	0	.034	.060	12.154	37.518	1.757	18.810	10.706
630013	0	.182	.221	3.553	27.542	2.784	7.554	2.713
630021	0	.056	.088	8.919	47.866	2.317	17.090	7.377
630022	0	.095	.122	10.078	41.460	2.028	15.642	7.712
630023	0	.159	.192	4.386	45.519	3.221	9.973	3.096
630031	0	.083	.133	5.785	39.490	2.613	12.463	4.770
630032	0	.132	.174	5.305	31.392	2.433	10.031	4.124
630033	0	.197	.243	2.569	19.480	2.754	5.704	2.071
630041	9	.071	.135	5.620	25.711	2.139	10.353	4.840
630042	9	.080	.122	8.928	57.488	2.538	18.736	7.384

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
630043	9	.158	.204	3.907	37.147	3.083	9.380	3.042
630051	9	.110	.167	5.578	33.882	2.465	12.554	5.094
630052	9	.148	.193	5.059	79.477	3.964	14.575	3.677
630053	9	.096	.107	19.611	60.360	1.754	23.218	13.234
630061	9	.087	.118	9.195	36.289	1.987	14.041	7.068
630062	9	.117	.137	12.609	53.812	2.066	17.135	8.294
630063	9	.119	.142	9.195	48.223	2.290	14.662	6.402
630071	9	.073	.120	6.691	27.143	2.014	11.073	5.498
630072	9	.046	.076	15.939	89.438	2.369	31.714	13.388
630073	9	.077	.097	23.542	61.465	1.616	25.941	16.054
630081	9	.016	.031	16.196	33.898	1.447	21.428	14.812
630082	9	.034	.052	18.184	83.535	2.143	31.561	14.725
630083	9	.145	.186	5.965	57.250	3.098	14.574	4.704
630091	9	.131	.199	3.772	24.003	2.523	8.247	3.269
630092	9	.116	.154	10.447	53.444	2.262	16.286	7.201
630093	9	.201	.230	3.519	32.004	3.016	8.398	2.785
630101	9	.077	.123	7.028	28.497	2.014	11.652	5.786
630102	9	.144	.209	3.595	35.076	3.124	10.094	3.232
630103	9	.076	.096	26.896	87.485	1.804	32.586	18.068
630111	9	.044	.076	9.090	31.997	1.876	14.973	7.981
630112	9	.076	.107	11.136	55.588	2.234	19.506	8.731
630113	9	.082	.098	18.891	85.609	2.129	29.429	13.825
630121	9	.063	.116	6.319	31.047	2.217	12.288	5.543
630122	9	.133	.183	4.365	27.294	2.500	8.874	3.549
630123	9	.175	.207	4.263	53.745	3.551	10.802	3.042
630131	0	.026	.047	11.062	27.634	1.581	14.996	9.488
630132	0	.114	.170	4.750	33.214	2.644	11.302	4.274
630133	0	.105	.139	12.943	52.205	2.008	17.389	8.658
630141	0	.008	.024	14.638	36.578	1.581	22.123	13.995
630142	0	.049	.098	5.811	17.366	1.729	9.366	5.418
630143	0	.144	.223	2.803	21.291	2.756	7.137	2.590
630151	0	.035	.063	12.902	60.540	2.166	25.108	11.591
630152	0	.174	.250	2.390	32.676	3.698	7.019	1.898
630153	0	.172	.209	3.802	27.769	2.703	7.819	2.893
73011	5	.103	.147	10.066	33.221	1.817	13.461	7.410
73012	5	.091	.138	9.565	31.619	1.818	12.860	7.073
73013	5	.120	.146	10.112	34.218	1.840	12.976	7.054
73021	5	.061	.102	9.873	28.532	1.700	13.064	7.685
73022	5	.087	.137	8.100	29.415	1.906	11.929	6.260
73023	5	.076	.125	11.449	34.458	1.735	15.223	8.775
73031	5	.097	.162	5.347	25.870	2.200	9.579	4.355
73032	5	.093	.151	7.032	28.788	2.023	11.130	5.501
73033	5	.053	.075	26.347	82.028	1.764	33.975	19.255
73041	5	.075	.098	14.303	33.054	1.520	16.578	10.905
73042	5	.075	.106	11.959	34.702	1.703	16.167	9.490
73043	5	.099	.126	10.596	36.231	1.849	14.754	7.979
73051	5	.072	.121	10.532	48.130	2.138	17.805	8.329
73052	5	.091	.142	7.336	47.169	2.536	14.660	5.782
73053	5	.109	.153	6.807	31.102	2.138	11.987	5.608
73061	5	.051	.070	12.495	29.288	1.531	15.411	10.066
73062	5	.111	.151	8.707	31.530	1.903	12.099	6.358
73063	5	.105	.148	10.776	35.682	1.820	14.294	7.855
73071	5	.050	.074	15.222	47.186	1.761	21.275	12.083
73072	5	.095	.134	10.621	43.264	2.018	15.977	7.916
73073	5	.051	.080	39.742	89.763	1.503	37.753	25.121
73081	5	.043	.078	11.446	34.360	1.733	16.998	9.811
73082	5	.110	.142	19.378	43.925	1.506	17.830	11.843
73083	5	.141	.196	4.685	51.272	3.308	12.929	3.908
73091	5	.021	.039	14.655	30.682	1.447	18.518	12.798
73092	5	.100	.154	7.602	28.181	1.925	11.085	5.757
73093	5	.086	.132	9.977	53.854	2.323	17.798	7.661
73101	5	.098	.179	3.993	16.456	2.030	7.112	3.503
73102	5	.116	.183	4.056	22.037	2.331	8.108	3.478
73103	5	.068	.155	4.481	18.302	2.021	8.506	4.209
73111	5	.017	.031	19.197	41.761	1.475	25.225	17.102
73112	5	.069	.106	13.021	58.371	2.117	21.569	10.187

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
73113	5	.104	.162	5.365	45.178	2.902	12.772	4.401
73121	5	.001	.003	23.596	43.213	1.353	31.850	23.535
73122	5	.095	.150	6.653	42.171	2.518	13.915	5.527
73123	5	.094	.147	7.403	55.562	2.740	15.936	5.817
73131	5	.136	.193	4.490	32.151	2.676	10.034	3.750
73132	5	.079	.131	9.454	83.564	2.973	21.933	7.377
73133	5	.050	.080	25.034	87.960	1.874	34.922	18.630
73141	5	.054	.084	10.912	32.951	1.738	15.618	8.987
73142	5	.149	.223	3.219	30.800	3.093	8.770	2.835
73143	5	.159	.243	2.581	32.004	3.521	8.767	2.490
73151	5	.049	.081	12.397	36.571	1.718	18.026	10.495
73152	5	.110	.177	4.809	30.902	2.535	10.742	4.238
73153	5	.118	.198	4.171	43.198	3.218	11.451	3.558
95011	0	.160	.192	6.930	27.757	2.001	9.882	4.938
95012	0	.205	.294	1.790	29.581	4.065	7.749	1.906
95013	0	.104	.127	14.249	47.011	1.816	18.088	9.958
95021	0	.179	.202	6.209	35.284	2.384	10.519	4.413
95022	0	.246	.276	1.363	40.562	5.456	9.009	1.651
95023	0	.194	.220	5.042	43.683	2.943	11.621	3.948
95031	0	.230	.281	1.660	26.676	4.009	7.021	1.751
95032	0	.153	.183	6.939	31.668	2.136	11.352	5.314
95033	0	.128	.156	9.751	48.924	2.240	15.751	7.032
95041	0	.307	.430	0.935	14.602	3.952	3.651	0.924
95042	0	.236	.326	1.372	31.549	4.796	7.414	1.546
95043	0	.196	.302	1.795	27.267	3.897	7.182	1.843
95051	0	.183	.245	2.543	20.387	2.831	6.806	2.404
95052	0	.233	.333	1.392	21.646	3.943	5.879	1.491
95053	0	.166	.254	2.321	31.728	3.697	9.718	2.628
95061	0	.143	.197	4.572	22.214	2.204	8.414	3.817
95062	0	.144	.215	3.914	35.172	2.998	11.118	3.709
95063	0	.200	.292	1.834	27.220	3.852	7.355	1.909
95071	0	.129	.166	8.048	46.327	2.399	14.449	6.022
95072	0	.181	.232	3.336	28.492	2.923	8.807	3.013
95073	0	.065	.083	19.472	55.107	1.682	24.282	14.434
95081	0	.157	.208	4.051	27.086	2.586	8.934	3.455
95082	0	.220	.277	1.813	28.115	3.938	7.509	1.907
95083	0	.160	.201	5.417	35.876	2.573	11.154	4.334
95091	0	.079	.102	11.572	36.788	1.783	16.952	9.508
95092	0	.149	.184	7.718	43.505	2.374	13.627	5.740
95093	0	.112	.139	10.532	43.825	2.040	16.140	7.912
95101	0	.247	.307	1.248	22.134	4.212	5.761	1.368
95102	0	.202	.243	2.791	27.615	3.145	8.157	2.593
95103	0	.282	.339	0.980	16.249	4.071	4.330	1.063
95111	0	.106	.150	5.680	36.999	2.552	12.419	4.866
95112	0	.194	.238	2.826	26.992	3.090	7.881	2.550
95113	0	.168	.196	5.601	29.511	2.295	9.914	4.319
95121	0	.165	.218	3.700	35.554	3.100	10.643	3.433
95122	0	.118	.139	12.506	53.330	2.065	18.064	8.748
95123	0	.139	.167	8.527	34.468	2.011	13.165	6.548
95131	0	.123	.145	9.676	32.334	1.828	12.868	7.039
95132	0	.234	.277	1.637	27.258	4.081	7.068	1.732
95133	0	.224	.276	1.792	26.595	3.853	7.079	1.837
95141	0	.185	.221	3.598	30.533	2.913	8.955	3.074
95142	0	.461	.504	0.460	13.888	5.494	2.451	0.446
95143	0	.274	.326	1.028	28.622	5.278	6.153	1.166
95151	0	.125	.185	5.538	44.986	2.850	12.820	4.498
95152	0	.176	.222	3.825	30.961	2.845	9.656	3.394
95153	0	.134	.162	7.328	35.639	2.205	12.951	5.873
106011	0	.072	.082	16.553	58.060	1.873	24.761	13.221
106012	0	.129	.149	14.765	54.462	1.921	18.588	9.679
106013	0	.093	.134	9.799	50.471	2.269	17.204	7.580
106021	0	.120	.136	13.090	55.141	2.052	19.212	9.360
106022	0	.153	.178	8.331	30.604	1.917	11.574	6.039
106023	0	.161	.187	6.025	28.783	2.186	10.017	4.583
106031	0	.131	.146	10.155	50.227	2.224	15.642	7.033
106032	0	.128	.150	11.826	50.048	2.057	16.968	8.248

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
106033	0	.113	.141	11.800	48.184	2.021	17.329	8.575
106041	0	.212	.223	6.740	25.572	1.948	8.574	4.402
106042	0	.095	.102	18.168	60.624	1.827	25.332	13.867
106043	0	.129	.144	18.905	58.013	1.752	21.332	12.177
106051	0	.074	.078	20.812	48.564	1.528	23.662	15.490
106052	0	.129	.142	13.013	44.506	1.849	16.912	9.145
106053	0	.117	.131	13.310	54.067	2.015	18.859	9.357
106061	0	.081	.087	14.277	35.273	1.572	18.015	11.461
106062	0	.130	.152	11.279	49.519	2.095	16.388	7.821
106063	0	.165	.191	8.096	33.432	2.032	11.840	5.826
106071	0	.078	.083	19.240	40.153	1.445	21.019	14.550
106072	0	.106	.123	17.009	50.337	1.720	19.897	11.566
106073	0	.130	.156	12.013	31.654	1.623	13.080	8.058
106081	0	.172	.201	6.644	34.820	2.289	11.585	5.061
106082	0	.205	.259	2.177	26.262	3.473	7.303	2.103
106083	0	.101	.173	8.247	49.312	2.445	16.406	6.709
106091	0	.105	.114	15.697	55.272	1.876	20.838	11.105
106092	0	.118	.137	13.490	47.966	1.886	17.327	9.189
106093	0	.054	.072	12.675	49.218	1.971	20.321	10.312
106101	0	.141	.162	9.409	37.625	2.000	14.396	7.199
106102	0	.156	.177	8.699	46.194	2.304	14.484	6.285
106103	0	.197	.216	4.392	31.361	2.672	9.447	3.535
106111	0	.163	.185	9.923	32.596	1.812	12.322	6.799
106112	0	.111	.136	12.676	49.603	1.978	18.163	9.182
106113	0	.126	.172	7.718	52.805	2.616	16.059	6.139
106121	0	.127	.144	15.244	54.644	1.893	19.344	10.217
106122	0	.153	.171	11.031	56.332	2.260	17.282	7.647
106123	0	.163	.195	6.146	35.093	2.390	11.762	4.923
106131	0	.111	.126	14.635	52.804	1.900	19.389	10.207
106132	0	.144	.163	9.917	45.181	2.134	14.601	6.934
106133	0	.065	.078	21.382	57.627	1.642	26.339	16.044
106141	0	.203	.236	3.583	42.682	3.451	10.653	3.086
106142	0	.222	.298	1.629	51.032	5.596	10.008	1.788
106143	0	.285	.446	1.063	23.929	4.744	4.605	0.971
106151	0	.244	.275	1.437	26.136	4.265	6.970	1.634
106152	0	.128	.171	8.357	47.683	2.389	15.206	6.366
106153	0	.138	.183	8.116	47.880	2.429	14.474	5.959
109011	0	.020	.024	23.122	52.287	1.504	30.158	20.055
109012	0	.065	.079	14.895	60.113	2.009	24.516	12.204
109013	0	.118	.140	12.010	57.236	2.183	18.500	8.474
109021	0	.070	.078	13.517	33.666	1.578	17.252	10.932
109022	0	.092	.105	16.254	61.767	1.949	24.136	12.381
109023	0	.113	.129	8.964	56.000	2.499	16.677	6.672
109031	0	.045	.054	19.534	46.425	1.542	24.102	15.634
109032	0	.065	.080	17.502	58.860	1.834	24.366	13.287
109033	0	.062	.073	40.279	88.453	1.482	39.171	26.433
109041	0	.026	.034	18.995	54.153	1.688	28.045	16.610
109042	0	.046	.060	18.856	57.821	1.751	26.245	14.988
109043	0	.060	.074	25.449	61.693	1.557	28.497	18.303
109051	0	.029	.039	19.653	44.895	1.511	26.175	17.318
109052	0	.096	.127	10.124	87.151	2.934	22.263	7.588
109053	0	.105	.130	11.104	61.180	2.347	20.326	8.659
109061	0	.017	.022	24.765	57.090	1.518	33.228	21.885
109062	0	.090	.110	10.142	55.144	2.332	18.863	8.090
109063	0	.147	.183	4.921	56.306	3.383	13.930	4.118
109071	0	.126	.132	11.237	35.284	1.772	14.169	7.996
109072	0	.146	.164	6.663	43.304	2.549	12.221	4.794
109073	0	.065	.075	41.969	81.577	1.394	36.408	26.114
109081	0	.043	.043	26.106	82.471	1.777	37.794	21.264
109082	0	.121	.138	7.021	37.926	2.324	12.315	5.299
109083	0	.125	.148	8.734	56.849	2.551	16.489	6.463
109091	0	.116	.117	18.153	40.025	1.485	17.919	12.067
109092	0	.141	.148	12.715	57.169	2.120	17.608	8.304
109093	0	.168	.205	3.648	30.332	2.883	8.033	2.786
109101	0	.083	.035	16.476	49.702	1.737	21.090	12.143
109102	0	.126	.137	13.309	56.497	2.060	18.110	8.790

STATION		P_{119}	P_{238}	d_{25}	d_{75}	SORTING COEFFICIENT	GEOMETRIC MEAN	FREDLE INDEX
109103	0	.146	.171	6.419	30.437	2.178	10.311	4.735
109111	0	.036	.036	28.077	89.755	1.788	44.067	24.647
109112	0	.193	.198	7.971	29.844	1.935	9.230	4.770
109113	0	.143	.161	8.447	48.585	2.398	14.103	5.881
109121	0	.058	.058	18.533	37.100	1.415	22.169	15.668
109122	0	.068	.071	25.824	88.131	1.847	35.512	19.223
109123	0	.101	.119	10.755	55.186	2.265	17.874	7.891
109131	0	.019	.022	24.612	51.208	1.442	31.357	21.739
109132	0	.096	.106	13.689	35.077	1.601	16.039	10.020
109133	0	.092	.109	21.686	55.989	1.607	22.350	13.910
109141	0	.025	.026	30.400	85.280	1.675	44.346	26.477
109142	0	.081	.091	23.531	60.367	1.602	25.828	16.125
109143	0	.061	.069	42.332	80.077	1.375	39.837	28.965
109151	0	.028	.031	22.782	55.719	1.564	30.193	19.307
109152	0	.117	.131	20.547	58.995	1.694	20.951	12.364
109153	0	.087	.100	38.733	63.711	1.283	29.961	23.361
113011	9	.088	.115	9.790	34.978	1.890	14.270	7.550
113012	9	.114	.149	9.689	70.992	2.707	18.725	6.917
113013	9	.101	.149	7.972	53.173	2.583	16.005	6.197
113021	9	.022	.035	18.585	37.333	1.417	23.323	16.456
113022	9	.110	.152	6.678	35.090	2.292	12.256	5.347
113023	9	.206	.279	1.904	32.783	4.150	6.991	1.685
113031	9	.351	.433	0.753	19.542	5.094	3.682	0.723
113032	9	.208	.259	2.170	28.758	3.641	7.476	2.053
113033	9	.219	.281	1.785	25.553	3.783	5.728	1.514
113041	9	.061	.078	14.651	41.864	1.690	19.355	11.450
113042	9	.130	.170	5.753	47.737	2.881	12.385	4.299
113043	9	.120	.150	10.673	54.300	2.256	16.115	7.144
113051	9	.015	.023	19.092	56.191	1.716	29.333	17.098
113052	9	.110	.173	4.187	27.485	2.562	9.027	3.523
113053	9	.152	.209	3.781	41.933	3.330	10.687	3.209
113061	9	.072	.105	10.523	34.072	1.799	15.037	8.356
113062	9	.131	.174	7.330	57.971	2.812	16.108	5.728
113063	9	.137	.174	6.555	35.413	2.324	11.676	5.024
113071	9	.069	.094	17.525	82.829	2.174	25.651	11.799
113072	9	.116	.164	6.803	46.936	2.627	13.505	5.142
113073	9	.085	.111	15.692	58.867	1.937	21.396	11.047
113081	9	.108	.150	7.635	52.520	2.623	15.543	5.926
113082	9	.191	.275	2.022	32.597	4.015	7.464	1.859
113083	9	.144	.210	3.941	50.302	3.572	12.077	3.381
113091	9	.116	.162	6.178	35.622	2.401	12.176	5.071
113092	9	.175	.240	2.701	42.810	3.981	9.580	2.406
113093	9	.093	.137	11.528	65.321	2.380	19.839	8.334
113101	9	.031	.060	12.102	50.164	2.036	21.074	10.351
113102	9	.100	.151	6.841	52.852	2.780	15.072	5.422
113103	9	.143	.199	4.253	34.846	2.862	10.251	3.582
113111	9	.042	.064	15.342	54.515	1.885	23.253	12.336
113112	9	.139	.190	4.774	54.613	3.382	13.826	4.088
113113	9	.105	.134	16.554	90.626	2.340	26.718	11.419
113121	9	.147	.216	3.643	52.067	3.781	12.268	3.245
113122	9	.126	.175	6.346	54.573	2.933	15.233	5.195
113123	9	.140	.198	4.244	33.503	2.810	9.923	3.532
113131	9	.072	.105	10.010	31.572	1.776	14.135	7.959
113132	9	.112	.146	11.335	82.855	2.704	20.810	7.697
113133	9	.146	.170	9.579	60.406	2.511	16.834	6.703
113141	9	.081	.123	7.616	30.918	2.015	12.601	6.254
113142	9	.168	.232	3.094	32.064	3.219	9.371	2.911
113143	9	.170	.218	3.825	54.802	3.785	11.932	3.153
113151	9	.087	.141	6.230	32.464	2.283	12.334	5.403
113152	9	.138	.207	3.838	34.503	2.998	10.691	3.566
113153	9	.262	.355	1.115	25.689	4.800	4.956	1.032

APPENDIX XV

GRAVEL QUALITY PARAMETERS FOR DEPTH SUBSAMPLES OF' STEELHEAD SPAWNING GRAVEL COLLECTED AT THE LOWER DESCHUTES RIVER, OREGON, 1984.

This appendix contains mean values and statistics of dispersion for gravel quality indices calculated for depth stratified gravel samples collected from 13 summer steelhead spawning areas in the Deschutes River, Oregon. All data given here are based on the particle size distribution of all sediment particles less than 101.6 mm in diameter. The following are descriptions of the data presented:

- "A" - gravel stratum from 0 - 101.6 mm in depth
- "B" - gravel stratum from 101.6 - 203.2 mm in depth
- "C" - gravel stratum from 203.2 - 304.8 mm in depth
- "D" - gravel stratum from 304.8 - 406.4 mm in depth
- P119 - percent fines <1.19 mm
- P238 - percent fines <2.38 mm
- D25 - 25th percentile particle size
- D75 - 75th percentile particle size
- SORTCO sorting coefficiency
- GEOMM geometric mean particle diameter
- FREDLE Fredle indix
- LNFREDLE natural-log transformation of Fredle index

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=5									
P119	15	0.04033333	0.02369649	0.01300000	0.11200000	0.00611841	0.60500000	0.00056152	58.752
P238	15	0.06860000	0.03346398	0.02900000	0.16800000	0.00864033	1.02900000	0.00111983	48.781
D25	15	12.53566667	2.64730120	6.73800000	16.35100000	0.68353023	188.03500000	7.00820367	21.118
D75	15	39.98193333	12.89321527	30.91300000	79.99400000	3.32901387	599.12900000	166.23500007	32.260
SORTCO	15	1.81400000	0.47308139	1.45800000	3.34600000	0.12214909	27.21000000	0.22380600	26.079
GEOMN	15	18.82226667	2.79371290	14.89300000	24.23700000	0.72133357	282.33400000	7.80483178	14.843
FREDLE	15	10.85866667	2.57069232	8.61200000	14.30900000	0.66378990	162.87700000	6.60845898	23.675
LNFREDLE	15	2.44610762	0.25499216	1.72490716	2.72884089	0.06581287	36.69161436	0.06497001	10.420
STA=10									
P119	15	0.08253333	0.03672070	0.01400000	0.13200000	0.00948124	1.23800000	0.00134841	44.492
P238	15	0.11253333	0.04731885	0.02200000	0.16600000	0.01221664	1.68800000	0.00223870	42.045
D25	15	9.23686667	4.15530972	4.70400000	18.70900000	1.07289636	138.55300000	17.26659884	44.986
D75	15	38.96146667	10.78588898	18.32800000	52.64300000	2.78490456	524.42200000	116.33540112	30.851
SORTCO	15	2.00620000	0.34361881	1.41000000	2.69600000	0.08872199	30.09300000	0.11807389	17.128
GEOMN	15	14.64640000	5.02712717	8.78000000	25.94700000	1.29799865	219.69600000	25.27200754	34.323
FREDLE	15	7.69960000	3.78204548	4.44800000	16.17500000	0.97651993	115.49400000	14.30386769	49.120
LNFREDLE	15	2.09250934	0.36906396	1.69524857	2.78345484	0.09529190	31.38764015	0.13620820	17.637
STA=58									
P119	15	0.05480000	0.03344121	0.00900000	0.13800000	0.00863448	0.82200000	0.00111831	61.024
P238	15	0.07300000	0.04293018	0.01000000	0.18500000	0.01108452	1.09500000	0.00184300	58.808
D25	15	13.30253333	5.79768056	3.51700000	23.31000000	1.49695468	199.53800000	33.61309984	43.583
D75	15	38.27566667	17.41684398	17.87700000	91.40500000	4.49700978	574.13500000	303.34645410	45.504
SORTCO	15	1.73773333	0.24133186	1.32900000	2.25500000	0.06231162	26.06600000	0.05824107	13.888
GEOMN	15	18.99826667	9.15464661	6.31400000	45.47600000	2.36371959	284.97400000	83.80755450	48.187
FREDLE	15	11.26840000	5.33792846	2.80000000	22.96500000	1.37824720	169.02600000	28.49348026	47.371
LNFREDLE	15	2.41103707	0.47196708	1.33500107	3.17659443	0.12186138	36.16555598	0.22275293	19.575
STA=73									
P119	15	0.06186667	0.03608891	0.00100000	0.13600000	0.00931812	0.92800000	0.00130241	58.333
P238	15	0.09746667	0.05468333	0.00300000	0.19300000	0.01411918	1.46200000	0.00299027	56.105
D25	15	11.90160000	5.25044396	3.99300000	23.59600000	1.35565880	178.52400000	27.56716183	44.115
D75	15	34.22840000	8.31357760	16.45600000	48.13000000	2.14655651	513.42600000	69.11557254	24.289
SORTCO	15	1.78913333	0.34850904	1.35300000	2.67600000	0.08998465	26.83700000	0.12145855	19.479
GEOMN	15	16.70360000	6.22858888	7.11200000	31.85000000	1.60821473	250.55400000	38.79531940	37.289
FREDLE	15	10.05426667	5.18161272	3.50300000	23.53500000	1.33788665	150.81400000	26.84911035	51.536
LNFREDLE	15	2.30410818	0.46561675	1.50474384	3.20010067	0.12022173	34.56162266	0.21679896	20.208
STA=95									
P119	15	0.16786667	0.05856604	0.07900000	0.30700000	0.01512169	2.51800000	0.00342998	34.888
P238	15	0.21660000	0.07847587	0.10200000	0.43000000	0.02026228	3.24900000	0.00615840	36.231
D25	15	5.06400000	3.07939020	0.93500000	11.57200000	0.79509513	75.96000000	9.48264400	60.809
D75	15	33.64406667	8.94852863	18.60200000	46.32700000	2.31050016	459.66100000	80.07616464	29.202
SORTCO	15	2.77360000	0.76960804	1.78300000	4.21200000	0.19871194	41.60400000	0.59229654	27.748
GEOMN	15	10.00625667	3.51874660	3.65100000	16.95200000	0.90750367	150.09400000	12.35344364	35.125
FREDLE	15	4.10066667	2.25297155	0.92400000	9.50800000	0.58171475	61.51000000	5.07588081	54.942
LNFREDLE	15	1.53616471	0.45739333	0.65440635	2.35213687	0.11809845	23.04247088	0.20920866	29.775

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VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=106									
P119	15	0.13560000	0.05362142	0.07200000	0.24800000	0.01384499	2.03400000	0.00287526	39.544
P238	15	0.15186667	0.06132684	0.07800000	0.27500000	0.01583452	2.27800000	0.00376098	40.382
D25	15	11.82926667	5.61297816	1.43700000	20.81200000	1.44926473	177.43900000	31.50552378	47.450
D75	15	43.30460000	11.01426188	25.57200000	58.06000000	2.84387019	649.56900000	121.31396483	25.434
SORTCO	15	2.14186667	0.75000618	1.44500000	4.26500000	0.19365076	32.12800000	0.56250927	35.016
GEOMN	15	16.42546667	5.47321492	6.97000000	24.76100000	1.41317802	246.38200000	29.95608155	33.322
FREDLE	15	8.72166667	4.14884021	1.63800000	15.49000000	1.07122594	130.82500000	17.21287510	47.569
LNFREDLE	15	2.16639721	0.51845661	0.96850360	2.80275418	0.13386492	32.49595811	0.26879726	23.932
STA=109									
P119	15	0.04953333	0.03518901	0.01700000	0.12800000	0.00908576	0.74300000	0.00123827	71.041
P238	15	0.05340000	0.03477643	0.02200000	0.13200000	0.00897924	0.80100000	0.00120940	65.124
D25	15	21.06413333	5.30031516	11.23700000	30.40000000	1.36853548	315.96200000	28.09338055	25.163
D75	15	54.33733333	17.91334449	33.66600000	89.75500000	4.62520566	815.06000000	320.88791095	32.967
SORTCO	15	1.59973333	0.12812185	1.41500000	1.78800000	0.03308092	23.99600000	0.01641521	8.009
GEOMN	15	28.13760000	9.17202510	14.16900000	48.34600000	2.36820670	422.06400000	84.12604440	32.597
FREDLE	15	17.58280000	5.29193860	7.99600000	26.47700000	1.36637267	263.74200000	28.00461417	30.097
LNFREDLE	15	2.87977917	0.31209998	2.19678003	3.31334929	0.08058387	43.19668760	0.09740640	10.838
STA=113									
P119	15	0.09080000	0.08036453	0.01500000	0.35100000	0.02075003	1.36200000	0.00645846	88.507
P238	15	0.12693333	0.09851140	0.02300000	0.43300000	0.02543553	1.90400000	0.00970850	77.609
D25	15	10.68500000	5.52702813	0.75300000	19.09200000	1.42707253	159.67500000	30.54804000	51.721
D75	15	43.11006667	15.32199613	19.54200000	82.82900000	3.95612239	646.65100000	234.76356550	35.542
SORTCO	15	2.30533333	0.95017793	1.41700000	5.09400000	0.24533889	34.58000000	0.90283810	41.217
GEOMN	15	16.93566667	6.62191822	3.68200000	29.33300000	1.70977090	254.03500000	43.84978795	39.100
FREDLE	15	8.66513333	4.60491675	0.72300000	17.09800000	1.18898439	129.97700000	21.20525827	53.143
LNFREDLE	15	2.13252583	0.59700020	0.54406696	2.89580143	0.15414479	31.98788750	0.35640923	27.995
STA=501									
P119	15	0.02706667	0.02345655	0.00000000	0.07900000	0.00605645	0.40600000	0.00055021	86.662
P238	15	0.05420000	0.03777036	0.00600000	0.13400000	0.00975226	0.81300000	0.00142660	69.687
D25	15	11.21393333	3.97899696	5.62500000	18.85700000	1.02737260	168.20900000	15.83241678	35.483
D75	15	39.73446667	11.13365291	23.46600000	56.05100000	2.87469682	596.01700000	123.95822712	28.020
SORTCO	15	1.91993333	0.27512996	1.40600000	2.35700000	0.07103825	28.79900000	0.07569650	14.330
GEOMN	15	18.82513333	5.21489494	10.35400000	26.62300000	1.34648008	282.37700000	27.19512927	27.702
FREDLE	15	10.14960000	3.76400637	5.06900000	16.70400000	0.97186227	152.24400000	14.16774397	37.085
LNFREDLE	15	2.35891957	0.33533051	1.80319385	2.87379060	0.08658196	35.38379388	0.11248655	14.215
STA=504									
P119	15	0.04540000	0.05010532	0.00300000	0.20300000	0.01293718	0.68100000	0.00251054	110.364
P238	15	0.06266667	0.06050344	0.00500000	0.24800000	0.01562192	0.94000000	0.00366067	96.548
D25	15	13.09973333	4.87583287	2.44500000	20.24100000	1.25893863	196.49600000	23.77374621	37.221
D75	15	46.35293333	14.74295366	28.95600000	84.92600000	3.80661827	695.29400000	217.35468250	31.806
SORTCO	15	2.03620000	0.77638512	1.26000000	4.41600000	0.20046183	30.54300000	0.60277817	38.129
GEOMN	15	20.60480000	4.95101113	10.10100000	27.78500000	1.27838558	309.07200000	24.51251117	24.028
FREDLE	15	11.44966667	4.60534938	2.28700000	18.59900000	1.18909610	171.74500000	21.20924295	40.223
LNFREDLE	15	2.44034494	0.45472083	1.18997529	2.97547854	0.11740841	36.60517411	0.20677103	18.633

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=508									
P119	15	0.06200000	0.07076924	0.00400000	0.28200000	0.01827254	0.93000000	0.00500829	114.144
P238	15	0.08833333	0.08011836	0.01400000	0.26900000	0.02068647	1.32500000	0.00641895	90.700
D25	15	11.76000000	6.47996852	1.55100000	20.54900000	1.67312068	176.40000000	41.98999200	55.102
D75	15	39.30413333	17.66226520	16.25400000	89.36800000	4.56037726	589.56200000	311.95561198	44.937
SORTCO	15	2.03733333	0.71734905	1.37700000	4.24200000	0.18521873	30.56000000	0.51458967	35.210
GEOMN	15	18.65480000	9.59382173	6.07200000	40.23700000	2.47711412	279.82200000	92.04141546	51.428
FREDLE	15	10.48273333	6.03968126	1.43200000	18.80200000	1.55943900	157.24100000	36.47778978	57.616
LNFREDLE	15	2.26975526	0.65662911	0.88871396	2.98578298	0.16954091	34.04632890	0.43116179	28.930
STA=615									
P119	15	0.08073333	0.04481464	0.01100000	0.15000000	0.01157109	1.21100000	0.00200835	55.509
P238	15	0.12220000	0.05816995	0.02700000	0.22300000	0.01501962	1.83300000	0.00338374	47.602
D25	15	9.27940000	4.20384915	3.17900000	16.76100000	1.08542918	139.19100000	17.67238769	45.303
D75	15	36.54480000	9.96279778	25.03400000	55.03800000	2.57238333	548.17200000	99.25733960	27.262
SORTCO	15	2.09206667	0.38754492	1.54000000	2.82900000	0.10006367	31.38100000	0.15019107	18.525
GEOMN	15	15.38613333	5.51731492	8.10800000	25.62200000	1.42456459	230.79200000	30.44076398	35.859
FREDLE	15	7.87146667	3.76879217	2.88900000	15.01900000	0.97309795	118.07200000	14.20379441	47.879
LNFREDLE	15	2.09767653	0.43125742	1.35815206	2.77377552	0.11135019	31.46514798	0.18598296	20.559
STA=630									
P119	15	0.05913333	0.03672070	0.00700000	0.13100000	0.00948124	0.88700000	0.00134841	62.098
P238	15	0.09693333	0.05398607	0.01400000	0.19900000	0.01393914	1.45400000	0.00291450	55.694
D25	15	9.25820000	4.04800117	3.77200000	16.19600000	1.04518941	138.87300000	16.38631346	43.723
D75	15	34.66353333	9.38535899	24.00300000	60.54000000	2.42328927	519.95300000	88.08496341	27.076
SORTCO	15	2.02820000	0.37684843	1.44700000	2.61300000	0.09730185	30.42300000	0.14201478	18.580
GEOMN	15	15.42600000	5.17143697	8.24700000	25.10800000	1.33525928	231.39000000	26.74376029	33.524
FREDLE	15	8.17453333	3.99139576	3.26900000	15.50600000	1.03057395	122.61800000	15.93124012	48.827
LNFREDLE	15	2.13365131	0.41568610	1.45137961	2.80372395	0.10732969	32.00476968	0.17279493	19.482

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=5									
P119	15	0.11100000	0.03131180	0.05300000	0.17800000	0.00808467	1.66500000	0.00098043	28.209
P238	15	0.16993333	0.03945787	0.08500000	0.24200000	0.01018798	2.54900000	0.00155692	23.220
D25	15	6.32286667	3.39137686	2.60000000	16.69500000	0.87564974	94.84300000	11.50143698	53.637
D75	15	48.88393333	17.07551381	30.31400000	81.41500000	4.40887871	733.25900000	291.57317192	34.931
SORTCO	15	2.87186667	0.34470482	2.19900000	3.60800000	0.08900240	43.07800000	0.11882141	12.003
GEOMN	15	14.82006667	5.31196724	9.00900000	28.93800000	1.37154804	222.30100000	28.21699592	35.843
FREDLE	15	5.34806667	2.53028565	2.49700000	13.15700000	0.65331695	80.22100000	6.40238550	47.312
LNFREDLE	15	1.79049804	0.33540773	1.25190546	2.65020920	0.08660190	26.85747066	0.11249835	18.733
STA=10									
P119	15	0.14720000	0.06980687	0.07200000	0.30100000	0.01792078	2.20800000	0.00481731	47.151
P238	15	0.18460000	0.07815808	0.10600000	0.36800000	0.02018033	2.76900000	0.00610869	42.339
D25	15	7.00900000	4.46723614	0.88400000	15.98800000	1.15343541	105.13500000	19.95619871	63.736
D75	15	48.16933333	16.86667421	25.08800000	85.70000000	4.35495655	662.54000000	284.48869881	38.186
SORTCO	15	2.93473333	1.10208526	2.11500000	5.81200000	0.28455719	44.02100000	1.21459192	37.553
GEOMN	15	13.67060000	6.07775018	5.09400000	26.40300000	1.56926835	205.05900000	36.93904726	44.459
FREDLE	15	5.47400000	3.18744277	0.97800000	11.40400000	0.81266623	82.11000000	9.90639600	57.498
LNFREDLE	15	1.73487235	0.56706014	0.68208623	2.51801900	0.14641830	26.02308523	0.32155720	32.686
STA=58									
P119	15	0.12740000	0.05037828	0.06100000	0.25600000	0.01300762	1.91100000	0.00253797	39.543
P238	15	0.15713333	0.06264283	0.07400000	0.31400000	0.01617431	2.35700000	0.00392412	39.866
D25	15	8.92273333	6.91226091	1.09100000	24.08900000	1.78473809	133.84100000	47.77935092	77.468
D75	15	37.73033333	15.32728851	23.72100000	78.12000000	3.95748888	565.95500000	234.92577310	40.623
SORTCO	15	2.38686667	0.78981217	1.62100000	4.75700000	0.20392863	35.80300000	0.62380327	33.090
GEOMN	15	13.39660000	6.98887529	5.19500000	29.43500000	1.80451984	200.94900000	48.84437783	52.169
FREDLE	15	6.57273333	4.65131484	1.09200000	16.82700000	1.20096433	98.59100000	21.63472978	70.767
LNFREDLE	15	1.86332521	0.58927832	0.73812055	2.88071816	0.15215101	27.94987816	0.34724893	31.625
STA=73									
P119	15	0.09806667	0.01960126	0.06900000	0.14900000	0.00506102	1.47100000	0.00038421	19.988
P238	15	0.14833333	0.02938199	0.10600000	0.22300000	0.00757607	2.22500000	0.00086095	19.781
D25	15	8.76746667	4.01245447	3.21900000	19.37800000	1.03601129	131.51200000	16.09979084	45.765
D75	15	39.09586667	15.45221845	22.03700000	83.56400000	3.98974565	586.43800000	238.77105512	39.524
SORTCO	15	2.19366667	0.45778686	1.50600000	3.09300000	0.11820006	32.90500000	0.20956881	20.869
GEOMN	15	13.91826667	4.16154061	8.10800000	21.93300000	1.07450516	208.77400000	17.31842021	29.900
FREDLE	15	6.64146667	2.45902797	2.83500000	11.84300000	0.63491829	99.62200000	6.04681855	37.025
LNFREDLE	15	1.98466962	0.32760179	1.34416943	2.55279892	0.08458642	29.77004432	0.10732293	16.507
STA=95									
P119	15	0.21013333	0.07942190	0.11800000	0.46100000	0.02050665	3.15200000	0.00630784	37.796
P238	15	0.26286667	0.08554854	0.13900000	0.50400000	0.02208854	3.94300000	0.00731855	32.544
D25	15	3.57880000	3.20619120	0.86000000	12.50600000	0.82783501	53.68200000	10.27966203	89.588
D75	15	31.35560000	9.26268741	13.88800000	53.33000000	2.39161560	470.33400000	85.79737797	29.541
SORTCO	15	3.55660000	1.10110638	2.06500000	5.49400000	0.28430448	53.34900000	1.21283526	30.960
GEOMN	15	9.04940000	3.57218489	2.45100000	18.06400000	0.92232388	135.74100000	12.76021911	39.474
FREDLE	15	3.04933333	2.13181096	0.84600000	8.74800000	0.55043122	45.74000000	4.54461795	69.911
LNFREDLE	15	1.28819734	0.47608418	0.36880112	2.27706214	0.12292441	19.32296011	0.22665615	36.957

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=106									
P119	15	0.14046667	0.03452921	0.09500000	0.22200000	0.00891540	2.10700000	0.00119227	24.582
P238	15	0.16720000	0.05026956	0.10200000	0.29800000	0.01297954	2.50800000	0.00252703	30.066
D25	15	10.82466667	4.63882023	1.62900000	18.16800000	1.19773823	162.36700000	21.51865312	42.855
D75	15	47.35686667	8.81048945	26.26200000	60.62400000	2.27485860	710.35300000	77.62472441	18.604
SORTCO	15	2.36040000	0.98749067	1.72000000	5.59600000	0.25496900	35.40600000	0.97513783	41.836
GEOMN	15	16.01553333	4.26335661	7.30300000	25.33200000	1.10079394	240.23300000	18.17620955	26.620
FREDLE	15	7.72393333	3.12987827	1.78800000	13.86700000	0.80802678	115.85900000	9.79360921	40.517
LNFREDLE	15	2.08527291	0.45674985	1.02532449	2.69914399	0.11793230	31.27909364	0.20862042	21.904
STA=109									
P119	15	0.10286667	0.03842965	0.04600000	0.19300000	0.00992249	1.54300000	0.00147684	37.359
P238	15	0.11633333	0.03782415	0.06000000	0.19800000	0.00976615	1.74500000	0.00143067	32.514
D25	15	14.60286667	5.86030546	6.66300000	25.82400000	1.51312436	219.04300000	34.34318012	40.131
D75	15	56.54440000	16.25722755	29.84400000	88.13100000	4.19759810	848.16600000	264.29744769	28.751
SORTCO	15	2.03606667	0.37018904	1.60100000	2.93400000	0.09558240	30.54100000	0.13703992	18.182
GEOMN	15	20.54686667	6.72697716	9.23000000	35.51200000	1.73689803	308.20300000	45.25222170	32.740
FREDLE	15	10.54886667	4.31135048	4.77000000	19.22300000	1.11318591	158.22700000	18.58774298	40.872
LNFREDLE	15	2.37762753	0.39240658	1.75267208	3.00682057	0.10131894	35.66441289	0.15398292	16.504
STA=113									
P119	15	0.13786667	0.03271493	0.10000000	0.20800000	0.00844696	2.06800000	0.00107027	23.729
P238	15	0.19046667	0.04222705	0.14600000	0.27500000	0.01090298	2.85700000	0.00178312	22.170
D25	15	5.57073333	2.70388883	2.02200000	11.33500000	0.69814109	83.56100000	7.31101478	48.537
D75	15	46.78906667	16.01496913	27.48500000	82.85500000	4.13504725	701.83600000	256.47923621	34.228
SORTCO	15	3.03560000	0.51314448	2.29200000	4.01500000	0.13249333	45.53400000	0.26331726	16.904
GEOMN	15	12.76860000	3.97241252	7.46400000	20.81000000	1.02567250	191.52900000	15.78006126	31.111
FREDLE	15	4.81020000	1.72837418	1.85900000	7.69700000	0.44626428	66.15300000	2.98727717	39.190
LNFREDLE	15	1.63753450	0.33670436	1.05047191	2.16297814	0.08693669	24.56301749	0.11336982	20.562
STA=501									
P119	15	0.06726667	0.03389156	0.02200000	0.14400000	0.00875076	1.00900000	0.00114864	50.384
P238	15	0.11173333	0.05021734	0.05700000	0.23100000	0.01296606	1.67600000	0.00252178	44.944
D25	15	10.21933333	6.75232589	2.73300000	28.13500000	1.74344305	153.29000000	45.59390495	66.078
D75	15	52.05773333	20.25658642	18.73300000	91.93000000	5.23022812	780.86600000	410.32929321	38.912
SORTCO	15	2.44426667	0.60392507	1.79600000	3.72100000	0.15593278	36.66400000	0.36472550	24.708
GEOMN	15	18.91466667	8.96750056	7.76500000	39.42300000	2.31539869	283.72000000	80.41606624	47.410
FREDLE	15	8.53913333	5.31328251	2.25400000	21.98600000	1.37188364	128.08700000	28.23097098	62.223
LNFREDLE	15	2.12372079	0.52790066	1.17988501	3.13314363	0.13630336	31.85581187	0.27867911	24.857
STA=504									
P119	15	0.10020000	0.07127131	0.02300000	0.33600000	0.01840217	1.50300000	0.00507960	71.129
P238	15	0.12693333	0.07297697	0.03500000	0.35900000	0.01884257	1.90400000	0.00532568	57.492
D25	15	11.06046667	8.35599078	0.49800000	29.60600000	2.15750758	165.90700000	69.82258198	75.548
D75	15	50.84533333	15.08293658	32.81900000	81.58900000	3.89439788	762.68000000	227.49897581	29.664
SORTCO	15	2.75046667	1.98447639	1.56300000	9.78300000	0.51238960	41.25700000	3.93814655	72.151
GEOMN	15	17.90693333	8.35617097	5.81700000	36.77800000	2.15755807	268.60400000	69.82559335	46.668
FREDLE	15	8.62033333	6.25275139	0.59500000	23.53100000	1.61445347	129.30500000	39.09689995	72.535
LNFREDLE	15	2.06418564	0.64138146	0.46687374	3.19993762	0.16559365	31.26278465	0.41131887	30.772

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=508									
P119	15	0.14346667	0.12156589	0.05200000	0.51800000	0.03138818	2.15200000	0.01477827	84.735
P238	15	0.18713333	0.11979975	0.08600000	0.55300000	0.03093216	2.80700000	0.01435198	64.018
D25	15	6.37820000	4.36313189	0.22700000	13.58100000	1.12655581	95.67300000	19.03691989	68.407
D75	15	38.20393333	18.33216371	7.38200000	76.47500000	4.73334432	573.05900000	336.06822621	47.985
SORTCO	15	2.90520000	1.07388156	2.06600000	5.70400000	0.27727503	43.57800000	1.15322160	36.964
GEOMN	15	12.67706667	6.68203507	1.20800000	25.66500000	1.72529404	190.15600000	44.64959264	52.710
FREDLE	15	5.24113333	3.28320536	0.21200000	10.81500000	0.84771998	78.61700000	10.77983741	62.643
LNFREDLE	15	1.66053381	0.66149628	0.19227189	2.46936991	0.17079761	24.90800714	0.43757733	39.836
STA=615									
P119	15	0.19320000	0.08343278	0.05000000	0.31100000	0.02154225	2.89800000	0.00696103	43.185
P238	15	0.26846667	0.09652451	0.10900000	0.40700000	0.02492252	4.02700000	0.00931698	35.954
D25	15	3.35026667	3.25794419	0.78400000	11.72500000	0.84119757	50.25400000	10.61420035	97.244
D75	15	32.26840000	12.33951480	16.35100000	57.13000000	3.18604902	484.02600000	152.26362554	38.240
SORTCO	15	3.76733333	1.15456397	2.00600000	5.69100000	0.29810713	56.51000000	1.33301795	30.647
GEOMN	15	8.97866667	4.97547126	3.59000000	18.95000000	1.28466115	134.68000000	24.75531424	55.416
FREDLE	15	2.95946667	2.58218545	0.78500000	9.44600000	0.66671742	44.39200000	6.66768170	87.252
LNFREDLE	15	1.21616786	0.55918975	0.55675456	2.24621913	0.14438217	18.24251785	0.31269318	45.980
STA=630									
P119	15	0.09946667	0.04455793	0.03400000	0.17400000	0.01150481	1.49200000	0.00198541	44.797
P238	15	0.14046667	0.05701988	0.05200000	0.25000000	0.01472247	2.10700000	0.00325127	40.593
D25	15	8.71666667	4.73507925	2.39000000	18.18400000	1.22259221	130.75000000	22.42097552	54.322
D75	15	48.58520000	21.70032193	17.36600000	89.43800000	5.60299903	728.77800000	470.90397203	44.664
SORTCO	15	2.49926667	0.64499042	1.72900000	3.96400000	0.16653581	37.48900000	0.41601264	25.807
GEOMN	15	16.04340000	7.50370432	7.01900000	31.71400000	1.93744812	240.65100000	56.30557854	46.771
FREDLE	15	6.95420000	3.78847757	1.89800000	14.72500000	0.97818070	104.31300000	14.35256231	54.478
LNFREDLE	15	1.96678714	0.48482020	1.06402084	2.75525180	0.12518004	29.50180703	0.23505063	24.650

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=5									
P119	15	0.12793333	0.04658397	0.06400000	0.21100000	0.01202793	1.91900000	0.00217007	36.413
P238	15	0.18166667	0.05516555	0.09600000	0.27400000	0.01424368	2.72500000	0.00304328	30.366
D25	15	7.25566667	5.28704194	1.93400000	19.96100000	1.36510836	108.83500000	27.95281252	72.868
D75	15	48.80646667	18.93900882	27.04200000	87.14800000	4.89003105	732.09700000	358.68605512	38.804
SORTCO	15	2.89526667	0.66514193	1.72700000	3.97700000	0.17173891	43.42900000	0.44241378	22.973
GEOMN	15	14.99180000	6.17848078	7.46600000	25.15600000	1.59527688	224.87700000	38.17362474	41.212
FREDLE	15	5.86986667	3.77223459	1.96900000	14.56900000	0.97398678	88.04800000	14.22975384	64.264
LNFREDLE	15	1.80068825	0.51022310	1.08822520	2.74528176	0.13173904	27.01032379	0.26032761	28.335
STA=10									
P119	15	0.21373333	0.18564231	0.08700000	0.80700000	0.04793264	3.20600000	0.03446307	86.857
P238	15	0.25753333	0.18863792	0.11900000	0.82400000	0.04870610	3.86300000	0.03558427	73.248
D25	15	5.99566667	5.01659936	0.25900000	17.68900000	1.29528038	89.93500000	25.16626910	83.670
D75	15	36.81693333	15.82432103	0.83800000	58.30700000	4.08582212	552.25400000	250.40913621	42.981
SORTCO	15	2.84333333	0.90359802	1.79700000	5.15300000	0.23330801	42.65000000	0.81648938	31.780
GEOMN	15	10.92680000	5.57008282	0.63800000	20.22900000	1.43818920	163.90200000	31.02582260	50.976
FREDLE	15	4.42700000	3.16301287	0.35500000	10.60200000	0.81668641	66.40500000	10.00465043	71.448
LNFREDLE	15	1.52015953	0.63490065	0.30380145	2.45117750	0.16393064	22.80239251	0.40309883	41.765
STA=58									
P119	15	0.16780000	0.12307791	0.06900000	0.56700000	0.03177858	2.51700000	0.01514817	73.348
P238	15	0.19100000	0.12340989	0.09300000	0.58700000	0.03186430	2.86500000	0.01523000	64.613
D25	15	8.33880000	6.20366477	0.20300000	21.58500000	1.60177936	125.08200000	38.48545660	74.395
D75	15	36.75306667	18.09345964	9.87400000	82.87000000	4.67171119	551.29600000	327.37328192	49.230
SORTCO	15	2.82726667	1.83745151	1.69800000	7.55400000	0.47442794	42.40900000	3.37622807	64.990
GEOMN	15	12.38100000	6.89994472	1.18700000	26.11500000	1.78155807	185.71500000	47.60923714	55.730
FREDLE	15	5.99993333	4.18105985	0.16400000	15.38300000	1.07954501	89.99900000	17.48126150	69.685
LNFREDLE	15	1.74111611	0.72201398	0.15186235	2.79624421	0.18642321	26.11674172	0.52130418	41.468
STA=73									
P119	15	0.09553333	0.03235046	0.05000000	0.15900000	0.00835285	1.43300000	0.00104655	33.863
P238	15	0.14440000	0.04610206	0.07500000	0.24300000	0.01190350	2.16600000	0.00212540	31.927
D25	15	11.96840000	10.38176109	2.58100000	39.74200000	2.68055919	179.52600000	107.78096340	86.743
D75	15	48.72080000	21.89455362	18.30200000	89.76300000	5.65314944	730.81200000	479.37187803	44.939
SORTCO	15	2.30373333	0.65893014	1.50300000	3.52100000	0.17013503	34.55600000	0.43418892	28.603
GEOMN	15	17.60286667	9.63020201	8.50600000	37.75300000	2.48650747	264.04300000	92.78079084	54.708
FREDLE	15	8.82140000	6.70266252	2.49000000	25.12100000	1.73062002	132.32100000	44.92568483	75.982
LNFREDLE	15	2.11004153	0.58363538	1.24990174	3.26273959	0.15069401	31.65122296	0.34063026	27.659
STA=95									
P119	15	0.16973333	0.06054097	0.06500000	0.28200000	0.01563161	2.54600000	0.00366521	35.668
P238	15	0.21600000	0.07862297	0.08300000	0.33900000	0.02030036	3.24000000	0.00618157	36.400
D25	15	6.37793333	5.39692070	0.98000000	19.47200000	1.39347893	95.66900000	29.12675307	84.619
D75	15	35.44833333	10.41371981	16.24900000	55.10700000	2.68881089	531.72500000	108.48556024	29.377
SORTCO	15	2.96353333	1.06875220	1.68200000	5.27800000	0.27595063	44.45300000	1.14223127	36.063
GEOMN	15	11.65886667	5.29202157	4.33000000	24.28200000	1.36639409	174.88300000	28.00549227	45.391
FREDLE	15	4.98693333	3.78444910	1.06300000	14.43400000	0.96788540	74.80400000	14.05087064	75.165
LNFREDLE	15	1.61572465	0.61195817	0.72416123	2.73657287	0.15800589	24.23586970	0.37448791	37.875

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=106									
P119	15	0.13580000	0.05608310	0.05400000	0.28500000	0.01448059	2.03700000	0.00314531	41.298
P238	15	0.17460000	0.08540224	0.07200000	0.44600000	0.02205076	2.61900000	0.00729354	48.913
D25	15	9.97933333	5.28958202	1.06300000	21.38200000	1.36576421	149.68700000	27.97967798	53.006
D75	15	43.45526667	11.41811157	23.92900000	58.01300000	2.94711093	651.82900000	130.28194292	26.266
SORTCO	15	2.32046667	0.74620678	1.62300000	4.74400000	0.19266976	34.80700000	0.55682455	32.158
GEOMN	15	15.27167000	5.42679322	4.60500000	26.33900000	1.40119199	229.07400000	29.45008469	35.535
FREDLE	15	7.38320000	3.67085681	0.97100000	16.04400000	0.94781115	110.74800000	13.47518974	49.719
LNFREDLE	15	2.02318046	0.50542507	0.67854103	2.83579824	0.13050019	30.34770692	0.25545450	24.982
STA=109									
P119	15	0.10620000	0.03524243	0.06000000	0.16800000	0.00909956	1.59300000	0.00124203	33.185
P238	15	0.12573333	0.04294592	0.06900000	0.20500000	0.01108859	1.88600000	0.00184435	34.156
D25	15	19.03000000	14.76429941	3.64800000	42.33200000	3.81212572	285.45000000	217.98453714	77.584
D75	15	58.99780000	16.18507860	30.33200000	88.45300000	4.16864137	883.61100000	260.66356311	27.408
SORTCO	15	2.09233333	0.62233898	1.28300000	3.38300000	0.16068723	31.38500000	0.38730581	29.744
GEOMN	15	22.16446667	10.26741199	8.03300000	39.83700000	2.65103438	332.46700000	105.41974898	46.328
FREDLE	15	12.85100000	9.23380367	2.78600000	28.96500000	2.38415785	192.76500000	85.26311014	71.853
LNFREDLE	15	2.41703628	0.67722431	1.33131005	3.40003003	0.17485856	36.25554425	0.45863277	28.019
STA=113									
P119	15	0.14820000	0.04925618	0.08500000	0.26200000	0.01271789	2.22300000	0.00242617	33.236
P238	15	0.19826667	0.06558252	0.11100000	0.35500000	0.01693333	2.97400000	0.00430107	33.078
D25	15	6.89340000	4.93665132	1.11500000	16.55400000	1.27463789	103.40100000	24.37052626	71.614
D75	15	47.83466667	17.56261484	25.55300000	90.62600000	4.53464765	717.51700000	308.44544012	36.715
SORTCO	15	3.02820000	0.83000019	1.93700000	4.80000000	0.21430513	45.42300000	0.68890031	27.409
GEOMN	15	13.40953333	6.07214956	4.95600000	26.71800000	1.56782227	201.12800000	36.87100027	45.286
FREDLE	15	5.13040000	3.27166447	1.03200000	11.81900000	0.84474013	76.95600000	10.70378840	63.770
LNFREDLE	15	1.67601482	0.55325400	0.70902053	2.51922756	0.14284957	25.14022232	0.30608999	33.010
STA=501									
P119	15	0.08466667	0.03213069	0.04500000	0.17300000	0.00829611	1.27000000	0.00103238	37.950
P238	15	0.12873333	0.04212984	0.08500000	0.24000000	0.01087788	1.93100000	0.00177492	32.726
D25	15	10.26066667	5.08135932	2.60000000	18.66900000	1.31200133	153.91000000	25.82021252	49.523
D75	15	49.31900000	16.35939139	25.33700000	87.95000000	4.22371849	739.78500000	267.59696871	33.169
SORTCO	15	2.33766667	0.48372021	1.77300000	3.55700000	0.12489602	35.06500000	0.23398524	20.692
GEOMN	15	17.12980000	6.15939871	6.15900000	26.41200000	1.59034991	256.94700000	37.93819246	35.957
FREDLE	15	7.90580000	3.72285634	1.97300000	14.39400000	0.96123737	118.58700000	13.85965931	47.090
LNFREDLE	15	2.08917804	0.48185653	1.08957154	2.73397782	0.12481482	31.33767058	0.23218571	23.064
STA=504									
P119	15	0.10173333	0.04016478	0.02200000	0.18600000	0.01037050	1.52600000	0.00161321	39.480
P238	15	0.12693333	0.04126130	0.03700000	0.20500000	0.01065362	1.90400000	0.00170250	32.506
D25	15	11.09666667	7.65669714	4.39900000	29.94500000	1.97695070	166.45300000	58.62501112	68.999
D75	15	49.70766667	16.97835450	23.72900000	89.44700000	4.38379228	745.61500000	288.26452152	34.156
SORTCO	15	2.25966667	0.35176349	1.44100000	2.85200000	0.09082494	33.89200000	0.12373755	15.568
GEOMN	15	17.64300000	8.85967602	6.99400000	42.01200000	2.28755851	264.64500000	78.49385914	50.216
FREDLE	15	8.49266667	5.97839248	3.01100000	23.29700000	1.54361430	127.39000000	35.74117667	70.395
LNFREDLE	15	2.11751025	0.49502965	1.38904059	3.19035289	0.12781611	31.76265375	0.24505435	23.378

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
STA=508									
P119	15	0.15240000	0.06937123	0.04300000	0.27900000	0.01558779	2.28600000	0.00364469	39.614
P238	15	0.19460000	0.06899979	0.06100000	0.33900000	0.01781567	2.91900000	0.00476097	35.457
D25	15	5.76593333	4.10358264	0.86300000	14.32600000	1.05954048	86.48900000	16.83939050	71.169
D75	15	42.82000000	20.38286957	21.71800000	86.97400000	5.26283829	642.30000000	415.46137171	47.601
SCRTCO	15	3.03660000	0.84680777	2.02000000	5.73000000	0.21864483	45.54900000	0.71708340	27.88
GEOMN	15	12.01626667	6.48504773	5.31900000	24.62600000	1.67443212	180.24400000	42.05584407	53.969
FREDLE	15	4.46580000	3.12568939	0.92800000	12.19100000	0.80704953	66.98700000	9.76993417	69.992
LNFREDLE	15	1.56314566	0.52982057	0.65648320	2.57953478	0.13679908	23.44718492	0.28070984	33.895
STA=615									
P119	15	0.18293333	0.10551538	0.09800000	0.51400000	0.02724395	2.74400000	0.01113350	57.680
P238	15	0.25586667	0.11683497	0.15000000	0.59800000	0.03016666	3.83800000	0.01365041	45.662
D25	15	3.96760000	2.45622105	0.27800000	7.78400000	0.63419355	59.51400000	6.03302183	61.907
D75	15	38.82506667	21.99153063	8.10700000	83.64600000	5.67818879	582.37600000	483.62741950	56.643
SCRTCO	15	3.43406667	1.15065897	2.17400000	6.65400000	0.29709887	51.51100000	1.32401607	33.507
GEOMN	15	10.26540000	5.30638323	1.48800000	18.77600000	1.37010226	153.98100000	28.15770297	51.692
FREDLE	15	3.32613333	1.87309468	0.27500000	5.96400000	0.48363097	49.89200000	3.50848370	56.314
LNFREDLE	15	1.35350787	0.52266093	0.24298618	1.94075402	0.13495047	20.30261812	0.27317445	38.615
STA=630									
P119	15	0.13920000	0.04369570	0.07600000	0.20100000	0.01128218	2.08800000	0.00190931	31.391
P238	15	0.17293333	0.05391722	0.09600000	0.24300000	0.01392137	2.59400000	0.00290707	31.178
D25	15	9.72300000	8.43155258	2.56900000	26.89600000	2.17701751	145.84500000	71.09107886	86.718
D75	15	47.80626667	21.90631438	19.48000000	87.88500000	5.42380705	717.09400000	441.26524378	43.941
SCRTCO	15	2.57113333	0.59823560	1.61600000	3.55100000	0.15446377	38.56700000	0.35788584	23.267
GEOMN	15	14.97106667	8.79939821	5.70400000	32.58600000	2.27199485	224.56600000	77.42980892	58.776
FREDLE	15	6.87846667	5.61505297	2.07100000	18.06800000	1.44980044	103.17700000	31.52881984	81.632
LNFREDLE	15	1.85018406	0.65544965	1.12200324	2.94801154	0.16923637	27.75276094	0.42961424	35.426

APPENDIX XVI

SUMMARY OF STEELHEAD AND RESIDENT RAINBOW TROU'I REDDS COUNTED, BY BAR AND RIVER MILE, IN THE LOWER DESCHUTES RIVER, OREGON, 1984.

This appendix contains redd count data for steelhead and resident rainbow trout spawning areas in the lower Deschutes River, Oregon which were surveyed in 1984. Counts of trout redds are presented here on a bar-by-bar, a Study Section, and a ten-mile reach basis.

Deschutes Gravel Study

Redd Counts
Study Section I

Bar #	Bar Code	RM	Count	Date
701A,702	1030	99.9	16 redds	5/31/84
701B	1026	99.9	2 redds	5/31
716A	1101	99.9	1 redd	5/31
706	1050	99.9	15 redds	5/31
708,709	1060,1065	99.9	6 redds	5/31
711	1075	99.9	72 redds	5/31
733	1205	98.9	95 redds	6/1
732	1200	98.9	7 redds	6/1
734,735,737	1210,1215,1225	98.9	7 redds	6/1
738-750	1245 thru 1310	98.9	16 redds	6/1
752	1365	98.3	1 redd	6/1
753A-C,2A	1370,1375,1380, 1395	98.1	34 redds	6/1
3	1400	98.0	20+ redds	6/1

Deschutes Gravel Study

Redd Count
Study Section II

Bar#	Bar Code	River Mile	Count	Date
9	2015	96.7	12 redds	6/1/84
11,12	2025,2030	96.5	8 redside redds	6/1
15	2050	96.4	158+ redds	6/1
24	2120	94.3	3 redds	6/1
600	2055	96.0	2 redds	6/1
601	2100	95.0	3 sthd redds	6/1
602	2105	95.0	2 redds	6/1
22	2110	94.8	3 redds	6/1
27	2150	94.3	6 redds	6/1
27	2150	94.3	7 sthd redds	6/1
29.1	2161	94.2	4 redds	6/1
29.4	2164	94.2	73 redds	6/1
33	2190	92 .0	3 sthd redds	6/14
34.5	2200	91.1	1 sthd redd	6/14
607	2205	91.9	4 sthd redd	6/14
35	2210	91.9	1 sthd redd	6/14
609	2220	91.5	1 sthd redd	6/14
38	2235	90.6	1 redside redd	6/14
39	2240	90.6	2 sthd redds	6/14
613	2245	90.3	1 redd	6/14
614	2265	88.3	11 redside redds	6/14
614	2265	88.3	1 sthd redd	6/14
53	2320	87.3	42 redside redds	6/14
53	2320	87.3	7 sthd redds	6/14
54	2325	86.9	1 sthd redd	6/14
617	2360	86.0	7 redside redds	6/14
617	2360	86.0	2+ sthd redds	6/14
62	2380	85.3	10 redside redds	6/14
62	2380	85.3	7 sthd redds	6/14
601	2100	95 .0	4 sthd redds	7/4
601	2100	95.0	4 redside redds	7/4
22	2110	94.8	4 sthd redds	7/4
603	2130	94.2	5 redside redds	7/4
603	2130	94.2	1 sthd redd	7/4
604	2140	94.2	1 sthd redd	7/4
604	2140	94.2	6 redds	7/4
605	2175	92.7	5+ redds	7/4
605	2175	92.7	2 sthd redds	7/4
607	2205	91.9	21+ redds	7/4
607	2205	91.9	3 sthd redds	7/4
609	2220	91.5	3 redds	7/4
609	2220	91.5	2 sthd redds	7/4

Deschutes Gravel Study

Redd Count
Study Section II

Bar#	Bar Code	River Mile	Count	Date
613	2245	90.3	10+ redds	7/4/84
53	2320	87.3	88 redds (7 sthd)	7/4
615	2340	86.7	138 redds	7/4
616	2350	86.1	heavy redside use	7/4
57	2345	86.1	10 redds	7/4
617	2360	86.0	mass spawned	7/4
2	2380	85.3	mass spawned	7/4
61	2375	85.3	2+ redds	7/4
618	2385	85.3	15 redds	7/4
618	2385	85.3	4 sthd redds	7/4

Deschutes Gravel Study

Redd Counts
Study Section III

Bar #	Bar Code	River Mile	Count	Date
92.5	3160	76.3	6 redds	6/15/84
93	3165	74.5	1 sthd redd	6/15
93	3165	74.5	5 redds	6/15
99	3195	73.6	mass spawned	6/15
ll4A	3260	70.3	5 sthd redds	6/15
ll4B	3265	70.2	1 sthd redd	6/15
ll4B	3265	70.2	1 redside redd	6/15
58A	3285	69.2	3 sthd redds	6/15
58A	3285	69.2	3 redside redds	6/15
58B	3290	69.2	4 sthd redds	6/15
58B	3290	69.2	2 redds	6/15
ll8A	3305	69.1	20+ redds	6/15
ll8A	3305	69.1	1 sthd redd	6/15
629	3340	66.6	many redsides	6/15
156	3350	65.6	1 sthd & redd	6/15
160	3370	64.5	8 sthd redds, many redsides present	6/15
618	2385	85.3	2 sthd redds	6/14
618	2385	85.3	1 redside redd	6/14
619	3010	83.0	8 redds	7/4
619	3010	83.0	4 sthd redds	7/4
70	3015	83.0	1 sthd redd	7/4
68	3020	83.0	10+ redds	7/4
76	3055	82.7	1 sthd redd	7/4
77	3060	82.7	1 redd	7/4
77	3060	82.7	4 sthd redds	7/4
75	3050	82.7	2 sthd redds	7/4
623	3215	7219	2 redds	7/4
103	3220	72.9	4 stha redds	7/4
624	3225	72.7	4 redside redds	7/5
ll4A	3260	70.3	4 sthd redds	7/5
ll4A	3260	70.3	2 redside redds	7/5
ll4B	3265	70.2	1 sthd redd	7/5
ll4B	3265	70.2	mass spawned	7/5
ll4C	3270	70.2	disturbed by redsd	7/5
115	3275	69.6	redside activ. ev.	7/5
58A	3285	69.2	18 redds	7/5
58A	3285	69.2	2 sthd redds	7/5

Deschutes Gravel Study

Redd Counts
Study Section III

Bar # .	Bar Code	River Mile	Count	Date
58B	3290	69.2	6 redds	7/5
58B	3290	69.2	2 sthd redds	7/5
119	3295	69.1	1	7/5
628	3305	69.1	100+ redds	7/5
154	3330	67.5	4 redds	7/5
629	3340	66.6	3 redside redds	7/5
630	3370	64.5	14 redds	7/5
630	3370	64.5	6 sthd redds	7/5
620	3080	79.5	12 redside redds	7/4
99	3195	73.6	27 redds	7/4
631	3385	62.9	spawned patches	7/5
165	3400	61.8	55 redds	7/5
165	3400	61.8	3 sthd redds	7/5
633	3410	59.4	3 redside redds	7/5
83	3105	77.2	14 redds	7/5
84	3110	77.2	2 redside redds	7/5
	3140	76.9	2 redside redds	7/5
92.5	3160	76.3	13 redds	7/5
93	3165	74.5	20+ redds	7/5
93	3165	74.5	10+ sthd redds	7/5
95	3175	74.0	6 sthd redds	7/5
211.5	3495	50.8	2 sthd redds	8/17
214	3510	46.5	1 sthd redd	8/17
	3506	47.5	4 redds	9/13
	3507	47.5	1 sthd redd	9/13
	3509	47.5	5 sthd redds	9/13
102	3210	72.9	2 redds	7/4
102	3210	72.9	1 sthd redd	7/4

Deschutes Gravel Study

Redd Counts
Study Section IV

Bar #	Bar Code	River Mile	Count	Date
IV-12	4020	40.9	7 redside redds	7/25/84
IV-19	4055	39.9	surf. dist. by fish	7/25
IV-92	4335	21.9	2 trout redds	8/11
IV-93	4340	21.9	6 sthd redds	8/11
IV-94	4345	21.1	surf. dist by fish	8/11
915	4135	31.7	5 sthd redds	8/16
906	4055	39.8	1 sthd redd	8/11
	4180	29.7	2 sthd redds	8/16

SUMMARY TABLE

Steelhead, resident rainbow, and unclassified trout redds counted per 10 mile reach of the lower Deschutes River in 1984.

River Mile	Steelhead	Resident Rainbow	Unclassified	Total Redds
0-10	0	0	0	0
10-20	0	0	0	0
20-30	8	2	0	10
30-40	0	0	0	0
40-50	7	7	4	18
50-60	2	0	0	2
60-70	19	3	198	220
70-80	29	28	80	137
80-90	50	70	211	331
90-100	25	18	536	579
Totals	146	128	1029	1283

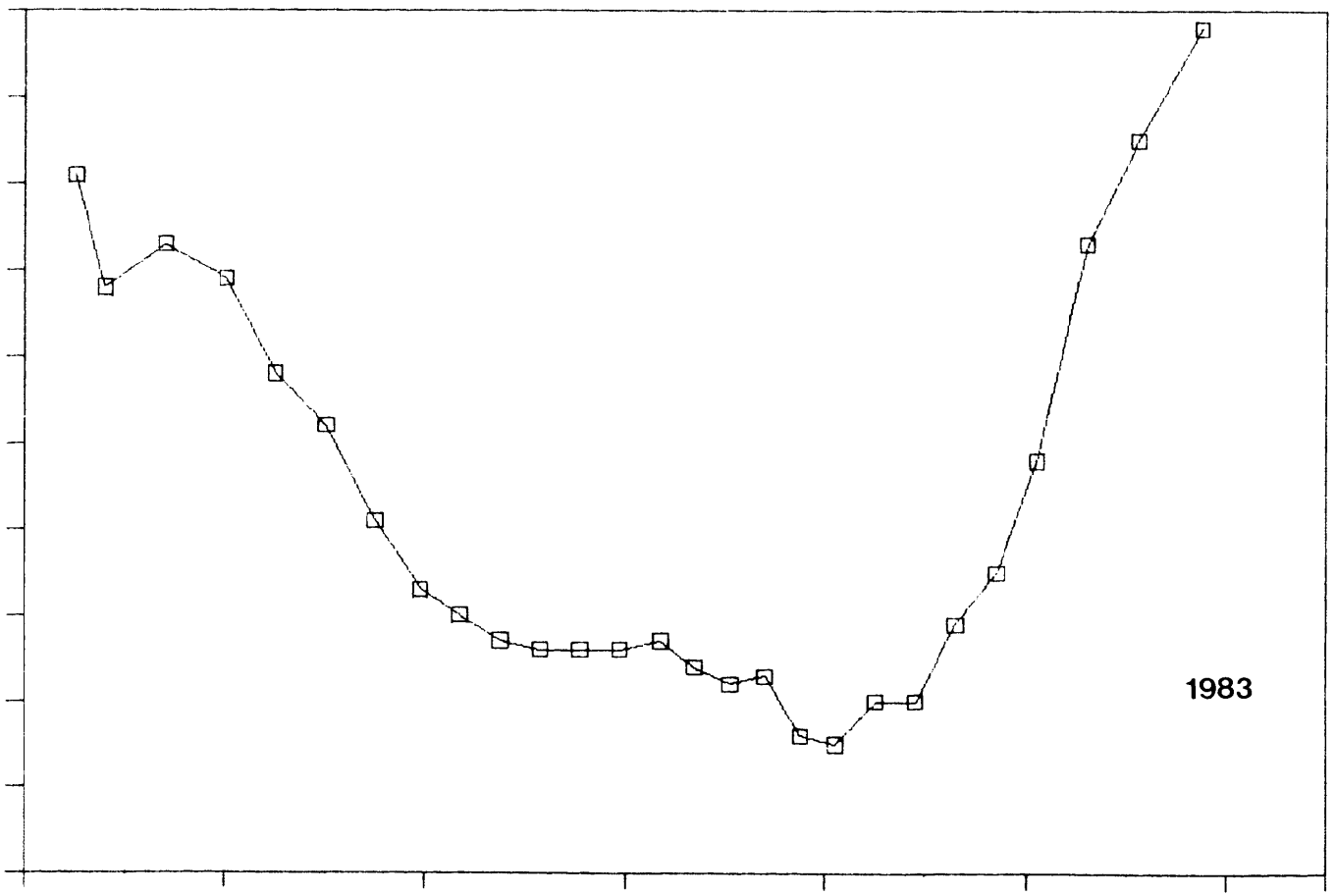
APPENDIX XVII

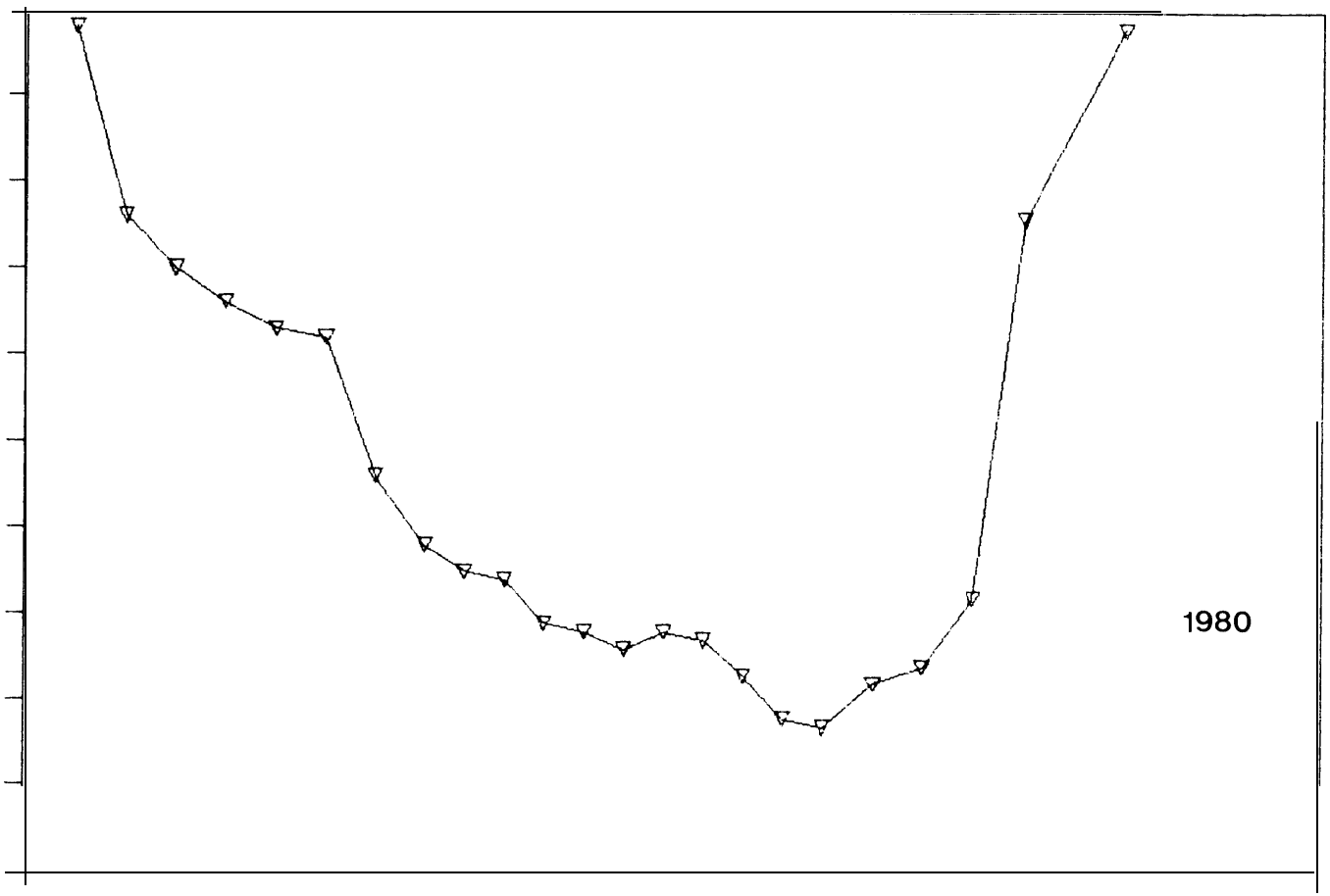
RIVER CROSS-SECTIONS FOR THE DESCHUTES RIVER AT USGS TRANSECT SITES NEAR THE PELTON AND MOODY GAGES, LOWER DESCHU'I'ES RIVER, OREGON.

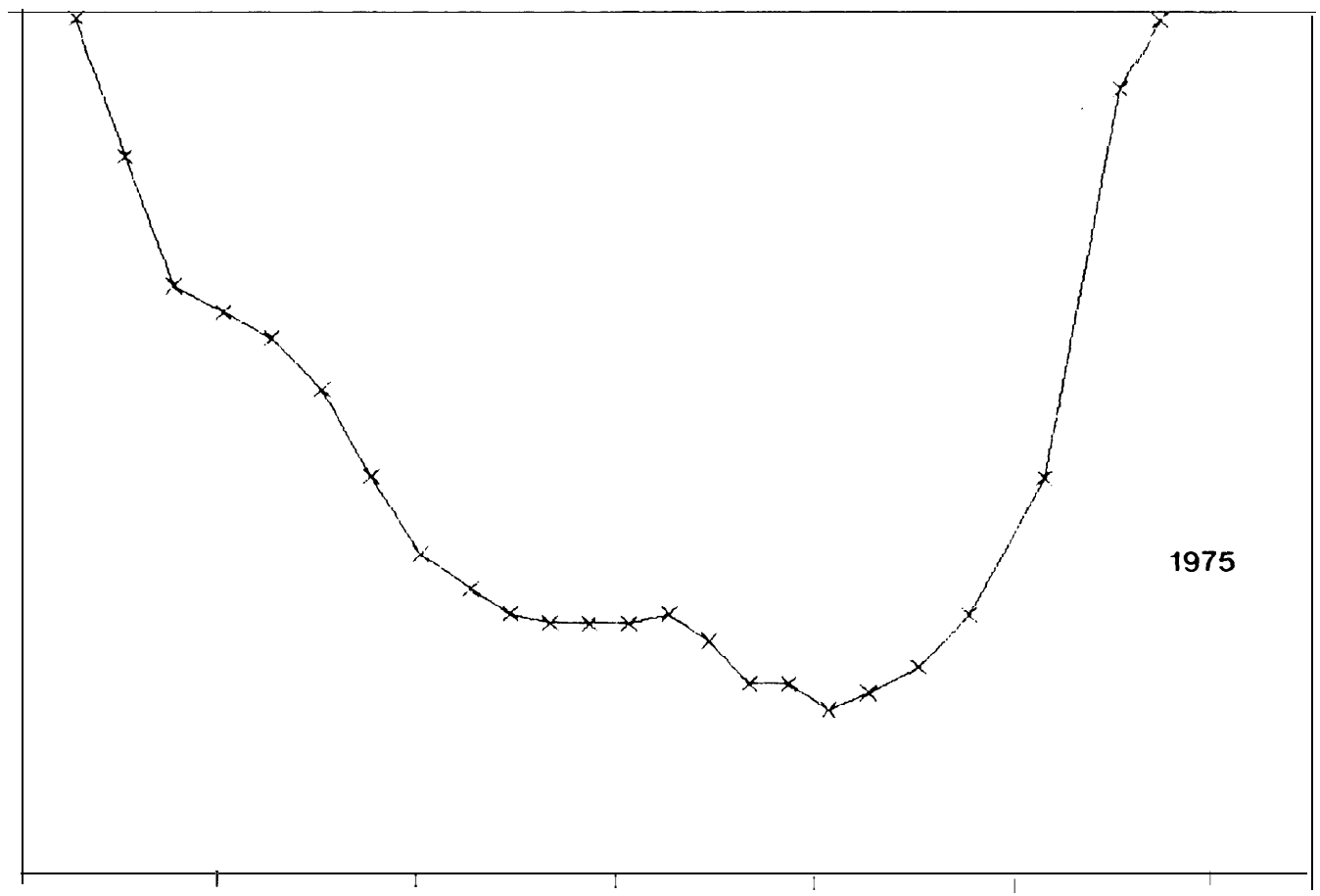
This appendix contains two time series of channel cross-sections for the Deschutes River, Oregon based on historical data. One series of cross-sections is for a u. s. Geological Survey (USGS) transect near Pelton (RM 100) and the other is for a USGS transect near Moody (RM 1.3).

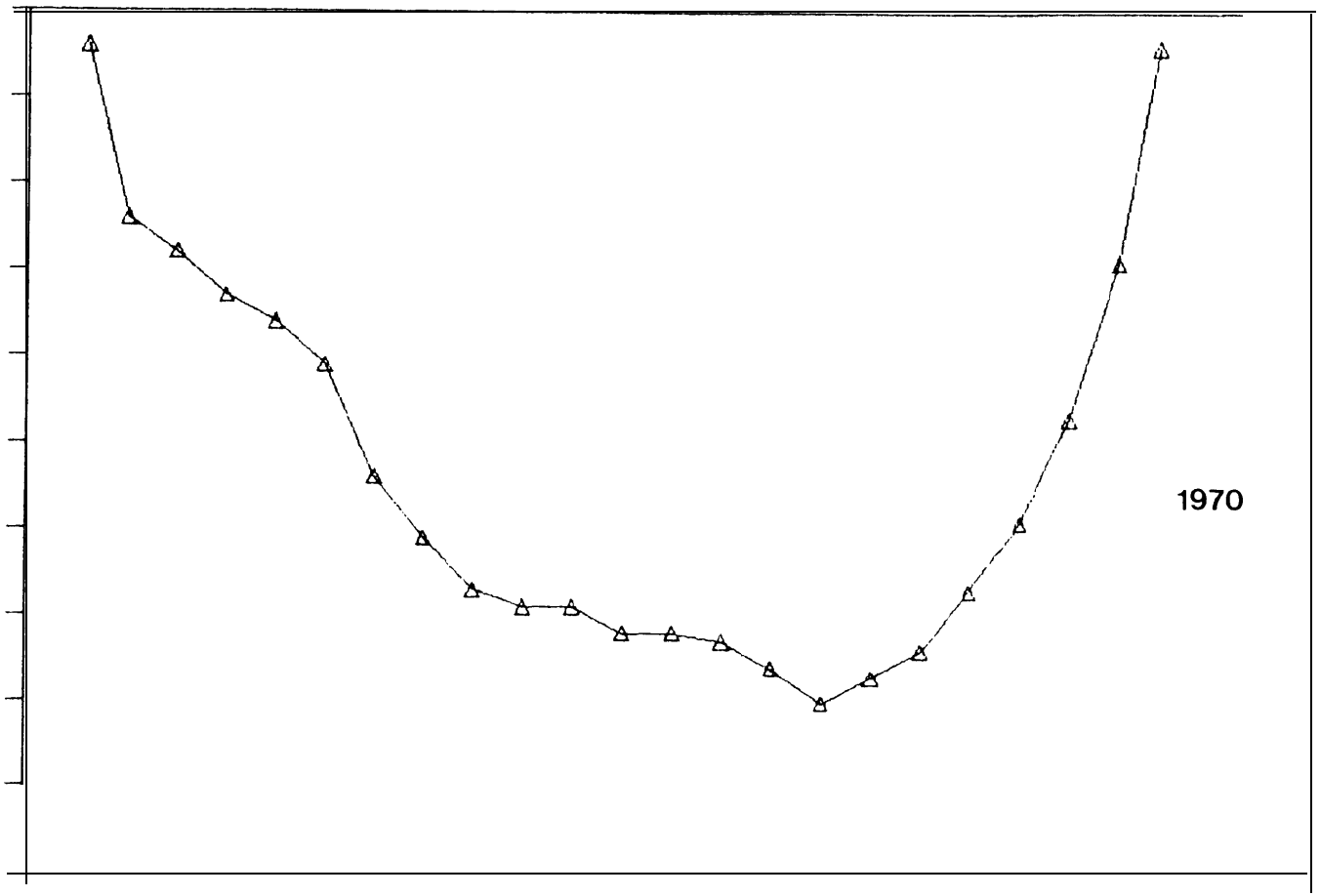
Cross-sections in each series are presented sequentially on transparent overlays to allow an examination of historical trends.

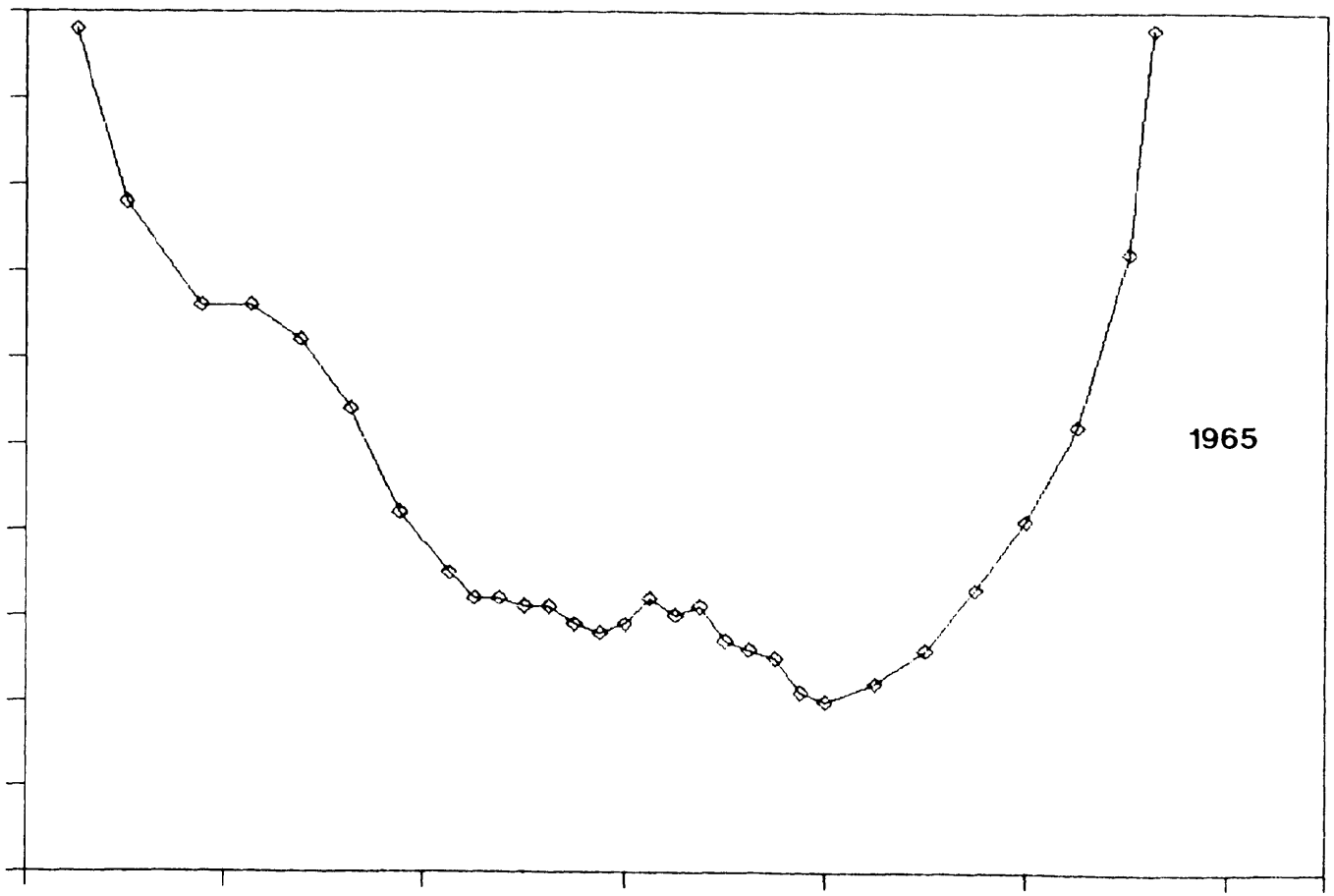
PELTON (RM 100)

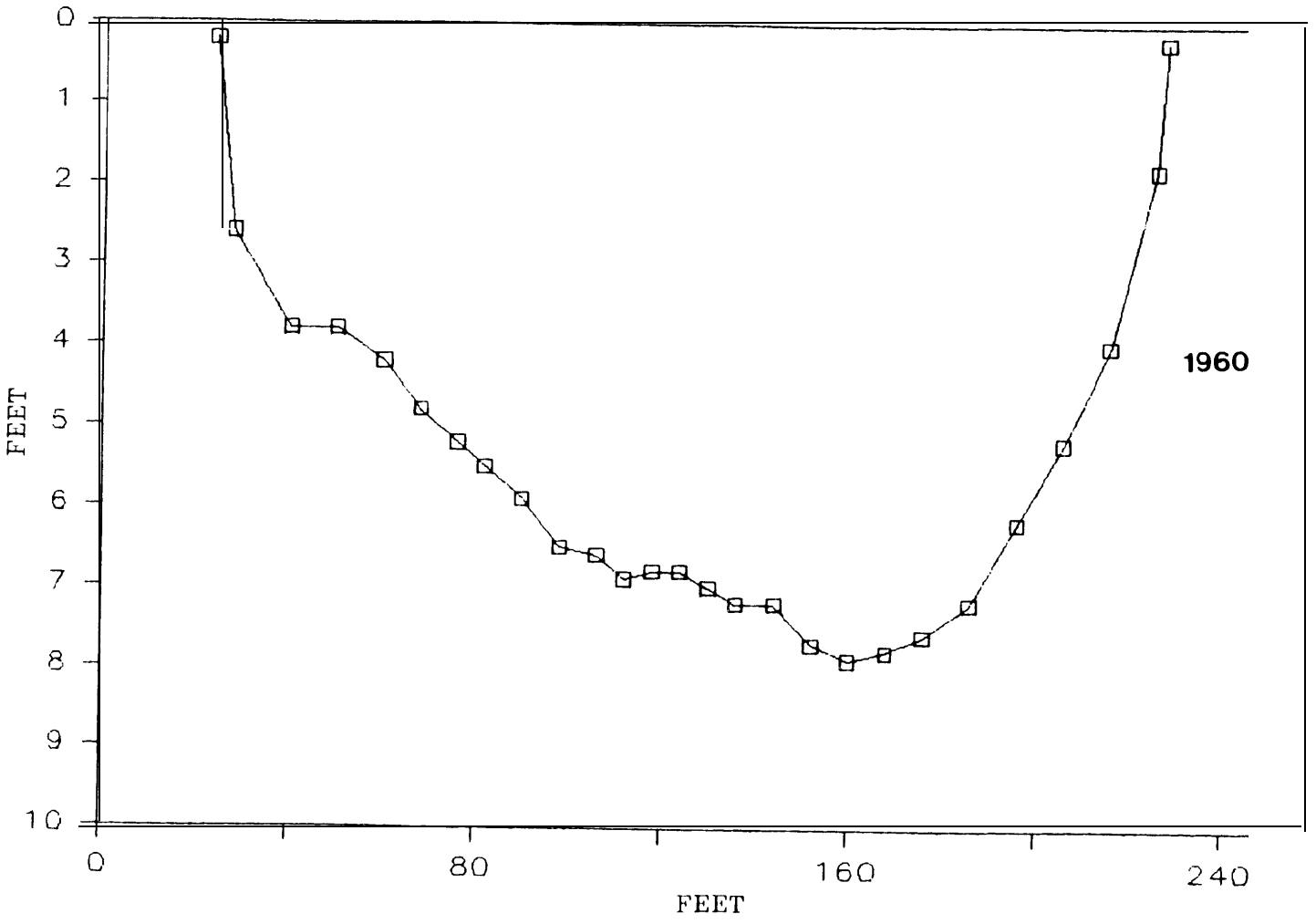

1983


1980


1975

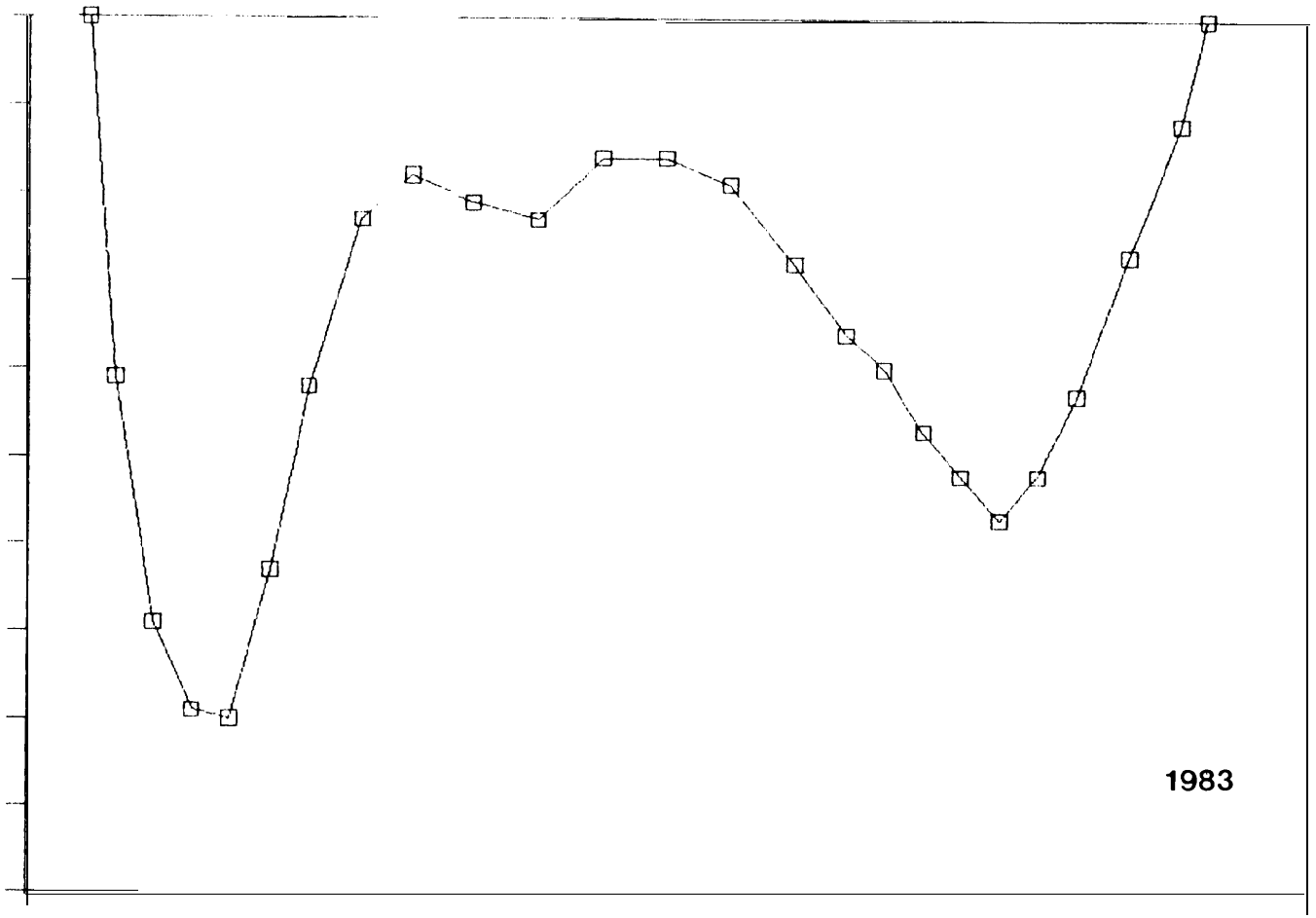

1970

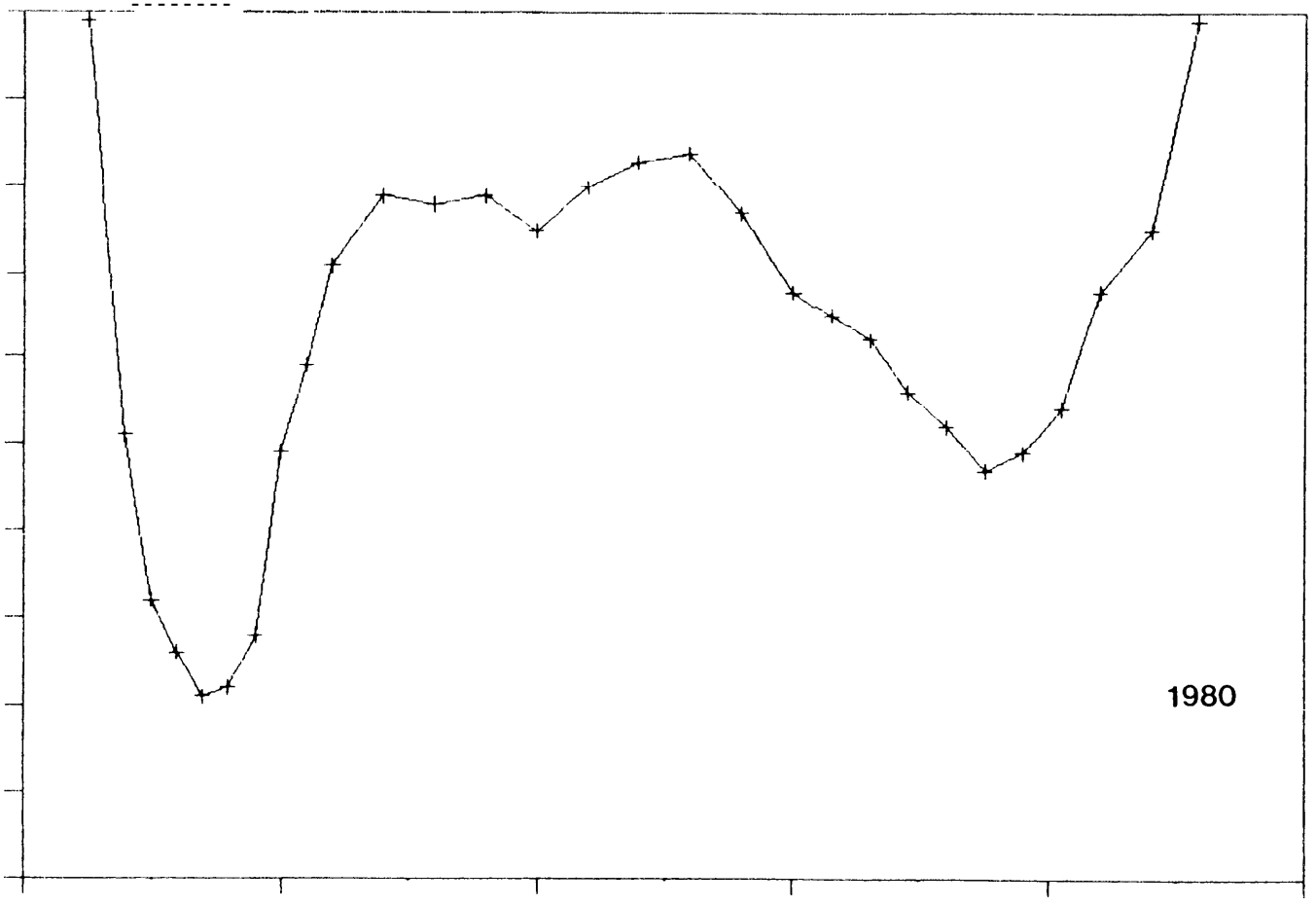

1965

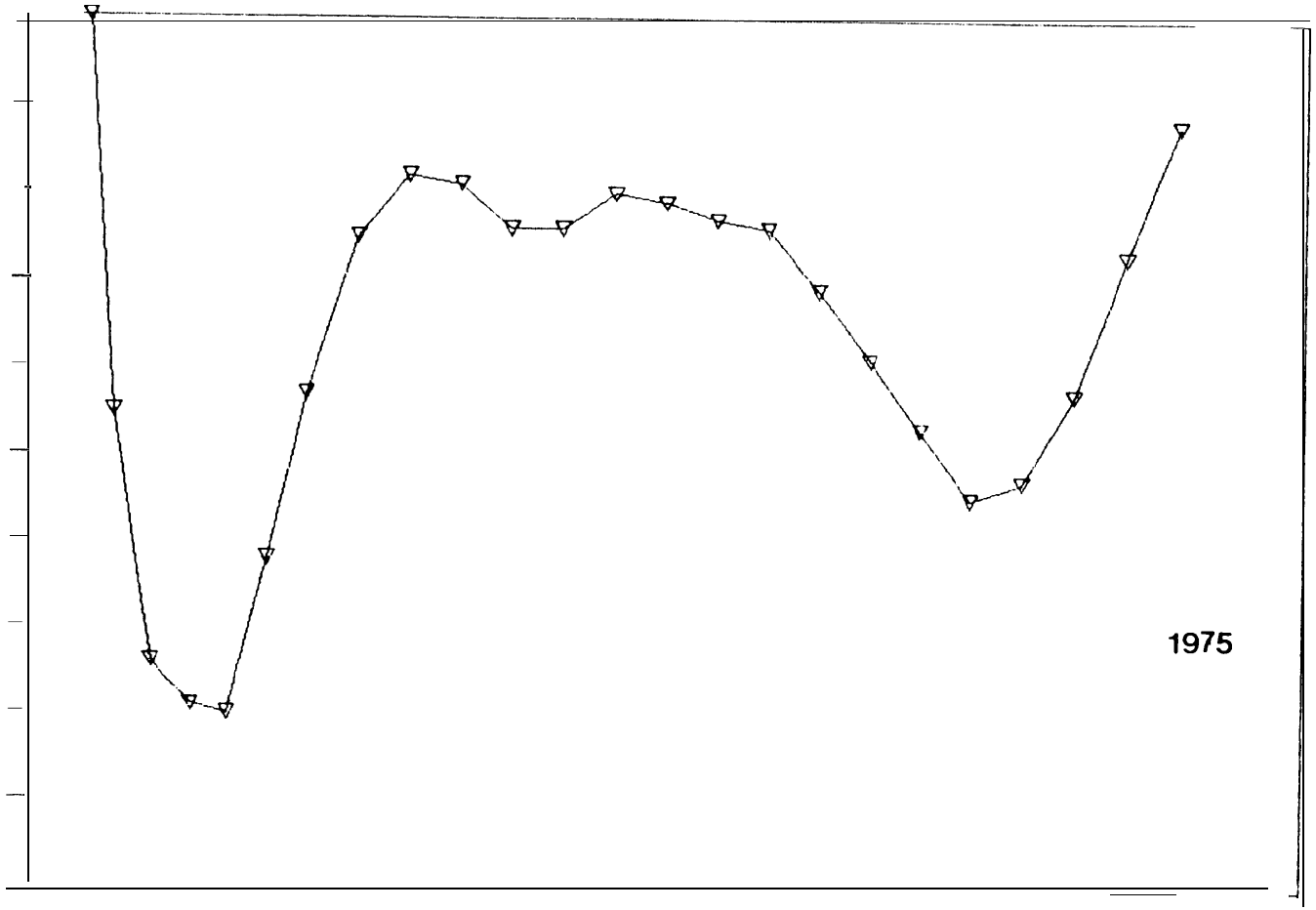


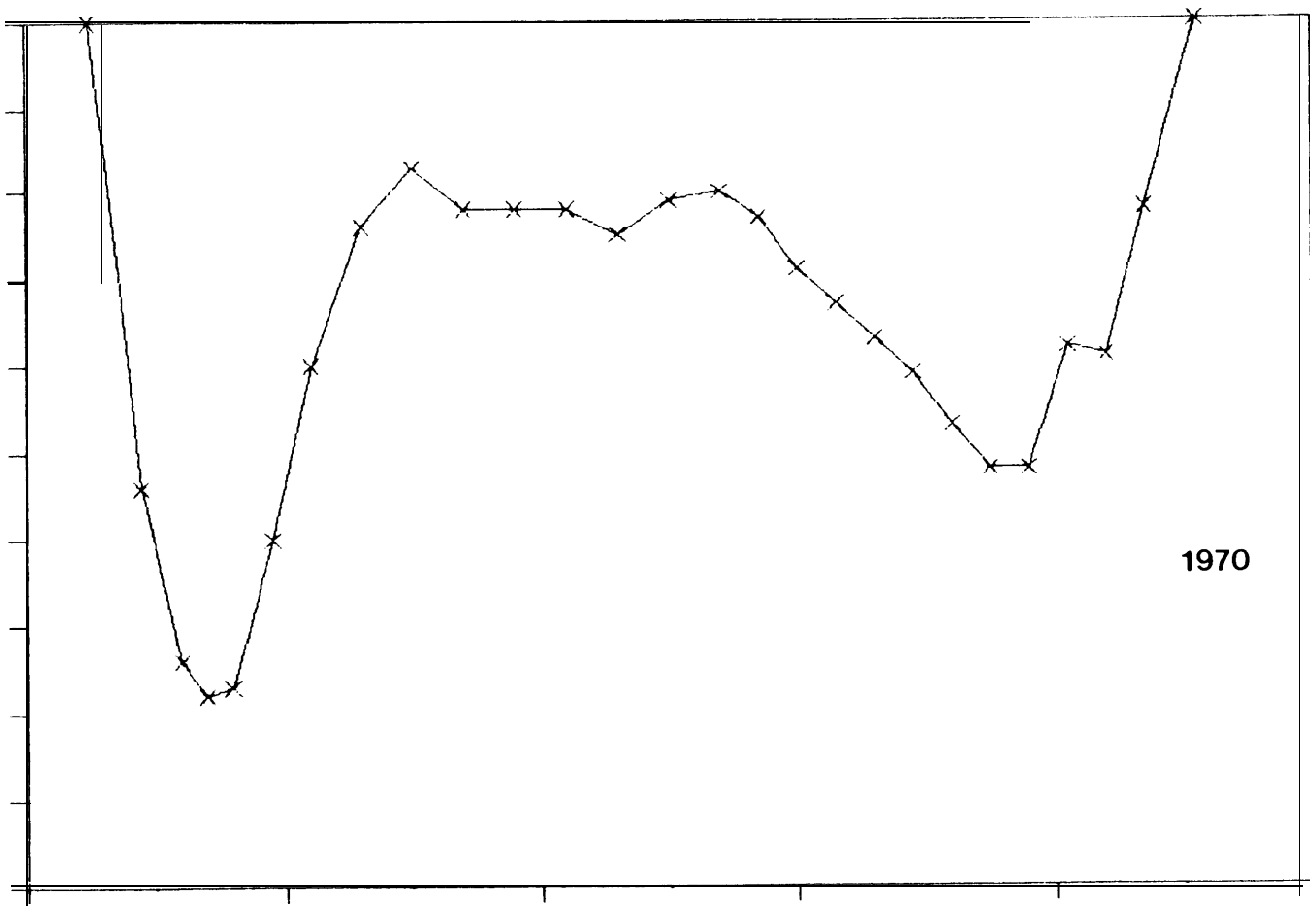
USGS PELTON GAGE RATING TRANSECT, 1960 - 1983

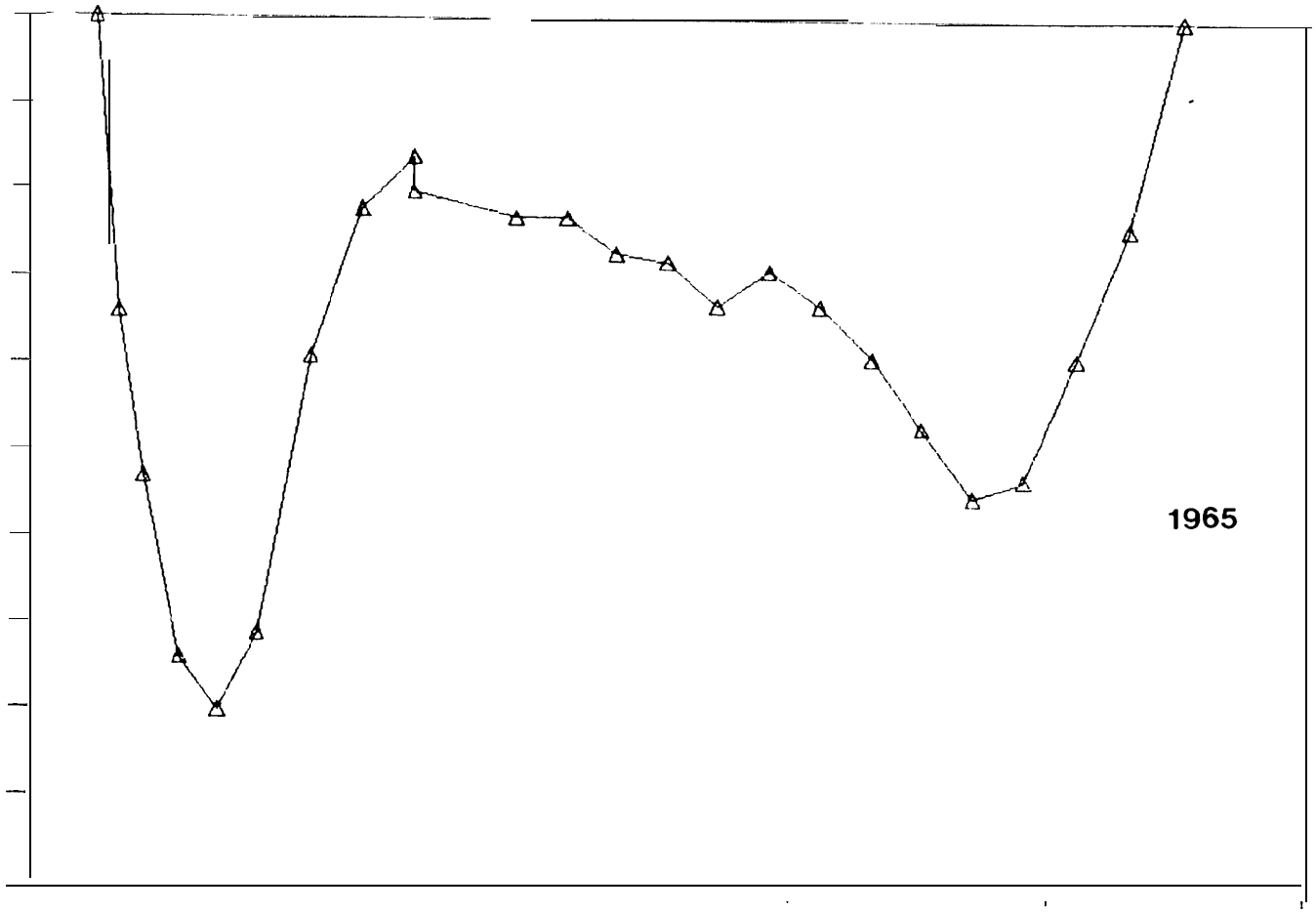
MOODY (RM 1.3)

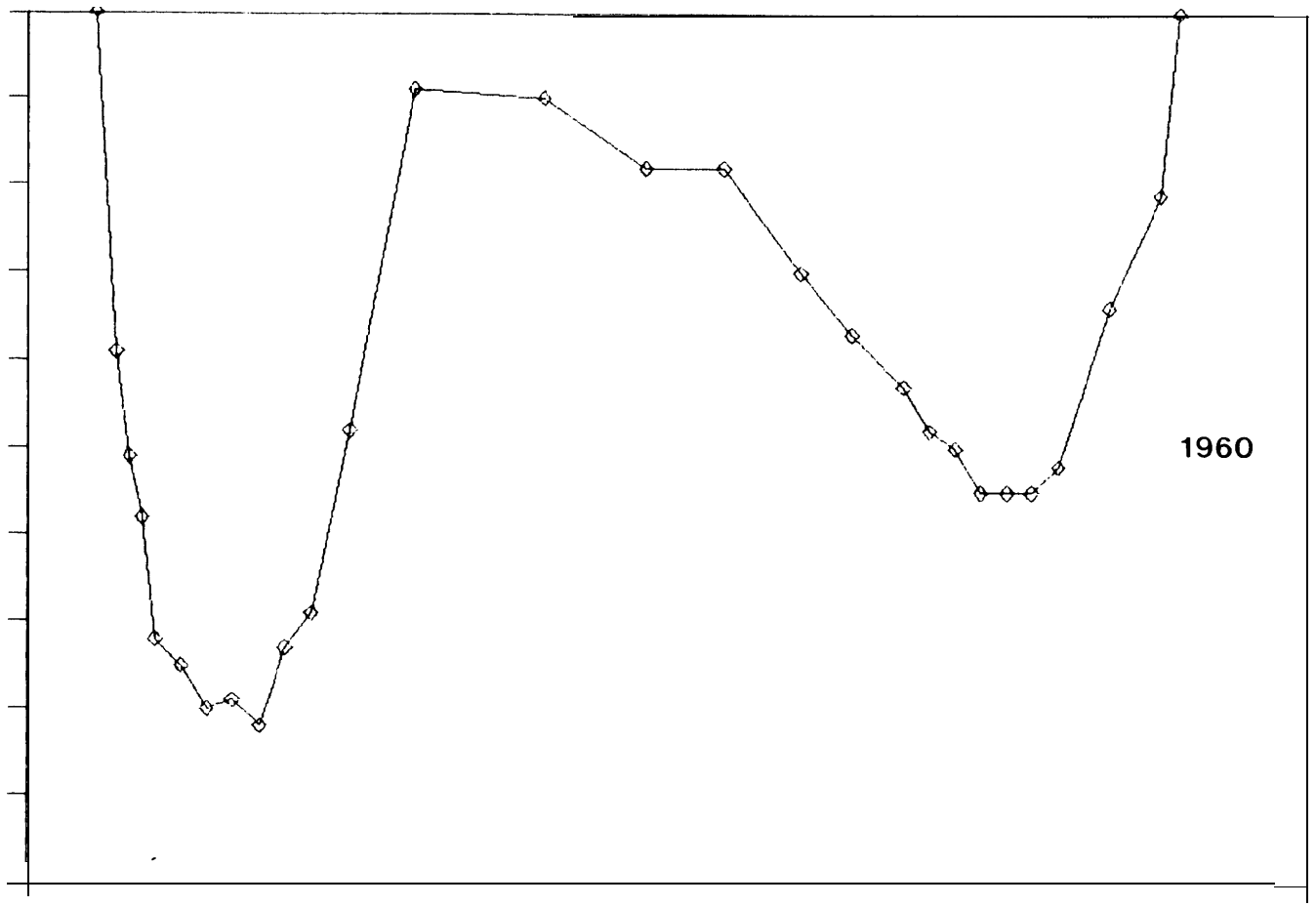

1983

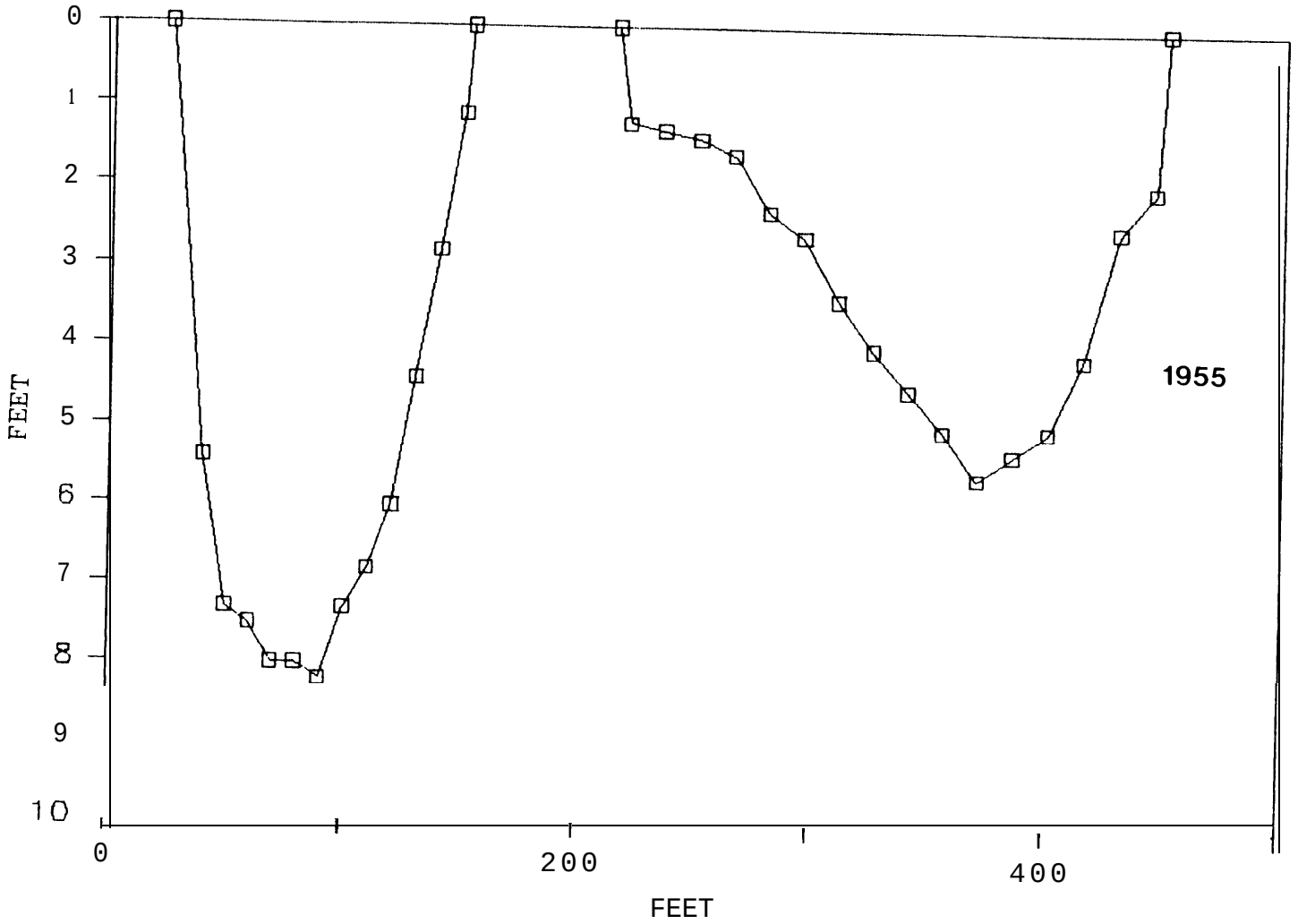

1980


1975


1970


1965


1960



USGS MOODY GAGE RATING "RANSECT, 1955 - 1983