United States Department of Agriculture
Soil Conservation Service
Northeast NTC
160 East 7th Street
Chester, PA 19013-6092
215-499-3960

Subject: Salinity Survey

Date: 15 September 1990

To: Ferris P. Algood
State Soil Scientist
USDA-Soil Conservation Service
P.O. Box 11350
Salt Lake City, Utah 84147-0350

I apologize for not getting a detailed technical report on the joint USDA-SCS and USDOT-ACD salinity survey to you. However, though we continue to work on the report, progress has been slow as most of Bill O'Keefe and my time have been away from our offices this summer.

As discussed during our phone conversation on 14 September, we experienced problems in the field with the receiver to transmitter connector and lost some of our messages during field work on 6 and 7 June. On 6 September, I met with Bill O'Keefe in Cambridge, Massachusetts, and discussed the garbled messages and improvements to the imagery. We are still working on un-garbling the messages transmitted from Capp Ferry's land.

The following is a progress report. I have enclosed samples of the maps we have prepared to date. Figure 1 is a portion of a Rand McNally map showing our travels in Utah based on Loran-C. The unit was not always energized and spurious reflections were captured and can be noted in the mountainous areas east of Salt Lake City.

Figure 2 is a portion of a USGS topographic map showing the location of the vehicle and sampling points in a study area which was located immediately north of Salt Lake City. In this figure, several of the EM sample sites have been annotated. Figure 3 is an unannotated blow-up of the survey area displayed in Figure 2. All sample sites are displayed in Figure 3 along with the location of the vehicle at ten minute intervals. Figures 4 and 5 have been produced from Figure 3, using SURFER software and the INTRANSIT data file. In these figures, the distribution of soil salinity (in mmhos/cm) within the study site is displayed. In Figure 4, the contour interval is 4 mmhos/cm and values above 16 mmhos/cm have not been graphed. In Figure 5, the contour interval is 8 mmhos/cm and values above 64 mmhos/cm have not been graphed.

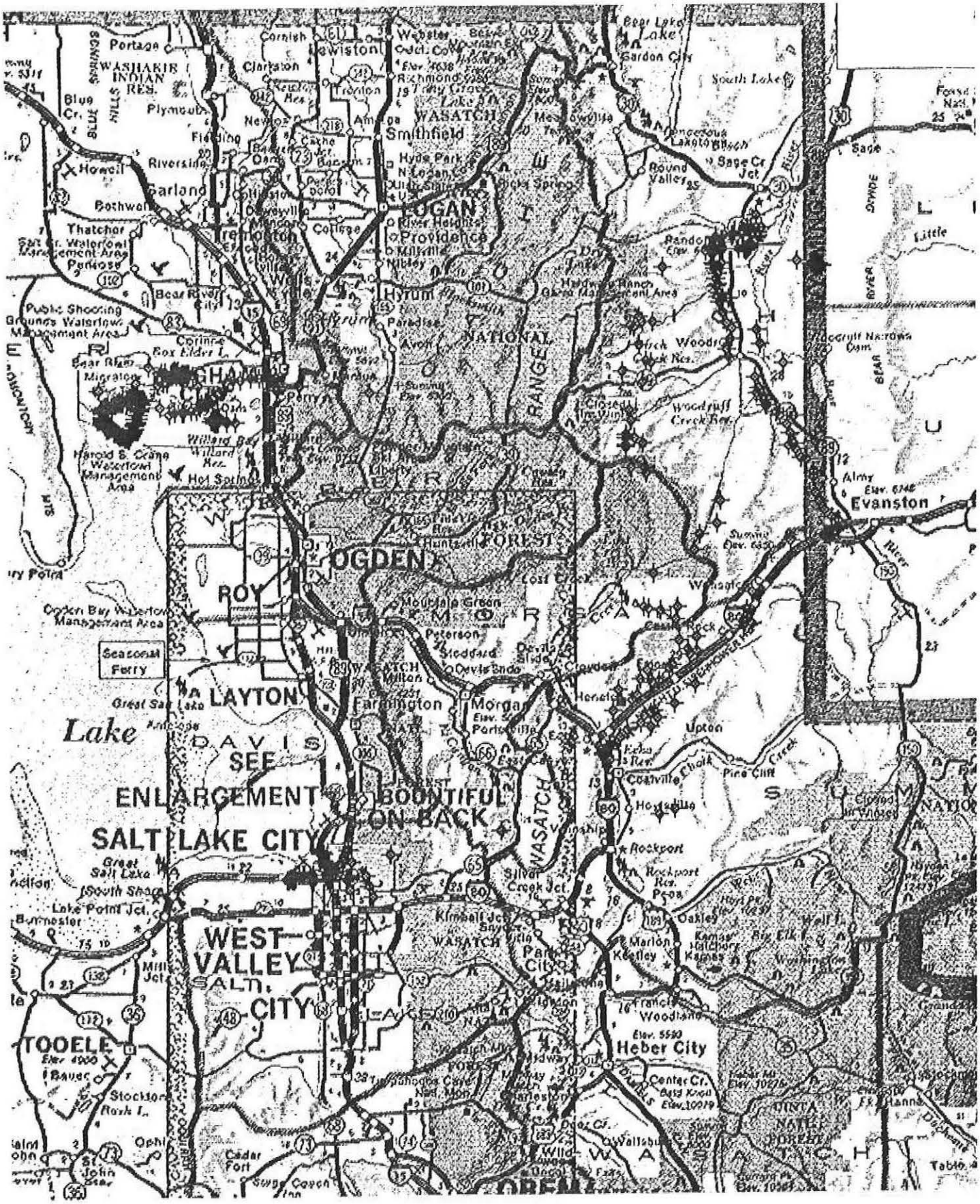
Figures 6 thru 8 depict salinity distributions within the Bear River Migratory Bird Refuge. In this survey, we were restricted to sampling along the dike. In Figure 6, values are expressed in mmhos/cm. These values were derived from a regression equation based on soil samples and EM measurements taken in the vertical and horizontal positions. However, at these high values, a linear relation between EM and saturated paste values is unlikely and the

accuracy of these absolute values cannot be assured. In Figures 7 and 8, I have mapped the distribution of relative EM values. Relative values were obtained by dividing the EM value at each sample site by the averaged value obtained for the Bird Refuge. Figure 7 represents the values obtained with the EM meter in the horizontal position. These values are more sensitive to soil salinity in the upper (<75 cm) part of the profile. Figure 8 represents the values obtained with the EM meter in the vertical position. In the vertical position, the EM meter measures the average conductivity within the upper 1.5 m of the soil profile.

I will prepare a final written report as soon as possible. However, I am scheduled to be in the field for five of the next seven weeks. I thank you for your patients and understanding.

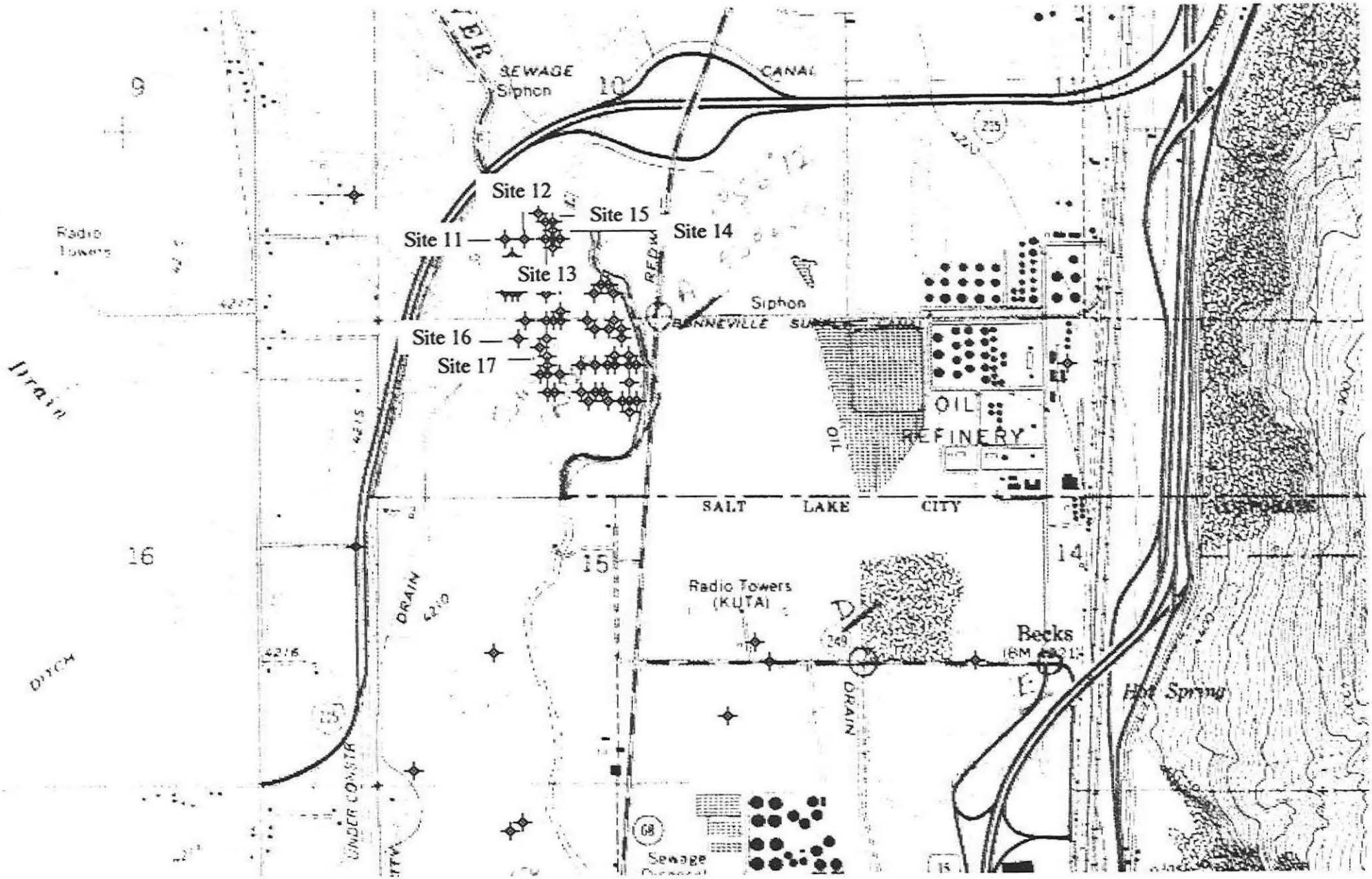
With kind regards.

James A. Doolittle
Soil Scientist (GPR)



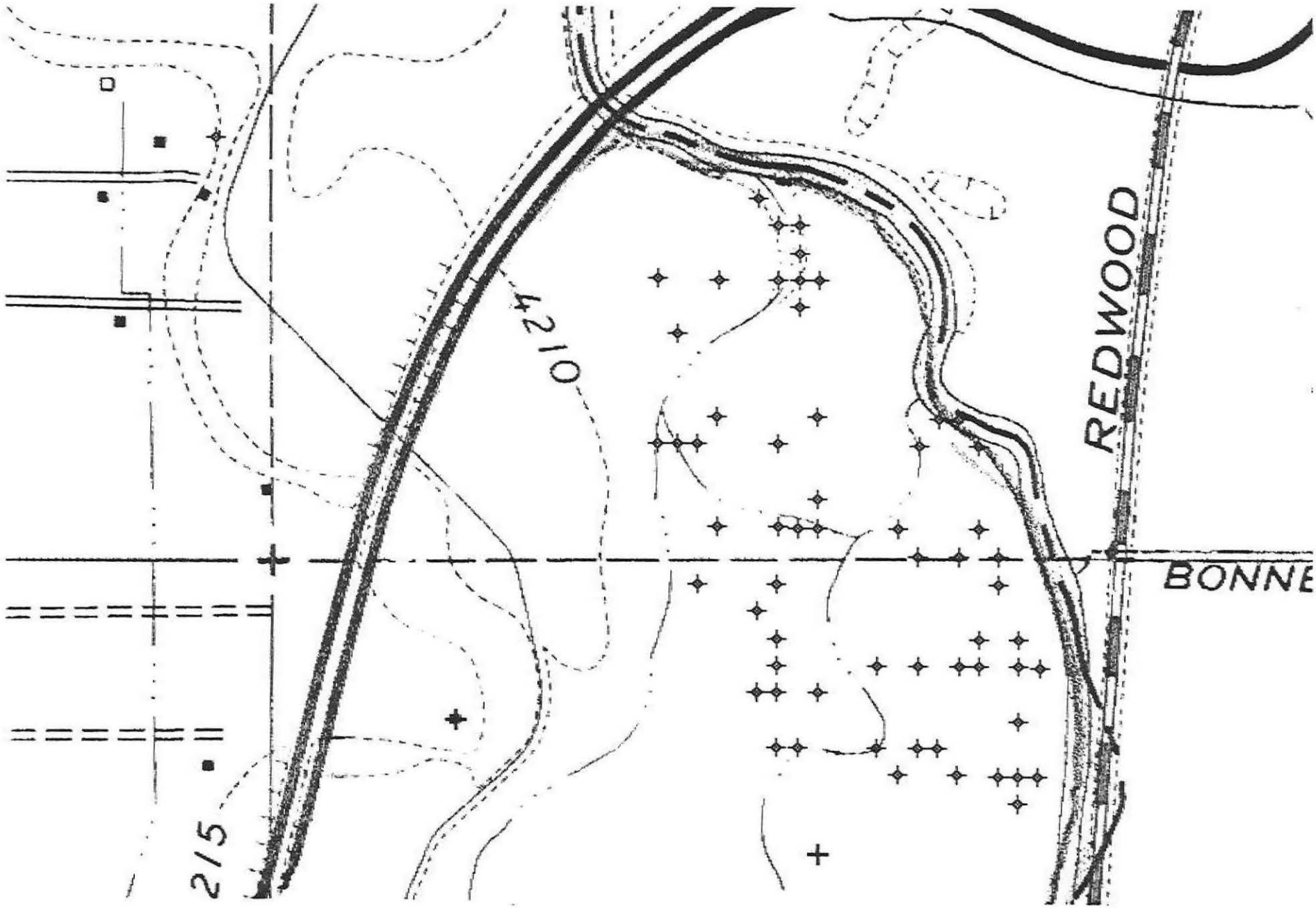
Portage
WASHAKIE INDIAN RES.
Blue Cr.
Plymouth
Cornish
Clarkston
Newton
Fielding
Riverside
Howell
Garland
Bothwell
Thatcher
Salt Cr. Waterfowl Management Area
Penrose
Public Shooting Grounds Waterfowl Management Area
Bear River City
Corinne
Box Elder L.
Bear River Migratory
Harold S. Crane Waterfowl Management Area
Willard Bay
Willard Res.
Hot Springs
Lewiston
Webster
Richmond
Smithfield
Hyde Park
N. Logan
Ricks Spring
LOGAN
Providence
Millville
Nibley
Hyrum
Paradise
Avon
Mendon
Perry
Liberty
Huntsville
Mountain Green
Peterson
Stoddard
Devils Slide
Croydon
Farmington
Morgan
Portsville
Henefer
Upton
Coalville
Hoytsville
Rockport
Rockport Res.
Peoa
Oakley
Marion
Keetley
Kamas
Francis
Woodland
Heber City
Center Cr.
Wallsburg
Wild Cow
Charleston
Midway
Wasatch Mtn.
Tuscarora
Cedar Fort
Stockton
Bauer
Ophir
St. John
Lake Point Jct.
Burmester
Great Salt Lake
South Shore
Great Salt Lake
Antelope
Lake
DAVIS
SEE
ENLARGEMENT
SALT LAKE CITY
BOUNTIFUL
ON BACK
WEST
VALLEY
CITY
TOOELE
Elev. 4900
Ogden Bay Waterfowl Management Area
Seasonal Ferry
OGDEN
ROY
LAYTON
Farmington
Morgan
WASATCH
NATIONAL
FOREST
RANGE
Woodruff Creek Res.
Woodruff Narrows Dam
Evanston
Almy
Elev. 6748
Sage
Sage Cr. Jct.
Round Valley
Randolph
Bear Lake
Gardon City
South Lake
Little
BEAR RIVER DIVIDE
Wasatch
Castle Rock
Pine Cliff
Chalk Creek
Silver Creek Jct.
Kimball Jct.
Snyder
Park City
Wild Cow
Cedar Fort
Stage Coach Inn
Tabio

Fig 1



SEWAGE
Siphon
CANAL
Site 12
Site 15
Site 14
Site 11
Site 13
Site 16
Site 17
Siphon
BONNEVILLE
OIL
REFINERY
SALT LAKE CITY
Radio Towers
(KUTA)
Becks
Hot Spring
Sewage
DRAIN
DITCH
Drain
UNDER CONSTR
9
10
11
14
15
16

Fig 2



F-3

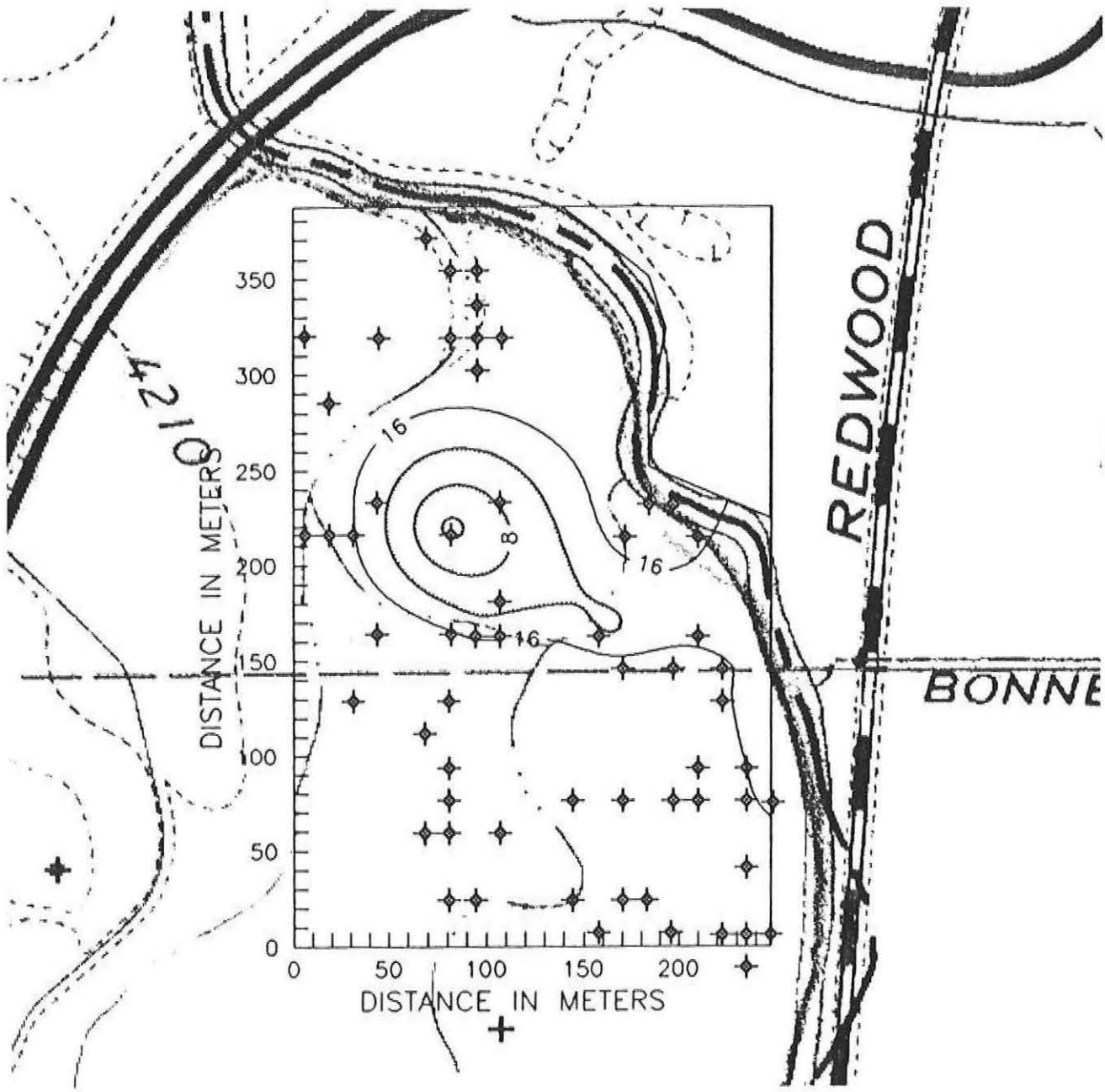

421
REDWOOD
BONNE
DISTANCE IN METERS
DISTANCE IN METERS
0
50
100
150
200
250
300
350
16
8
16
16

Fig 4

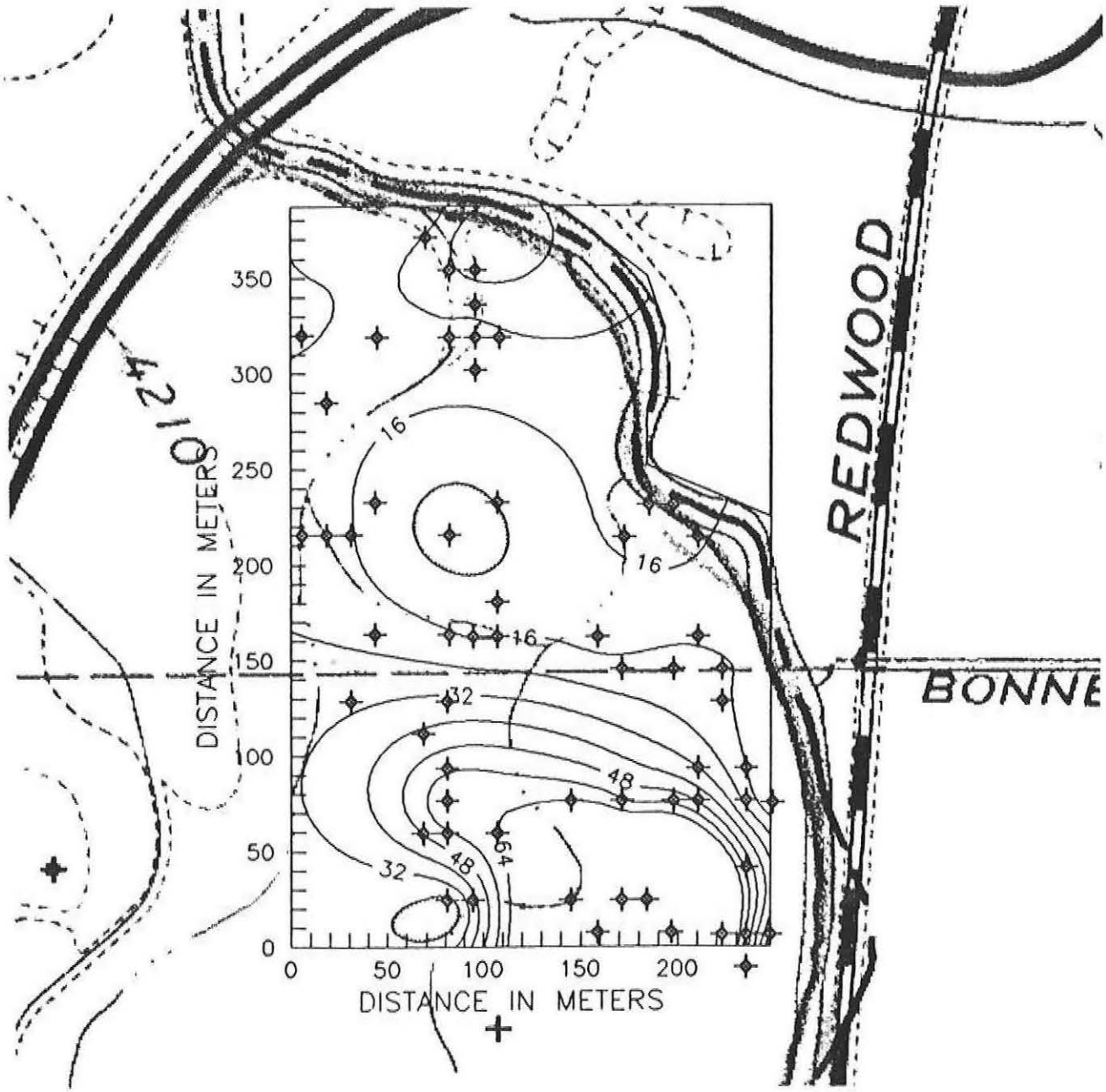
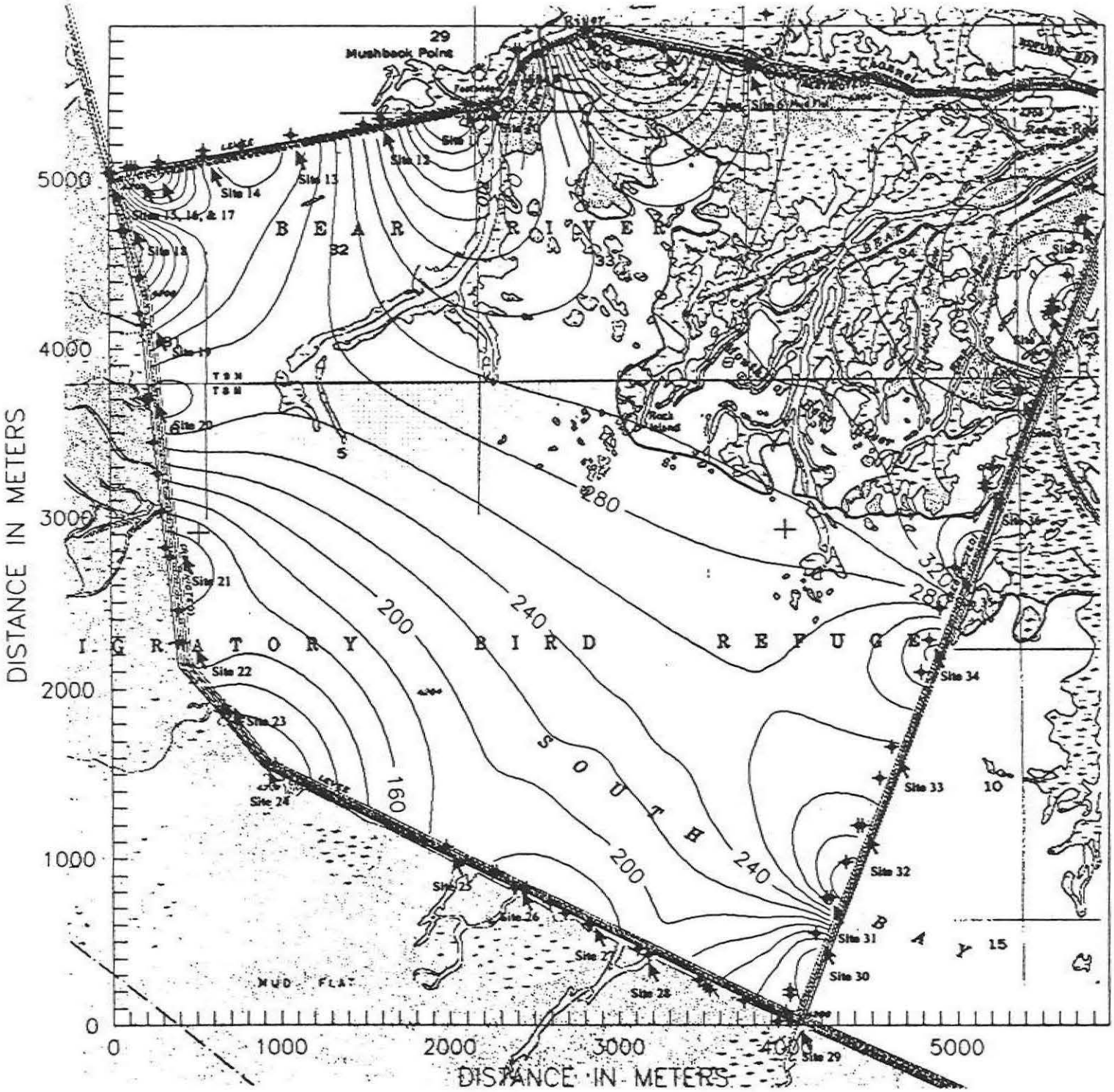
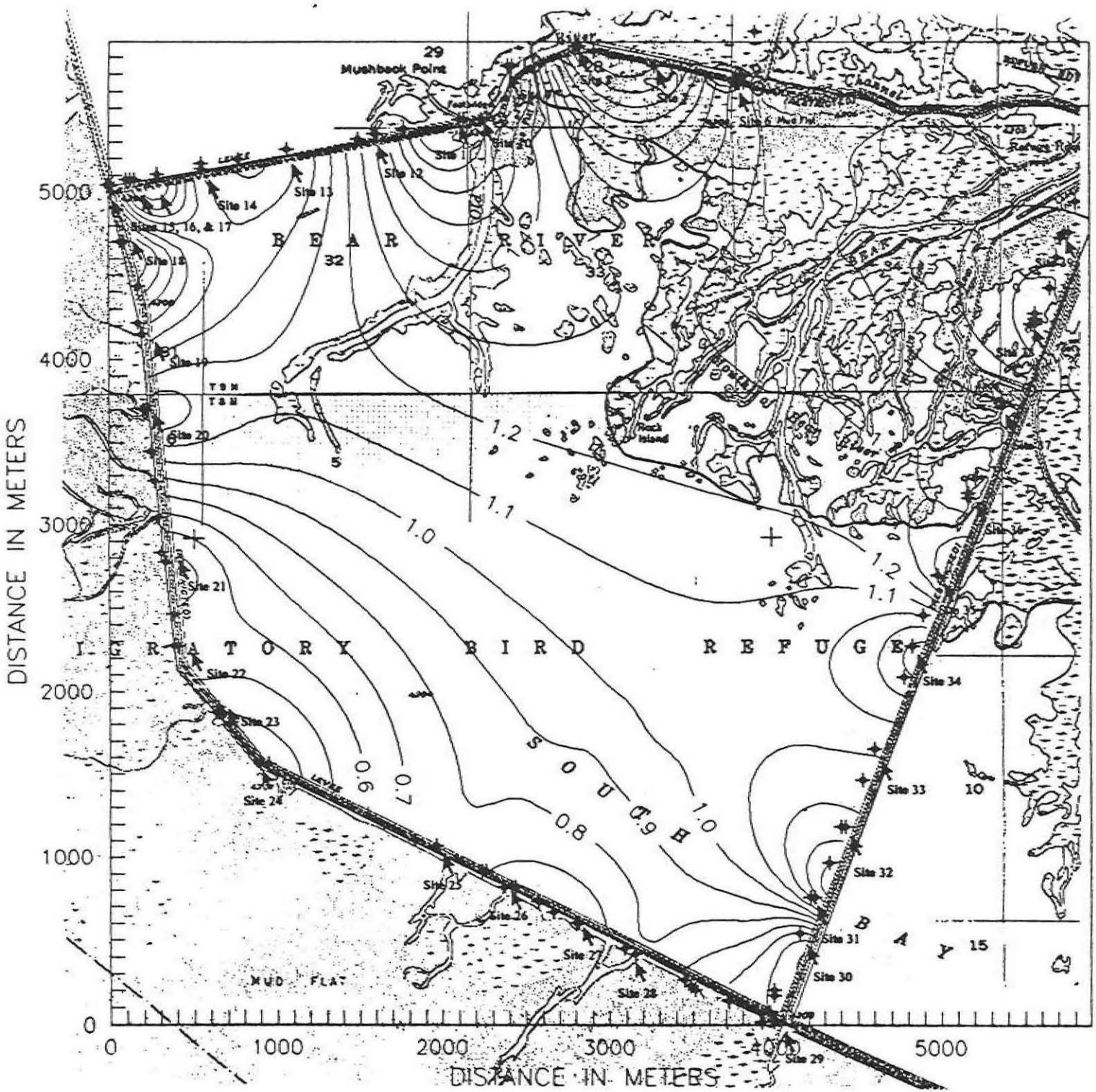

REDWOOD
BONNE
4210
DISTANCE IN METERS
DISTANCE IN METERS
0
50
100
150
200
250
300
350
16
32
48
64

Fig 5



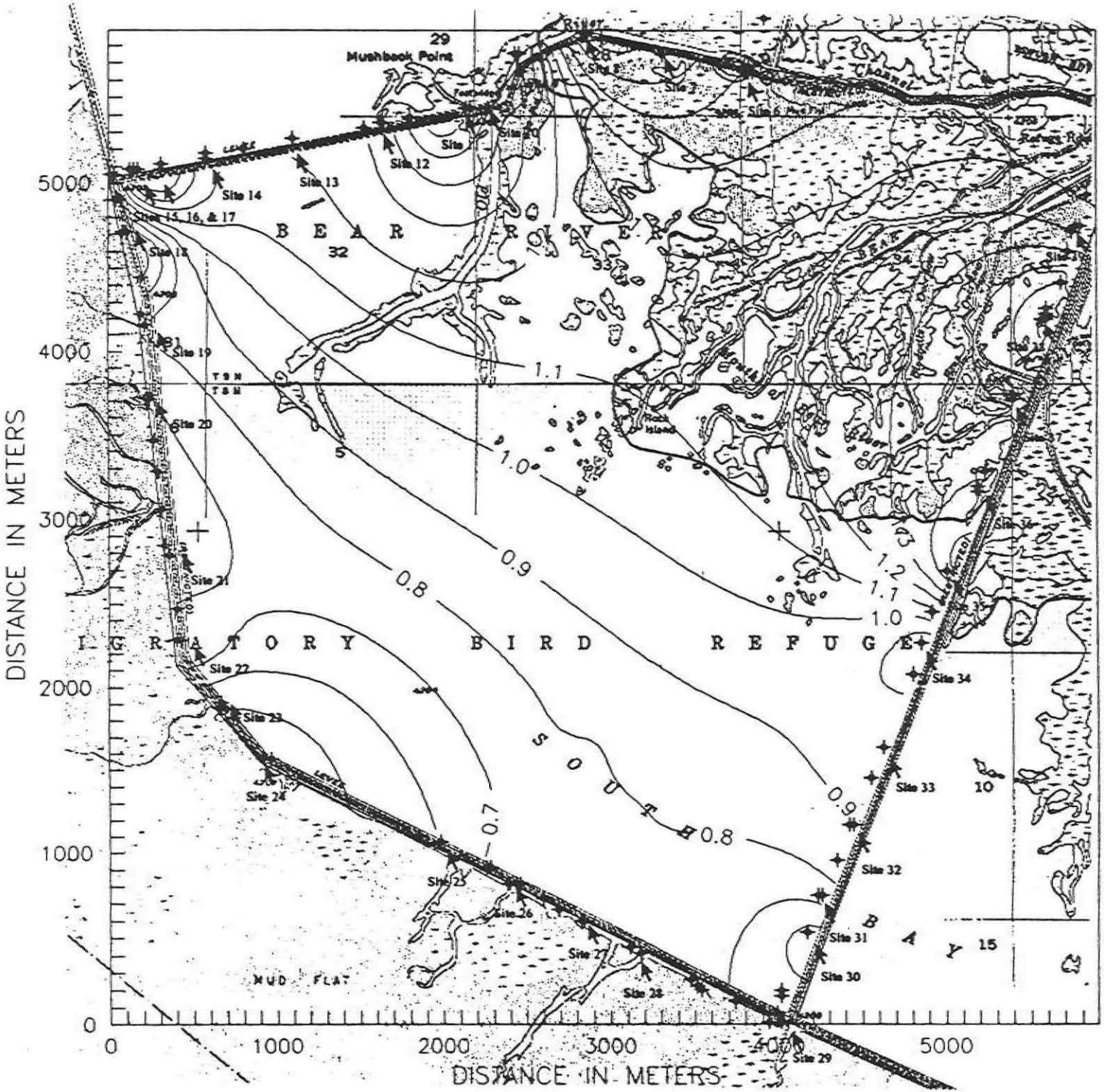
Mushback Point
BEAR RIVER
SOUTH BAY
MIGRATORY BIRD REFUGE
MUD FLAT
Site 12
Site 13
Site 14
Site 15, 16, & 17
Site 18
Site 19
Site 20
Site 21
Site 22
Site 23
Site 24
Site 25
Site 26
Site 27
Site 28
Site 29
Site 30
Site 31
Site 32
Site 33
Site 34
Rock Island
280
240
200
160
320
DISTANCE IN METERS
DISTANCE IN METERS
0
1000
2000
3000
4000
5000

Fig C



Mushback Point
Channel
Site 1
Site 12
Site 13
Site 14
Sites 15, 16, & 17
Site 18
Site 19
Site 20
Site 21
Site 22
Site 23
Site 24
Site 25
Site 26
Site 27
Site 28
Site 29
Site 30
Site 31
Site 32
Site 33
Site 34
Site 36
Site 37
Rock Island
BEAR RIVER
SOUTH BAY
MUD FLAT
T 9 N
T 8 N
1.2
1.1
1.0
0.9
0.8
0.7
0.6
DISTANCE IN METERS
DISTANCE IN METERS
0
1000
2000
3000
4000
5000

Fig 7



Mushback Point
BEAR RIVER
SOUTH BAY
MUD FLAT
Rock Island
Site 12
Site 13
Site 14
Site 15, 16, & 17
Site 18
Site 19
Site 20
Site 21
Site 22
Site 23
Site 24
Site 25
Site 26
Site 27
Site 28
Site 29
Site 30
Site 31
Site 32
Site 33
Site 34
1.1
1.0
0.9
0.8
0.7
1.2
DISTANCE IN METERS
DISTANCE IN METERS
0
1000
2000
3000
4000
5000

Fig 8