

SALT LAKE BAY  
10203-803



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Fish and Wildlife Enhancement  
Ecological Services Juneau  
Southeast Alaska Ecological Services  
P.O. Box 021287  
Juneau, Alaska 99802-1287  
(907) 586-7240

IN REPLY REFER TO:

Mr. Ed Iwamoto  
U.S. Forest Service, Chatham Area  
204 Siginaka Way  
Sitka, Alaska 99835

November 4, 1991

RE: LTF Bark Deposition Study

Dear Ed:

I have enclosed the results of the bark monitoring study entitled "Distribution of Bark Deposits at Seven U.S. Forest Service Log Transfer Facility Sites on Chichagof Island, Alaska." Under separate cover we will forward project related photographic prints and oversized scale drawings of the bark deposition areas. If you have any questions regarding these items you may contact me at 586-7240.

I wish to thank you for your support and cooperation during the project and look forward to future cooperative efforts.

Sincerely,

Nevin D. Holmberg  
Field Supervisor

cc: DEC, NMFS, Juneau  
ADF&G, Douglas  
ADF&G, FWE, Sitka  
EPA, Anchorage

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APR 27 1991

Department of the Interior  
Bureau of Land Management

Distribution of Bark Deposits at Seven  
U.S. Forest Service Log Transfer Facility Sites  
on Chichagof Island, Alaska

Prepared for:  
USDA Forest Service  
Chatham Area, Tongass National Forest  
Sitka, Alaska

Prepared By  
William A. Hughes, Fish and Wildlife Biologist

Approved By  
Nevin D. Holmberg, Field Supervisor

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U.S. Department of the Interior  
Fish and Wildlife Service  
Division of Ecological Services  
Juneau, Alaska  
October 1991

DISTRIBUTION OF BARK DEPOSITS AT SEVEN U.S. FOREST SERVICE  
LOG TRANSFER FACILITY SITES ON CHICHAGOF ISLAND, ALASKA

INTRODUCTION

In March 1991, the U.S. Fish and Wildlife Service (USFWS) and the U.S. Forest Service (USFS) entered into a cooperative agreement to conduct studies to determine the area covered by bark deposits and other logging related wood solids on the ocean bottom at seven log transfer facility (LTF) sites on Chichagof Island. The LTFs are managed by the USFS. Monitoring of bark deposits at the Corner Bay LTF and False Bay LTF is a requirement of National Pollution Discharge Elimination System (NPDES) permits which are administered by the Environmental Protection Agency (EPA). Monitoring of the other LTF sites is required through general provisions of the USFS timber sale operating plans and related Environmental Impact Statements for the construction and operation of these facilities.

The USFWS and National Marine Fisheries Service (NMFS) provided biologist-divers to conduct the underwater surveys. The surveys were conducted during the time period of May 4 to 11, 1991, at the following LTF sites (Figure 1):

Corner Bay - SE 1/4, Sec. 1, R63E, T48S  
False Island - SW 1/4, Sec. 18, R64E, T48S  
8 Fathom - NE 1/4, Sec. 6, R59E, T45S  
Salt Lake Bay - NE 1/4, Sec. 14, R60E, T45S  
Seal Creek - SW 1/4, Sec. 36, R63E, T45S  
Kennel Creek - SE 1/4, Sec. 2, R63E, T46S  
False Bay - NE 1/4, Sec. 19, R65E, T45S

METHODS

Where practical, the survey team placed semi-permanent 11.5 x 12.2-cm aluminum markers near the center of the seaward face of each LTF bulkhead. Other markers of the same size were placed away from, but referenced to, the primary site markers to act as off site references if a primary marker is lost or destroyed. The locations of the markers are described in Appendix C. It was impractical to attach the markers to the steel low angle slide LTFs at False Bay and Corner Bay. These sites were described and referenced to off site reference markers.

Fiberglass Keson transect tapes (100 m long) were extended seaward in a radiating pattern from the base of the LTF at or immediately below the primary survey site marker. Five or six transects were set approximately equal distance apart (approximately every 30°). The bearing of each transect was measured from the top of the LTF with a hand-held compass. Reverse bearings from the seaward end of the transect were used

if large metal objects on the LTF interfered with the compass.

Divers swam along each transect line and recorded the thickness (depth) of the bark deposits at 10-meter intervals along each transect. The bark depth was measured to the nearest 2.5 cm (1 inch) by probing a measuring stick into the bark deposit until refusal. The divers periodically dug into the bark deposit to confirm that the deposits were composed of wood debris and that the full extent of the deposits were being measured.

Water depth at each 10-m interval along each transect was measured with sport-diving depth gauges. Accuracy of water depth measurements is probably no better than  $\pm 1$  m.

The divers swam along each transect to the perimeter of the bark deposit or to a point where the ambient water depth exceeded 18 meters (60 ft). Data incidently collected at depths exceeding the 18-m isobath were included on the base maps. Divers also recorded the general character of any subtidal vegetation and macrobenthic invertebrate marine life observed along each transect.

The original scope of work specified that the boundary of 100% and 50% bark coverage be mapped. However, the divers observed that the estimated 50% coverage boundary nearly coincided with the 100% coverage boundary, and that it was impractical to attempt to differentiate the boundaries. Within the limits and accuracy of this survey, the boundary of 100% and 50% coverage are considered the same. Scattered and discontinuous patches of bark debris with less than 50% coverage are noted as "trace" amounts.

A generalized scale drawing of each area was prepared showing the boundary of >50% coverage and the 18-m isobath. The 18-m isobath is referenced to chart datum of MLLW. The surface area of bark coverage was determined by superimposing a 16-dot/sq. inch transparent grid over the scale drawings. If the area of 50% bark coverage was entirely within safe diving depths, the total area of bark coverage was determined. However, total area of coverage estimates could not be determined at sites where bark deposits extended beyond safe diving limits.

The survey team at the Corner Bay LTF inadvertently failed to extend the survey line to the seaward limit of bark deposits on the southeastern most transect (no. 5). No data was collected beyond the end of this 100-m transect even though divers had not reached the 18-m isobath. This resulted in an underestimation of the bark coverage at this site (probably 10 - 20%).

The LTF at False Island discharges into a semi-enclosed basin with a maximum depth of about 20 meters (68 ft.). Most of the bark is confined to this basin. The maximum depth of the basin only slightly exceeds study design limits of 18 meters. Therefore, bark covered areas in the center of the basin between

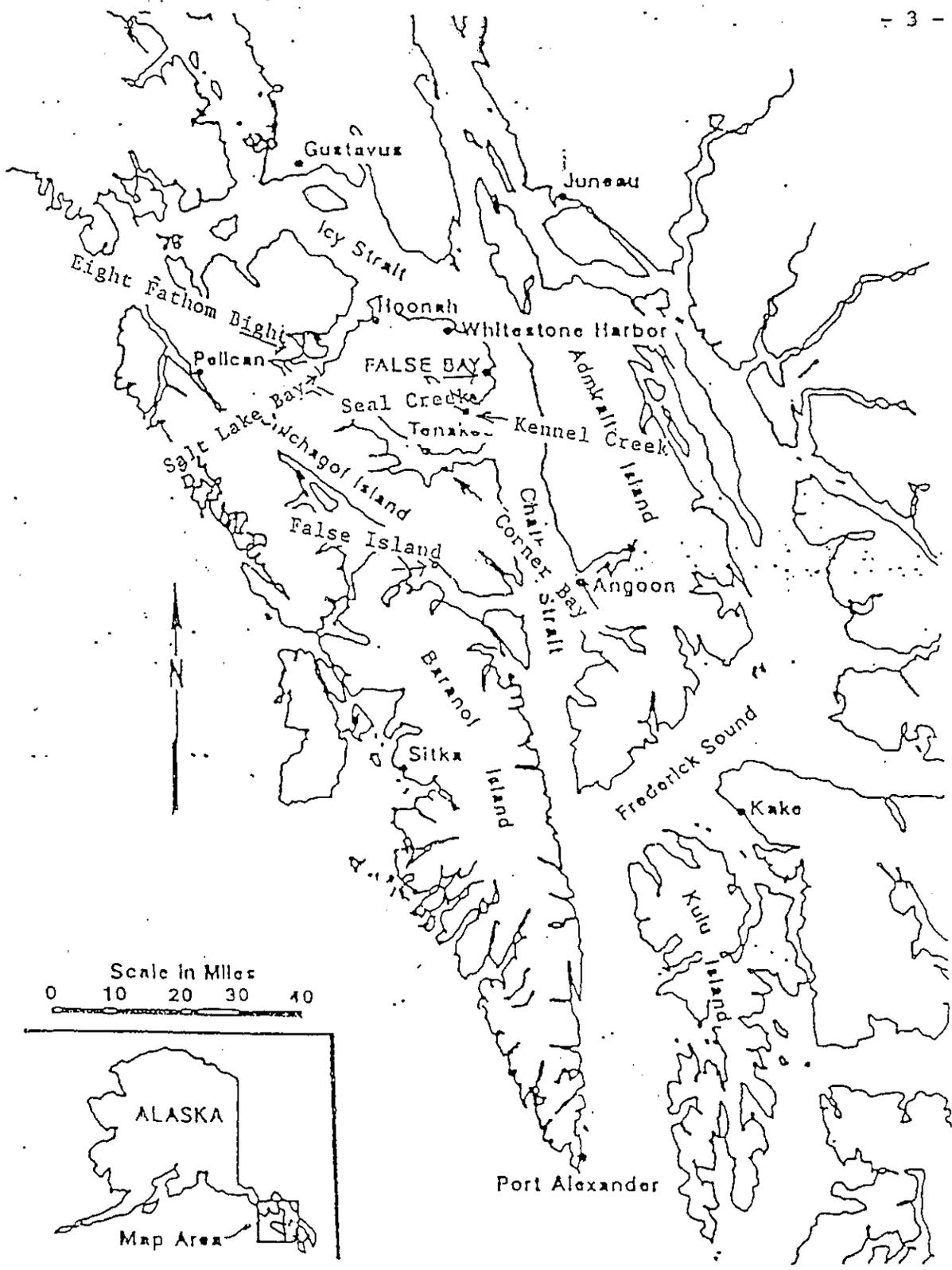


Figure 1. Log Transfer Facility Survey Site Locations.

### Regional Location Map

Map reproduced from USFS Environmental Assessment for the False Bay LTF.

18 and 20 meters water depth are included with the areas less than 18 m water depth.

#### RESULTS

The perimeter boundary of the areas of 50% bark deposition are shown on the appended scale drawings for each LTF (Appendix D). The measured subtidal surface area of bark coverage landward of the 18-m isobath is given in Table 1. The estimated total area of bark deposition is given for Seal Creek and Salt Lake Bay LTFs. Total area estimates for the other sites were not feasible because significant deposits of bark existed beyond the 18-m isobath.

Water depth and bark depth measurements recorded at 10-m intervals along each transect are listed in Appendix A (Table A1 - A7). A general description of benthic marine life at each survey site is given in Appendix B. Descriptions of the location of transect line origins and off site reference points are listed in Appendix C.

#### ACKNOWLEDGEMENTS

Bill Hughes (USFWS), Sitka, Alaska, was the principal investigator for the survey and is responsible for the preparation of this report. Duane Petersen (NMFS), Brad Hanson (NMFS), Andy Grossman (USFWS), and Ed Grossman (USFWS), assisted in the diving operations and collection of field data. Ted Estrada (USFWS), served as skipper aboard the support vessel M/V CURLEW.

Table 1. Area of 50% or greater bark coverage at selected LTFs on Chichagof Island, Alaska.

	Bark covered area <18 meters water depth		Total bark covered area	
	<u>hectares</u>	<u>acres</u>	<u>hectares</u>	<u>acres</u>
Eight Fathom	0.50	1.24	N/A	N/A
Salt Lake	0.47	1.16	0.67	1.65
False Bay	0.37	0.91	N/A	N/A
Seal Creek	0.15	0.37	0.19	0.47
Kennel Creek	0.37	0.91	N/A	N/A
Corner Bay*	0.67	1.65	N/A	N/A
False Island	0.75	1.85	0.75	1.85

N/A - significant amounts of unmeasured bark debris exists beyond end of survey area.

\* Measured area is probably 10-20% underestimated due to sampling error.

APPENDIX A

-- Bark Depth Measurements --

Table A-1. Bark depth and water depth measurements along underwater transects at Eight-Fathom Bight LTF in Port Frederick on Chichagof Island, Alaska, 5/5/91.

Distance along Transect (meters)	Transect				
	#1 (95° Mag N) b/w	#2 (125° Mag N) b/w	#3 (155° Mag N) b/w	#4 (185° Mag N) b/w	#5 (215° Mag N) b/w
0	---	---	---	---	---
10	0/7	T	0/12	0/20	0/16
20	15/14	26/25	8/37	7/35	1/25
30	7/17	10/35	8/50	8/45	8/34
40	2/21	8/45	9/-	15/55	9/60
50	6/23	4/55	6/70	12/60	10/63
60	5/24	4/60	---	8/65	9/70
70	2/31	4/60	---	---	---
80	2/27	---	---	---	---
90	T/40				
100	T/45				

Notes: b = bark depth in inches.  
w = water depth in feet.  
Subtract 5 ft. from measured water depth to reference to MLLW chart datum.  
T = trace amounts of bark (10% - 50%).  
Time of Survey - 1255 hrs. to 1530 hrs., 5/15/91.

Table A-2. Bark and water depth measurements along underwater transects at Salt Lake Bay LMF in Port Frederick, Chichagof Island, Alaska, 5/6/91.

Distance along transect (meters)	Transect				
	#1 (170' Mag N) b/w	#2 (200' Mag N) b/w	#3 (230' Mag N) b/w	#4 (260' Mag N) b/w	#5 (290' Mag N) b/w
0	---	0/10	---	---	---
10	T/10	0/11	T/10	0/8	T/8
20	10/16	8/15	4/16	5/14	T/10
30	9/23	8/25	10/28	7/21	12/30
40	T/31	8/36	7/39	6/30	8/20
50	T(50%)/37	11/48	10/50	6/38	T/23
60	T/44	8/55	9/60	4/51	T/27
70	T/52	6/62	2/70	6/58	T/34
80	T/59	2/70	T/75	3/67	0/35
90	T/65	1/80	---	2/78	T/40
100	T/70	---	---	---	---

Notes: b = bark depth in inches.  
w = water depth in feet.  
T = Subtract 3 ft. from measured water depth to reference to MLIM.  
T = trace amounts of bark.  
Time of Survey - 1000 hrs. to 1300 hrs., 5/6/91.

Table A-3. Bark depth and water depth measurements along underwater transects at False Bay LTF on Chichagof Island, Alaska, 5/7/91.

Distance along transect (meters)	Transect				
	#1 323° Mag N. b/w	#2 353° Mag N. b/w	#3 023° Mag N. b/w	#4 053° Mag N. b/w	#5 083° Mag N. b/w
0	----	----	----	0/0	
10	0/2	----	0/3	0/0	0/2
20	0/7	0/7	0/9	0/0	0/3
30	0/13	0/15	0/16	0/10	0/6
40	0/18	10/35	T(50%)/35	T/20	0/13
50	0/25	4/55	15/53	11/35	0/23
60	T/35	12/65	8/75	4/50	0/34
70	6/42	100% covering fine bark	8/90	4/60 (10/70 @75 <sub>m</sub> )	11/44
80	8/50	100% covering fine bark	100%	100%	3/50
90	----	100% covering fine bark	100%	100%	9/56
100	5/72				10/65

Notes: b = bark depth in inches.

w = water depth in feet.

T = trace amounts of bark.

Subtract 5 ft. from measured water depth to reference to MLLW.

T = time of survey - 1000 hrs. to 1130 hrs., 5/7/91.

Table A-4. Bark depth and water depth measurements along underwater transects at Seal Creek LTF on Chichagof Island, Alaska, 5/7/91.

Distance along transect (meters)	Transect				
	#1 140' Mag N. b/w	#2 185' Mag N. b/w	#3 215' Mag N. b/w	#4 245' Mag N. b/w	#5 260' Mag N. b/w
0	0/5	T/-	T/10	0/10	---
10	T/15 (100% @ 13m)	4/16 (16" @ 15m)	T(50%)/17	1/15	(T@5m) T/12
20	7/27	6/34 (5 @ 25m)	3/31	3/30	6/20
30	3/35	T/44	T/44	T/38	5/35 (50% @ 35m) T(50%)/35
40	4/44	T/60 (T @ 45m)	T/55	T/50	T/54
50	5/67	---	T/70	T/57	T(50%)/60
60	3/64	---	0/85	T/67	---
70	6/70	---	---	T/80	---
80	---				
90					
100					

Notes: b = bark depth in inches.  
w = water depth in feet.  
Subtract 5 ft. from measured depth to reference water depth to MLLW.  
T = trace amounts of bark.  
Time of Survey - 1400 hrs. to 1630 hrs., 5/7/91.

Table A-5. Bark depth and water depth measurements along underwater transects at Kennel Creek LTF on Chichagof Island, Alaska, 5/8/91.

Distance along transect (meters)	Transect					
	#1 270° Mag N. b/w	#2 290° Mag N. b/w	#3 320° Mag N. b/w	#4 320° Mag N. b/w	#5 020° Mag N. b/w	#6 050° Mag N. b/w
0	---	---	---	---	---	---
10	12/8	4/10	11/10	5/20	6/20	23/15
20	3/23	28/36	36/38	22/38	23/37	2/30
30	7/29	16/48	25/55	21/55	14/50	20/40
40	1/36	8/60	6/68	22/60	10/68	24/50
50	6/42	8/70	8/82	---	---	9/60
60	5/47	5/78	---	---	---	16/60
70	5/51	12/82	---	---	---	---
80	2/57	---	---	---	---	---
90	4/66	---	---	---	---	---
100	4/67	---	---	---	---	---

Notes: b = bark depth in inches.  
w = water depth in feet.  
Subtract 5 ft. from measured water depth to reference to MLLW.  
Time of Survey - 1014 hrs. to 1155 hrs., 5/8/91.

Table A-6. Bark depth and water depth measurements along underwater transects at Corner Bay LTF on Chichagof Island, Alaska, 5/9/91.

Distance along transect (meters)	Transect				
	#1 350' Mag N. b/w	#2 022' Mag N. b/w	#3 052' Mag N. b/w	#4 082' Mag N. b/w	#5 112' Mag N. b/w
0	---				---
10	0/1	0/4	0/2	0/3	0/4
20	0/15	T/20	0/10	0/7	T/8
30	5/20	20/34	T/25	T/14	T/14
40	14/22	16/44	5/36	T/24 (10 @ 43m)	6/30
50	11/27	9/51	T/52	24/45	25/37
60	10/35	8/61	9/63	21/55	34/39
70	9/39	7/69	11/70	15/62	16/39
80	7/48	7/76	7/76	9/67	18/40
90	7/50		12/80	6/75	17/40
100	4/60			4/80	20/39

Notes: b = bark depth in inches.  
w = water depth in feet.  
Subtract 7 ft. from measured water depth to reference to MLLW.  
T = trace amounts of bark  
Time of Survey - 1125 hrs. to 1247 hrs., 5/9/91.

Table A-7. Bark depth and water depth measurements along underwater transects at False Island LTF site on Chichagof Island, 5/10/91.

Distance along transect (meters)	Transect				
	#1 105° Mag N. b/w	#2 130° Mag N. b/w	#3 165° Mag N. b/w	#4 190° Mag N. b/w	#5 220° Mag N. b/w
0	---	---	---	---	---
10	0/8	0/12	T/15	0/10	0/6
20	1/12	36*/26	T/30	19/25	T/21
30	26/25	24/45	36*/45	16/35	4/40
40	26/45	21/62	12/61	4/50	24/56
50	19/55	25/66	36/70	10/65	15/66
60	6/58	11/66	12/71	5/70	28/71
70	18/60	7/65	5/68	T/56	T/65
80	3/55	0/65	0/56	T/40	0/40
90	1/50	0/61	0/46	0/16	6/36
100	1/50	0/60	0/33	0/15	0/19

Notes: b = bark depth in inches.  
w = water depth in feet.  
Subtract 3 ft. from measured water depth to reference to MLLW chart datum.  
T = trace amounts of bark (10% to 50% coverage).  
Time of Survey - 1545 hrs. to 1650 hrs., 5/10/91.

APPENDIX B

-- Benthic Marine Life --

Appendix B. General Description of Benthic Marine Life at Each LTF Site.

Eight Fathom Bight LTF. Plant and animal life was sparse at the site. Rockweed (Fucus spp.) was sparsely distributed in the intertidal area. Agarum spp. was moderately abundant in the lower intertidal zone. Several species of crab were observed, including king crab (Paralithodes camtschatica), tanner crab (Chionoecetes bairdi), horse crab (Telmessus cheiragonus), lyre crab (Hyas lyratus) and pagurid hermit crabs. Other invertebrates observed include sea stars (Evasterias troschelii and Pisaster ochraceus), sea cucumber (Parastichopus californicus), sea urchin (Strongylocentrotus droebachiensis), and sea anemone (Metridium senile).

Salt Lake Bay LTF. The slope seaward of the LTF was moderately steep, reaching a depth of 23 m (75 ft) about 80 meters from shore. The first 15 meters of the transect was generally void of bark debris. The substrate consisted of coarse gravel and cobble-sized shotrock material that was washed clean by wave action.

Moderately thick deposits of bark debris abruptly began at 15-20 meters from the LTF just below the depth at which wave action is sufficient to disperse the bark debris.

A sparse, narrow band of Laminaria spp., Alaria spp., Ulva spp., unidentified filamentous red algae, and Palmaria spp. was observed in the upper subtidal area. Some patches of drift Fucus spp. were present. The sea star (P. ochraceus) was observed on the LTF bulkhead.

Other invertebrates observed include balanoid barnacles, anemone (Cribrinopsis fernaldi and M. senile), sea stars (Crossaster papposus, E. troschelii and Pycnopodia helianthoides), sea pen (Ptilosarcus gurneyi), pagurid crabs, horse clam (Tresus capax), sea cucumber (P. californicus), lyre crab (H. lyratus) and tanner crab (C. bairdi). A rock sole (Lepidopsetta bilineata) was also observed at the site.

False Bay LTF. The first 40 meters of the transects were generally devoid of bark debris. Areas to either side of the LTF had dense growths of kelps (Laminaria spp., Alaria spp., and Ulva spp.). The LTF had not been in use this year and winter storms had cleared much of bark from the shallow areas adjacent to the LTF. However, significant deposits of bark debris were observed in the deeper waters that are not affected by wave action.

The deposit feeding sea cucumber (P. californicus) was abundant on the bark deposits. Ophiuroid brittle stars were very numerous

in deeper water on substrate covered by fine decomposing bark deposits. Other invertebrates noted include C. fernaldi, P. helianthoides, Henricia spp., Evasterias spp., Crossaster spp., Saxidomus giganteus, Mya truncata and Chlamys spp.

Seal Creek LTF. The rock fill at the base of the bulkhead was devoid of fauna. Some unidentified filamentous green algae was observed at the seven-meter mark. At 19 meters there were sparse patches of Agarum spp. and bark debris. Marine fauna observed include anemones (C. fernaldi), sea stars (E. troschelii, P. helianthoides, Crossaster papposus), crabs (H. lyratus, Oregonia gracilis, T. cheiragonus, and P. camtschatica), serpulid worms, sea cucumber (P. californicus), and sea peach (Halocynthia aurantium). A wolf-eel and rocksole were also noted.

Kennel Creek LTF. Marine life was very sparse at the site. Species observed include sea star (P. helianthoides), horsecrab (T. cheiragonus), sea pen (Ptilosarcus gurnei), burrowing anemone (Pachycerianthus fimbriatus), and rock sole (L. bilineata).

Corner Bay LTF. Very little marine life was observed except for a band of algae consisting of Laminaria spp., Alaria spp., Ulva spp. and some filamentous greens in the lower intertidal area. Sea stars (E. troschelii and P. helianthoides), rock sole (L. bilineata), sea cucumber (P. californicus), horse crab (T. cheiragonus), sea pen (P. gurneyi), and pagurid crabs were noted in the area.

False Island LTF. The first 20 meters of the transect was characterized by a very steep, rock-filled slope with moderate to dense growths of brown algae (Alaria spp. and Laminaria spp.). The nudibranch, (Melibe leonia), was abundant on the algal fronds. Other algae observed include Ulva spp. and Desmarestia spp.. Six juvenile king crab (P. camtschatica) were observed along transect #2 in about 19 m of water depth, but not in the bark covered areas. Other invertebrates include sea cucumber (Cucumaria miniata and P. californicus), lyre crab (H. lyratus), horse clam (T. capax), and cockle shells (Clinocardium nuttallii).

Significant areas of Pacific herring spawn were observed on the intertidal and subtidal areas immediately west of the LTF site along transect #4 and along the south shore of False Island.

APPENDIX C

-- Transect Line Locations --

Appendix C. Site Descriptions and Locations of Transect Line Origins and Off Site Reference Points.

Eight-Fathom Bight LTF: The primary site marker was nailed to the center of the log crib bulkhead on the seaward face of the LTF at the approximate MHW tideline. An off site marker (TBM#2) was nailed to a 30-inch dbh spruce tree located 535 ft east of the LTF and adjacent to the access road at the base of the adjacent peninsula. Bearing from the TBM#2 to the primary site marker on the LTF is 226<sup>0</sup> mag. N.

Salt Lake Bay LTF: The primary site marker was nailed to the center of the seaward side of the LTF at the approximate MHW tideline. The off site marker (TBM#2) was nailed to the next to the last spruce tree north of the LTF staging area, 256 ft from the primary site marker. The tree measured 3.6 ft dbh. A bearing from the primary site marker to TBM#2 was not taken, however, the appended photos clearly show the location of the off site marker.

False Bay LTF: The transect lines were run from the approximate center of the low angle steel slide LTF facility. The primary site marker could not be conveniently fixed to the steel slide. An off site marker (TBM#2) was nailed to the log crib bulkhead loading ramp located 116 feet south of the LTF. Compass bearing from TBM#2 to the LTF is 15<sup>0</sup> mag. N. An additional off site marker (TBM#3) was nailed to a 4.9-ft dbh spruce tree, 312 ft landward of TBM#2.

Seal Creek LTF. The primary site marker was nailed to the center of the seaward face of the log crib bulkhead LTF. An off site marker (TBM#2) was nailed to a 2.3-ft dbh spruce tree located 242 ft landward of the LTF face. The spruce tree is located on a sidehill just west of the LTF access road. The bearing from TBM#2 to the primary site marker is 185<sup>0</sup> mag. N. TBM#2 is nailed to the east side of the tree and may not be readily visible from the staging area.

Kennel Creek: The transect lines were run from the approximate center of the sheetpile bulkhead directly seaward of the A-frame. Attachment of the primary site marker to the steel sheetpiling was impractical. An off site marker (TBM#2) was nailed to a wooden log crib bulkhead located 33.1 ft south of transect line origin. The bearing from TBM#2 to the transect line origin site is 343<sup>0</sup> mag. N. No other off site markers were placed at the LTF site.

Corner Bay: The Corner Bay facility is a low angle steel slide design. The transect were set from the approximate center of the slide at about the + 4-ft (MLLW) tideline. A primary site marker was not affixed to the slide at the transect line origin. A USFS temporary bench mark (#2468) is located at the extreme west corner of the LTF on a concrete pile near the top of the slide (i.e. south rail). Distance from TBM#2468 to the transect origin is 71ft. The bearing from TBM#2468 to the transect origin is  $72^{\circ}$  mag. N. An additional off site marker (TBM#2) was placed on the middle creosote piling on the northeast side of the ramp leading to the adjacent boat dock. Bearing from the transect origin to TBM#2 is  $177^{\circ}$  mag. N., the distance is 90 ft.

False Island LTF: The primary site marker is nailed to the front center of the old LTF log crib bulkhead. The off site marker (TBM#2) was nailed to the first large spruce tree located 275 ft east of the LTF (bearing from tree to LTF is  $233^{\circ}$  mag. N). The tree has a steel cable attached to it which is joined to the adjacent floating boat dock.

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APPENDIX D

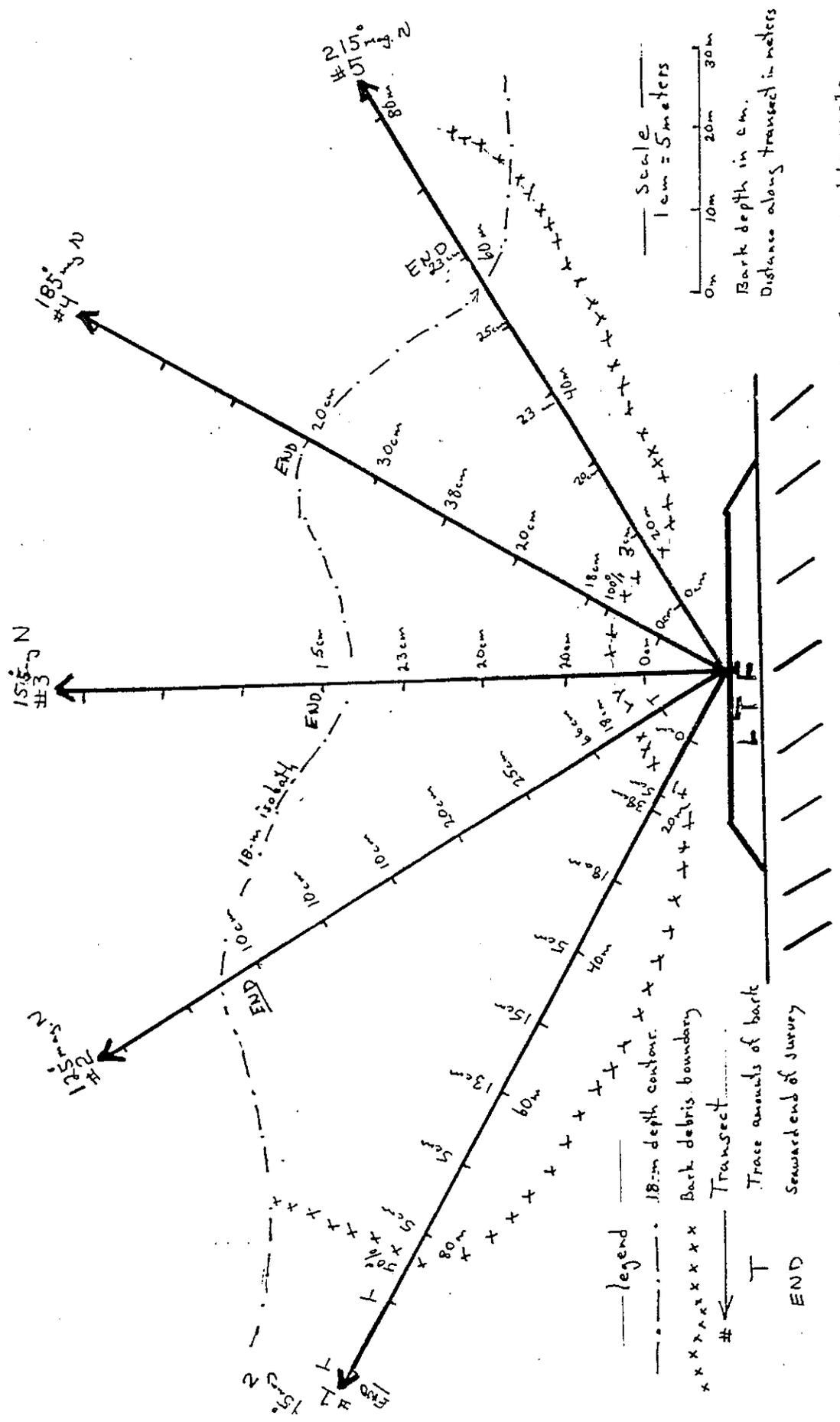
-- Bark Deposition Areas --

8-Fathom Bight

5/5/91

Appendix D. Scale Drawing of Bark Deposition Area.

Note: Significant amounts of unmeasured bark debris exist beyond end of survey area.

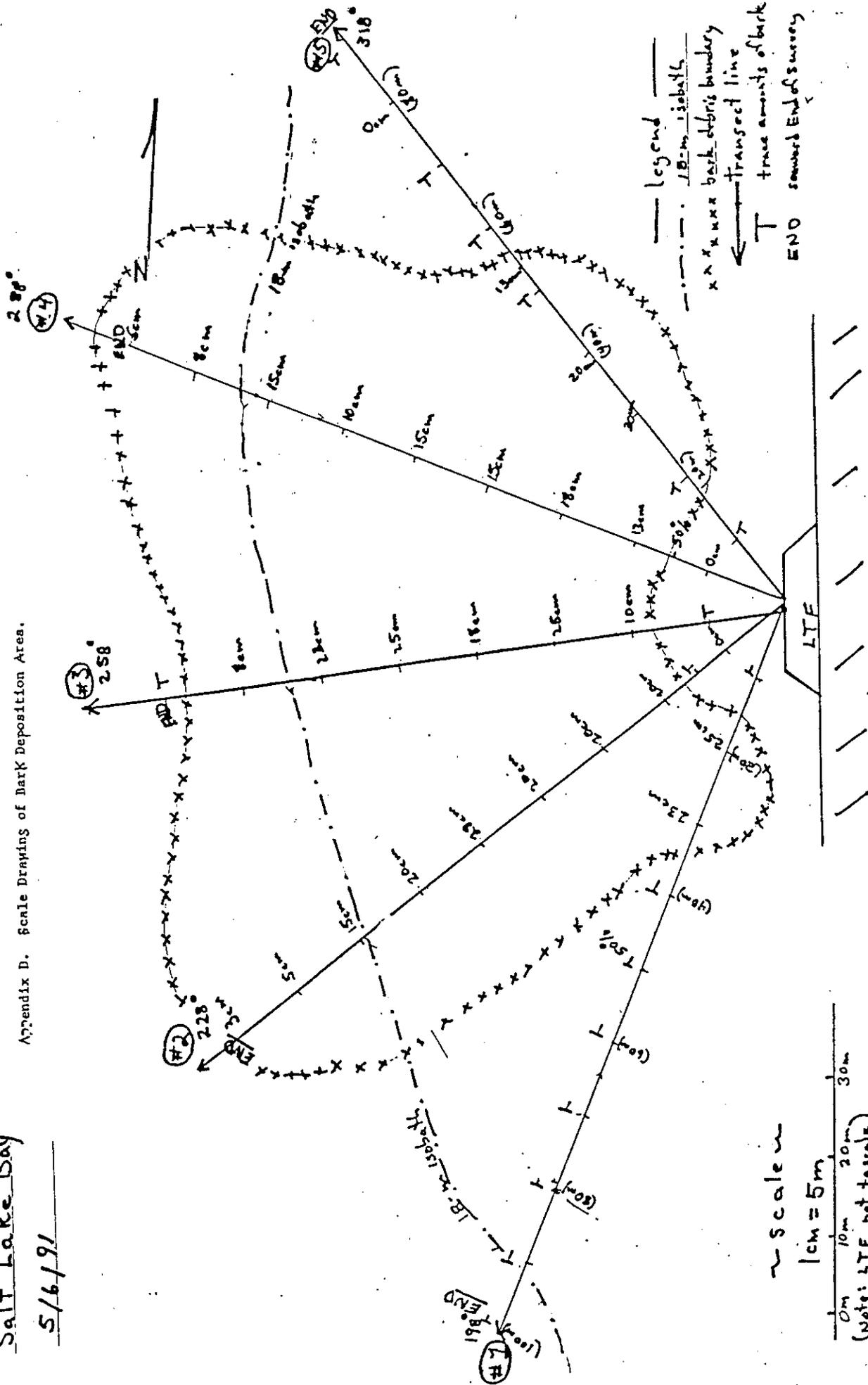


Note: Drawings have been reduced; use graphic scale.

Salt Lake Bay

5/6/91

Appendix D. Scale Drawings of Bark Deposition Area.

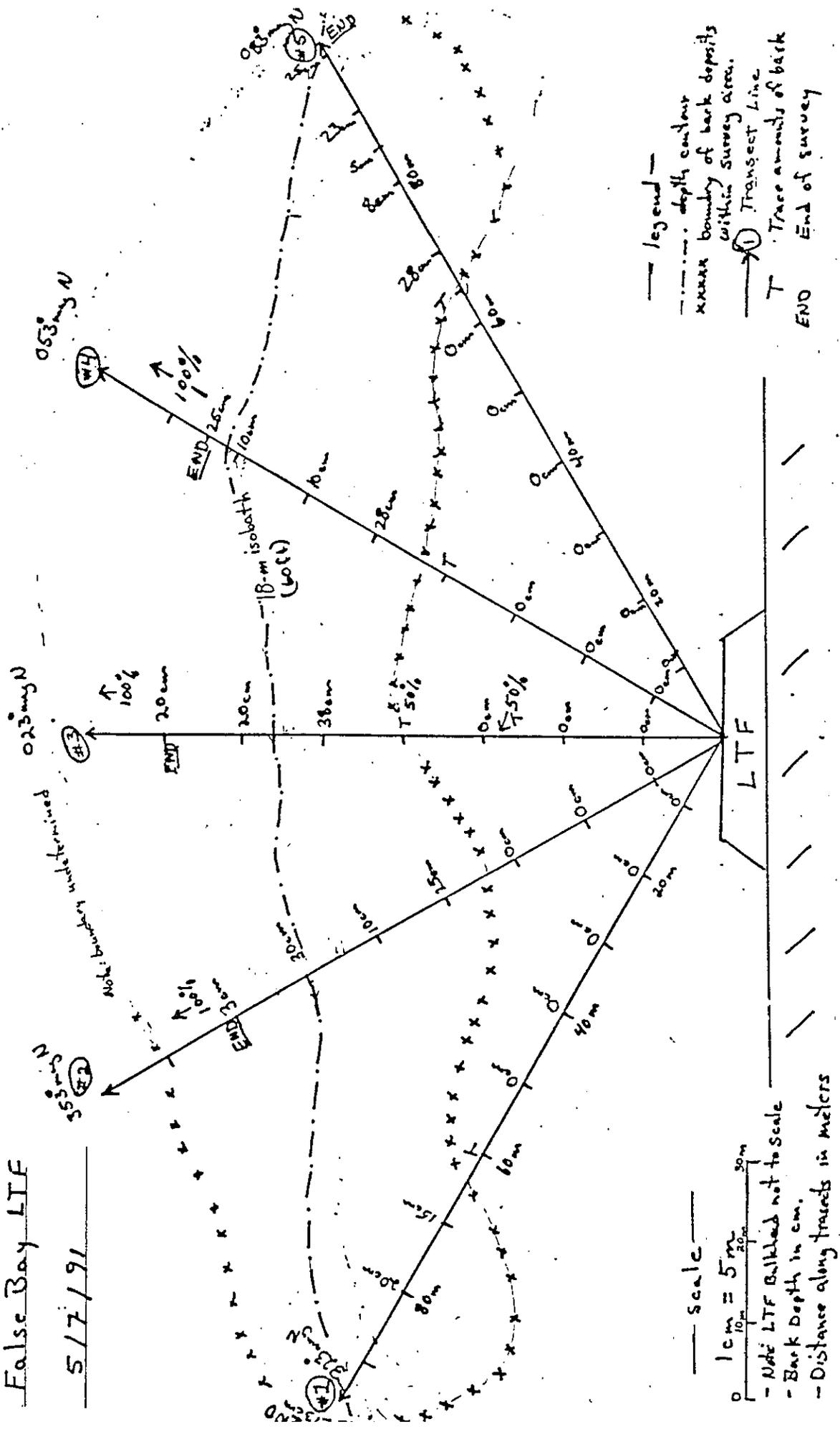


Notes: Significant areas of bark deposits exist beyond survey area.

Appendix D. Scale Drawing of Bark Deposition Area.

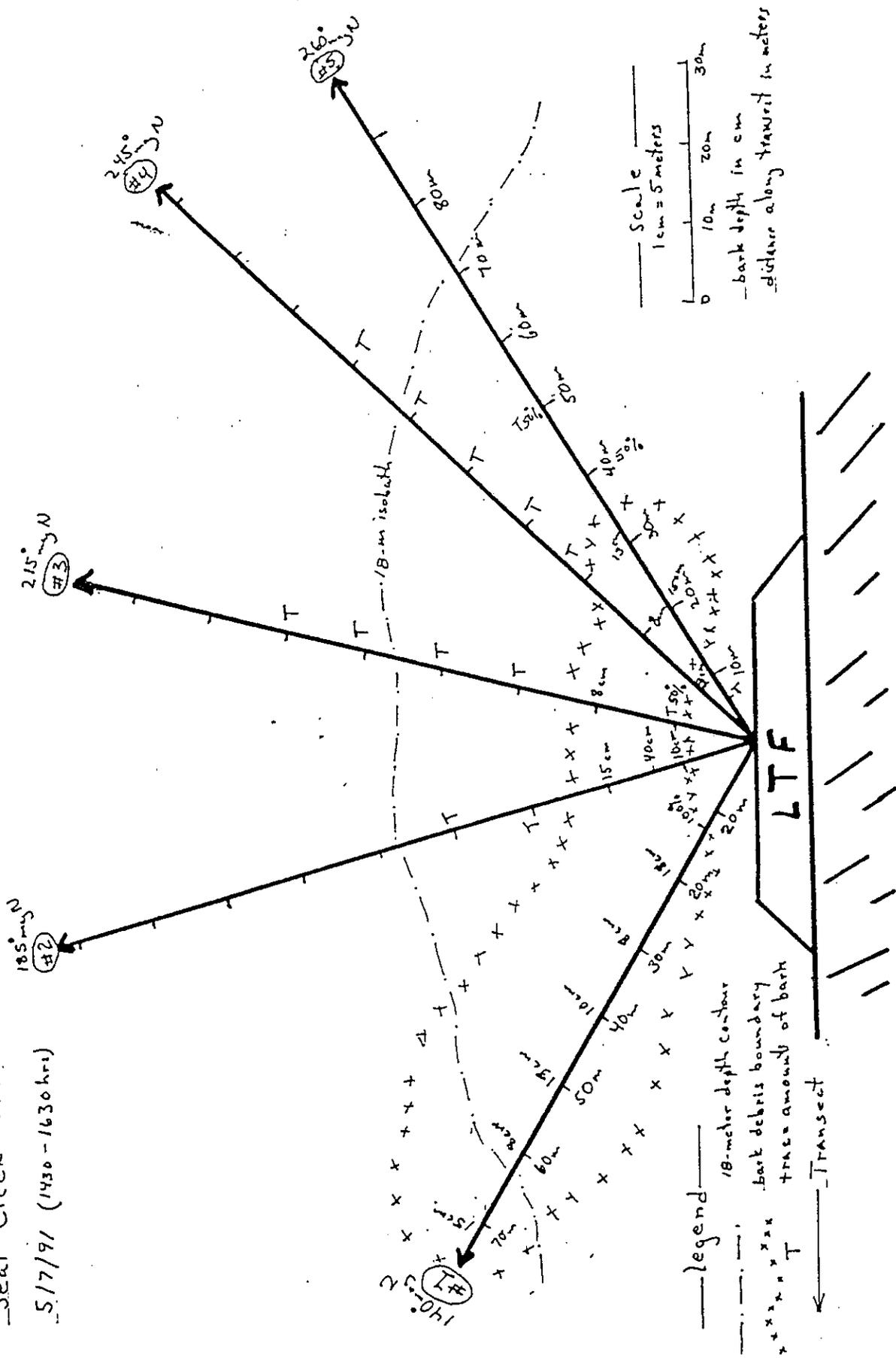
False Bay LTF

5/7/91



Seal Creek LTF  
 5/17/91 (1430-1630 hrs)

Appendix D. Scale Drawing of Bar's Deposition Area.

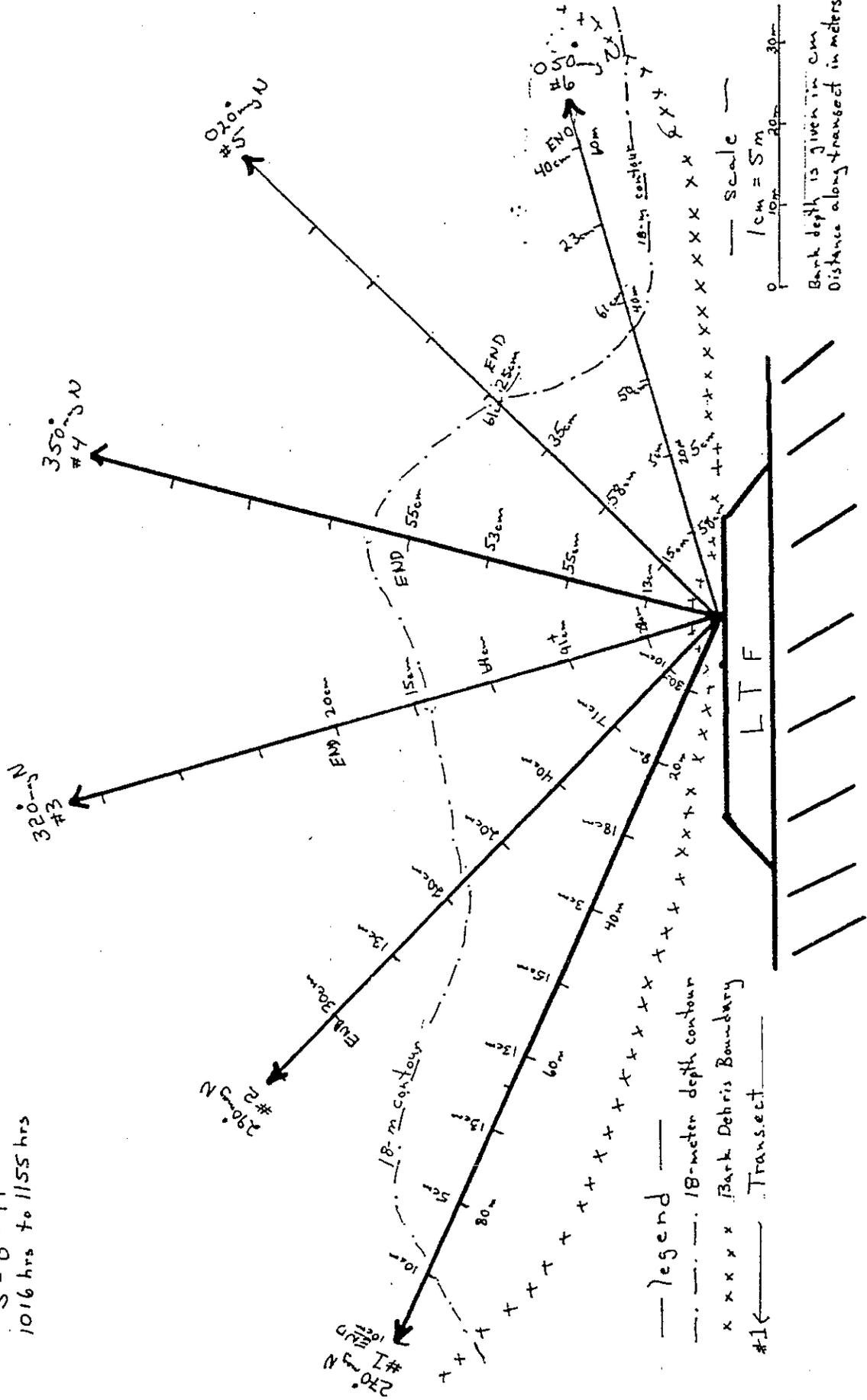


Kennel Creek

5-8-91  
1016 hrs to 1155 hrs

Appendix D. Scale Drawing of Bark Deposition Area.

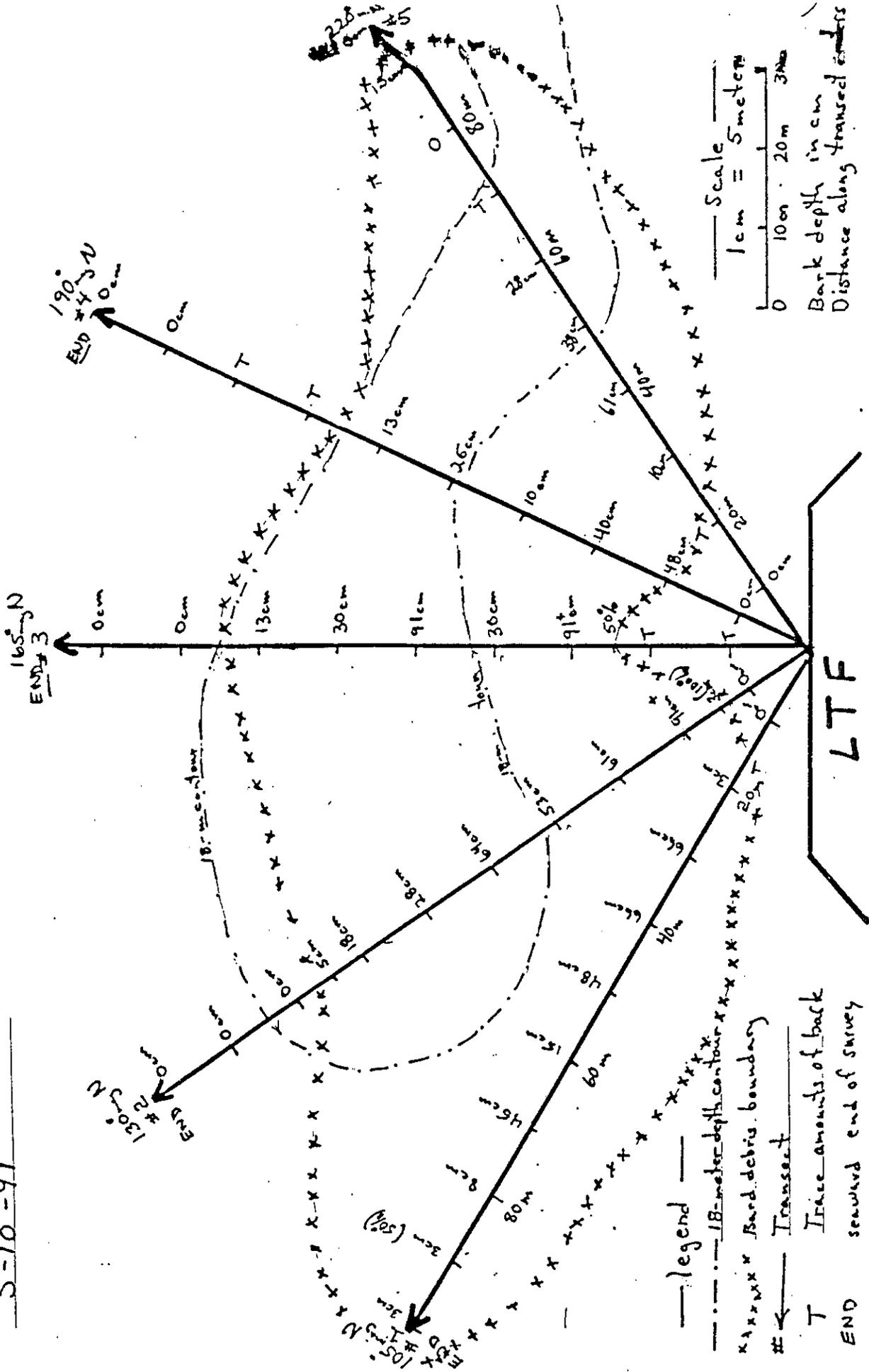
Note: Significant amounts of unmeasured bark deposits exist beyond end of survey area.



False Island

5-10-91

Appendix D. Scale Drawing of Bark Deposition Area.



- Legend —
- - - 18-meter depth contour
- x x x x x Bark debris boundary
- # ← Transect
- T Trace amounts of bark
- END seaward end of survey

Scale  
1cm = 5meters  
0 10cm 20cm 30cm

Bark depth in cm  
Distance along transect in cm

LTF

Corner Bay -  
5-9-91

Appendix D. Scale Drawing of Bark Deposition Area.

Note: Significant amounts of unannounced bark deposits exist beyond end of survey area

