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Survey of vegetation and elevational relationships within coastal marsh transition zones in the central Atlantic coastal region : final report

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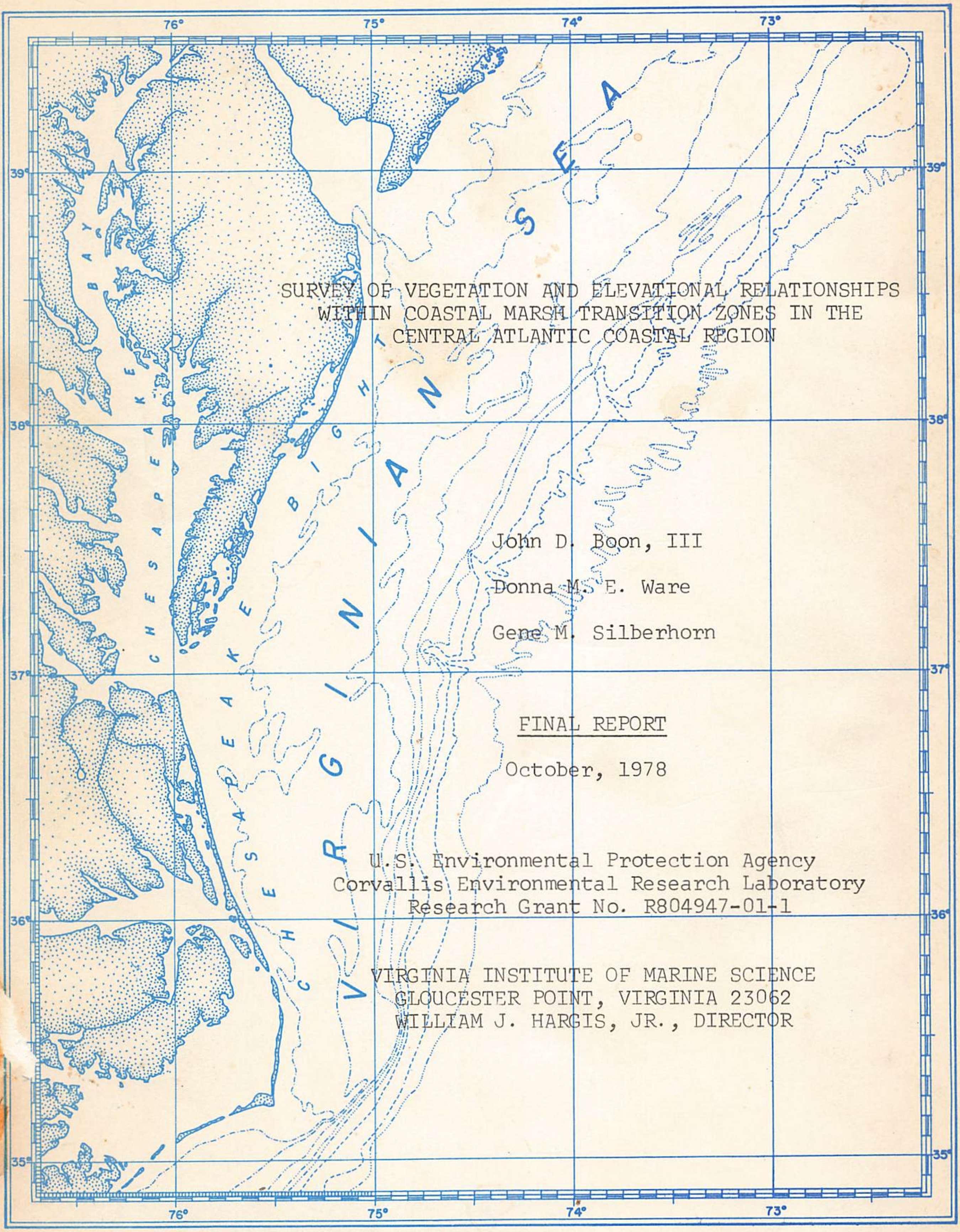

SURVEY OF VEGETATION AND ELEVATIONAL RELATIONSHIPS WITHIN COASTAL MARSH TRANSITION ZONES IN THE CENTRAL ATLANTIC COASTAL REGION

John D. Boon, III

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FINAL REPORT

October, 1978

U.S. Environmental Protection Agency
Corvallis Environmental Research Laboratory
Research Grant No. R804947-01-1

VIRGINIA INSTITUTE OF MARINE SCIENCE
GLOUCESTER POINT, VIRGINIA 23062
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INTRODUCTION

This report contains the findings of a one-year botanical field study of the marsh to uplands vegetational transition zone at selected sites within the Central Atlantic Coastal Region of the United States. The latter region is herein defined to include the coasts of Delaware, Maryland, Virginia, and North Carolina. To obtain results representative of the various coastal environments and associated wetlands types found within this region, five primary sites and one to four secondary sites in the vicinity of each primary site were chosen for detailed investigations. These sites are described in a later section. Figure 1 shows the locations of the five primary sites.

Our investigations have concentrated upon nonwooded wetlands, or marshes, including both saline and brackish types. We encountered these marshes in three major types of coastal environments:

1.) Tidally influenced marsh-lagoon systems behind barrier islands. These systems are commonly found along the seaward side of the Delmarva Peninsula extending from Cape Henelopen, Delaware, to Smith Island, Virginia. A variable percentage of the oceanic tide range is admitted to the inner embayments in the northern sector through a series of comparatively stable barrier inlets found along this coast. South of Assateague Island in Virginia, the major inlets tend to be deeper than those to the north. The southern inlets open into extensive monospecific marshes (mainly *Spartina alterniflora*) and tidal flat embayments several miles in width. While protected from ocean waves and currents, the interior marshes here are nevertheless exposed to a maximum amount of tidal flooding due to both astronomical and weather-induced tides that pass freely through the deep inlets. Tidal

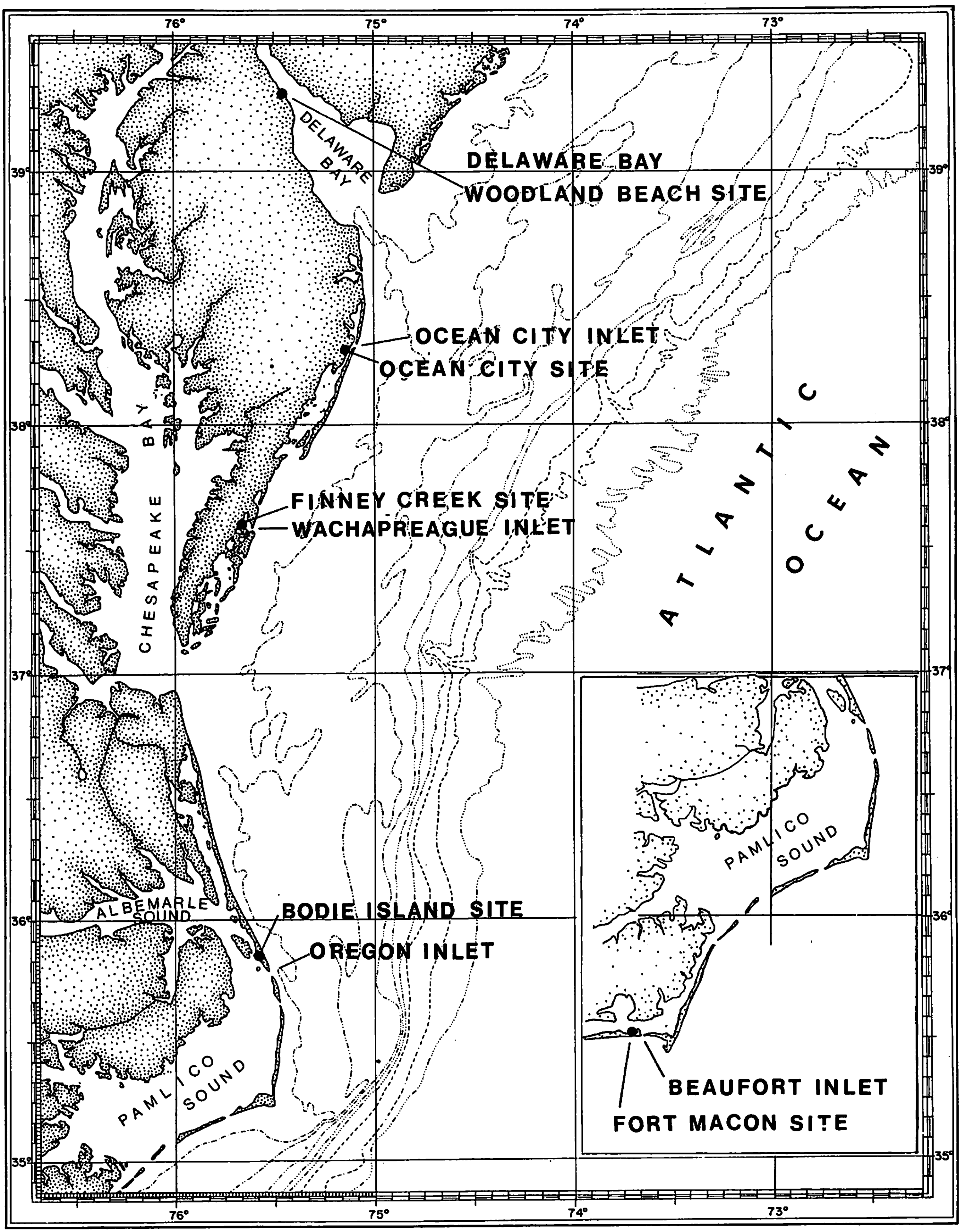

Figure 1. Location map showing the five primary survey sites.

measurements reveal, in fact, that astronomical tide ranges are slightly greater within the inner embayments as compared to the open ocean due largely to inertial flow effects. There are no major rivers or streams entering any of the coastal marshes and water salinity is normally high.

2.) Tidally restricted coastal sounds behind barrier beaches. Examples of these systems include Currituck, Albemarle and Pamlico Sounds in North Carolina. These broad and extensive shallow sounds have tidal communication with the ocean through a small number of comparatively unstable and shallow inlets, most having a history of opening and closing in response to storms and an active littoral sand transport regime. Except in the vicinity of the inlets, mean astronomical tide ranges are normally less than 0.5 feet (15 cm) in the coastal sounds. Flooding of the interior marshes occurs mainly in response to wind stress acting upon the considerable surface area of the sounds. Fringing marsh occurs sporatically directly behind the barrier beaches, having formed in most instances on flood tidal levees associated with past or present inlets. A number of rivers empty into the sounds so that extensive brackish water marshes (mainly *Juncus roemerianus*) are found along the inner shoreline and interior islands.

3.) Bay-estuary systems, principally the Delaware and Chesapeake Bays and their tributaries. Marshes in the estuarine environment exhibit both species change and greater species diversity proceeding landward from mesohaline toward brackish and finally freshwater conditions near the head of tide. A detailed study of marsh boundaries within the lower Chesapeake Bay and tributaries was reported earlier (Boon, Boule and Silberhorn, 1977) and a site situated along the south shore of Delaware Bay has been included in the present study.

Objectives and Definitions

The main purpose of the study was to obtain a representative sample of the vegetation present in the transition zone between marshes and wooded uplands in each type of coastal environment discussed above and to quantify plant community distributions along transects running perpendicular to the marsh boundary. In addition, limits of the transition zone were determined along each transect, defined as follows:

Upper Limit of Transition Zone (ULTZ) - The point along the transect proceeding from marsh to upland at which the amount of ground coverage by marsh plants is less than 5 percent and coverage by upland plants is at least 5 percent and is contiguous with the upland proper.

Lower Limit of Transition Zone (LLTZ) - The point along the transect proceeding from upland to marsh at which the amount of ground coverage by upland plants is less than 5 percent and coverage by marsh plants is at least 5 percent and is contiguous with the marsh proper.

The above definitions were used at each marsh site visited to determine transition zone limits along the transects. The only exceptions occurred along a few transects having bare ground between the upland and the marsh. Here no transition zone was defined and hence no limits were determined.

Transition zones between marshes and uplands usually occur on sloping ground, hence the distinction between upper and lower limits. We surveyed the ground elevation along each transect in order that plant distribution patterns might be compared with varying topographic relief. Where available, the tidal datum of mean high water[1] was selected as the vertical reference in order to compare transition zone elevations at different sites using a commonly defined datum. Mean high water along the U.S. East coast, moreover, can be used as the base elevation in a linear relationship between ground elevation and frequency of storm flooding, the latter being a primary factor controlling zonation in marsh-to-upland plant communities in coastal areas (Boon, Boule, and Silberhorn, 1977). The use of other tidal datums such as mean low water or mean tide level as the base elevation unnecessarily introduces another variable into the above relationship, that of the mean astronomical tide range, which varies with the locality and is independent of the factors governing weather-induced tides (Boon, Boule, and Silberhorn, 1977, pp. 35-37).

In other areas of the United States where the type of tide is mixed or intermediate between diurnal and semidiurnal, mean higher high water would be the preferred reference datum because of its elevational equivalence to mean high water for predominately diurnal or predominately semidiurnal tide regimes. A similar relationship holds between the tidal datums of mean low water and mean lower low water as demonstrated by Hicks (1977).

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[1]Mean high water is defined as the arithmetic mean of all high water heights occurring at a location during the current NOS tidal epoch, 1941-1959. At locations where the full 19-year series has not been measured, the equivalent of the 19-year datum may be obtained from a shorter series of observations using the method of simultaneous comparisons. Ref: NOS Tide and Current Glossary, Revised 1975 Ed.

FIELD METHODS

Sample Transects

At each study site transects were begun at points well within the upland (at least six meters inland from the apparent upper limit of the transition zone) and extended downslope at right angles across the transition zone into the marsh. At each of the five primary sites, eight or nine short transects were run which terminated a short distance beyond the apparent lower limit of the transition zone; in addition to the above, two long transects were run at each primary site which extended well out into the open marsh or until reaching marsh drainage channels when possible to do so. The purpose of the long transects was to provide a sample of the elevational profile of the marsh adjacent to the transition zone. This was accomplished in most instances using transects not more than 50 m in total length. At secondary sites, only the two long transects were run.

The spacing between transects at primary sites was nominally set at 20 m. However, when taping or pacing that distance between transects, a potential location would be skipped if a disturbed transition zone or steep scarps and/or depressions precluding a normal transition sequence were encountered. At secondary sites the two transects were set 30 to 50 m apart.

All transect measurements were taken in relation to a 50 m fiberglass tape graduated in meters, decimeters and centimeters which was stretched (tightened) over the ground starting at the upland end of the transect (Figure 2). The zero point of the tape was attached to a head stake driven into the ground to mark the beginning of the transect. Line stakes were placed at intervals along the tape to allow later recovery of the established transect.

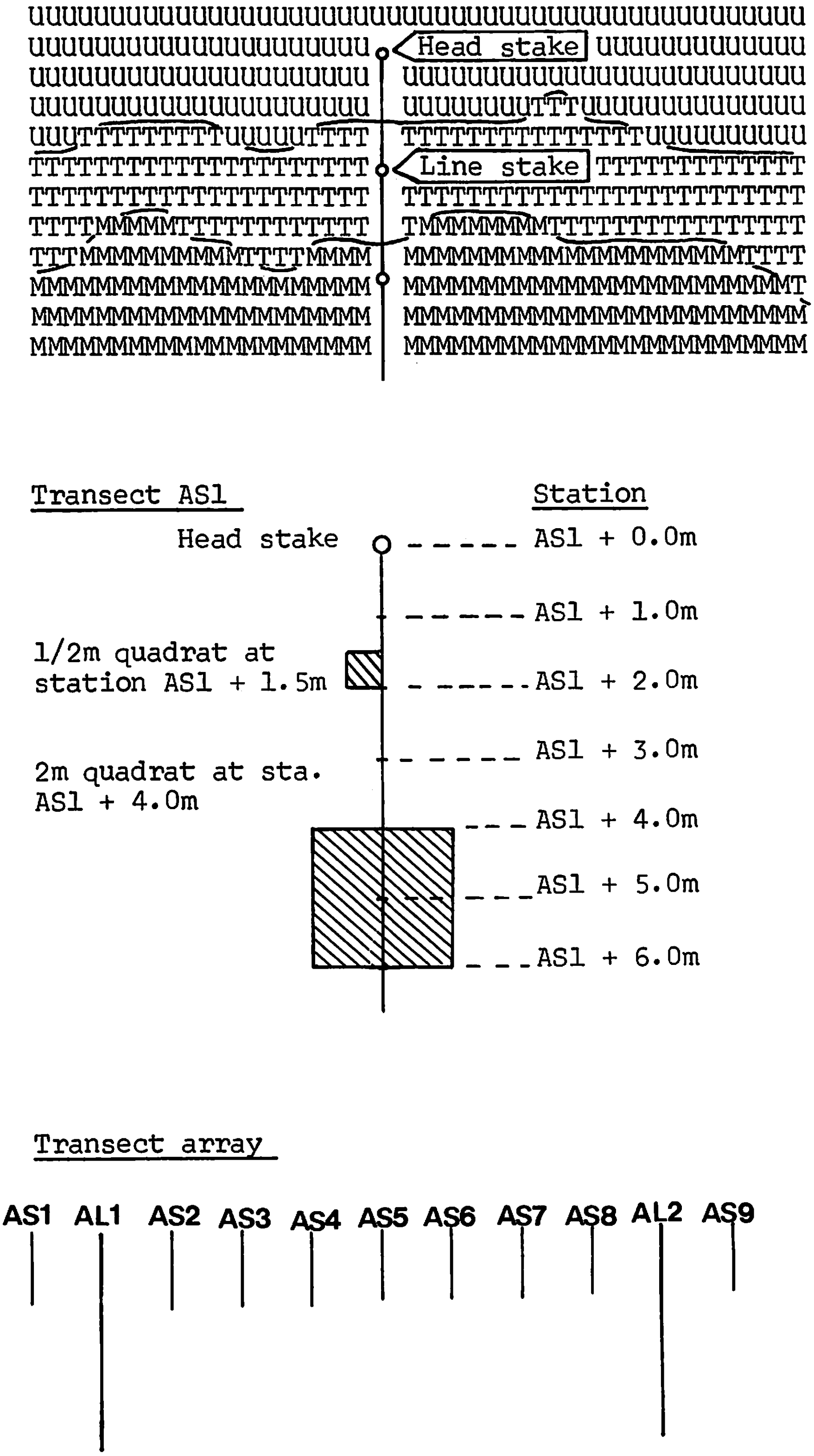

Figure 2. Transect Sampling Design used at Marsh Survey Sites

Two vegetational parameters were sampled along each transect: 1) coverage of herbaceous plants, trailing vines, seedlings and saplings of woody plants, and 2) basal area of trees, shrubs and vines with a stem diameter of more than 5 mm. Coverage was estimated within a 50 X 50 cm quadrat formed by placing a three-sided plastic frame against the left side of the tape (facing the upland) to complete the square as shown in Figure 2. The quadrats were measured continuously at 50 cm intervals within the transition zone except in instances where the zone was unusually wide or broken due to irregular topographic relief. Elsewhere quadrat spacing was frequently increased to 150 cm or 300 cm intervals as dictated by the complexity of the plant community observed. Basal area measurements were made within a 2 X 2 m quadrat centered on the tape.

Field Classification Systems

Coverage, a measure of plant dominance, was determined using an eleven-class system illustrated in Figure 3. Using this system, the botanist recorded the midpoint value of the class interval estimate representing the percentage of ground covered by the leaves and stems of each individual species found in the quadrat. These estimates were based on all herbaceous vegetation present, including plants rooted outside but extending into the quadrat. Midpoint values of the central class were recorded as 50+ or 50- to indicate percentages belonging to the upper or lower end of the class range. The latter procedure permits any of our 11-class estimates (Fig. 3) to be converted to an equivalent value in the 6-class system of Daubenmire (1959).

At a certain number of sites, intermixed grasses such as those of the *Spartina patens*-*Distichlis spicata* community were given a combined estimate denoted as "combo" in addition to their individual estimates. The combined estimate was frequently used late in the growth season when many of the

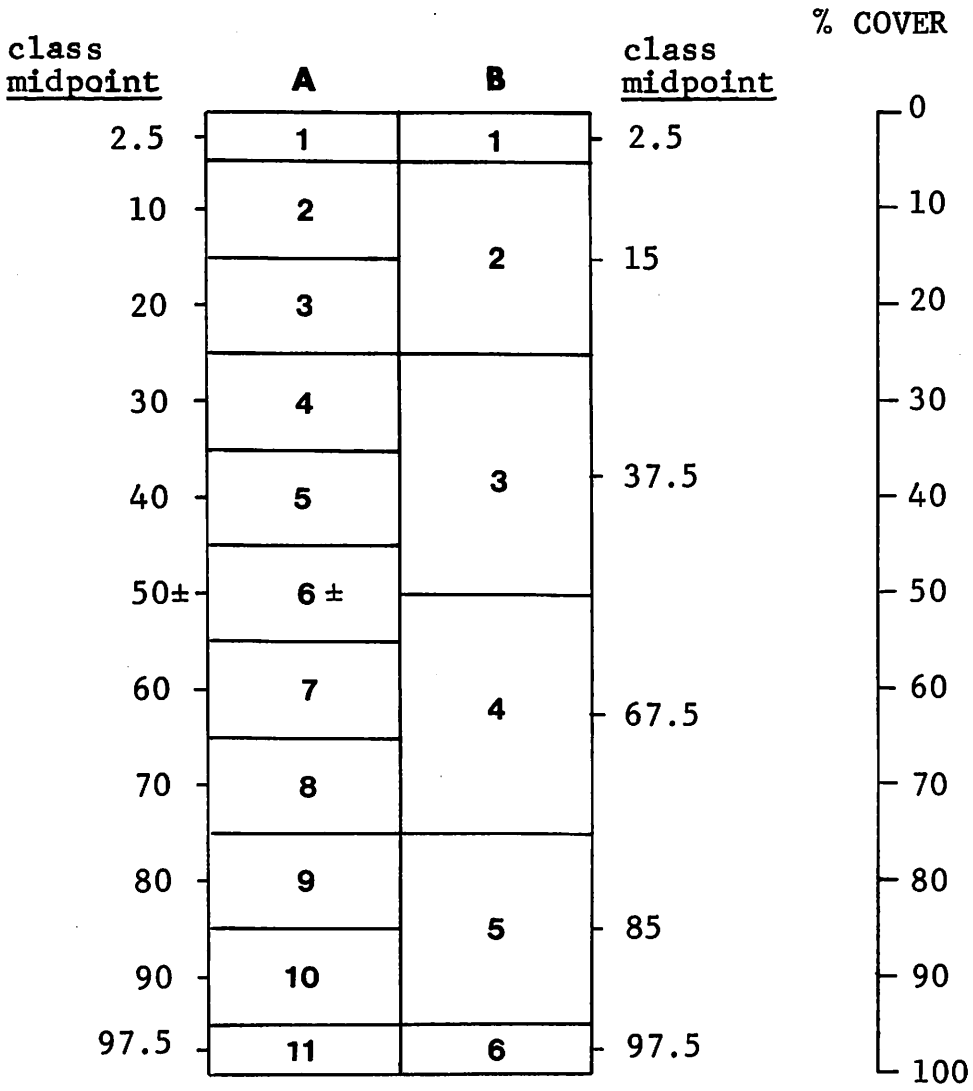

Figure 3 . Comparison of Percent Coverage Classification used in this study (A) and Classification used by Daubenmire (B).

grasses in mixed communities had lost chlorophyll to the point where leaves and stems of the individual species were difficult to distinguish from one another and from dead material of a previous year.

Following completion of the coverage estimates, basal area measurements were made of all trees, shrubs and vines actually within or touching the sides of each 2 m quadrat. Trees were defined as any woody plant with a trunk diameter of more than 10 cm, shrubs as woody plants with basal stem diameters of between 0.5 and 10.0 cm. Seedlings and saplings having stem diameters of less than 0.5 cm were included in the herbaceous cover.

Basal area was determined for trees by measuring the trunk circumference at a point approximately 4.5 ft above the ground and converting to the area of a circle having the same circumference. Shrub and vine diameters were measured a few centimeters above the ground using a set of metric calipers before conversion to equivalent circle areas. When clumped shrubs with multiple stems (e.g., Iva frutescens) were encountered, the diameter of a representative stem for each apparent size class was measured and its equivalent area multiplied by the number stems in that class to obtain the total area.

Voucher specimens were collected at all sites and keying of questionable species was accomplished in the laboratory. These specimens have been added to the collection of the herbarium at the College of William and Mary in Williamsburg, Virginia.

Elevation Measurements

Once the botanical sampling was completed, a series of elevation measurements were taken at regular intervals along the tape beginning at the head stake. Initially these elevations were referred to a temporary datum assigned to a master stake driven into the upland at each site. This datum was made common to all transects by means of a double-run line of levels connecting a network of turning point stakes located near the transects. Each setup of the leveling instrument along a transect would then begin with a backsight to one of these turning points.

At sites located near tidal bench marks established by the National Ocean Survey, the official tidal datum of mean high water (MHW) was transferred to the master stake at the marsh site using double-run leveling. All ground elevations measured along the transects were then adjusted to refer to the datum of MHW. At three of the sites (Finney Creek, Parramore Island in Virginia; Bodie Island in North Carolina) we determined MHW elevations from a month-long series of tidal measurements using the method of simultaneous comparisons (Swanson, 1974). In computing these datums, tidal data from NOS stations at Hampton Roads, Virginia and Ocean City, Maryland were used as a reference for the comparisons.

All leveling was done with a Nikon automatic level and a Philadelphia Metagrad Survey Rod with hand level by Kueffel and Esser. All closures upon return to the initiating mark in a line of levels were required to be within ± 5 mm or the line was repeated until the proper closure was obtained. However, the absolute error associated with the final result —ground elevations above MHW— is expected to be ± 3 cm or less at most sites. An exception is the Bodie Island site where the uncertainty of MHW elevations is likely to be two or three times as great. There as elsewhere the controlling factor is the strength of the MHW elevation determined from simultaneous comparisons.

DESCRIPTION OF MARSH SURVEY SITES

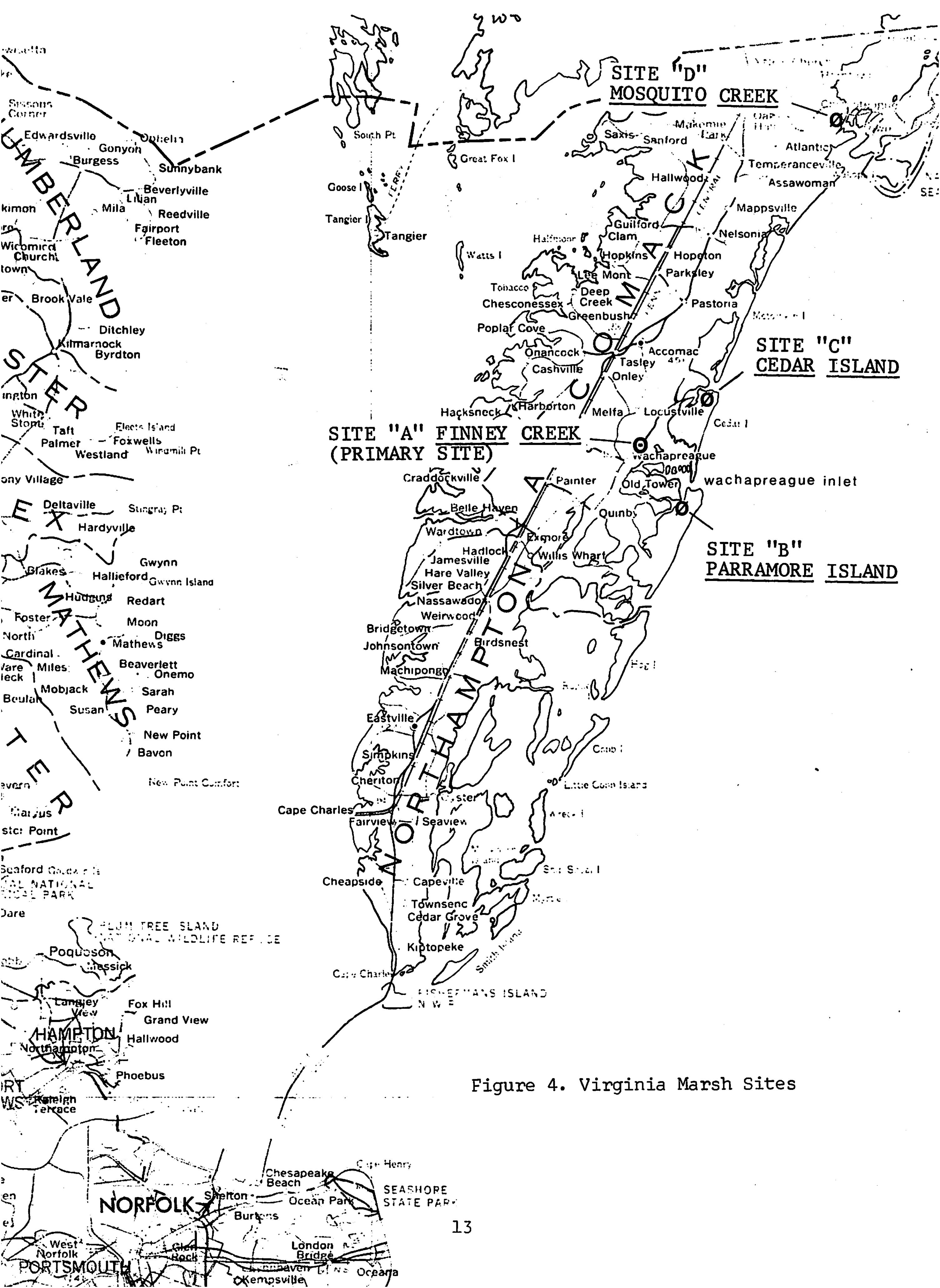

Figure 4. Virginia Marsh Sites

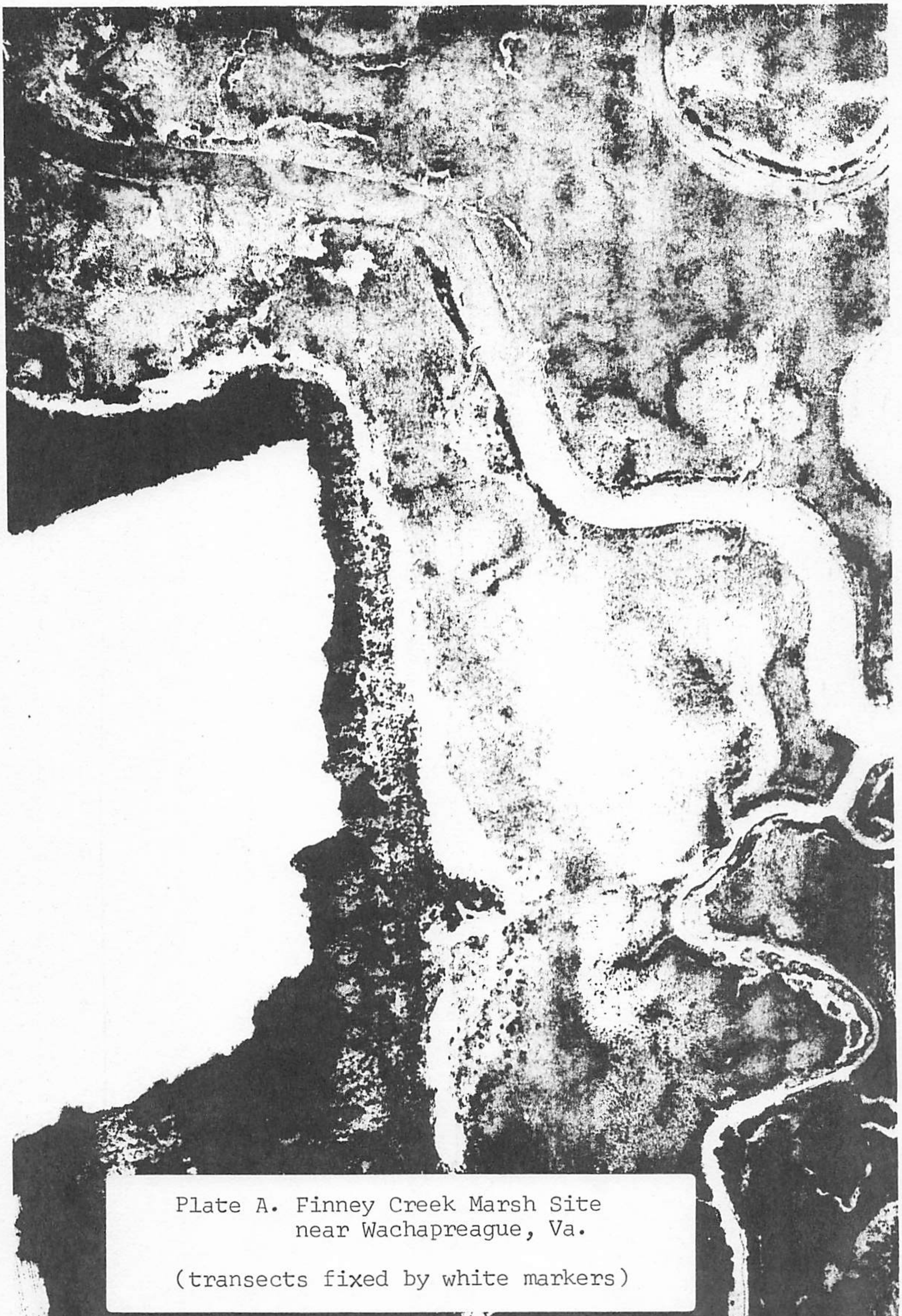

Plate A. Finney Creek Marsh Site near Wachapreague, Va.

(transects fixed by white markers)

Plate B. Enlarged view of Finney Creek. Wachapreague town docks appear at lower left. Marsh survey site is in upper left corner.

VIRGINIA: Finney Creek (Site A)

The Finney Creek location is the primary study area for the coastal marshes of Virginia. The majority of these marshes occur as extensive monospecific stands of Spartina alterniflora growing inside the barrier islands and coastal inlets on the seaward side of Virginia's Eastern Shore Peninsula. Site A is located on the mainland approximately one mile NNE of the town of Wachapreague in Accomack County (Figure 4) near Finney Creek, one of the main tidal waterways in the area.

Tidal characteristics are well known at this site due to almost eight years of tidal record collected at the VIMS laboratory dock in nearby Wachapreague. The mean tidal range is 4.1 feet (125 cm) at Wachapreague as compared to 3.9 feet (119 cm) at the nearest coastal inlet six miles to the east. Thus there is a small amplification of the tide wave as it progresses from the inlet through the interior marsh channels and tidal flat embayments between inlet and mainland. Moreover there are brief periods during each year when weather-induced surges modify drastically the normal astronomical tide, causing very unusual highs and lows. During the winter of 1977-1978, for example, two extratropical storms occurred which together produced a maximum high and a minimum low tide with an 11.0-foot (335 cm) difference in height. Clearly the marshes in this area are subject to wide variations in tidal flooding as compared to other sites in Virginia, particularly inside Chesapeake Bay and its tributaries. All of the Eastern Shore sites are typified by high salinity regimes (25.0 - 30.0 PPT).

Eleven transects were run at approximately 10 m intervals along the upland boundary of the study site. The wooded upland is locally very narrow, being a well defined strip between the marshland and cultivated cornfields. Festuca rubra is common in the dry soil along the field borders.

Loblolly pine (Pinus taeda) is the most important upland tree species present. Other important woody species include Prunus serotina, Juniperus virginiana, Myrica cerifera, and Japanese honeysuckle (Lonicera japonica). The honeysuckle is locally abundant here in contrast to its absence on the barrier islands.

Below the transition zone lies a belt of Iva frutescens beneath which grows a dense stand of Juncus gerardi, an interruptedly circumboreal marsh species reaching its southern limit (in North America) on the Eastern Shore of Virginia. Because of local topography, the Iva belt varies from several meters wide at the southernmost transect to about nil at the northernmost transect. In some places along the lower edge of the Iva belt Distichlis, S. patens, and Borrichia frutescens occur and below these scattered stems of live Spartina alterniflora occur in a band of dead S. alterniflora debris covering bare areas. The bare areas grade seaward into a panne marsh community consisting of short form (dwarf) S. alterniflora, Salicornia spp., plus some Distichlis and Limonium carolinianum. Nearer the feeder channels leading to Finney Creek the S. alterniflora is taller and forms a monospecific community.

On five transects (AS1, AS4, AS5, AS6 and AS9) the ULTZ is defined, at least in part, by the upper limit of Distichlis; on three other transects (AS5, AS8 and AL2) it is defined, at least in part, by the upper limit of Juncus gerardi, and on AS7 by the upper limit of Iva frutescens. On AL2 seedlings of Iva and Baccharis reach a common upper limit with the Juncus. Baccharis and/or Iva seedlings mark the ULTZ on the two transects bordering AL2 as well (AS9 and AS10). Of the eight transects mentioned above, Spartina patens also reaches its upper limit at approximately the same elevation as the more definitive marsh species on four transects (AS1, AS5, AL2 and AS10). On AS7 and AS8 S. patens occurs well above the point set as the ULTZ.

On AS6 Spartina patens and Festuca rubra occur in abundance in the upland all the way to the edge of the cultivated field in an open stand of Eastern red cedar. These species were observed in similar upland habitats on Cedar Island and on Parramore Island. The ULTZ is set at the upper limit of Distichlis on AS6.

On AL1 the ULTZ is based on the upper limit of Spartina patens, which is about 1 1/2 m in distance and about three cm higher in elevation than the upper limit of Distichlis. The upper limit of S. patens was used to set the ULTZ in this case because it appeared to be a natural tapering of coverage values from the S. patens mixed with the Distichlis. The ULTZ on AS3 is based on the upper limit of a stand of Atriplex patula.

There is no band of Baccharis along the marsh-upland border here, but scattered individuals do occur. On several transects (AS1, AL1, AS8 and AS10) a Baccharis shrub occurs at or near the upper limit of Spartina patens, Distichlis, or Juncus gerardi, but on AS4 and AS5 it grows lower in the transition zone and is absent at the ULTZ.

Many weedy species play a role in the transition zone at Finney Creek. These are species that also thrive in open, sunny, and disturbed upland habitats. The lower limits of the following species were used in setting the LLTZ: Elymus virginicus, Calystegia sepium, Lactuca scariola, L. canadensis, Lonicera japonica, Festuca rubra. Asparagus officinalis, Lepidium virginicum, and Sonchus oleraceus were observed in the transition zone in the vicinity. On AS3 the LLTZ was set at the lower limit of traces of Calystegia sepium and a small Baccharis stem. Because the Finney Creek site was studied early in the season, Calystegia had just begun to grow and the data underestimated the potential coverage this species would attain by summer. The same situation applies the LLTZ on AS6 where Festuca rubra was very hard to discern within the S. patens stand and was thought to be underestimated.

VIRGINIA: Parramore Island (Site B)

Parramore Island is one link in the chain of barrier islands that lines the coast of Virginia from its border with Maryland to Fisherman's Island at the southern tip of the Delmarva Peninsula. About eight miles in length, it is among the largest of the barrier islands in Virginia. It supports maturing stands of pine, thickets of Myrica-Persea-Juniperus-Smilax, and combinations of pine and thicket along a relic system of ridges on the northern third of the island (McCaffrey, 1976). Extensive Spartina alterniflora marshes occur on the landward side of the island, most of which are well-drained by numerous dendritic marsh channel networks leading into the larger tidal tributaries. All of Virginia's barrier islands are slowly migrating landward over the marshes to the west.

The study site is about 1 1/2 miles south of the northern end of the island some 50 m south of a jeep trail that traverses the island. The mean tidal range here is about 3.8 feet (116 cm). Two transects were run into Spartina alterniflora marsh from upland vegetation on a higher wedge of ground that is part of an old dune ridge running parallel to the major ridge of the island, Italian Ridge. The study area is separated from Italian Ridge by a large swale area occupied by poorly drained lakes and associated brackish marshes. Common upland tree species at the study site include loblolly pine (Pinus taeda), Eastern red cedar (Juniperus virginiana), wild black cherry (Prunus serotina), red bay (Persea palustris), and the shrub wax-myrtle (Myrica cerifera). Uniola laxa is the most abundant grass of the upland.

Festuca rubra and Spartina patens were two key plants used to set limits to the transition zone on Parramore. On both transects the ULTZ was set as the upper limit of 10% coverage of Spartina patens. The LLTZ was set at the lower limit of *F. rubra*, which occurred within the *S. patens-Distichlis* stand, just above or a short distance below the upper limit of the *Iva* zone. Other species occurring in the transition zone here include *Teucrium canadense*, *Myrica cerifera* and *Juniperus virginiana*. The *M. cerifera* in the transition zone on transect BL1 seems to be on a hummock of higher ground. On transect BL2 there are scattered dead loblolly pines and dead *Myricas* within the transition zone.

The botanist's interpretation of the intermixed *F. rubra-S. patens* community at the upland border of this site is that it represents a marsh-uplands transition. On both transects *S. patens* exhibited a continuous presence amid a trend of decreasing percent coverage proceeding from a point clearly within the marsh to its upper limit.

Below the transition zone is a zone of *Iva frutescens* with a dense ground cover of *Spartina patens*. *Baccharis* is uncommon at this site but a few individuals are present along the marsh border. The *Spartina alterniflora* marsh begins immediately below the *Iva* zone, and there are extensive areas of saltmarsh cordgrass debris in its upper reaches, and extensive bare areas where old wrack lines have been washed away by the tide. These bare areas, in many cases, are being colonized by *Salicornia europea*.

VIRGINIA: Cedar Island (Site C)

Cedar Island is the next barrier island found to the north of Parramore Island. Unlike Parramore, it has only a few moderately elevated ridges at its northern end, populated by dense stands of Eastern red cedar, (*Juniperus virginiana*). The study area was located on a crescent-shaped ridge near the extensive marshes found on the landward side of the island. Open sandy areas occur along the midline of the ridge with sparse coverage by prickly pear cactus (*Opuntia compressa*), bayberry (*Myrica pensylanica*), *Rumex acetosella*, broom sedge (*Andropogon virginicus*), and *Spartina patens*. Below this highest ground occur stands of red cedar with bayberry, poison ivy (*Rhus radicans*), *Festuca rubra*, and *Spartina patens* in heavy cedar litter. This vegetation type is distinctive because of the co-dominant status that bayberry and poison ivy assume together with the Eastern red cedar (McCaffrey, 1976). Scattered *Myrica cerifera* occur along the lower edge of the upland and occasionally within the transition zone.

Viewed from the marsh, much of the periphery of the upland is belted by *Iva frutescens*, and large stands of *Iva* occur inside coves into the upland. In some places the *Iva* belt is very narrow, sometimes comprised of a single rank, or absent. *Baccharis* occurs sporadically along the upland side of the *Iva* belt, sometimes forming a narrow belt along the border of the upland in the absence of *Iva*. Below the saltbushes is an extensive high marsh of *Spartina patens* and *Distichlis*. Drainage near the study site was poor; several large pannes containing standing water occur nearby, colonized by *Salicornia europaea* along their margins. Farther to the west lie *Spartina alterniflora* marshes which are well drained. The mean tidal range is about 3.6 feet (110 cm) near these marshes.

Two transects were run at this site. The ULTZ on CL1 is defined by the upper limit of a stand of *Juncus gerardi* under cedars. The *Juncus* gives way abruptly to trailing poison ivy and bare ground. The LLTZ is defined by the lowest cedar stem in the *Juncus* stand, which also coincides with the transition from pure *Juncus* to a mixture of *Juncus* with *Distichlis* and *Spartina patens*.

The ULTZ on CL2 is defined by the upper limit of *Distichlis* and *Scirpus americanus* under red cedars. Here the LLTZ is also at the lowest cedar stem.

In other types of transitions here the ULTZ is marked by the upper limit of *Distichlis* under *Myrica* shade, by *Distichlis* and *S. patens* under cedar shade, by *Baccharis*, or by *Baccharis* and *Iva* simultaneously. The transition zones are comparatively narrow (between three and four meters) throughout the area.

VIRGINIA: Mosquito Creek (Site D)

This site is located a few miles south of the Maryland border on the mainland behind an army reserve post near state route 175, just south of the causeway crossing Queen Sound to Chincoteague Island. Tidal communication is somewhat restricted here as is typical of the shallower channels leading into Chincoteague Bay. The mean tidal range is 1.7 feet (52 cm) at the site but is obviously subjected to transient meteorological tides of much greater range.

Like Finney Creek, Cedar Island, and Parramore Island, the Mosquito Creek site is also part of the system of extensive Spartina alterniflora marshes which has developed behind the barrier islands. Two transects were run from the upland into these stands of saltmarsh cordgrass. The upland here is a dense growth of Myrica cerifera and Rhus radicans beneath Pinus taeda, Juniperus virginiana, and Prunus serotina. Japanese honeysuckle (Lonicera japonica) is present but not abundant. In response to heavy shading, the upland is nearly barren of ground cover.

Below the transition zone there is an Iva belt varying from very narrow to several meters wide. In contrast to the Iva belt at Finney Creek, a strikingly high number of these shrubs are dead, and the stand is considerably less dense, the shrubs tending to be very low and sparsely distributed at the lower edge of the belt. Juncus gerardi forms dense local stands in the Iva, but stands of mixed Spartina patens and Distichlis are more often associated with the Iva. Spartina patens and Distichlis occur as a salt-meadow zone between the Iva and the uppermost S. alterniflora.

On DL1 the ULTZ is marked by the upper limit of Panicum virgatum, which is at a slightly higher elevation than the upper limit of Scirpus americanus, Spartina patens and Festuca rubra. The LLTZ is the lower limit of Solidago *graminifolia*, *Lonicera japonica*, *Rhus radicans*, *Calystegia sepium*, and seedlings of *Prunus serotina* and *Myrica cerifera*. The LLTZ is also at the upper limit of *Juncus gerardi* here.

On DL2 the ULTZ is the upper limit of *Juncus gerardi* and *Distichlis* and the LLTZ is the lower limit of *Festuca rubra*. *Rhus radicans*, *Teucrium canadense*, *Festuca rubra*, *Setaria geniculata*, and *Erechtites hieracifolia* also occur in the transition zone.

Other types of transitions at this site include:

1. ULTZ = upper limit of *Spartina patens-Distichlis* meeting a dense stand of *Erechtites hieracifolia* at border of *Myrica* thicket.

   LLTZ = lower limit of *Festuca*, *Calystegia*, *Erechtites*, and poison ivy. *Baccharis* and *Panicum virgatum* occur in the transition zone also.

2. ULTZ = upper limit of *Distichlis* and *Carex straminea* in *Festuca*, *Erechtites* and *Rubus* at border of *Myrica* thicket.

   LLTZ = lower limit of *Calystegia* in a dense stand of *Spartina patens*; just below the lower limit of *Baccharis*.

3. ULTZ = upper limit of *Baccharis*, *S. patens*, *Solidago sempervirens*, and *Juncus gerardi* in *Solidago graminifolia*, *Rhus radicans*, *Calystegia*, and *Teucrium canadense* at border of *Myrica* thicket.

   LLTZ = lower limit of *Calystegia* and *Teucrium* in *Spartina patens*. *Distichlis*, *Juncus* and *Festuca* occur between the ULTZ and LLTZ.

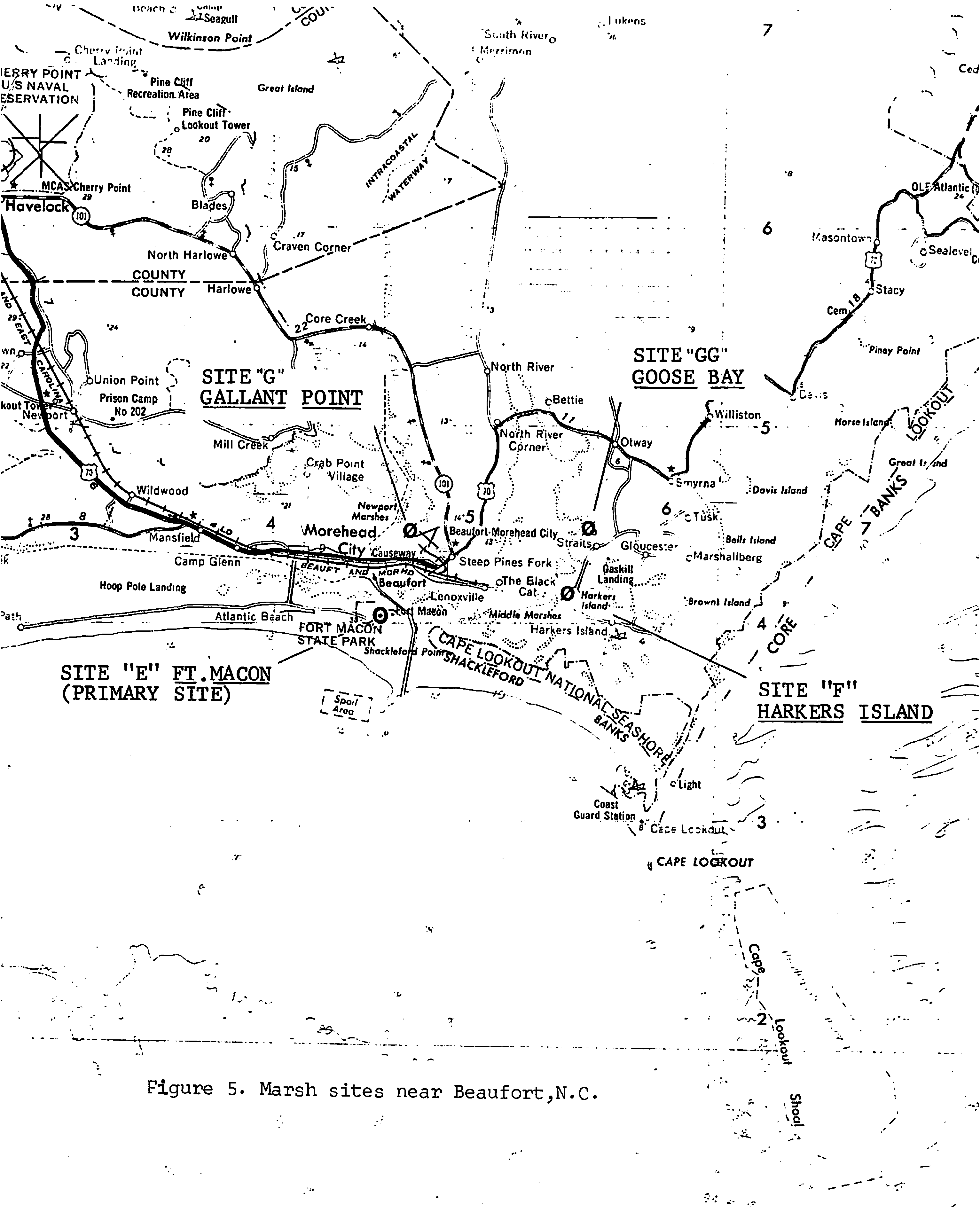

Figure 5. Marsh sites near Beaufort,N.C.

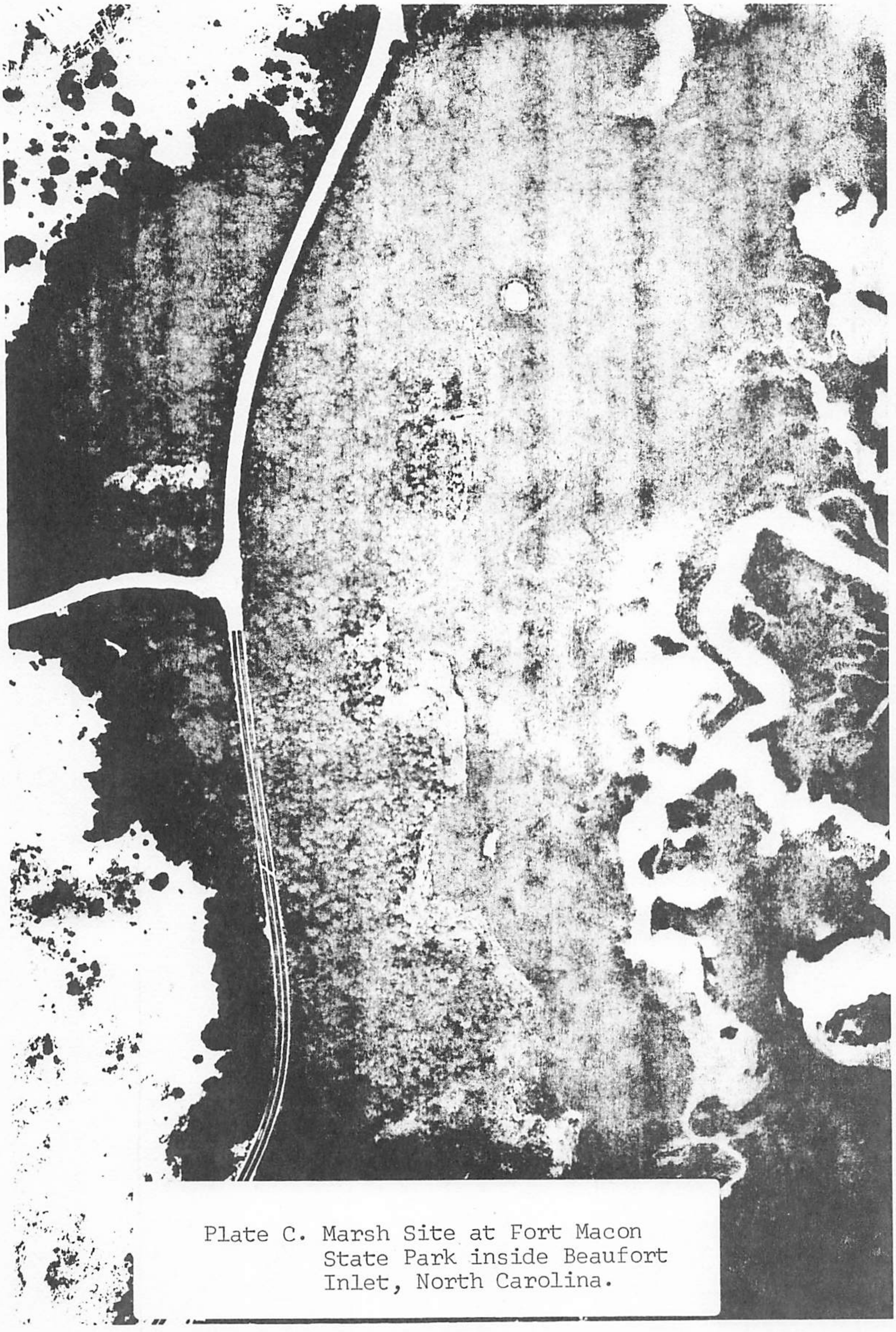

Plate C. Marsh Site at Fort Macon State Park inside Beaufort Inlet, North Carolina.

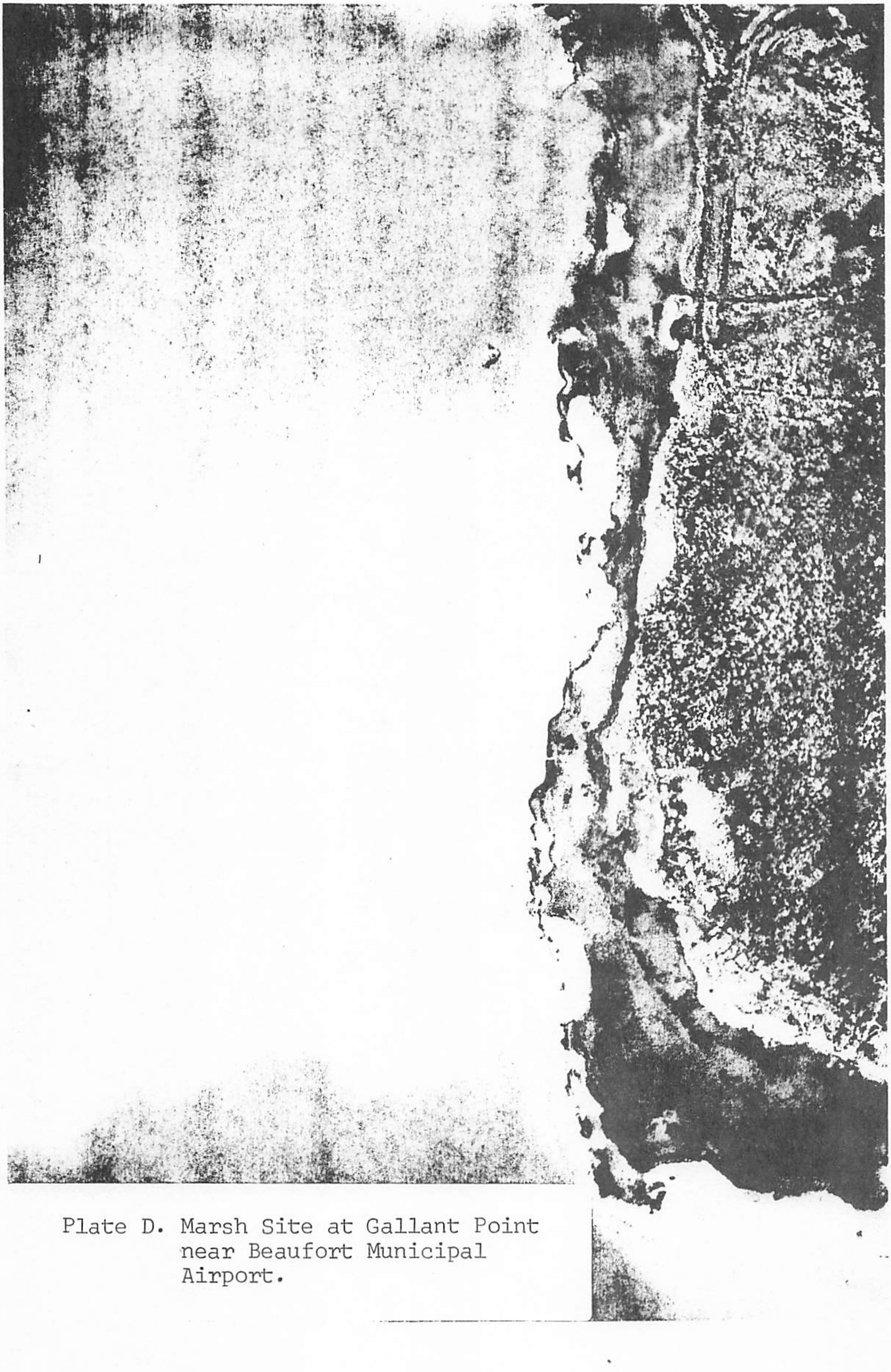

Plate D. Marsh Site at Gallant Point near Beaufort Municipal Airport.

NORTH CAROLINA: Ft. Macon (Site E)

Ft. Macon State Park (Carteret Co.) was chosen as one of two primary study sites for tidal saltmarshes in North Carolina. It is located on the eastern tip of Bogue Banks, the barrier island immediately west of Shackleford Banks and Cape Lookout and is separated from the mainland by Bogue Sound. In general the chain of barrier islands on the East Coast is oriented in a more or less north-south or northeast-southeast direction. Bogue Banks is an exception, with its long axis running east-west. This orientation is thought to account, at least in part, for the fact that this island is accreting rather than eroding on the seaward side.

Tidal communication is somewhat restricted inside Beaufort Inlet. The mean range of tide outside the inlet is 3.9 feet (119 cm) as compared to 3.1 feet (94 cm) just inside the inlet at the primary site. Farther inside along the coastal sound and river systems the mean range is typically 1.5 feet (46 cm) or less. The main tidal waterways do not become brackish, however, until well inland along the coastal river systems.

Extensive marshes of *Spartina alterniflora* are present behind vegetated dunes on the north side of Bogue Banks, and these marshes are particularly well developed in the vicinity of Ft. Macon. Most of the *S. alterniflora* is low to medium height but taller plants grow on the edges of the marsh channels and also at the upper limit of the marsh in several places. Narrow bands of saltmeadow (*Spartina patens* and *Distichlis spicata*) are sometimes present between saltmarsh cordgrass and the transition to upland or between saltmarsh cordgrass and stands of *Juncus roemerianus*. Black needlerush stands are a common feature and are particularly well developed in coves into the upland (Plate C). Scattered individuals of both *Iva frutescens* and *Baccharis halimifolia* grow near the upland border, but they do not form stands.

Several species of brackish marsh plants are frequently encountered in the uppermost reaches of the marsh. These include *Triglochin striata*, *Samolus parviflorus*, *Cladium jamaicense*, *Pluchea purpurascens*, *Scirpus robustus*, and *Fimbristylis castanea*. Their presence is attributed to ground water seepage from the upland moderating salinity.

The upland thicket is predominantly yaupon (*Ilex vomitoria*), wax myrtle (*Myrica cerifera*), Eastern red cedar (*Juniperus virginiana*), Southern red cedar (*J. silicicola*), poison ivy (*Rhus radicans*) and Virginia creeper (*Parthenocissus quinquefolia*) with frequent occurrences of supple jack (*Berchemia scandens*) and pepper-vine (*Ampelopsis arborea*). The poison ivy is common over most of the area, both as vines climbing in trees and as small erect plants on the ground. Occasional live oaks occur on higher ground, and where the zone of upland between the marsh and the road is the broadest, one can walk freely among yaupon, cedar, and live oak. For the most part, however, the thicket does not permit easy passage. *Zanthoxylem clavi-herculis*, *Celtis sp.*, *Morus rubra*, and *Persea palustris* also occur in the upland but are rare.

The transition zone is very narrow at this site, ranging from about one meter to about three meters wide on the transects. Uprooted, contorted *Juniperus* is a common feature of the upland border here, frequently occurring within the transition zone *per se*. The ULTZ and LLTZ were defined by the upper limits of marsh species and the lower limits of upland species, respectively, as follows:

	ULTZ	LLTZ
ES1	*Spartina alterniflora*	*Rhus radicans*; *Ipomoea sagittata*
EL1	*Samolus parviflorus*	*Juniperus sp.*; *Eupatorium serotinum*

	ULTZ	LLTZ
ES2	Cynanchum palustre	Juniperus sp.
ES3	Baccharis saplings; Triglochin striata	Rhus radicans
ES6	Triglochin striata	Rhus radicans
ES7	Triglochin striata; Samolus parviflorus	Iresine rhizomatosa
ES8	Cladium jamaicense	Iresine rhizomatosa
EL2	Fimbristylis castanea; Borrichia frutescens; Baccharis halimifolia	Iresine rhizomatosa
ES9	Cladium jamaicense	Rhus radicans; Iresine rhizomatosa

ES6 is unusual because the transect extends from the upland into a narrow band of marsh vegetation, then crosses an island of higher ground containing a mixture of marsh species (sea ox-eye and saltmeadow hay) and upland species (cedar and yaupon), plus Baccharis halimifolia. Below this the transect enters a stand of black needlerush.

There is no transition zone in terms of interdigitating marsh and upland plants on ES4 or ES5. On these transects and at several other similar locations at this site, a zone of essentially bare soil about two meters wide occurs between the upper limit of marsh plants and an abrupt increase in slope at the lower limit of upland. Crab burrows are present in this bare zone, and the soil is sandy with a pilled texture. The soil color becomes markedly darker closer to the upland. On both ES4 and ES5 the monospecific stand of low Spartina alterniflora ends roughly six meters below the upper limit of marsh species. Approaching the upland from the upper limit of pure S. alterniflora, Distichlis mixes in with the saltmarsh cordgrass, the number of saltmarsh cordgrass plants decreases, and those present become taller toward the upland. Distichlis drops out near the upland, leaving only a thin stand of tall (about 1 m) Spartina alterniflora plants on the lower edge of the bare zone. On HS5 a clump of Fimbristylis and a Baccharis sapling occur in the upper part of the bare zone. It is possible that the bare zone relates to a previous deposit of debris, but there was no evidence of it. A more likely factor is the shading of this zone afforded by the upland overstory. Although transition zones were recognizable on other transects, in general these were not heavily vegetated transition zones like those encountered at other study sites.

NORTH CAROLINA: Harkers Island (Site F)

Harkers Island (Carteret Co.) is about four miles long, varies from one-half mile to one mile in width, and has its long axis oriented more or less east-west. It is located north of Cape Lookout, between the mainland and Shackleford Banks (Figure 1). *Juncus roemerianus* marshes have developed along the north side and on the west end of the island. The site studied is the extensive *Juncus* marsh on Brooks Creek at the west end. The mean tidal range at the study site is 1.6 feet (49 cm).

The transects are located in the segment of marsh just northwest of the marina north of Rush Point. There have been modifications along most of the shoreline at Brooks Creek and it appears that these have reduced normal tidal drainage into the area of the transects. One transect (FL1) was run from a stand of yaupon (*Ilex vomitoria*) north of the marina into the *Juncus*. *Persea palustris*, *Myrica cerifera*, and *Sabal minor* also occur in the yaupon thicket, and *Rhus radicans* is common as a ground cover. The ULTZ on this transect is set at the upper limit of appreciable coverage by *Eleocharis rostellata* that extends from the marsh into the yaupon stand for a distance of about 2 1/2 meters. In the vicinity of the transect *Setaria geniculata* occurs with *E. rostellata* in the edge of the yaupon. The LLTZ is the lower limit of *Festuca rubra*, *Ipomoea sagittata*, and *Rhus radicans*, and is just above the lower limit of *Panicum virgatum*. The data shows *Rhus radicans* in three subsequent quadrats, but those plants were rooted on a hummock adjacent to the transect and hanging over it. The extensive stand of black needlerush begins at the lower edge of the *Panicum virgatum*. There is no *Iva* at the marsh border here, but scattered individuals do occur in the *Juncus*, along with *Lythrum lineare*, *Ipomoea sagittata*, *Cynanchum palustre*,

thicket, and *Rhus radicans* is common as a ground cover. The ULTZ on this transect is set at the upper limit of appreciable coverage by *Eleocharis rostellata* that extends from the marsh into the yaupon stand for a distance of about 2 1/2 meters. In the vicinity of the transect *Setaria geniculata* occurs with *E. rostellata* in the edge of the yaupon. The LLTZ is the lower limit of *Festuca rubra*, *Ipomoea sagittata*, and *Rhus radicans*, and is just above the lower limit of *Panicum virgatum*. The data shows *Rhus radicans* in three subsequent quadrats, but those plants were rooted on a hummock adjacent to the transect and hanging over it. The extensive stand of black needlerush begins at the lower edge of the *Panicum virgatum*. There is no *Iva* at the marsh border here, but scattered individuals do occur in the *Juncus*, along with *Lythrum lineare*, *Ipomoea sagittata*, *Cynanchum palustre*,

Kosteletskya virginica and E. rostellata. The Eleocharis is extremely hard to see when mixed with Juncus and probably has higher coverage values in the marsh than the data indicates. In the vicinity of the fastland, hummocks bearing Baccharis, Persea, Juniperus, Myrica, and Panicum virgatum frequently occur in the Juncus stand.

The other transect (FL2) was run from a beach ridge populated by live oak (Quercus virginiana) through the Juncus stand and ultimately into a panne of Spartina alterniflora. The ridge is bordered by marsh on three sides and by strand and small stands of S. alterniflora growing at the edge of the open water of the adjacent sound. The vegetation on the highest elevation of the ridge consists of Quercus virginiana, Pteridium aquilinum, Aristida stricta, Scleria triglomerata, and some Spartina patens. At lower elevations one finds Ilex vomitoria, saplings of Q. virginiana, Uniola laxa, and Spartina patens. In more open areas Strophostyles sp. and S. patens grow together in abundance.

The ULTZ on FL2 is set at the upper limit of Juncus roemerianus and Distichlis, which is just above the upper limit of Borrichia frutescens. The lower limits of Uniola laxa and Strophostyles-S. patens are just above the ULTZ. Spartina patens shows a bimodal distribution on this transect. It is present in the vicinity of the LLTZ and immediately above the ULTZ as an upland component (in ascending percent coverages with ascending elevation), but is absent from most of the transition zone on this transect.

The LLTZ is the lower limit of a stand of Festuca rubra in Spartina patens, Distichlis, Juncus, and Borrichia. Kosteletskya virginica, Cynanchum palustre, Elymus virginicus, and Smilax bona-nox also occur in the transition zone in the general vicinity.

A stand of *Juncus* mixed with *Distichlis*, *Borrichia*, and *Spartina patens* occurs immediately below the transition zone. The transect ends about eighteen meters below the LLTZ in the panne of *Spartina alterniflora* that has developed in the center of this arm of the marsh.

NORTH CAROLINA: Gallant Point (Site G)

Gallant Point (Carteret Co.) is the tip of a triangular neck of land that juts into the Newport River just north of Beaufort. The Beaufort-Morehead City Airport and an abandoned fish meal plant cover most of this tract of land, but there is a band of woodland thicket between the airport and a fringing marsh of Spartina alterniflora that extends from northwest of the fish meal plant around Gallant Point to the cove of Gable Creek. Gallant Point is located about 2.8 miles north of the entrance to Beaufort Inlet and is situated near a major shipping channel; hence the mean tidal range of 3.0 feet (91 cm) is only slightly less than that of Ft. Macon just inside the inlet.

The two transects are located northeast of Gallant Point, and begin in a thicket of Myrica cerifera, poison ivy, Campsis radicans, and Ampelopsis arborea. Yucca aloifolia, though not common here, occurs in the upland on both transects. The habitat for this species is listed in the Manual of the Flora of the Carolinas (Radford, Ahles, and Bell, 1968) as sand dunes and edges of brackish marshes. A stand of Yucca found at the edge of the marsh on GL1 appears to be growing within the upper edge of the marsh, but a closer look reveals that the large trunks of these plants extend along the ground from points well into the upland where they are rooted, and become erect at the marsh border. The stand of Yucca on GL2 is several meters into the upland and is being shaded out by the Myrica and Prunus serotina.

Over most of the periphery of this marsh the transition to upland is abrupt due to the presence of a distinct berm. In some places Juncus roemerianus is immediately adjacent to the berm and occasionally various combinations of Spartina patens, Borrichia frutescens, Cynanchum palustre, and Iresine rhizomatosa abut the upland vegetation at the berm. Transition zones are therefore poorly developed at this locality and the transects selected document such vegetational transitions as do exist.

On GL1 the transition zone is very narrow, covering a horizontal distance of about half a meter. The ULTZ was selected coincident with the upper limit of Iva frutescens and the uppermost coverage of Spartina patens; the LLTZ was set at the lowermost limit of trailing poison ivy within the Iva stand. This narrow band of Iva with Borrichia and S. patens beneath gives way to a local stand of Borrichia, S. patens, and Distichlis that is about ten meters wide, below which is the stand of Spartina alterniflora. Salicornia virginica and Limonium carolinianum occur in salt pannes within the S. alterniflora community. The tide enters this section of low marsh laterally because direct drainage is impeded by a long shell berm lying along the shoreline in front of the transect.

On GL2 there is a single large Quercus virginiana within a thicket of Myrica cerifera fringed by Baccharis halimifolia. The ULTZ was fixed by the upper limit of coverage by Distichlis and S. patens. Numerous dead trailing stems of poison ivy are present at the ULTZ along with traces of Festuca rubra and live oak seedlings. The LLTZ lies about 5.5 m below the ULTZ at the base of an outlying Baccharis less than a meter in distance below the lower limit of the poison ivy (the small stems of the poison ivy have numerous rhizoids but are rooted only in the upland). Scattered Iva shrubs also occur within the transition zone. Below the LLTZ a zone of Juncus and Iva mixed with Distichlis and S. patens extends for about 7 m before changing to a stand of Borrichia and Distichlis which extends an additional 5 m and ends in a pure stand of Borrichia on a low berm. Juncus resumes within the Borrichia until the stand of Spartina alterniflora is reached at the lower end of the transect.

NORTH CAROLINA: Goose Bay (Site GG)

Goose Bay is at the mouth of the North River, just north of the west end of Harkers Island (Carteret Co.). The specific site where the two transects were run is on the south side of a small embayed tributary to Goose Bay and immediately east of Crow Hill Road which crosses the tributary just above the head of the bay. Tidal flow is admitted to the embayment through a highway culvert which impedes the flow to some extent and may reduce the tidal range at the site. Otherwise, the mean tidal range is probably the same as at Harker's Island.

The upland is a stand of tall loblolly pines. The pineland is lower on GGL1 than on GGL2 and on the former a thin coverage of Juncus roemerianus occurs beneath the pines (estimated at 5% to 10% coverage overall). Ilex glabra and Myrica cerifera are in the understory on GGL1, and small amounts of Pteridium aquilinum, Aristida sp., and Vaccinium spp. are present, too. GGL2 has a steeper gradient and the more xerophytic species have high coverage values in the upland, especially Pteridium and Aristida. Immediately above the marsh in the vicinity of GGL2 is a local association of lowland woody species including Nyssa sylvatica, Clethra alnifolia, Ilex glabra, Lyonia lucida, Persea palustris, and Magnolia virginiana.

Juncus roemerianus and local patches of Limonium carolinianum dominate the marsh immediately below the transition zone here, but in the vicinity of GGL1 the Juncus is mixed with Spartina patens and Borrichia frutescens in its upper edge, and a small enclave of S. patens-Distichlis occurs in the Juncus between the locations of the two transects. The relatively rare Agalinis maritima was observed growing with S. patens and Distichlis here. Below the black needlerush stands, colonies of Spartina alterniflora form the "heart" of this embayed marsh.

On both transects the ULTZ is marked by the upper limit of high coverage by Juncus roemerianus and the lower limit of Pinus taeda stems. On GGL2 there is no Juncus above the ULTZ. The low coverage of Juncus that occurs within the pine stand on GGL1 was disregarded in placing the ULTZ. The LLTZ on GGL1 is set by the lower limit of young stems of Ilex vomitoria. Myrica cerifera, Smilax sp., and Spartina patens also occur with the Juncus in the transition zone on this transect. The LLTZ on GGL2 is about a half meter seaward of the lowest upland plant (Myrica cerifera) at the point where high coverage of Juncus begins. This position was chosen rather than the lower limit of Myrica because the occurrence of Juncus here is spotty, and none occurs in the half-meter between the Myrica and the point where high coverage of Juncus begins.

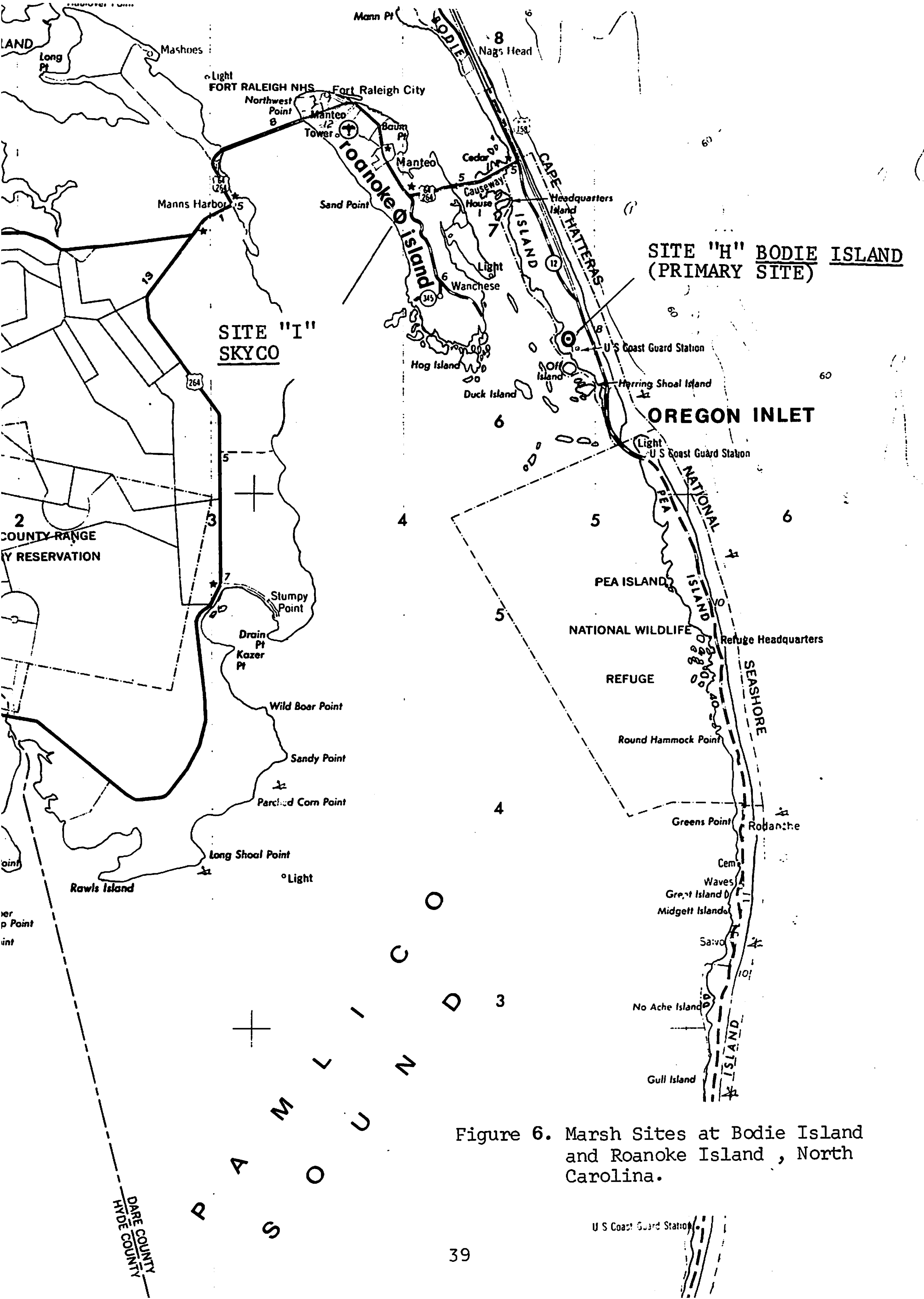

Figure 6. Marsh Sites at Bodie Island and Roanoke Island , North Carolina.

Plate E. Marsh Site at Bodie Island

NORTH CAROLINA: Bodie Island (Site H)

Bodie Island (Dare County) includes the lower portion of a long, narrow barrier peninsula extending from the Back Bay region of extreme southern coastal Virginia into northern North Carolina. The lower portion appears to have been separated from the upper portion of this peninsula by an ephemeral inlet into Albemarle Sound around the beginning of the 19th century. Bodie Island borders tidally restricted Roanoke Sound for most of its length and reaches Albemarle Sound to the north and Pamlico Sound to the south. Oregon Inlet separates it from Pea Island to the south.

The marshes occurring throughout most of the inner coastal sound environment away from the barrier islands are low salinity types, chiefly monospecific stands of Juncus roemerianus having very extensive coverage in front of the low-lying uplands. The astronomical tide range within the sounds is less than 0.5 feet (15 cm) but transient wind-induced tides appear to cause significant inundation of the marsh borders primarily during the passage of extratropical lows during winter.

Most of the marshes immediately behind the barrier islands are fairly narrow and have received a considerable amount of either wind-blown or "washover" sands from the barrier beaches which complicates interpretation of marsh origin and development. At the present time, new intertidal marsh seems to be forming only along the flood tidal deltas and channel levees lying just inside Oregon Inlet. Elsewhere, including the study site, we found the marshes on Bodie Island to be poorly drained features with little systematic change in surface elevation as one approaches the upland. It appears likely that many of them are relic marshes associated with former barrier inlets that have since closed.

The complexity of the tidal regime inside Oregon Inlet was illustrated by a two-month series of tidal measurements taken at Blossie Creek near the study site (approximately 2.5 miles northwest of Oregon Inlet). The mean daily range during November-December averaged less than one foot (30 cm) amid considerable longer period variation in response to local winds and atmospheric pressure changes. Thus determination of tidal datums by comparison with other tide stations outside the area was made much more difficult.

The primary study site selected for the area is located just north of the Bodie Island Lighthouse on a nature preserve managed by the U.S. National Park Service (Figure 6). The marsh here fronts Roanoke Sound and extends to a thicket of wax myrtle and yaupon bordering a pine-forested sand ridge. In 1963 the marsh was diked and ditched by the Park Service as part of a mosquito control program. Proposed filling of impounded areas was prevented, however, by a storm which breached the dikes shortly after their completion. Later it was reported that the marsh vegetation had not changed as a result of the modifications (Cooper and Waits, 1973) and no attempts have been made to restore the dikes.

Juncus roemerianus occupies most of the lower marsh at this site, particularly in the vicinity of the creek heads (Plate E). A stand of Spartina alterniflora occurs within a large salt pond northeast of the immediate study area. Above the creek heads continuous stands of Juncus change to patches of Juncus within a saltmeadow of Spartina patens and Distichlis. Farther inland the saltmeadow includes a mixed assemblage of brackish species such as Kosteletskya virginica, Solidago sempervirens, Lythrum lineare, Fimbristylis castanea, and Eleocharis rostellata. These species characterize the so-called "marginal" type of marsh described by Cooper and Waits (1973) in a previous study at this location. In addition, Typha angustifolia and T. domingensis were found along with stands of Iva in the high marsh. Juncus frequently reappears in a zone at the edge of the upland thicket and is frequently present in the transition zone.

The delineation of the marsh to upland transition at the Bodie Island site posed greater difficulties than at any other site in our study. Part of the difficulty derived from strictly logistical problems encountered while attempting to penetrate the extremely dense vegetation of the thicket border comprised of Myrica cerifera, Rhus radicans, Rosa palustris, Smilax sp., and Parthenocissus quinquefolia, with scattered Baccharis halimifolia, Ilex vomitoria, Persea palustris, Amelanchier canadensis, and Prunus serotina. At the seaward edge of the thicket the central problem consisted of a random element introduced among plant distribution patterns as a result of uneven topographic relief. The latter appears to be due to erosion or in some instances, decomposition of multiple soil horizons so that adjacent marsh plants often were rooted in dissimilar layers at different elevations. There were scattered incursions of marsh vegetation, especially Juncus, Iva and Baccharis, within the upland thicket in addition to numerous hummocks containing Myrica, Baccharis, and Rhus radicans at scattered points within the marsh. Consequently the transition zone might well be described as broken over much of this area.

Because of the time involved in clearing thicket vegetation, the upland ends of the study transects were started just inside the first zone of Myrica rather than in the yaupon-Myrica zone deeper inside the thicket. For similar reasons, coverage estimates were made for some of the trees and shrubs on the last five transects in place of the usual basal area measurements.

The ULTZ is defined by the upper limit, of Juncus (HL1, HS4), Eleocharis rostellata (HS1, HS5), Spartina patens (HS6, HS7, HL2, HS8), or a combination of these (HS2, HS3). For the most part, upland ground cover was very sparse --usually just poison ivy on otherwise bare ground under Myrica shade.

The LLTZ on all transects except HS2 is marked by the lower limit of Rhus radicans. On three transects (HS1, HL1, and HS4) the lower limit of the poison ivy occurs in the Juncus stand of the marsh border. On all the other transects the lower limit of poison ivy occurs either in marginal type marsh (HS7, HL2, HS8), in marginal type with Iva and Baccharis (HS3, HS5), or in a stand of Iva and Typha spp. (HS6). There is no Juncus zone near the thicket on HS7, but in most cases where the LLTZ is in marginal type marsh, or some variation thereof, the transect has passed through a zone of Juncus and poison ivy above the LLTZ. In the case of HS2, the LLTZ is marked by the lower limit of scattered Myrica cerifera, Baccharis and Iva growing with E. rostellata, S. sempervirens, K. virginica, S. patens and dead Andropogon virginicus. Several large patches of Andropogon occur in the marginal type marsh, but nearly all of the plants were dead. Mikania scandens, Calystegia sepium, Setaria geniculata, Boehmeria cylindrica, Rubus sp., Thelypteris palustris, Osmunda regalis and Smilax laurifolia also occur in the transition zone.

Eleocharis rostellata was not reported from this marsh in the paper by Cooper and Waits (1973). However, they did report E. tuberculosa as a component of marginal type marsh. Eleocharis tuberculosa was not found in this present study, but E. rostellata was found in abundance in the marginal type marsh and also in the transition zone.

NORTH CAROLINA: Skyco (Site I)

Two transects were run in a black needlerush marsh located just north of Skyco on the west side of Roanoke Island. Although site-specific tidal data are lacking, this is an area having a very small astronomical tide range (average less than 15 cm) but with apparently significant meteorological tides. Salinities are variable but generally brackish. Drainage into the marsh is by way of a channelized gut. The marsh covers about .06 sq. mi. (0.2 sq. km.) in a cove immediately north of the pier ruins at Ashbee Harbor. It is separated from Croatan Sound in the more northerly part by a sandy berm along the shoreline; wave action from the sound is eroding marsh peat of a Big Cordgrass stand south of the berm.

The upland is dominated by a stand of loblolly pines of several age classes. The oldest trees appear to be about 50 years old, but the majority are estimated to be between twenty and thirty years. The understory is comprised of small sweet gums and occasional red bays and sweet bays. *Myrica cerifera* and *Nyssa sylvatica* var. *biflora* occur more commonly on the immediate border with the marsh. The marsh appears to be vegetated solely by black needlerush at first appraisal, but in spots saltmeadow has developed to a very limited extent. It is best developed in the northeast "corner" of the cove (Transect IL1) where seaside mallow, seaside goldenrod, *Typha angustifolia* and *T. domingensis* occur with it. At the upper limit of the transect transition zone *Distichlis* and *Spartina patens* (saltmeadow) intergrade with small saplings of *Rosa palustris* and a stand of *Solidago graminifolia*. The *Solidago* continues upward beneath the upland cover. The second transect (IL2) passes from black needlerush (*Juncus roemerianus*) into sawgrass (*Cladium jamaicense*) with *S. graminifolia* into cane (*Arundinaria gigantea*) under upland cover. One small loblolly and one *Myrica cerifera* sapling occur in this transition.

Several other kinds of transitions were observed here at the Skyco marsh, proceeding from the marsh toward the upland:

1. Black needlerush directly (without sawgrass) into cane under pine-black gum cover.

2. Black needlerush directly into cane and *S. graminifolia* (without sawgrass) under upland cover.

3. Black needlerush into cane, *S. graminifolia*, *Panicum virgatum* under upland cover.

4. Black needlerush into sawgrass with some *Smilax bona-nox*, under pine-*Myrica* cover.

5. Black needlerush into sawgrass with *Ipomoea sagittata* and *S. graminifolia* (without cane) to upland. A common type.

6. Black needlerush into *Ipomoea sagittata* to upland cover.

7. Black needlerush under shade of *Myrica* with *Panicum virgatum*, *Rosa palustris*, *Solidago sempervirens*, and poison ivy.

8. *Spartina patens* and *Distichlis* into *S. graminifolia* and cane under upland cover.

9. *Spartina patens* into *Smilax bona-nox*, poison ivy, *Rubus*, and *Setaria geniculata* under upland cover.

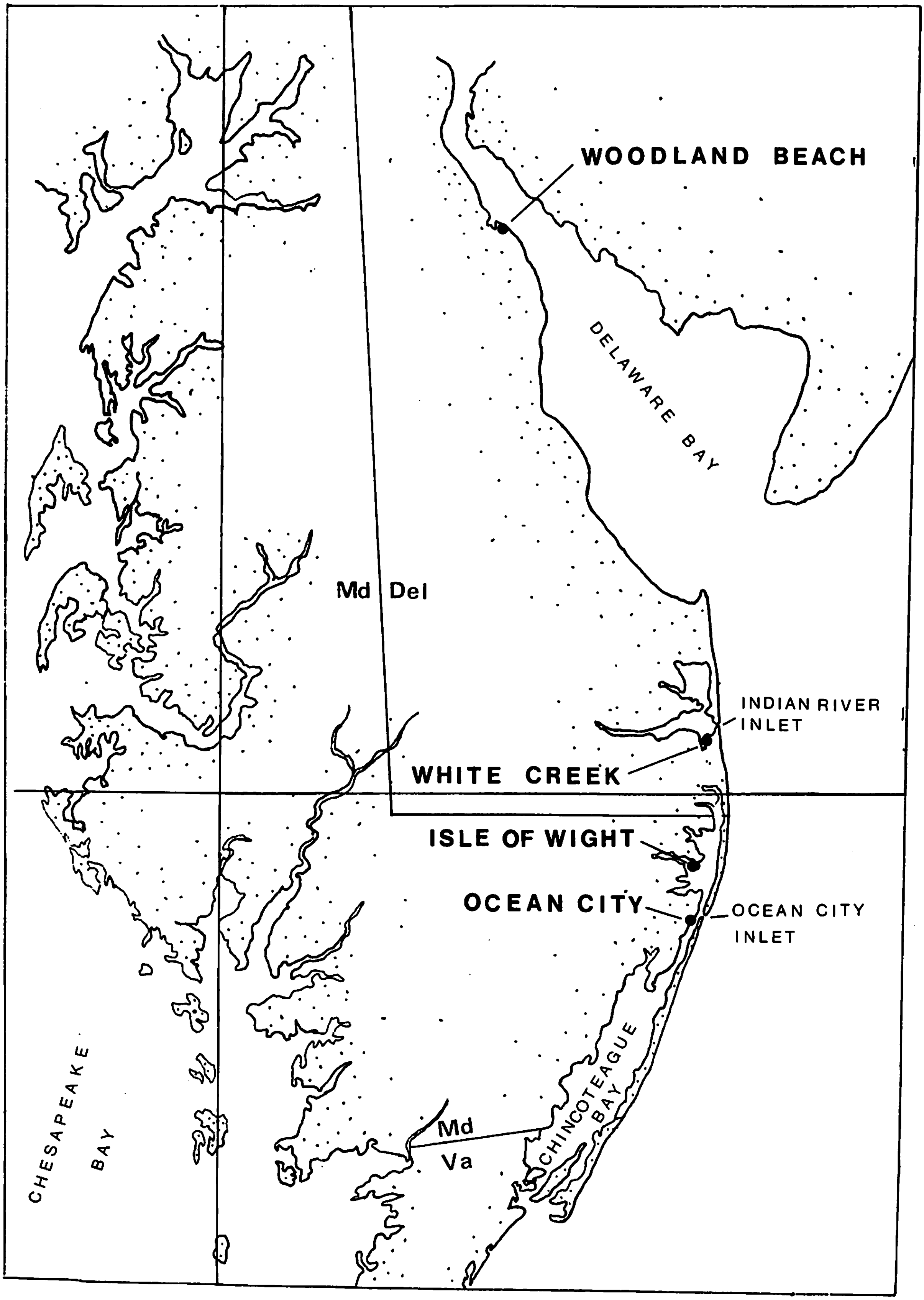

Figure 7. Maryland and Delaware Marsh Sites.

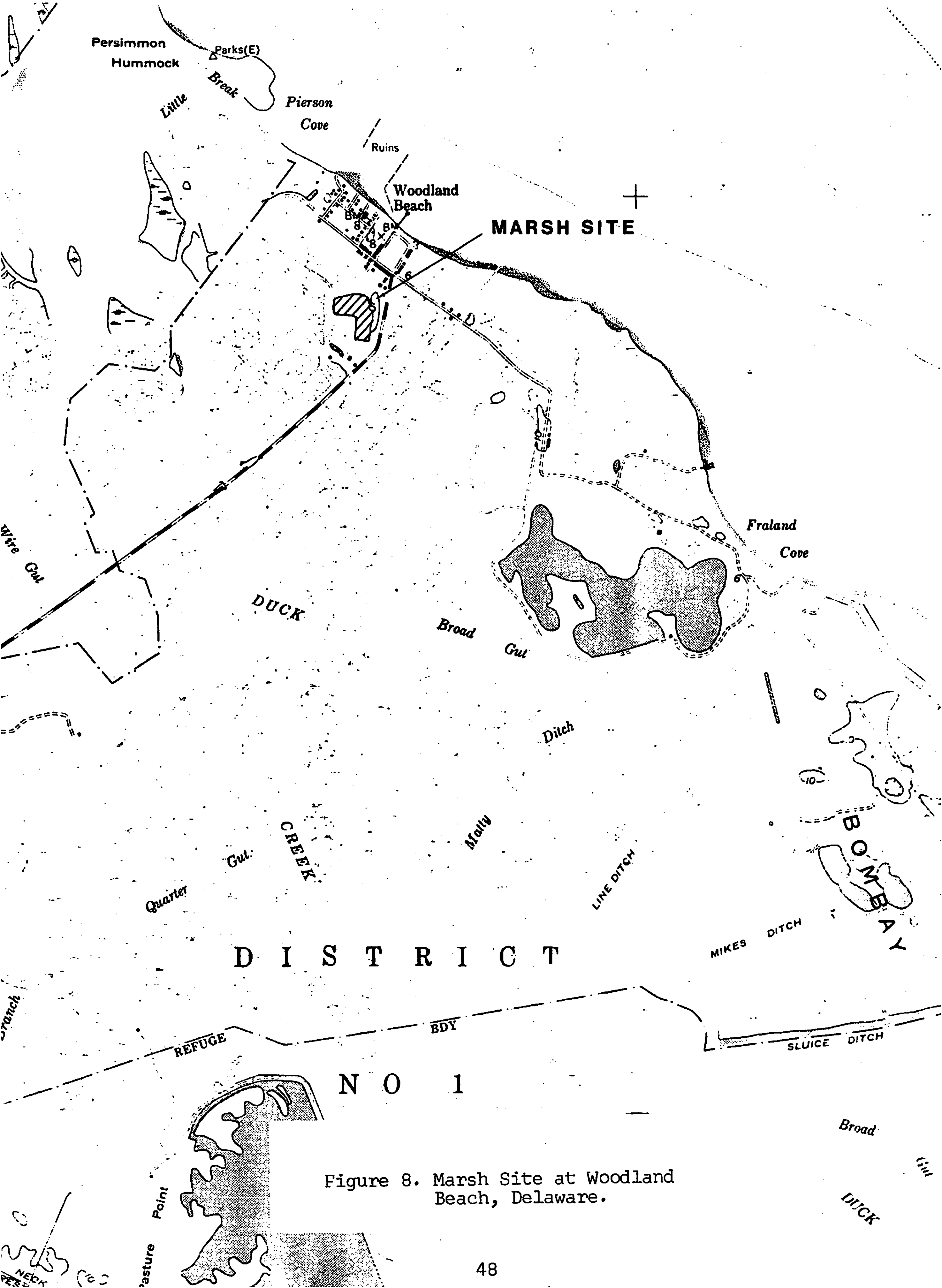

Figure 8. Marsh Site at Woodland Beach, Delaware.

DELAWARE: Woodland Beach (Site L)

Woodland Beach (Kent Co.) is the primary site for Delaware Bay. This is one of few sites observed in this region in which the border between marsh and wooded upland is not entirely dominated by *Phragmites australis*, a cosmopolitan grass that invades spoil mounds and marsh borders, especially on disturbed sites. The study area is on the south edge of the village of Woodland Beach a few miles north of the Bombay Hook National Wildlife Refuge. Extensive *Spartina alterniflora* marshes occur throughout this region. The marsh that was studied is a small cove marsh about 150 M in diameter that is almost completely surrounded by upland. The marsh receives tidal waters by way of a drainage channel that ultimately communicates with Delaware Bay by way of two inlets known as Sluice Race and Big Break. The mean tidal range just outside these inlets is 5.9 feet (180 cm), the largest range in the vicinity of any of the sites in this study.

The stand of upland woods is very open, and some of the trees are large. The dominant trees are tulip poplar (*Liriodendron tulipifera*), hickory (*Carya cordiformis*, *C. tomentosa*, *C. glabra*), sweet gum (*Liquidambar styraciflua*), wild black cherry (*Prunus serotina*). Persimmon (*Diospyros virginiana*) and Northern red oak (*Quercus rubra*) are also present. *Viburnum prunifolium* is the most common understory shrub. Poison ivy is present but not abundant, but Japanese honeysuckle, on the other hand, is rampant. Colonies of ferns occur scattered through the woodland, *Thelypteris hexagonoptera* being commonly encountered.

Ten transects were run, spaced roughly twenty meters apart. On four transects (LL1, LS1, LS2, and LS3), scattered shrubs of *Baccharis halimifolia* mark the ULTZ. On two transects (LS4 and LS7) the ULTZ is marked by *Atriplex patula*; on two others (LS6 and LS8) by the upper limit of the *Phragmites* stand; on LL2 by Solidago sempervirens; and on LS5 by S. sempervirens and A. patula. Baccharis, A. patula, S. sempervirens, and Phragmites are all capable of growth in upland habitats but are clearly part of the transition zone sequence at this site.

On all but one transect the LLTZ is set at the lower limit of trailing Japanese honeysuckle. When possible the ends of these vines were traced back to the point at which they were rooted, a distance which varied from one-half to two meters toward the upland. The exception for placement of the LLTZ was on LS5 where persimmon marks the lower limit. Much of the transition zone at this site is sparsely vegetated, with shoots of Japanese honeysuckle trailing on exposed mud.

Immediately below the transition zone one encounters small stands of Scirpus robustus, Spartina cynosuroides, Typha angustifolia, or various combinations of these three, or Phragmites, bare soil, or Spartina alterniflora directly. The center of the marsh is S. alterniflora except along channel levees where Amaranthus cannabinus, Atriplex patula, and Polygonum sp. occur. The lateness of the season made identification of the Polygonum difficult, but it is probably either P. ramosissimum var. atlanticum or P. prolificum.

DELAWARE: White Creek (Site M)

Two transects were run in an embayed marsh of _Spartina alterniflora_ on White Creek, a tributary to Indian River Bay. Tidal connection is through Indian River Inlet, about 2 1/2 miles north. The study site is located on the west side of Cedar Neck, north of Ocean View, Delaware, at Murray Landing on property belonging to the Jacob Boyer Hocker family. Like most of coastal Delaware, White Creek is marked by numerous channels dredged into the upland, often by way of small marsh-bordered tributaries, to create boat access. There is also some minor ditching of a limited extent. The transects are near the channel dredged at Murray Landing, but it appears this site receives tidal influence directly from White Creek.

A stand of loblolly pine dominates the upland on this point of land, and the trees are estimated to be about thirty-five years old. A thicket of _Smilax_ and poison ivy occurs beneath the pines, and a few individuals of hardwood species are scattered through the pine stand. The transition zone is about eight meters wide on ML1 and five meters wide on ML2, and the upper limit is marked by the upper limit of a stand of _Baccharis halimifolia_. _Panicum virgatum_ and _Phragmites_ occur with the _Baccharis_ and have their highest coverage values in the portion of the _Baccharis_ stand nearer the upland. _Spartina patens_ enters beneath the _Baccharis_ at a lower elevation. The lower limit of the _Baccharis_ stand marks the lower limit of the transition zone. A small outlying _Baccharis_ was discounted on ML1, and the large _Baccharis_ at 14.7 M on ML2 is growing on a hummock at the base of a large loblolly pine stump. Narrow zones of _Iva frutescens_ and saltmeadow lie between the _Baccharis_ and the saltmarsh cordgrass.

Numerous large sawed pine stumps with robust-stemmed poison ivy growing on the hummocks at their bases occur in the transition zone. Only one live loblolly was observed (a tree about 20 cm in diameter near ML2). A few live *Juniperus virginiana* were observed in the transition zone and a few dead pine and cedar stems were observed in the *Iva* zone. This suggests that the tidal regime may have changed here in recent years, perhaps due to dredging.

In terms of the vegetation present and the type of coastal environment to which White Creek belongs, it is very similar to the two Maryland sites described in the pages that follow. Although White Creek is physically in the state of Delaware, it bears little resemblance to the primary site for Delaware Bay at Woodland Beach.

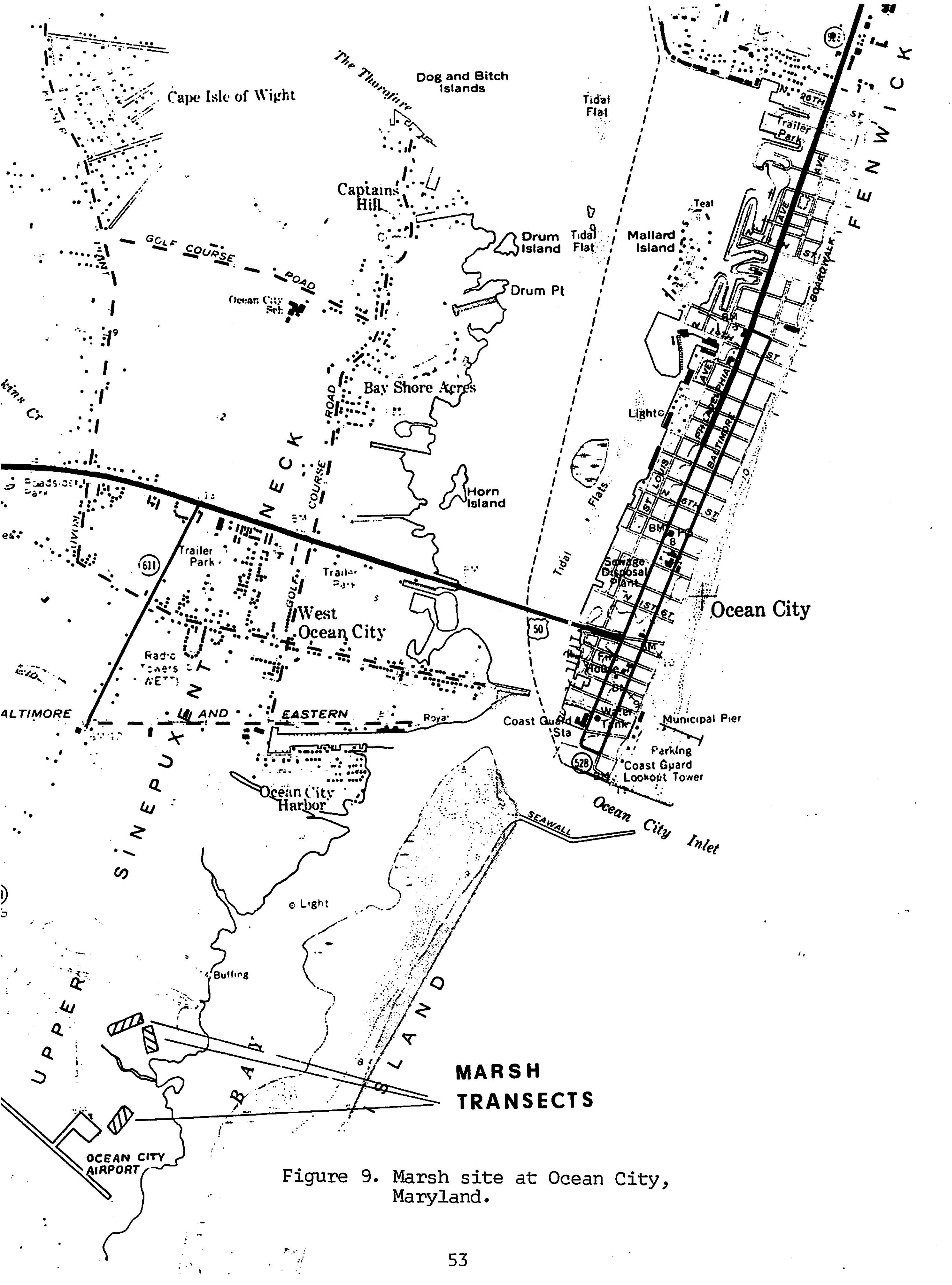

Figure 9. Marsh site at Ocean City, Maryland.

MARYLAND: Ocean City (Site N)

The primary site for Maryland is located on Upper Sinepuxent Neck (Worcester Co.) just north of the Ocean City Airport and south of the community of West Ocean City and the Ocean City Harbor. Part of this study area is on property owned by the city (NS1 and NL1), and the rest on property owned by Ronald C. Pulliam and Doyle Graybarck. The marshland here is part of a complex of embayed Spartina alterniflora marshes that have developed along the mainland across Sinepuxent Bay from Assateague Island. Like practically all coastal marshes in this region, this site has been mosquito ditched. Tidal connection is through Ocean City Inlet, about 1.5 miles to the north, between Assateague and Fenwick Islands. The mean tidal range at the site is approximately 2.2 feet (67 cm) based on the assumption of uniform tidal characteristics within Sinepuxent and Isle of Wight Bays.

Upland vegetation of NS1 and NL1 consists of a thin rim of loblolly pine, Myrica, and Prunus serotina between the marsh and a cleared area adjacent to the airport, whereas transects NS2 through NS6 begin in a relatively extensive stand of lowland hardwoods to the north. Transects NS7 through NS8 originate in a stand of tall loblolly pines on a point of land bordering the marsh. The elevational gradient from the marsh to the upland is particularly low at the locus of these last three transects.

Baccharis halimifolia forms a distinct band between the upland and the marsh over most of the border here. Iva is present below the Baccharis, either as spotty individuals or as distinct stands. Below the Iva is a saltmeadow of Spartina patens and Distichlis that varies considerably in width, the maximum width attained along the transects being about twelve meters. The saltmeadow gives way to an expanse of low Spartina alterniflora, with medium height plants bordering the mosquito ditches. Numerous decayed pine stumps occur in the upper part of the S. alterniflora but are absent in the saltmeadow.

The limits of Baccharis halimifolia determine both the ULTZ and the LLTZ in places where it is sufficiently abundant. Baccharis is unique among the plants occurring in the transition zone because the marsh border appears to be its optimum habitat in this region. It characteristically occurs along the marsh border as a distinct belt surrounding both saline and brackish marshes. In autumn the belt is highly visible due to the eye-catching silver-white pappus which appears on the pistillate plants. This species also occurs in upland habitats --old fields, thickets, open woods, and low, mesic disturbed areas in the coastal plain and Piedmont, but generally only as sporadic individuals. In contrast, most other plants present in the transition zone find their optimum habitat, or one at least as suitable, in either the upland or the marsh depending upon their type.

The upper limit of the Baccharis zone marks the ULTZ on all but NS2, NL2, and NS8. On NS2 the ULTZ is the upper limit of Spartina patens and Distichlis spicata in the vicinity of scattered Baccharis. On NL2 and NS8 the ULTZ is set at the upper limit of the S. patens stand under shade of loblolly pine, above the upper limit of Baccharis.

With the following exceptions, the LLTZ on the transects is marked by the lower limit of Baccharis halimifolia: NS3--lower limit of Festuca rubra; NS7 and NL2--lower limit of trailing Lonicera japonica.

MARYLAND: Isle of Wight (Site O)

Two transects were run in a fringing marsh of Spartina alterniflora on the west side of Isle of Wight. The site faces the St. Martin River, a tributary to Isle of Wight Bay. There are no specific tidal data available at this site; however, the mean range of tide in Isle of Wight Bay at a point 2.5 miles east of the site is approximately 67 cm (2.2 feet). The tidal range just outside Ocean City Inlet four miles to the south is 104 cm (3.4 feet), indicating that tidal communication is fairly unrestricted. As there is very little freshwater inflow, salinities are only slightly reduced in the embayment except within the smaller tributaries.

The upland above the transects is an open oak woodland with very little understory. A dense stand of Uniola laxa covers extensive areas of the ground. Loblolly pine, Myrica cerifera, Quercus phellos, sweet gum and black gum also occur in the upland near the marsh.

Panicum virgatum occurs commonly in the upper portion of the transition zone along with Baccharis and Phragmites, the latter being common in coves. On transect OL1 the upper limit of the transition zone is defined by the upper limit of the Baccharis-Panicum stand and on OL2 by the upper limit of Panicum virgatum and Spartina patens. Several young Nyssa sylvatica (averaging about 10 cm diam. at the base) occur sporatically in the transition zone but are not thriving; in every case it was noted that the tops of these trees are dead. On both transects the lower limit of the transition zone is the lower limit of the Baccharis stand. Some Iva is present below the Baccharis and a saltmeadow zone about 15 m wide lies between it and the Spartina alterniflora marsh. Remnants of old tree stumps are visible in the Iva zone in the vicinity.

SUMMARY AND CONCLUSIONS

Transition Zone Widths

The average transition zone width at the five primary sites ranges from about 1.5 m at Fort Macon to about 17 m at Bodie Island, North Carolina, with intermediate values of 3 m at Finney Creek, Virginia, 4.5 m at Ocean City, Maryland, and 3.5 m at Woodland Beach, Delaware. The exceptionally wide transition zones at Bodie Island are related to the topographic irregularities present at this site, the latter stemming from its probable existence as a relic marsh (site description, p. 41). Excluding Bodie Island, the average transition zone width for the remaining primary sites is approximately 3 m, increasing to 3.5 m for primary and secondary sites combined.

Flora of the Transition Zone

The flora of the transition zone, based on data obtained at seventy transects at fourteen study sites, totals 85 species of vascular plants. However, nearly half of these species were present in the transition zone at only one of the fourteen sites and are for the most part upland or brackish marsh species.

The upland components of the flora are of two types: 1) species present both in the transition zone and the adjacent upland woods, and 2) species occurring in the transition zone but generally not present in the adjacent wooded upland. The best example of the first category is *Rhus radicans* which occurs both in the upland and in the transition zone at every site; its abundance in the transition zone appears to be correlated to its abundance in the upland. This kind of pattern was also observed in *Lonicera japonica* and *Juniperus virginiana*. In the second category of upland components of the transition zone flora, the species are those for which the optimum habitat is an open and sunny one. *Calystegia sepium*, *Ipomoea sagittata*, *Asparagus officinalis*, and *Teucrium canadense* are examples of the latter category.

The herbaceous marsh components of importance in the transition zone were species of the high marsh, particularly Spartina patens, Distichlis spicata, Juncus roemerianus, and J. gerardi. On occasion a few individuals of S. alterniflora were present within the transition zone, generally near the lower limit. Limonium carolinianum occurred only rarely and none of the three species of Salicornia were observed other than in the marsh proper. The woody marsh species that played a role in the transition zone were Iva frutescens and Borrichia frutescens. In the literature Iva and Baccharis are frequently lumped together as "saltbushes" of the marsh border, but in this study, based on distributional patterns relative to elevation, Iva was treated as a marsh species, in contrast to the treatment of Baccharis as a transition zone species. Iva sometimes marked the ULTZ, but the Iva belt generally reached its upper limit in the lower part of the transition zone and its lower limit in the marsh proper, and sometimes was entirely below the transition zone.

Six species occurred in the transition zone at all five subregions: Rhus radicans, Baccharis halimifolia, Distichlis spicata, Spartina patens, Panicum virgatum, and Iva frutescens. Each of these species occurred in slightly more than half of the fourteen sites and all were frequently vegetationally significant where they occurred. Ten more species were present in the transition zone in at least three of the five subregions and were vegetationally important in at least one subregion: Elymus virginicus, Festuca rubra, Lonicera japonica, Myrica cerifera, Setaria geniculata, Eleocharis rostellata, Fimbristylis castanea, Juncus roemerianus, Scirpus americanus, and Solidago sempervirens. Table 1 contains a breakdown by subregion of the species that are vegetationally significant in the transition zone of at least one of the study sites.

Table 1. Vegetational significance[1] of species in the transition zone at the five subregions. The symbol X signifies vegetational significance at one or more sites within a subregion although absence of the symbol does not imply absence of the species.

Species	Del.	Md.	Va.	N.C.(N)	N.C.(S)
Spartina patens	X	X	X	X	X
Distichlis spicata	X	X	X	X	X
Panicum virgatum	X	X	X	X	X
Solidago sempervirens		X	X	X	
Scirpus americanus		X	X		
Eleocharis rostellata				X	X
Fimbristylis castanea				X	X
Juncus roemerianus				X	X
Atriplex patula	X		X		
Scirpus robustus	X				
Phragmites communis	X				
Spartina cynosuroides	X				
Juncus gerardi			X		
Cladium jamaicense				X	
Kosteletskya virginica				X	
Thelypteris palustris				X	
Osmunda regalis				X	
Borrichia frutescens					X
Iva frutescens		X	X	X	X
Baccharis halimifolia	X	X	X	X	
Lonicera japonica	X	X	X		
Festuca rubra		X	X		X
Rhus radicans			X	X	X
Solidago graminifolia			X	X	
Calystegia sepium			X	X	
Ipomoea sagittata				X	X
Uniola laxa		X			X
Juniperus virginiana			X		
Elymus virginicus			X		
Setaria geniculata			X		
Erechtites hieracifolia			X		
Teucrium canadense			X		
Iresine rhizomatosa					X
Arundinaria gigantea				X	
Mikania scandens				X	

[1]Vegetational significance for each species was based on its average coverage value per transect at each site.

Of the coastal saltmarshes studied, the transition zone flora at Finney Creek in Virginia was the most diverse (containing about 30 species) while the least diverse floras were found at Gallant Point and Goose Bay in North Carolina, and at White Creek in Delaware where fewer than 10 species occurred in the transition zone. The large number of species present at Finney Creek is primarily due to a significant contribution by upland annual weeds such as Lepidium virginicum, Bromus commutatus, Solanum americanum, Ambrosia artemisiifolia and Eupatorium capillifolium, plus the biennials Asparagus officinalis, Lactuca canadensis, and L. scariola. Less than one-fourth of the transition zone components at Finney Creek are marsh species as compared to about half at most other sites. The presence of upland weedy species at Finney Creek is probably a function of the immediate proximity of agricultural land and associated weedy field borders. At the other sites, none of which bordered cultivated land, the weedy species involved in the transition zone, with the exception of fireweed (Erechtites hieracifolia) were generally perennials, such as Teucrium canadense and Calystegia sepium. In addition to the numerous annual weeds present, perennial weeds were also a component of the transition zone flora at Finney Creek.

Species Important in Determining Transition Zone Limits

Three species were found to have broad geographical significance as markers of the upper limit of the transition zone (ULTZ): Distichlis spicata, Spartina patens, and Baccharis halimifolia; Juncus roemerianus frequently marked the ULTZ in both northern and southern North Carolina. Twelve other species were utilized in setting the ULTZ: Atriplex patula, Borrichia frutescens, Cladium jamaicense, Cynanchum palustre, Eleocharis rostellata, Fimbristylis castanea, Iva frutescens, Phragmites australis, Panicum virgatum, Solidago sempervirens, Samolus parviflorus, and Triglochin striata.

The lower limit of the transition zone (LLTZ) was most frequently marked by the lower limit of Festuca rubra, Lonicera japonica, Rhus radicans, and/or Baccharis halimifolia. Fourteen additional species were used in locating the LLTZ: Arundinaria gigantea, Calystegia sepium, Elymus virginicus, Eupatorium serotinum, Ilex vomitoria, Ipomoea sagittata, Iresine rhizomatosa, Juniperus spp., Lactuca spp., Myrica cerifera, Rosa palustris, Smilax bona-nox, Solidago graminifolia, and Setaria geniculata.

General Phytogeography of Species of Vegetational Significance in the Transition Zone

Nearly half of the species listed in Table 1 have a broad range of distribution[2] from the maritime provinces of Canada along the east coast of the United States to at least as far south as Florida. Some of these species are limited to a predominately coastal occurrence (denoted by "C"), while the remainder range significantly into inland states (denoted by "I") in addition to their coastal range. Some of the species range further south than Florida into subtropical or tropical America (denoted by "T").

The species of broad distribution are as follows:

Spartina patens	(C)
Iva frutescens	(C)
Distichlis spicata	(C,T)
Solidago sempervirens	(C,T)
Calystegia sepium	(I)
Eleocharis rostellata	(I)
Elymus virginicus	(I)
Erechtites hieracifolia	(I)
Juniperus virginiana	(I)
Osmunda regalis	(I)
Scirpus americanus	(I)
Teucrium canadense	(I)
Thelypteris palustris	(I)
Panicum virgatum	(I,T)
Phragmites australis	(I,T)
Rhus radicans	(I,T)
Scirpus robustus	(I,T)

[2] Ranges are based on Fernald, 1950; Hitchcock, 1950; Gleason and Cronquist, 1963; Radford, Ahles, and Bell, 1968; Duncan, 1974; and Harvill, et al., 1977.

Another type of distributional pattern is exhibited by the following list of species which have a predominately southern distribution ranging north from the tropics, subtropics, or Florida to reach their respective northern limits in various regions along the East Coast. The northern limits are cited by state with further delimitation by county or region within the state in those cases in which that information was available.

Ipomoea sagittata	(C)	North Carolina (Dare County)
Borrichia frutescens	(C)	Virginia; DC.
Arundinaria gigantea	(I)	Virginia
Cladium jamaicense	(C,T)	Virginia (City of Virginia Beach)
Iresine rhizomatosa	(I)	Maryland
Juncus roemerianus	(C)	Maryland
Fimbristylis castanea	(C,T)	New York (Long Island)
Kosteletzkya virginica	(C,T)	New York (Long Island)
Uniola laxa	(I)	New York (Long Island)
Baccharis halimifolia	(I,T)	Massachusetts
Lonicera japonica	(I)	Massachusetts
Setaria geniculata	(I,T)	Massachusetts
Spartina cynosuroides	(C)	Massachusetts

The four remaining species on the list have a primarily northern distribution ranging south from eastern Canada and reaching their southern limits along the east coast north of Florida, as follows:

Juncus gerardi	(C)	Virginia (City of Chesapeake)
Solidago graminifolia	(I)	North Carolina (Dare County)
Atriplex patula	(I)	South Carolina
Festuca rubra	(I)	North Carolina

Juncus gerardi is an interruptedly circumboreal species, Atriplex patula also occurs in Eurasia, and Festuca rubra in n. Europe and Greenland where it is a plant of the high marsh. Phragmites australis is cosmopolitan, an aggressive plant that is rapidly spreading in this country to the exclusion of more valuable marsh species.

Vegetational Patterns of the Transition Zone

Two kinds of abundance patterns are distinquishable as the upper limit of the transition zone is approached. In one, the coverage values for the marsh species defining the ULTZ very gradually taper off. In the other more common pattern, there is a relatively abrupt decrease in the percent coverage of the definitive species over a horizontal distance of roughly one-half to one meter from the ULTZ. Because of this the ULTZ was often found to be a reasonably discrete point rather than the last vestige of very gradually diminishing coverage values of marsh plants across the transition zone. This sharp change may occur in response to an abruptly changing environmental factor such as shading, ground slope, or frequency of inundation, or perhaps the attainment of some other discrete tolerance limit relating to soil factors or competition, or a combination of these factors.

In terms of physiognomy, three major types of vegetational patterns dominate the transition zone. The most typical involves herbaceous species (generally associated with woody vines and scattered *Baccharis*), with the ULTZ occurring just before upland trees and shrubs begin. The transition at Finney Creek typifies this pattern. Another less common pattern involves herbaceous components (with or without woody vines and scattered *Baccharis*) which continue for a short distance among the upland trees and shrubs. The latter pattern was found locally on Cedar Island, Harkers Island, and at Fort Macon. The third pattern features *Baccharis* occurring in a well-defined zone at the marsh border where it serves to delineate one or both of the transition zone limits. This pattern is particularly well developed at Ocean City and at White Creek. *Spartina patens*, often in conjunction with *Distichlis spicata*, frequently occurs beneath the *Baccharis*, and generally reaches its upper limit at or somewhat below the uppermost stems of *Baccharis*. The woody upland vine *Lonicera japonica* (Japanese honeysuckle) is also commonly present as a component of the ground cover beneath the *Baccharis*.

Baccharis apparently has a high light requirement and a tolerance for occasional inundation with saline water. Thus its habitat of best development is the transition zone between the upland and the marsh where the light requirement is met but where upland trees and shrubs are at a competitive disadvantage in terms of coping with the environmental factors associated with occasional inundation. Where _Baccharis_ occurs in the upland it is generally in successional habitats, such as old fields and field borders, where analysis of associated species indicates that it will ultimately be shaded out. On the other hand, its occurrence as a band along the border between the marsh and wooded upland in undisturbed situations is a continuing characteristic of the marsh border.

Elevations of Transition Zone Limits

The elevations of the transition zone limits at primary and secondary sites are summarized in Tables 2-6. At each of the five primary sites and at certain secondary sites having tidal bench marks nearby, the reference datum is mean high water. The elevations obtained at the remaining secondary sites are shown in parentheses in the tables and refer to an arbitrary datum made common to both transects at each site. In accordance with experimental design, the five primary sites feature between ten and eleven transect measurements at each site and thus contain the lead information for comparisons between subregions of the U.S. central Atlantic coast. The secondary site measurements were taken as a check on the consistency of plant distributions and limit elevations on transects at other locations in the subregion.

The results for the primary sites show that the elevations above MHW of the upper limit of the transition zone are generally more consistent than those corresponding to the lower limit. Sample standard deviations for the former average approximately $\pm$ 3 cm as opposed to an average of about $\pm$ 5 cm for the latter. Although this is a rather small difference, greater at some sites as opposed to others, it may reflect the irregular distribution of certain upland plants which are rooted at the border with the marsh but have a tendency to extend coverage in the direction of the marsh (e.g., _Lonicera japonica_).

One of the central aims of this investigation has been to determine if the upper limit of any marsh within a given coastal environment bears a constant elevational relationship to the tidal datum of mean high water. The results of our study do not conflict with that hypothesis. Taking the elevational means of the ULTZ as the most concise indicator of the marsh upper limit, we note that an elevation of approximately 40 cm MHW is typical of the tidally-restricted coastal sound environment as exemplified by the Bodie Island and Fort Macon sites whereas 60-70 cm MHW characterizes the tidally-open marsh and lagoon environments of Finney Creek and Ocean City. Finally, the results from the bay-estuarine environment at Woodland Beach (ULTZ = 34 cm MHW) are consistent with the previous findings of Boon, Boule, and Silberhorn (1977) in which the average upper limit of marshes in lower Chesapeake Bay was located at 29 cm MHW. In the latter study the ULM was determined at the median point of the transition zone, a point which is found slightly seaward of and lower than the ULTZ.

The chief factor differentiating marshes in the above coastal environments is, in our view, the degree of exposure to storm-induced tidal surge. Low atmospheric pressure and high wind stress accompanying tropical and extratropical storms are the principal contributors to locally high surge levels in bays, sounds, and the open ocean. However, the greatest concentration of these effects normally occurs in the ocean with the resultant surge waves then propagating through inlets and bay mouths into the interior waterways (Overland and Myers, 1976). Under these conditions, the impedance caused by a shallow inlet is certain to reduce the magnitude of the interior high water levels that would otherwise result from oceanic storms. Where the inlets are deep as on the Eastern Shore of Virginia, one should expect a higher frequency of inundation to result along the marsh borders inside these inlets as compared to those that are more restrictive.

Table 2. TRANSITION ZONE ELEVATION SUMMARY

FORT MACON SUBREGION - ELEVATIONS IN CM.

		(1) ULTZ	(2) LLTZ	(1)-(2)	datum
1.	Fort Macon, N.C.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
	EL1	33.6	37.2	- 3.6	MHW
	EL2	44.0	29.5	14.5	MHW
	ES1	37.0	32.2	4.8	MHW
	ES2	42.6	39.1	3.5	MHW
	ES3	37.2	30.4	6.8	MHW
	ES4	36.5	17.8	18.7	MHW
	ES5	36.1	25.5	10.6	MHW
	ES6	32.4	30.8	1.6	MHW
	ES7	31.9	30.7	1.2	MHW
	ES8	41.6	28.4	13.2	MHW
	ES9	44.4	31.0	13.4	MHW
	Mean	37.94	30.23	7.70	MHW
	Standard deviation	4.54	5.60	6.87	---
2.	Gallant Point, N.C.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
	GL1	44.9	37.0	7.9	MHW
	GL2	46.6	39.0	7.6	MHW
	Mean	45.8	38.0	7.8	MHW
3.	Harker's Island, N.C.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
	FL1	41.0	25.4	15.6	MHW
	FL2	44.8	29.5	15.3	MHW
	Mean	42.9	27.4	15.5	MHW
4.	Goose Bay, N.C.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
	GGL1	(44.0)	(35.5)	8.5	TBM @ GGL2
	GGL2	(52.2)	(30.6)	21.6	TBM @ GGL2
	Mean	(48.1)	(33.0)	15.1	TBM @ GGL2

Table 3. TRANSITION ZONE ELEVATION SUMMARY

BODIE ISLAND SUBREGION - ELEVATIONS IN CM.

1. Bodie Island, N.C.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
HL1	40.0	31.6	8.4	MHW
HL2	41.1	33.4	7.7	MHW
HS1	39.9	32.9	7.0	MHW
HS2	40.1	31.8	8.3	MHW
HS3	38.3	29.7	8.6	MHW
HS4	41.6	38.0	3.6	MHW
HS5	37.0	34.3	2.7	MHW
HS6	42.1	32.3	9.8	MHW
HS7	44.5	34.9	9.6	MHW
HS8	38.0	33.0	5.0	MHW
Mean	40.26	33.19	7.07	MHW
Standard deviation	2.20	2.23	2.48	---

2. Skyco, N.C.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
IL1	(63.1)	(61.8)	1.3	TBM @ IL2
IL2	(76.6)	(57.8)	18.8	TBM @ IL2
Mean	(69.8)	(59.8)	10.0	TBM @ IL2

Table 4. TRANSITION ZONE ELEVATION SUMMARY

WACHAPREAGUE SUBREGION - ELEVATIONS IN CM.

1. Finney Creek, Va.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
AL1	70.0	47.8	22.2	MHW
AL2	66.8	49.0	17.8	MHW
AS1	70.3	49.1	21.2	MHW
AS3	69.5	55.8	13.7	MHW
AS4	68.4	49.2	19.2	MHW
AS5	66.3	50.1	16.2	MHW
AS6	70.7	51.8	18.9	MHW
AS7	63.6	54.6	9.0	MHW
AS8	63.4	50.8	12.6	MHW
AS9	73.4	59.2	14.2	MHW
AS10	68.7	52.0	16.7	MHW
Mean	68.28	51.76	16.52	MHW
Standard deviation	3.04	3.47	3.92	---

2. Parramore Island, Va.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
BL1	83.8	57.5	26.3	MHW
BL2	86.0	57.4	28.6	MHW
Mean	84.9	57.4	27.5	MHW

3. Cedar Island, Va.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
CL1	66.2	45.7	20.5	MHW
CL2	62.4	46.4	16.0	MHW
Mean	64.3	46.0	18.3	MHW

4. Mosquito Creek, Va.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
DL1	52.6	38.5	14.1	MHW
DL2	51.4	44.3	7.1	MHW
Mean	52.0	41.4	10.6	MHW

Table 5. TRANSITION ZONE ELEVATION SUMMARY

OCEAN CITY SUBREGION - ELEVATIONS IN CM.

1. Ocean City, Md.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
NL1	60.6	34.2	26.4	MHW
NL2	71.2	57.4	13.8	MHW
NS1	60.2	40.0	20.2	MHW
NS2	62.4	52.6	9.8	MHW
NS3	61.2	52.6	8.6	MHW
NS4	61.7	53.0	8.7	MHW
NS5	59.4	46.4	13.0	MHW
NS6	64.6	55.2	9.4	MHW
NS7	63.0	56.3	6.7	MHW
NS8	63.1	53.6	9.5	MHW
Mean	62.74	50.13	12.61	MHW
Standard deviation	3.35	7.60	6.18	---

2. Isle of Wight, Md.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
OL1	(69.0)	(49.6)	19.4	TBM @ OL2
OL2	(70.0)	(51.3)	18.7	TBM @ OL2
Mean	(69.5)	(50.4)	19.1	TBM @ OL2

3. White Creek, Del.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum

No Elevation Data at White Creek.

Table 6. TRANSITION ZONE ELEVATION SUMMARY

DELAWARE BAY SUBREGION - ELEVATIONS IN CM.

1. Woodland Beach, Del.	(1) ULTZ	(2) LLTZ	(1)-(2)	datum
LL1	37.9	17.4	20.5	MHW
LS1	35.6	10.4	25.2	MHW
LS2	32.4	8.0	24.4	MHW
LS3	35.5	7.8	27.7	MHW
LS4	34.4	1.8	32.6	MHW
LS5	31.0	13.4	17.6	MHW
Mean	34.47	9.80	24.67	MHW
Standard deviation	2.47	5.34	5.29	---

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APPENDIX A

PLANT LISTS

PLANT LISTS

Explanation of Plant Lists

The plant lists presented in this report contain the species encountered along the study transects at each site visited. A separate list has been compiled for each of the five primary study areas including flora at both primary and secondary sites in each of the five areas. Each list has been subdivided into groups of species occurring within the upland, the transition zone, and the marsh proper. A final subdivision is used which separates the herbaceous plants (dominance indicated by percent ground cover estimates) from trees and shrubs (dominance indicated by basal area measurements). A few low-growing woody species (e.g., Rhus radicans) are listed under herbaceous plants.

The presence of a species in the upland or marsh at each site is indicated by an X placed in the appropriate column on the right side of the page. For those species occurring in the transition zone, a pair of numbers separated by a slash mark are entered in the columns. The first number is an estimate of relative abundance on a scale of ascending abundance values from one to five; the second is a frequency index equal to the number of transects in which the plant was observed. The total number of transects at a site is indicated in parentheses below the site name at the top of the columns. Where relative abundance was not determined for woody plants within the transition zone, an X is used to indicate their presence.

The plant list also introduces a system of code names devised for each plant on the basis of the first letter and following consonants in the respective generic and specific names. Following the name code are symbols in parentheses signifying habitat affinity for each species (Table 7). The assignment of one or more habitat codes to each species encountered in this study is based on field experience obtained during this study together with habitat data published in the *Manual of the Flora of the Carolinas* (Radford, Ahles, and Bell, 1968), *Gray's Manual of Botany*, 8th edition (Fernald, 1950), *Manual of the Grasses of the United States* (Hitchcock, 1950), *The Flora of Delaware and the Eastern Shore* (Tatnall, 1946), and *Tidal Wetlands Plants of Virginia* (Silberhorn, 1976). Nomenclature was based primarily on the *Manual of the Flora of the Carolinas*.

Among the transect data presented later in this report, certain species occasionally appear within the transition zone that are not usually regarded as typical of a transitional habitat (e.g., *Uniola laxa*) and hence were not given a T subscript in their habitat code. In some cases their presence may be due to local irregularities in topographic relief; in other cases further research may show that these plants merit reclassification as transition zone species.

Table 7. Plant Habitat Symbols

Symbol	
U	Upland, mesic to dry.
L	Low woods, including swamps and bottoms, shores, and swales.
M	Saltmarsh; species bearing this symbol may also occur in brackish marshes.
B	Brackish marsh; species bearing this symbol may also occur in freshwater marshes.
U_T, L_T, M_T, B_T	Any habitat symbol bearing the <u>subscript</u> T indicates a species that occurs both in the major habitat listed and in the transition zone between wooded upland and saltmarsh.
T	The transition zone as the habitat of greatest dominance of a species (*Baccharis halimifolia*).
D	Dunes (barrier islands); beaches.
F	Freshwater marshes.
H	Coastal hammocks.

PLANT LIST--BEAUFORT REGION, NORTH CAROLINA

I. UPLAND

A. Herbaceous Plants

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
Arn ggn (L/U)	Arundinaria gigantea		X		X
Ars str (U)	Aristida stricta				X
Ast trt (U)	Aster tortifolius				X
Dch dch (U)	Dichanthelium dichotomum		X		
Ely vrg (L_T/U_T)	Elymus virginicus			X	
Ept alb (U)	Eupatorium album		X		
Ept srt (U_T)	Eupatorium serotinum	X			
Fst rbr (U_T)	Festuca rubra		X		
Hyp hyp (U)	Hypericum hypericoides		X		
Ipm sgt (U_T)	Ipomoea sagittata	X	X		
Irs rhz (L_T)	Iresine rhizomatosa	X			
Jnc rmr (M_T)	Juncus roemerianus				X
Mlc mtc (U)	Melica mutica			X	
Rbs sp. (U)	Rubus sp.			X	
Rhs rdc (U_T/L_T)	Rhus radicans	X	X	X	X
Scl trg (U)	Scleria triglomerata		X		
Spr ptn (M_T/D)	Spartina patens	X	X		
Str umb (U_T/D)	Strophostyles umbellata		X		
Unl lxa (L)	Uniola laxa		X		X

I. UPLAND (cont'd.)

B. Woody Plants

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
1. Trees					
Ilx vmt (U)	Ilex vomitoria	X	X	X	X
Jnp sp. (U_T)	Juniperus sp.	X			
Nys syl (U/L)	Nyssa sylvatica				X
Pns tda (U/L)	Pinus taeda				X
Prn srt (U)	Prunus serotina			X	
Prs pls (L)	Persea palustris	X			
Qrc vrg (U)	Quercus virginiana	X	X	X	X
2. Shrubs					
Bcc hlm (T/U_T)	Baccharis halmifolia	X		X	
Clt aln (L/U)	Clethra alnifolia				X
Ilx glb (L)	Ilex glabra				X
Lyn lcd (L)	Lyonia lucida				X
Myr crf (U_T/L_T)	Myrica cerifera	X	X	X	X
Rhs rdc (U_T/L_T)	Rhus radicans	X	X	X	
Sbl mnr (L)	Sabal minor		X		
Vcc sp. (U)	Vaccinium sp.				X
Ycc alf (U/D)	Yucca aloifolia			X	
3. Vines					
Amp arb (L)	Ampelopsis arborea	X			

PLANT LIST--BEAUFORT REGION, NORTH CAROLINA (cont'd.)

B. Woody Plants

3. Vines (cont'd.)

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
Brc scn (L)	Berchemia scandens	X	X	X	
Cmp rdc (U/L)	Campsis radicans			X	
Lnc jpn (U_T)	Lonicera japonica			X	
Prt qnq (U_T)	Parthenocissus quinquefolia	X		X	
Sml b-n (U)	Smilax bona-nox	X	X		X
Vts rtn (L/U)	Vitis rotundifolia	X	X		

II. TRANSITION ZONE

A. Herbaceous Plants

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
Cld jmc (B_T)	Cladium jamaicense	3/2			
Cyn plś (M_T/H)	Cynanchum palustre	2/1	2/1		
Dst spc (M_T)	Distichlis spicata	2/3	3/1	3/2	
Elc rst (B_T)	Eleocharis rostellata		3/1		
Ely vrg (L_T/U_T)	Elymus virginicus		1/1		
Ept srt (U_T)	Eupatorium serotinum	2/1			
Fmb cst (B_T)	Fimbristylis castanea	2/1		3/1	
Fst rbr (U_T)	Festuca rubra		5/2	3/1	
Ipm sgt (U_T)	Ipomoea sagittata	1/1	4/1		1/1
Irs rhz (L_T)	Iresine rhizomatosa	3/5			
Jnc rmr (M_T)	Juncus roemerianus		5/2	2/1	4/2
Lmn crl (M)	Limonium carolinianum	1/2			

PLANT LIST--BEAUFORT REGION, NORTH CAROLINA (cont'd.)

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
II. TRANSITION ZONE					
A. Herbaceous Plants (cont'd.)					
Pnc vrg (U_T/B_T)	Panicum virgatum		5/1		
Psp vgn (B)	Paspalum vaginatum		2/1		
Rhs rdc (U_T/L_T)	Rhus radicans	3/6	3/1	4/2	
Sml prv (B_T/F)	Samolus parviflorus	2/4			
Spr alt (M)	Spartina alterniflora	2/2			
Spr ptn (M_T/D)	Spartina patens	3/5	2/1	5/2	3/1
Str gnc (U_T)	Setaria geniculata		1/1		
Trg str (B_T)	Triglochin striata	2/4			
Unl lxa (L)	Uniola laxa				3/2
B. Woody Plants					
1. Trees					
Ilx vmt (U)	Ilex vomitoria	X/2	3/1		1/1
Jnp sp. (U_T)	Juniperus sp.	3/2			
2. Shrubs					
Bcc hlm (T/U_T)	Baccharis halimifolia	2/4	1/1		
Brr frt (M_T)	Borrichia frutescens (coverage)	2/3	3/1		1/1
Iva frt (M_T)	Iva frutescens		1/1	2/1	
Myr crf (U_T/L_T)	Myrica cerifera	1/2	3/1	1/1	2/2

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
B. Woody Plants					
2. Shrubs (cont'd.)					
Rhs rdc (U_T/L_T)	Rhus radicans	1/4	1/1	1/1	
Sbl mnr (L)	Sabal minor (coverage)		3/1		
3. Vines					
Sml b-n (U)	Smilax bona-nox				1/1
III. MARSH					
A. Herbaceous Plants					
Ast tnf (B)	Aster tenuifolius	X	X	X	
Cld jmc (B_T)	Cladium jamaicense	X			
Cyn pls (M_T/H)	Cynanchum palustre	X	X		
Dst spc (M_T)	Distichlis spicata	X	X	X	X
Elc alb (B)	Eleocharis albida	X			
Elc rst (B_T)	Eleocharis rostellata		X		
Fmb cst (B_T)	Fimbristylis castanea	X	X		
Ipm sgt (U_T)	Ipomoea sagittata (trace)	X	X		X
Jnc rmr (M_T)	Juncus roemerianus	X	X	X	X
Kst vrg (B_T)	Kosteletskya virginica	X			
Lmn crl (M)	Limonium carolinianum	X			X
Lyt lnr (B)	Lythrum lineare	X			
Rhs rdc (U_T/L_T)	Rhus radicans (trace)		X		

		FT. MACON (11T)	HARKERS IS. (2T)	GALLANT PT. (2T)	GOOSE BAY (2T)
III. MARSH					
A. Herbaceous Plants (cont'd.)					
Scr rbs (B_T)	Scirpus robustus	X			
Sda lnr (B)	Suaeda linearis	X			X
Slc vrg (M)	Salicornia virginica	X		X	
Sld smp (B_T/D)	Solidago sempervirens				X
Sml prv (B_T/F)	Samolus parviflorus	X			
Spr alt (M)	Spartina alterniflora	X	X	X	X
Spr ptn (M_T/D)	Spartina patens	X	X	X	X
Trg str (B_T)	Triglochin striata	X			
B. Woody Plants					
Brr frt (M_T)	Borrichia frutescens	X	X	X	X
Iva frt (M_T)	Iva frutescens	X	X	X	X

PLANT LIST--BODIE ISLAND AND ROANOKE ISLAND, NORTH CAROLINA

		BODIE IS. (10T)	ROANOKE IS. (2T)
I. UPLAND			
A. Herbaceous Plants			
Arn ggn (L/U)	Arundinaria gigantea		X
Cyp flc (B/L)	Cyperus filicinus	X	
Elc rst (B_T)	Eleocharis rostellata (trace)	X	
Ely vrg (L_T/U_T)	Elymus virginicus	X	
Fst rbr (U_T)	Festuca rubra	X	
Hyd sp. (L)	Hydrocotyle sp.	X	
Kst vrg (B_T)	Kosteletskya virginica	X	
Oen frt (U_T/L_T)	Oenothera fruticosa	X	
Osm rgl (L_T)	Osmunda regalis	X	
Ptr aql (U)	Pteridium aquilinum		X
Rbs sp. (U)	Rubus sp.	X	
Rhs rdc (U_T/L_T)	Rhus radicans	X	X
Scr rbs (B_T)	Scirpus robustus	X	
Sld grm (L_T)	Solidago graminifolia		X
Sld smp (B_T/D)	Solidago sempervirens	X	
Spr ptn (M_T/D)	Spartina patens (trace)	X	
Thl pls (L/F)	Thelypteris palustris	X	
B. Woody Plants			
1. Trees			
Nys syl (U/L)	Nyssa sylvatica		X
Pns tda (U/L)	Pinus taeda		X
Prn srt (U)	Prunus serotina	X	

		BODIE IS. (10T)	ROANOKE IS. (2T)
B. Woody Plants			
1. Trees (cont'd.)			
Prs pls (L)	Persea palustris	X	X
2. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia	X	
Ilx vmt (U)	Ilex vomitoria	X	
Iva frt (M_T)	Iva frutescens (trace)	X	
Myr crf (U_T/L_T)	Myrica cerifera	X	X
Rsa pls (L)	Rosa palustris	X	X
3. Vines			
Lnc jpn (U_T)	Lonicera japonica		X
Prt qnq (U_T)	Parthenocissus quinquefolia	X	
Rhs rdc (U_T/L_T)	Rhus radicans	X	X
Sml sp.	Smilax sp.		X
Sml b-n (U)	S. bona-nox	X	
Sml hsp (L)	S. hispida		X
Sml rtn (U)	S. rotundifolia	X	
II. TRANSITION ZONE			
A. Herbaceous Plants			
And vrg (L)	Andropogon virginicus var. abbreviatus	1/1	
Arn ggn (L/U)	Arundinaria gigantea		3/1
Asc inc (B_T/L)	Asclepias incarnata	1/3	

II. TRANSITION ZONE

A. Herbaceous Plants (cont'd.)

		BODIE IS. (10T)	ROANOKE IS. (2T)
Ast sbl (B)	Aster subulatus	1/1	
Bhm cyl (L_T)	Boehmeria cylindrica	1/1	
Cld jmc (B_T)	Cladium jamaicense		5/1
Cly spm (U_T/L_T)	Calystegia sepium	3/5	
Cyp flc (B/L)	Cyperus filicinus	1/1	
Dst spc (M_T)	Distichlis spicata	3/9	5/1
Elc rst (B_T)	Eleocharis rostellata	5/10	
Ern ggn (L)	Erianthus giganteus	1/1	
Fmb cst (B_T)	Fimbristylis castanea	1/1	3/2
Fst rbr (U_T)	Festuca rubra	2/1	
Hbs msc (B)	Hibiscus moscheutos	1/1	
Ipm sgt (U_T)	Ipomoea sagittata		4/2
Jnc rmr (M_T)	Juncus roemerianus	5/8	3/2
Kst vrg (B_T)	Kosteletskya virginica	3/9	3/2
Lnc jpn (U_T)	Lonicera japonica		1/1
Lyt lnr (B)	Lythrum lineare	2/4	
Mkn scn (L_T)	Mikania scandens	3/7	3/2
Oen frt (L_T/U_T)	Oenothera fruticosa	1/1	
Osm rgl (L_T)	Osmunda regalis	3/4	
Pnc vrg (U_T/B_T)	Panicum virgatum		3/1
Rbs sp. (U)	Rubus sp.	2/2	
Rhs rdc (U_T/L_T)	Rhus radicans	5/10	3/2
Rsa pls (L)	Rosa palustris		3/1

		BODIE IS. (10T)	ROANOKE IS. (2T)
II. TRANSITION ZONE			
A. Herbaceous Plants (cont'd.)			
Scr rbs (B_T)	Scirpus robustus	2/7	2/1
Sld grm (L_T)	Solidago graminifolia		5/2
Sld smp (B_T/D)	Solidago sempervirens	3/9	3/1
Spr ptn (M_T/D)	Spartina patens	5/9	5/2
Str gnc (U_T)	Setaria geniculata	1/2	
Thl pls (B/L)	Thelypteris palustris	3/4	
Typ sp.	Typha sp.		1/1
Typ ang (B/F)	Typha angustifolia	2/4	2/1
Typ dmn (B/F)	Typha domingensis	2/3	2/1
B. Woody Plants			
1. Trees			
Aml cnd (L/U)	Amelanchier canadensis	1/1	
Pns tda (U/L)	Pinus taeda		X/1
2. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia	2/6	
Iva frt (M_T)	Iva frutescens	2/6	
Myr crf (U_T/L_T)	Myrica cerifera	2/4	1/1
Rsa pls (L)	Rosa palustris	1/1	
3. Vines (based on coverage)			
Prt qnq (U_T)	Parthenocissus quinquefolia	1/1	
Sml b-n (U)	Smilax bona-nox	2/2	

		BODIE IS. (10T)	ROANOKE IS. (2T)
B. Woody Plants			
3. Vines (cont'd.)			
Sml lrf (L)	Smilax laurifolia	1/1	
III. MARSH			
A. Herbaceous Plants			
Asc inc (B_T/L)	Asclepias incarnata	X	
Brr frt (M_T)	Borrichia frutescens	X	
Cld jmc (B_T)	Cladium jamaicense		X
Dst spc (M_T)	Distichlis spicata	X	X
Elc rst (B_T)	Eleocharis rostellata	X	
Fmb cst (B_T)	Fimbristylis castanea	X	X
Hbs msc (B)	Hibiscus moscheutos	X	
Jnc rmr (M_T)	Juncus roemerianus	X	X
Kst vrg (B_T)	Kosteletskya virginica	X	X
Lyt lnr (B)	Lythrum lineare	X	
Mkn scn (L_T)	Mikania scandens	X	
Scr amr (B_T)	Scirpus americanus	X	
Sld smp (B_T/D)	Solidago sempervirens	X	
Spr ptn (M_T/D)	Spartina patens	X	X
Str gnc (U_T)	Setaria geniculata (trace)	X	
Typ dmn (B/F)	Typha domingensis	X	X
Rhs rdc (U_T/L_T)	Rhus radicans (trace)	X	

		BODIE IS. (10T)	ROANOKE IS. (2T)
III. MARSH (cont'd.)			
B. Woody Plants			
1. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia	X	
Iva frt (M_T)	Iva frutescens	X	
Myr crf (U_T/L_T)	Myrica cerifera	X	
Rhs rdc (U_T/L_T)	Rhus radicans (trace)	X	

PLANT LIST--MARYLAND

		OCEAN CITY (10T)	ISLE OF WIGHT (2T)
I. UPLAND			
A. Herbaceous Plants			
Crx sp.	Carex sp.	X	X
Elp crl (U)	Elephantopus carolinianus		X
Fst rbr (U_T)	Festuca rubra	X	
Jnc crc (L)	Juncus coriaceus		X
Jnc dch (U/L)	Juncus dichotomus		X
Lnc jpn (U_T)	Lonicera japonica	X	
Mtc rpn (U/L)	Mitchella repens		X
Pnc agr (B/L)	Panicum agrostoides		X
Pnc vrg (B_T/U_T)	Panicum virgatum	X	X
Rbs sp. (U)	Rubus sp.	X	X
Rhs rdc (U_T/L_T)	Rhus radicans	X	
Sld smp (B_T/D)	Solidago sempervirens	X	
Spr ptn (M_T/D)	Spartina patens		X
Unl lxa (L)	Uniola laxa	X	X
B. Woody Plants			
1. Trees			
Aml sp.	Amelanchier sp.	X	X
Ilx opc (U)	Ilex opaca	X	X
Lqd sty (L/U)	Liquidambar styraciflua		X
Mls ang (U/L)	Malus angustifolia	X	
Nys syl (U/L)	Nyssa sylvatica	X	
Pns tda (U/L)	Pinus taeda	X	X

		OCEAN CITY (10T)	ISLE OF WIGHT (2T)
B. Woody Plants			
1. Trees (cont'd.)			
Prn srt (U)	Prunus serotina	X	
Qrc flc (L)	Quercus falcata var. pagodaefolia	X	
Qrc phl (L)	Quercus phellos	X	X
Qrc ngr (L)	Quercus nigra	X	
2. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia	X	
Ilx glb (L/U)	Ilex glabra	X	
Myr crf (U_T/L_T)	Myrica cerifera	X	X
Myr htr (L)	M. heterophylla	X	
Rhs rdc (U_T/L_T)	Rhus radicans	X	
Vbr dnt (L)	Viburnum dentatum	X	
3. Vines			
Lnc jpn (U_T)	Lonicera japonica	X	
Sml sp.	Smilax sp.	X	X
Sml rtn (U)	S. rotundifolia		X
Vts sp.	Vitis sp.	X	
II. TRANSITION ZONE			
A. Herbaceous Plants			
Crx hmt (L_T)	Carex hormathodes(?)		2/2
Dch sp. (U)	Dichanthelium sp.	2/1	

PLANT LIST--MARYLAND (cont'd.)

II. TRANSITION ZONE

A. Herbaceous Plants (cont'd.)

		OCEAN CITY (10T)	ISLE OF WIGHT (2T)
Dst spc (M_T)	Distichlis spicata	5/10	3/2
Elc rst (B_T)	Eleocharis rostellata	1/1	
Fmb cst (B_T)	Fimbristylis castanea	2/1	
Fst rbr (U_T)	Festuca rubra	3/5	3/1
Hbs msc (B)	Hibiscus moscheutos		3/1
Jnc dch (U/L)	Juncus dichotomus		2/1
Jnc rmr (M_T)	Juncus roemerianus	3/1	
Lnc jpn (U_T)	Lonicera japonica	5/7	
Phr ast (M_T/L_T)	Phragmites australis	2/1	
Pnc vrg (B_T/U_T)	Panicum virgatum	3/1	5/2
Rbs sp. (U)	Rubus sp.	1/1	2/1
Rhs rdc (U_T/L_T)	Rhus radicans	1/1	
Scr amr (B_T)	Scirpus americanus		3/2
Sld smp (B_T/D)	Solidago sempervirens	2/2	4/2
Spr alt (M)	Spartina alterniflora	1/2	
Spr ptn (M_T/D)	Spartina patens	5/9	5/2
Unl lxa (L)	Uniola laxa	2/1	3/2

B. Woody Plants

1. Trees

		OCEAN CITY (10T)	ISLE OF WIGHT (2T)
Nys syl (U/L)	Nyssa sylvatica		3/1
Pns tda (U/L)	Pinus taeda		2/1

		OCEAN CITY (10T)	ISLE OF WIGHT (2T)
B. Woody Plants (cont'd.)			
2. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia	3/10	3/2
Iva frt (M_T)	Iva frutescens	1/6	1/1
Myr crf (U_T/L_T)	Myrica cerifera	1/4	2/2
Rhs rdc (U_T/L_T)	Rhus radicans	1/1	1/1
3. Vines			
Lnc jpn (U_T)	Lonicera japonica	1/1	
Sml sp.	Smilax sp.	1/1	
4. Seedlings and small saplings			
Bcc hlm (T/U_T)	Baccharis halimifolia	1/2	1/1
Iva frt (M_T)	Iva frutescens	2/2	
Myr crf (U_T/L_T)	Myrica cerifera	2/3	
III. MARSH			
A. Herbaceous Plants			
Atr ptl (B_T/U_T)	Atriplex patula	X	
Dst spc (M_T)	Distichlis spicata	X	X
Fst rbr (U_T)	Festuca rubra	X	
Lmn crl (M)	Limonium carolinianum	X	X
Scr amr (B_T)	Scirpus americanus		X
Slc erp (M)	Salicornia europaea	X	X
Spr alt (M)	Spartina alterniflora	X	X
Spr ptn (M_T/D)	Spartina patens	X	X

III. MARSH (cont'd.)

B. Woody Plants

		OCEAN CITY (10T)	ISLE OF WIGHT (2T)
Bcc hlm (T/U_T)	Baccharis halimifolia (seedlings/saplings)	X	X
Iva frt (M_T)	Iva frutescens	X	X
	I. frutescens seedlings	X	

PLANT LIST--DELAWARE

		WOODLAND BEACH (10T)	WHITE CREEK (2T)
I. UPLAND			
A. Herbaceous Plants			
All vnl (U)	Allium vineale	X	
Ath asp (L)	Athyrium asplenioides	X	
Ept rgs (U)	Eupatorium rugosum	X	
Lnc jpn (U_T)	Lonicera japonica	X	
Onc sns (L)	Onoclea sensibilis	X	
Pnc vrg (B_T/U_T)	Panicum virgatum		X
Rbs sp. (U)	Rubus sp.	X	
Rhs rdc (U_T/L_T)	Rhus radicans	X	X
Tcr cnd (L_T/D)	Teucrium canadense	X	
Thl pls (B/L)	Thelypteris palustris	X	
B. Woody Plants			
1. Trees			
Cry crd (L/U)	Carya cordiformis	X	
Dsp vrg (U)	Diospyros virginiana	X	
Lqd sty (L/U)	Liquidambar styraciflua	X	
Pns tda (U/L)	Pinus taeda		X
Prn srt (U)	Prunus serotina	X	
Qrc phl (L)	Quercus phellos		X
2. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia		X
Rhs rdc (U_T/L_T)	Rhus radicans	X	X

		WOODLAND BEACH (10T)	WHITE CREEK (2T)
B. Woody Plants			
2. Shrubs (cont'd.)			
Vbr dnt (L)	Viburnum dentatum	X	
Vbr prn (L)	V. prunifolium	X	
3. Vines			
Cmp rdc (U/L)	Campsis radicans	X	
Lnc jpn (U_T)	Lonicera japonica	X	
Prt qnq (U_T)	Parthenocissus quinquefolia	X	
Sml sp.	Smilax sp.		X
Sml glc (L/U)	S. glauca	X	
Sml hsp (L)	S. hispida	X	
Vts rpr (L)	Vitis riparia	X	
II. TRANSITION ZONE			
A. Herbaceous Plants			
All vnl (U)	Allium vineale	1/1	
Atr ptl (B_T/U_T)	Atriplex patula	3/6	
Dst spc (M_T)	Distichlis spicata		3/1
Ely vrg (L_T/U_T)	Elymus virginicus	1/1	
Lnc jpn (U_T)	Lonicera japonica	5/10	
Phr ast (M_T/L_T)	Phragmites australis	4/2	4/2
Pnc vrg (B_T/U_T)	Panicum virgatum		4/2
Rhs rdc (U_T/L_T)	Rhus radicans	1/1	2/1
Rmx crs (U)	Rumex crispus	1/1	

		WOODLAND BEACH (10T)	WHITE CREEK (2T)
II. TRANSITION ZONE			
A. Herbaceous Plants (cont'd.)			
Rbs sp. (U)	Rubus sp.	2/1	
Scr rbs (B_T)	Scirpus robustus	3/3	
Sld smp (B_T/D)	Solidago sempervirens	2/3	
Spr alt (M)	Spartina alterniflora	2/2	
Spr cyn (B_T)	Spartina cynosuroides	5/5	
Spr ptn (M_T/D)	Spartina patens		5/2
Tcr cnd (L_T/D)	Teucrium canadense	2/2	
Typ ang (B/F)	Typha angustifolia	2/2	
B. Woody Plants			
1. Trees			
Dsp vrg (U)	Diospyros virginiana	3/1	
Lqd sty (L/U)	Liquidambar styraciflua	2/1	
Nys syl (U/L)	Nyssa sylvatica	2/1	
2. Shrubs			
Bcc hlm (T/U_T)	Baccharis halimifolia	2/5	4/2
Rhs rdc (U_T/L_T)	Rhus radicans	1/1	1/1
3. Vines			
Cmp rdc (U/L)	Campsis radicans	1/1	
Lnc jpn (U_T)	Lonicera japonica	1/5	

		WOODLAND BEACH (10T)	WHITE CREEK (2T)
II. TRANSITION ZONE (cont'd.)			
4. Seedlings			
Bcc hlm (T/U_T)	Baccharis halimifolia		1/1
Iva frt (M_T)	Iva frutescens		1/1
III. MARSH			
A. Herbaceous Plants			
Amr cnn (B)	Amaranthus cannabinus	X	
Ast sbl (B)	Aster subulatus	X	
Atr ptl (B_T/U_T)	Atriplex patula	X	X
Dst spc (M_T)	Distichlis spicata		X
Phr ast (M_T/L_T)	Phragmites australis	X	
Ply sp. (M/D)	Polygonum sp.	X	
Pnc vrg (B_T/U_T)	Panicum virgatum	X	
Scr rbs (B_T)	Scirpus robustus	X	
Sld smp (B_T/D)	Solidago sempervirens	X	
Spr alt (M)	Spartina alterniflora	X	X
Spr cyn (B_T)	Spartina cynosuroides	X	
Spr ptn (M_T/D)	Spartina patens		X
Typ ang (B/F)	Typha angustifolia	X	
B. Woody Plants			
Bcc hlm (T/U_T)	Baccharis halimifolia		X
Iva frt (M_T)	Iva frutescens		X

PLANT LIST--EASTERN SHORE, VIRGINIA

I. UPLAND

A. Herbaceous Plants

Code	Species	FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
All vnl (U)	Allium vineale	X			
Amb art (U)	Ambrosia artemisiifolia	X			
Apc cnn (U)	Apocynum cannabinum				X
Asp off (U_T)	Asparagus officinalis	X			
Atr ptl (B_T/U_T)	Atriplex patula	X			
Brm cmm (U)	Bromus commutatus	X			
Cly spm (U_T/L_T)	Calystegia sepium	X		X	
Crx sp. (L)	Carex sp.	X		X	X
Cyn dct (U/L)	Cynodon dactylon	X			
Cyp sp. (L)	Cyperus sp.			X	
Dst spc (M_T)	Distichlis spicata (trace)	X			
Ely vrg (L_T/U_T)	Elymus virginicus	X			X
Erc hrc (U_T)	Erechtites hieracifolia	X			X
Fst rbr (U_T)	Festuca rubra	X	X	X	X
Gnp obt (U)	Gnaphalium obtusifolium			X	
Jnc dch (U/L)	Juncus dichotomus				X
Lct cnd (U)	Lactuca canadensis	X			
Lct scr (U)	Lactuca scariola	X			
Lgs snn (U)	Ligustrum sinense	X			
Lnc jpn (U_T)	Lonicera japonica	X			X

PLANT LIST--EASTERN SHORE, VIRGINIA (cont'd.)

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
I. UPLAND					
A. Herbaceous Plants (cont'd.)					
Opn cmp (U)	Opuntia compressa			X	
Phy amr (U)	Phytolacca americana	X			X
Poa prt (U)	Poa pratensis	X	X		
Rbs cnf (U)	Rubus cuneifolius	X			
Rhs rdc (U_T/L_T)	Rhus radicans	X	X	X	X
Rmx act (U)	Rumex acetosella			X	
Rmx crs (U)	Rumex crispus	X			
Sld alt (U)	Solidago altissima	X			
Sld grm (L_T)	Solidago graminifolia	X			X
Sld smp (B_T/D)	Solidago sempervirens	X			X
Sln amr (U)	Solanum americanum	X			
Smb cnd (L)	Sambucus canadensis				X
Spr ptn (M_T/D)	Spartina patens	X		X	
Tcr cnd (L_T/D)	Teucrium canadense	X			
Unl lxa (L)	Uniola laxa		X		
Vca ang (U)	Vicia angustifolia	X			
B. Woody Plants					
1. Trees					
Acr rbr (L/U)	Acer rubrum				X
Ilx opc (U)	Ilex opaca		X		

B. Woody Plants

1. Trees (cont'd.)

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Jnp vrg (U_T)	Juniperus virginiana	X	X	X	X
Mls pml (U)	Malus pumila	X			
Pns tda (U/L)	Pinus taeda	X	X		
Prn srt (U)	Prunus serotina	X	X	X	X
Prs pls (L)	Persea palustris		X		
Qrc phl (L)	Quercus phellos	X			
Sss alb (U)	Sassafras albidum				X

2. Shrubs

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Bcc hlm (T/U_T)	Baccharis halimifolia (seedlings)	X		X	
Myr crf (U_T/L_T)	Myrica cerifera	X	X	X	X
Myr pns (L/D)	Myrica pensylvanica			X	

3. Vines

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Cmp rdc (U/L)	Campsis radicans	X			
Lnc jpn (U_T)	Lonicera japonica	X			X
Prt qnq (U_T)	Parthenocissus quinquefolia	X	X	X	X
Sml b-n (U)	Smilax bona-nox		X		
Vts rtn (L/U)	Vitis rotundifolia				X

II. TRANSITION ZONE

A. Herbaceous Plants

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Amb art (U)	Ambrosia artemisiifolia	1/3			
Asp off (U_T)	Asparagus officinalis	2/2			1/1
Atr ptl (B_T/U_T)	Atriplex patula	3/7			
Chn amb (U_T)	Chenopodium ambrosioides	2/1			
Cly spm (U_T/L_T)	Calystegia sepium	2/2		1/1	3/1
Cyp rtr (U)	Cyperus retrorsus	1/1			
Dst spc (M_T)	Distichlis spicata	4/6	3/1	4/1	4/1
Ely vrg (L_T/U_T)	Elymus virginicus	3/8			3/1
Ept cpl (U)	Eupatorium capillifolium	1/1			
Erc hrc (U_T)	Erechtites hieracifolia				2/1
Fst rbr (U_T)	Festuca rubra	3/5	5/2	4/2	4/2
Gnp obt (U)	Gnaphalium obtusifolium	1/1		1/2	
Jnc grr (M_T)	Juncus gerardi	4/9		5/1	5/2
Lct cnd (U)	Lactuca canadensis	2/3			
Lct scr (U)	Lactuca scariola	2/3			
Lnc jpn (U_T)	Lonicera japonica	3/3			3/2
Lpd vrg (U)	Lepidium virginicum	1/1			
Phy amr (U)	Phytolacca americana	2/3			
Pnc vrg (B_T/U_T)	Panicum virgatum				4/1
Rbs arg (U)	Rubus argutus				1/1

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)

II. TRANSITION ZONE

A. Herbaceous Plants (cont'd.)

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Rhs rdc (U_T/L_T)	Rhus radicans	1/3	1/2	3/2	5/2
Rmx crs (U)	Rumex crispus	2/2			1/1
Scr amr (B_T)	Scirpus americanus			3/1	3/1
Sld grm (L_T)	Solidago graminifolia	1/1			4/1
Sld smp (B_T/D)	Solidago sempervirens	1/1			3/2
Smb cnd (L)	Sambucus canadensis				1/1
Spr ptn (M_T/D)	Spartina patens	5/11	5/2	4/2	3/2
Str gnc (U_T)	Setaria geniculata				3/2
Str sp. (U_T/D)	Strophostyles sp.				1/1
Tcr cnd (L_T/D)	Teucrium canadense	2/4	3/1		3/1

B. Woody Plants

1. Trees

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Jnp vrg (U_T)	Juniperus virginiana	1/1		4/1	
Pns tda (U/L)	Pinus taeda (one tree)	2/1			

2. Shrubs

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
Bcc hlm (T/U_T)	Baccharis halimifolia	3/7	1/1		3/1
Brr frt (M_T)	Borrichia frutescens	1/1			
Iva frt (M_T)	Iva frutescens	1/2	2/1		
Myr crf (U_T/L_T)	Myrica cerifera		3/1	1/1	3/1

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
B. Woody Plants (cont'd.)					
3. Vines					
Cmp rdc (U/L)	Campsis radicans	1/1			
Prt qnq (U_T)	Parthenocissus quinquefolia		1/1	1/1	2/2
Sml b-n (U)	Smilax bona-nox		1/1		
4. Seedlings and small saplings					
Bcc hlm (T/U_T)	Baccharis halimifolia	2/5		3/2	2/2
Iva frt (M_T)	Iva frutescens	2/5	2/1	3/2	X/1
Jnp vrg (U_T)	Juniperus virginiana	1/1		1/2	1/2
Myr sp.	Myrica sp.			2/2	3/2
Pns tda (U/L)	Pinus taeda	1/2			
Prn srt (U)	Prunus serotina	2/4	1/1		1/1
III. MARSH					
A. Herbaceous Plants					
Atr ptl (B_T/U_T)	Atriplex patula	X		X	X
Dst spc (M_T)	Distichlis spicata	X	X	X	X
Fst rbr (U_T)	Festuca rubra	X		X	
Hbs msc (B)	Hibiscus moscheutos		X		
Jnc grr (M_T)	Juncus gerardi	X		X	X
Kst vrg (B)	Kosteletskya virginica		X		
Lmn crl (M)	Limonium carolinianum	X			X

PLANT LIST--EASTERN SHORE, VIRGINIA (cont'd.)

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
III. MARSH					
A. Herbaceous Plants (cont'd.)					
Scr amr (B_T)	Scirpus americanus				X
Scr oln (M)	Scirpus olneyi				X
Scr rbs (B_T)	Scirpus robustus		X		
Slc sp. (M)	Salicornia sp.	X			X
Slc erp (M)	S. europaea	X		X	
Slc vrg (M)	S. virginica	X	X		
Spr alt (M)	Spartina alterniflora	X	X	X	X
Spr ptn (M_T/D)	Spartina patens	X	X	X	X
B. Shrubs					
Brr frt (M_T)	Borrichia frutescens	X			
Iva frt (M_T)	Iva frutescens	X	X	X	X
C. Woody seedlings and/or small saplings					
1. Trees					
Jnp vrg (U_T)	Juniperus virginiana	X	X		X
Pns tda (U/L)	Pinus taeda				X
Prn srt (U)	Prunus serotina		X		
2. Shrubs					
Bcc hlm (T/U_T)	Baccharis halimifolia	X	X	X	X
Iva frt (M_T)	Iva frutescens	X	X	X	X

		FINNEY CR. (11T)	PARRAMORE IS. (2T)	CEDAR IS. (2T)	MOSQUITO CR. (2T)
C. Woody seedlings and/or small saplings					
2. Shrubs (cont'd.)					
Myr sp.	Myrica sp.		X		X
Prn srt (U)	Prunus serotina		X		
Rhs rdc (U_T/L_T)	Rhus radicans		X		

APPENDIX B

PROFILE MEASUREMENTS ON MARSH SURVEY TRANSECTS

EXPLANATION OF PROFILE DATA

Ground Elevation Profiles

The large upper box in each of the graphs in this appendix contains the ground elevation profile measured along each transect. Ordinate values are heights above mean high water in centimeters wherever the letters MHW appear at the zero position of the vertical scale; otherwise the elevational datum is arbitrary. A scale of 0 to 50 meters is shown at the bottom of each page with distance increasing toward the marsh. Vertical exaggeration in height-distance scaling is 8:1. The site name and transect number are shown in the upper right corner of the box.

Percent Coverage/Basal Area Histograms

Each box below the elevation profile contains either a percent coverage or a basal area histogram representing a given plant species and based on field data tabulations(see Field Methods Section, p. 6). Ordinate values are 0 to 100% for herbaceous plant coverage estimates within each 50 x 50 cm quadrat and 0 to 50 cm^2 for basal area of trees and shrubs measured within each 2 x 2 m quadrat. The basal area histograms have a distance interval width of 2 meters and are shaded. Basal areas of less than 1 cm^2 are indicated by a plus symbol (+) as are coverage estimates of less than 2.5%.

Abbreviated names of plants and their habitat symbols are shown on the right of each of the smaller boxes. A key to the abbreviation of plant names is contained in the plant lists of Appendix A; habitat symbols are explained in Table 7 of Appendix A.

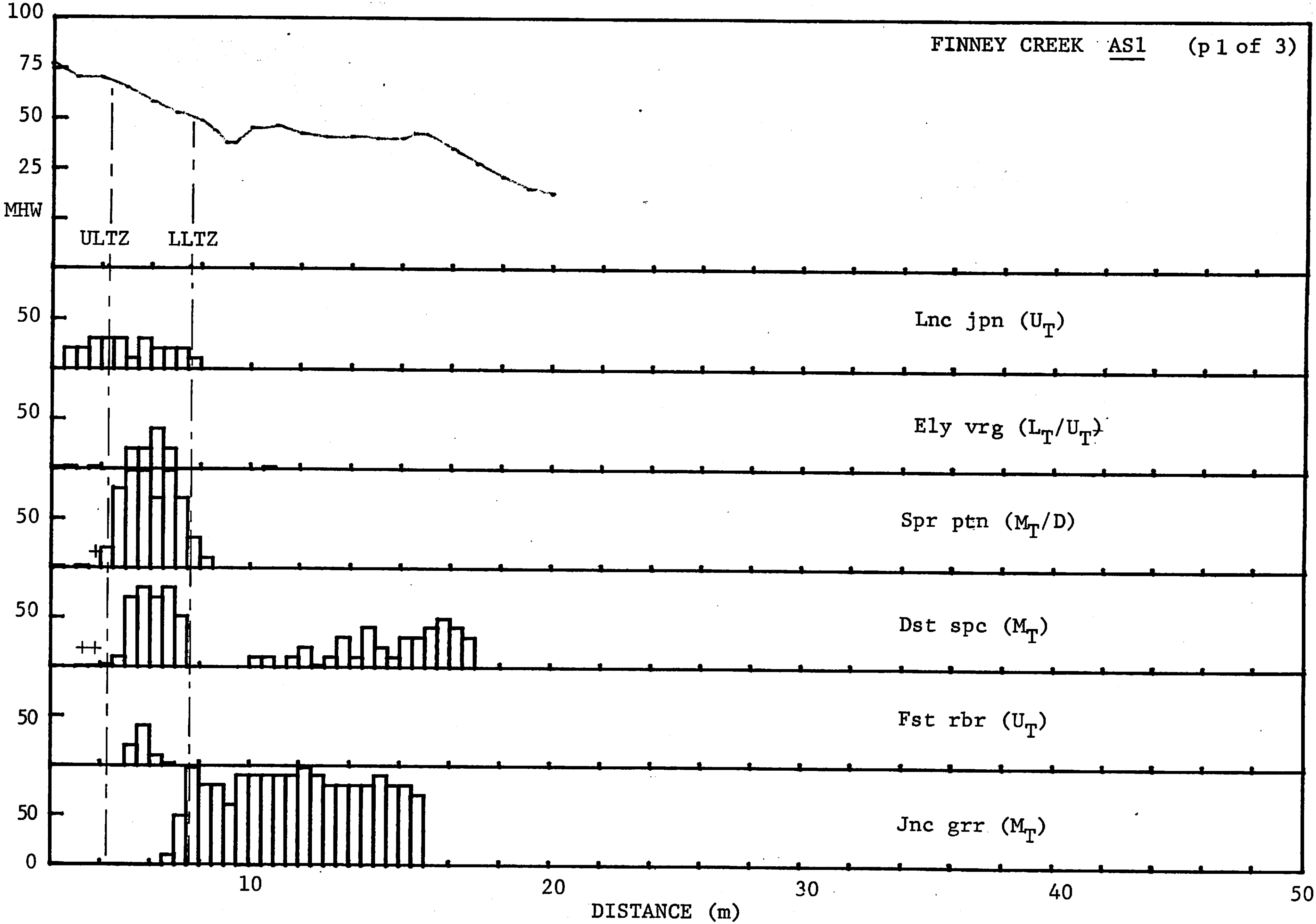
The same scale of horizontal distances (0 to 50 m) to which the ground elevation profiles refer also applies to the histograms.

Transition zone limits

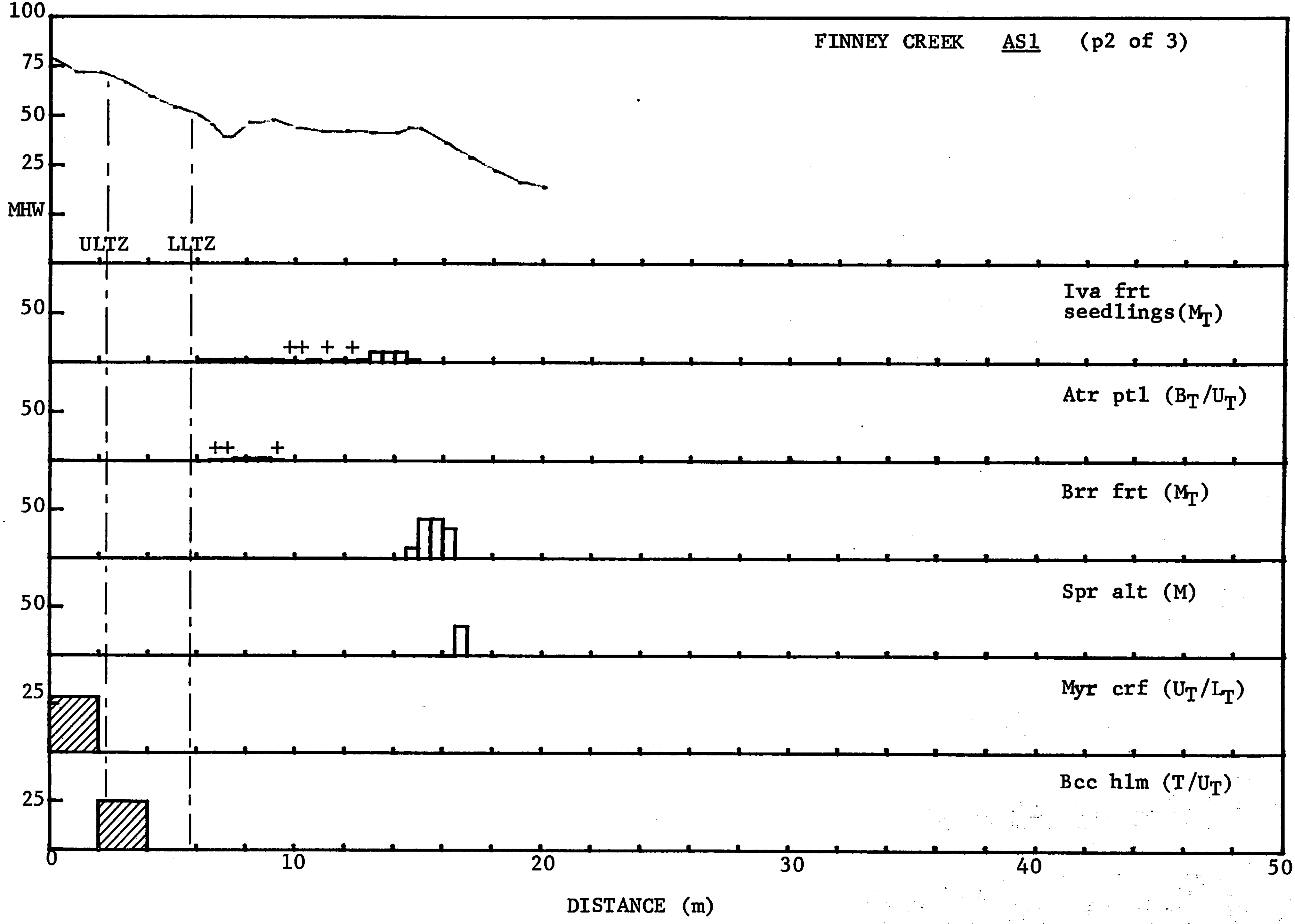
The upper and lower limits of the transition zone (ULTZ and LLTZ) are shown as dashed vertical lines running through all the boxes in each figure. As noted on p. 4, the selection of these limits was made independent of other field measurements using a recognition criteria based on continuous coverage observed along the transect. The limits chosen may therefore deviate from the fixed quadrat distance limits of the histograms since it is assumed in the latter instance that each coverage estimate applies at the midpoint of the quadrat in question.

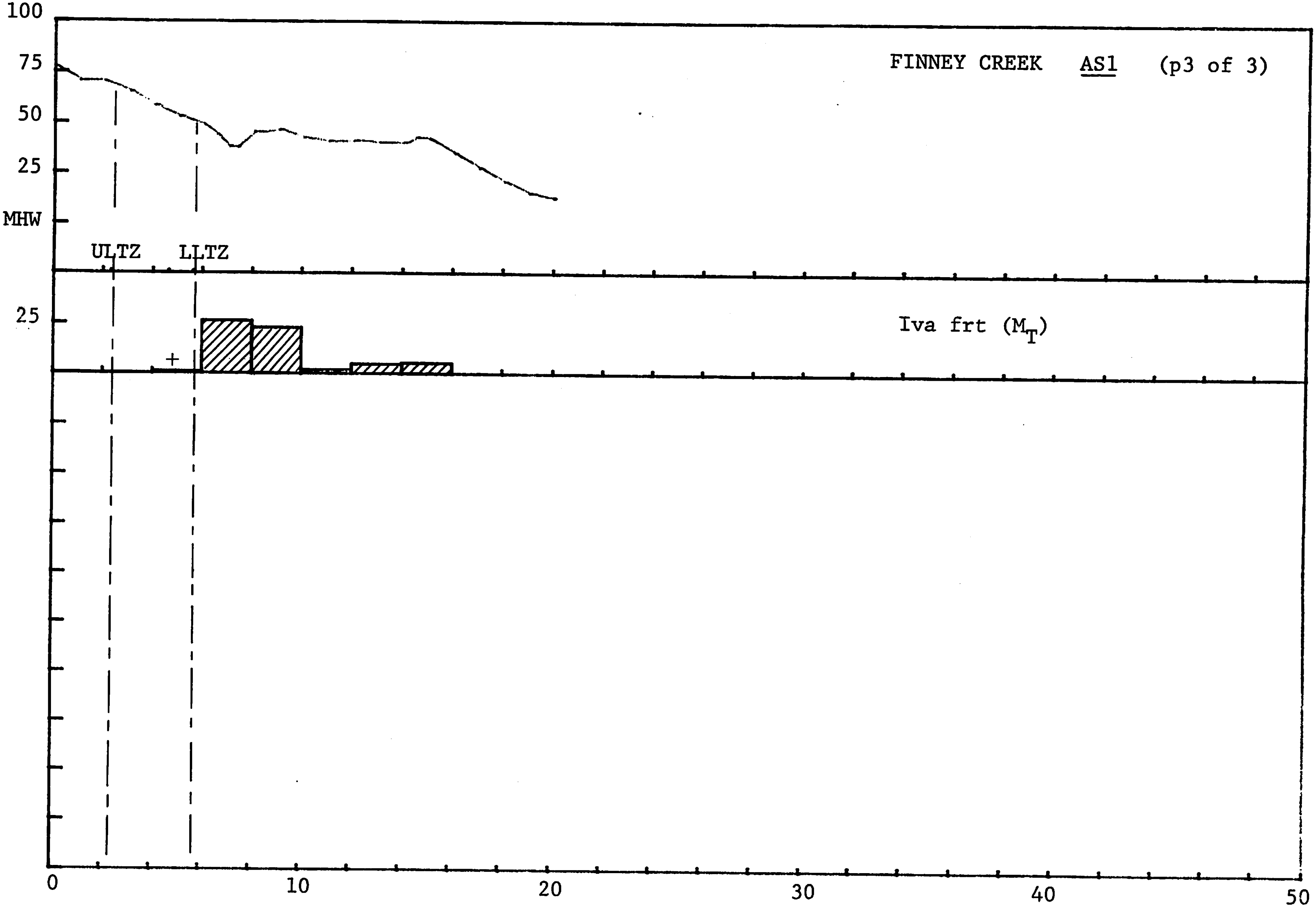
PROFILE DATA - WACHAPREAGUE SUBREGION(VIRGINIA)

FINNEY CREEK(PRIMARY)
PARRAMORE ISLAND
CEDAR ISLAND
MOSQUITO CREEK

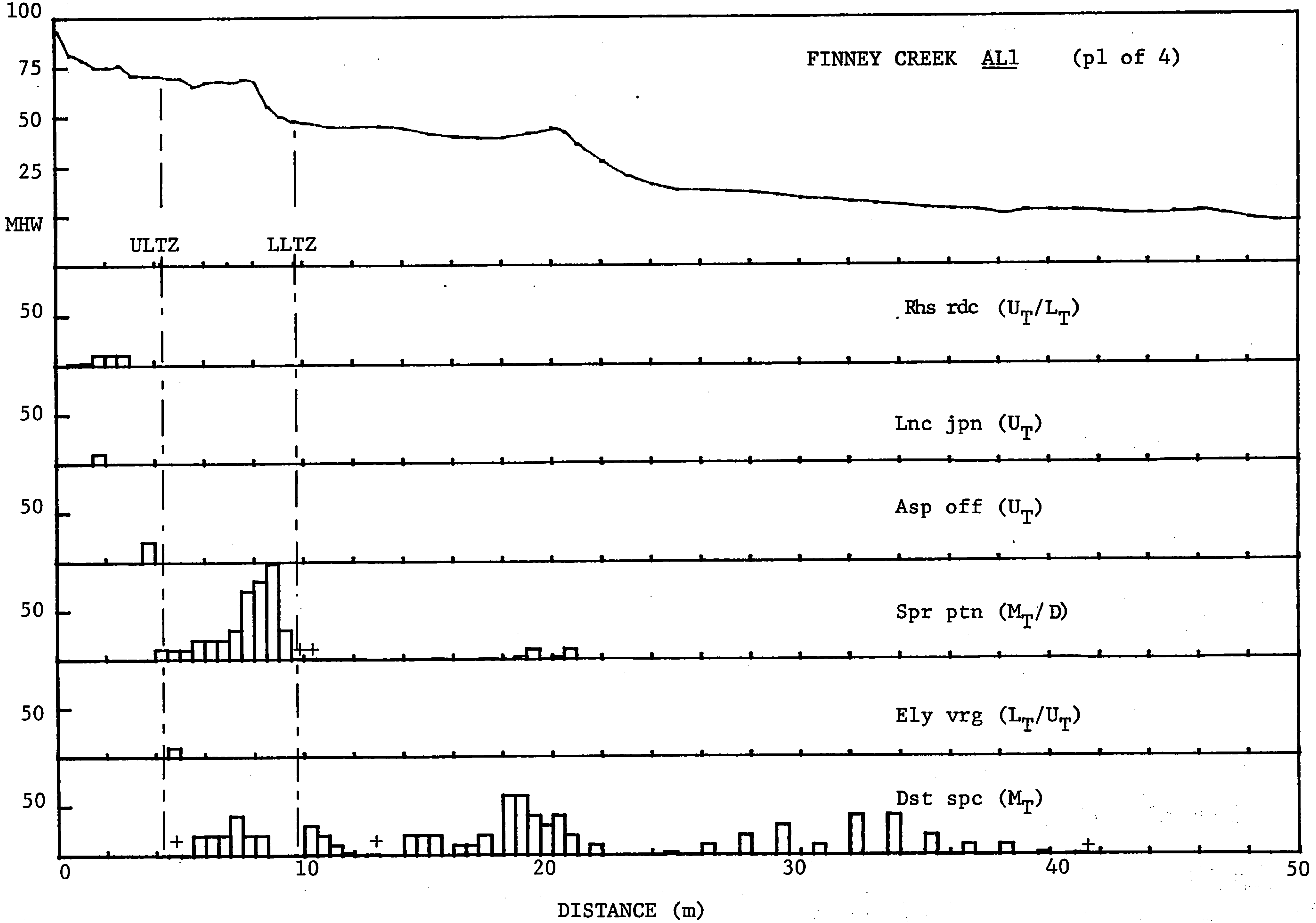


FINNEY CREEK AS1 (p 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Ely vrg (L_T/U_T)
Spr ptn (M_T/D)
Dst spc (M_T)
Fst rbr (U_T)
Jnc grr (M_T)
50
0
10
20
30
40
50
DISTANCE (m)

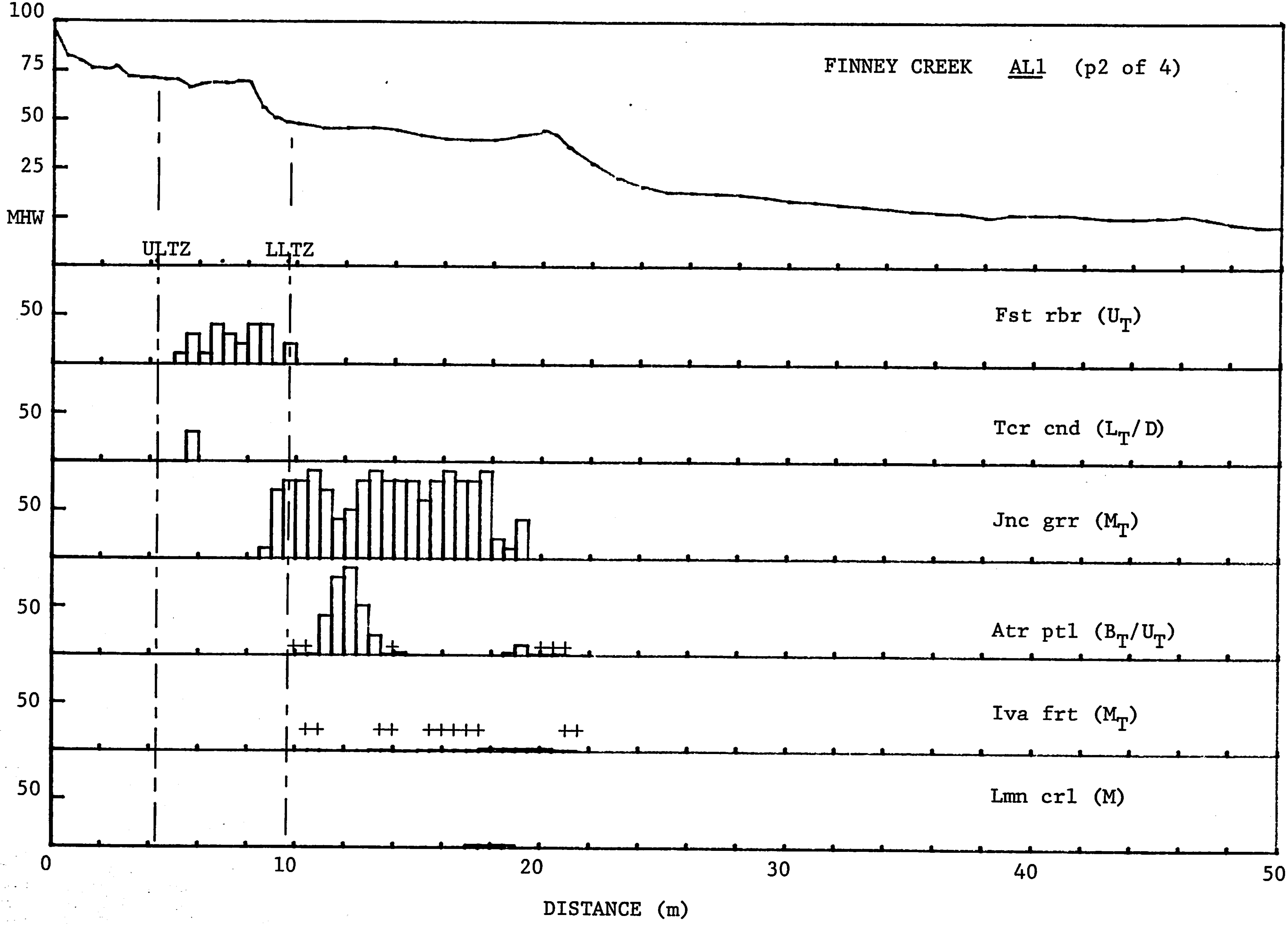

FINNEY CREEK AS1 (p2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Iva frt seedlings(M_T)
Atr ptl (B_T/U_T)
Brr frt (M_T)
Spr alt (M)
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
0
10
20
30
40
50
DISTANCE (m)

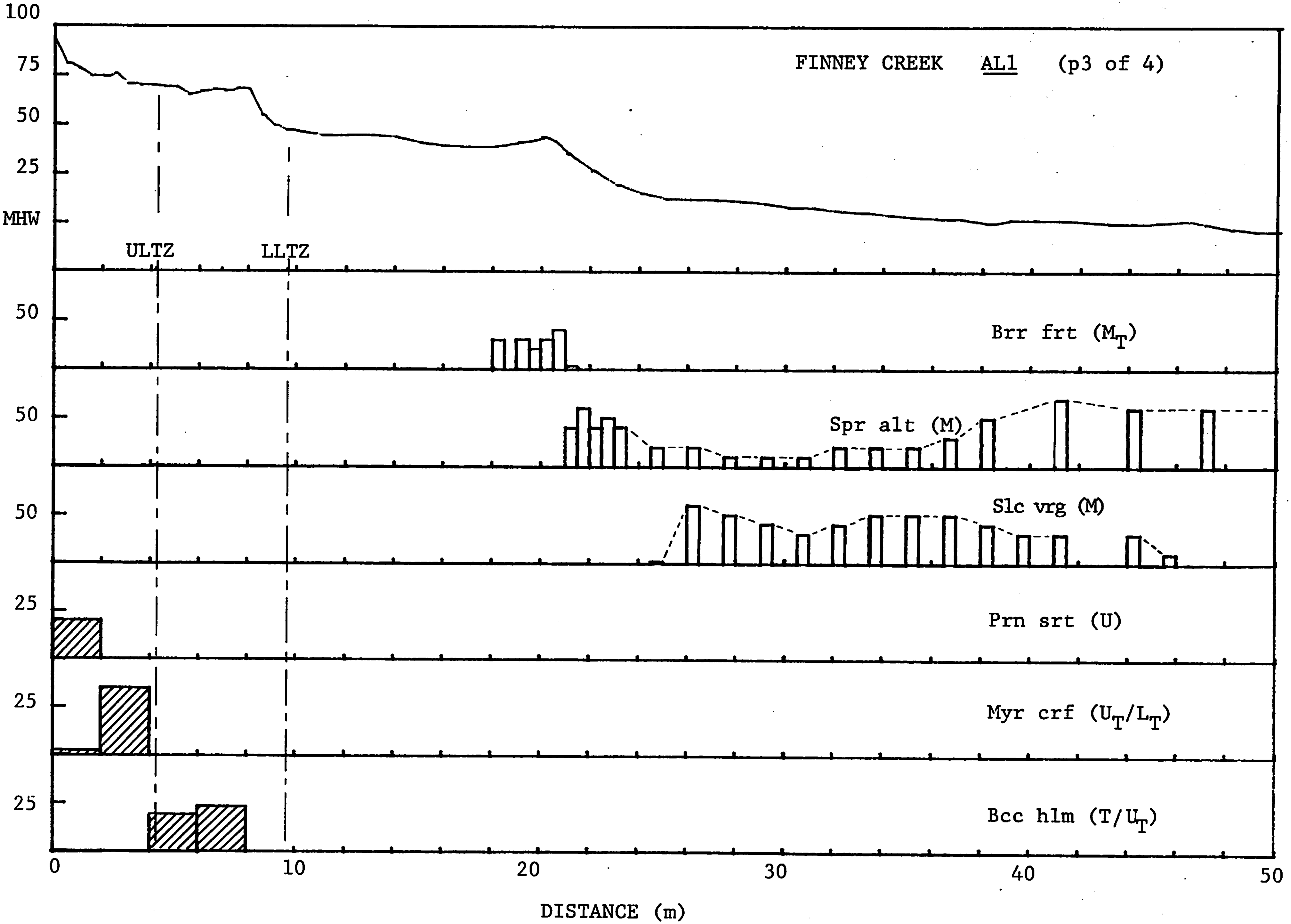


FINNEY CREEK AS1 (p3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Iva frt (M_T)
+
0
10
20
30
40
50

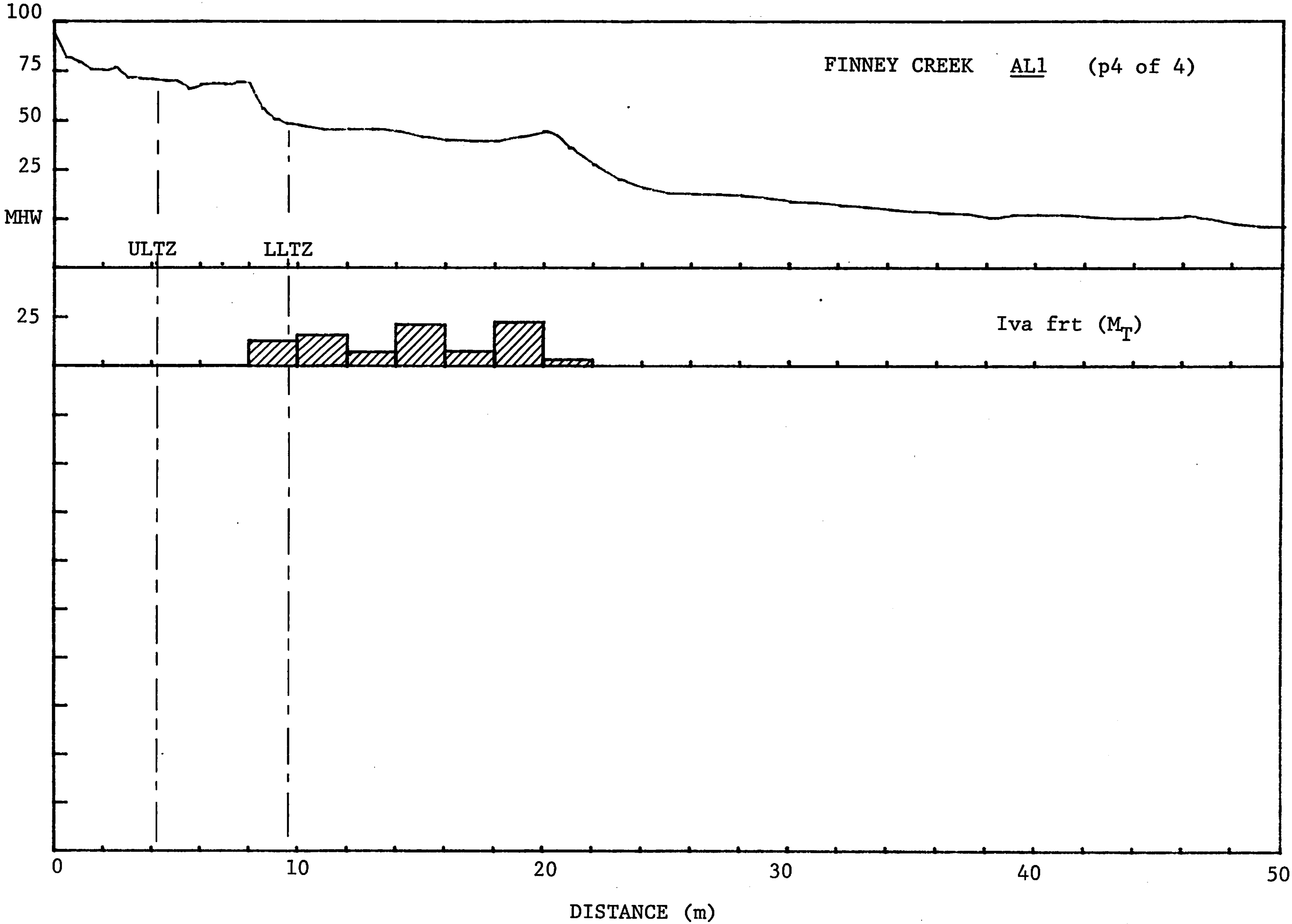


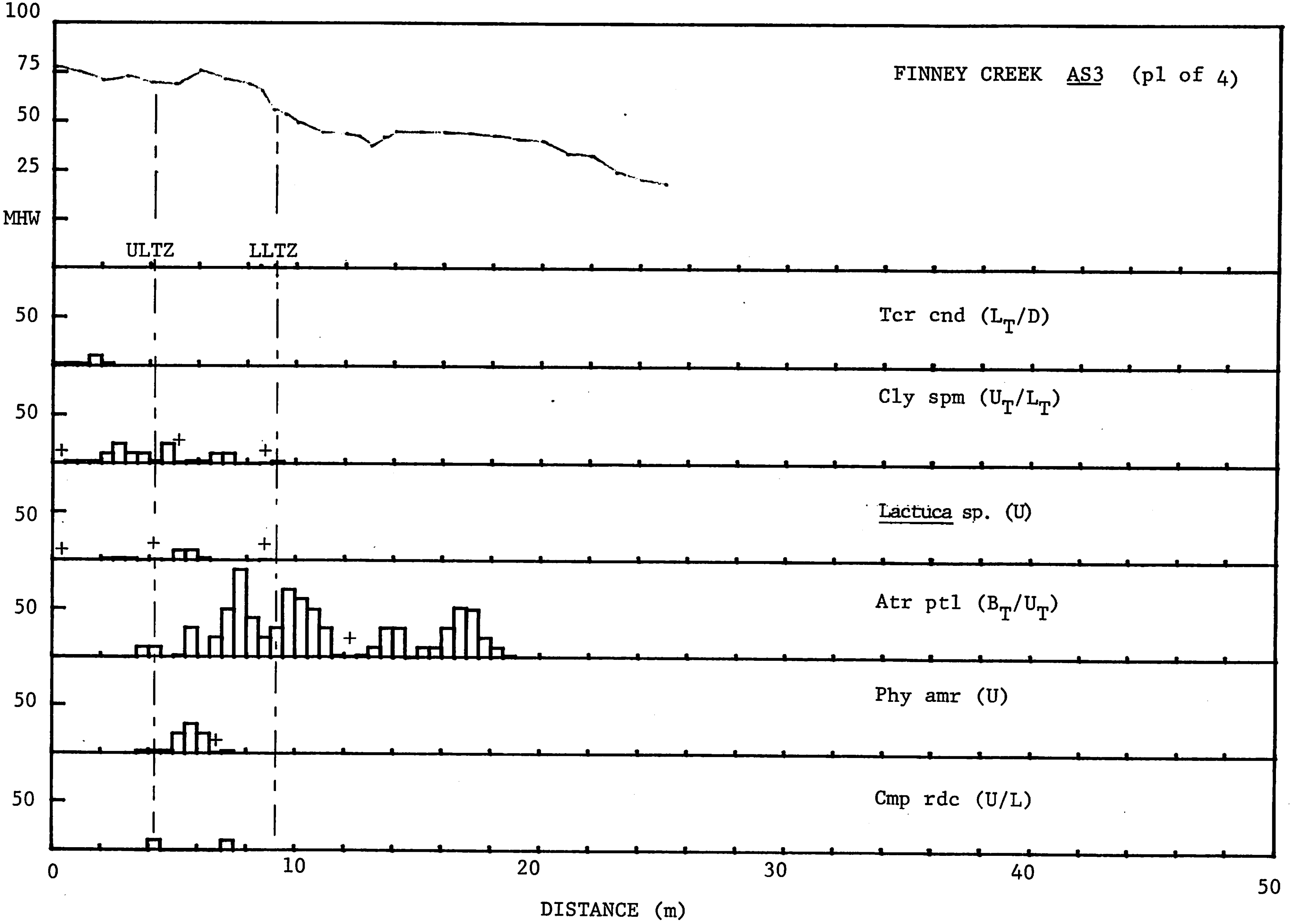
FINNEY CREEK AL1 (p1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Lnc jpn (U_T)
Asp off (U_T)
Spr ptn (M_T/ D)
Ely vrg (L_T/U_T)
Dst spc (M_T)
0
10
20
30
40
50
DISTANCE (m)

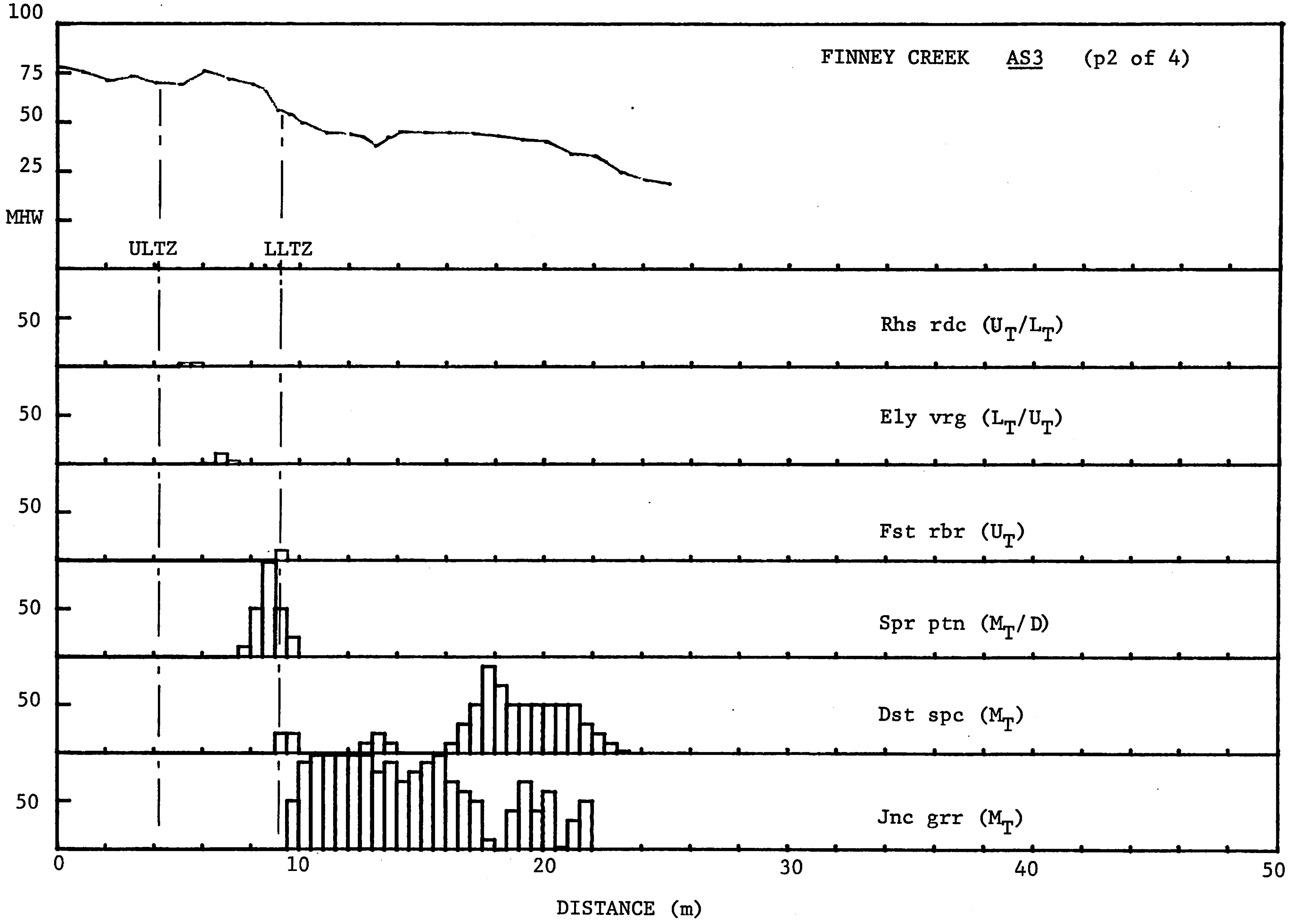

FINNEY CREEK AL1 (p2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Fst rbr (U_T)
Tcr cnd (L_T/D)
Jnc grr (M_T)
Atr ptl (B_T/U_T)
Iva frt (M_T)
Lmn crl (M)
0
10
20
30
40
50
DISTANCE (m)

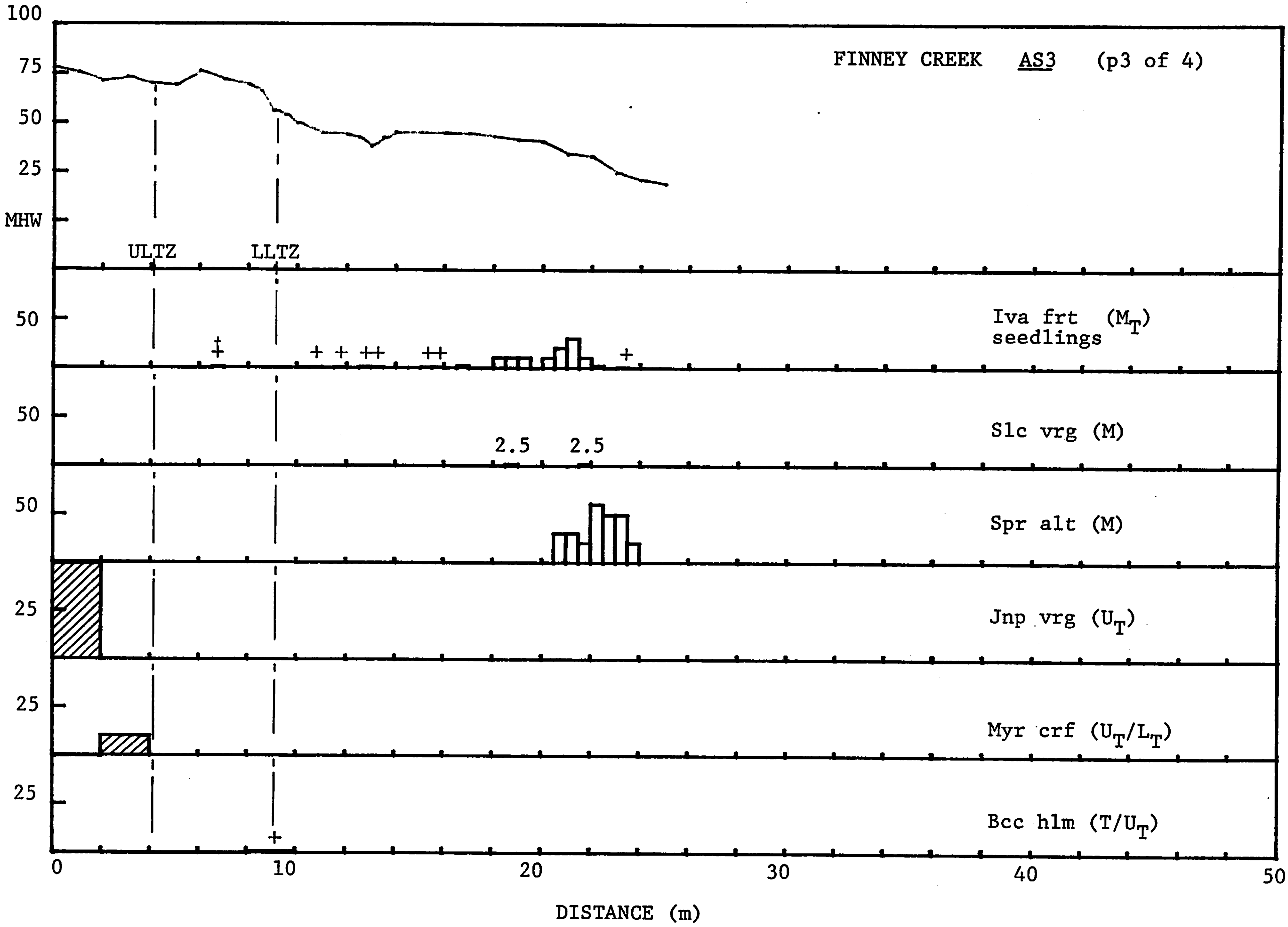


FINNEY CREEK AL1 (p3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Brr frt (M_T)
Spr alt (M)
Slc vrg (M)
Prn srt (U)
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
0
10
20
30
40
50
DISTANCE (m)

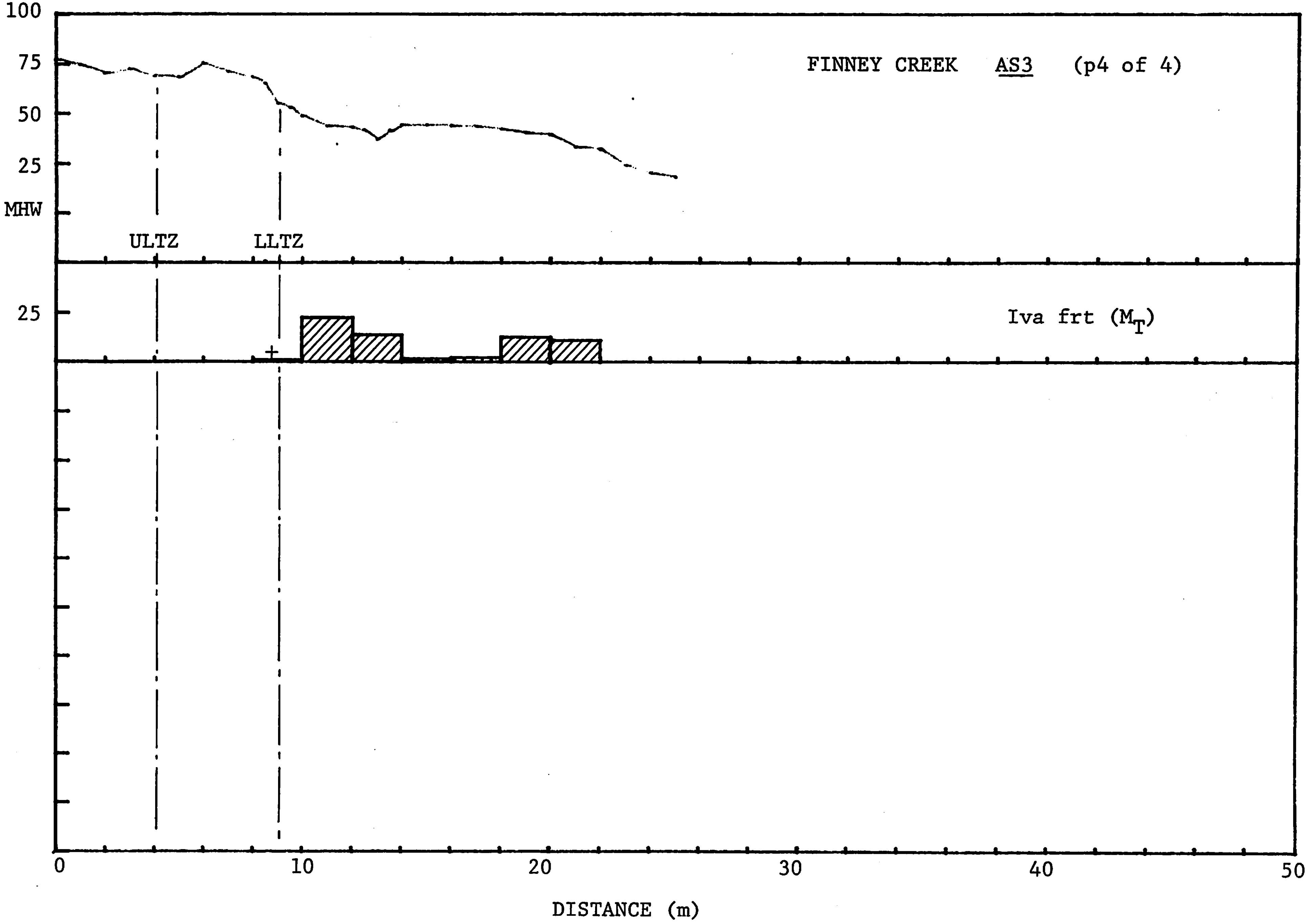

FINNEY CREEK AL1 (p4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)


FINNEY CREEK AS3 (p1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Tcr cnd (L_T/D)
Cly spm (U_T/L_T)
Lactuca sp. (U)
Atr ptl (B_T/U_T)
Phy amr (U)
Cmp rdc (U/L)
0
10
20
30
40
50
DISTANCE (m)

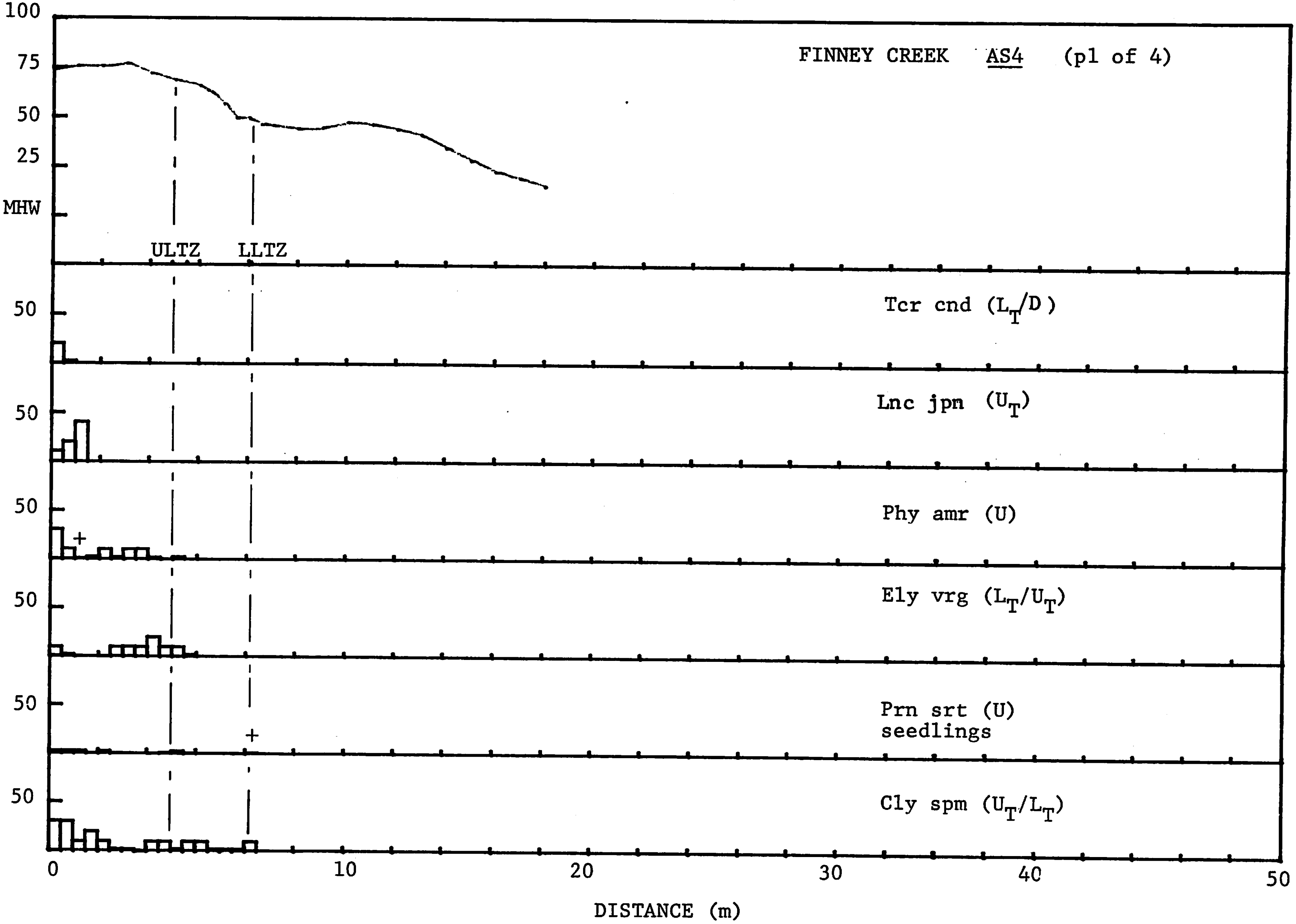

FINNEY CREEK AS3 (p2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Ely vrg (L_T/U_T)
Fst rbr (U_T)
Spr ptn (M_T/ D)
Dst spc (M_T)
Jnc grr (M_T)
0
10
20
30
40
50
DISTANCE (m)



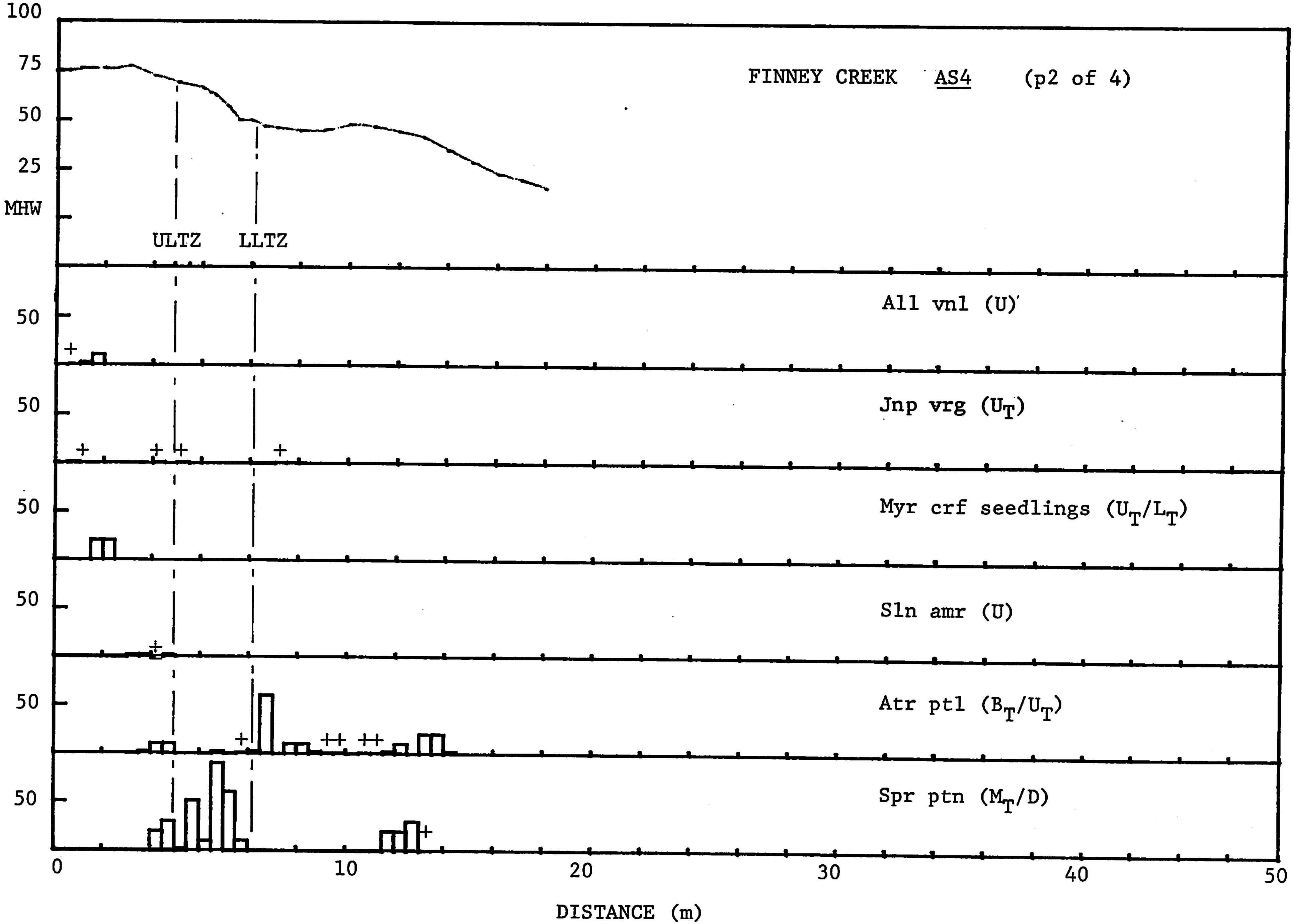
FINNEY CREEK AS3 (p3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
50
Iva frt (M_T)
seedlings
50
Slc vrg (M)
2.5
2.5
50
Spr alt (M)
25
Jnp vrg (U_T)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
0
10
20
30
40
50
DISTANCE (m)



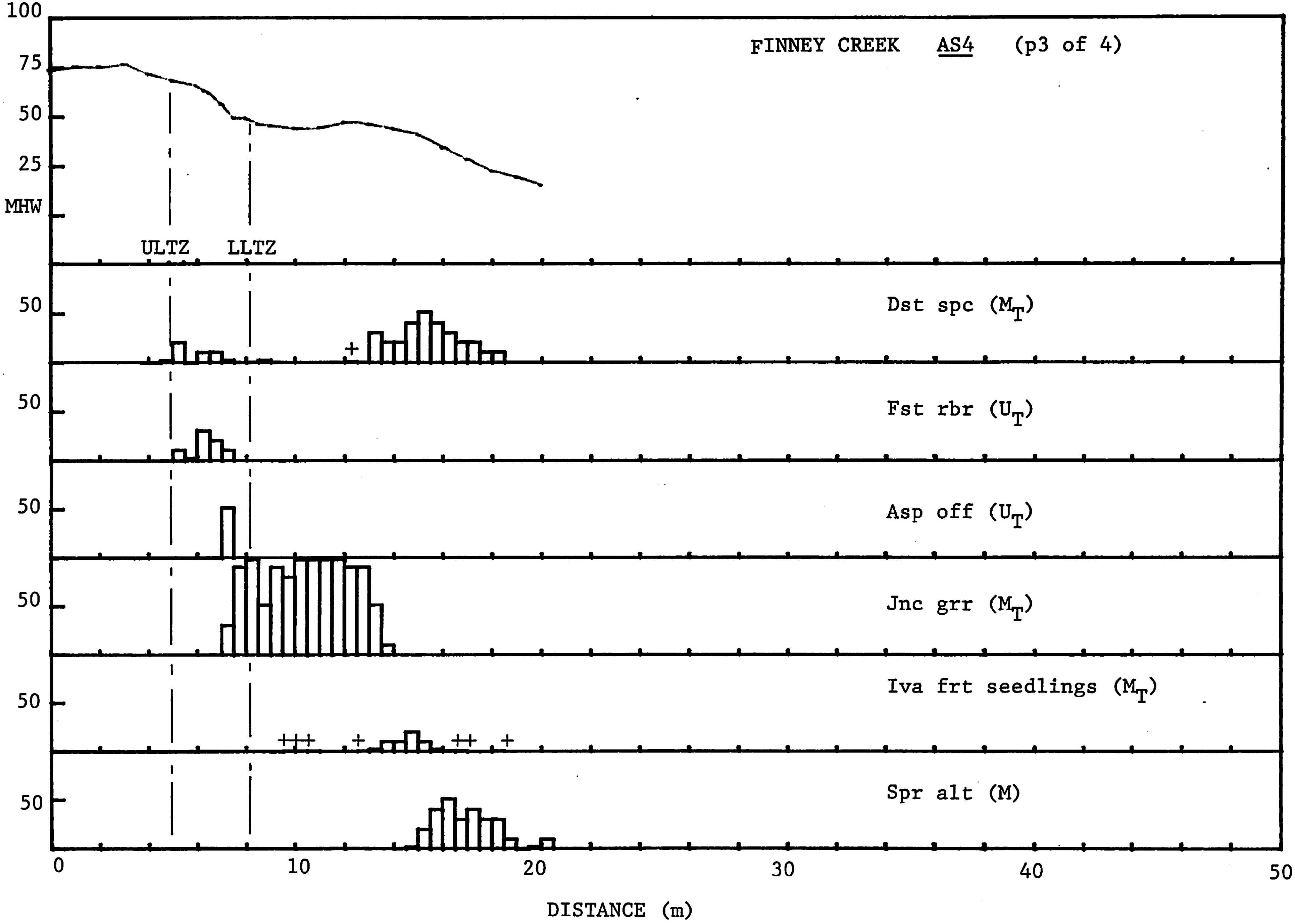
FINNEY CREEK AS3 (p4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



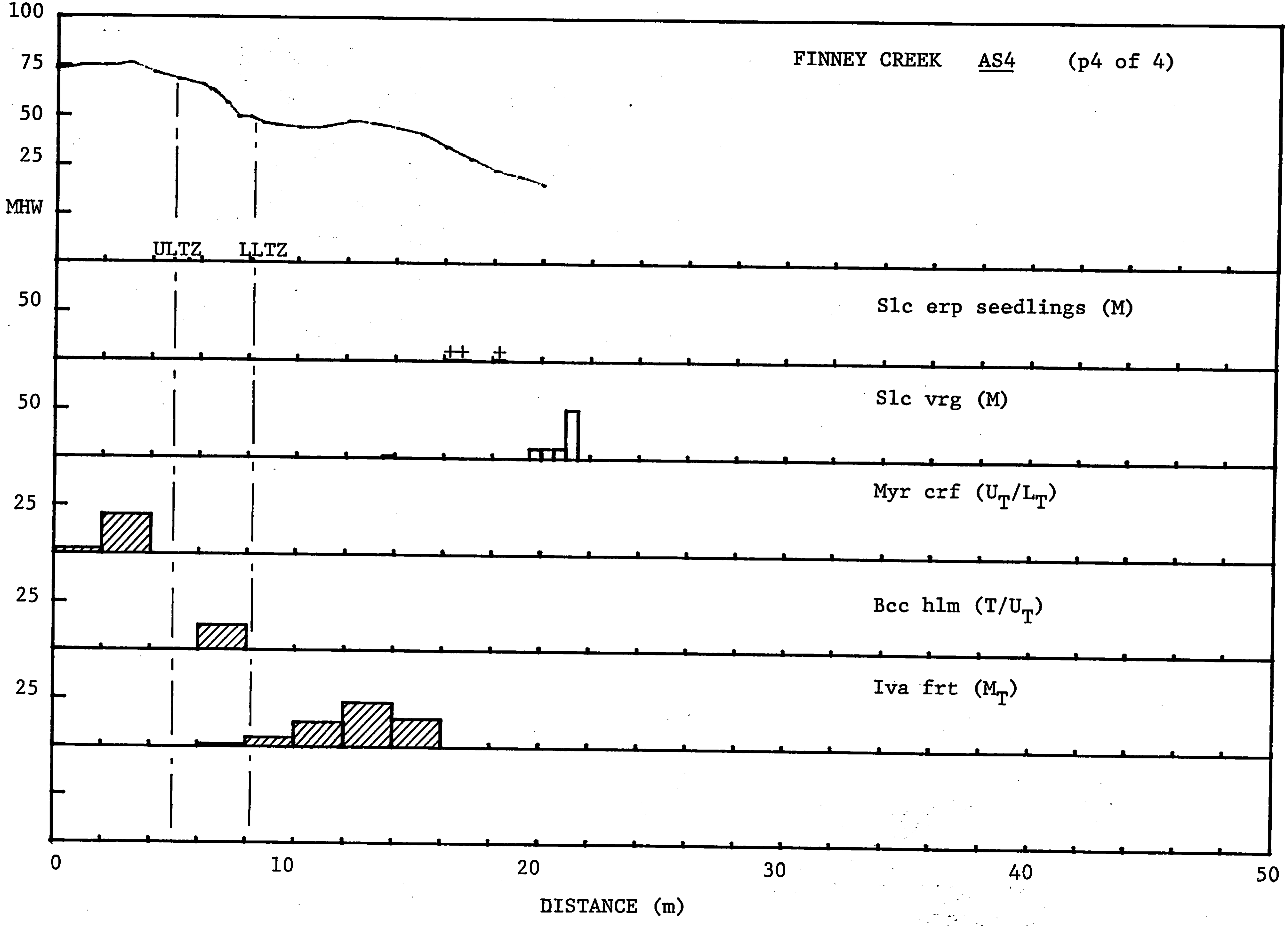
FINNEY CREEK AS4 (p1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Tcr cnd (LT/D)
Lnc jpn (UT)
Phy amr (U)
Ely vrg (LT/UT)
Prn srt (U)
seedlings
Cly spm (UT/LT)
0
10
20
30
40
50
DISTANCE (m)



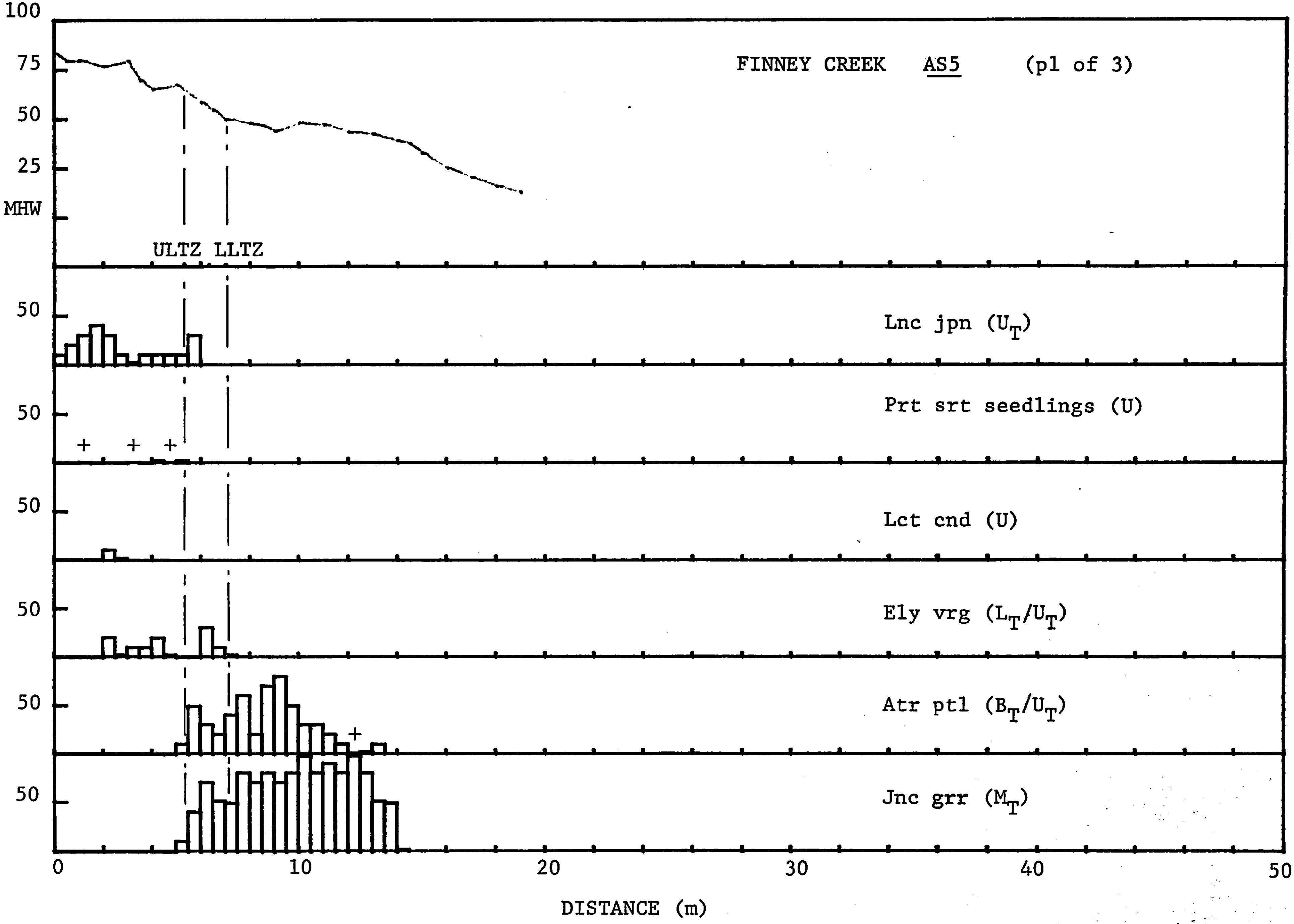
FINNEY CREEK AS4 (p2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
All vnl (U)
Jnp vrg (U_T)
Myr crf seedlings (U_T/L_T)
Sln amr (U)
Atr ptl (B_T/U_T)
Spr ptn (M_T/D)
50
0
10
20
30
40
50
DISTANCE (m)

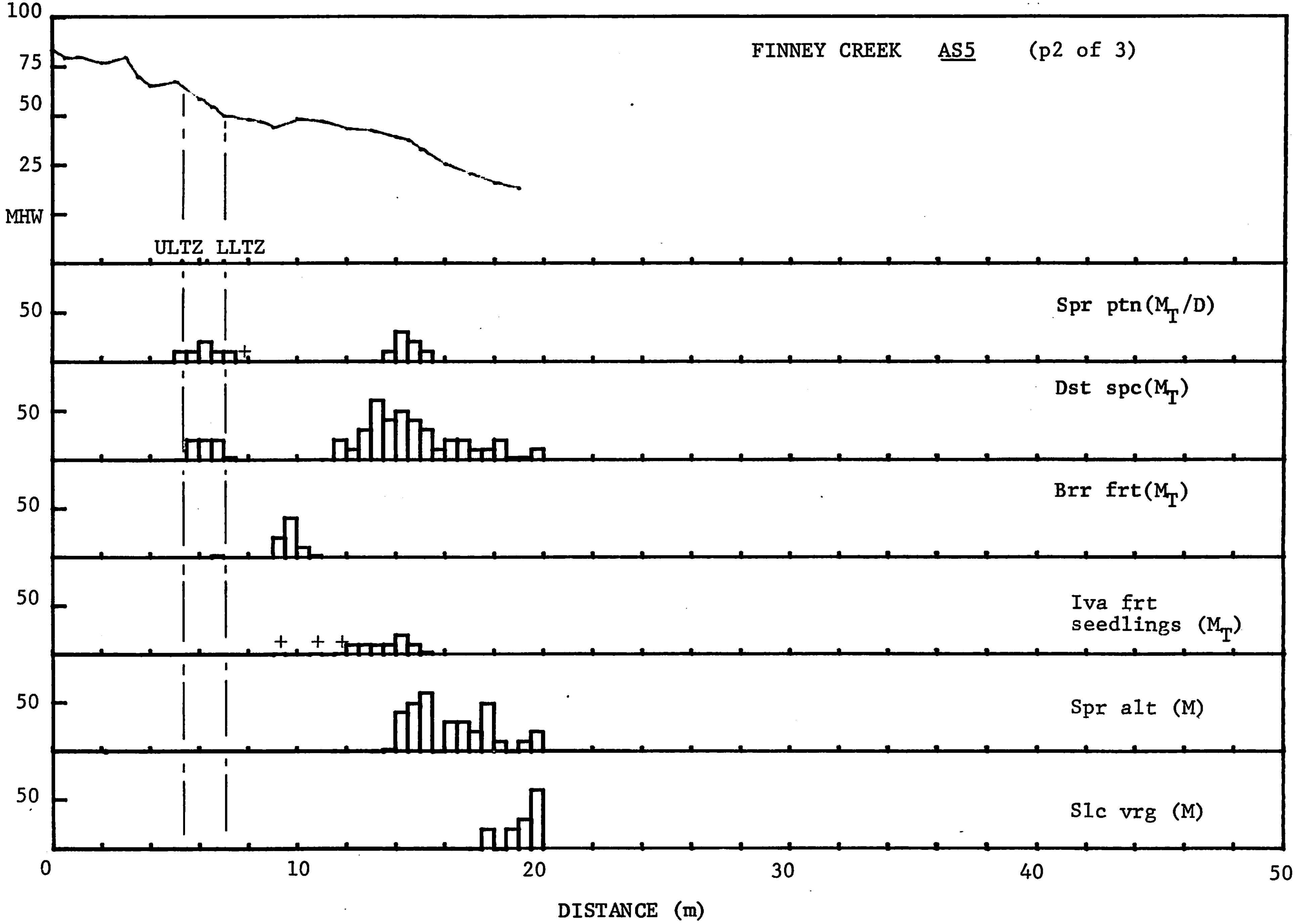


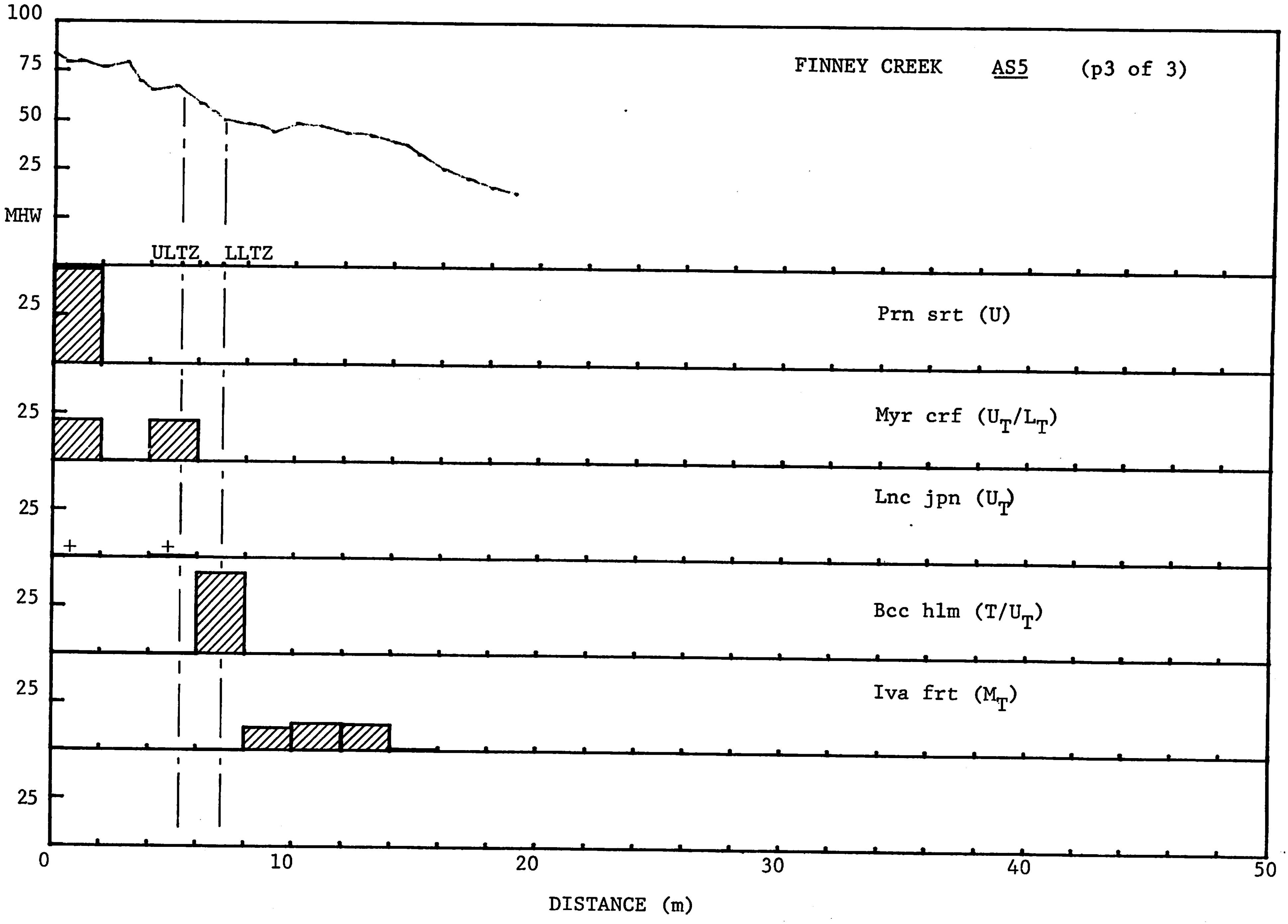
FINNEY CREEK AS4 (p3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Fst rbr (U_T)
Asp off (U_T)
Jnc grr (M_T)
Iva frt seedlings (M_T)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)



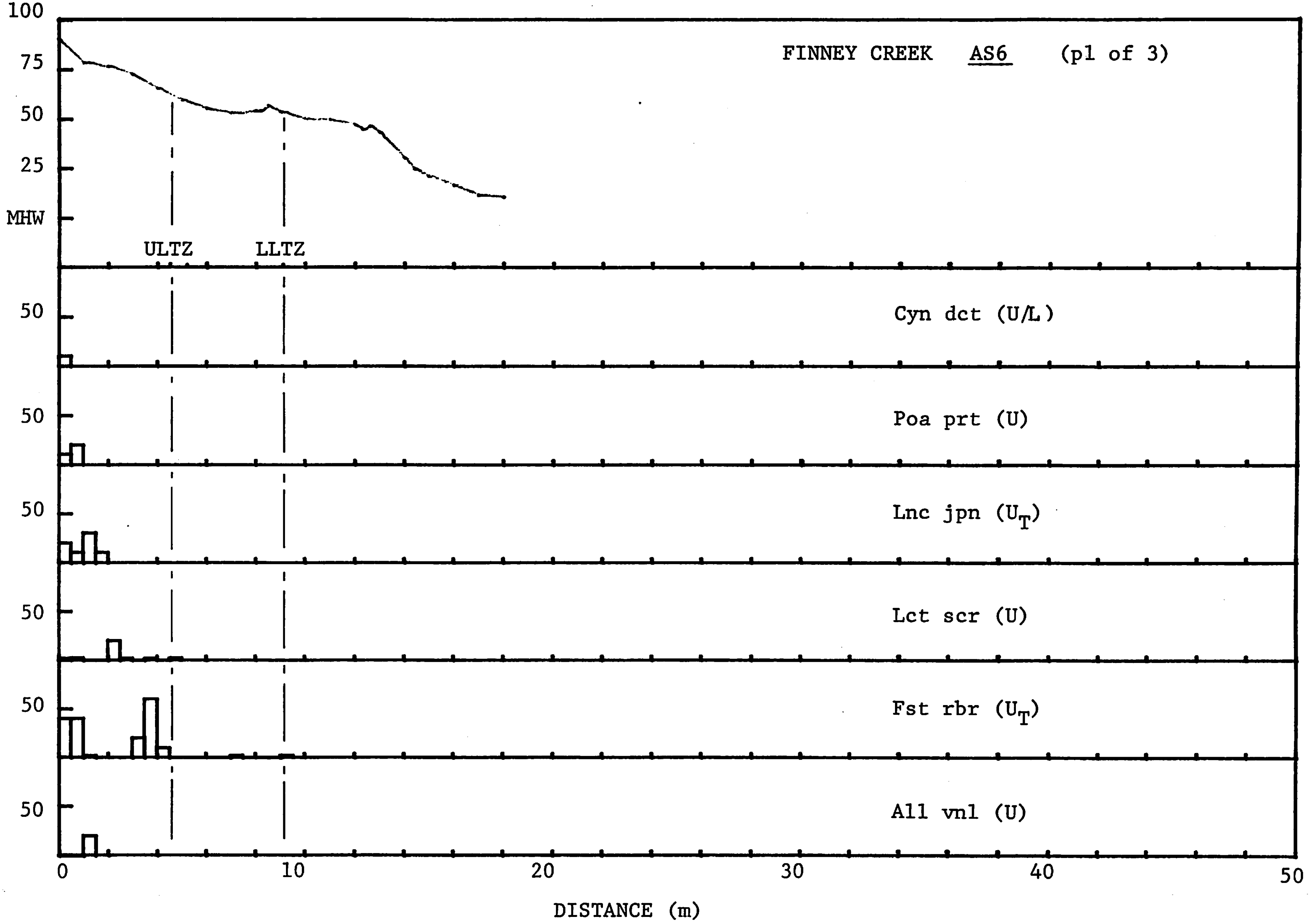
FINNEY CREEK AS4 (p4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
50
Slc erp seedlings (M)
50
Slc vrg (M)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

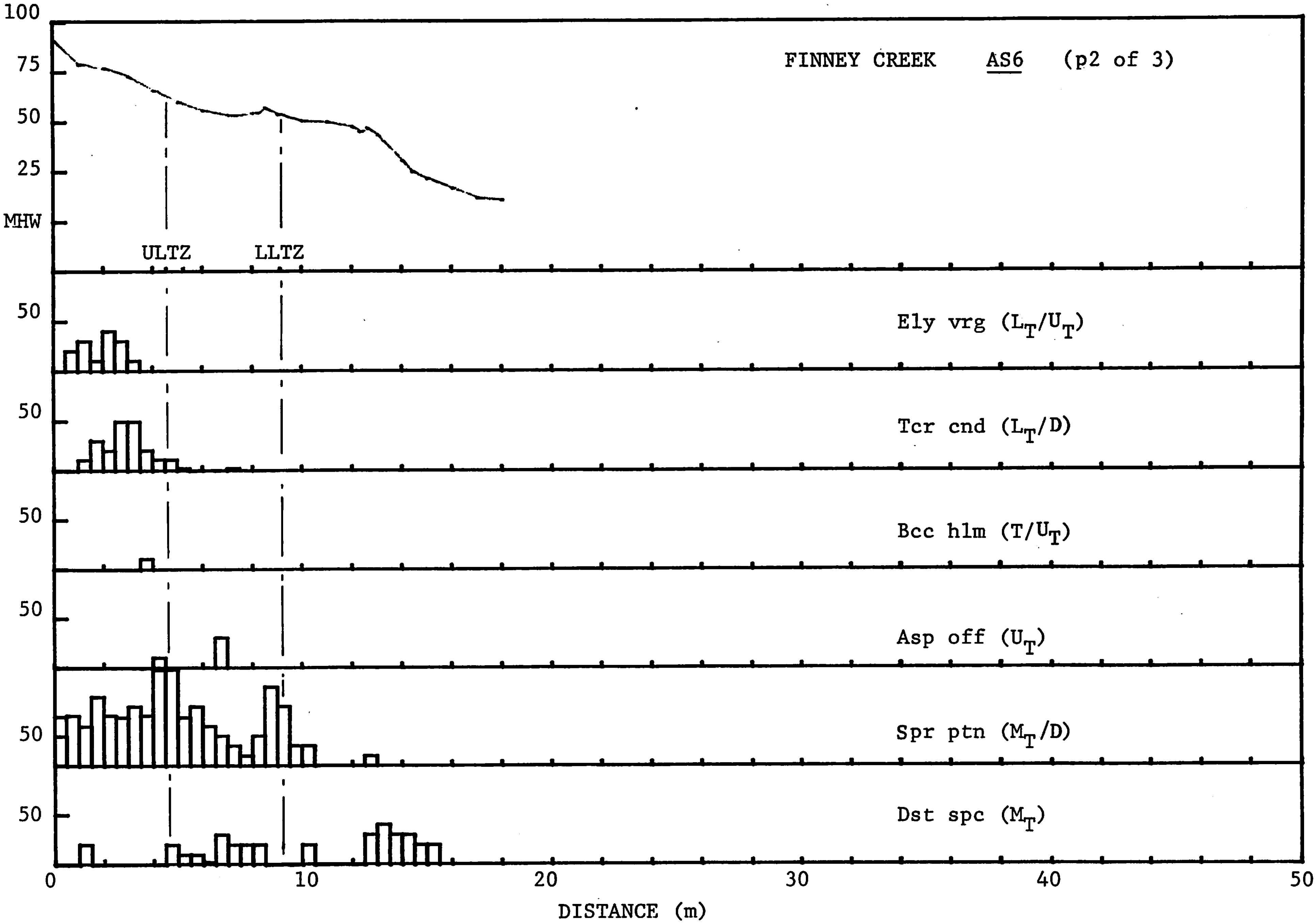

FINNEY CREEK AS5 (pl of 3)
100
75
50
25
MHW
ULTZ LLTZ
Lnc jpn (U_T)
Prt srt seedlings (U)
Lct cnd (U)
Ely vrg (L_T/U_T)
Atr ptl (B_T/U_T)
Jnc grr (M_T)
0
10
20
30
40
50
DISTANCE (m)

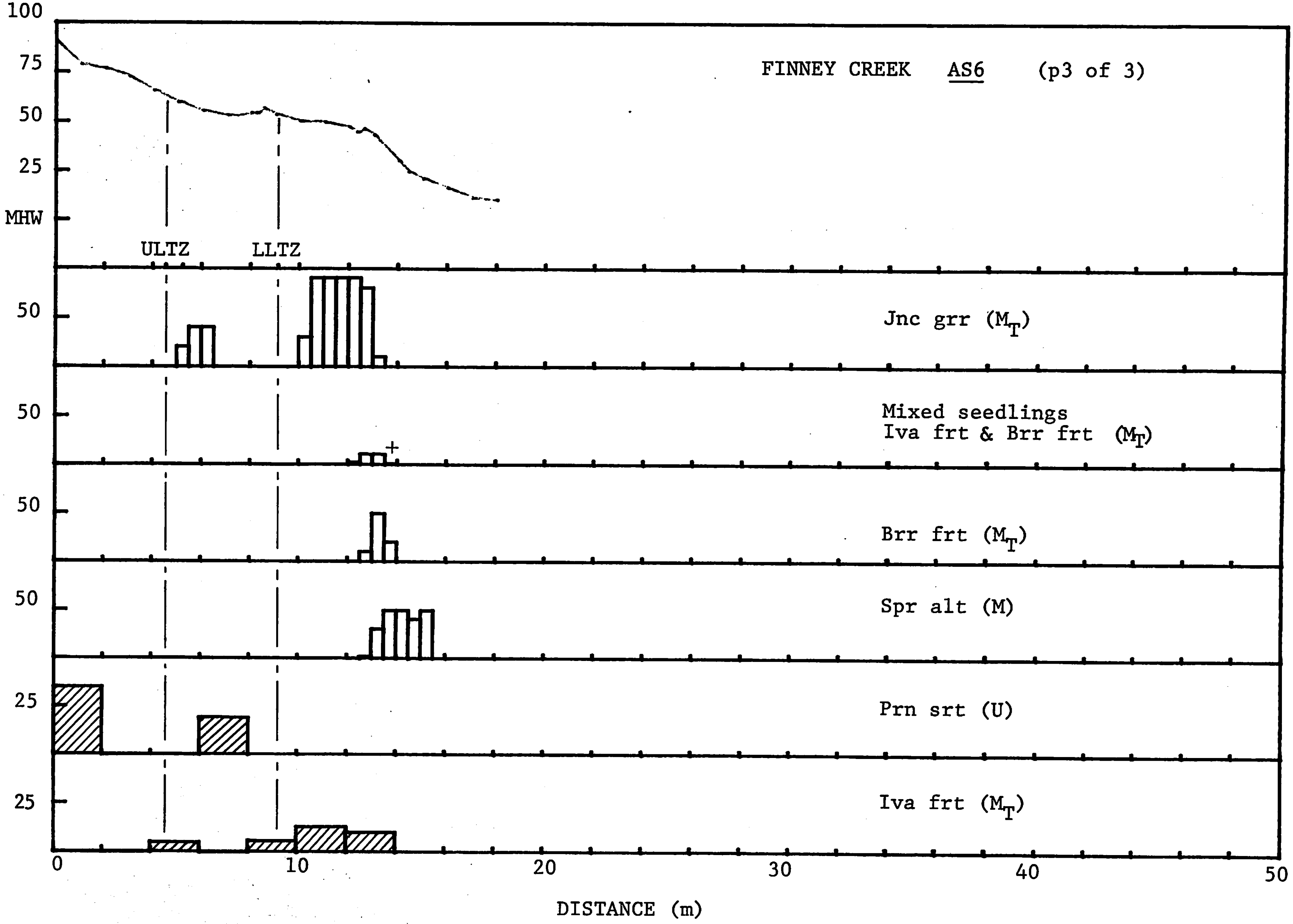

FINNEY CREEK AS5 (p2 of 3)
100
75
50
25
MHW
ULTZ LLTZ
Spr ptn(M_T/D)
Dst spc(M_T)
Brr frt(M_T)
Iva frt seedlings (M_T)
Spr alt (M)
Slc vrg (M)
0
10
20
30
40
50
DISTANCE (m)

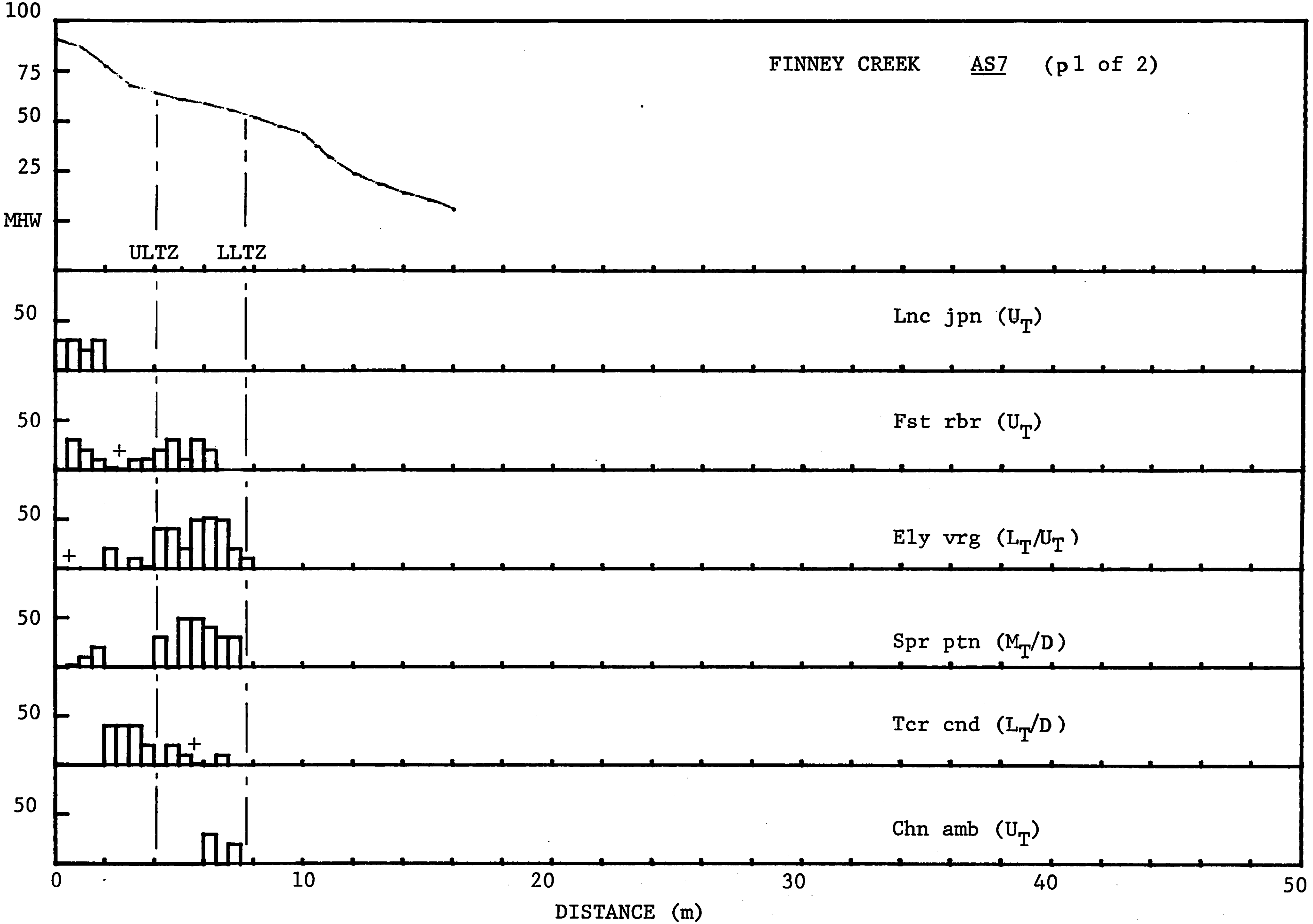


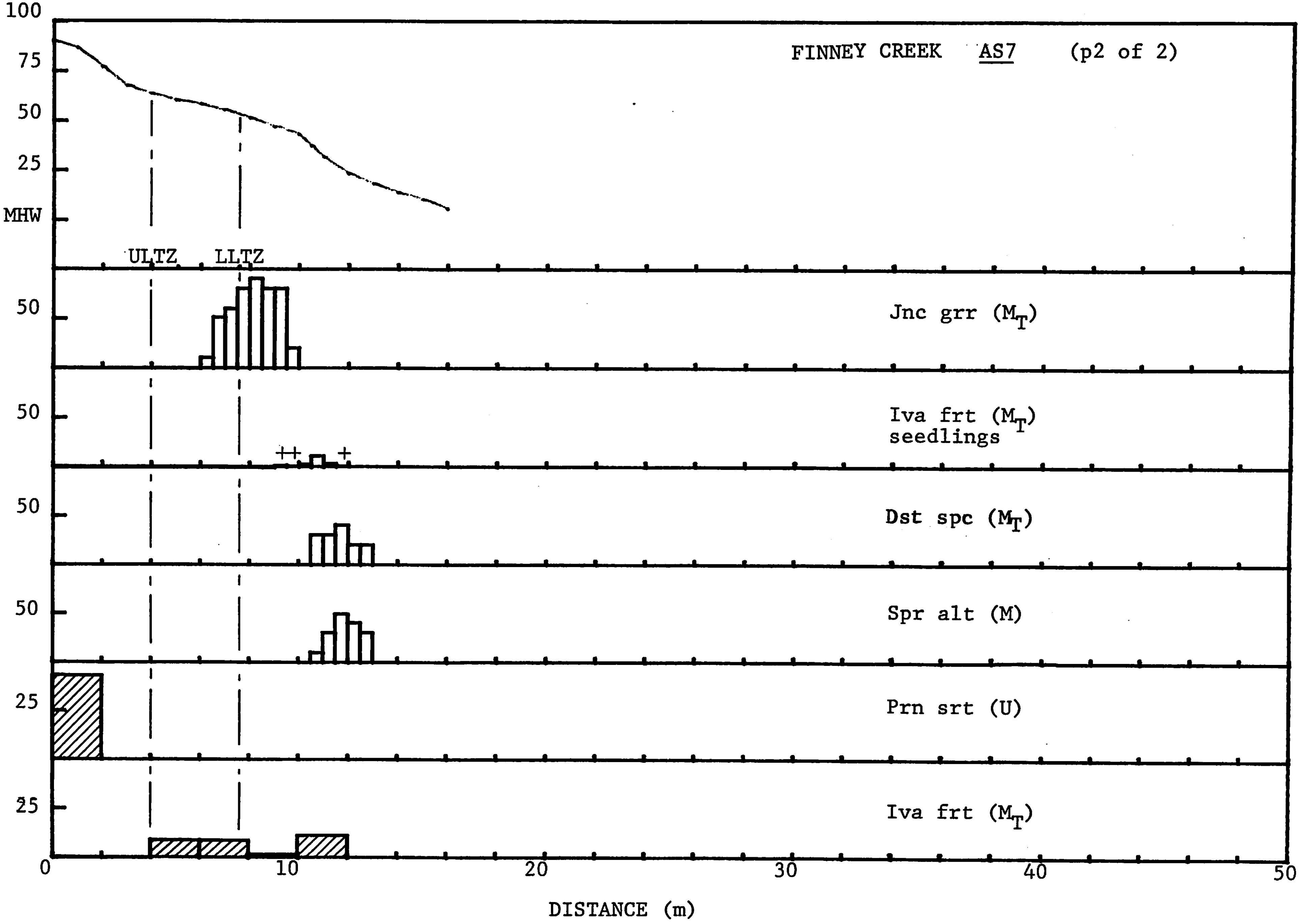
FINNEY CREEK AS5 (p3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Prn srt (U)
25
Myr crf (U_T/L_T)
25
Lnc jpn (U_T)
+
+
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)

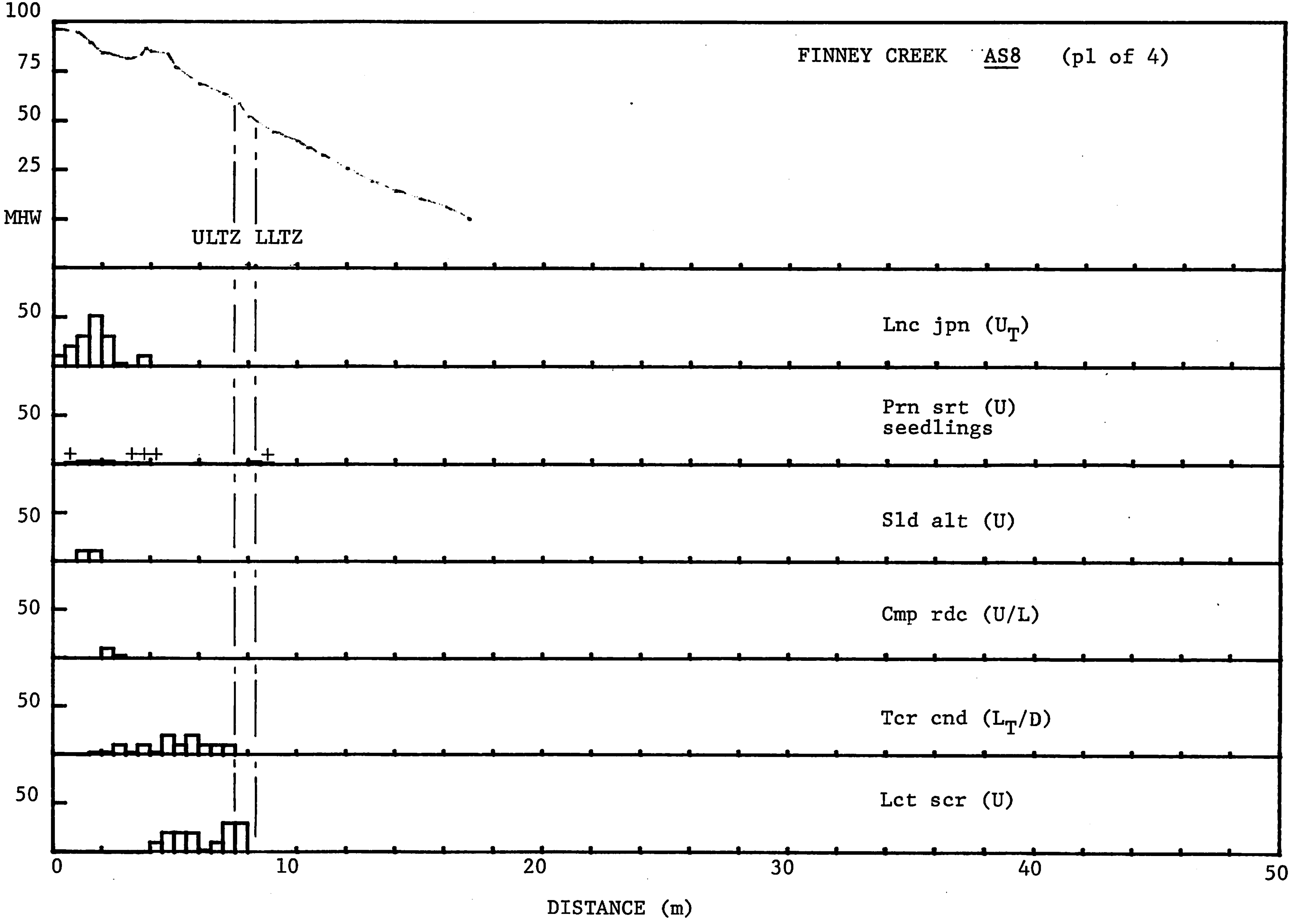

FINNEY CREEK AS6 (p1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Cyn dct (U/L)
Poa prt (U)
Lnc jpn (U_T)
Lct scr (U)
Fst rbr (U_T)
All vnl (U)
0
10
20
30
40
50
DISTANCE (m)


FINNEY CREEK AS6 (p2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Ely vrg (L_T/U_T)
50
Tcr cnd (L_T/D)
50
Bcc hlm (T/U_T)
50
Asp off (U_T)
50
Spr ptn (M_T/D)
50
Dst spc (M_T)
0
10
20
30
40
50
DISTANCE (m)

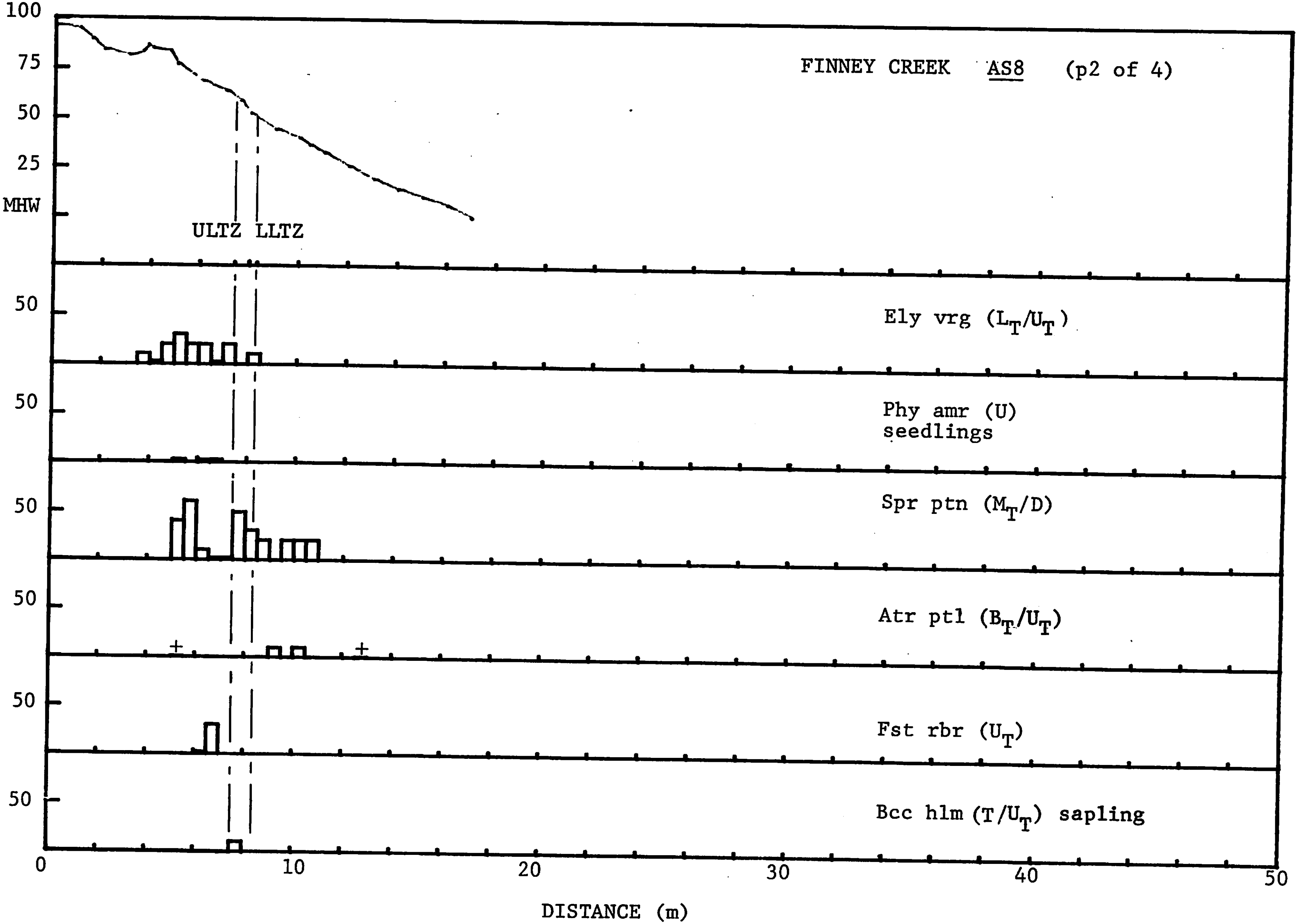

FINNEY CREEK AS6 (p3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Jnc grr (M_T)
Mixed seedlings
Iva frt & Brr frt (M_T)
+
Brr frt (M_T)
Spr alt (M)
Prn srt (U)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)


FINNEY CREEK AS7 (p 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Fst rbr (U_T)
Ely vrg (L_T/U_T)
Spr ptn (M_T/D)
Tcr cnd (L_T/D)
Chn amb (U_T)
50
0
10
20
30
40
50
DISTANCE (m)

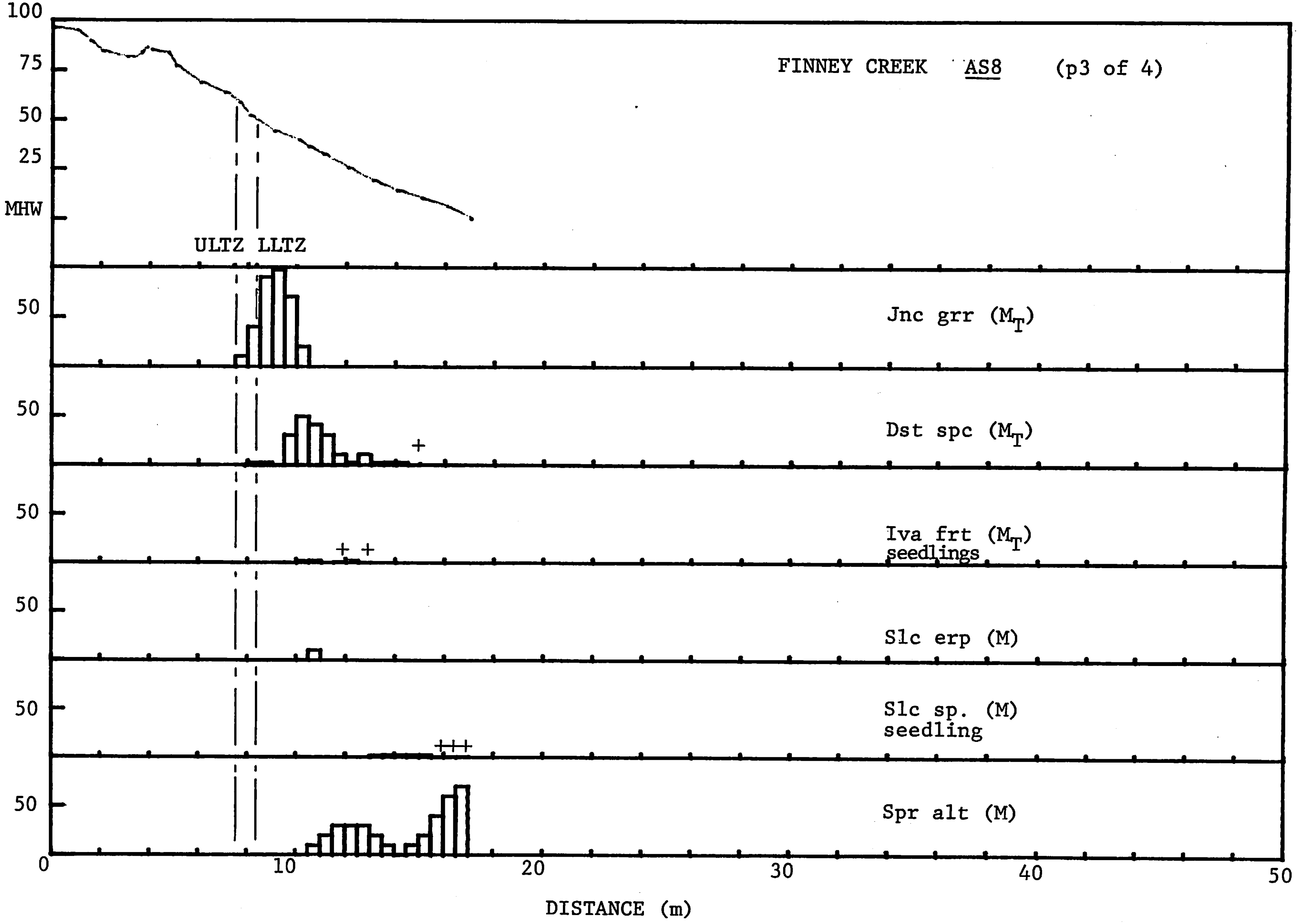

FINNEY CREEK AS7 (p2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Jnc grr (M_T)
Iva frt (M_T) seedlings
Dst spc (M_T)
Spr alt (M)
Prn srt (U)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



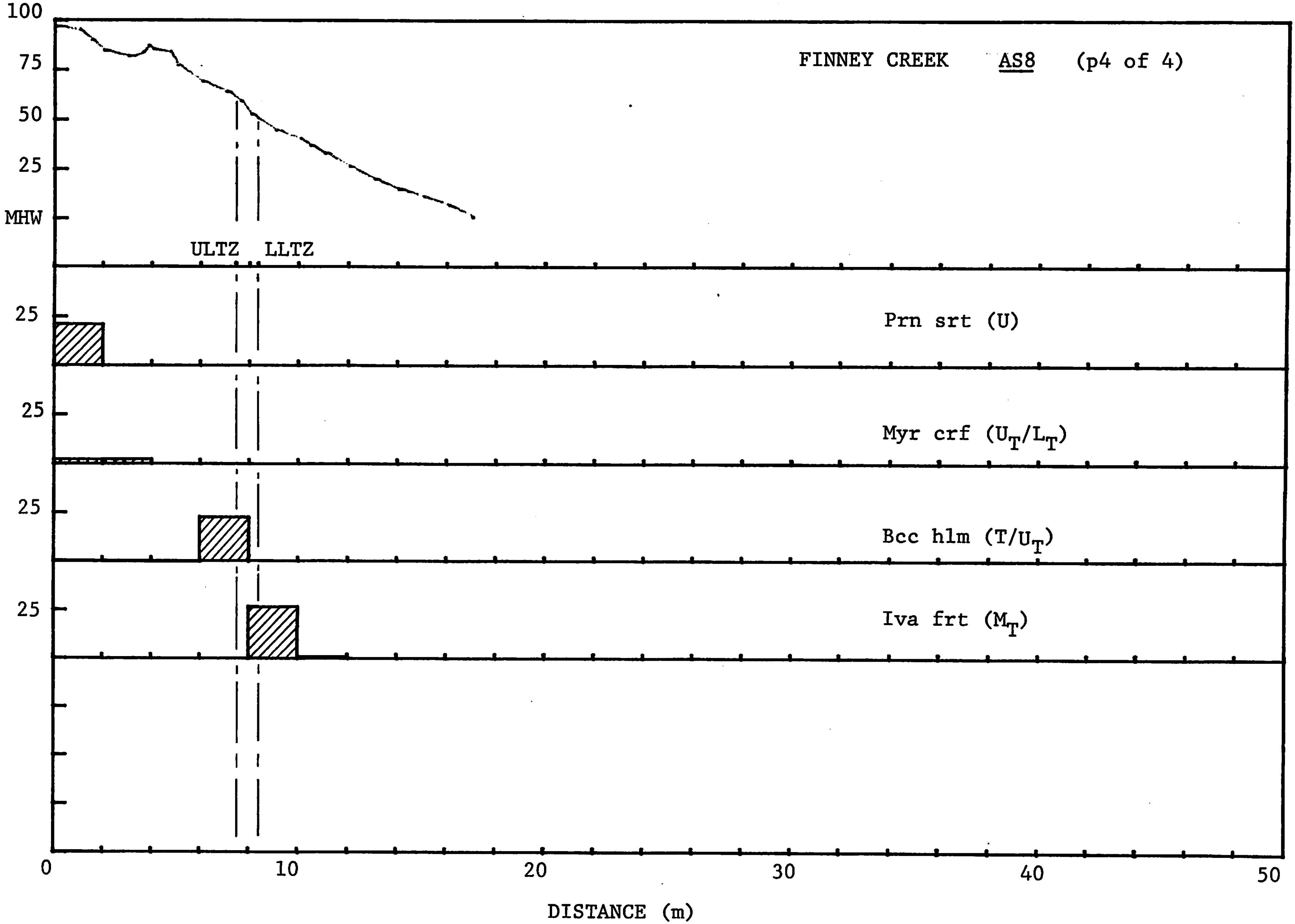
FINNEY CREEK AS8 (p1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Prn srt (U)
seedlings
Sld alt (U)
Cmp rdc (U/L)
Tcr cnd (L_T/D)
Lct scr (U)
0
10
20
30
40
50
DISTANCE (m)



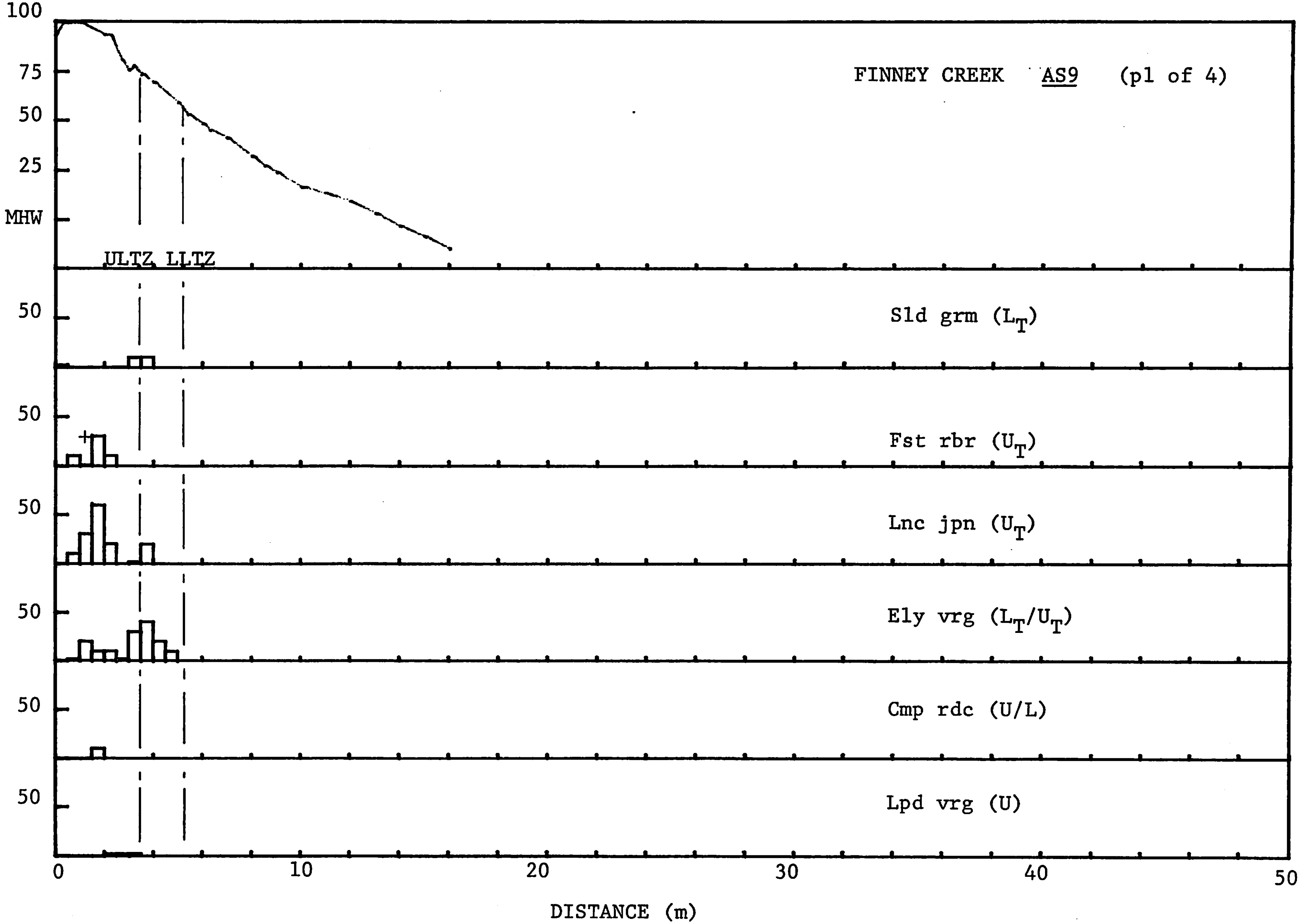
FINNEY CREEK AS8 (p2 of 4)
100
75
50
25
MHW
ULTZ LLTZ
50
Ely vrg (LT/UT)
50
Phy amr (U) seedlings
50
Spr ptn (MT/D)
50
Atr ptl (BT/UT)
50
Fst rbr (UT)
50
Bcc hlm (T/UT) sapling
0
10
20
30
40
50
DISTANCE (m)



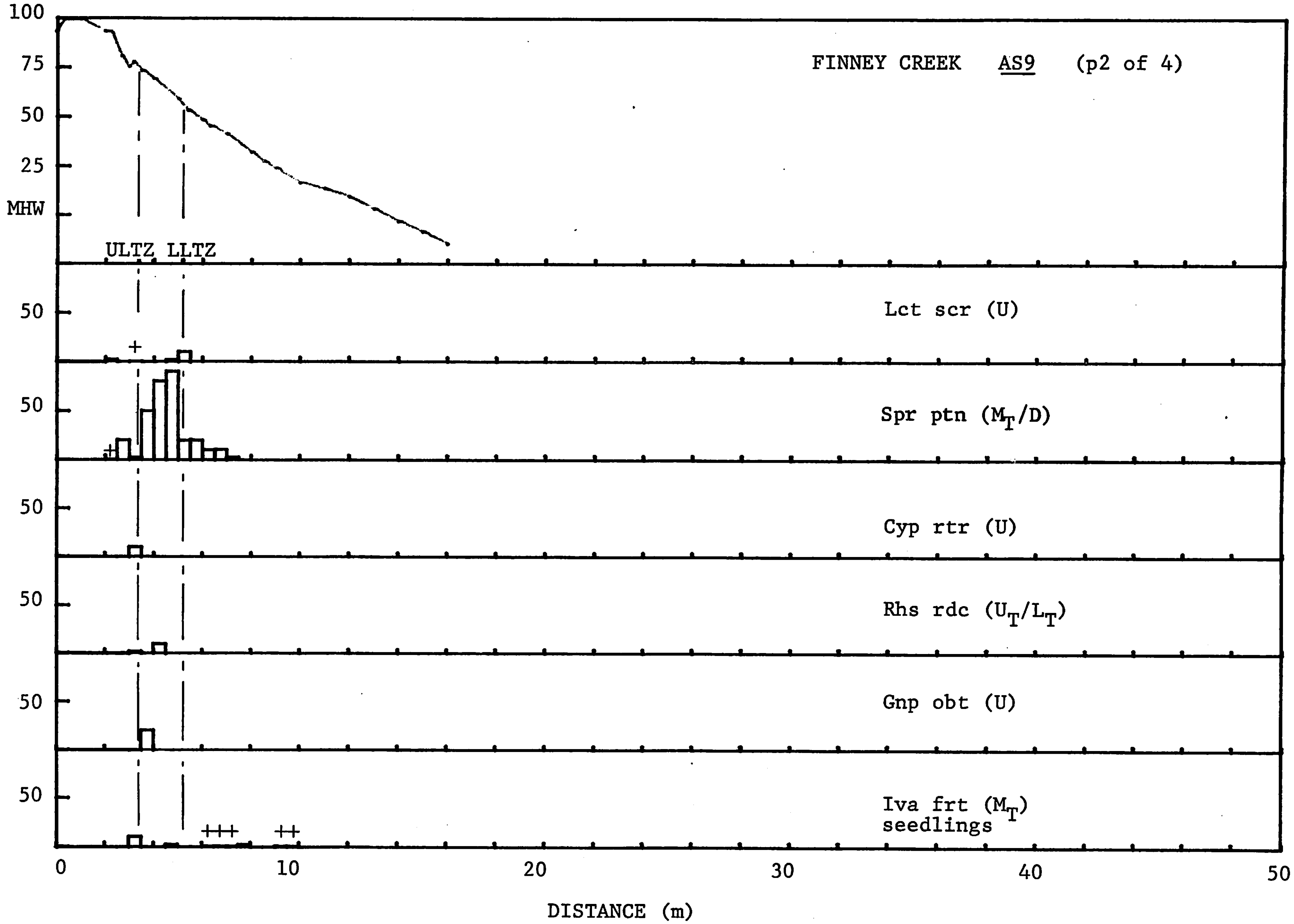
FINNEY CREEK AS8 (p3 of 4)
100
75
50
25
MHW
ULTZ LLTZ
50
Jnc grr (M_T)
50
Dst spc (M_T)
50
Iva frt (M_T)
seedlings
50
Slc erp (M)
50
Slc sp. (M)
seedling
50
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)



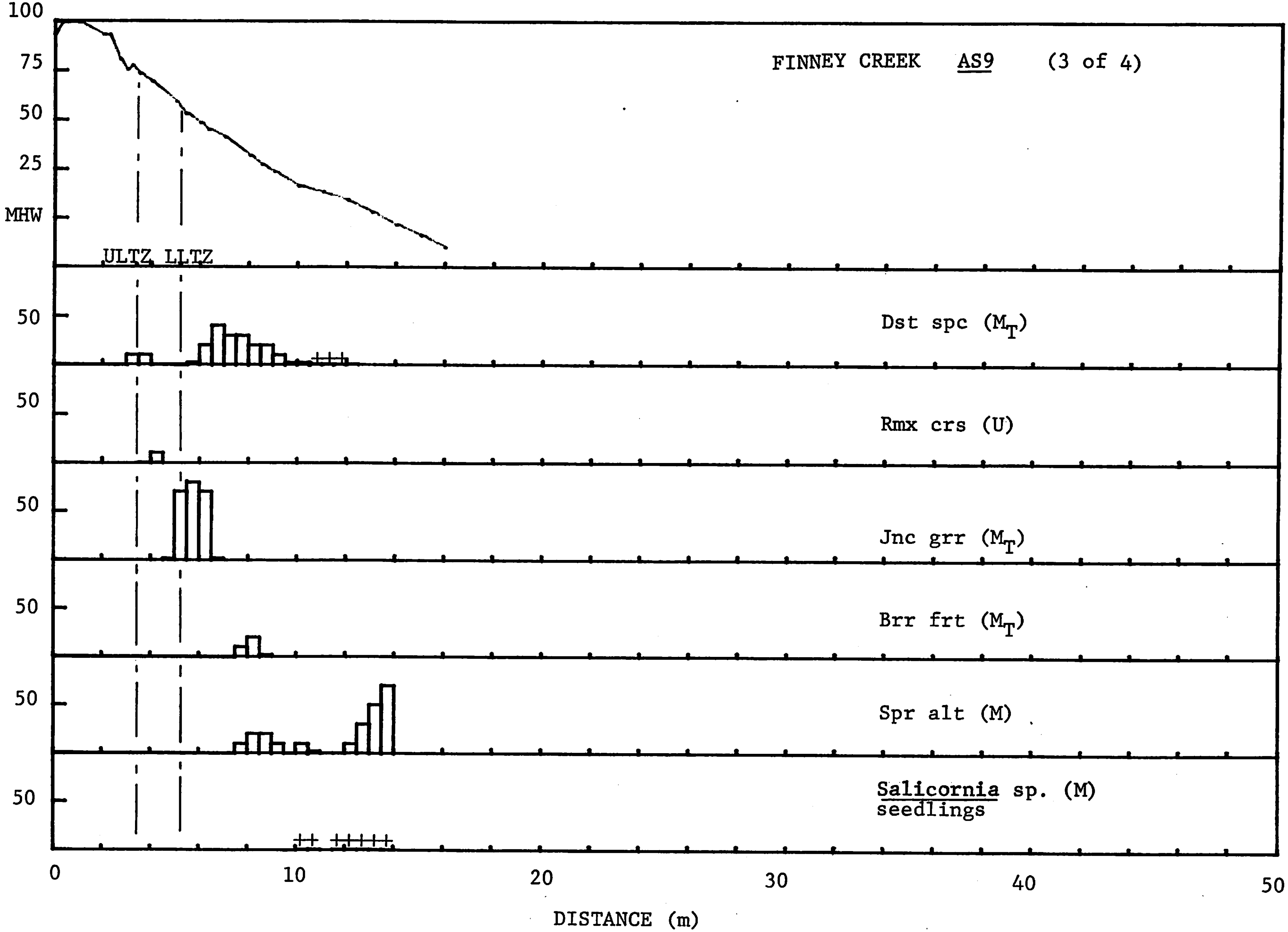
FINNEY CREEK AS8 (p4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
25
Prn srt (U)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



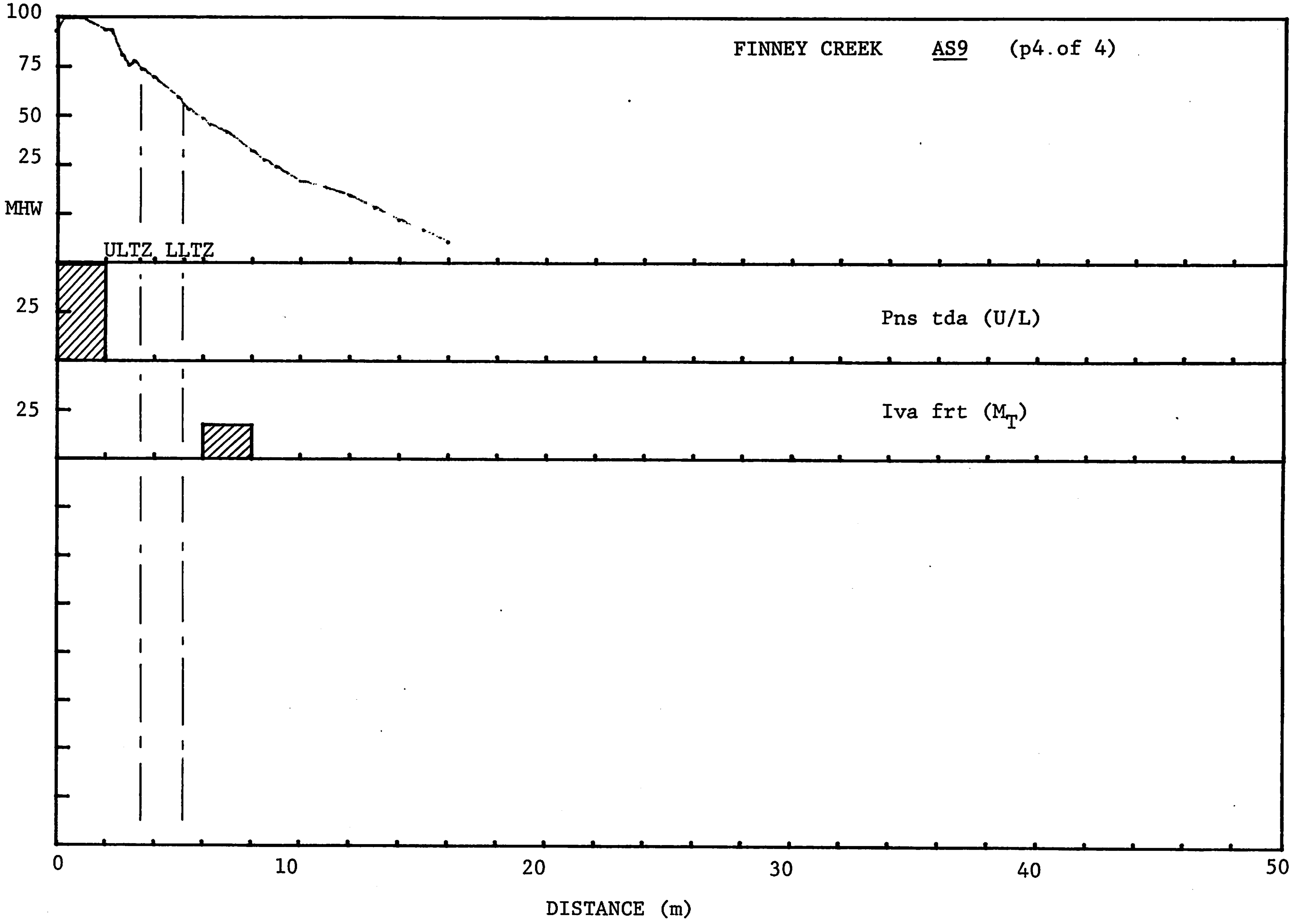
FINNEY CREEK AS9 (pl of 4)
100
75
50
25
MHW
ULTZ LLTZ
Sld grm (L_T)
Fst rbr (U_T)
Lnc jpn (U_T)
Ely vrg (L_T/U_T)
Cmp rdc (U/L)
Lpd vrg (U)
0
10
20
30
40
50
DISTANCE (m)

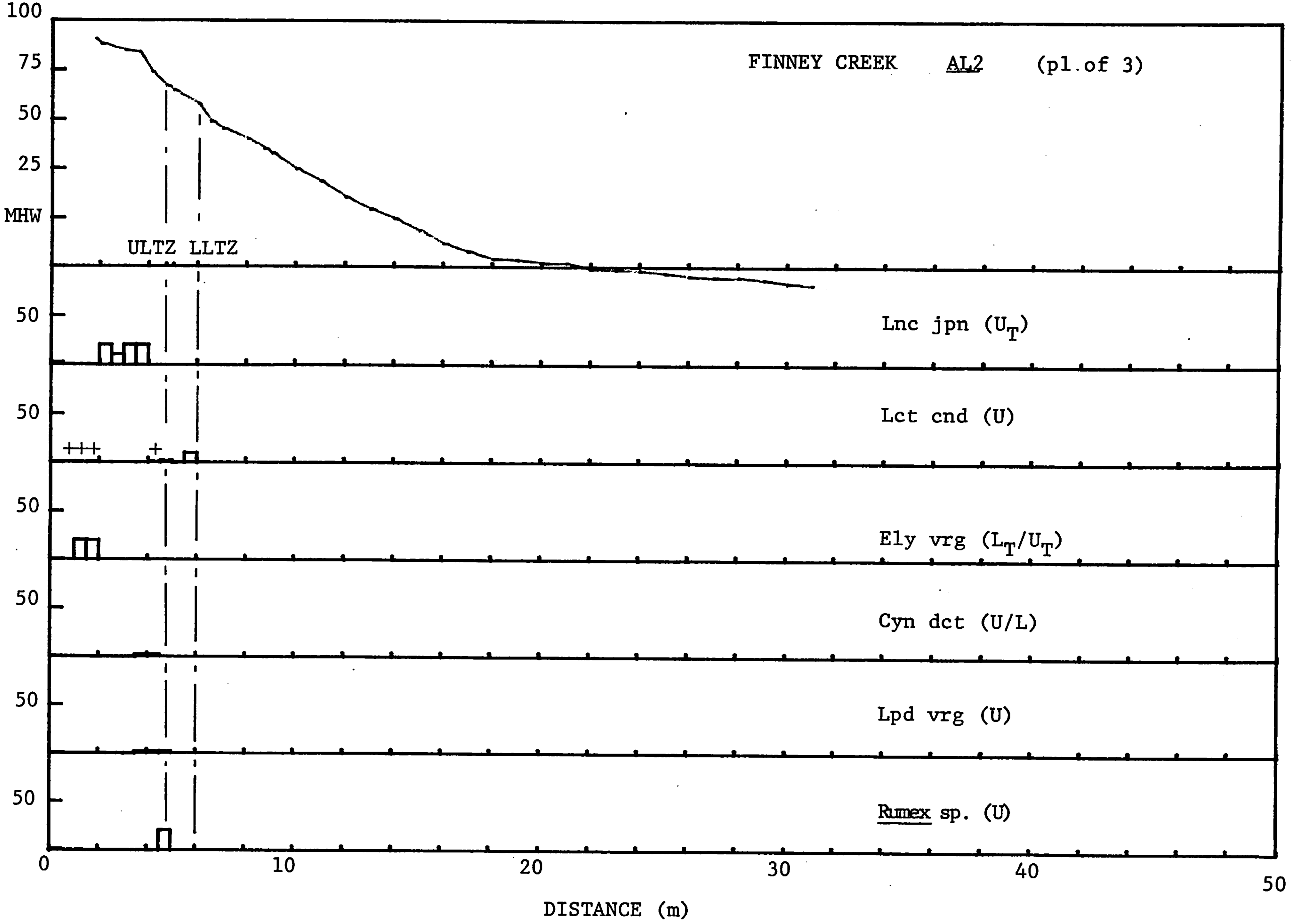


FINNEY CREEK AS9 (p2 of 4)
100
75
50
25
MHW
ULTZ LLTZ
Lct scr (U)
Spr ptn (M_T/D)
Cyp rtr (U)
Rhs rdc (U_T/L_T)
Gnp obt (U)
Iva frt (M_T)
seedlings
0
10
20
30
40
50
DISTANCE (m)

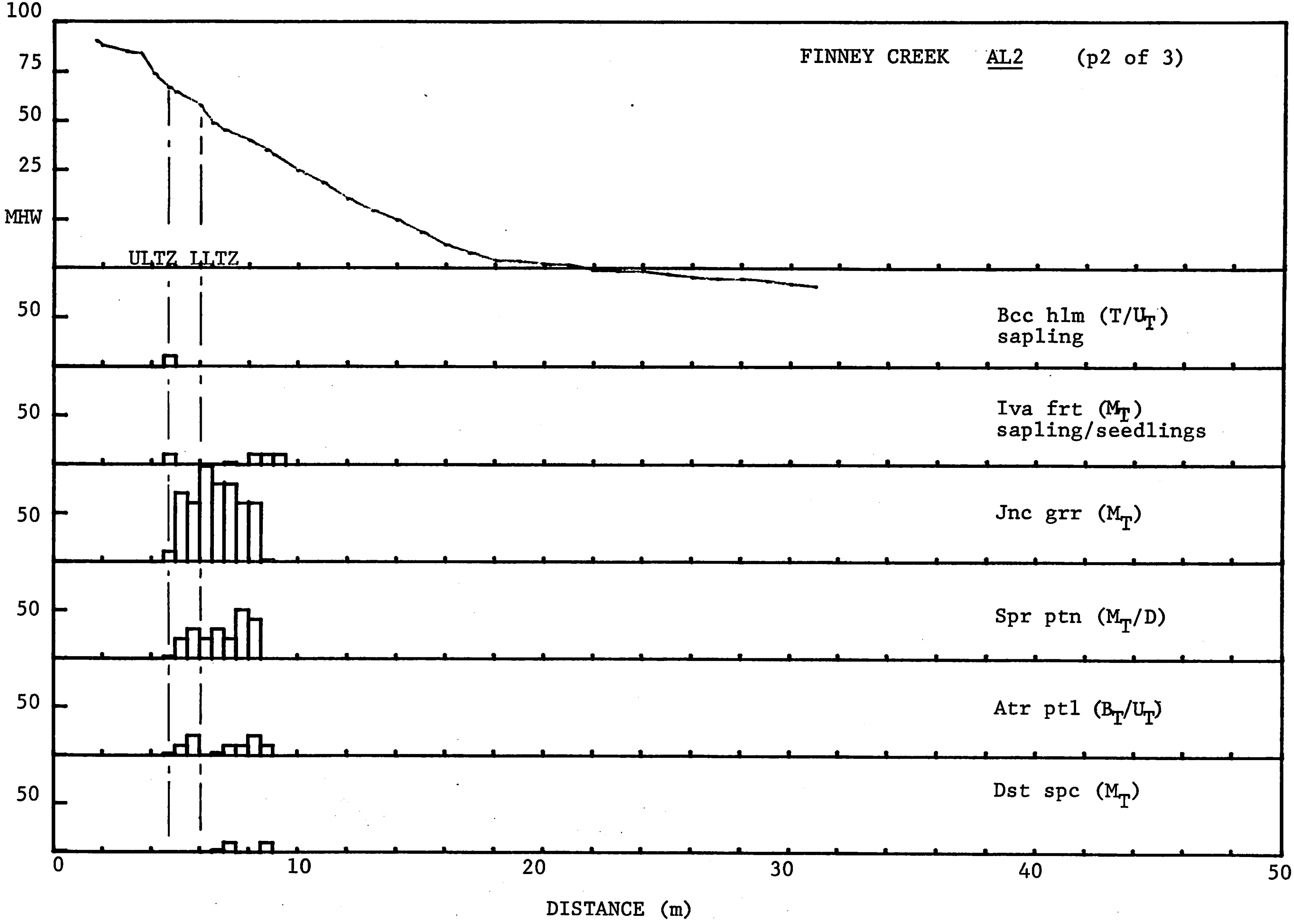


FINNEY CREEK AS9 (3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
50
Dst spc (M_T)
50
Rmx crs (U)
50
Jnc grr (M_T)
50
Brr frt (M_T)
50
Spr alt (M)
50
Salicornia sp. (M)
seedlings
0
10
20
30
40
50
DISTANCE (m)

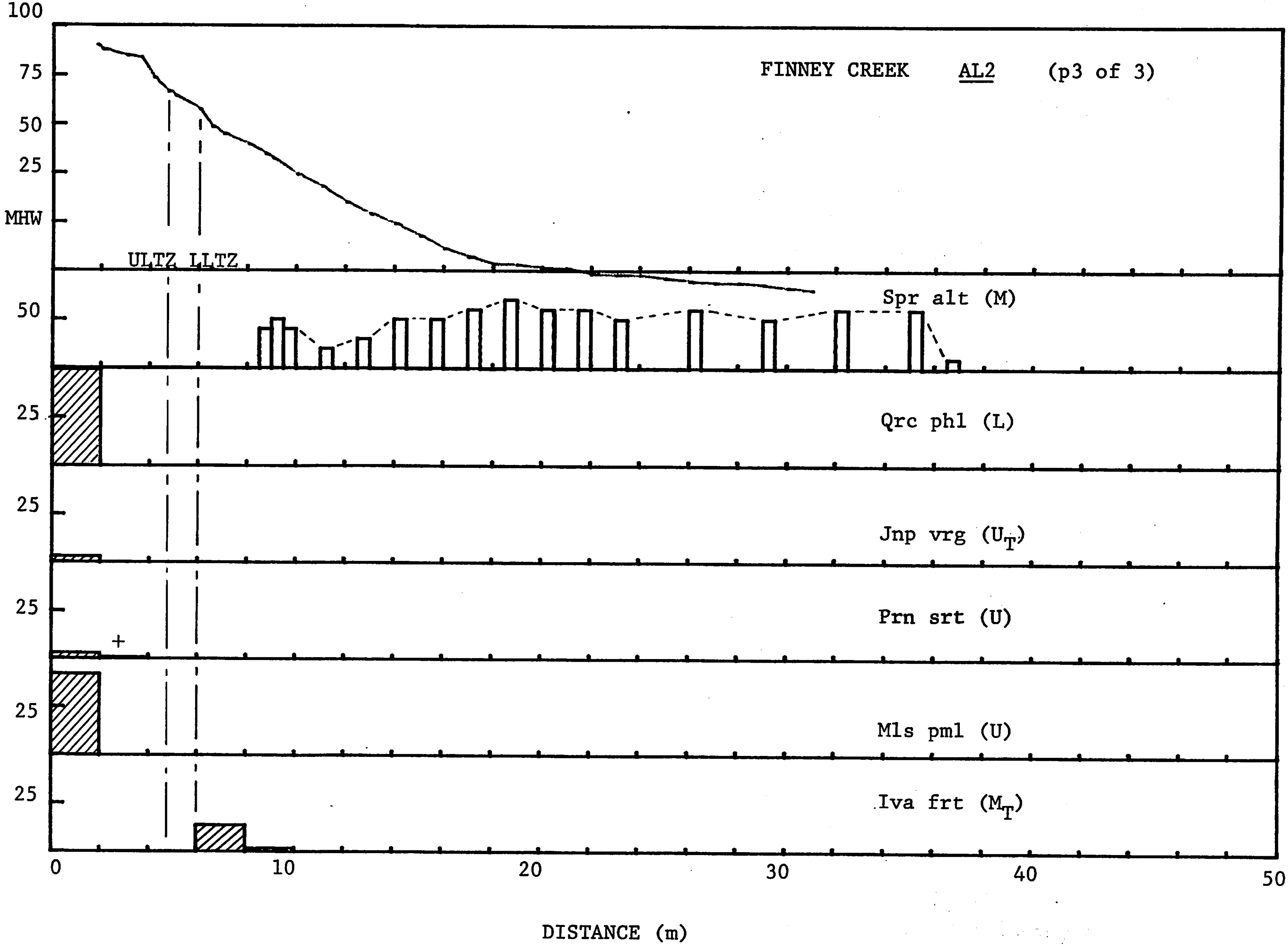

FINNEY CREEK AS9 (p4.of 4)
100
75
50
25
MHW
ULTZ LLTZ
25
Pns tda (U/L)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



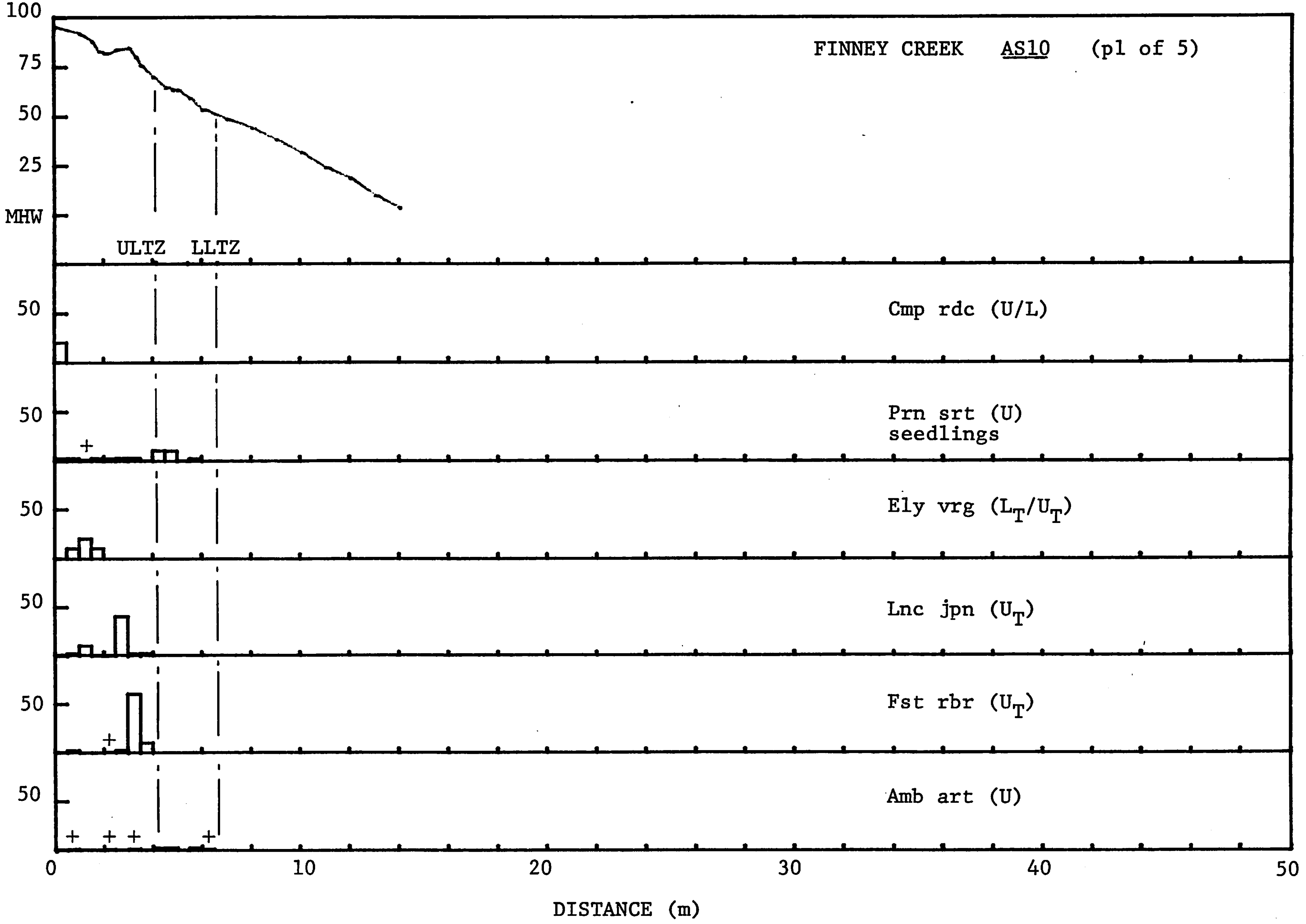
FINNEY CREEK AL2 (pl.of 3)
100
75
50
25
MHW
ULTZ LLTZ
Lnc jpn (U_T)
Lct cnd (U)
Ely vrg (L_T/U_T)
Cyn dct (U/L)
Lpd vrg (U)
Rumex sp. (U)
0
10
20
30
40
50
DISTANCE (m)

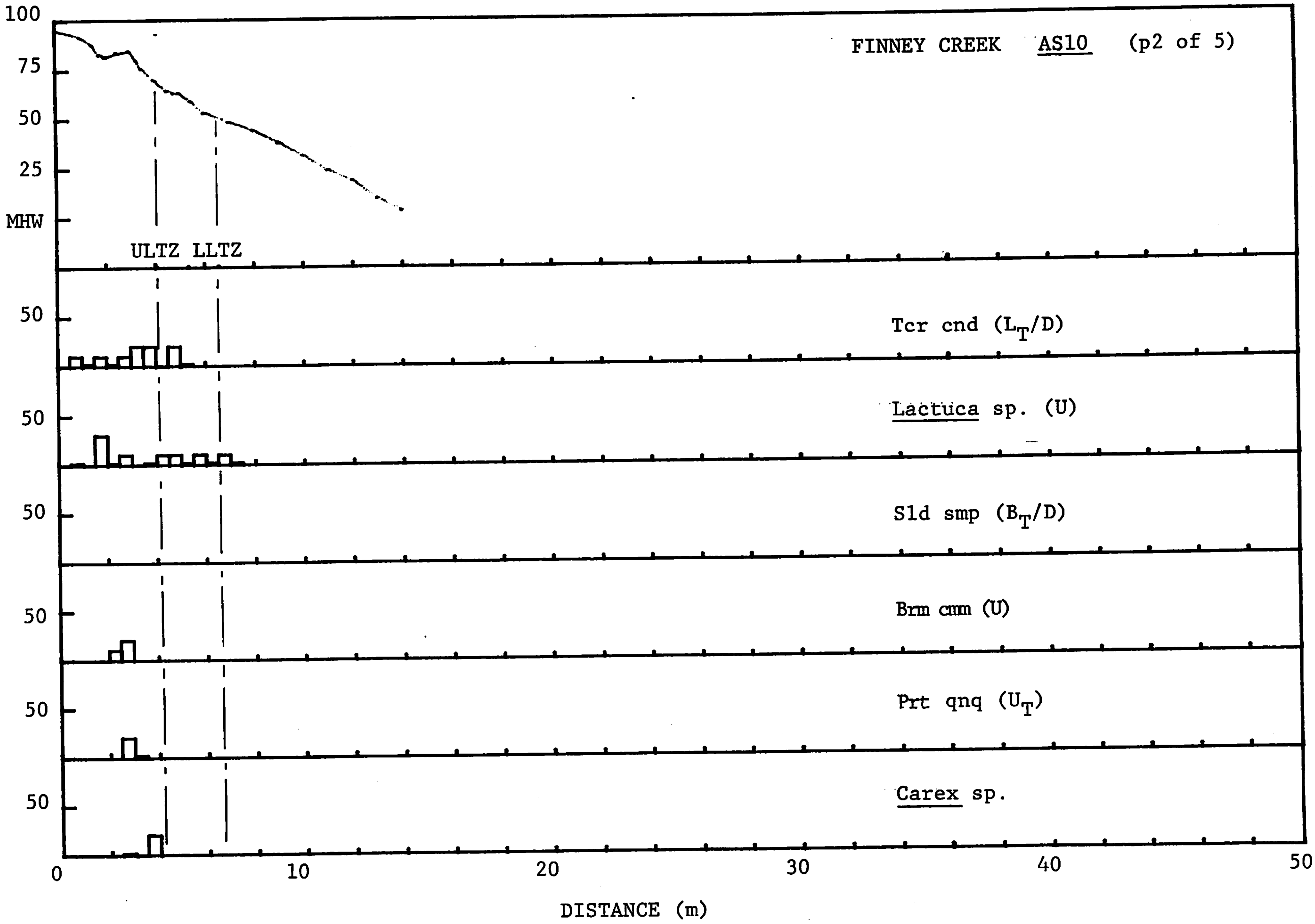


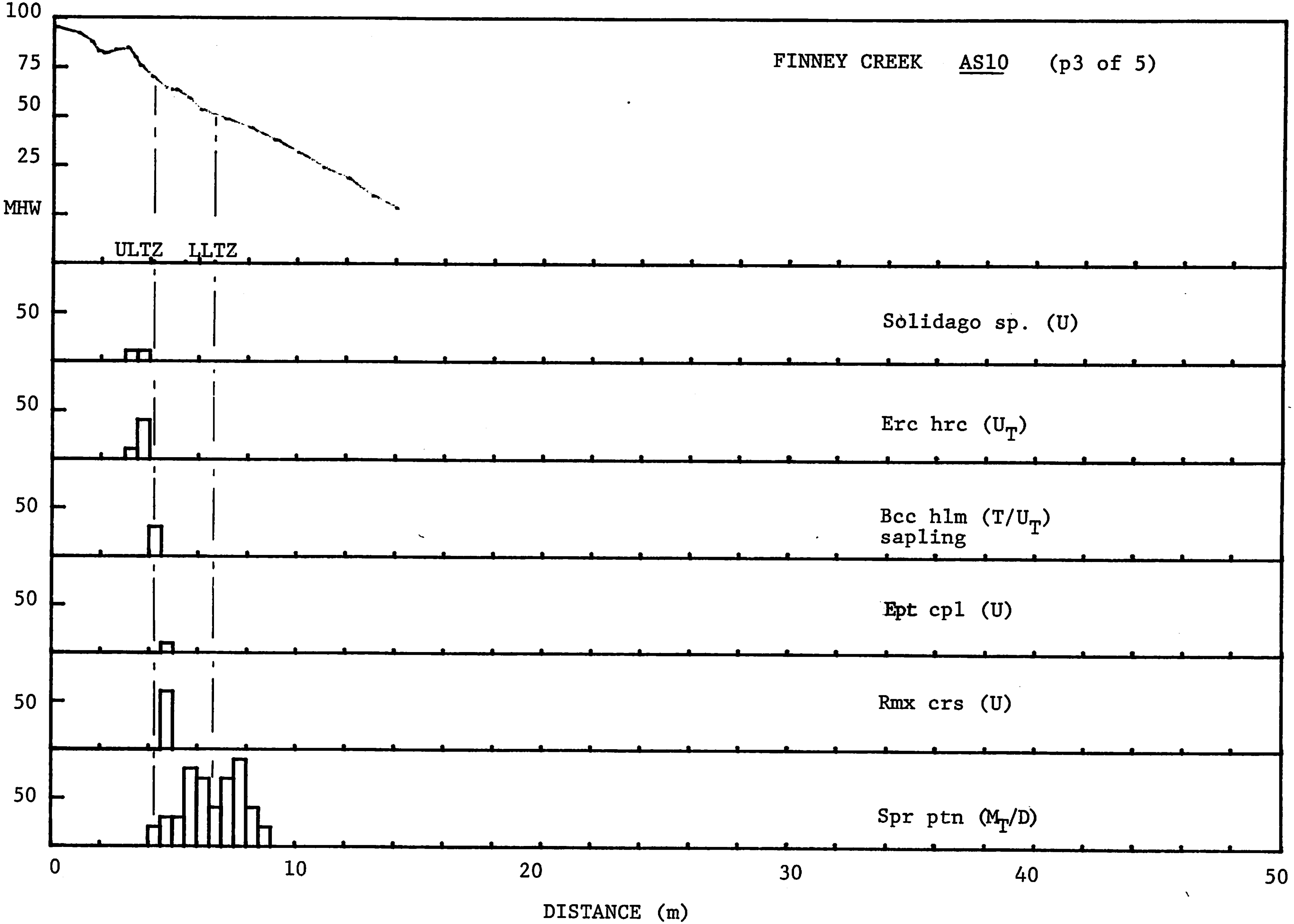
FINNEY CREEK AL2 (p2 of 3)
100
75
50
25
MHW
ULTZ LLTZ
Bcc hlm (T/U_T)
sapling
Iva frt (M_T)
sapling/seedlings
Jnc grr (M_T)
Spr ptn (M_T/D)
Atr ptl (B_T/U_T)
Dst spc (M_T)
0
10
20
30
40
50
DISTANCE (m)



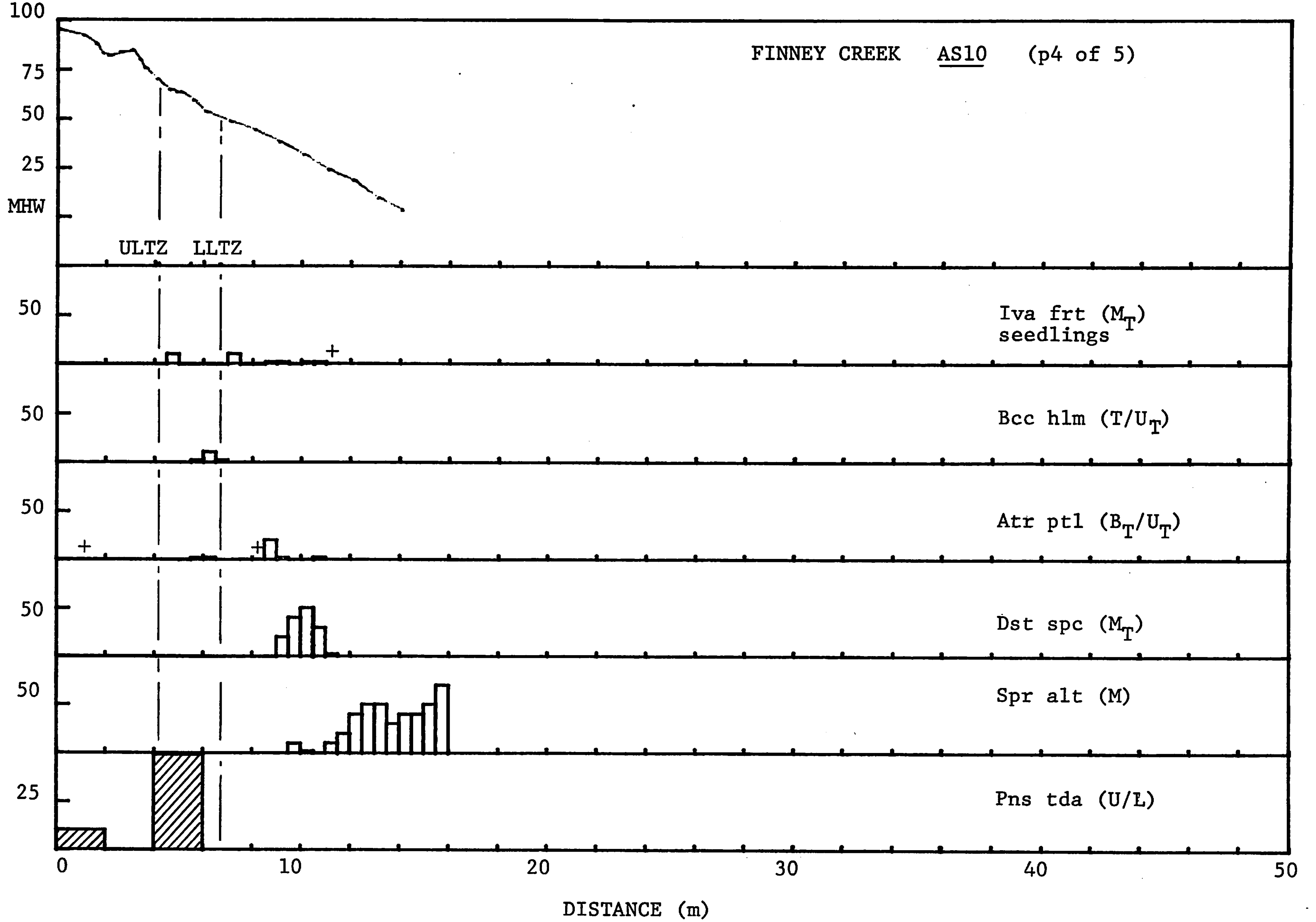
100
75
50
25
MHW
FINNEY CREEK AL2 (p3 of 3)
ULTZ LLTZ
50
Spr alt (M)
25
Qrc phl (L)
25
Jnp vrg (U_T)
25
Prn srt (U)
+
25
Mls pml (U)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)


FINNEY CREEK AS10 (pl of 5)
100
75
50
25
MHW
ULTZ
LLTZ
Cmp rdc (U/L)
50
Prn srt (U)
seedlings
50
Ely vrg (L_T/U_T)
50
Lnc jpn (U_T)
50
Fst rbr (U_T)
50
Amb art (U)
50
0
10
20
30
40
50
DISTANCE (m)

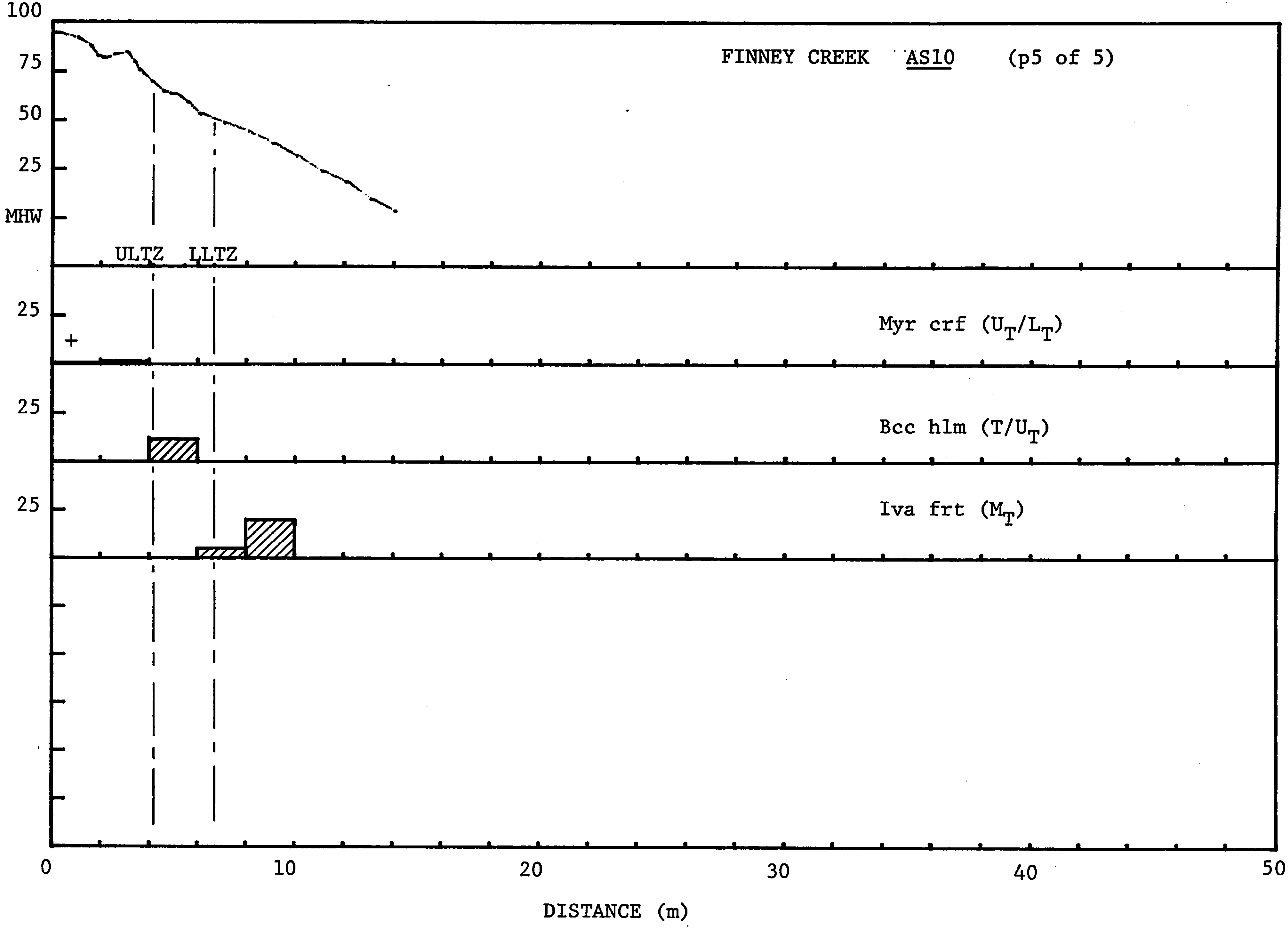

FINNEY CREEK AS10 (p2 of 5)
100
75
50
25
MHW
ULTZ LLTZ
Tcr cnd (L_T/D)
Lactuca sp. (U)
Sld smp (B_T/D)
Brm cmm (U)
Prt qnq (U_T)
Carex sp.
50
0
10
20
30
40
50
DISTANCE (m)



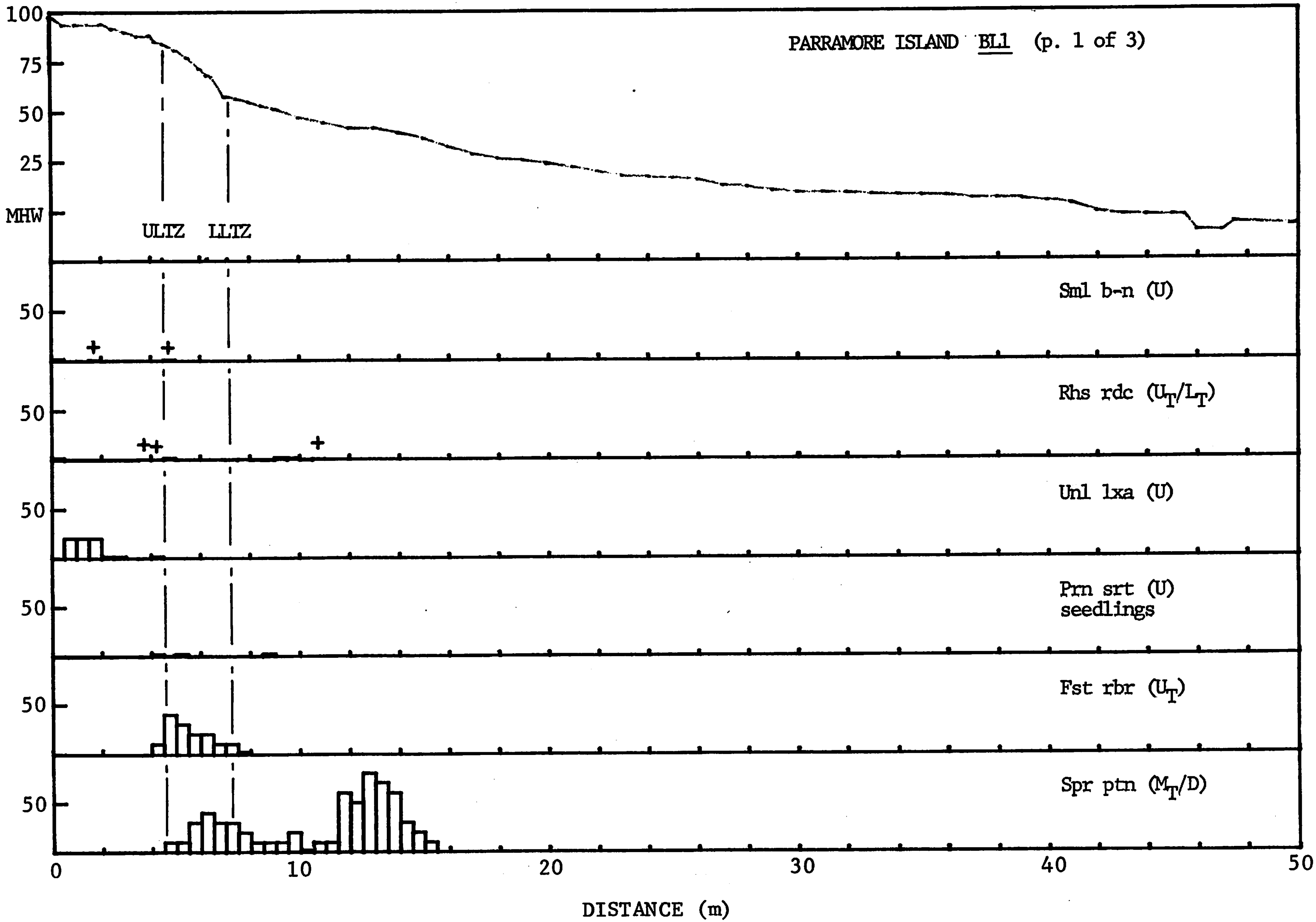
FINNEY CREEK AS10 (p3 of 5)
100
75
50
25
MHW
ULTZ
LLTZ
Solidago sp. (U)
Erc hrc (U_T)
Bcc hlm (T/U_T)
sapling
Ept cpl (U)
Rmx crs (U)
Spr ptn (M_T/D)
50
0
10
20
30
40
50
DISTANCE (m)

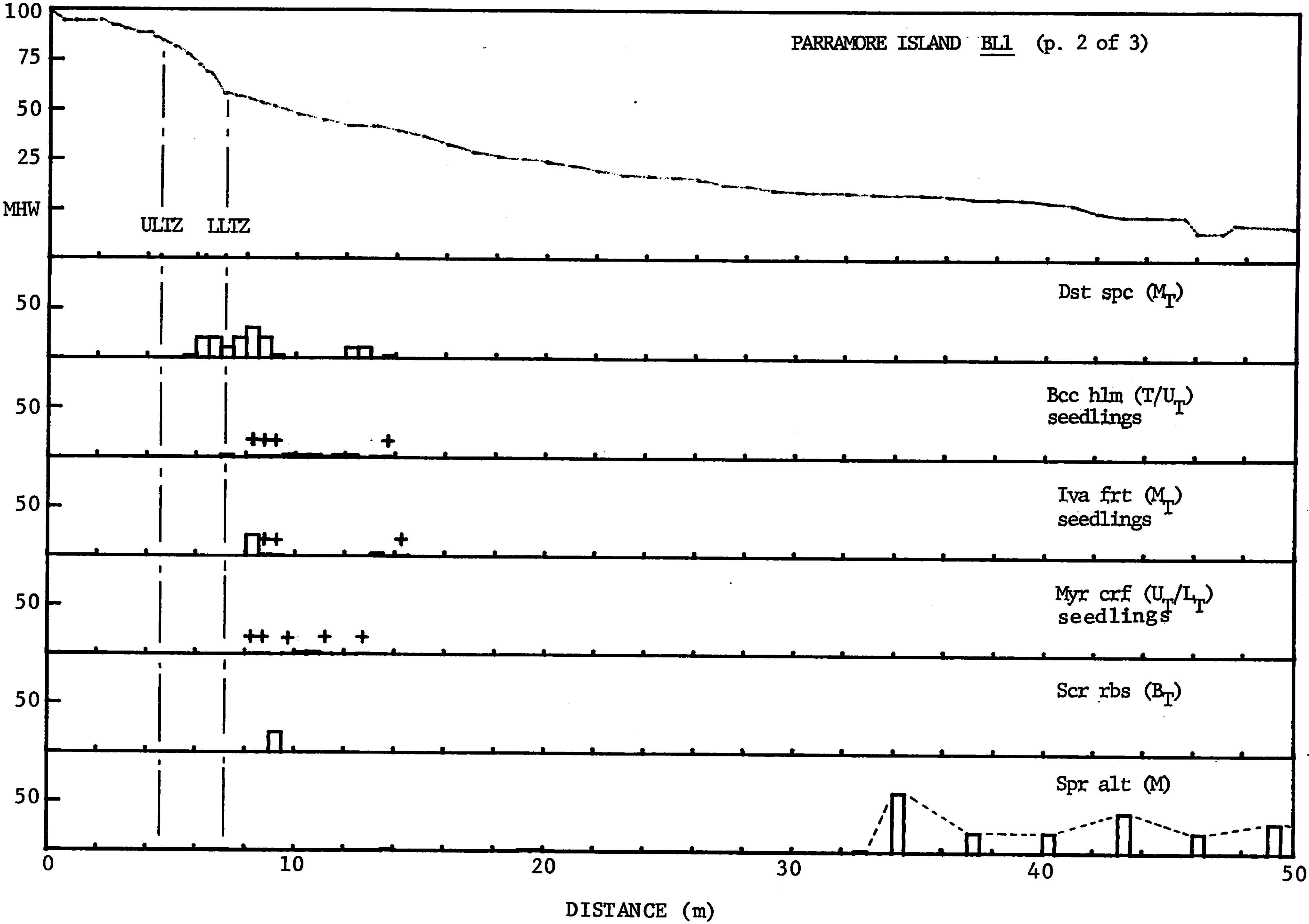


FINNEY CREEK AS10 (p4 of 5)
100
75
50
25
MHW
ULTZ
LLTZ
Iva frt (M_T) seedlings
Bcc hlm (T/U_T)
Atr ptl (B_T/U_T)
Dst spc (M_T)
Spr alt (M)
Pns tda (U/L)
0
10
20
30
40
50
DISTANCE (m)

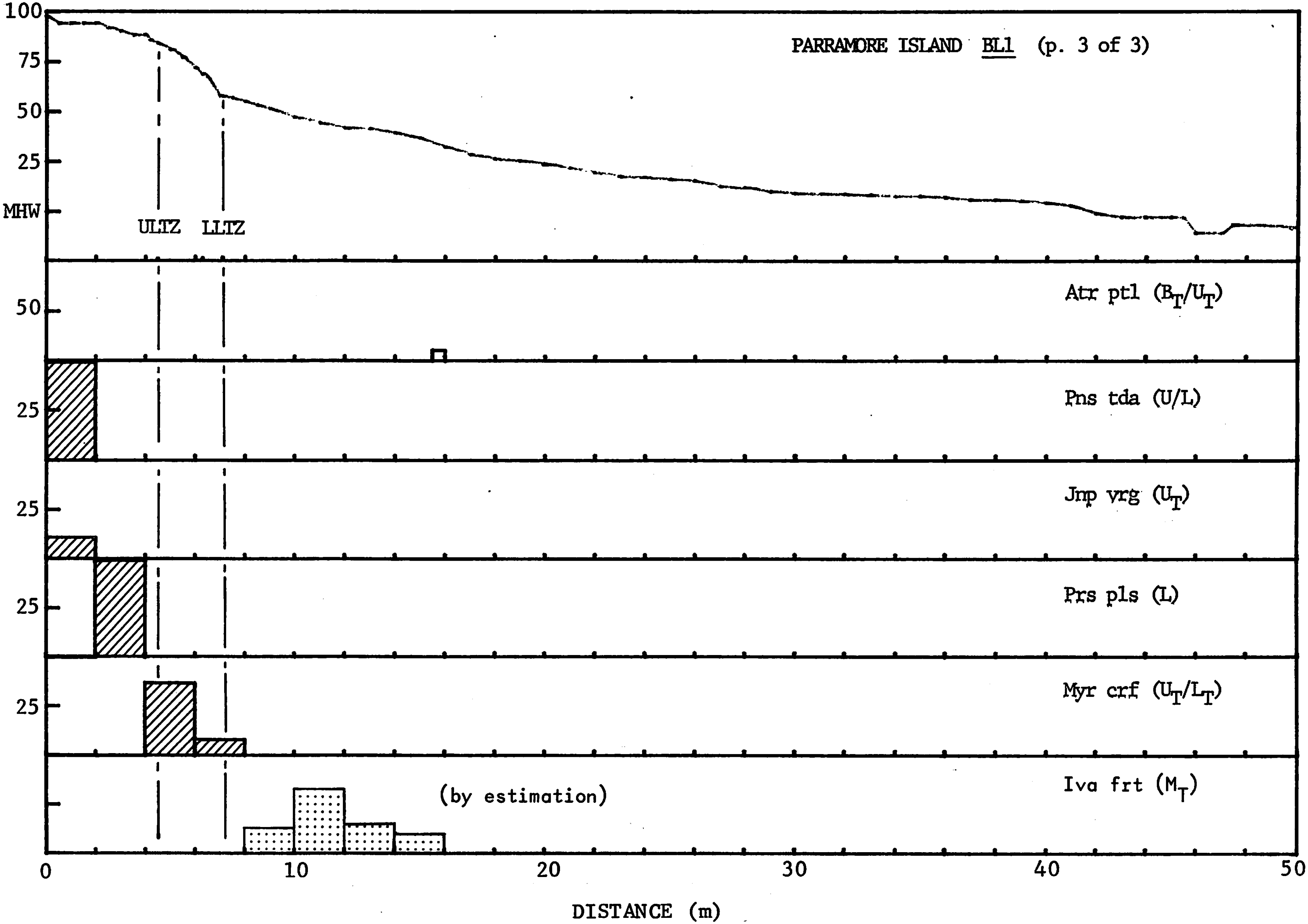


FINNEY CREEK AS10 (p5 of 5)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

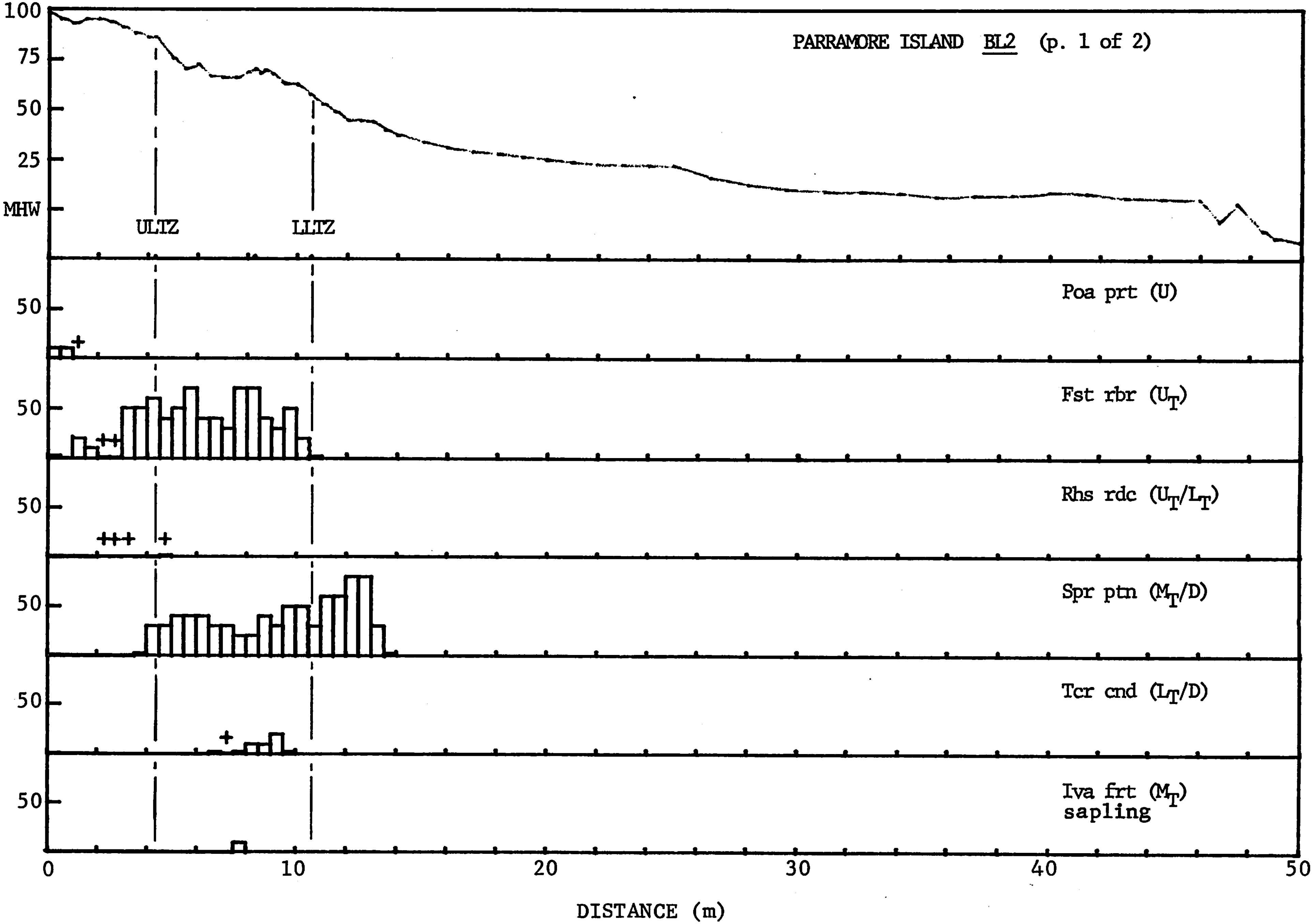

PARRAMORE ISLAND BL1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Sml b-n (U)
Rhs rdc (U_T/L_T)
Unl lxa (U)
Prn srt (U)
seedlings
Fst rbr (U_T)
Spr ptn (M_T/D)
0
10
20
30
40
50
DISTANCE (m)

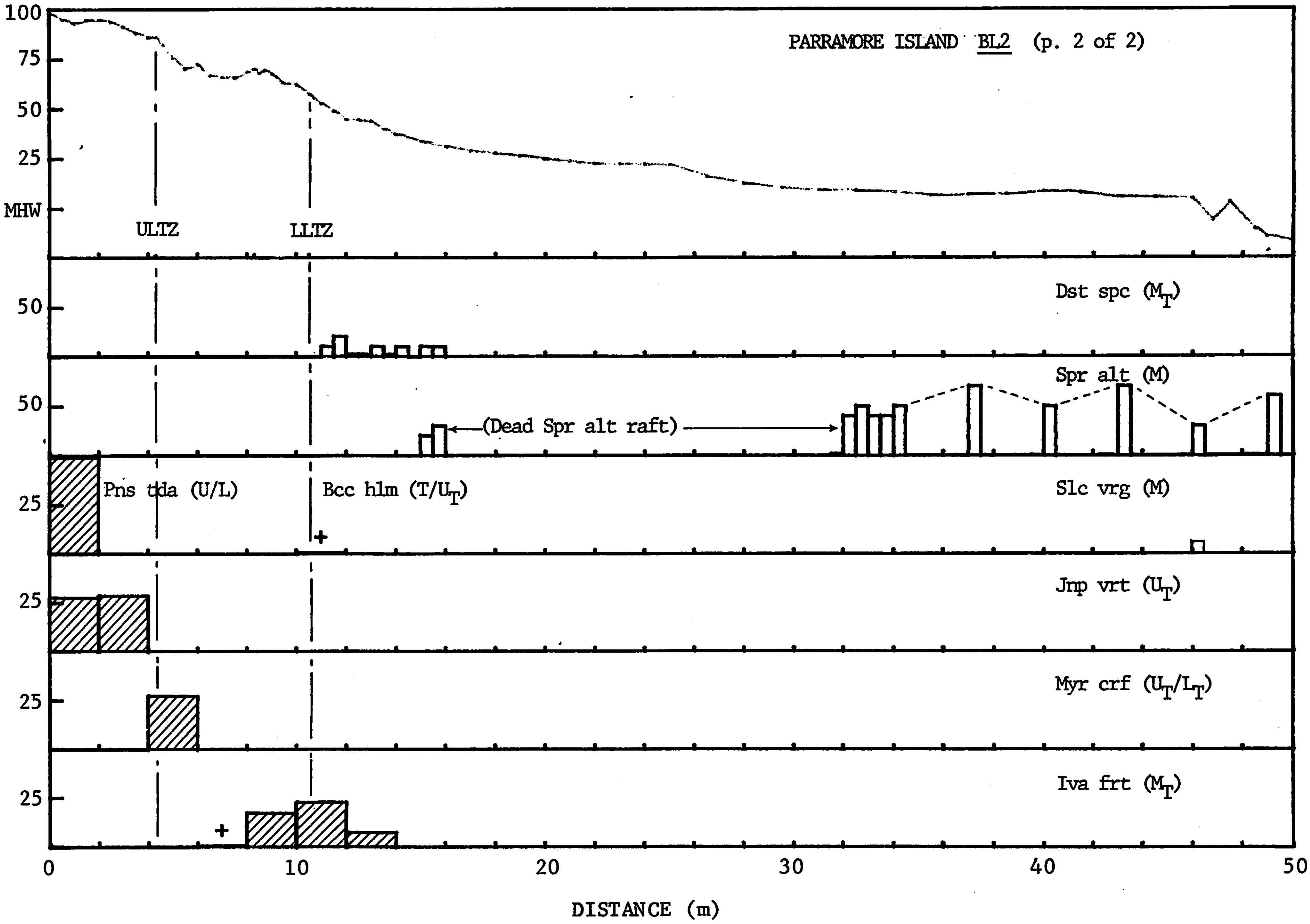


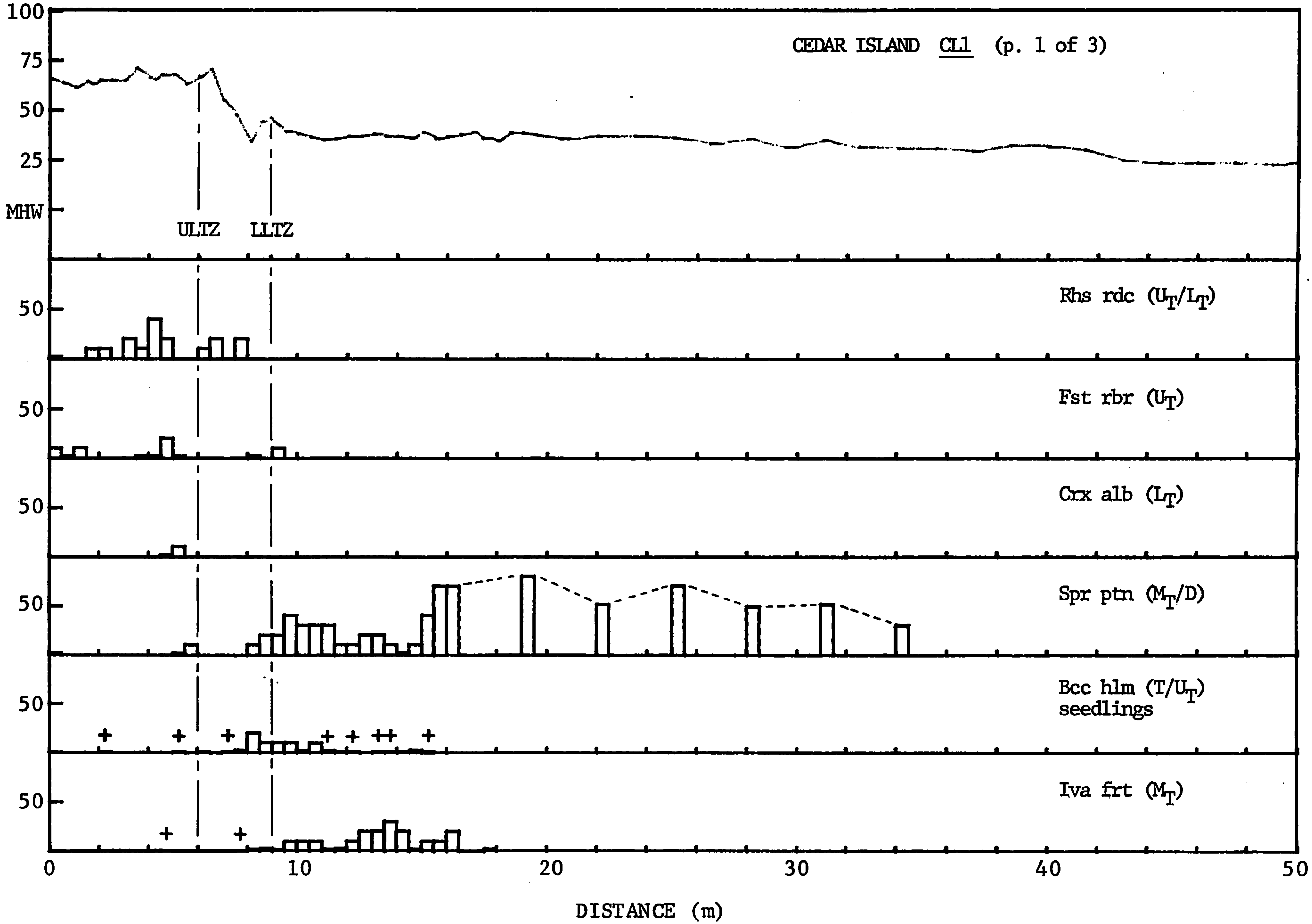
PARRAMORE ISLAND BL1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Bcc hlm (T/U_T) seedlings
Iva frt (M_T) seedlings
Myr crf (U_T/L_T) seedlings
Scr rbs (B_T)
Spr alt (M)
50
0
10
20
30
40
50
DISTANCE (m)

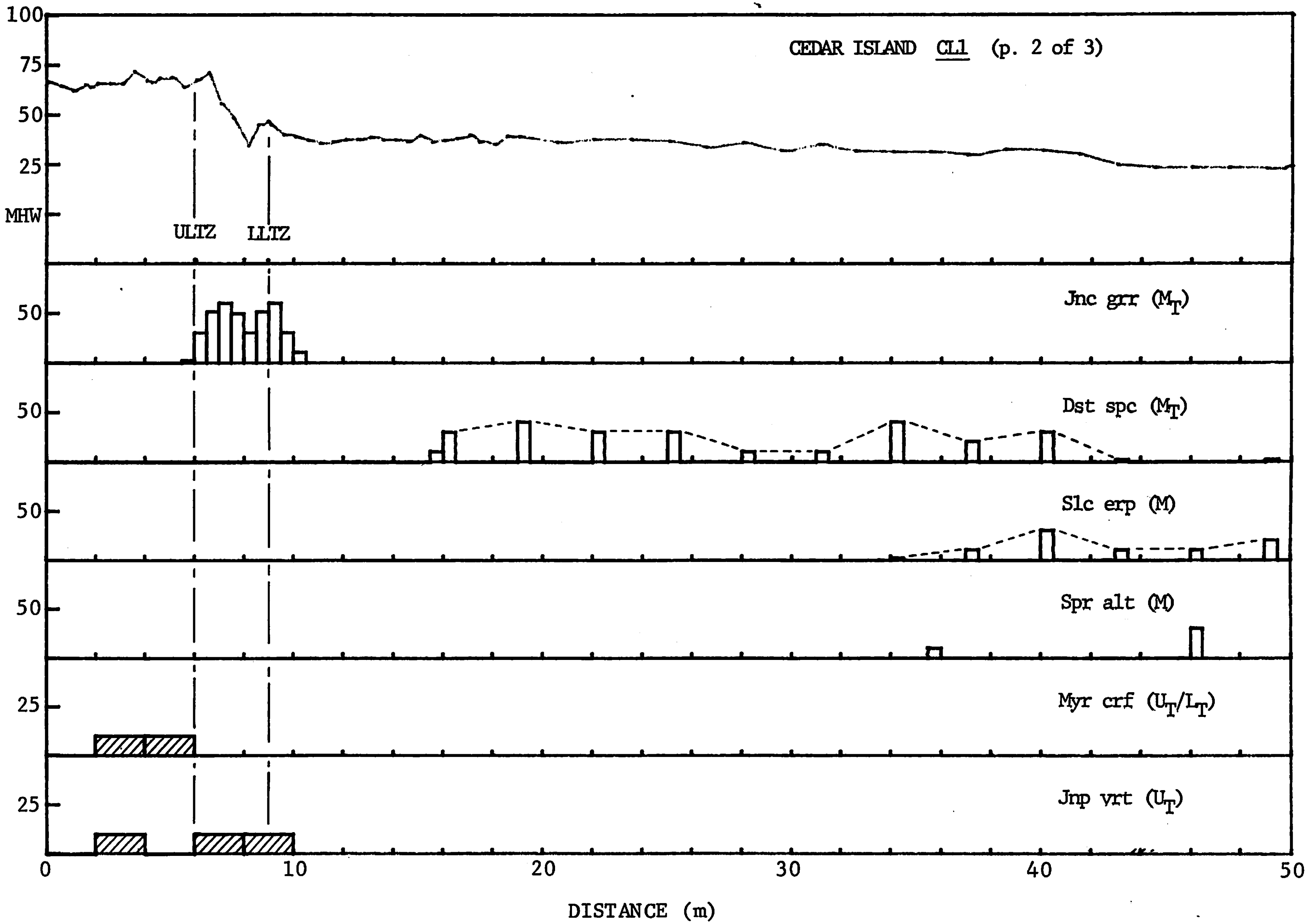


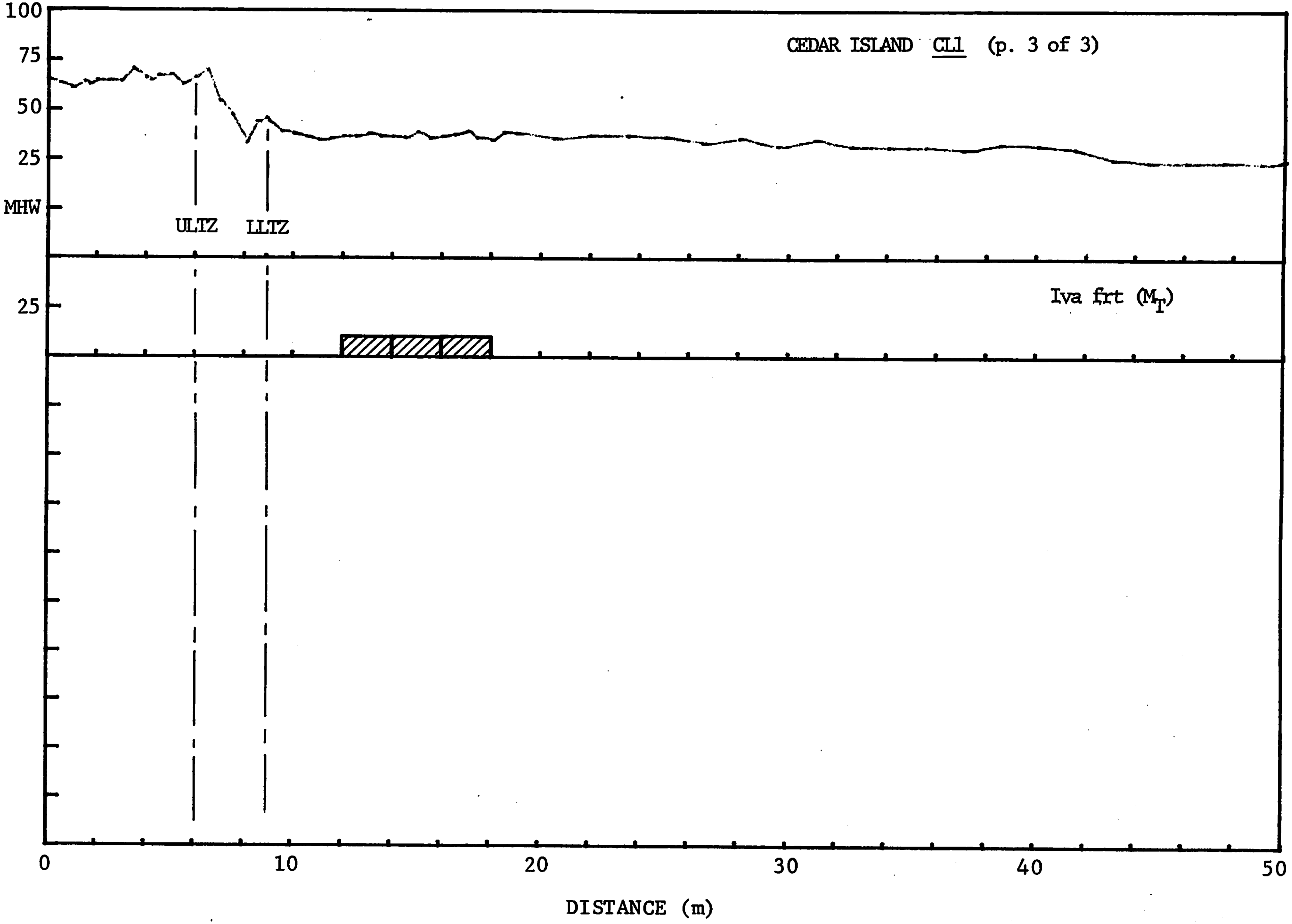
PARRAMORE ISLAND BL1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Atr ptl (B_T/U_T)
50
Pns tda (U/L)
25
Jnp vrg (U_T)
25
Prs pls (L)
25
Myr crf (U_T/L_T)
25
Iva frt (M_T)
(by estimation)
0
10
20
30
40
50
DISTANCE (m)


PARRAMORE ISLAND BL2 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Poa prt (U)
Fst rbr (U_T)
Rhs rdc (U_T/L_T)
Spr ptn (M_T/D)
Tcr cnd (L_T/D)
Iva frt (M_T)
sapling
0
10
20
30
40
50
DISTANCE (m)

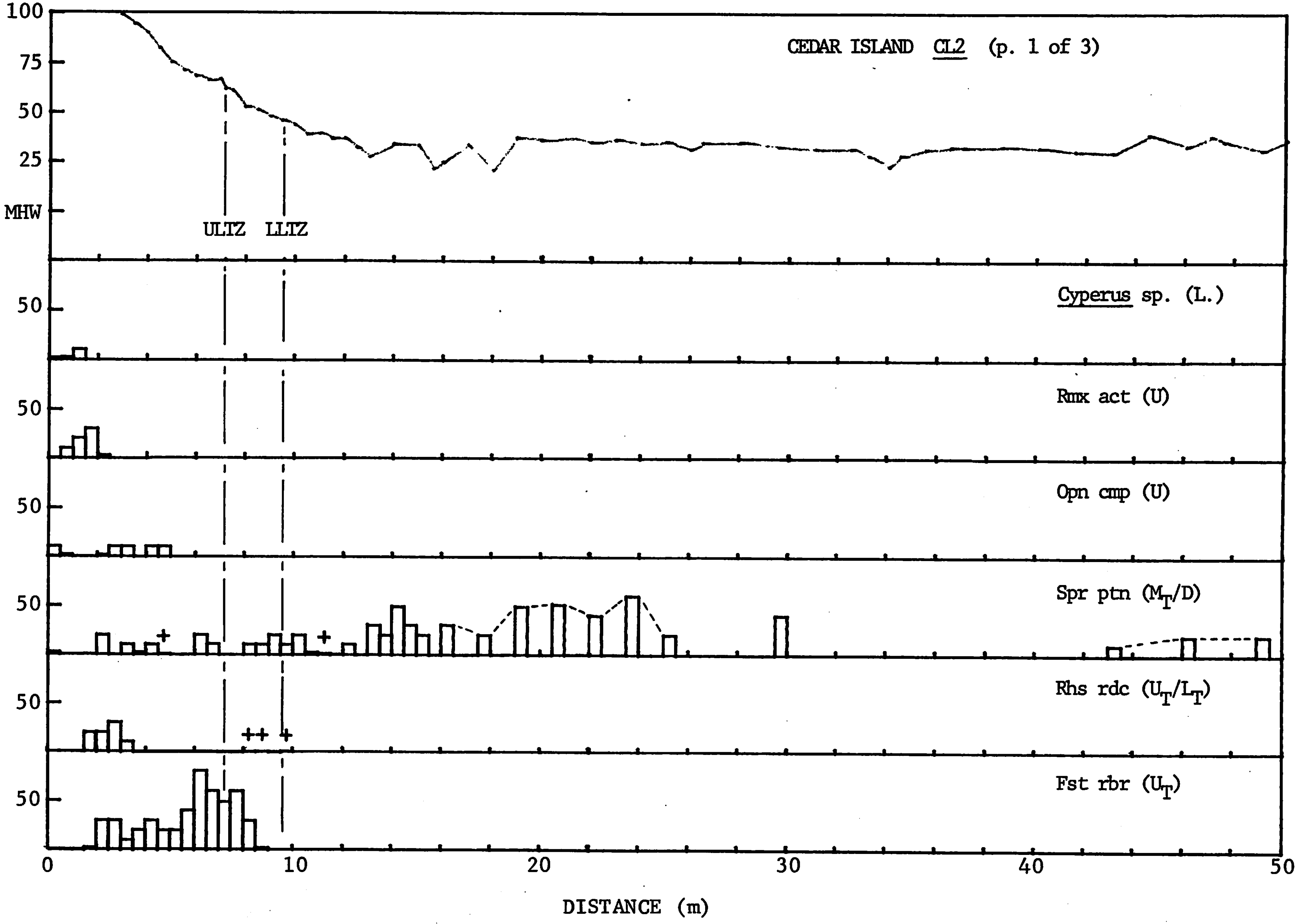

PARRAMORE ISLAND BL2 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Spr alt (M)
(Dead Spr alt raft)
Pns tda (U/L)
Bcc hlm (T/U_T)
Slc vrg (M)
Jnp vrt (U_T)
Myr crf (U_T/L_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)


CEDAR ISLAND CL1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Fst rbr (U_T)
Crx alb (L_T)
Spr ptn (M_T/D)
Bcc hlm (T/U_T)
seedlings
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

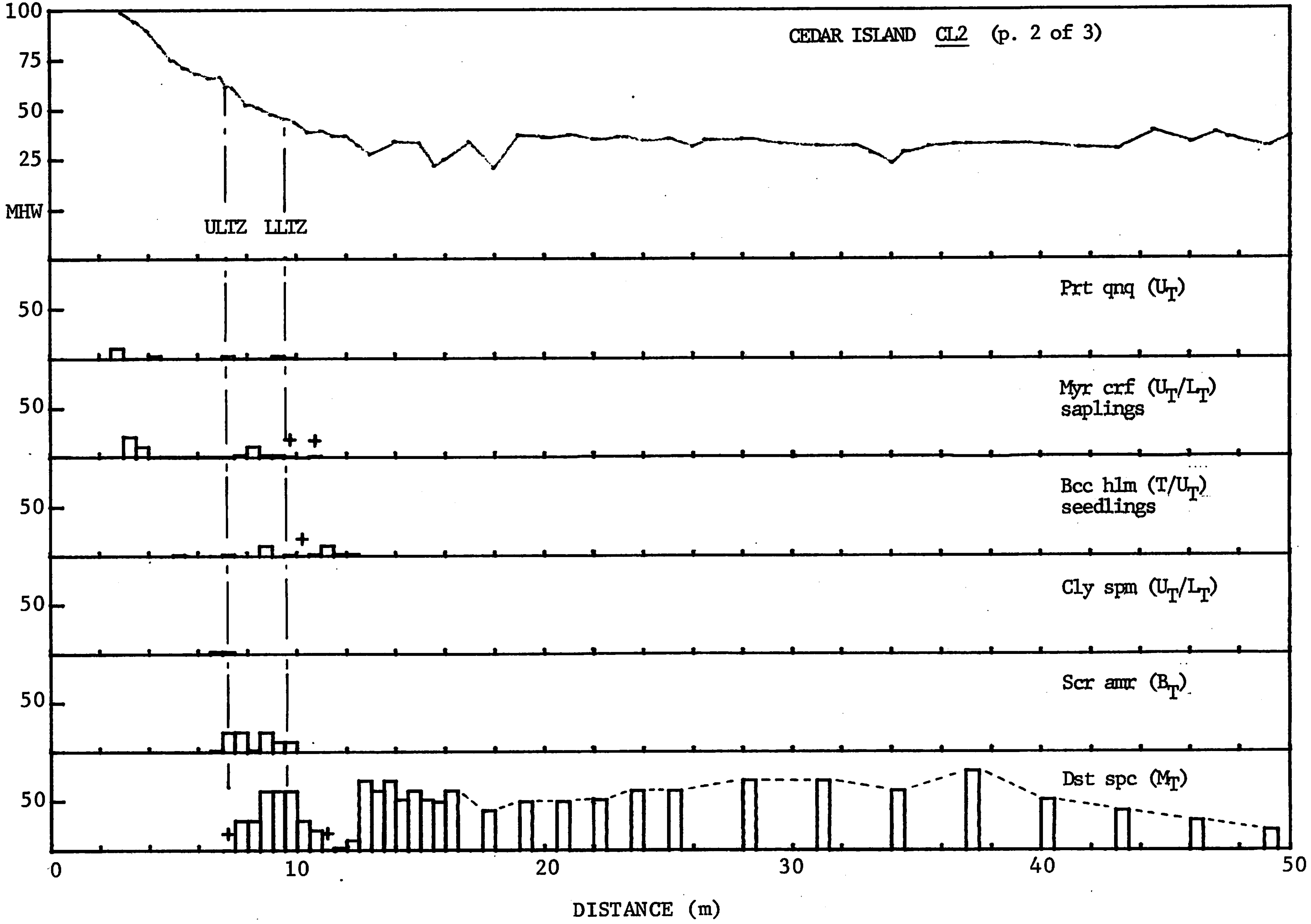

CEDAR ISLAND CL1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Jnc grr (M_T)
50
Dst spc (M_T)
50
Slc erp (M)
50
Spr alt (M)
50
Myr crf (U_T/L_T)
25
Jnp vrt (U_T)
25
0
10
20
30
40
50
DISTANCE (m)



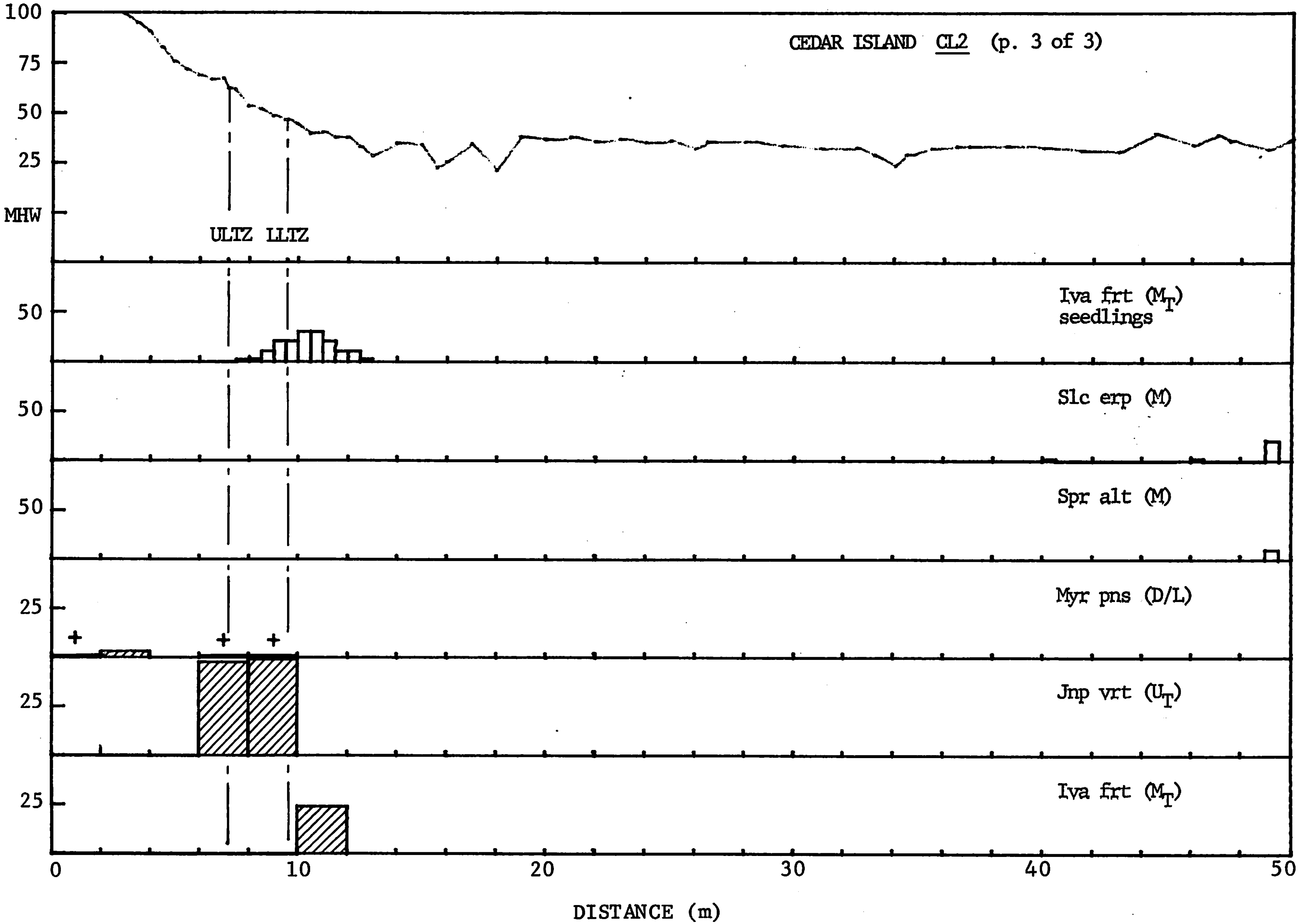
CEDAR ISLAND CL1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



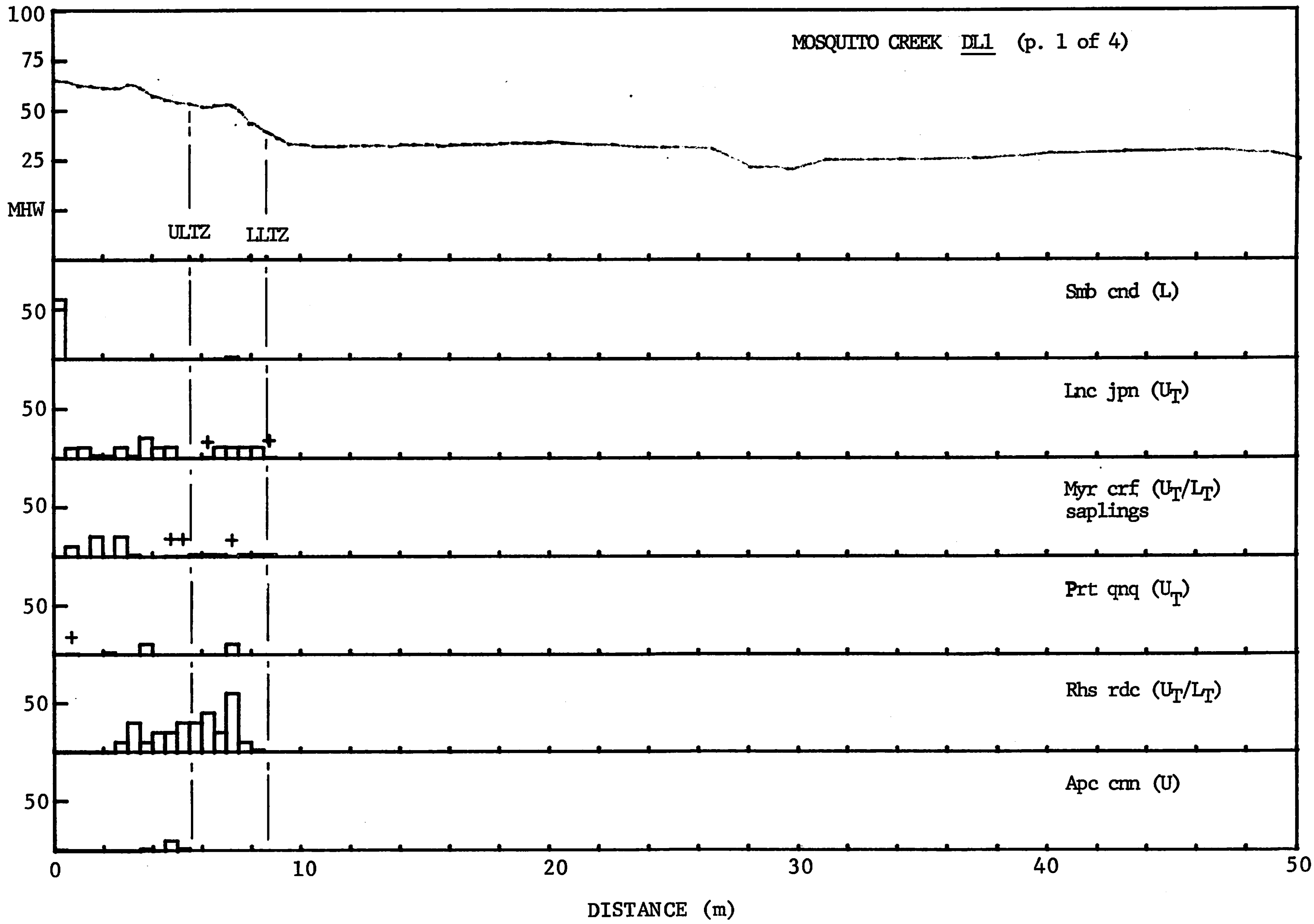
CEDAR ISLAND CL2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Cyperus sp. (L.)
Rmx act (U)
Opn cmp (U)
Spr ptn (M_T/D)
Rhs rdc (U_T/L_T)
Fst rbr (U_T)
0
10
20
30
40
50
DISTANCE (m)



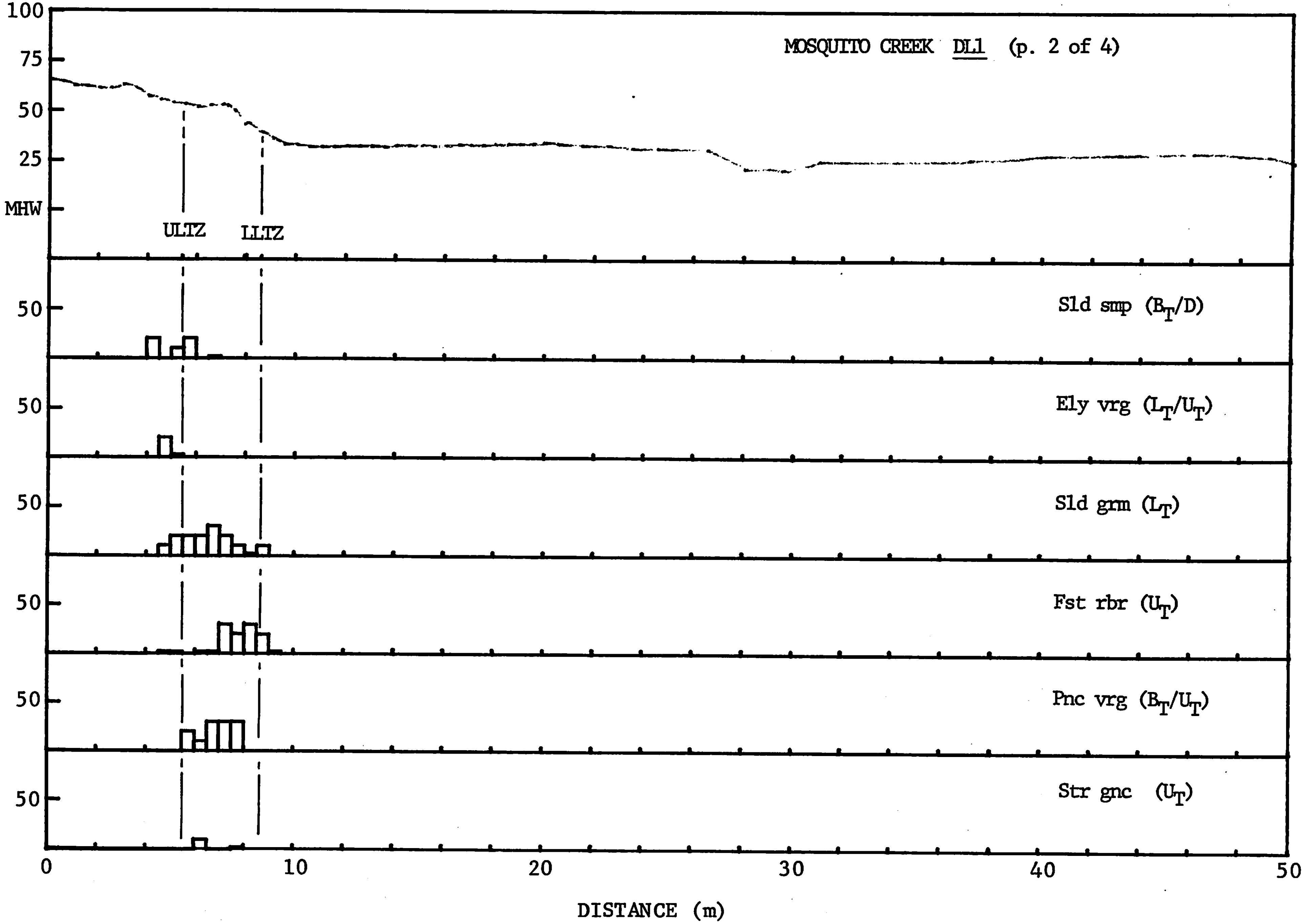
CEDAR ISLAND CL2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Prt qnq (U_T)
Myr crf (U_T/L_T) saplings
Bcc hlm (T/U_T) seedlings
Cly spm (U_T/L_T)
Scr amr (B_T)
Dst spc (M_T)
0
10
20
30
40
50
DISTANCE (m)



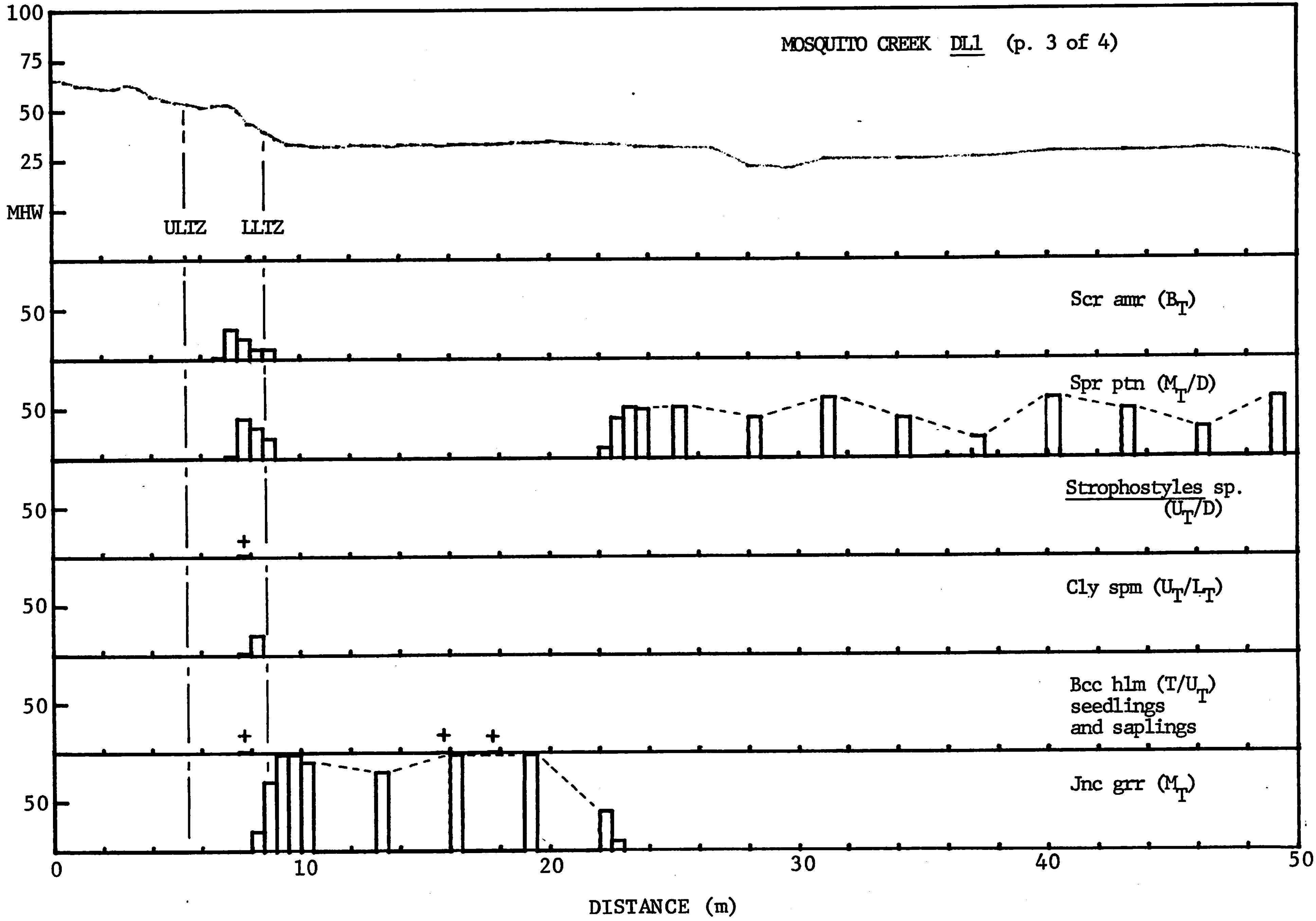
CEDAR ISLAND CL2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ LLTZ
Iva frt (M_T)
seedlings
Slc erp (M)
Spr alt (M)
Myr pns (D/L)
Jnp vrt (U_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

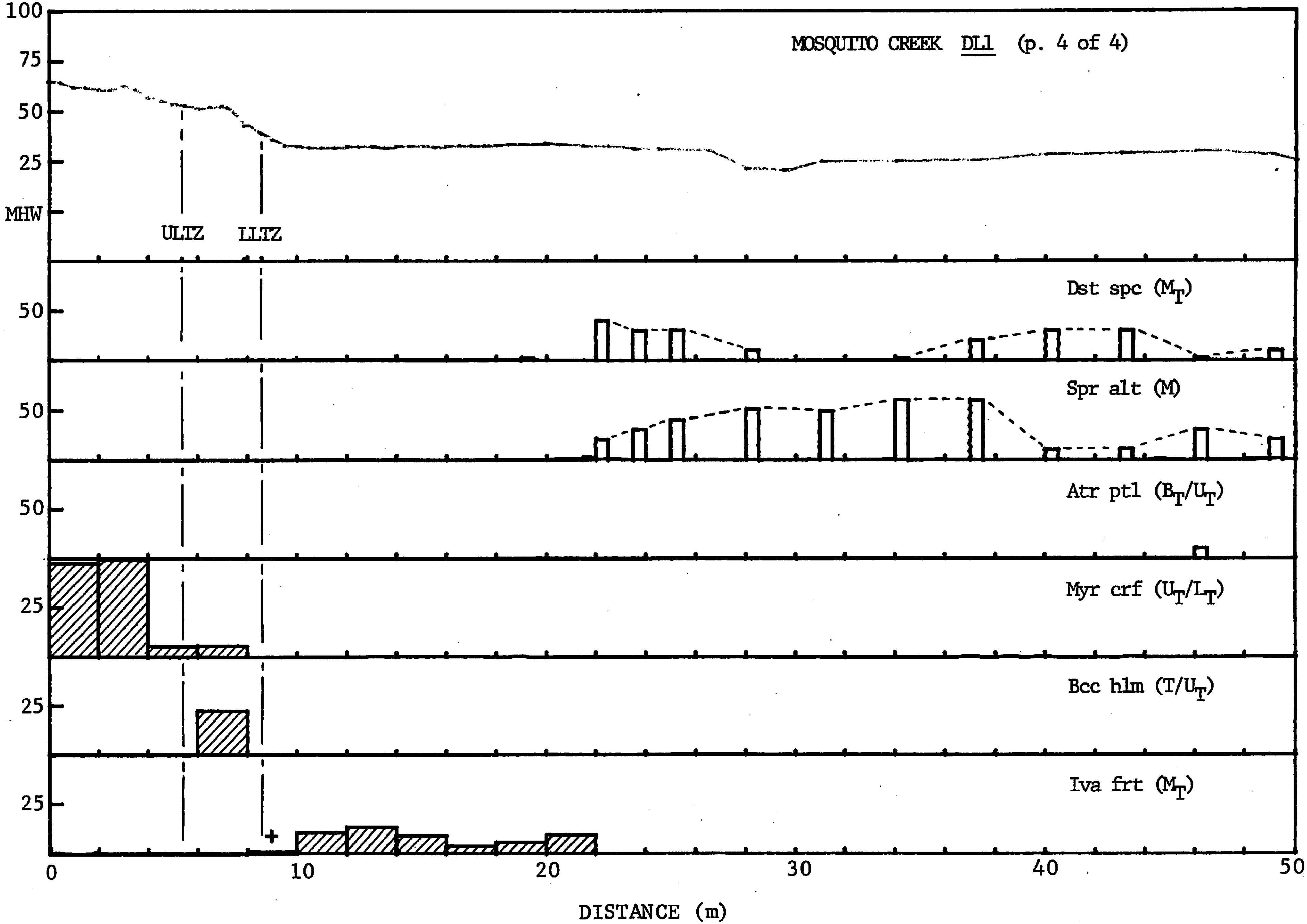


MOSQUITO CREEK DL1 (p. 1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Smb cnd (L)
Lnc jpn (U_T)
Myr crf (U_T/L_T) saplings
Prt qnq (U_T)
Rhs rdc (U_T/L_T)
Apc cnn (U)
0
10
20
30
40
50
DISTANCE (m)

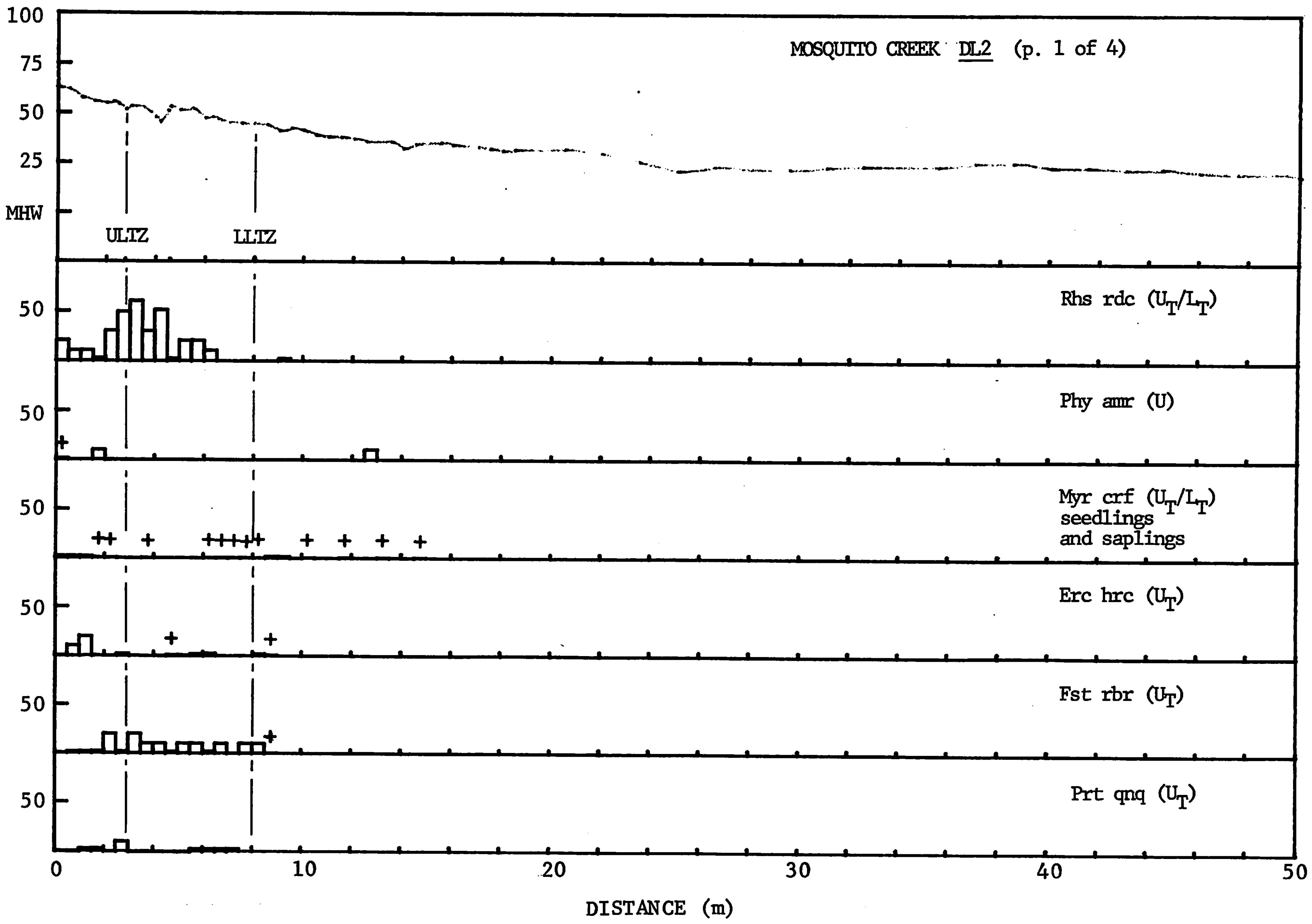


MOSQUITO CREEK DL1 (p. 2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Sld smp (B_T/D)
Ely vrg (L_T/U_T)
Sld grm (L_T)
Fst rbr (U_T)
Pnc vrg (B_T/U_T)
Str gnc (U_T)
0
10
20
30
40
50
DISTANCE (m)

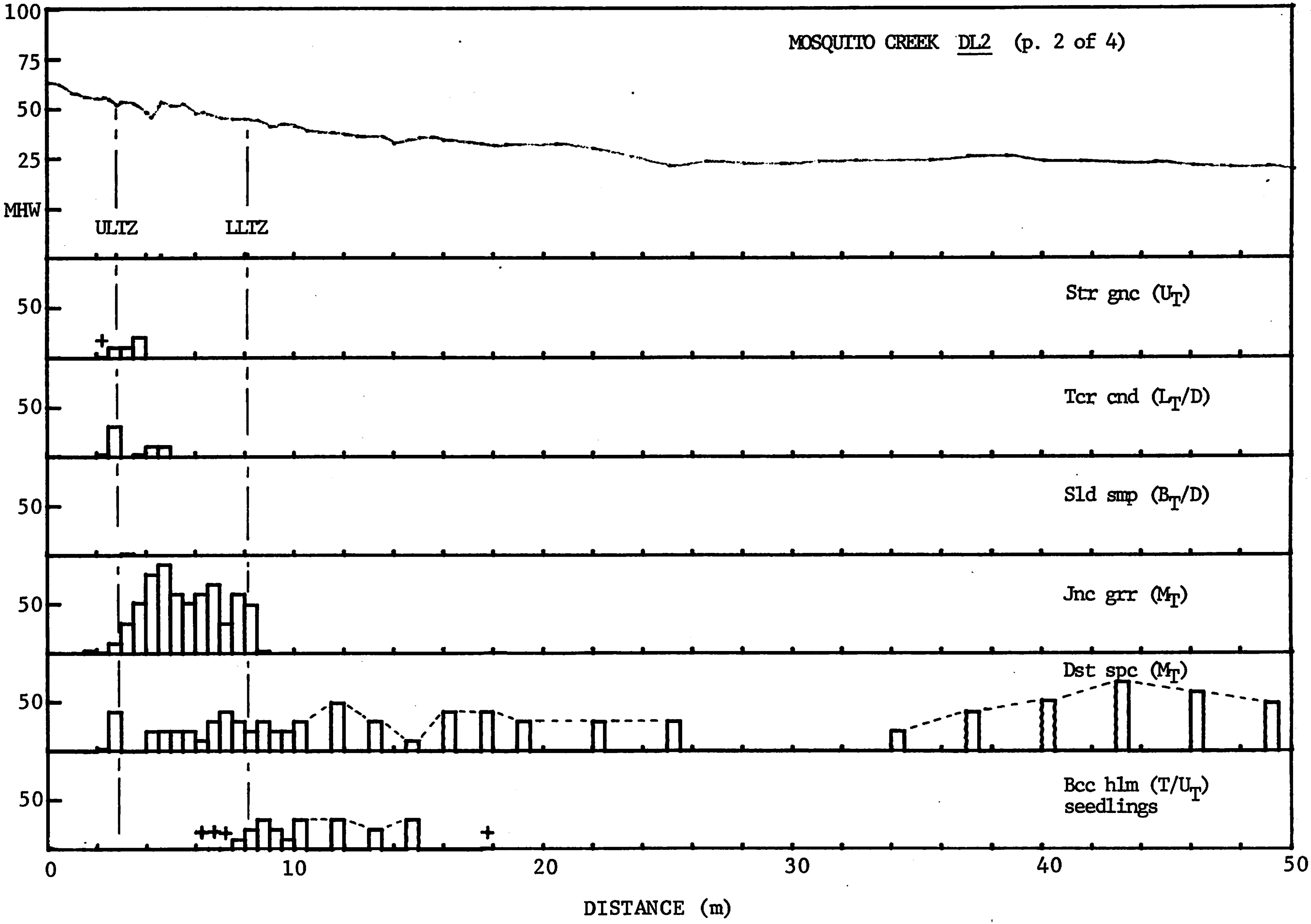

MOSQUITO CREEK DL1 (p. 3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Scr amr (B_T)
Spr ptn (M_T/D)
Strophostyles sp. (U_T/D)
Cly spm (U_T/L_T)
Bcc hlm (T/U_T) seedlings and saplings
Jnc grr (M_T)
0
10
20
30
40
50
DISTANCE (m)



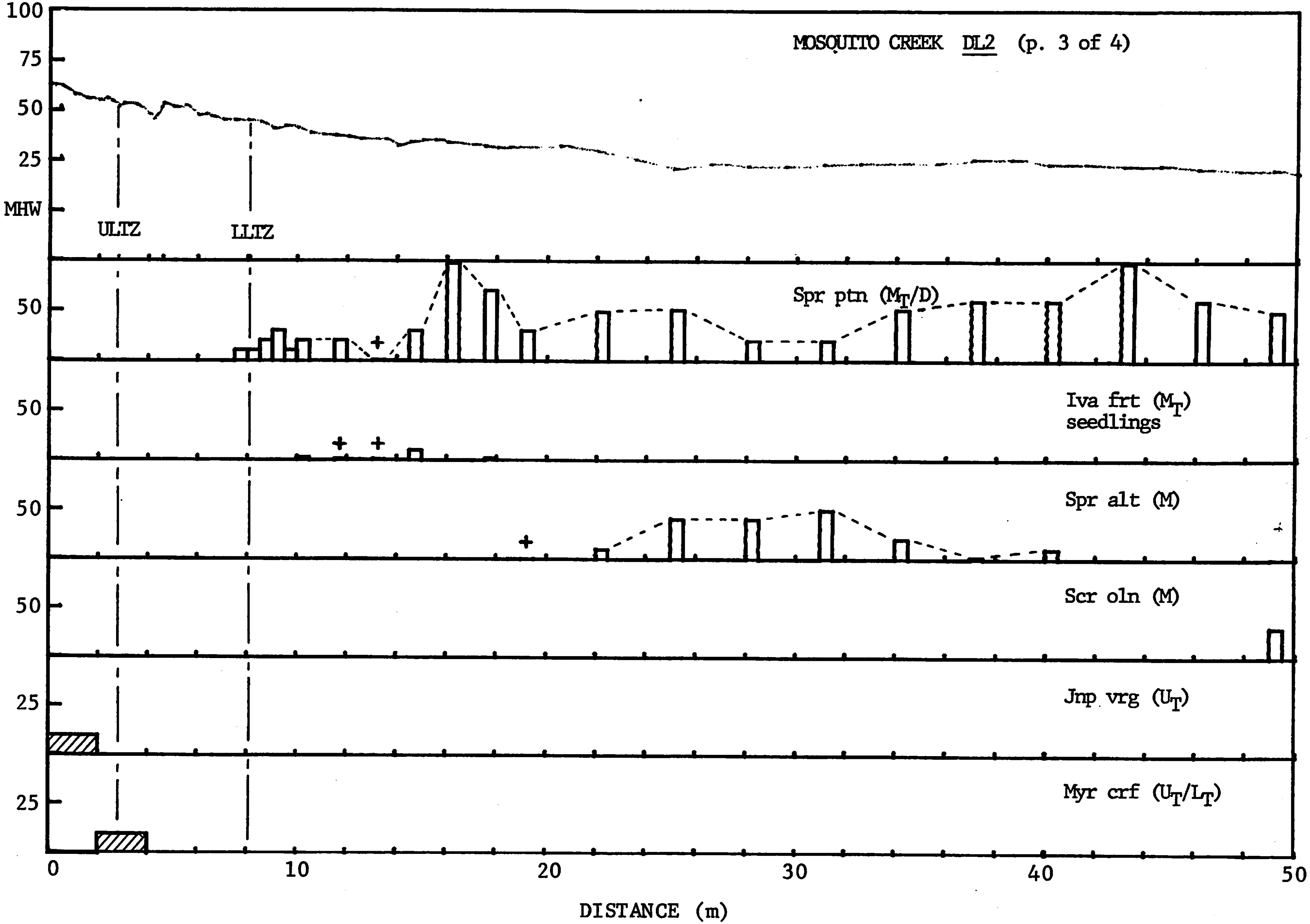
MOSQUITO CREEK DL1 (p. 4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Spr alt (M)
Atr ptl (B_T/U_T)
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
+
0
10
20
30
40
50
DISTANCE (m)

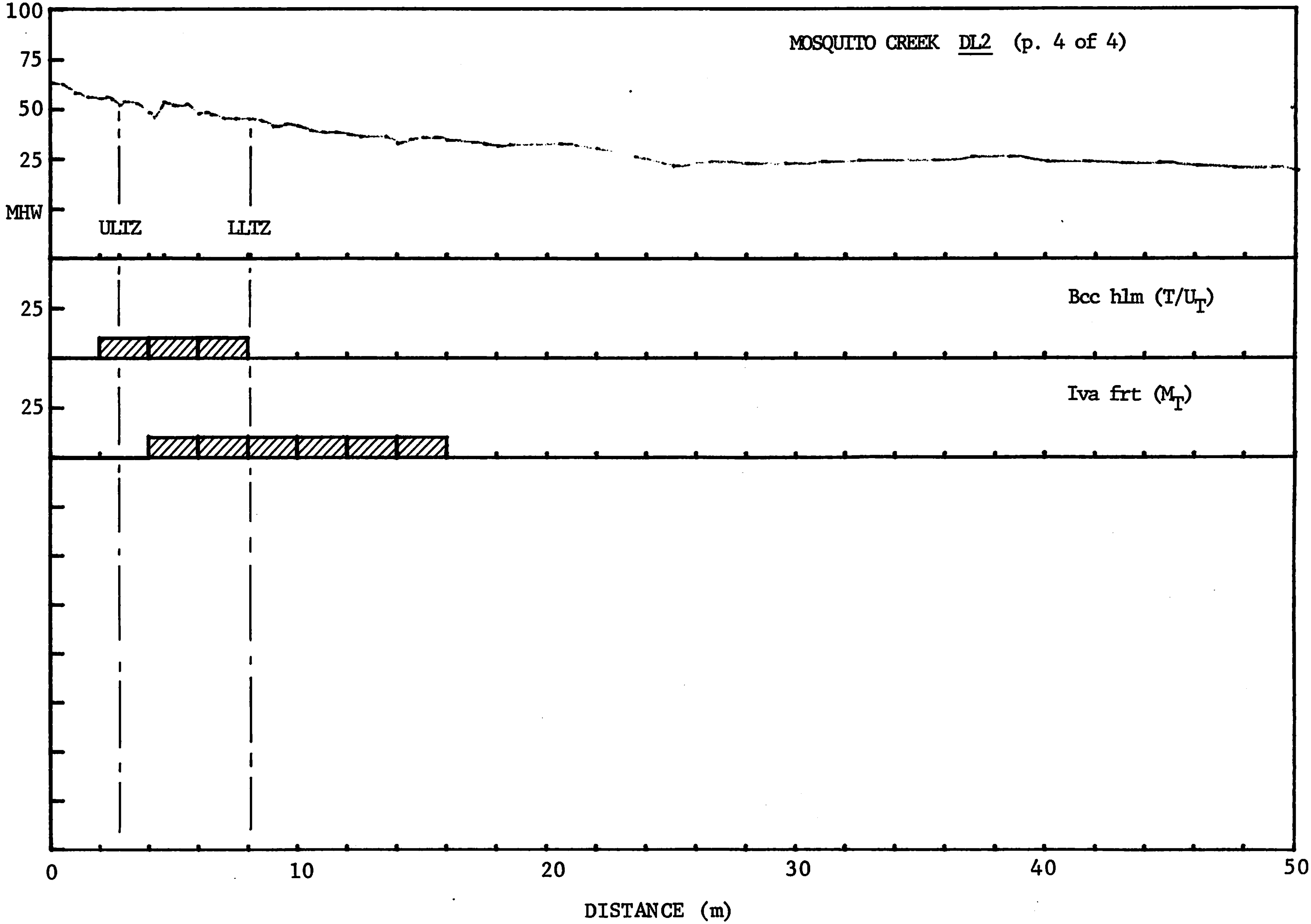


MOSQUITO CREEK DL2 (p. 1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Phy amr (U)
Myr crf (U_T/L_T)
seedlings
and saplings
Erc hrc (U_T)
Fst rbr (U_T)
Prt qnq (U_T)
0
10
20
30
40
50
DISTANCE (m)



MOSQUITO CREEK DL2 (p. 2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Str gnc (U_T)
Tcr cnd (L_T/D)
Sld smp (B_T/D)
Jnc grr (M_T)
Dst spc (M_T)
Bcc hlm (T/U_T)
seedlings
0
10
20
30
40
50
DISTANCE (m)

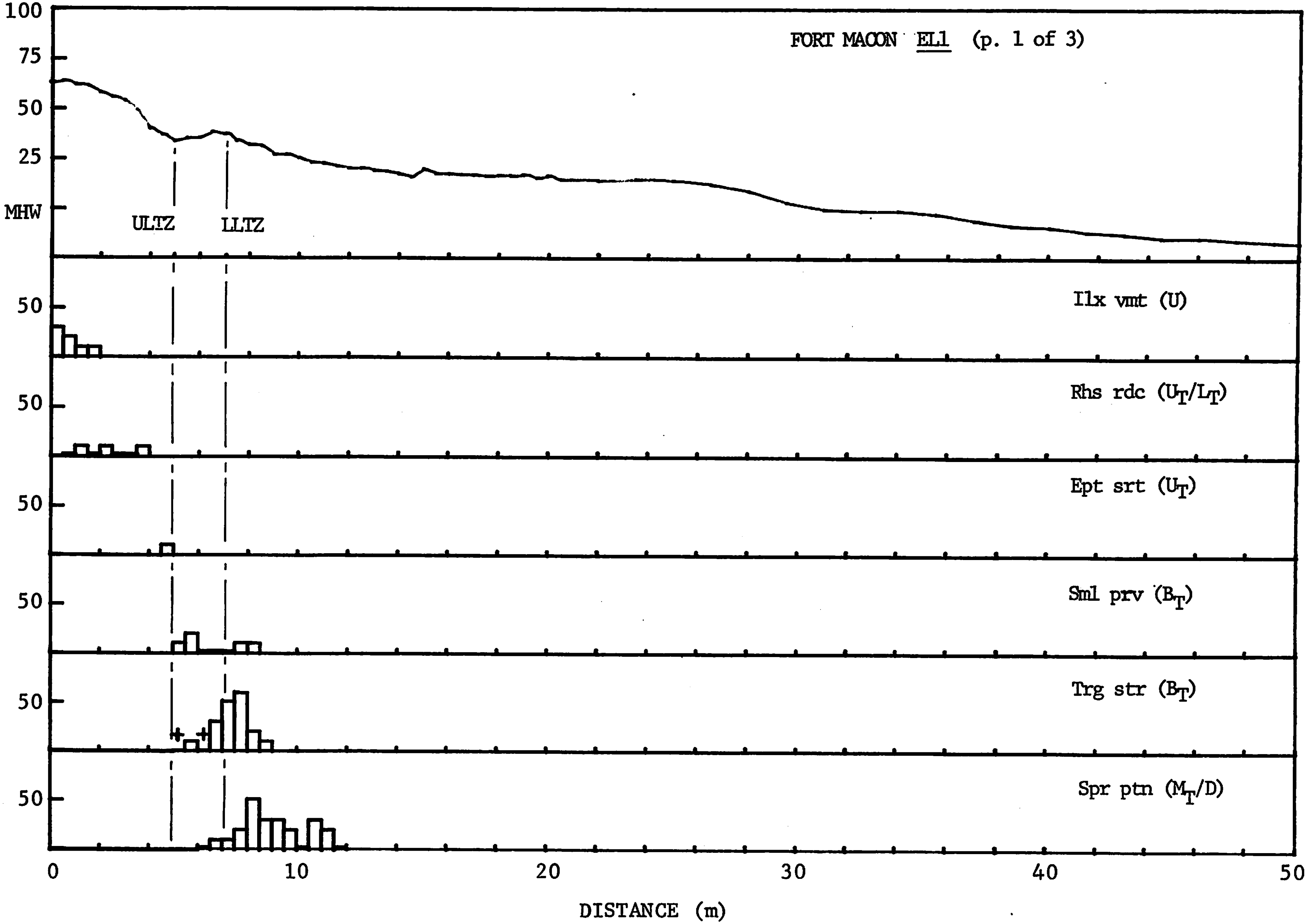

MOSQUITO CREEK DL2 (p. 3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Iva frt (M_T)
seedlings
Spr alt (M)
Scr oln (M)
Jnp vrg (U_T)
Myr crf (U_T/L_T)
0
10
20
30
40
50
DISTANCE (m)

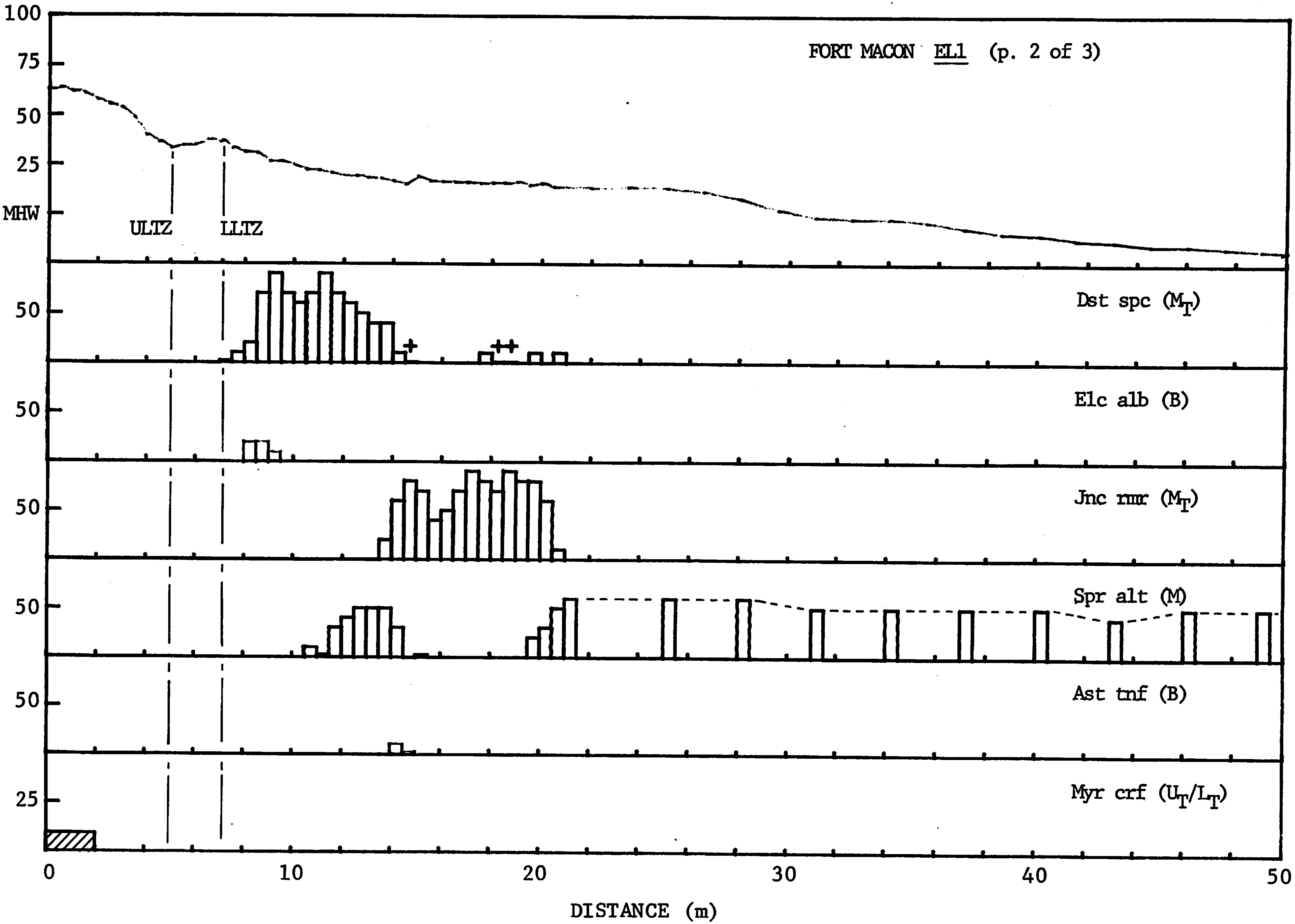


MOSQUITO CREEK DL2 (p. 4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

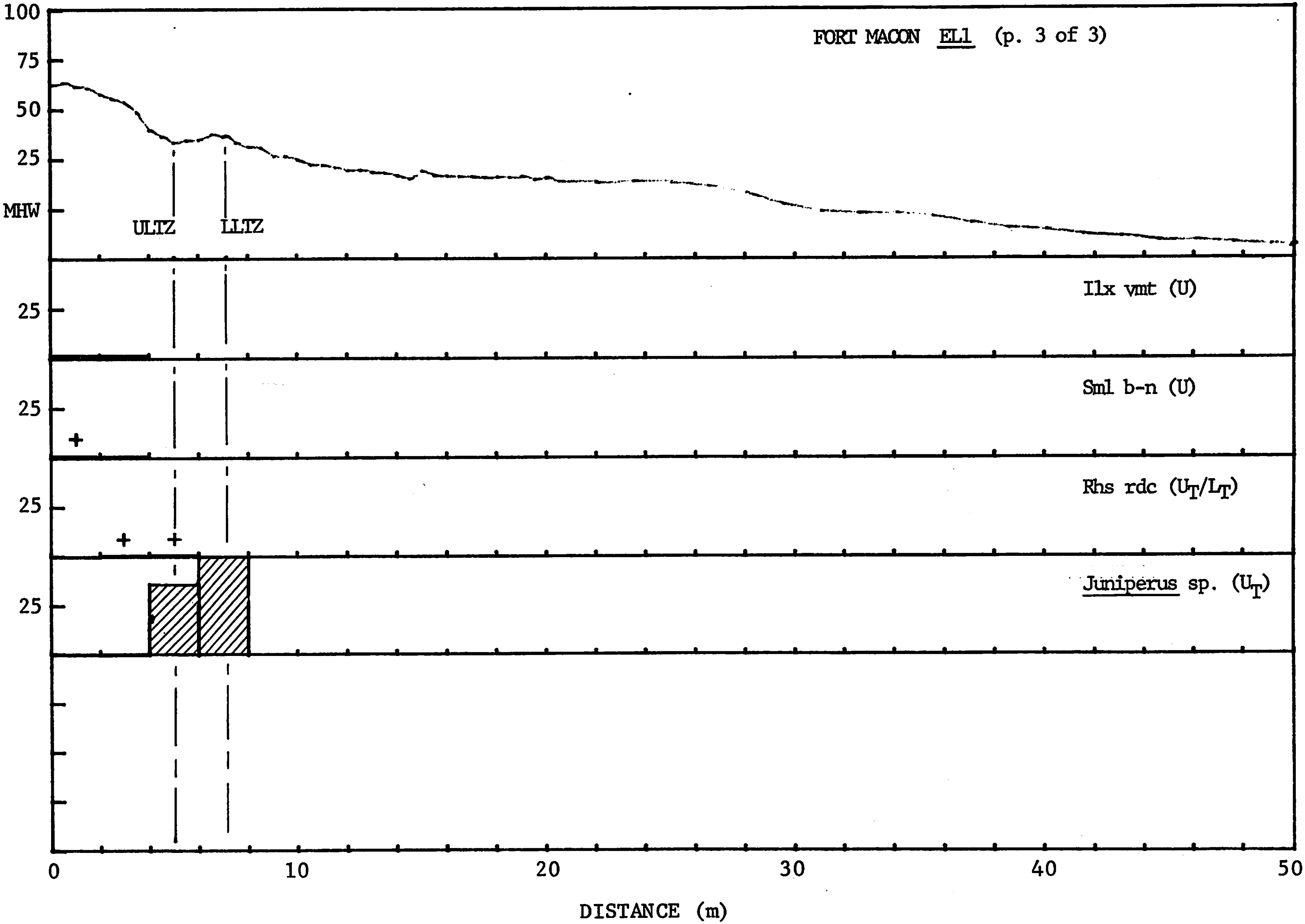
PROFILE DATA - FORT MACON SUBREGION(NORTH CAROLINA)

FORT MACON(PRIMARY)
GALLANT POINT
HARKERS ISLAND
GOOSE BAY

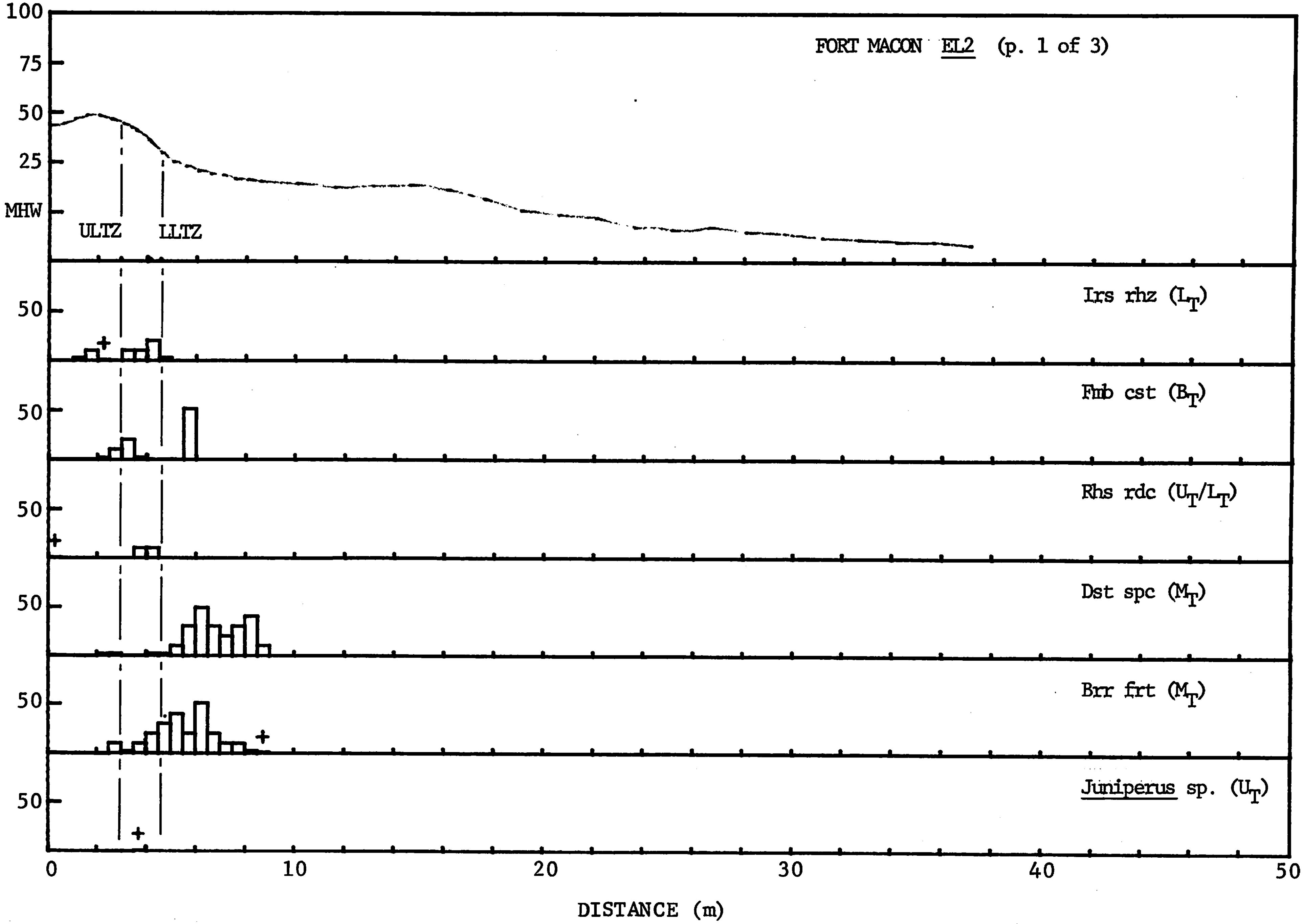

FORT MACON EL1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U)
50
Rhs rdc (U_T/L_T)
50
Ept srt (U_T)
50
Sml prv (B_T)
50
Trg str (B_T)
50
Spr ptn (M_T/D)
50
0
10
20
30
40
50
DISTANCE (m)



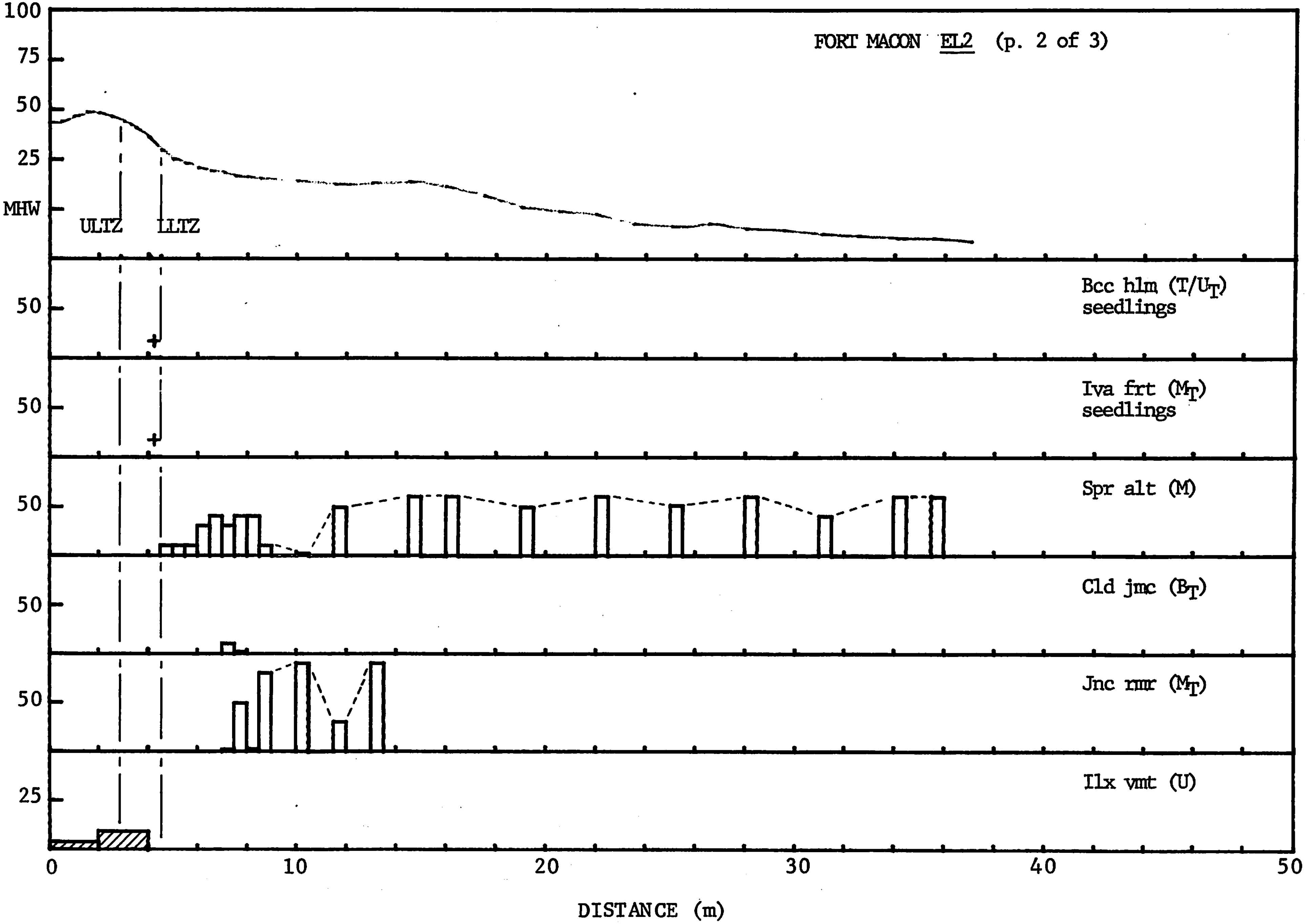
FORT MACON EL1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Elc alb (B)
Jnc rmr (M_T)
Spr alt (M)
Ast tnf (B)
Myr crf (U_T/L_T)
0
10
20
30
40
50
DISTANCE (m)



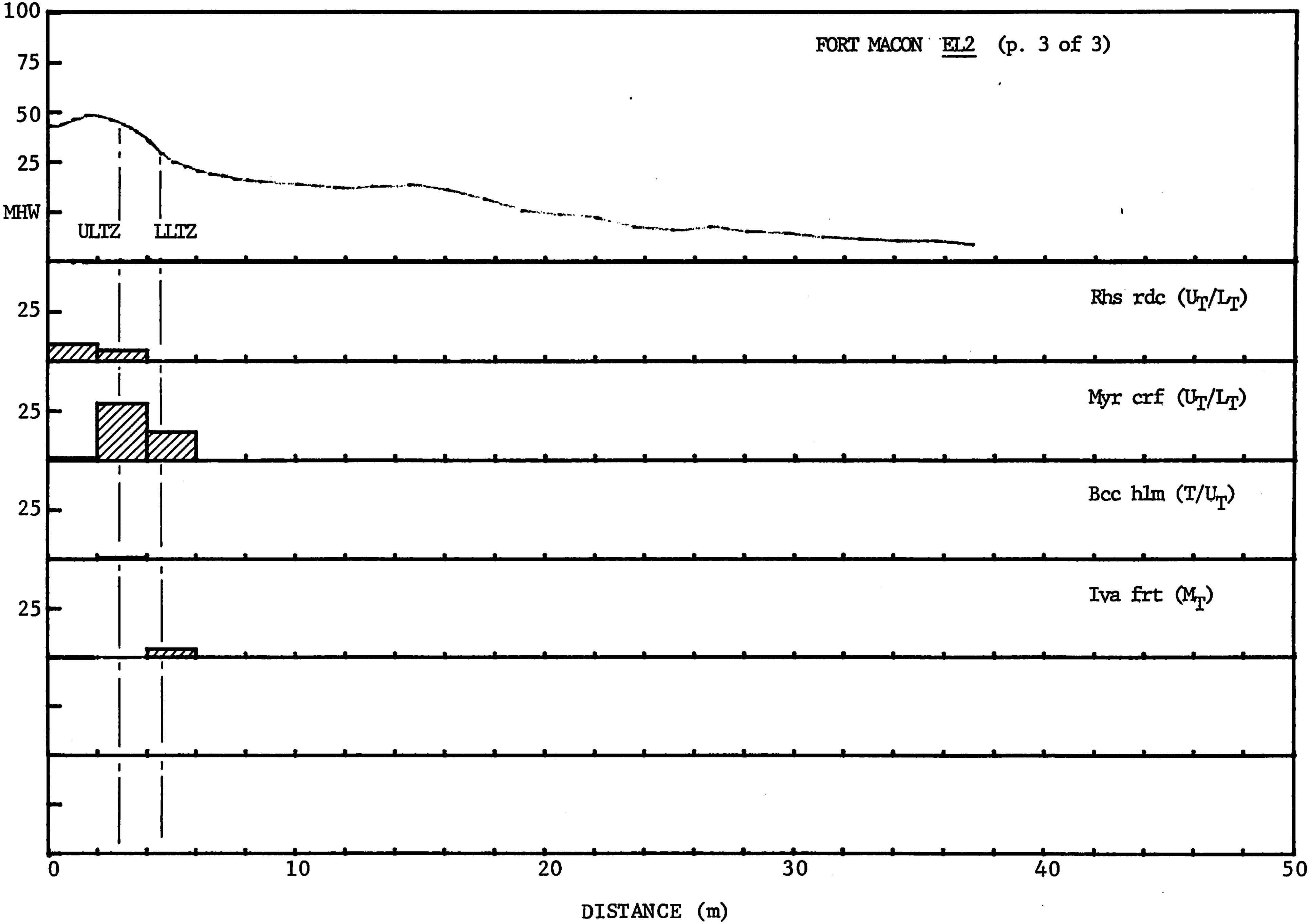
FORT MACON EL1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U)
25
Sml b-n (U)
25
Rhs rdc (UT/LT)
25
Juniperus sp. (UT)
25
0
10
20
30
40
50
DISTANCE (m)



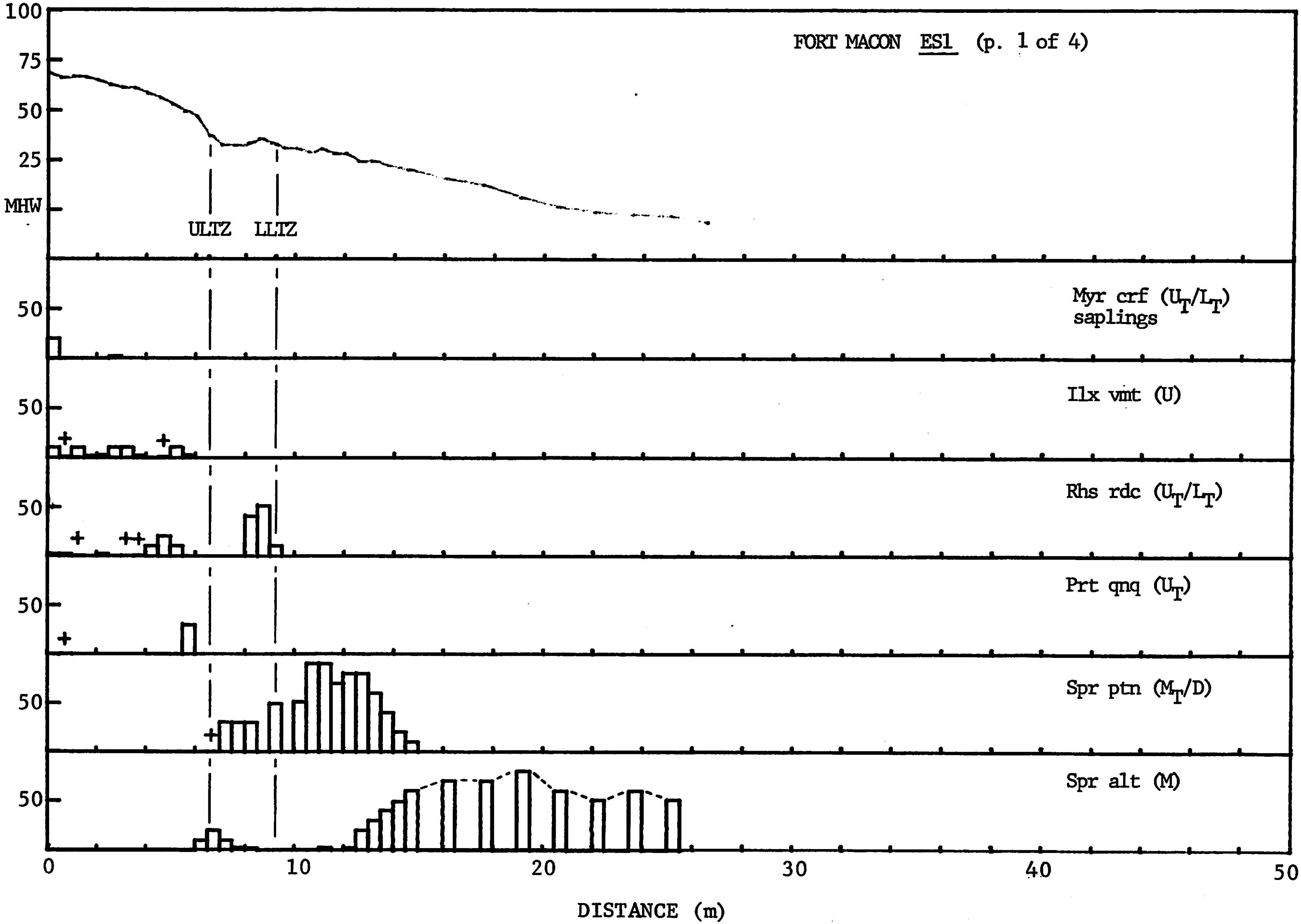
FORT MACON EL2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Irs rhz (L_T)
Fmb cst (B_T)
Rhs rdc (U_T/L_T)
Dst spc (M_T)
Brr frt (M_T)
Juniperus sp. (U_T)
0
10
20
30
40
50
DISTANCE (m)



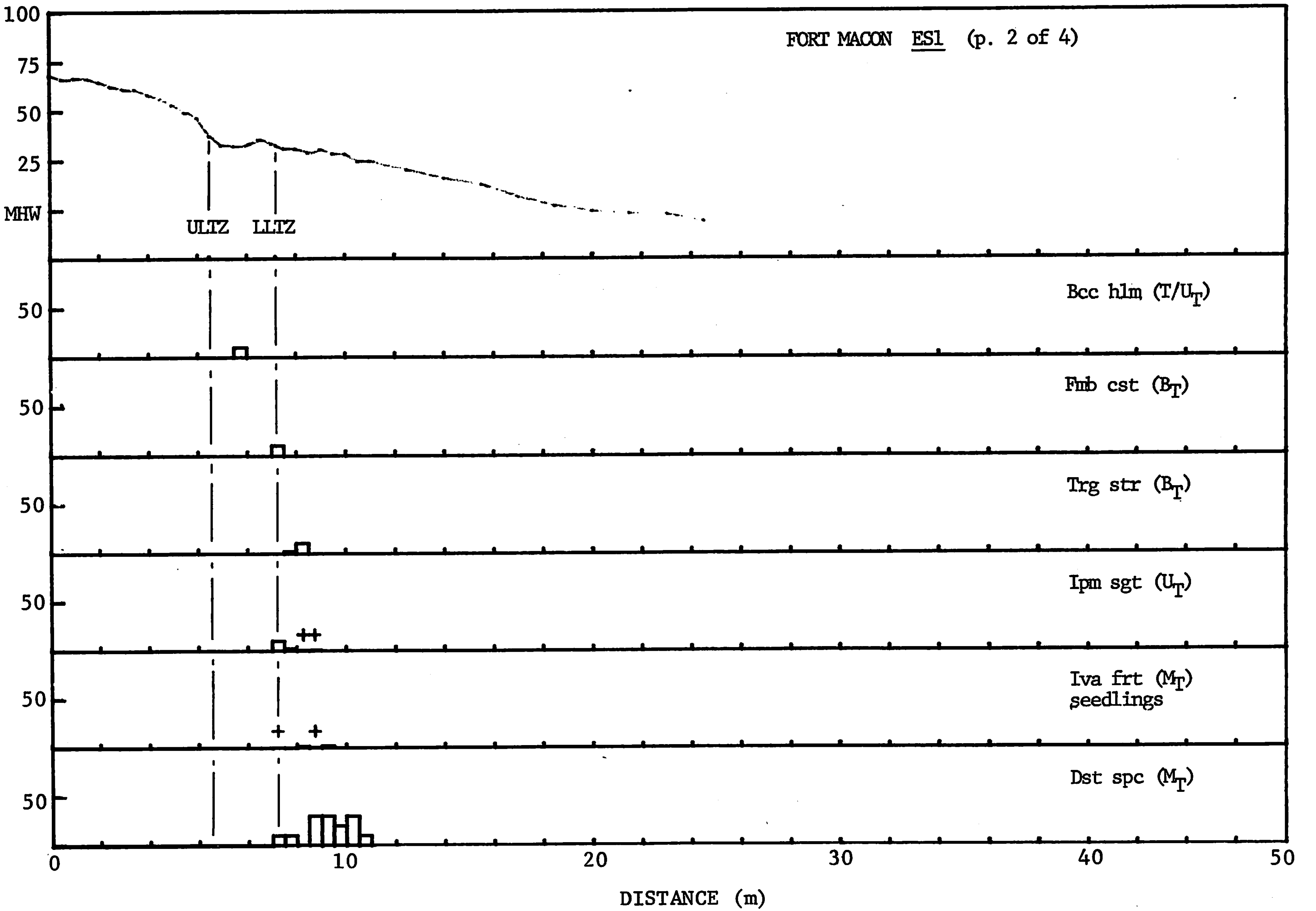
FORT MACON EL2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Bcc hlm (T/UT)
seedlings
Iva frt (MT)
seedlings
Spr alt (M)
Cld jmc (BT)
Jnc rmr (MT)
Ilx vmt (U)
0
10
20
30
40
50
DISTANCE (m)



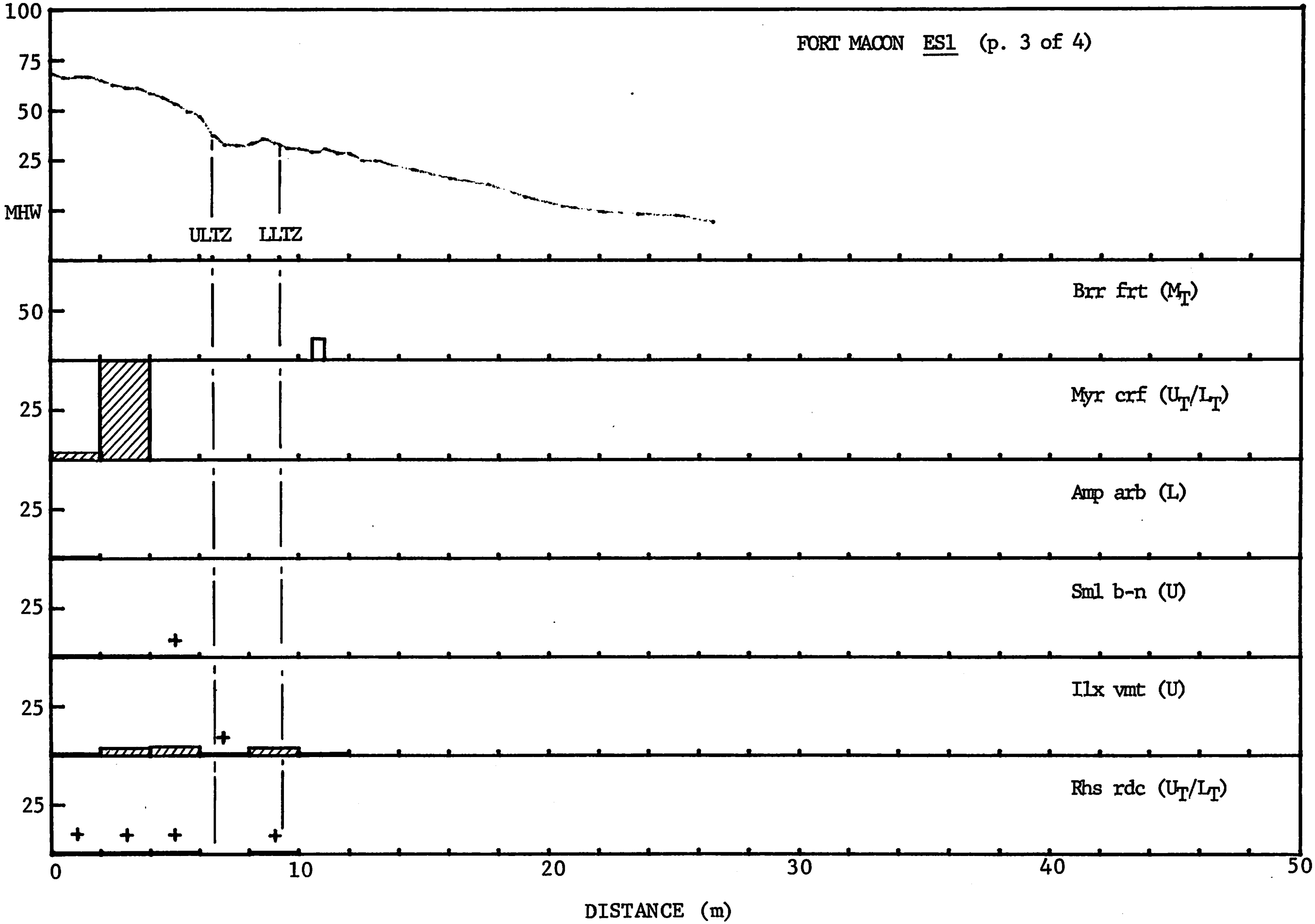
FORT MACON EL2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)



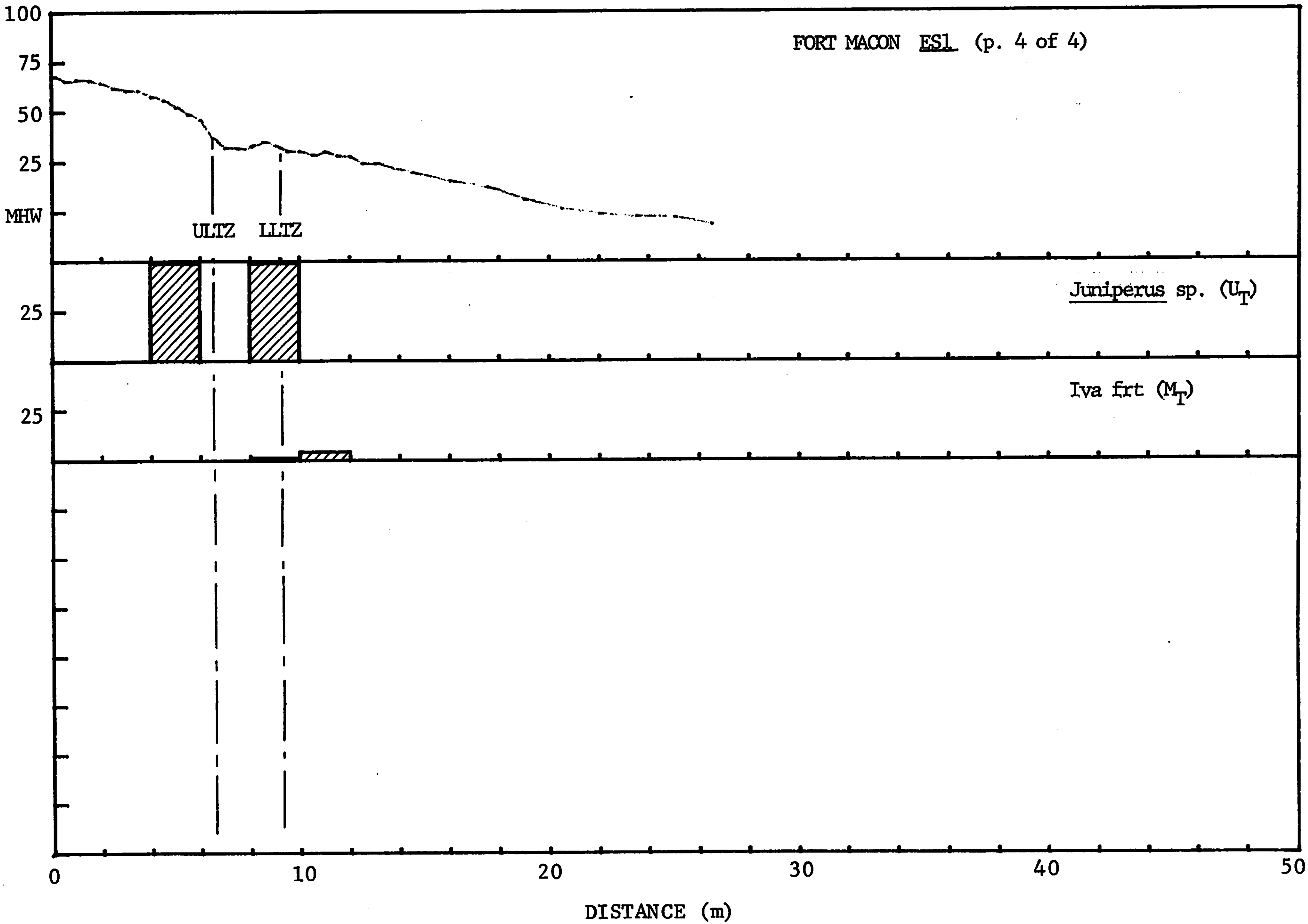
FORT MACON ES1 (p. 1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (U_T/L_T) saplings
Ilx vmt (U)
Rhs rdc (U_T/L_T)
Prt qnq (U_T)
Spr ptn (M_T/D)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)



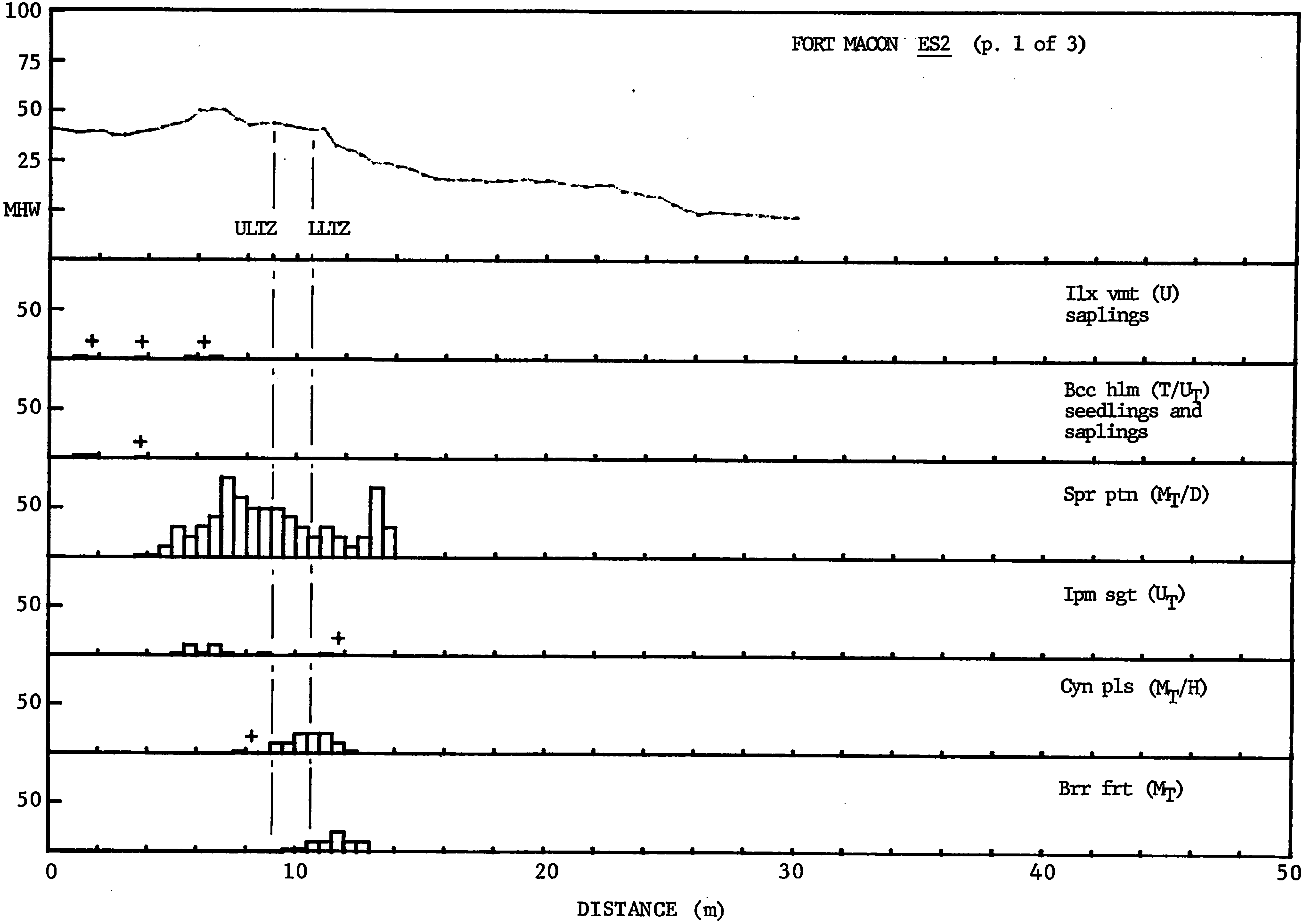
FORT MACON ESl (p. 2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Bcc hlm (T/U_T)
Fmb cst (B_T)
Trg str (B_T)
Ipm sgt (U_T)
Iva frt (M_T) seedlings
Dst spc (M_T)
50
0
10
20
30
40
50
DISTANCE (m)



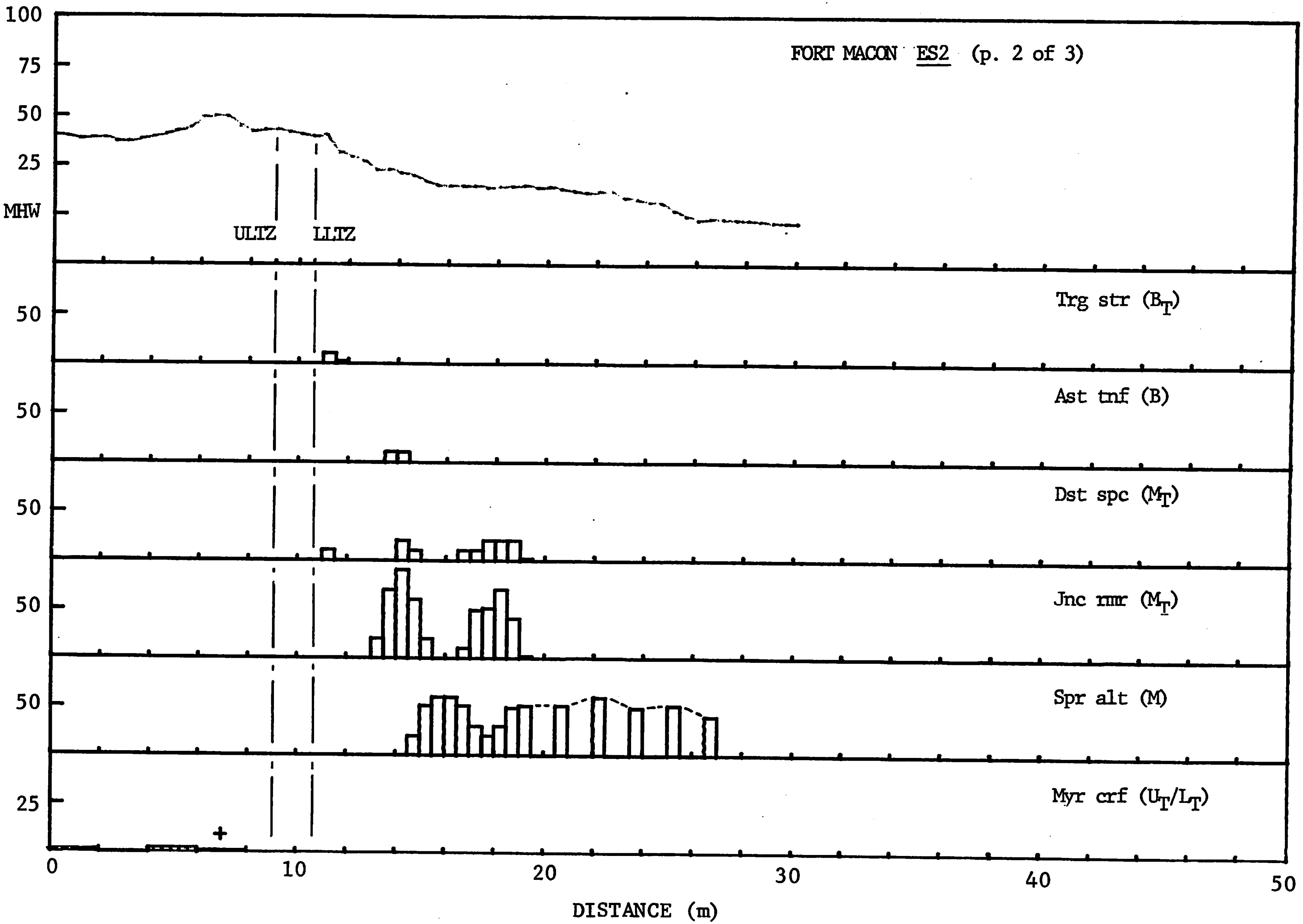
FORT MACON ES1 (p. 3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Brr frt (M_T)
50
Myr crf (U_T/L_T)
25
Amp arb (L)
25
Sml b-n (U)
25
Ilx vmt (U)
25
Rhs rdc (U_T/L_T)
25
0
10
20
30
40
50
DISTANCE (m)

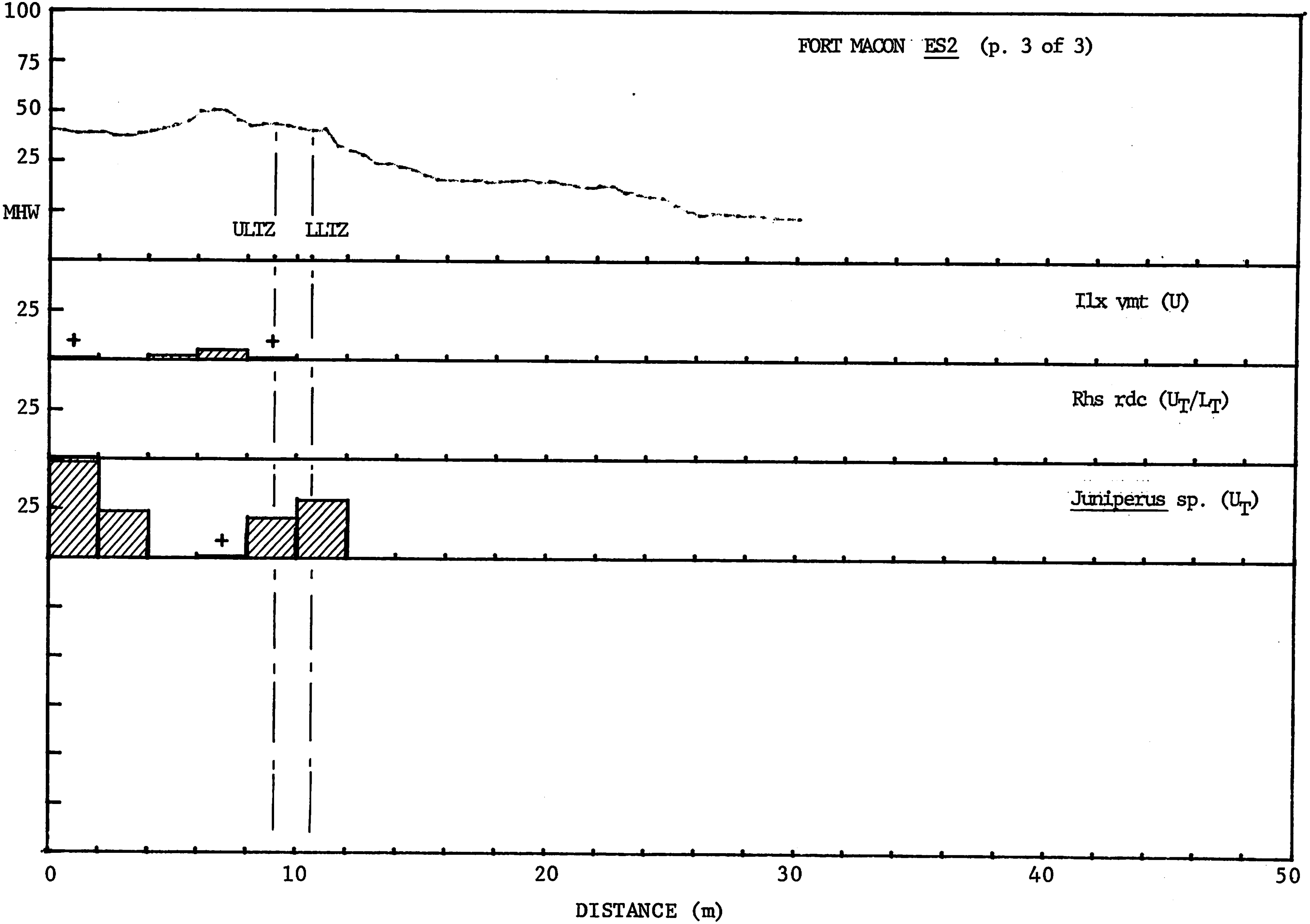


FORT MACON ES1 (p. 4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Juniperus sp. (U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)

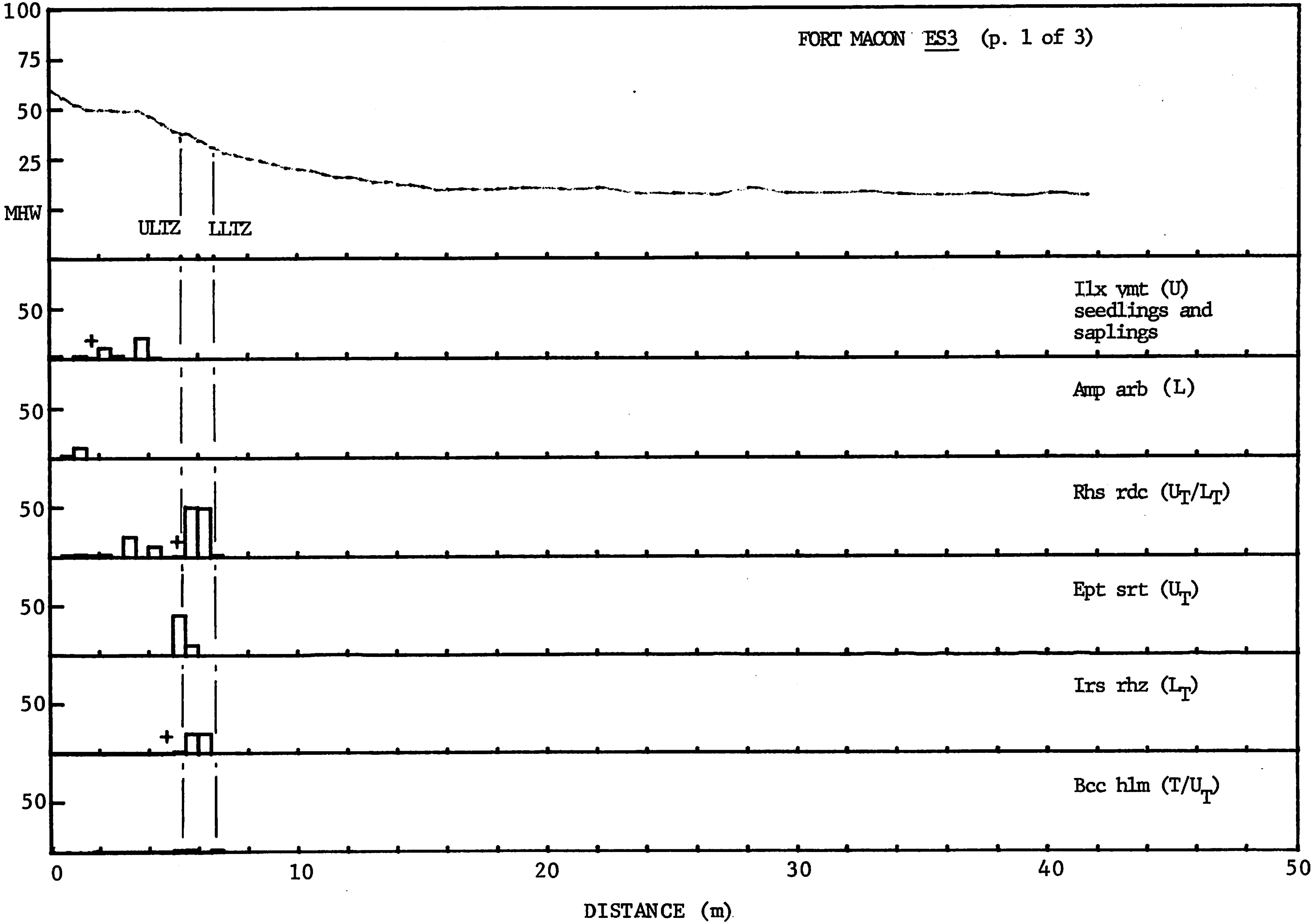


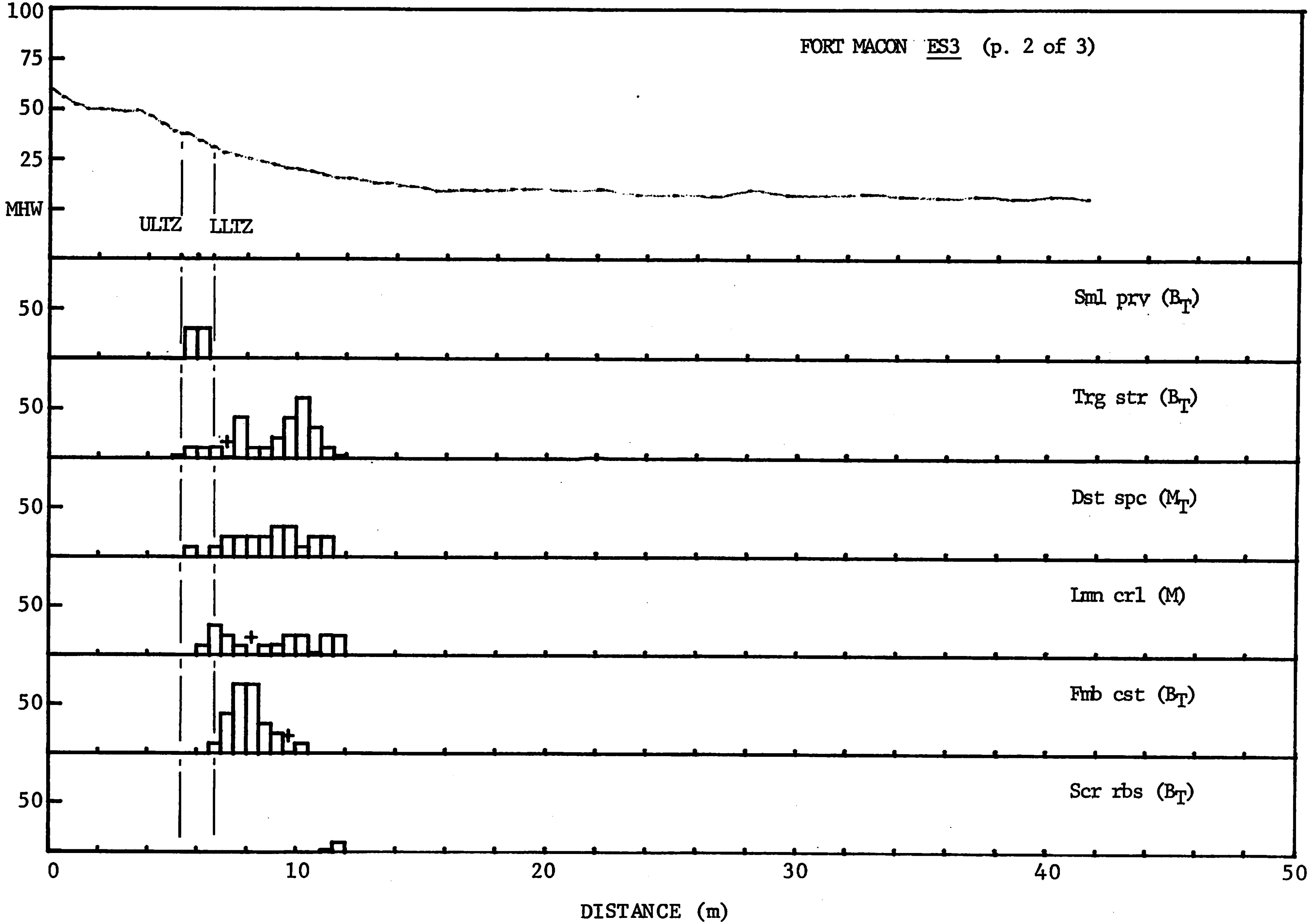
FORT MACON ES2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U) saplings
Bcc hlm (T/U_T) seedlings and saplings
Spr ptn (M_T/D)
Ipm sgt (U_T)
Cyn pls (M_T/H)
Brr frt (M_T)
0
10
20
30
40
50
DISTANCE (m)


FORT MACON ES2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Trg str (B_T)
50
Ast tnf (B)
50
Dst spc (M_T)
50
Jnc rmr (M_T)
50
Spr alt (M)
50
Myr crf (U_T/L_T)
25
0
10
20
30
40
50
DISTANCE (m)

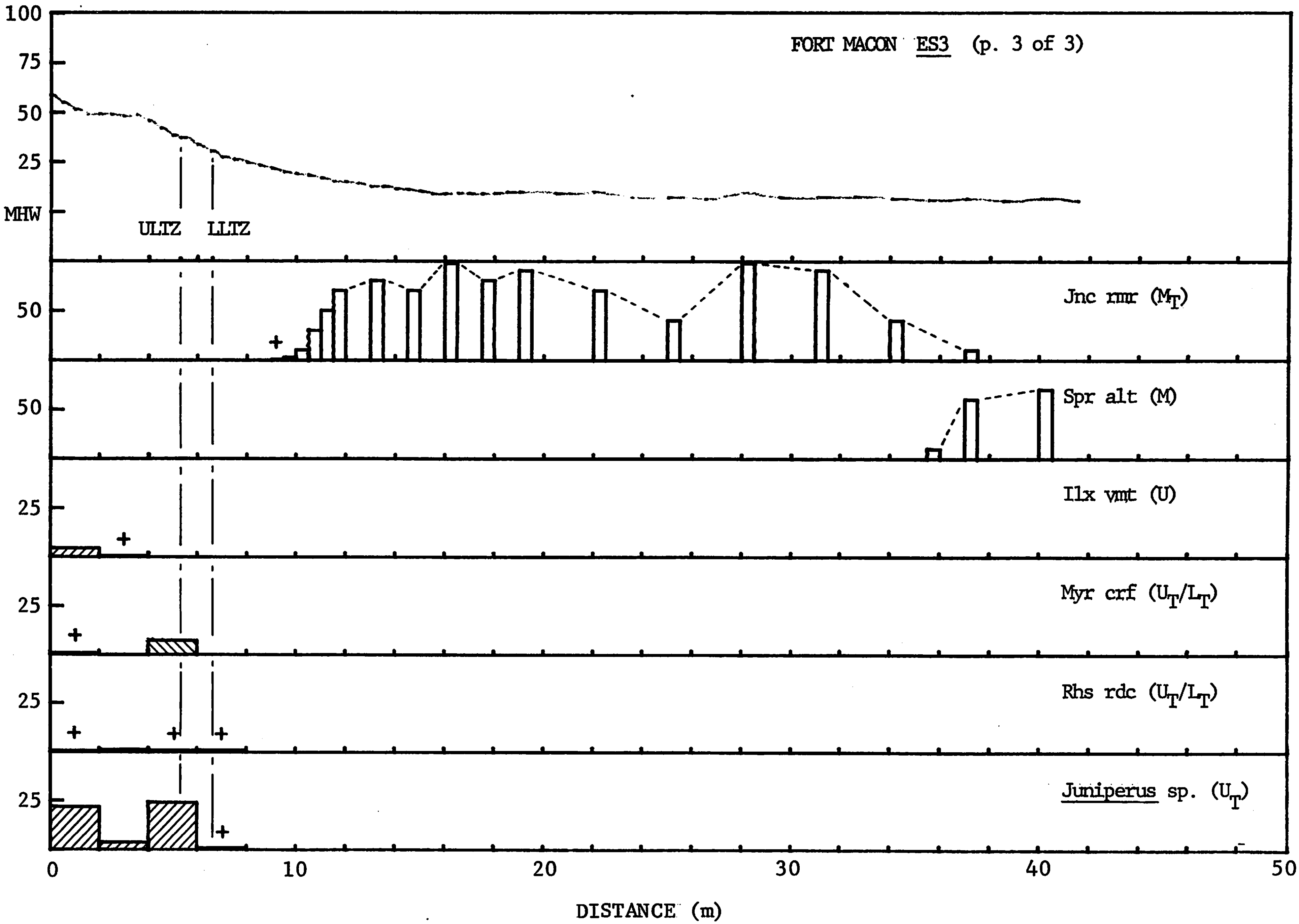


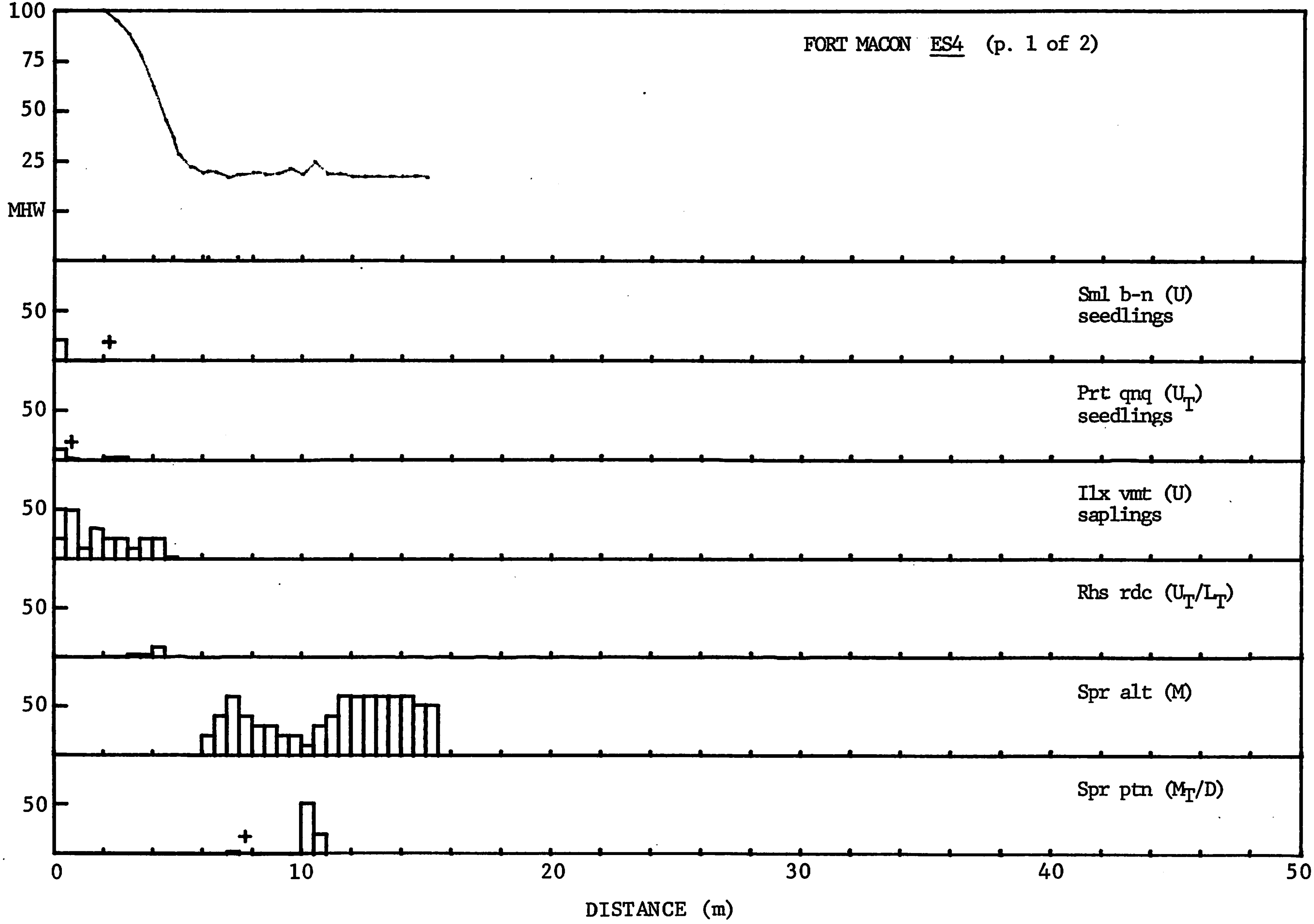
FORT MACON ES2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U)
25
Rhs rdc (U_T/L_T)
25
Juniperus sp. (U_T)
25
0
10
20
30
40
50
DISTANCE (m)


FORT MACON ES3 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U) seedlings and saplings
Amp arb (L)
Rhs rdc (UT/LT)
Ept srt (UT)
Irs rhz (LT)
Bcc hlm (T/UT)
0
10
20
30
40
50
DISTANCE (m)

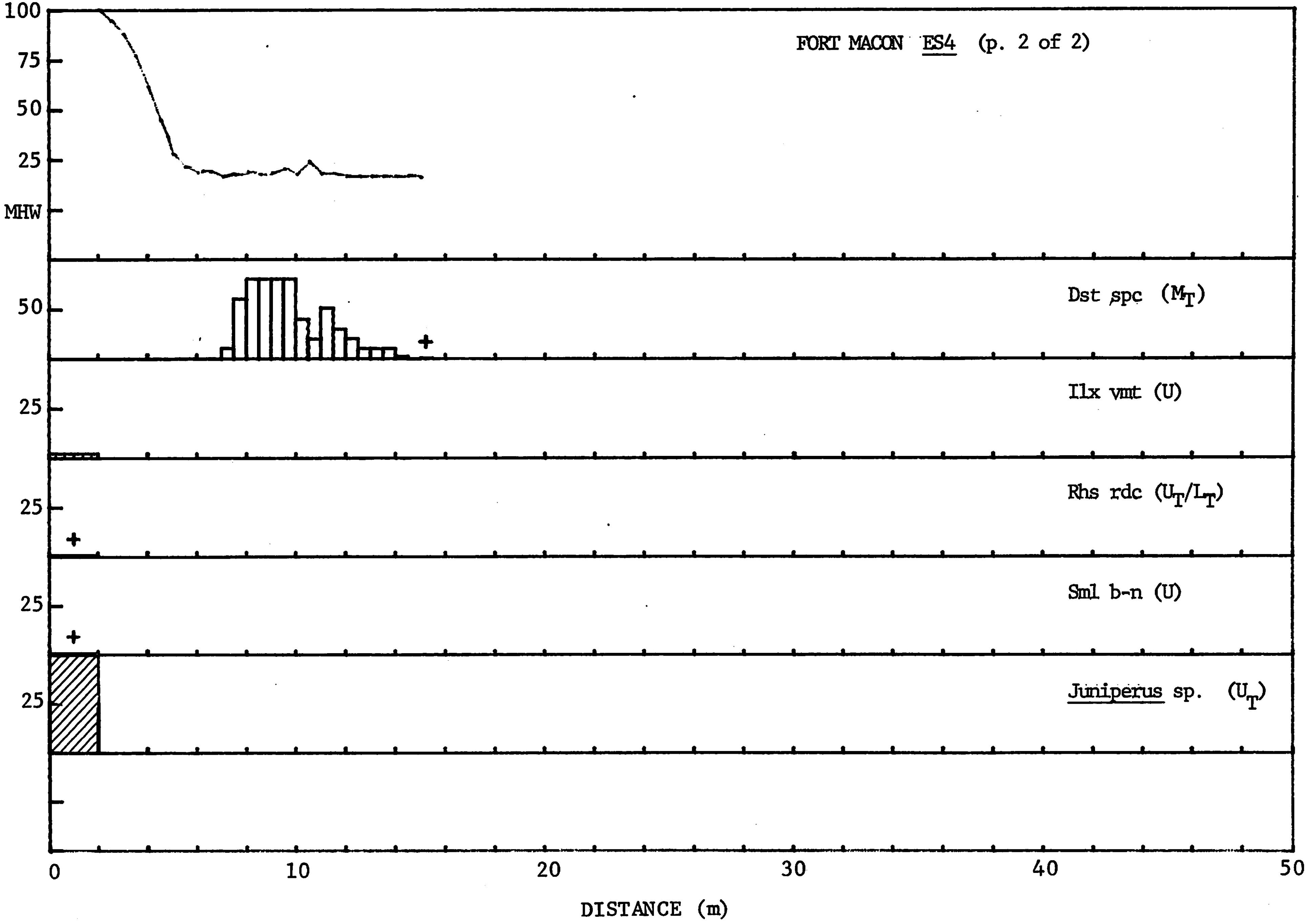


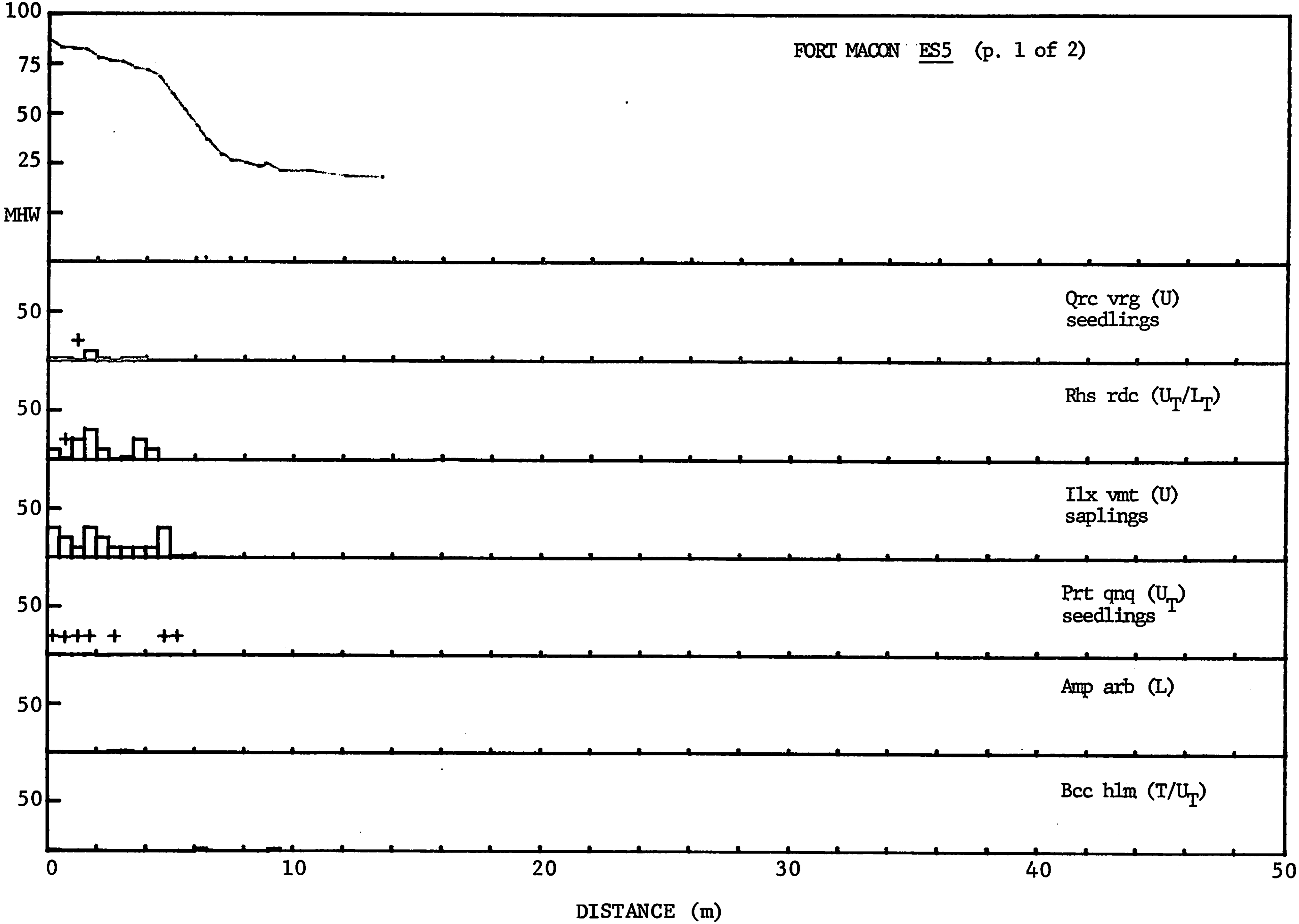
FORT MACON ES3 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Sml prv (B_T)
Trg str (B_T)
Dst spc (M_T)
Lmn crl (M)
Fmb cst (B_T)
Scr rbs (B_T)
50
0
10
20
30
40
50
DISTANCE (m)


FORT MACON ES3 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Jnc rmr (M_T)
Spr alt (M)
Ilx vmt (U)
Myr crf (U_T/L_T)
Rhs rdc (U_T/L_T)
Juniperus sp. (U_T)
0
10
20
30
40
50
DISTANCE (m)

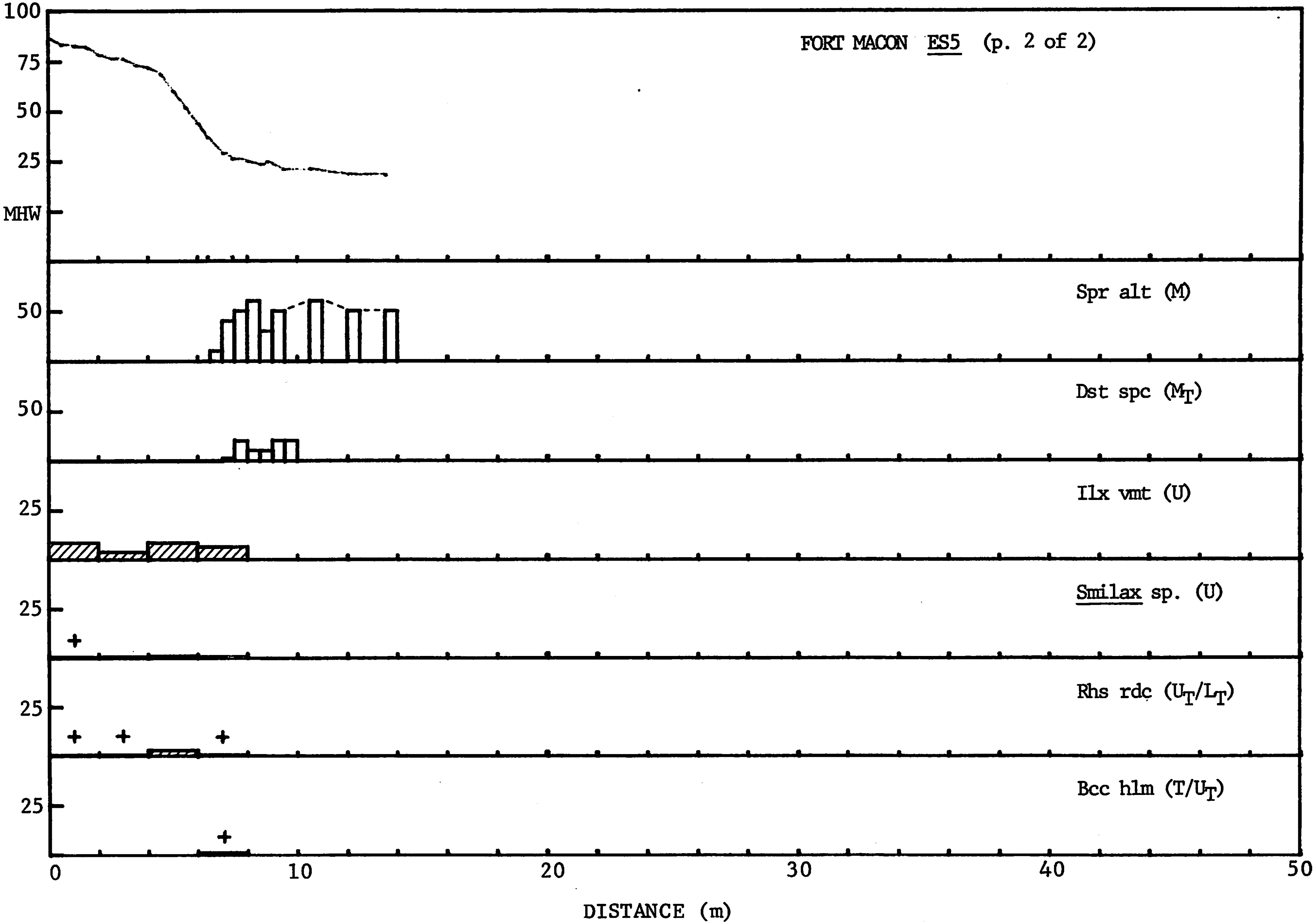


FORT MACON ES4 (p. 1 of 2)
100
75
50
25
MHW
Sml b-n (U)
seedlings
Prt qnq (U_T)
seedlings
Ilx vmt (U)
saplings
Rhs rdc (U_T/L_T)
Spr alt (M)
Spr ptn (M_T/D)
0
10
20
30
40
50
DISTANCE (m)

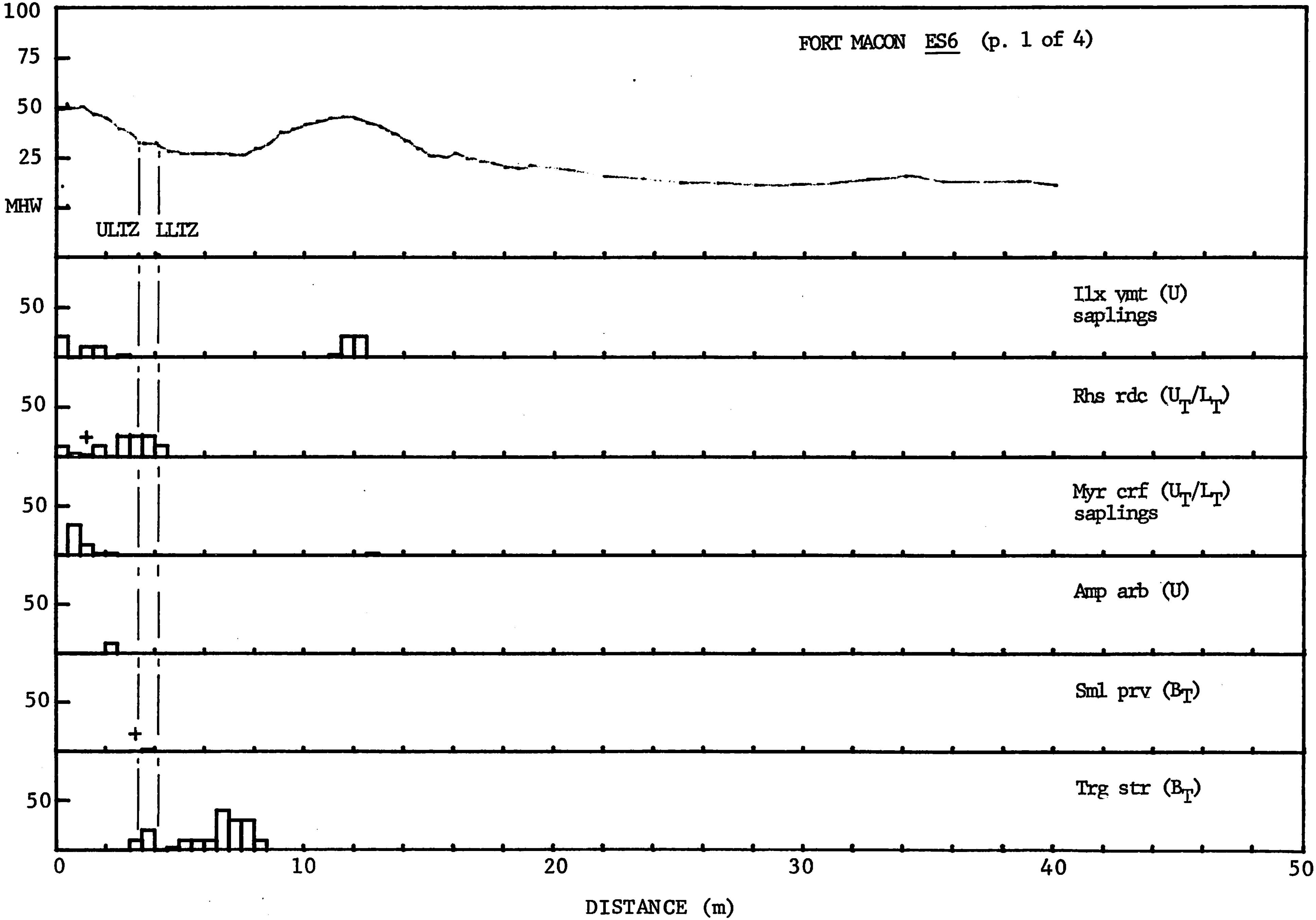

FORT MACON ES4 (p. 2 of 2)
100
75
50
25
MHW
Dst spc (M_T)
50
Ilx vmt (U)
25
Rhs rdc (U_T/L_T)
25
Sml b-n (U)
25
Juniperus sp. (U_T)
25
0
10
20
30
40
50
DISTANCE (m)

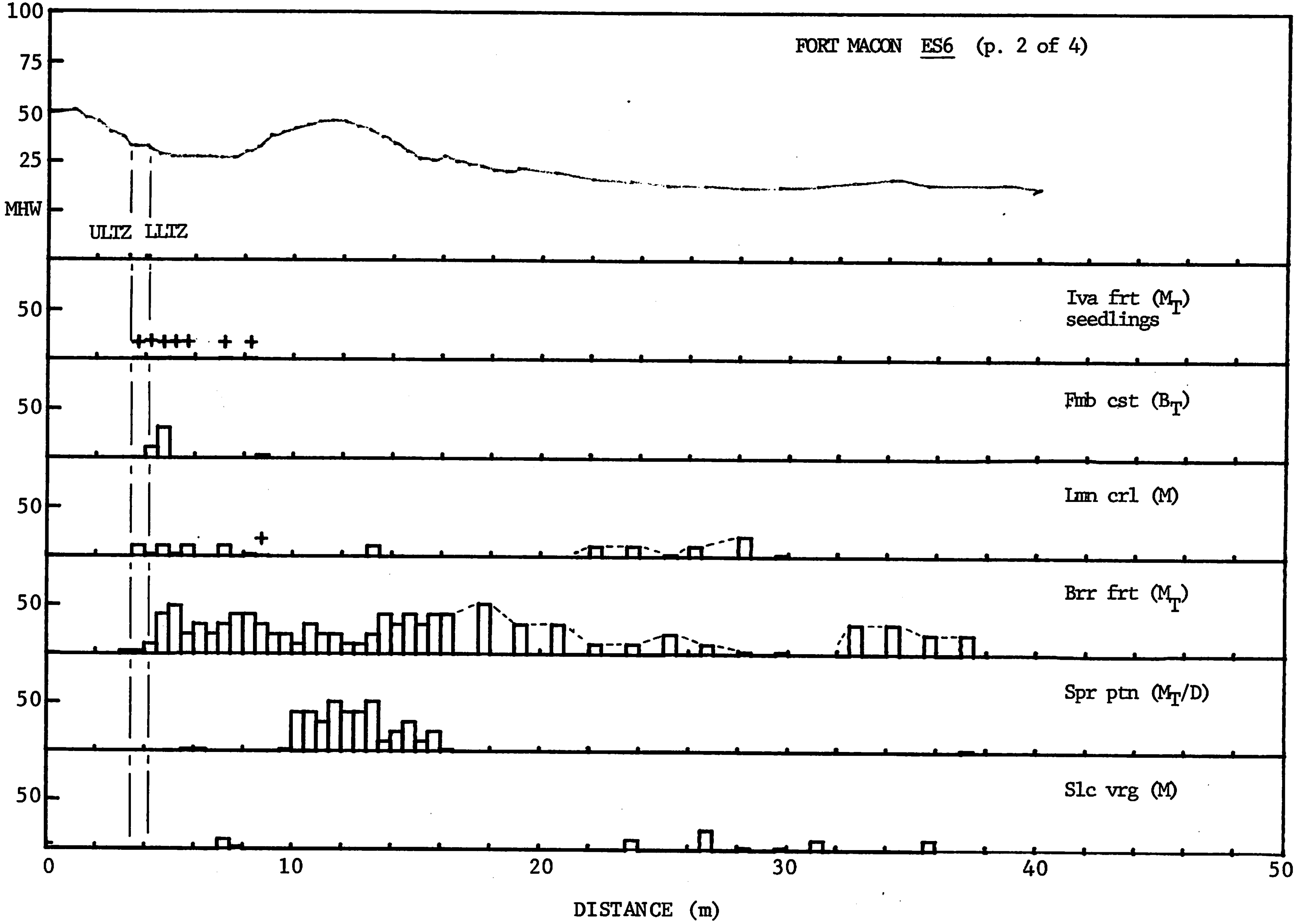


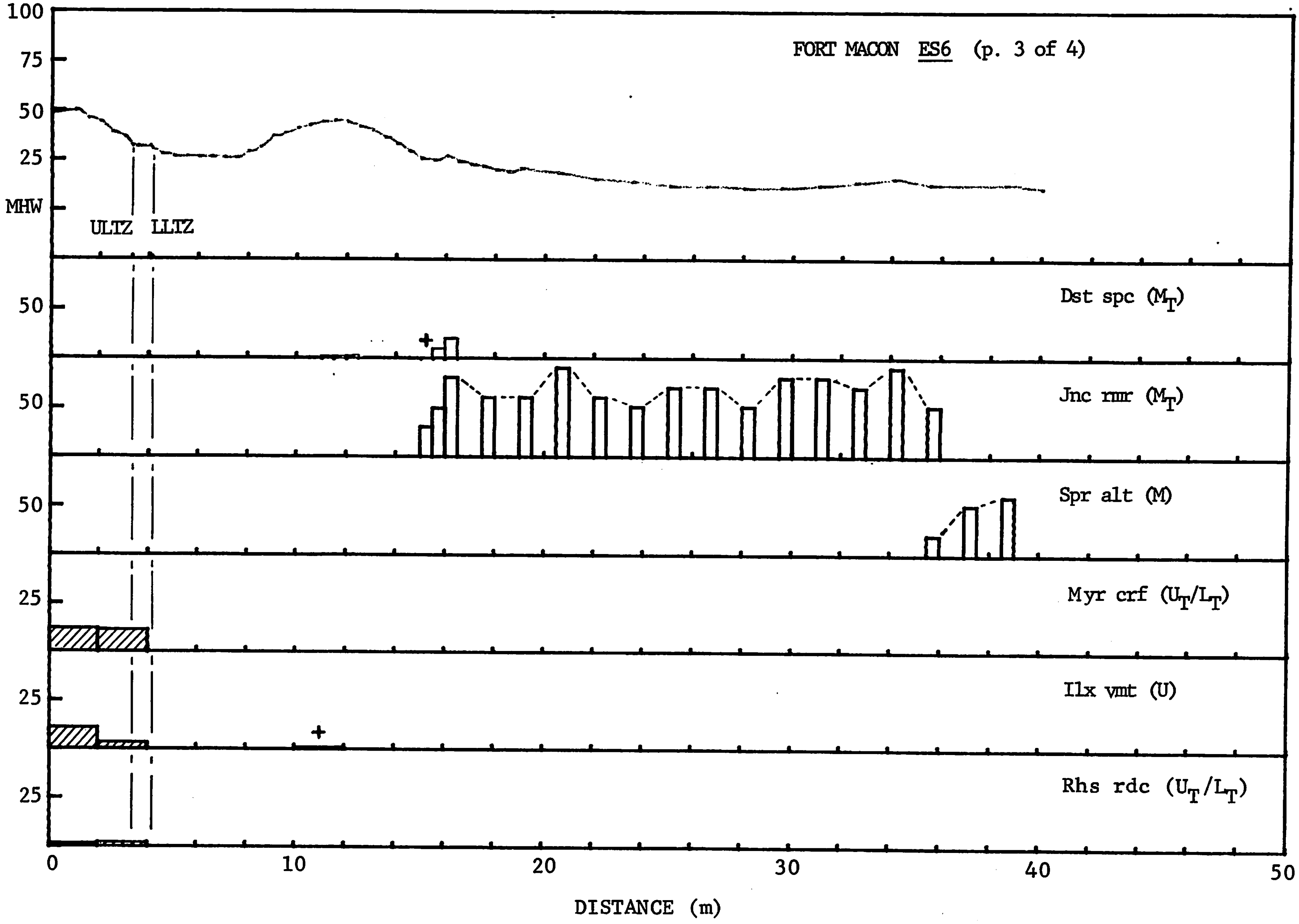
FORT MACON ES5 (p. 1 of 2)
100
75
50
25
MHW
Qrc vrg (U)
seedlings
Rhs rdc (U_T/L_T)
Ilx vmt (U)
saplings
Prt qnq (U_T)
seedlings
Amp arb (L)
Bcc hlm (T/U_T)
0
10
20
30
40
50
DISTANCE (m)



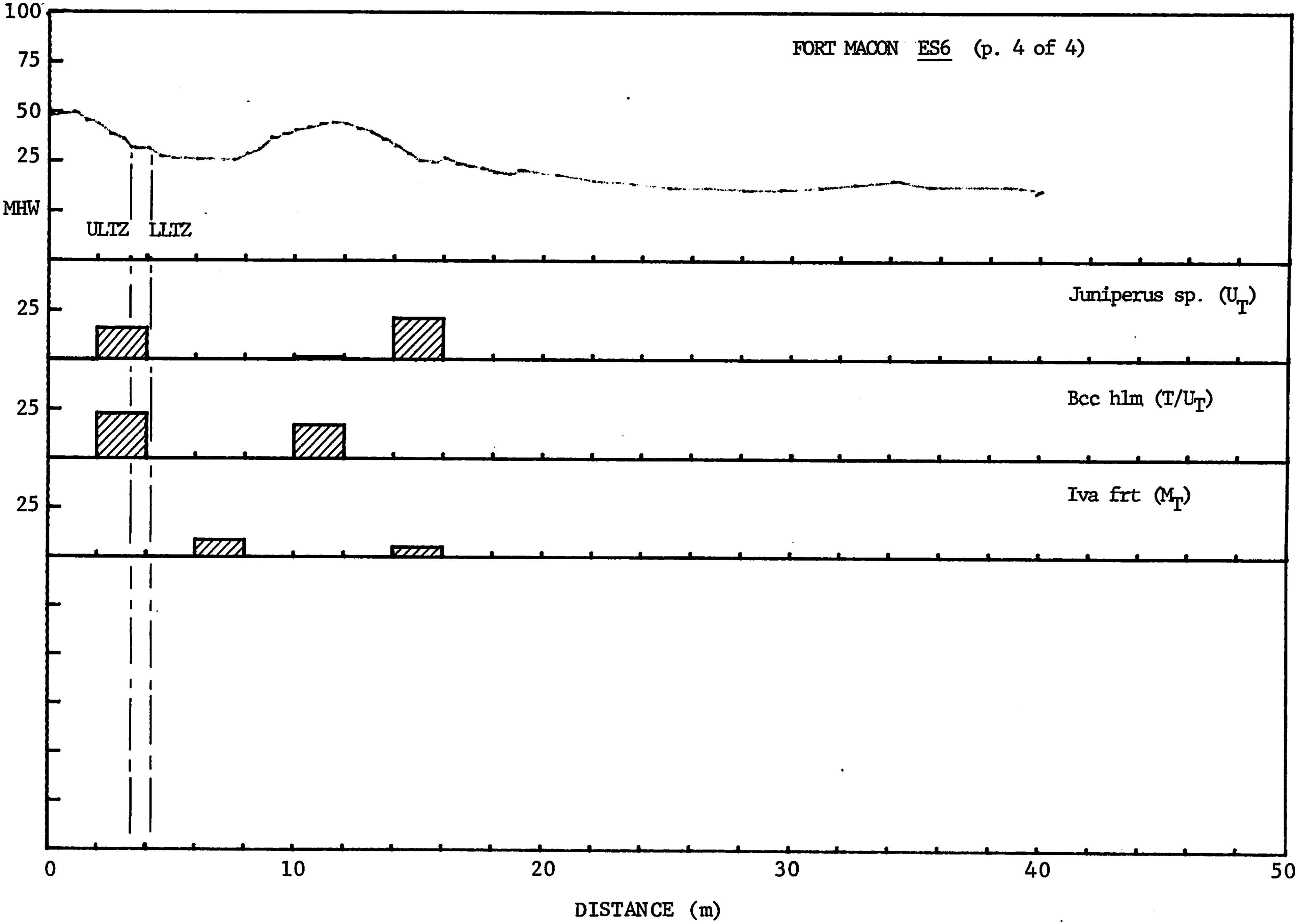
FORT MACON ES5 (p. 2 of 2)
100
75
50
25
MHW
Spr alt (M)
50
Dst spc (M_T)
50
Ilx vmt (U)
25
Smilax sp. (U)
25
Rhs rdc (U_T/L_T)
25
Bcc hlm (T/U_T)
25
0
10
20
30
40
50
DISTANCE (m)

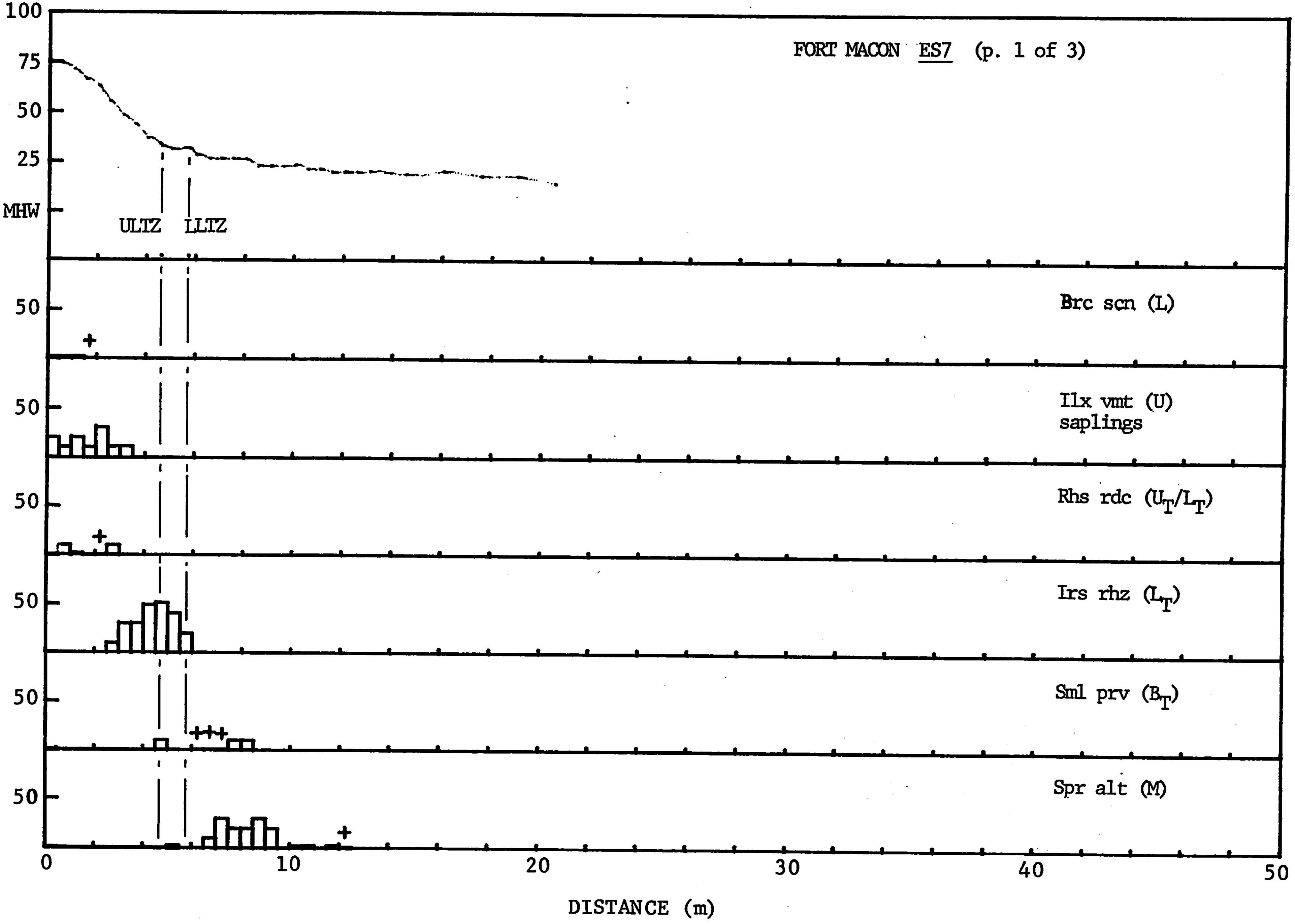

FORT MACON ES6 (p. 1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U)
saplings
Rhs rdc (U_T/L_T)
Myr crf (U_T/L_T)
saplings
Amp arb (U)
Sml prv (B_T)
Trg str (B_T)
0
10
20
30
40
50
DISTANCE (m)


FORT MACON ES6 (p. 2 of 4)
100
75
50
25
MHW
ULTZ LLTZ
Iva frt (M_T)
seedlings
Fmb cst (B_T)
Lmn crl (M)
Brr frt (M_T)
Spr ptn (M_T/D)
Slc vrg (M)
0
10
20
30
40
50
DISTANCE (m)

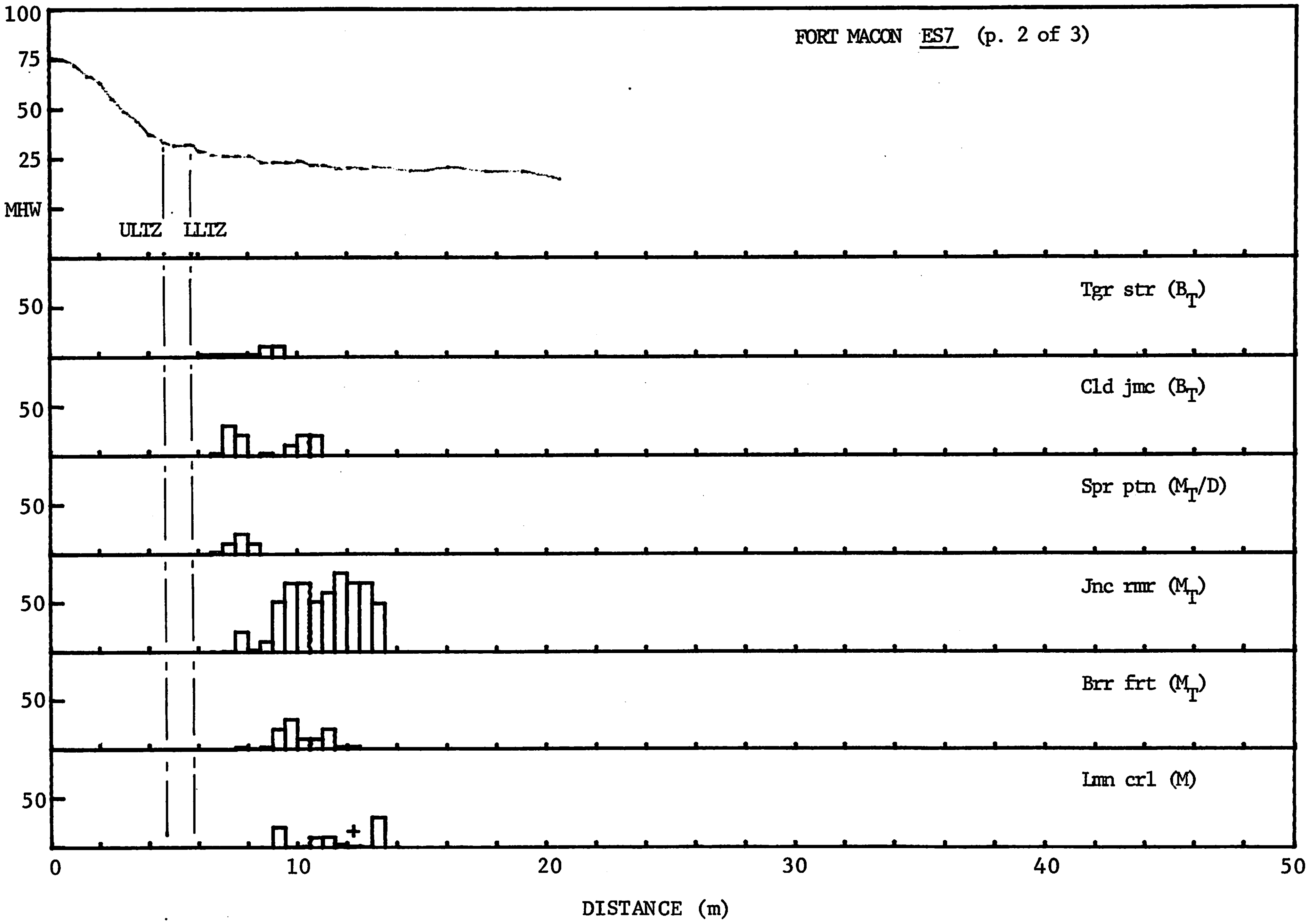


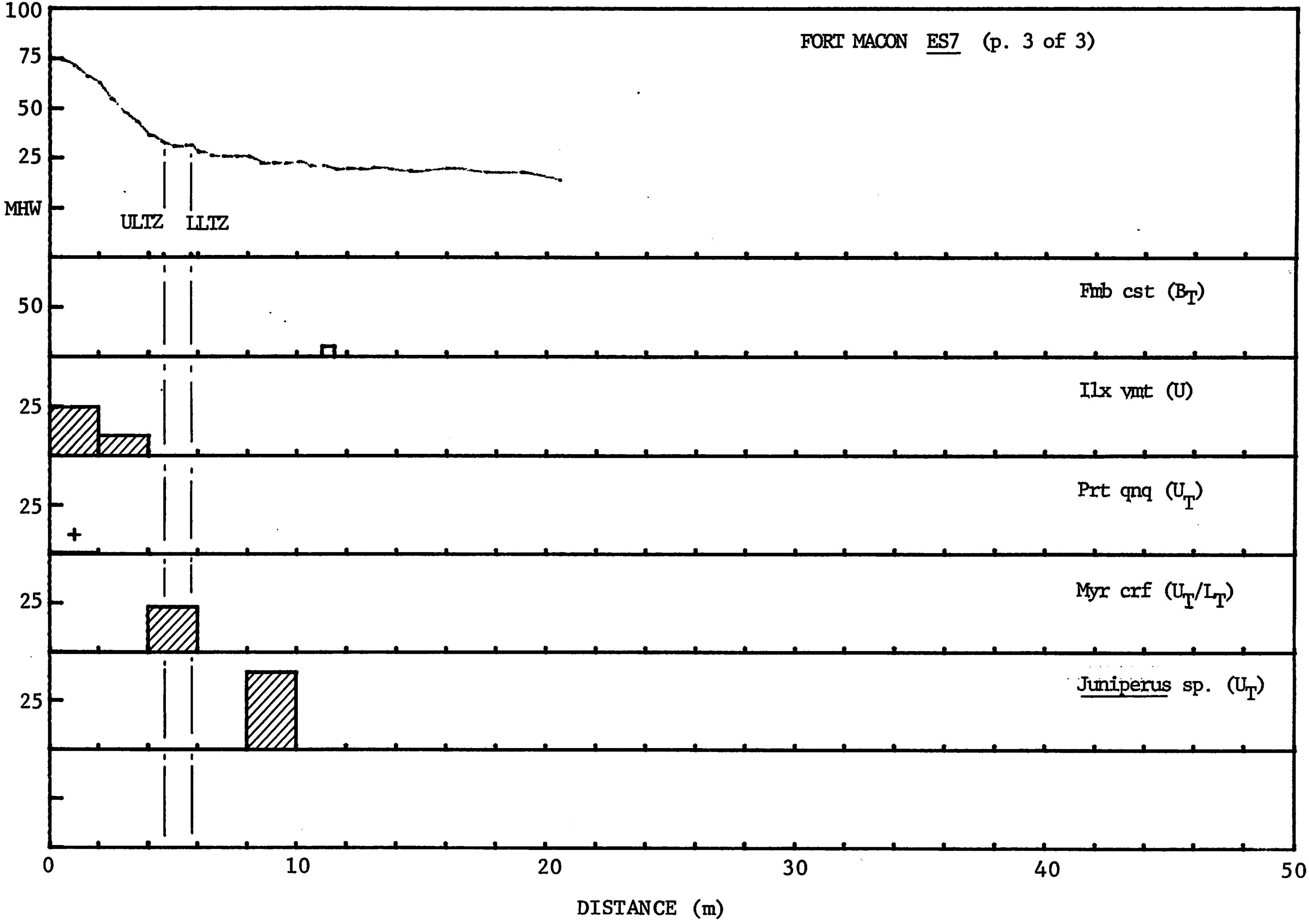
FORT MACON ES6 (p. 3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Jnc rmr (M_T)
Spr alt (M)
Myr crf (U_T/L_T)
Ilx vmt (U)
Rhs rdc (U_T/L_T)
0
10
20
30
40
50
DISTANCE (m)


FORT MACON ES6 (p. 4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Juniperus sp. (U_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)

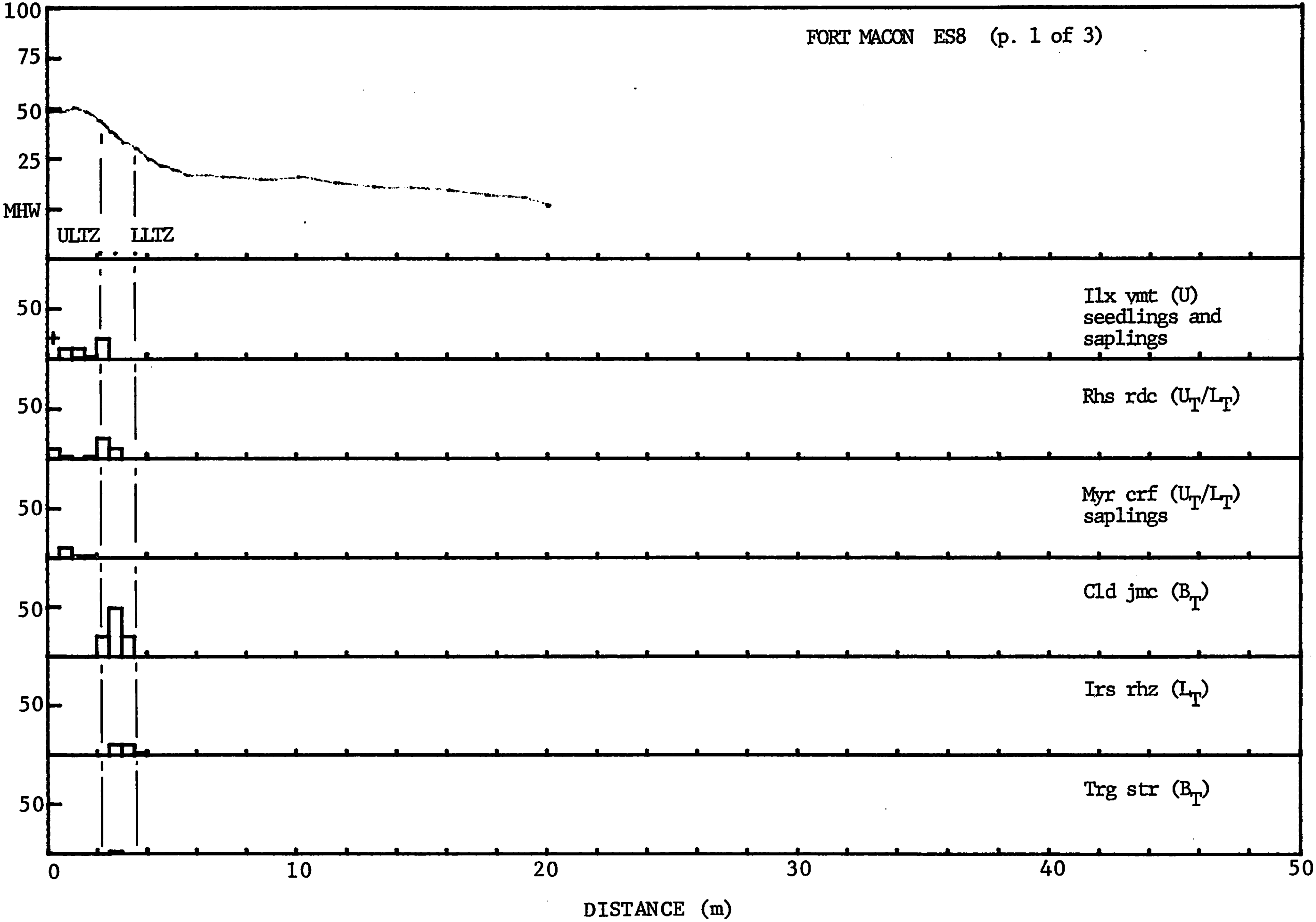


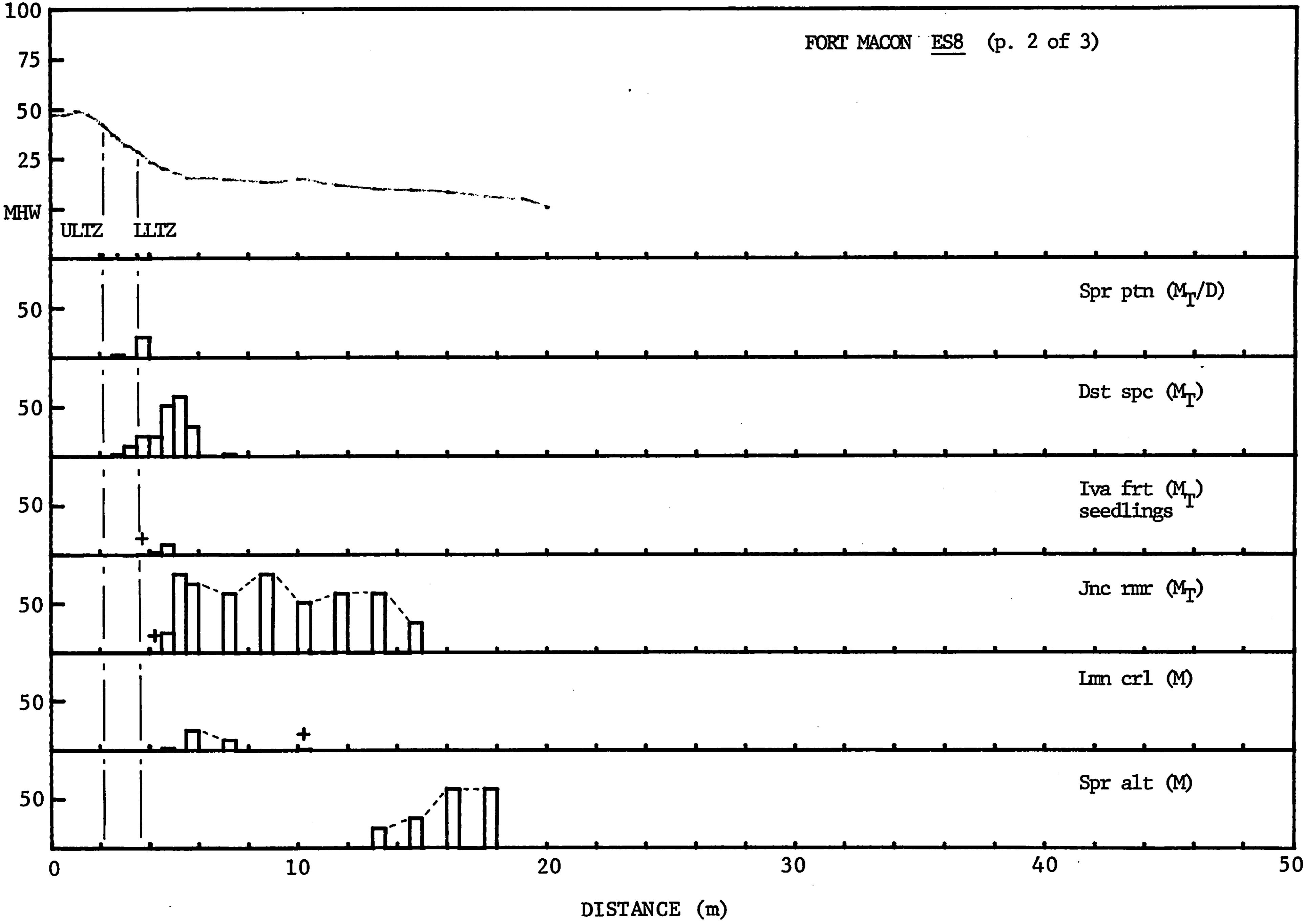
FORT MACON ES7 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Brc scn (L)
Ilx vmt (U) saplings
Rhs rdc (U_T/L_T)
Irs rhz (L_T)
Sml prv (B_T)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)

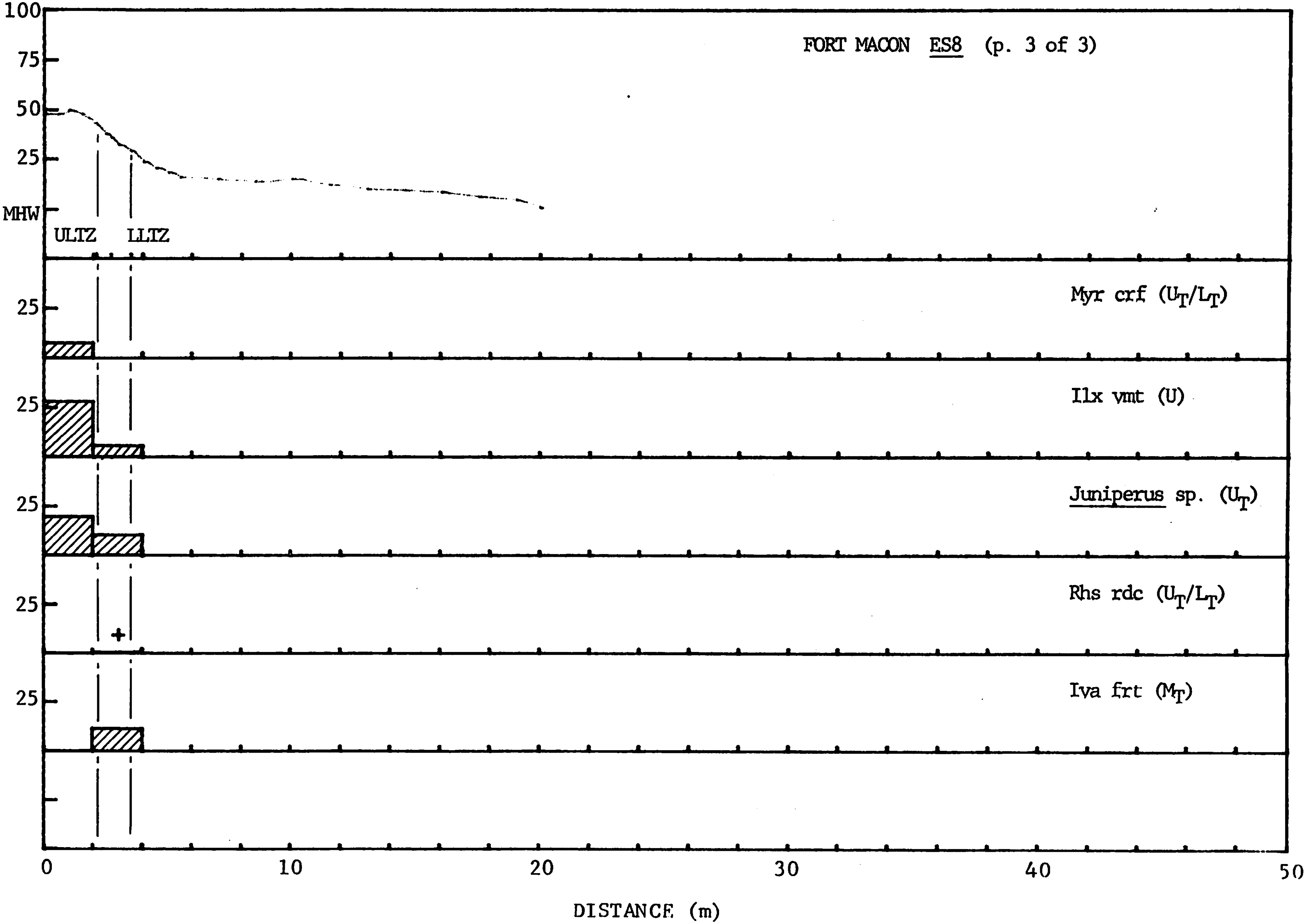

FORT MACON ES7 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Tgr str (B_T)
Cld jmc (B_T)
Spr ptn (M_T/D)
Jnc rmr (M_T)
Brr frt (M_T)
Lmn crl (M)
0
10
20
30
40
50
DISTANCE (m)

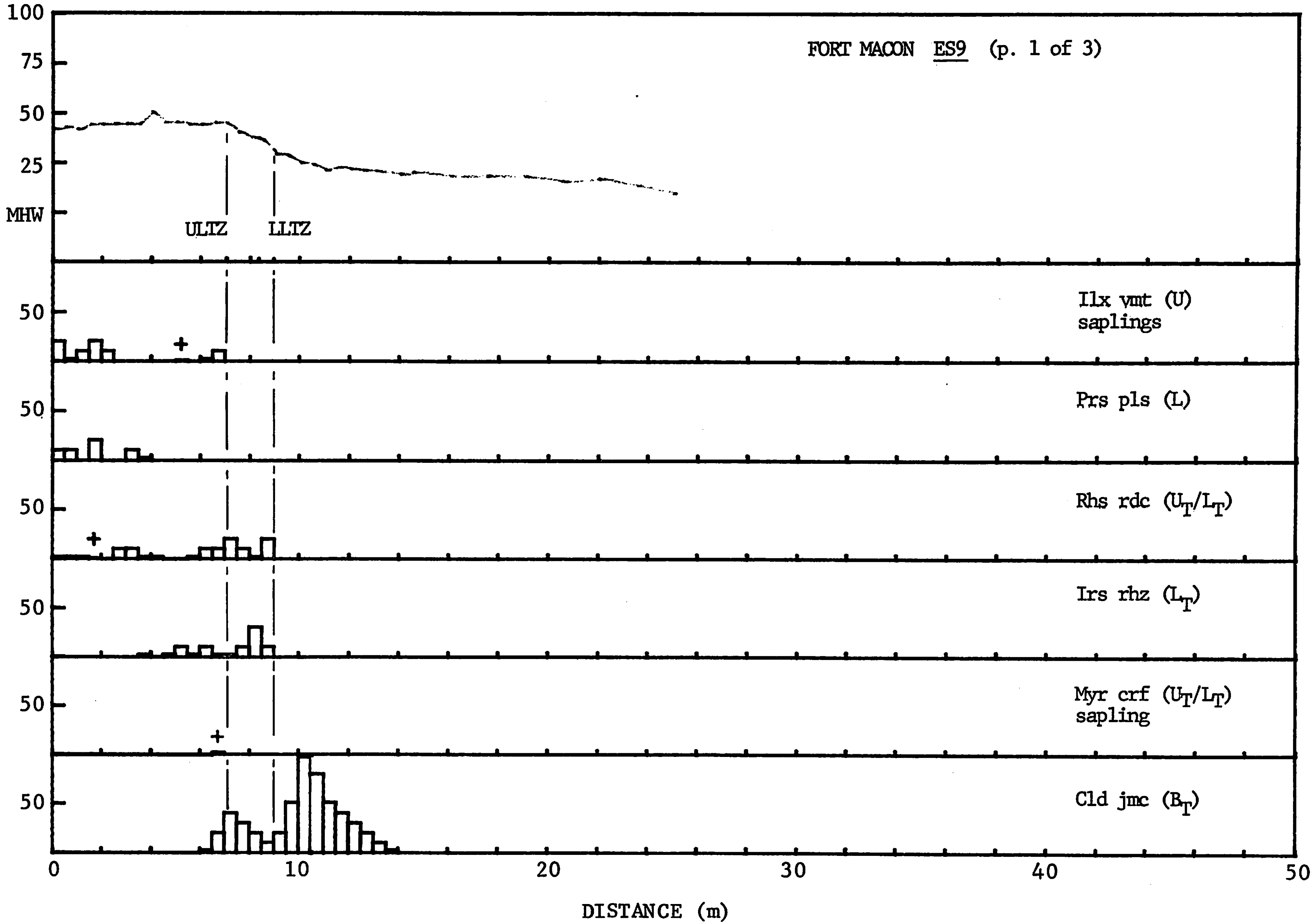


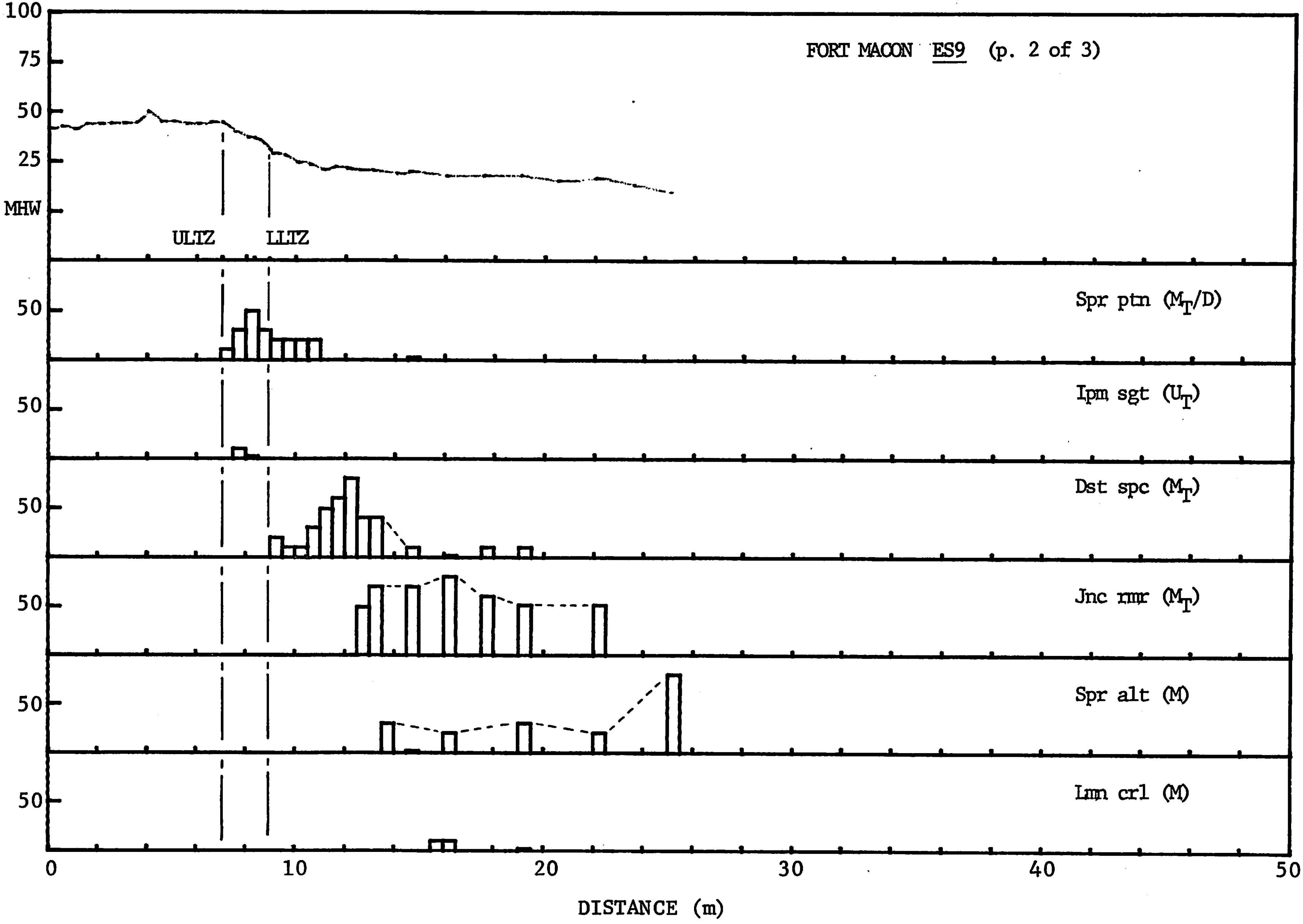
FORT MACON ES7 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Fmb cst (B_T)
50
Ilx vmt (U)
25
Prt qnq (U_T)
25
+
Myr crf (U_T/L_T)
25
Juniperus sp. (U_T)
25
0
10
20
30
40
50
DISTANCE (m)


FORT MACON ES8 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx vmt (U) seedlings and saplings
Rhs rdc (U_T/L_T)
Myr crf (U_T/L_T) saplings
Cld jmc (B_T)
Irs rhz (L_T)
Trg str (B_T)
0
10
20
30
40
50
DISTANCE (m)

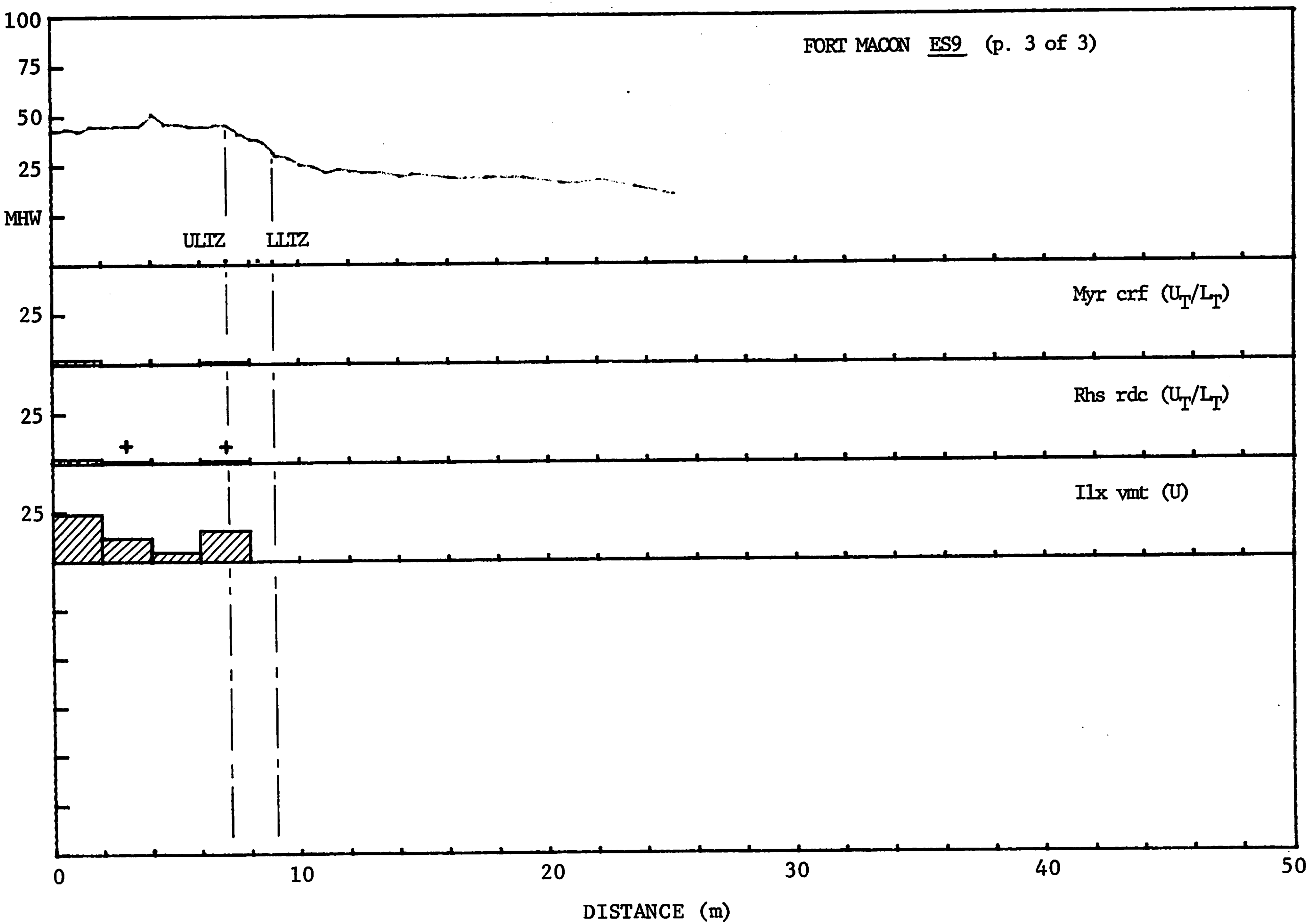

FORT MACON ES8 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Dst spc (M_T)
Iva frt (M_T)
seedlings
Jnc rmr (M_T)
Lmn crl (M)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)

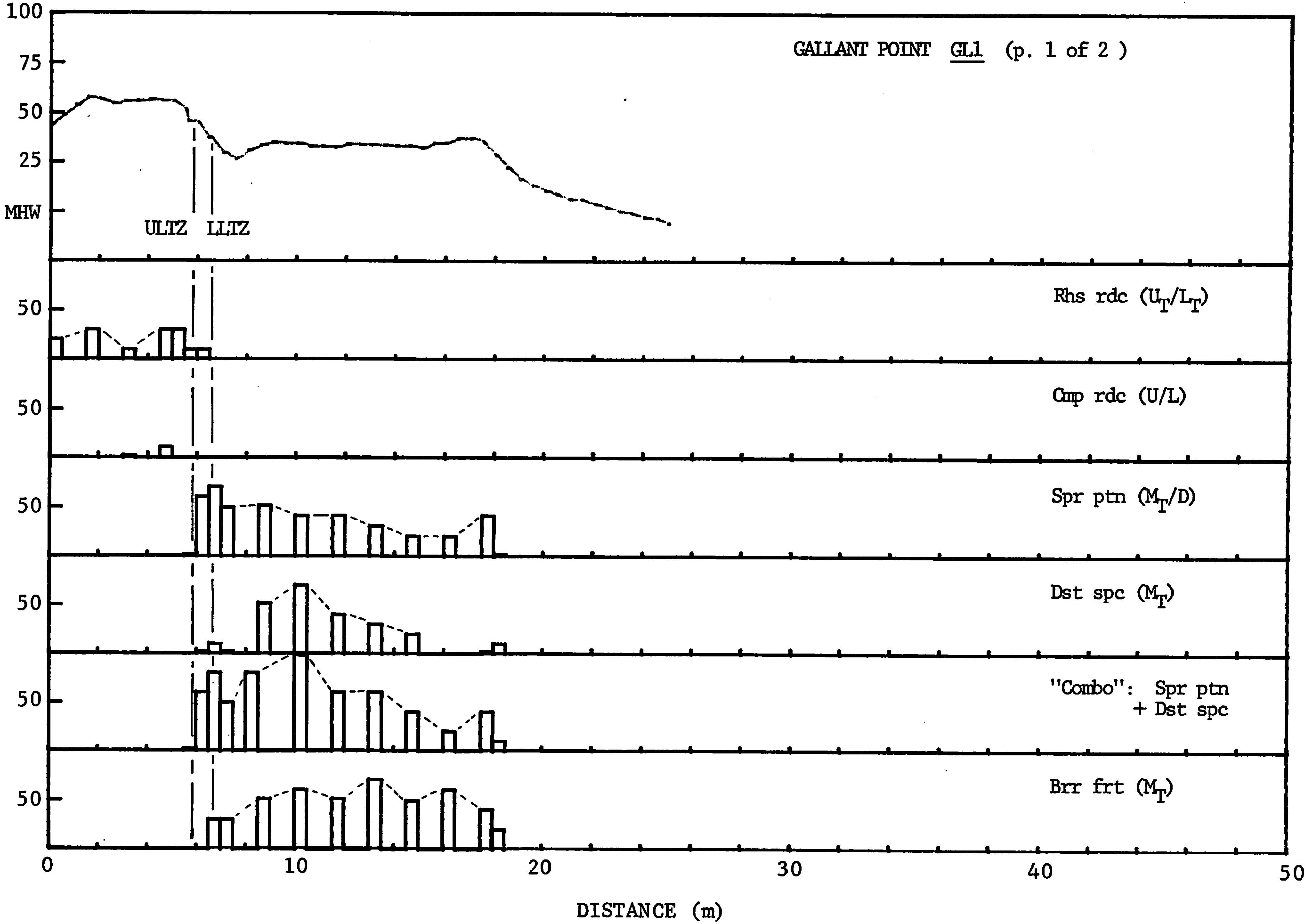

FORT MACON ES8 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (U_T/L_T)
Ilx vmt (U)
Juniperus sp. (U_T)
Rhs rdc (U_T/L_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

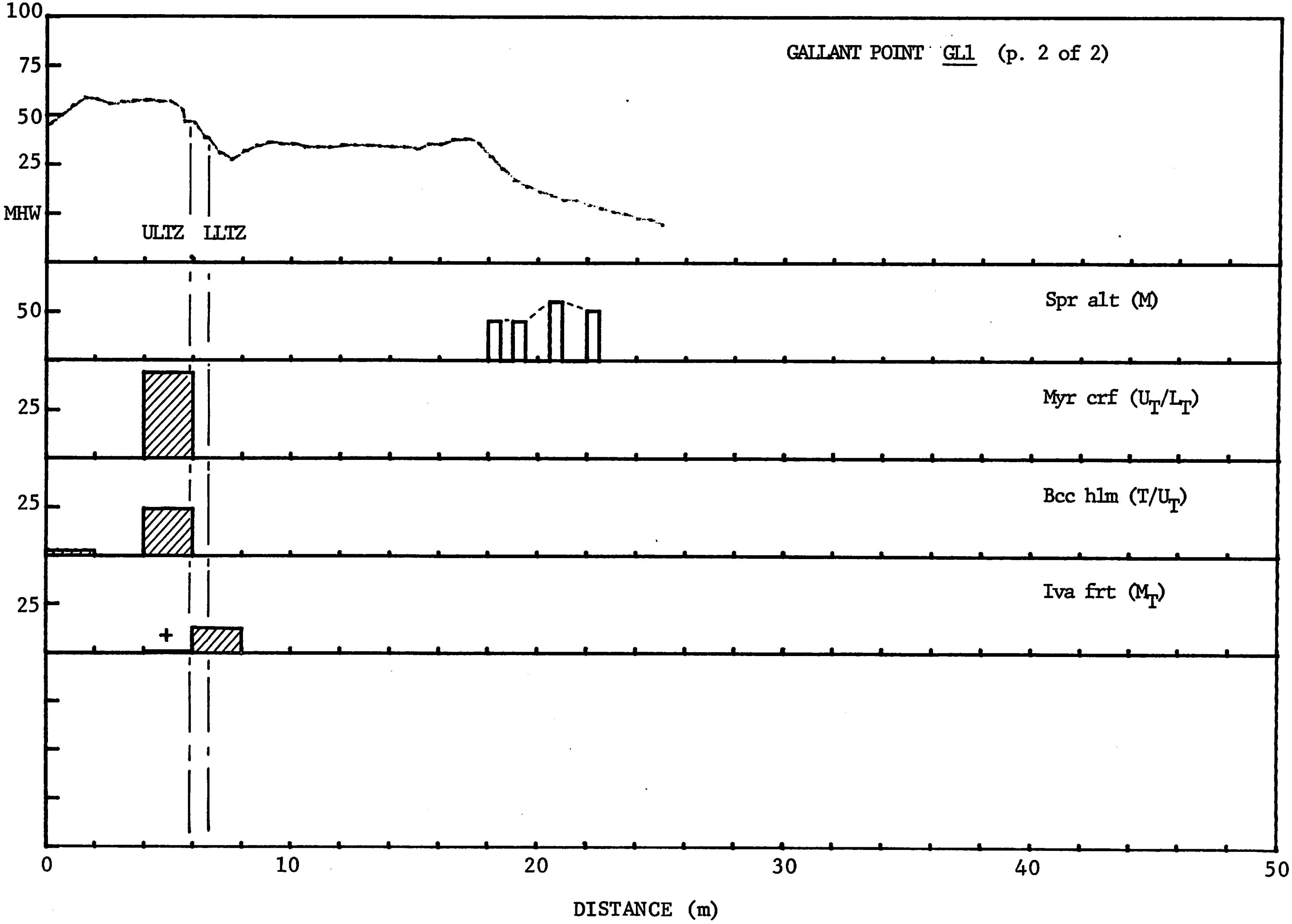

FORT MACON ES9 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Ilx vmt (U) saplings
50
Prs pls (L)
50
Rhs rdc (UT/LT)
50
Irs rhz (LT)
50
Myr crf (UT/LT) sapling
50
Cld jmc (BT)
0
10
20
30
40
50
DISTANCE (m)



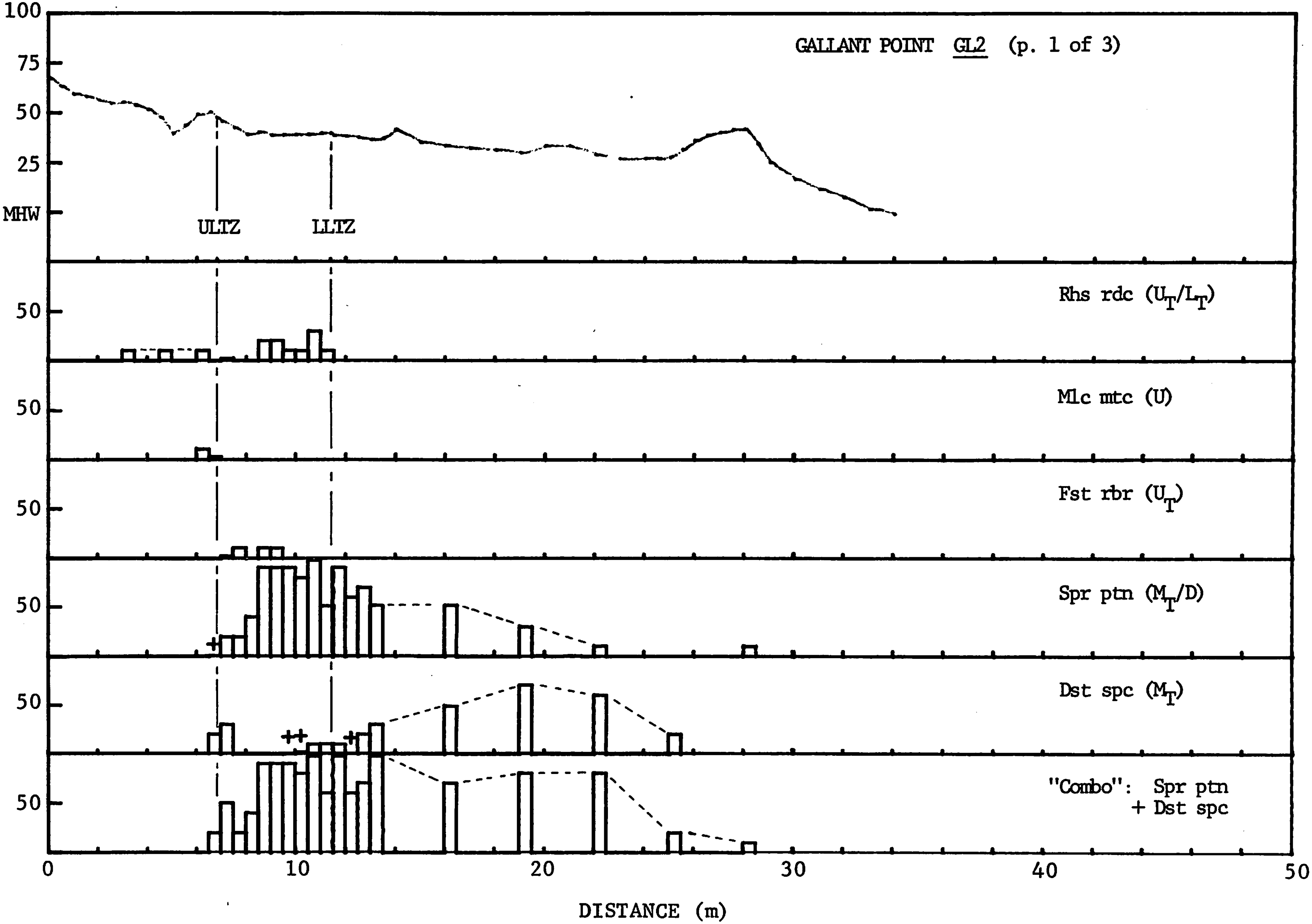
FORT MACON ES9 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Ipm sgt (U_T)
Dst spc (M_T)
Jnc rmr (M_T)
Spr alt (M)
Lmn crl (M)
0
10
20
30
40
50
DISTANCE (m)

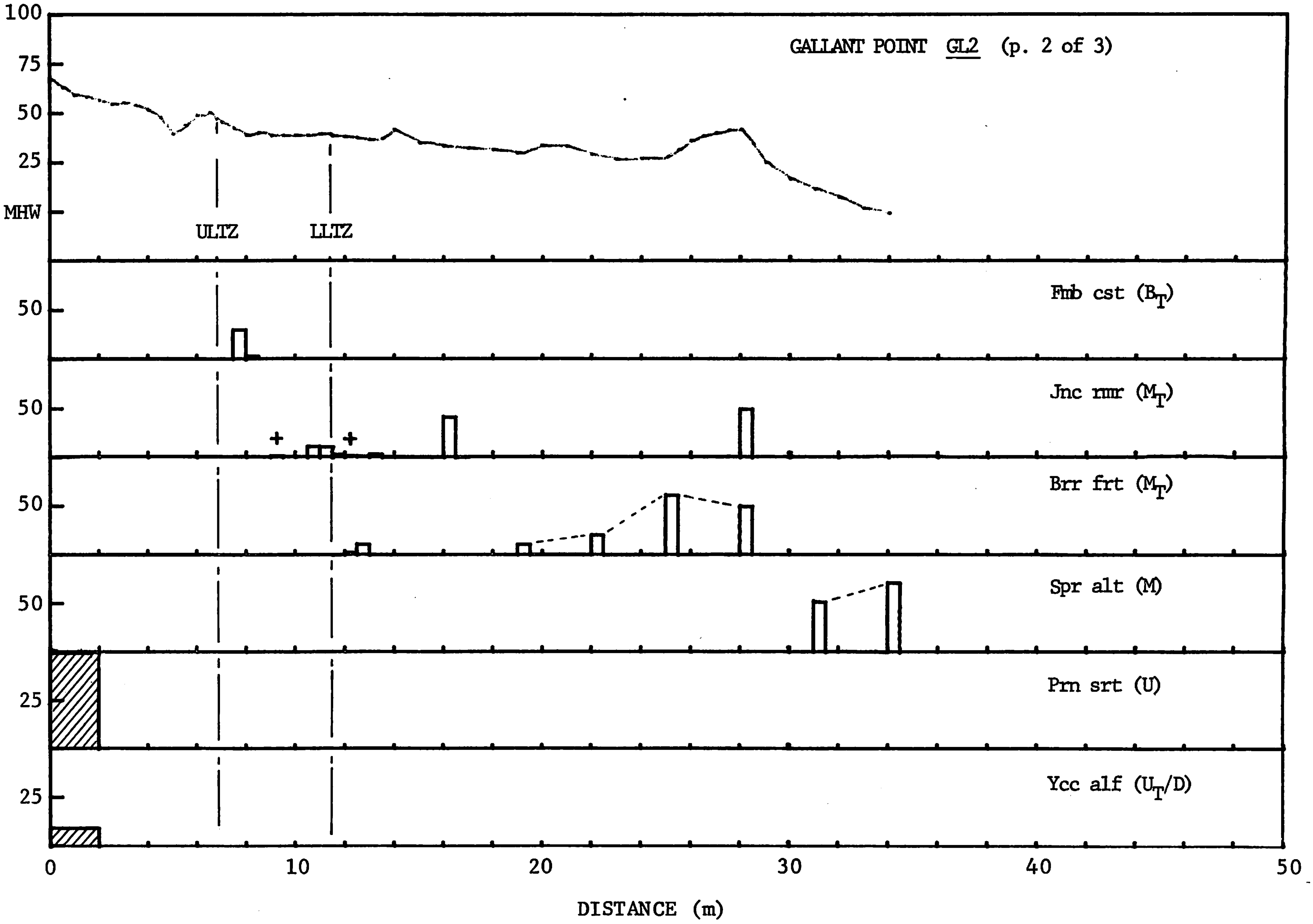

FORT MACON ES9 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (U_T/L_T)
25
Rhs rdc (U_T/L_T)
25
Ilx vmt (U)
25
0
10
20
30
40
50
DISTANCE (m)

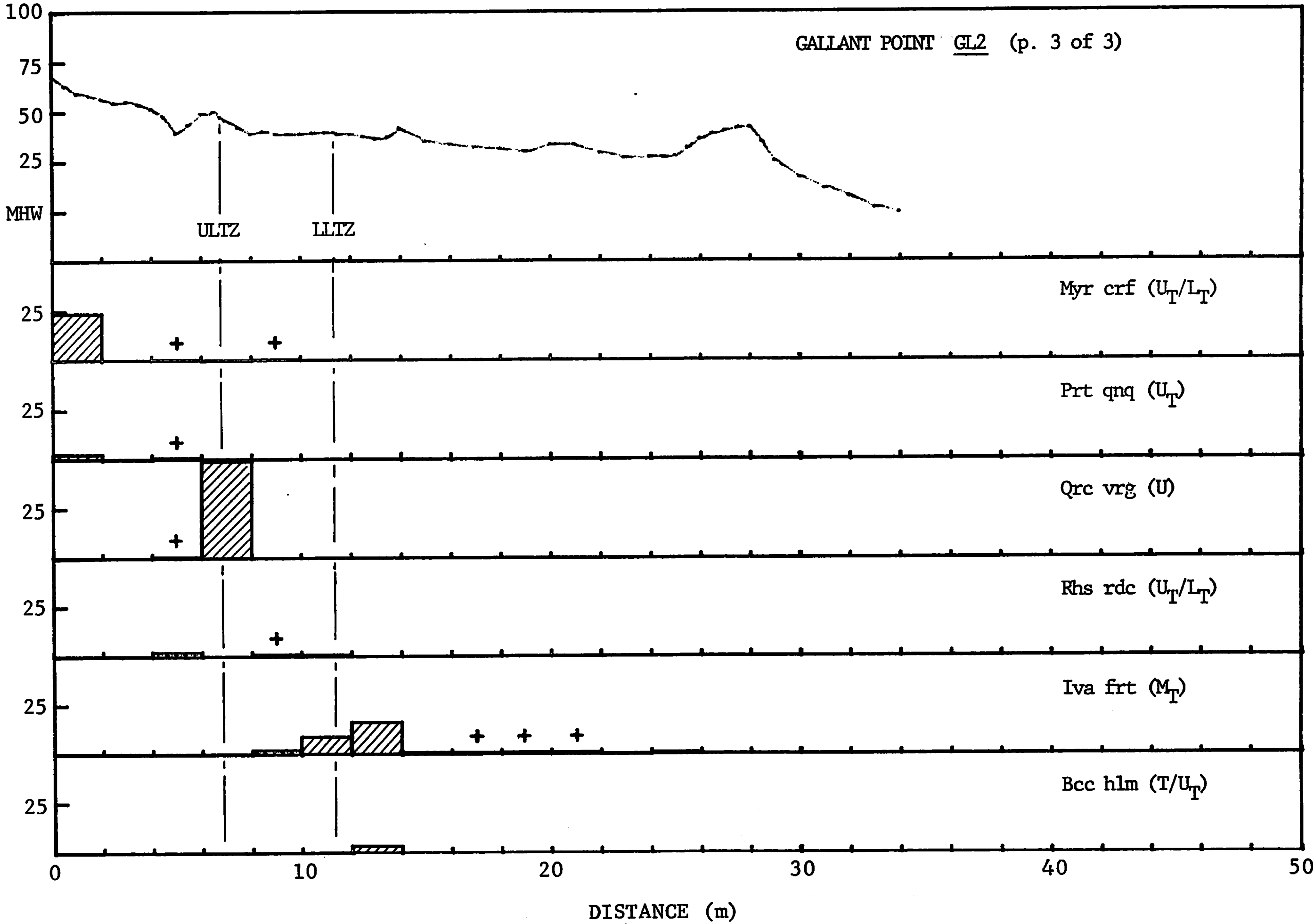

GALLANT POINT GL1 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Cmp rdc (U/L)
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn + Dst spc
Brr frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



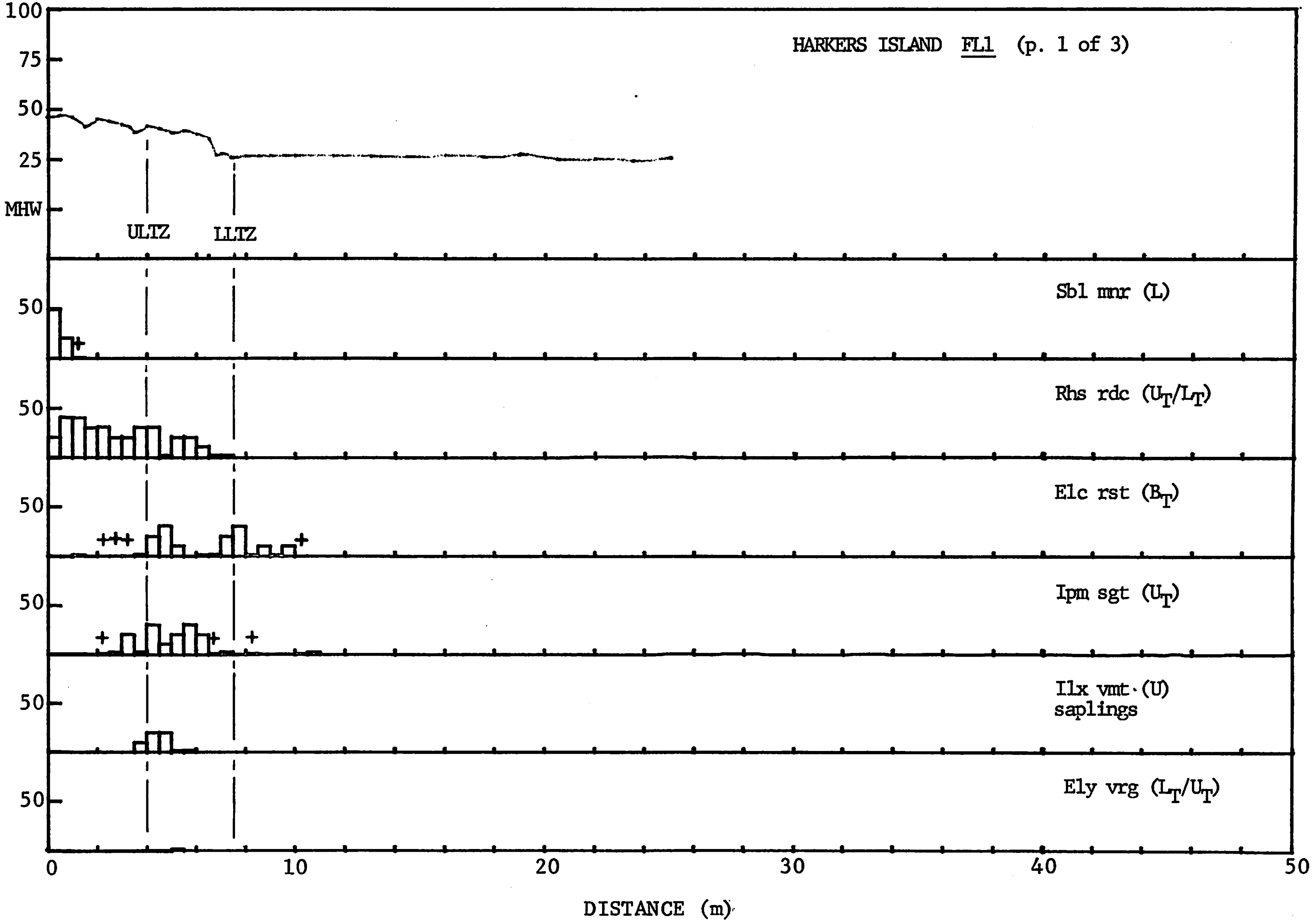
GALLANT POINT GL1 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
50
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
+
0
10
20
30
40
50
DISTANCE (m)


GALLANT POINT GL2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Mlc mtc (U)
Fst rbr (U_T)
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn
+ Dst spc
0
10
20
30
40
50
DISTANCE (m)

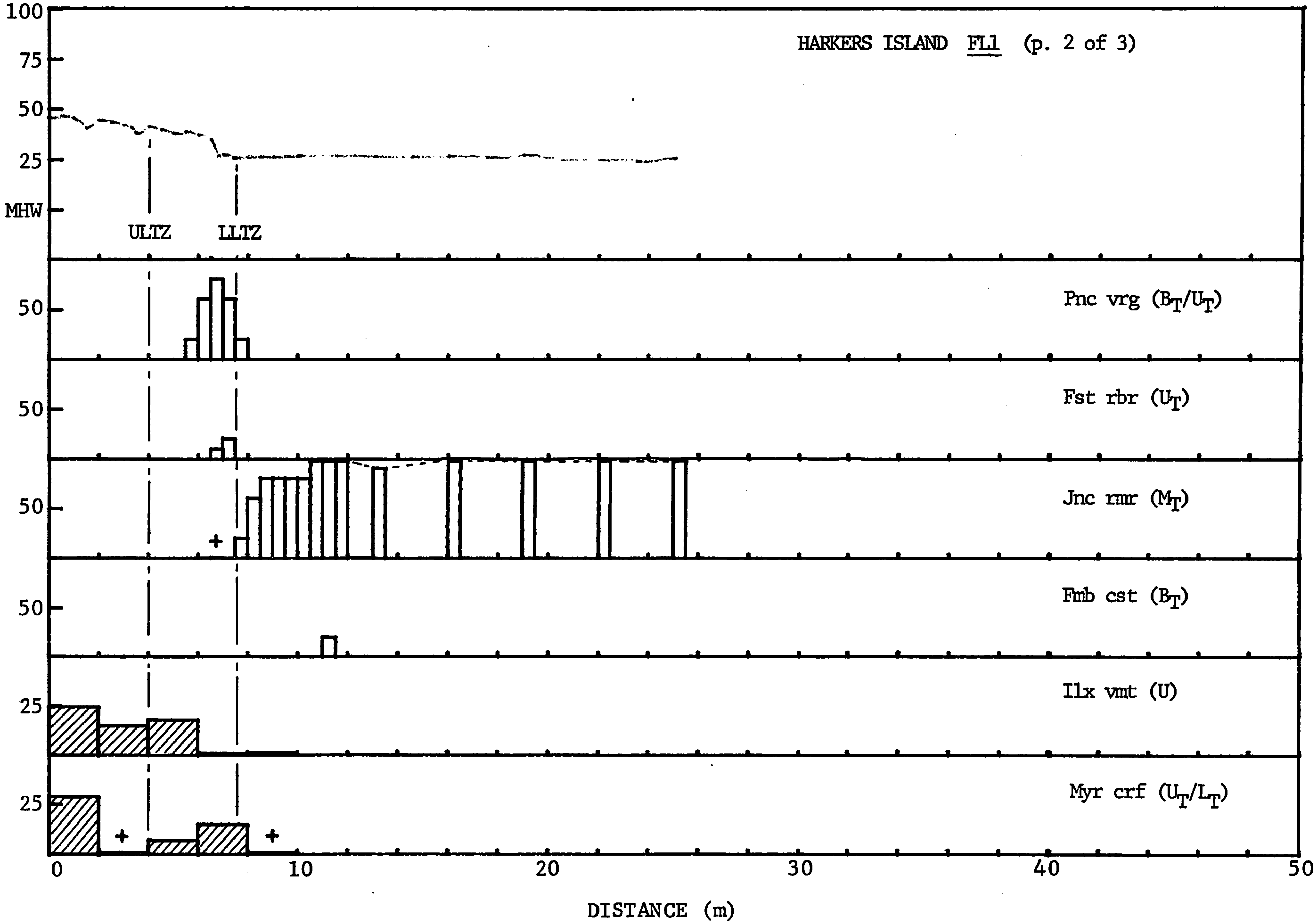

GALLANT POINT GL2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Fmb cst (B_T)
Jnc rmr (M_T)
Brr frt (M_T)
Spr alt (M)
Prn srt (U)
Ycc alf (U_T/D)
0
10
20
30
40
50
DISTANCE (m)



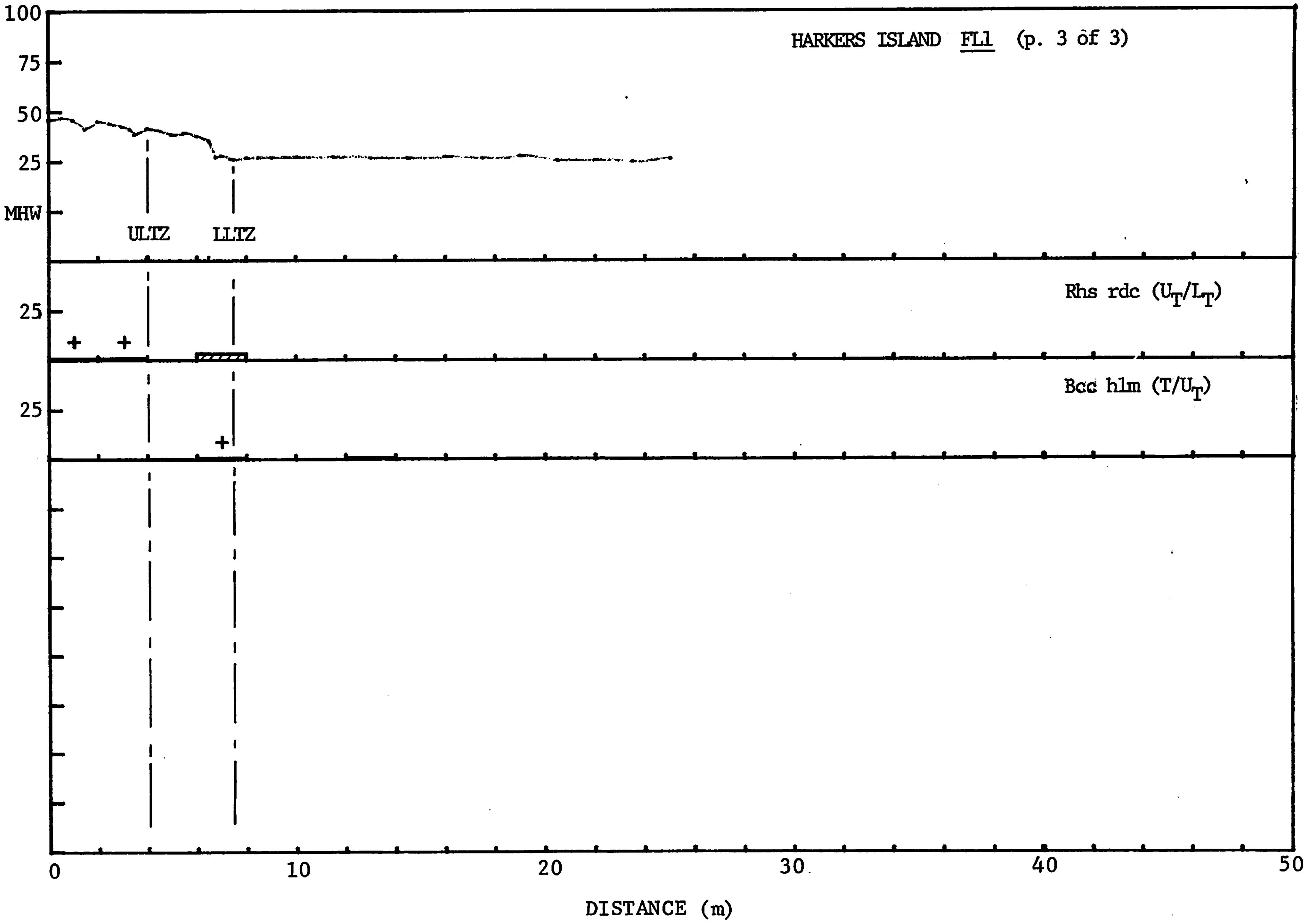
GALLANT POINT GL2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (U_T/L_T)
25
Prt qnq (U_T)
25
Qrc vrg (U)
25
Rhs rdc (U_T/L_T)
25
Iva frt (M_T)
25
Bcc hlm (T/U_T)
25
0
10
20
30
40
50
DISTANCE (m)

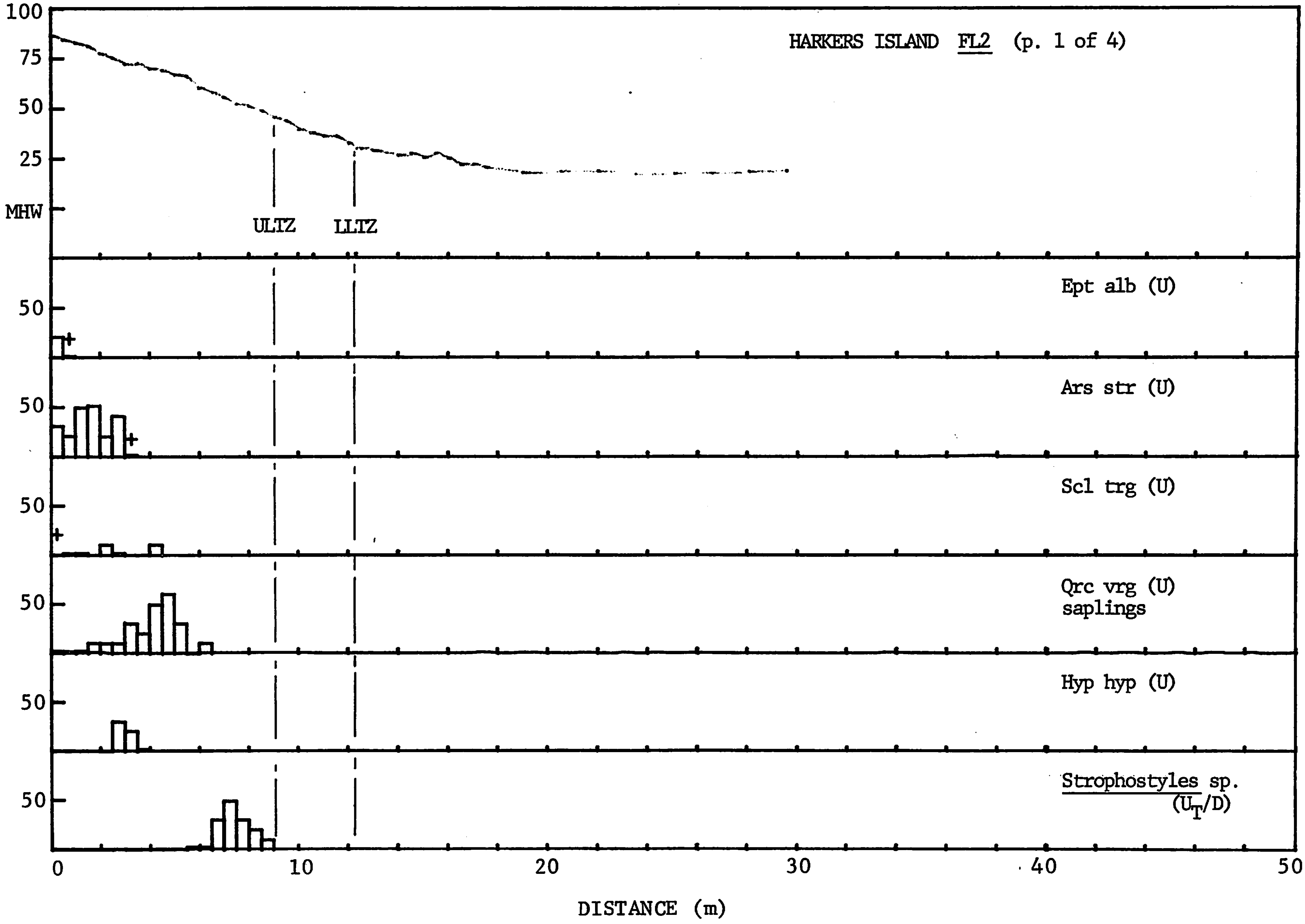


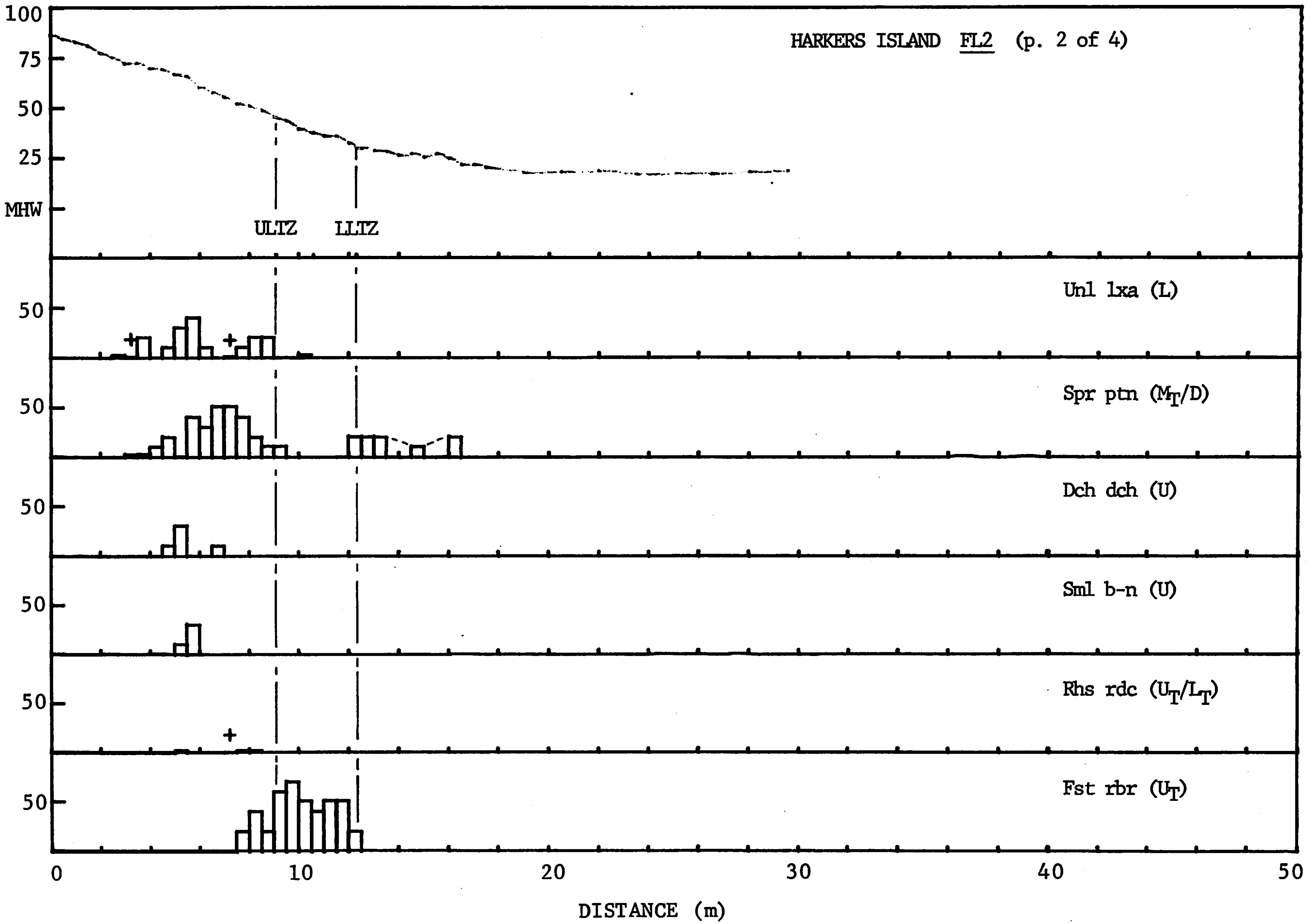
HARKERS ISLAND FL1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Sbl mnr (L)
Rhs rdc (U_T/L_T)
Elc rst (B_T)
Ipm sgt (U_T)
Ilx vmt (U) saplings
Ely vrg (L_T/U_T)
0
10
20
30
40
50
DISTANCE (m)

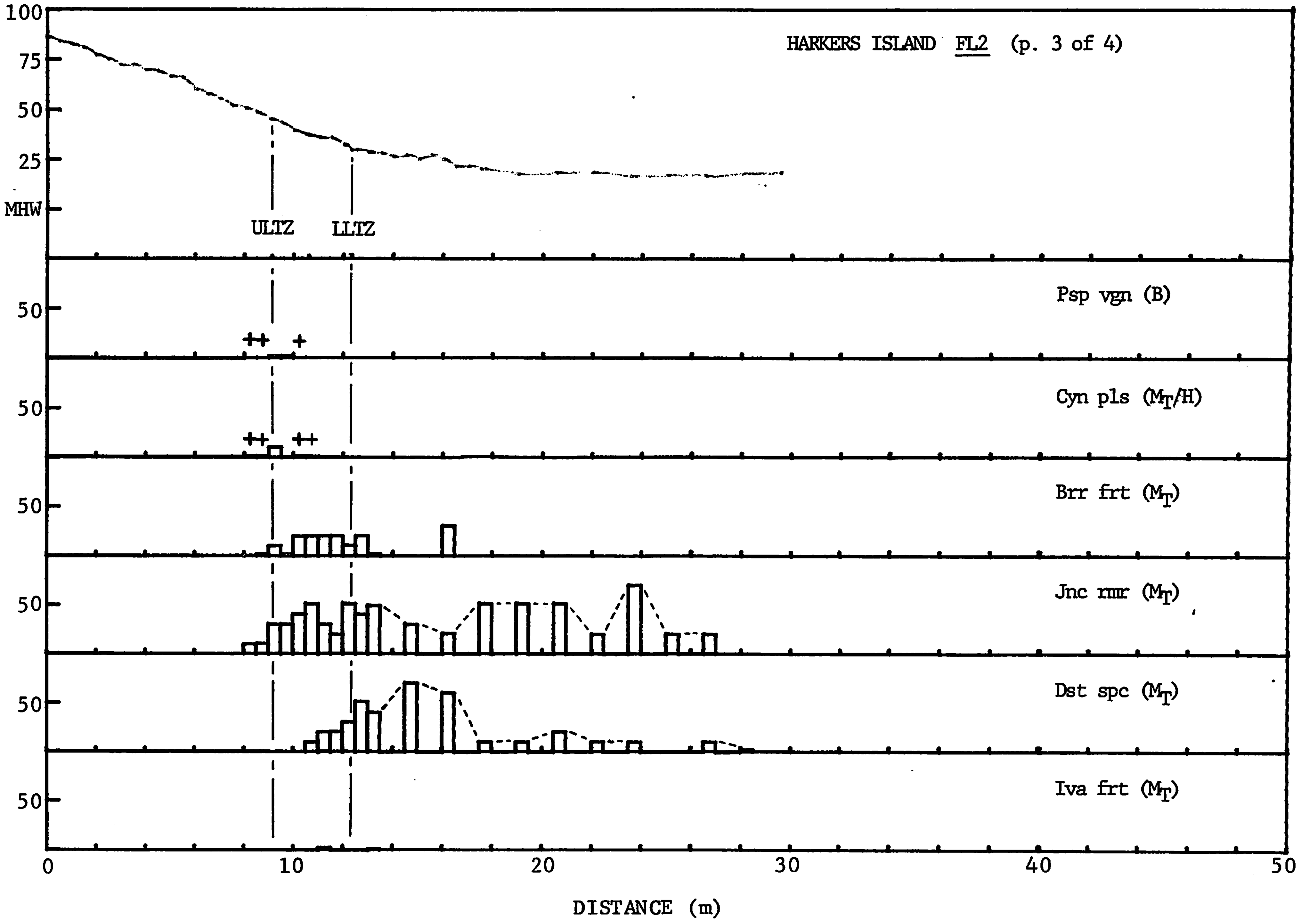


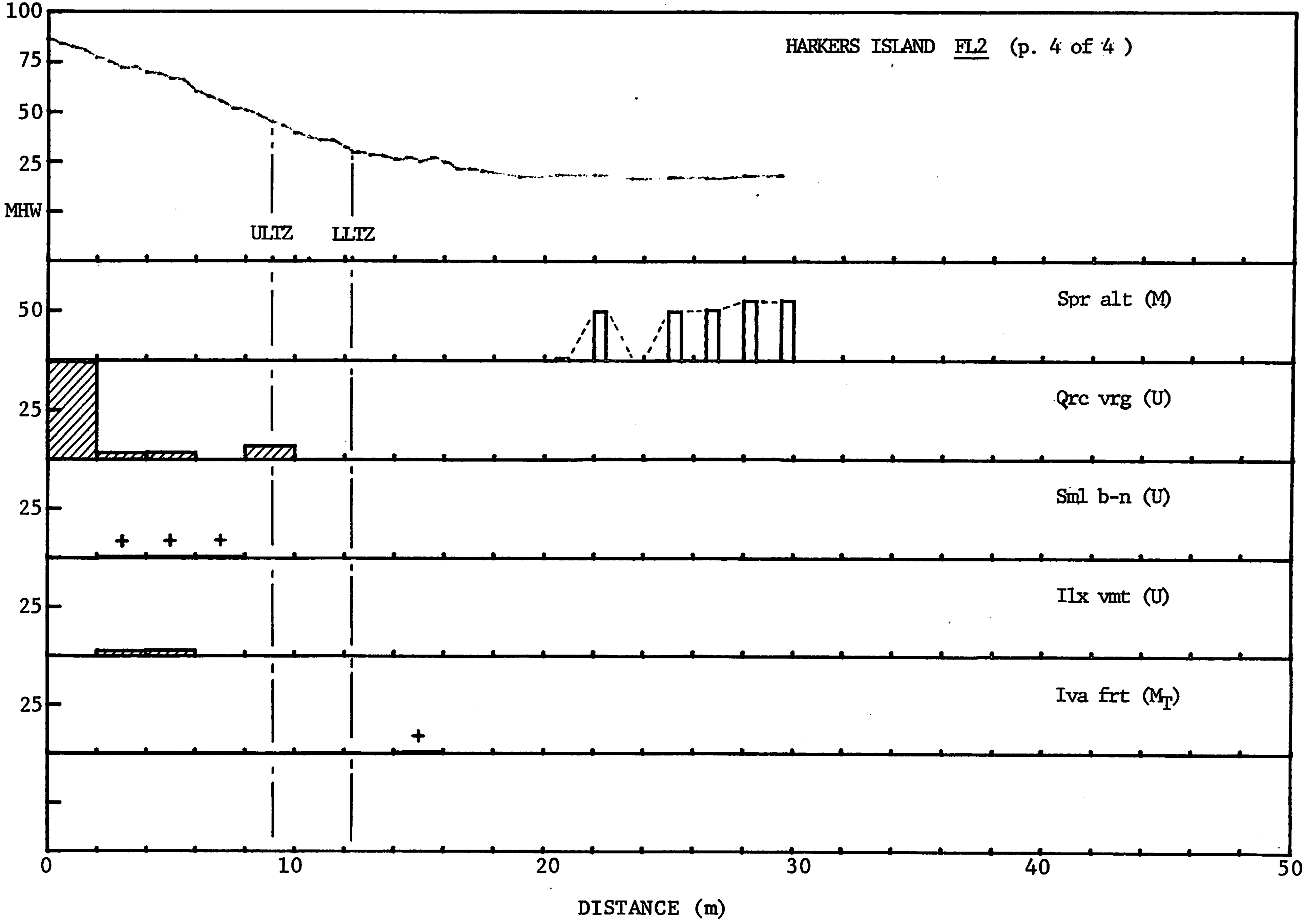
HARKERS ISLAND FL1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Pnc vrg (B_T/U_T)
Fst rbr (U_T)
Jnc rmr (M_T)
Fmb cst (B_T)
Ilx vmt (U)
Myr crf (U_T/L_T)
0
10
20
30
40
50
DISTANCE (m)

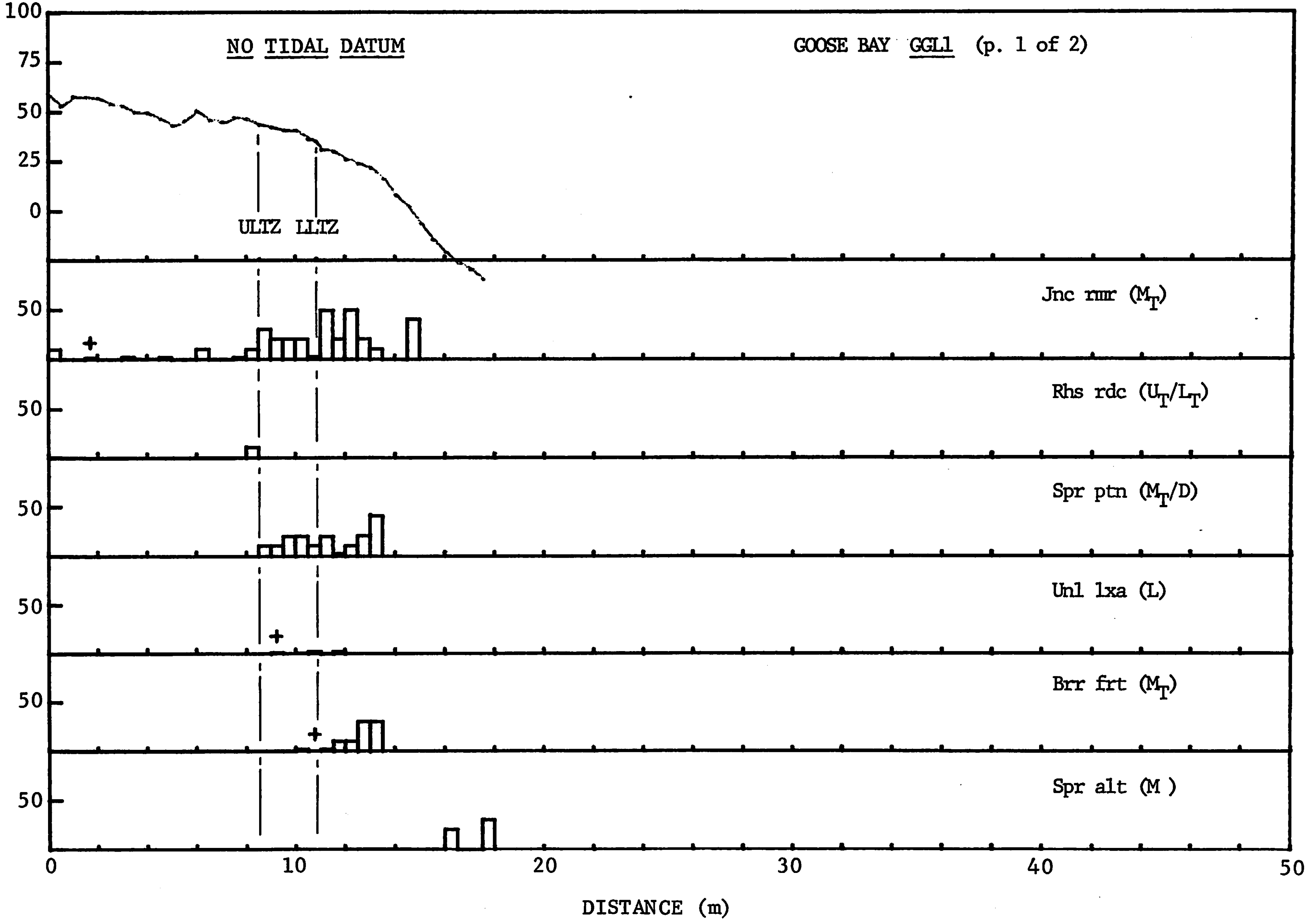

HARKERS ISLAND FL1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (UT/LT)
25
Bcc hlm (T/UT)
25
0
10
20
30
40
50
DISTANCE (m)

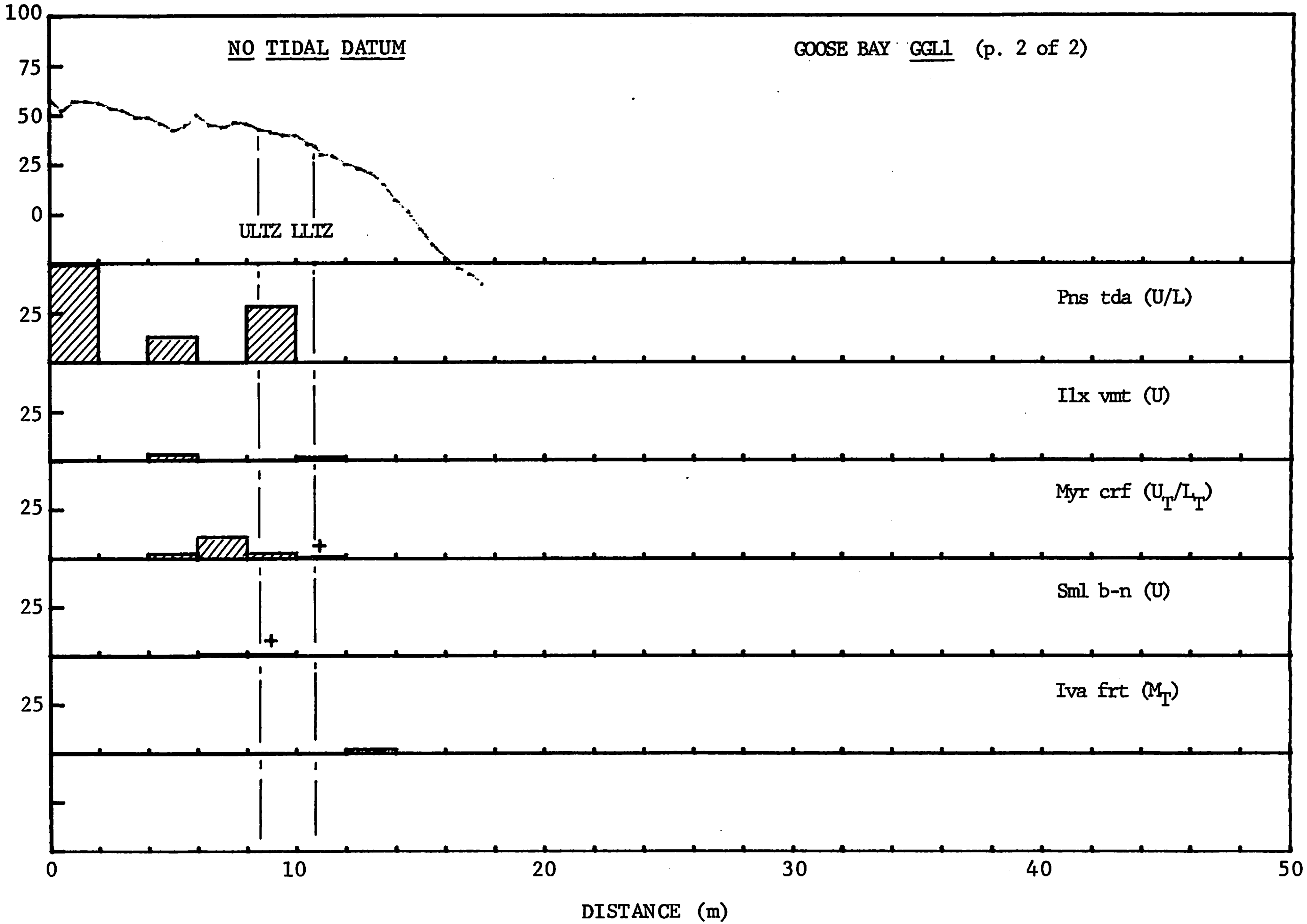

HARKERS ISLAND FL2 (p. 1 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Ept alb (U)
Ars str (U)
Scl trg (U)
Qrc vrg (U) saplings
Hyp hyp (U)
Strophostyles sp. (U_T/D)
0
10
20
30
40
50
DISTANCE (m)


HARKERS ISLAND FL2 (p. 2 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Unl lxa (L)
Spr ptn (M_T/D)
Dch dch (U)
Sml b-n (U)
Rhs rdc (U_T/L_T)
Fst rbr (U_T)
0
10
20
30
40
50
DISTANCE (m)

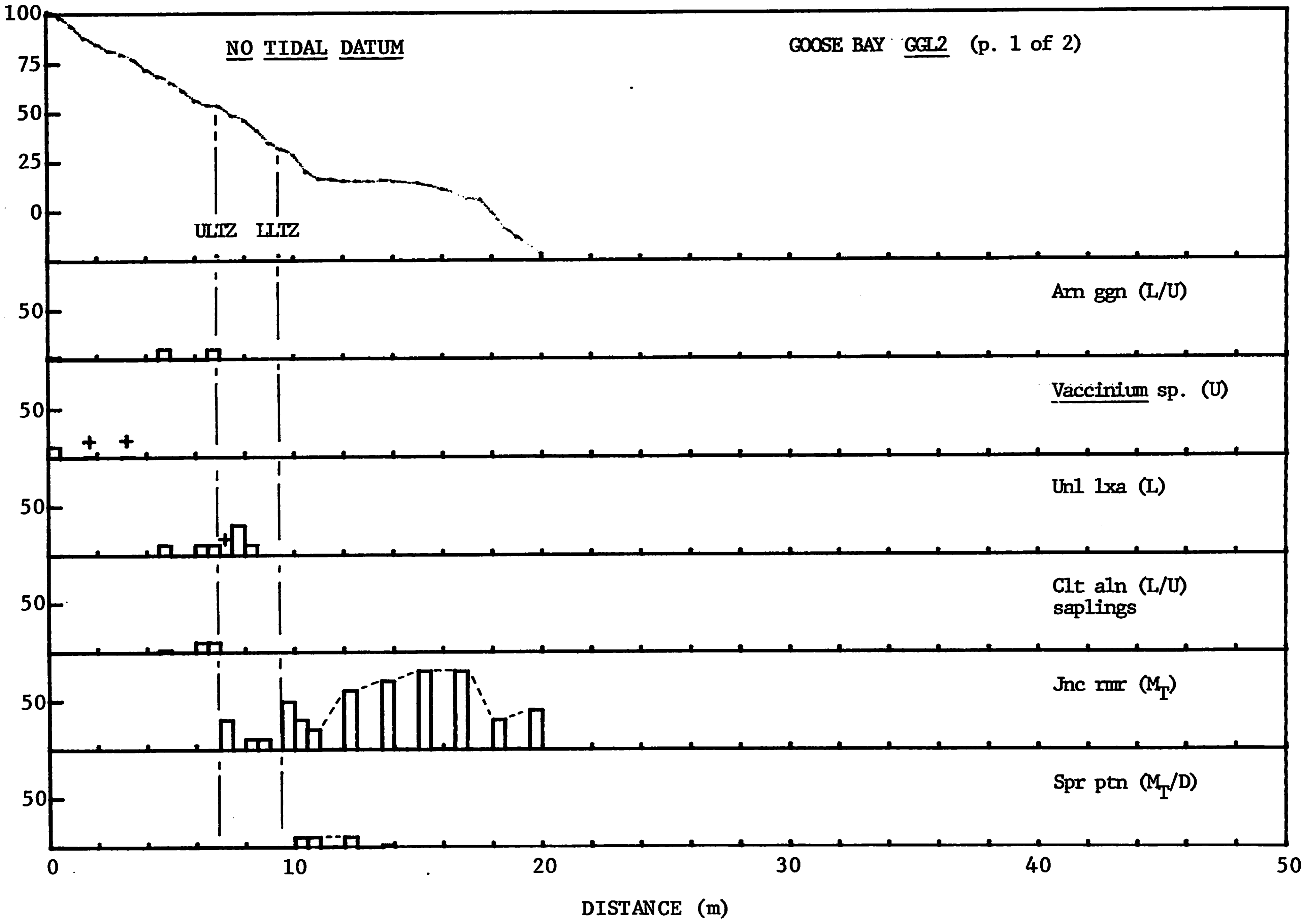

HARKERS ISLAND FL2 (p. 3 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Psp vgn (B)
Cyn pls (M_T/H)
Brr frt (M_T)
Jnc rmr (M_T)
Dst spc (M_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

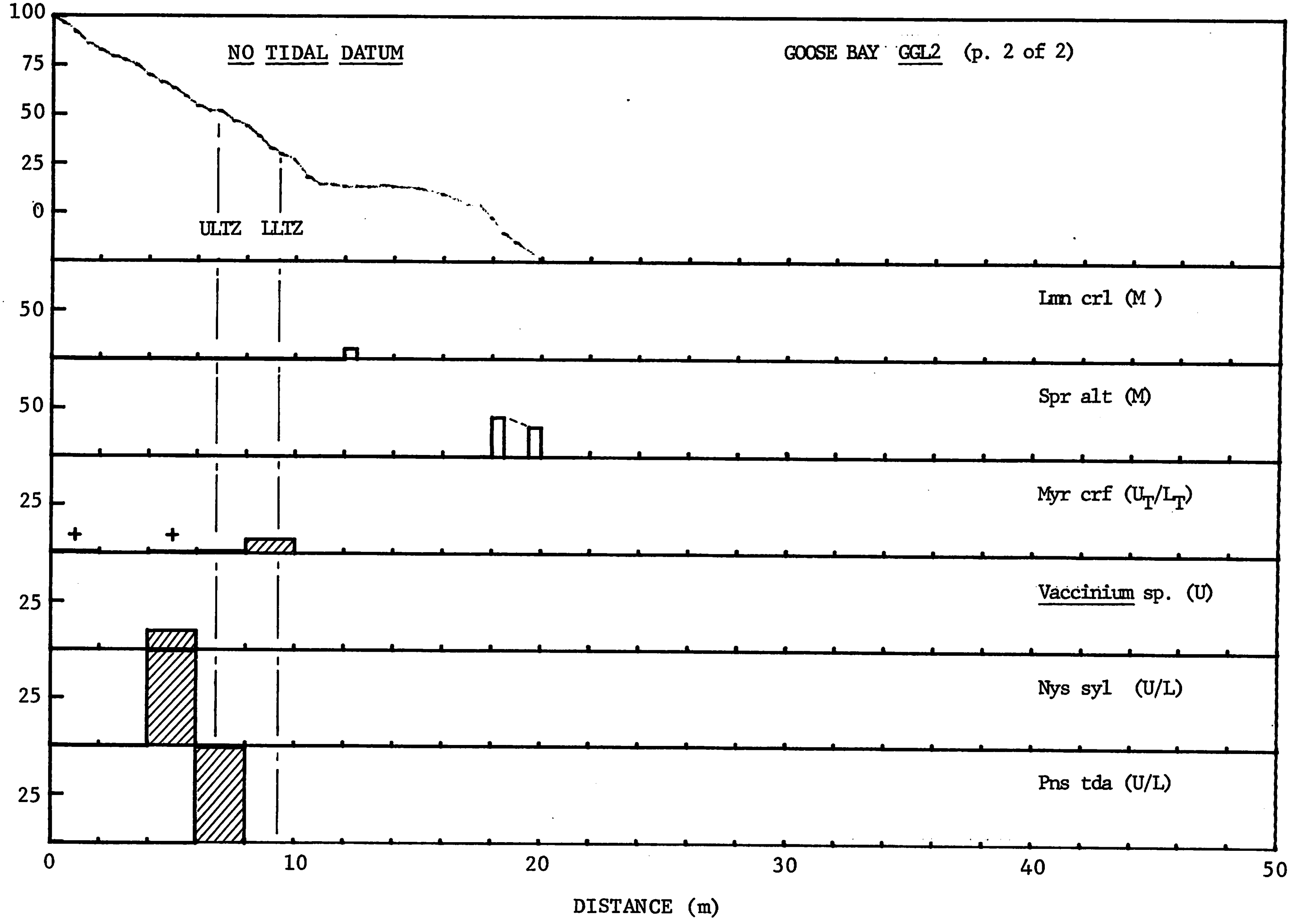

HARKERS ISLAND FL2 (p. 4 of 4)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
50
Qrc vrg (U)
25
Sml b-n (U)
25
Ilx vmt (U)
25
Iva frt (MT)
25
0
10
20
30
40
50
DISTANCE (m)


NO TIDAL DATUM
GOOSE BAY GGL1 (p. 1 of 2)
100
75
50
25
0
ULTZ LLTZ
Jnc rmr (M_T)
Rhs rdc (U_T/L_T)
Spr ptn (M_T/D)
Unl lxa (L)
Brr frt (M_T)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)



NO TIDAL DATUM
GOOSE BAY GGL1 (p. 2 of 2)
100
75
50
25
0
ULTZ LLTZ
Pns tda (U/L)
Ilx vmt (U)
Myr crf (UT/LT)
Sml b-n (U)
Iva frt (MT)
0
10
20
30
40
50
DISTANCE (m)

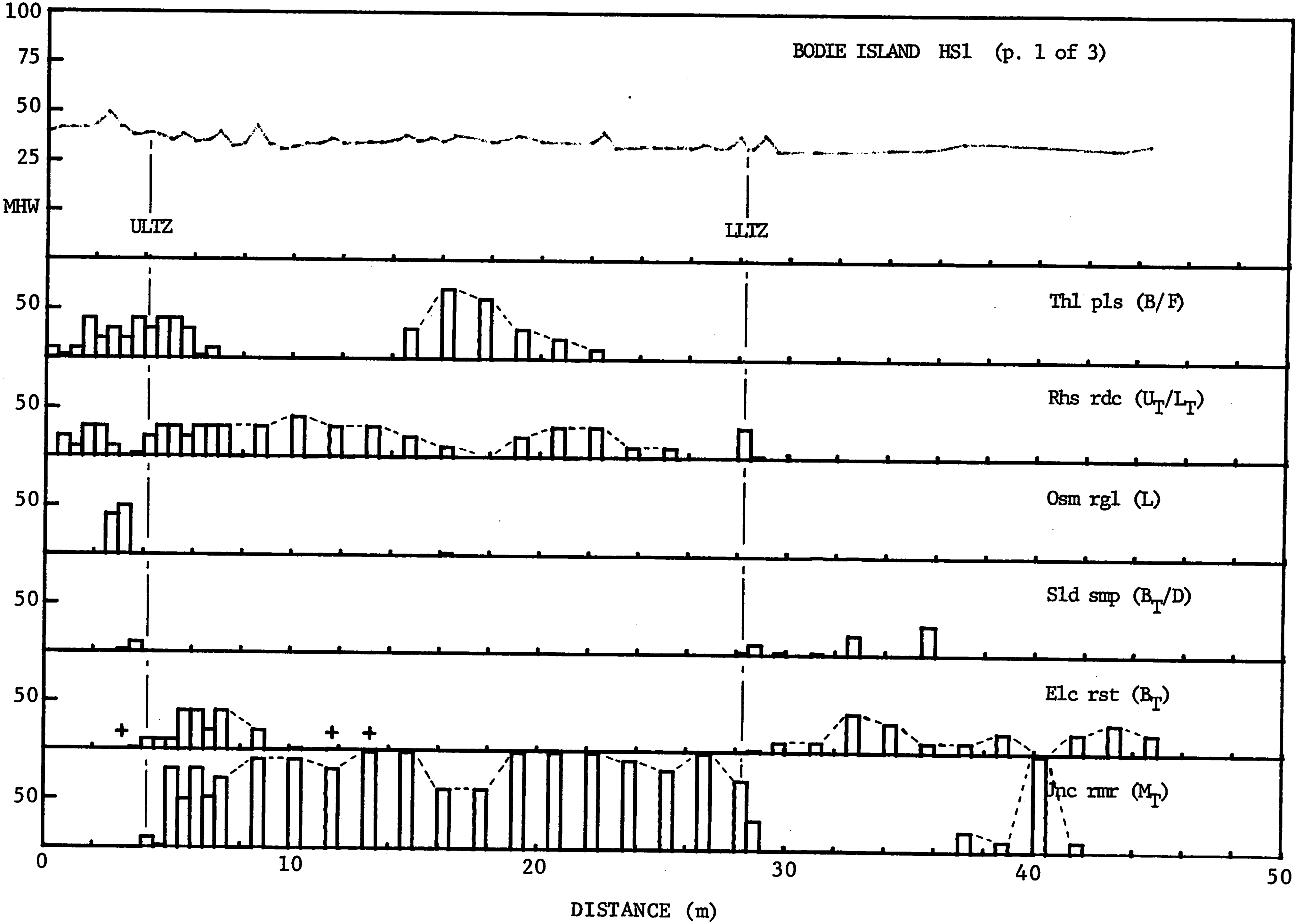

NO TIDAL DATUM
GOOSE BAY GGL2 (p. 1 of 2)
100
75
50
25
0
ULTZ
LLTZ
Arn ggn (L/U)
Vaccinium sp. (U)
Unl lxa (L)
Clt aln (L/U)
saplings
Jnc rmr (M_T)
Spr ptn (M_T/D)
0
10
20
30
40
50
DISTANCE (m)

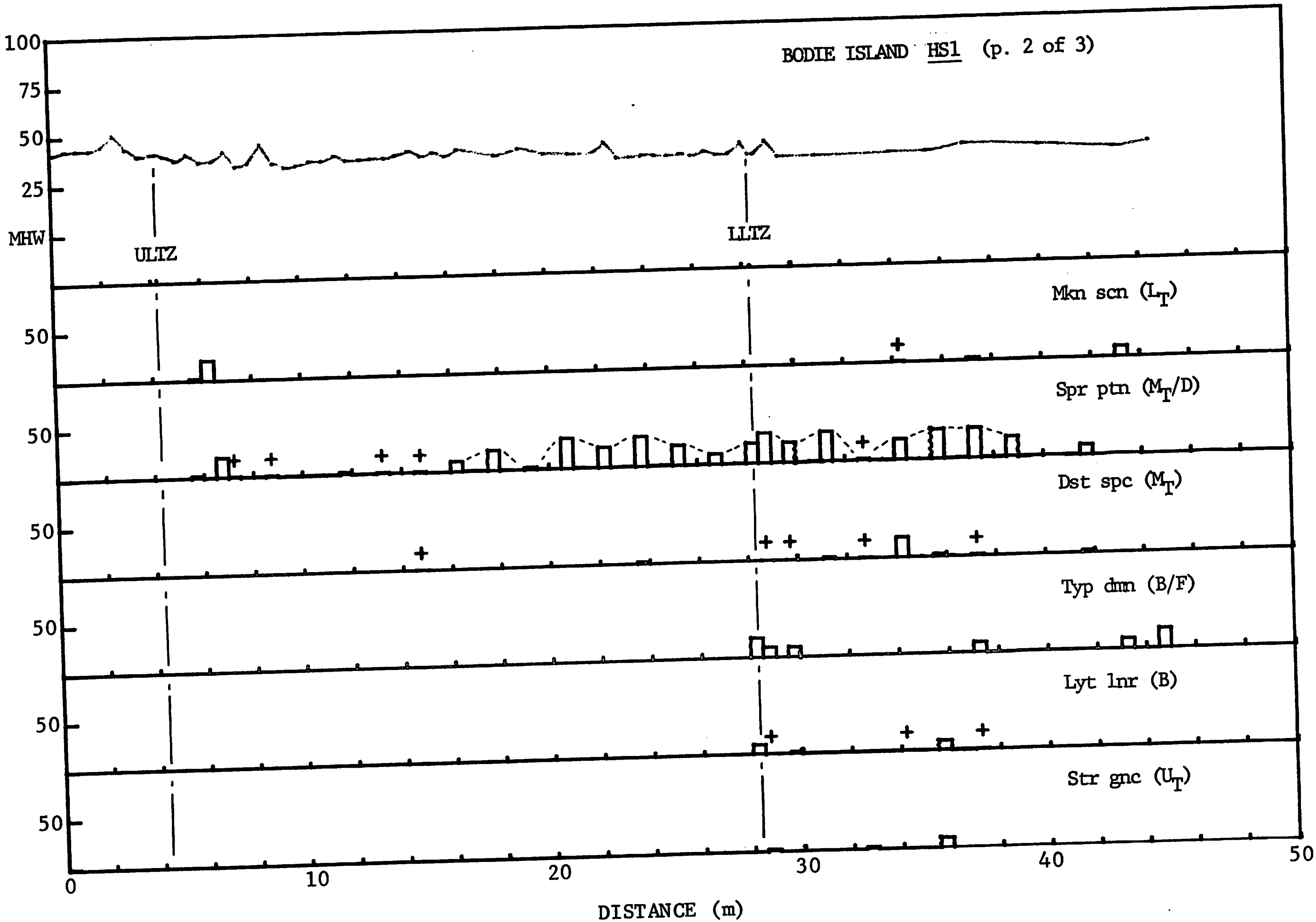


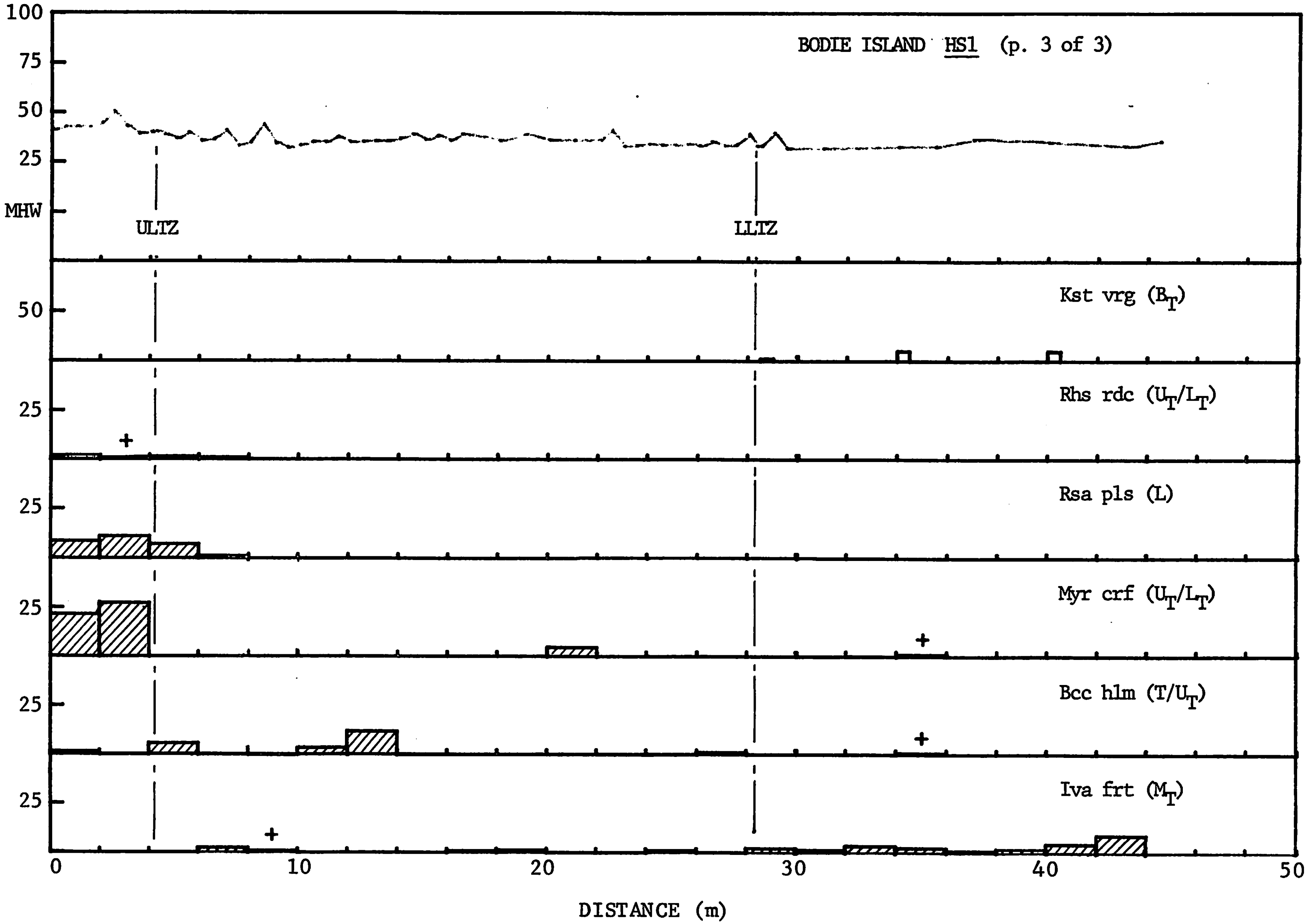
NO TIDAL DATUM
GOOSE BAY GGL2 (p. 2 of 2)
100
75
50
25
0
ULTZ
LLTZ
Lmn crl (M)
Spr alt (M)
Myr crf (U_T/L_T)
Vaccinium sp. (U)
Nys syl (U/L)
Pns tda (U/L)
0
10
20
30
40
50
DISTANCE (m)

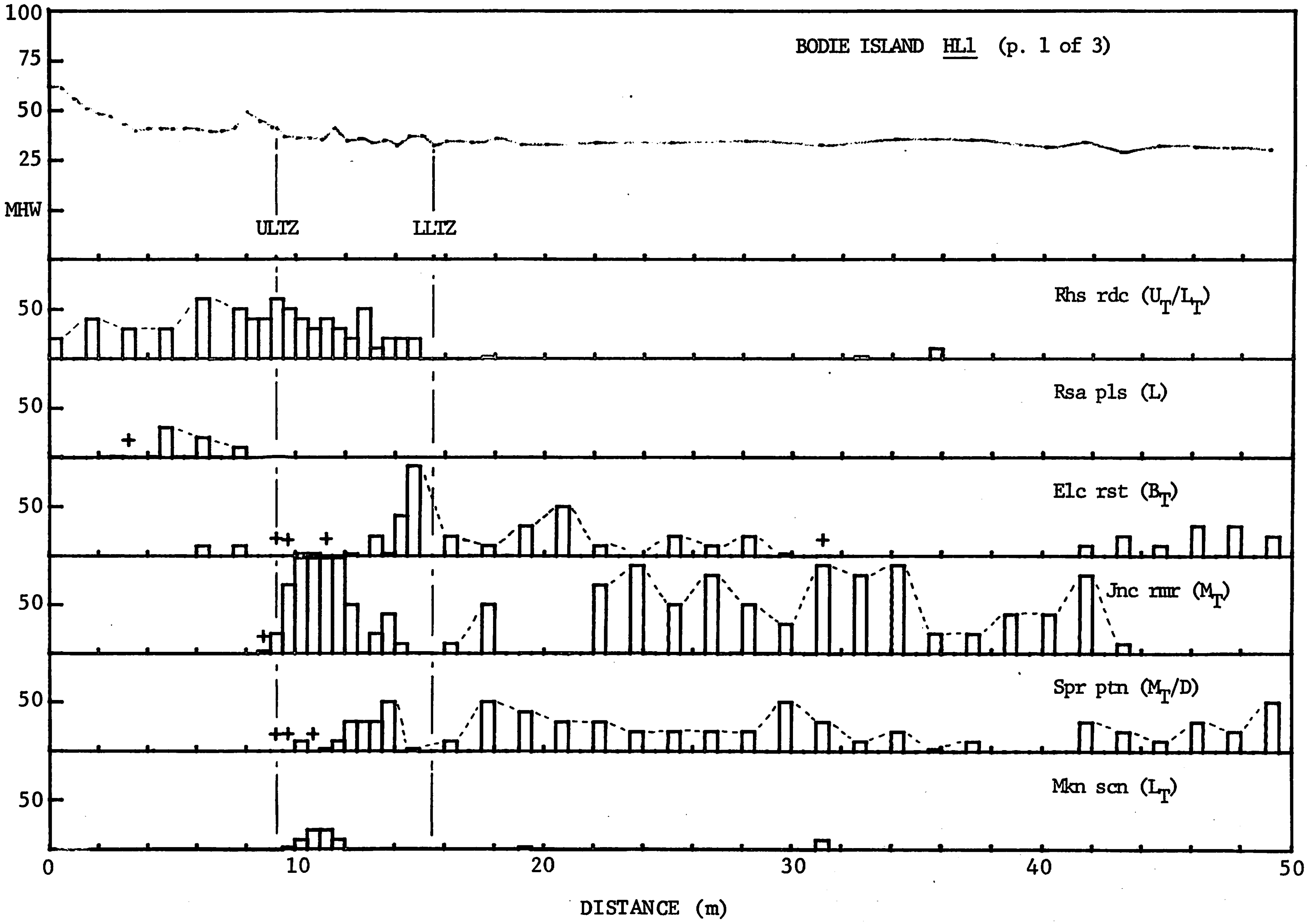
PROFILE DATA - BODIE ISLAND SUBREGION(NORTH CAROLINA)

BODIE ISLAND(PRIMARY)
SKYCO

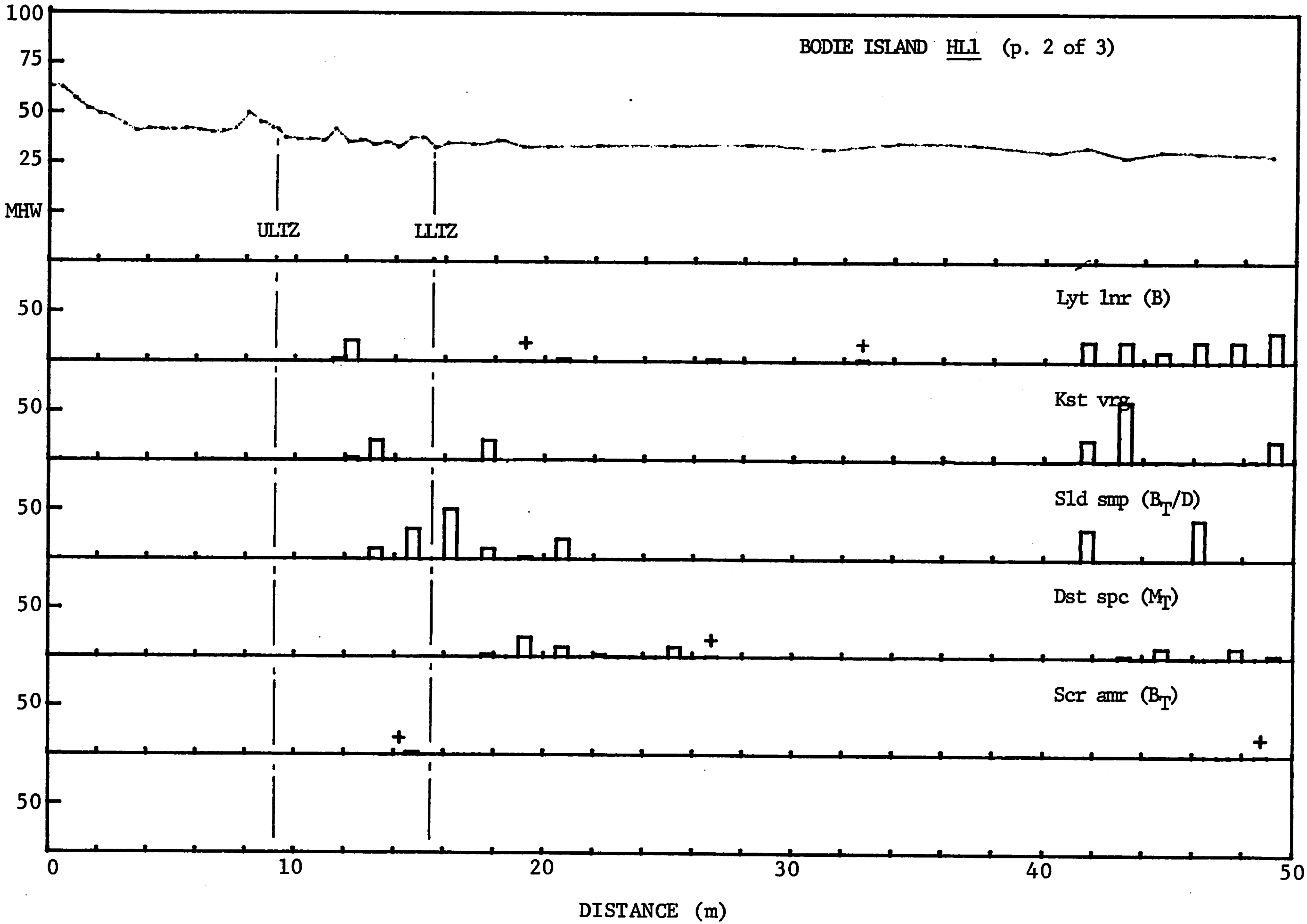

BODIE ISLAND HS1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Thl pls (B/F)
Rhs rdc (U_T/L_T)
Osm rgl (L)
Sld smp (B_T/D)
Elc rst (B_T)
Jnc rmr (M_T)
0
10
20
30
40
50
DISTANCE (m)


BODIE ISLAND HS1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Mkn scn (L_T)
50
Spr ptn (M_T/D)
50
Dst spc (M_T)
50
Typ dmn (B/F)
50
Lyt lnr (B)
50
Str gnc (U_T)
50
0
10
20
30
40
50
DISTANCE (m)

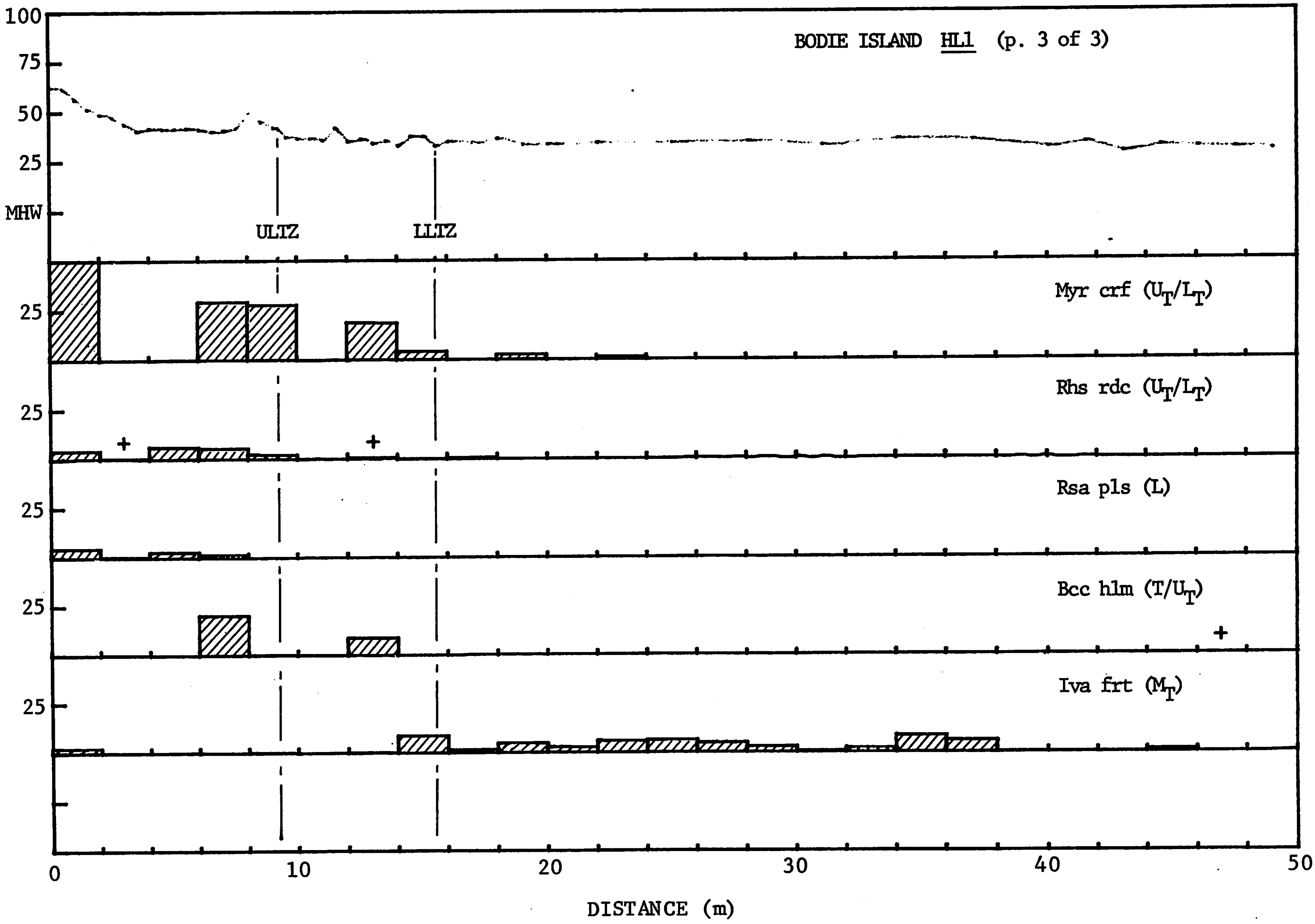

BODIE ISLAND HS1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Kst vrg (B_T)
50
Rhs rdc (U_T/L_T)
25
Rsa pls (L)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)



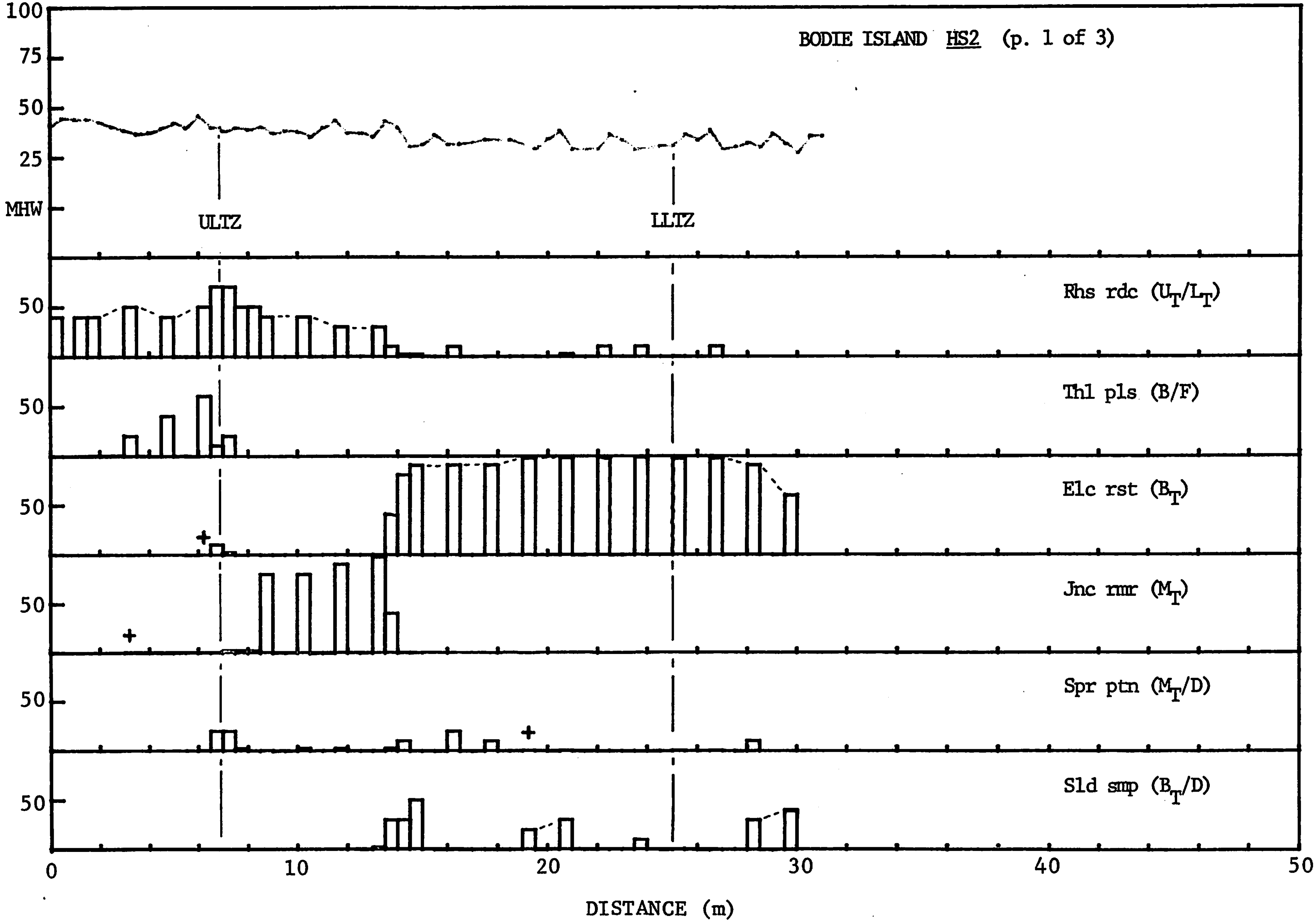
BODIE ISLAND HL1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Rsa pls (L)
Elc rst (B_T)
Jnc rmr (M_T)
Spr ptn (M_T/D)
Mkn scn (L_T)
0
10
20
30
40
50
DISTANCE (m)



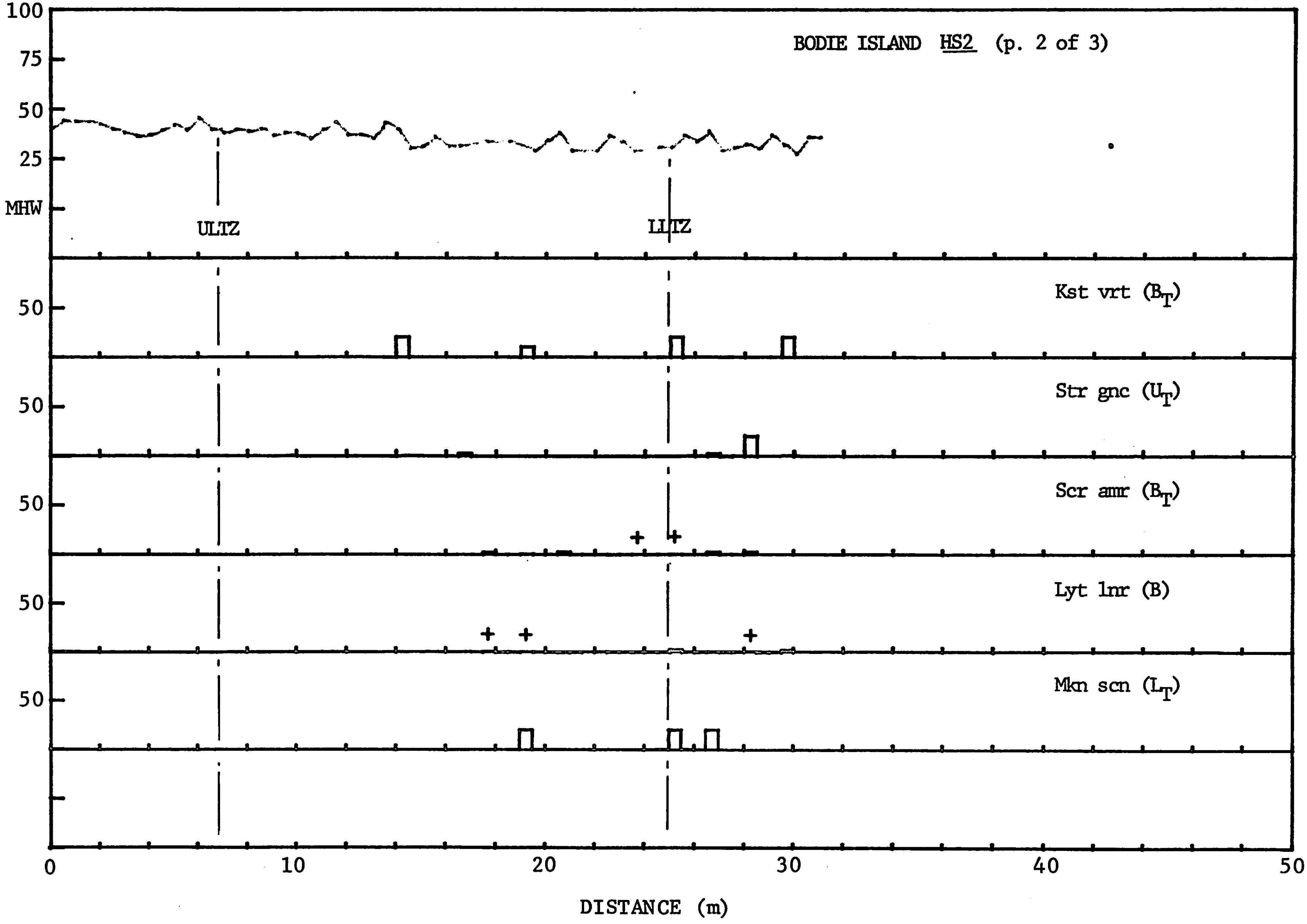
BODIE ISLAND HL1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lyt lnr (B)
Kst vrg
Sld smp (B_T/D)
Dst spc (M_T)
Scr amr (B_T)
50
0
10
20
30
40
50
DISTANCE (m)



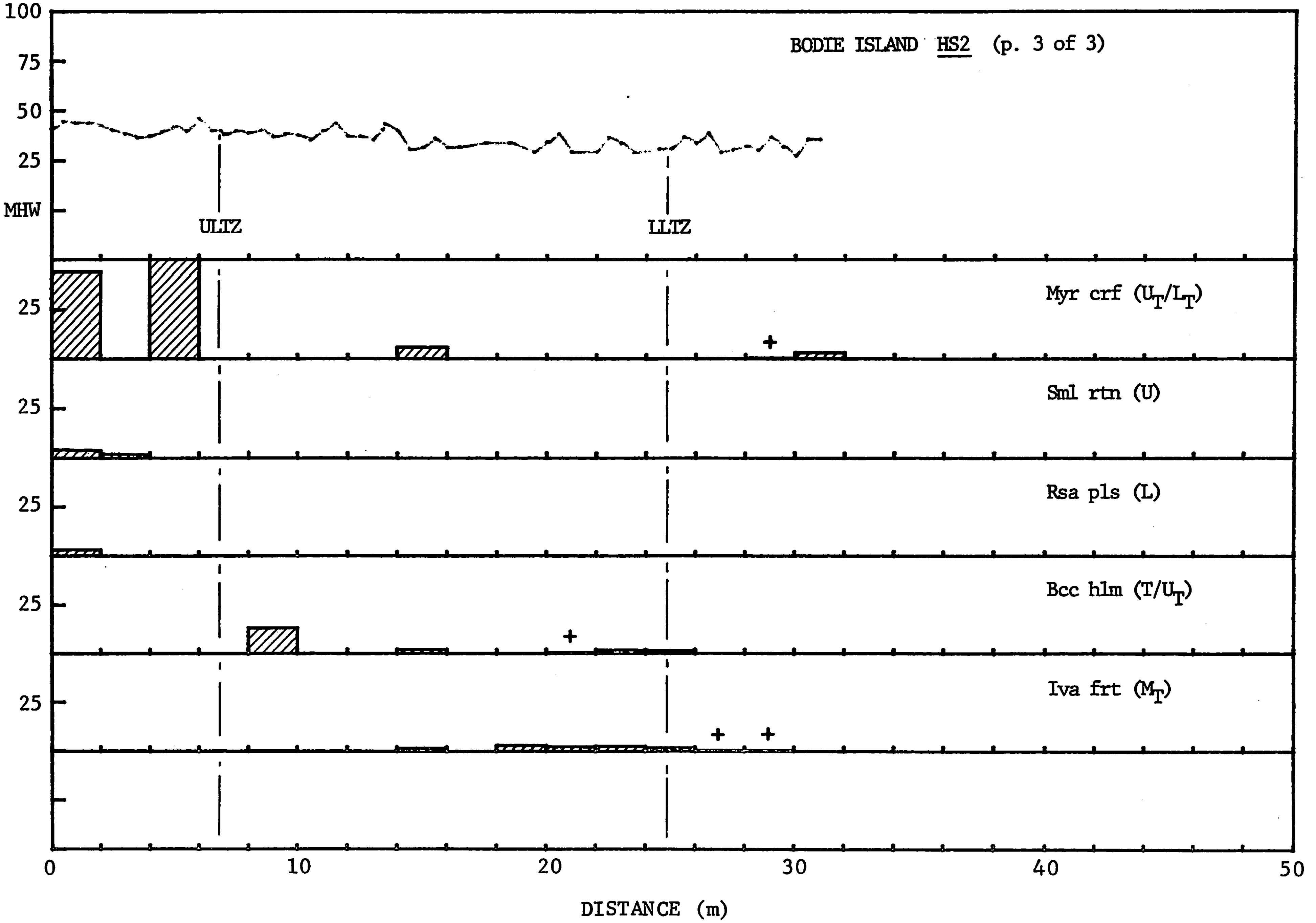
BODIE ISLAND HL1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (U_T/L_T)
Rhs rdc (U_T/L_T)
Rsa pls (L)
Bcc hlm (T/U_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



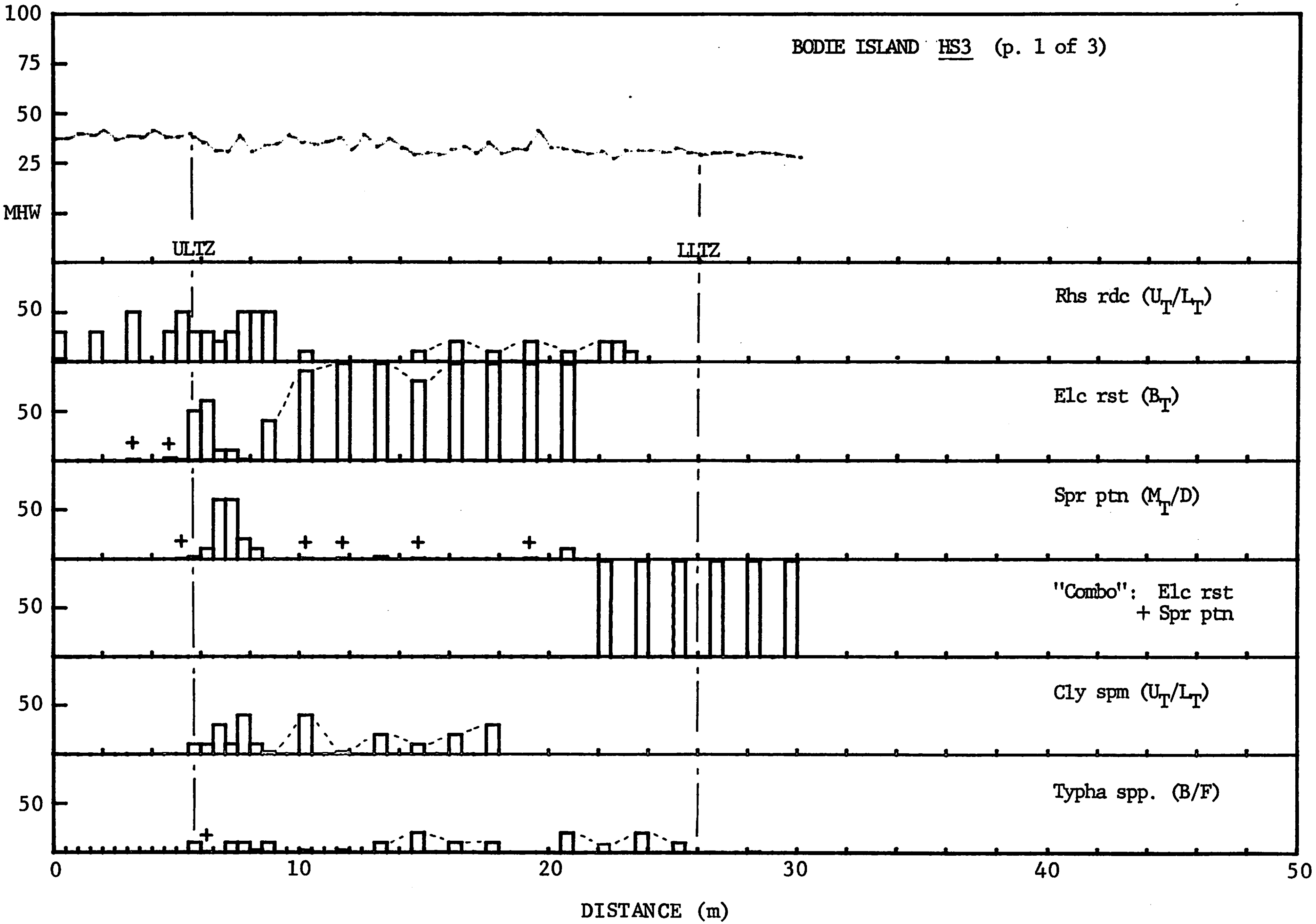
BODIE ISLAND HS2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Thl pls (B/F)
Elc rst (B_T)
Jnc rmr (M_T)
Spr ptn (M_T/D)
Sld smp (B_T/D)
0
10
20
30
40
50
DISTANCE (m)



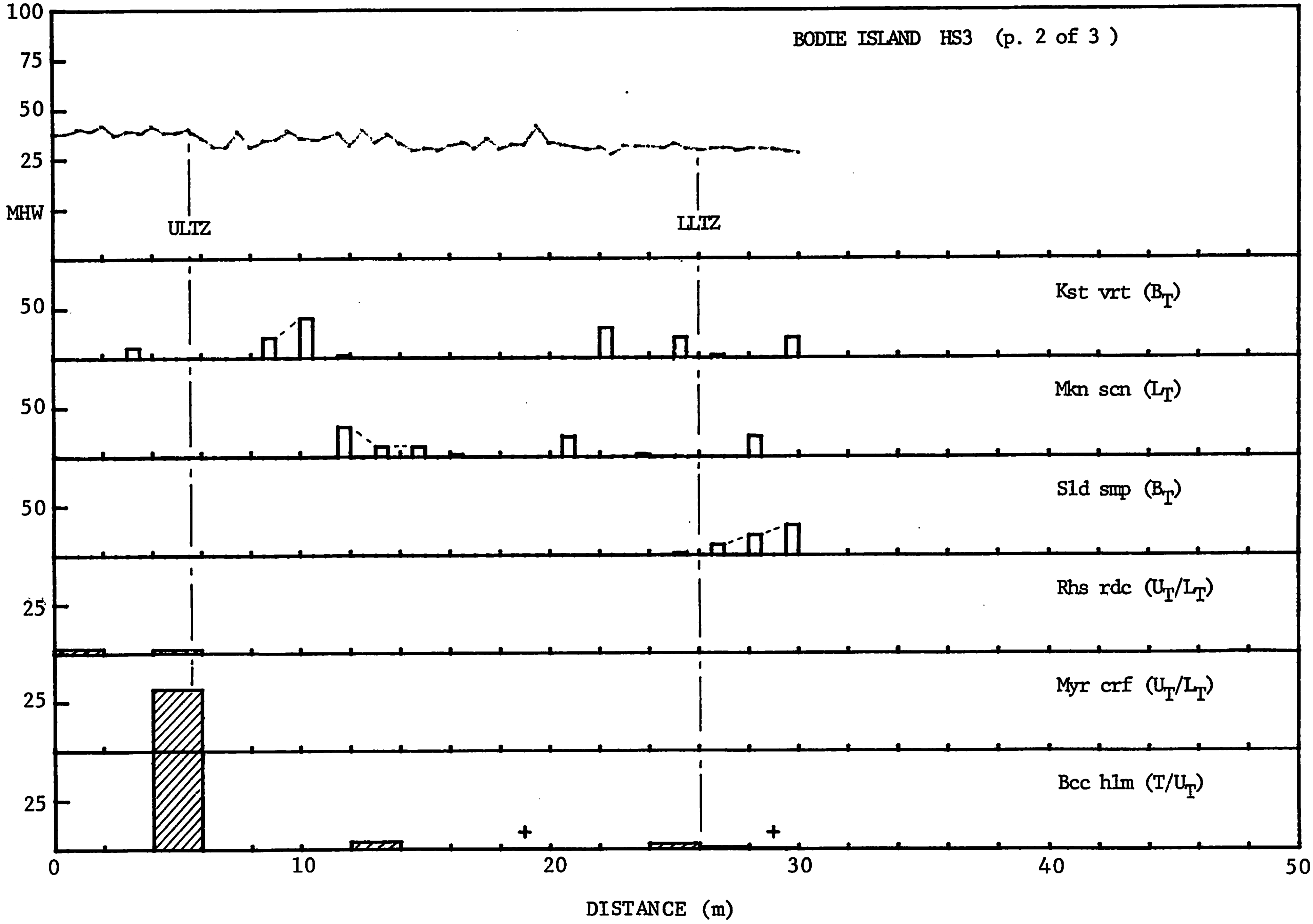
BODIE ISLAND HS2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Kst vrt (B_T)
Str gnc (U_T)
Scr amr (B_T)
Lyt lnr (B)
Mkn scn (L_T)
50
0
10
20
30
40
50
DISTANCE (m)



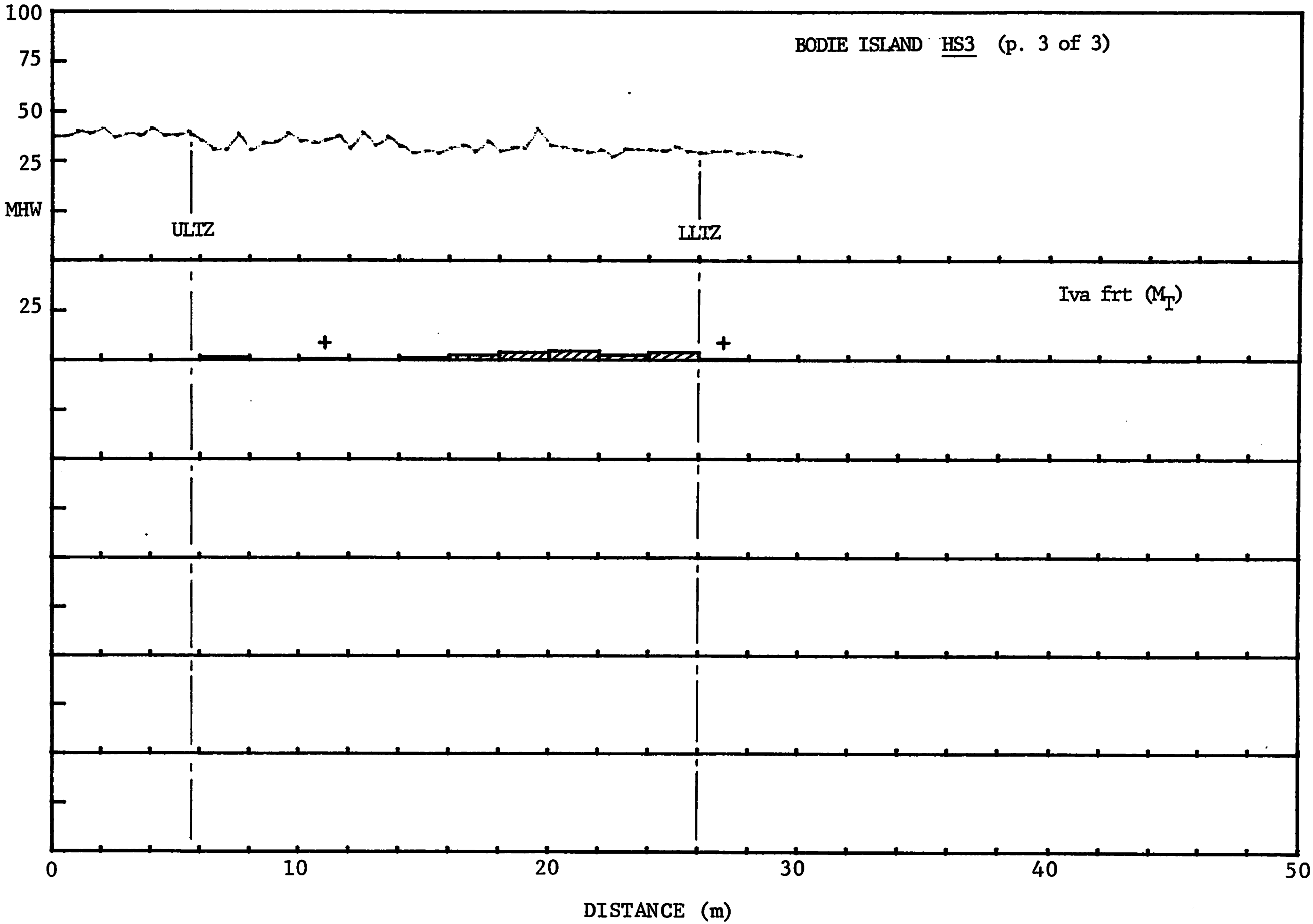
BODIE ISLAND HS2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Myr crf (UT/LT)
25
Sml rtn (U)
25
Rsa pls (L)
25
Bcc hlm (T/UT)
25
Iva frt (MT)
25
0
10
20
30
40
50
DISTANCE (m)

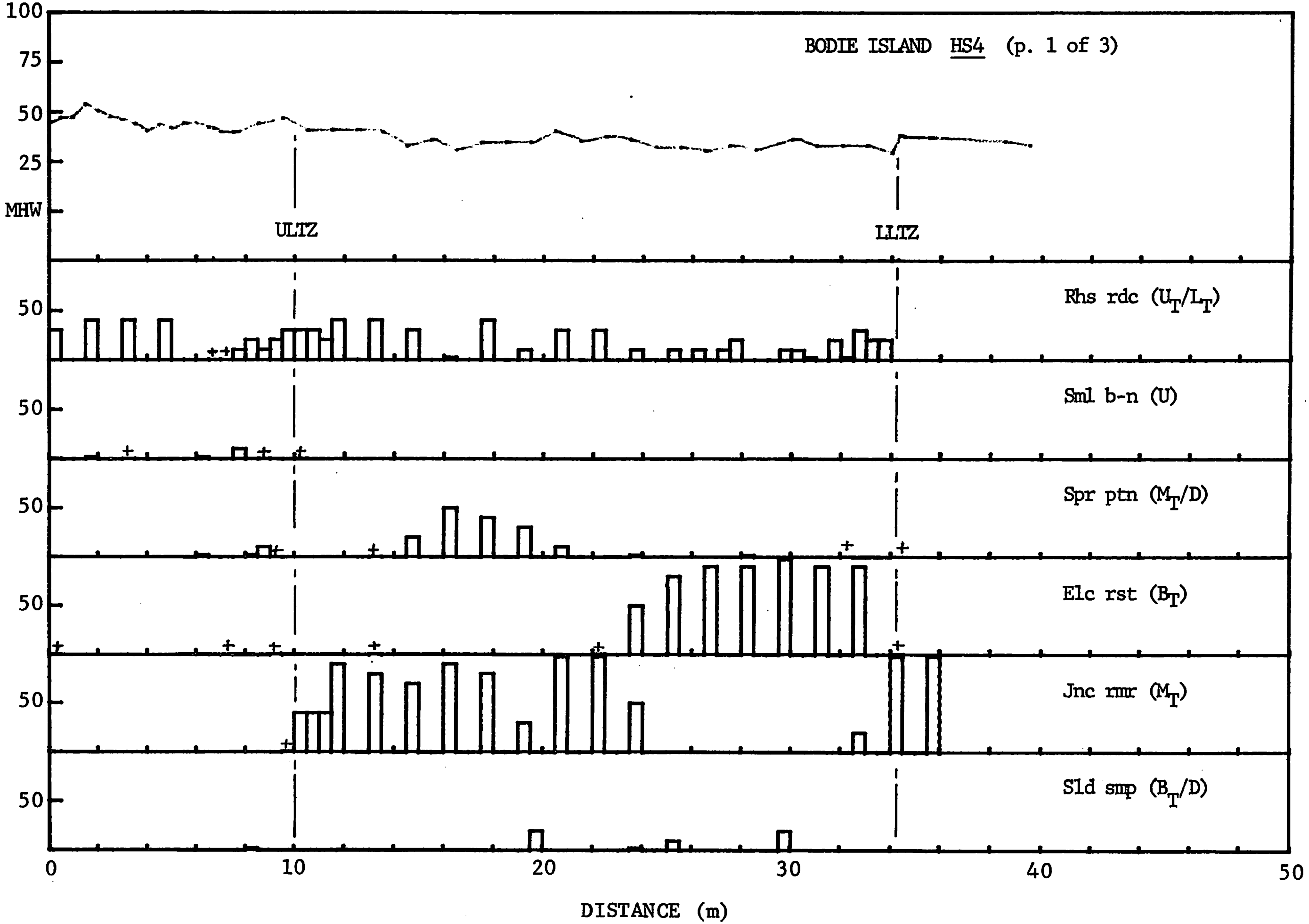


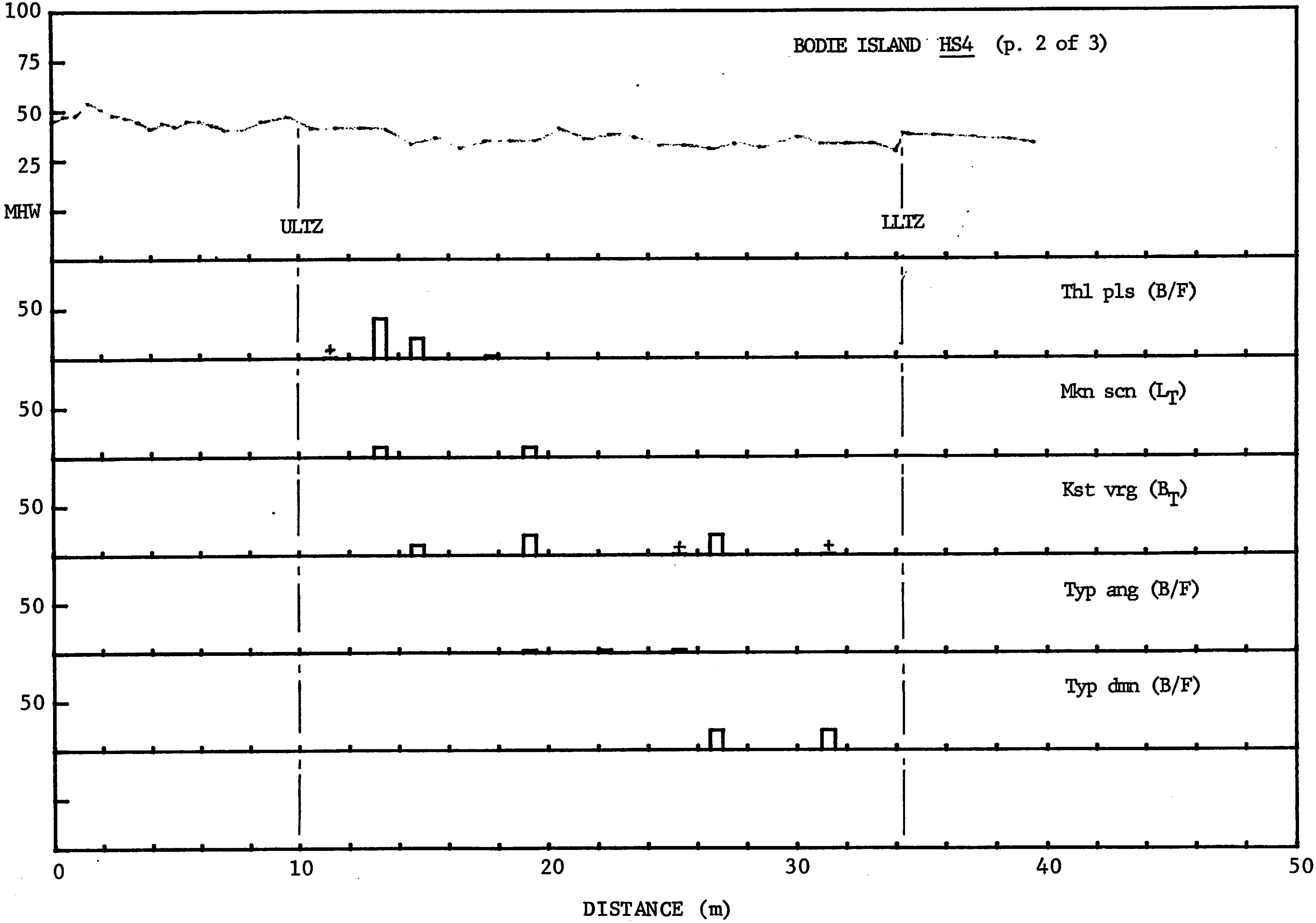
BODIE ISLAND HS3 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Elc rst (B_T)
Spr ptn (M_T/D)
"Combo": Elc rst + Spr ptn
Cly spm (U_T/L_T)
Typha spp. (B/F)
0
10
20
30
40
50
DISTANCE (m)

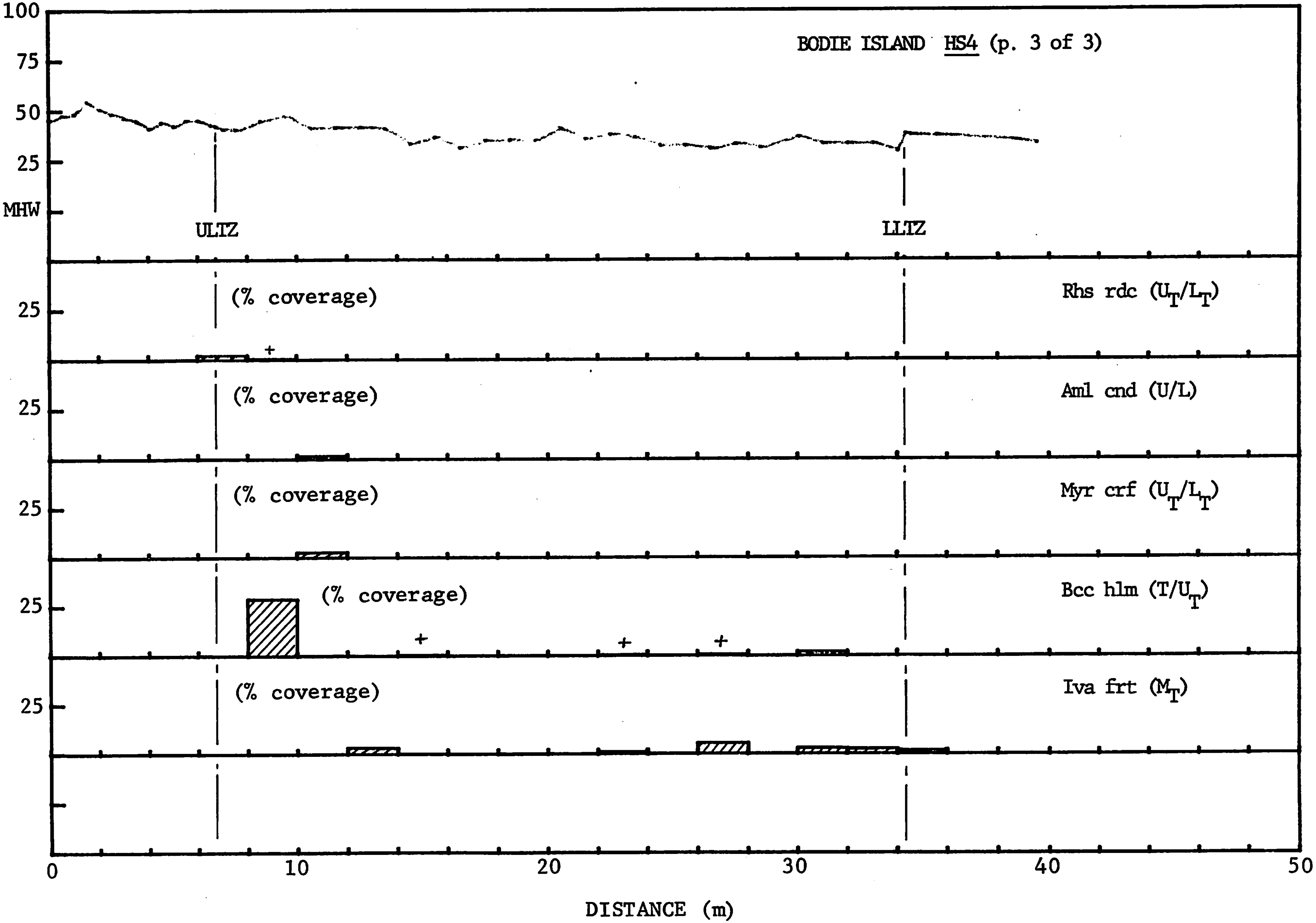


BODIE ISLAND HS3 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Kst vrt (BT)
50
Mkn scn (LT)
50
Sld smp (BT)
50
Rhs rdc (UT/LT)
25
Myr crf (UT/LT)
25
Bcc hlm (T/UT)
25
0
10
20
30
40
50
DISTANCE (m)

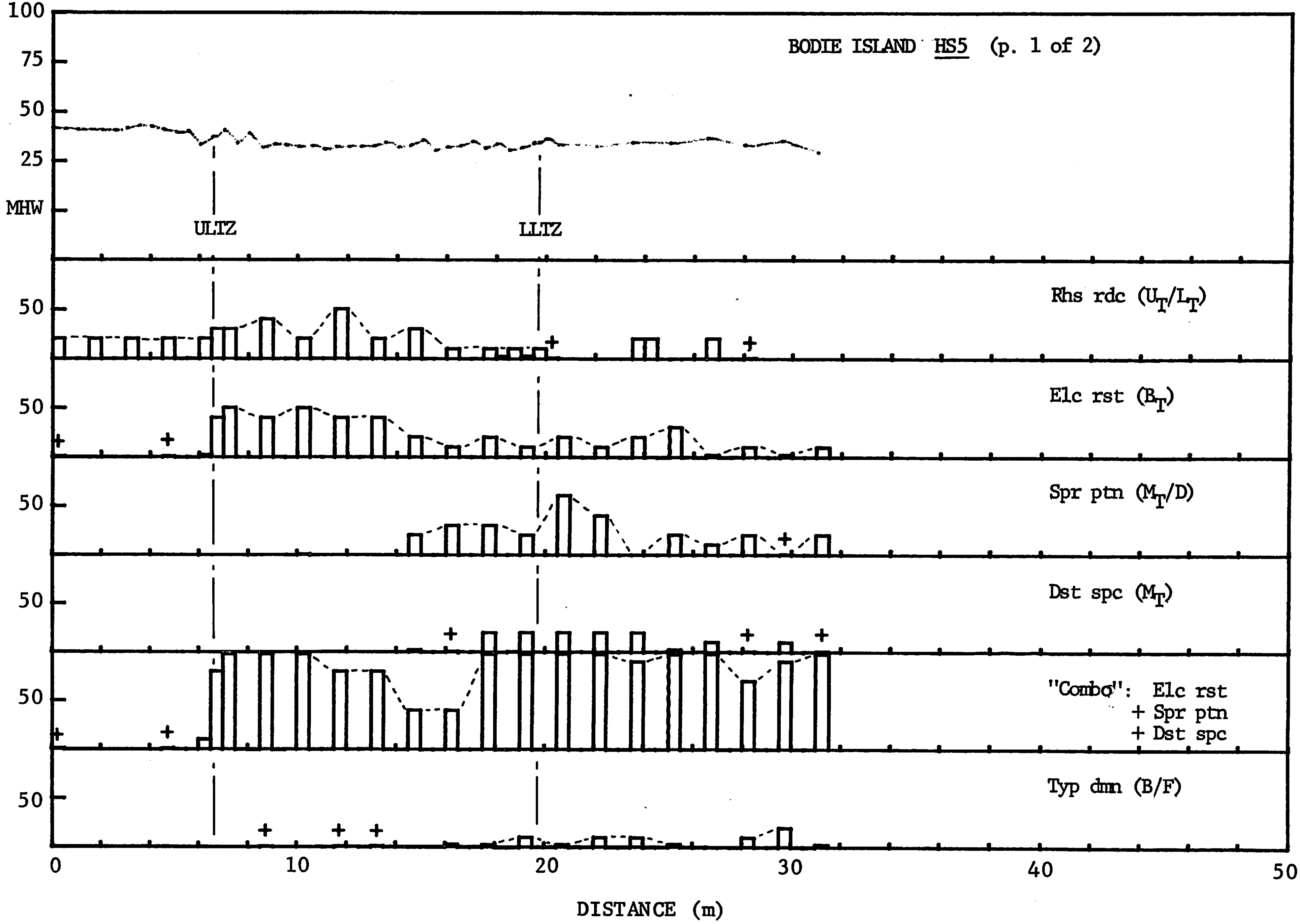

BODIE ISLAND HS3 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)


BODIE ISLAND HS4 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Sml b-n (U)
Spr ptn (M_T/D)
Elc rst (B_T)
Jnc rmr (M_T)
Sld smp (B_T/D)
0
10
20
30
40
50
DISTANCE (m)

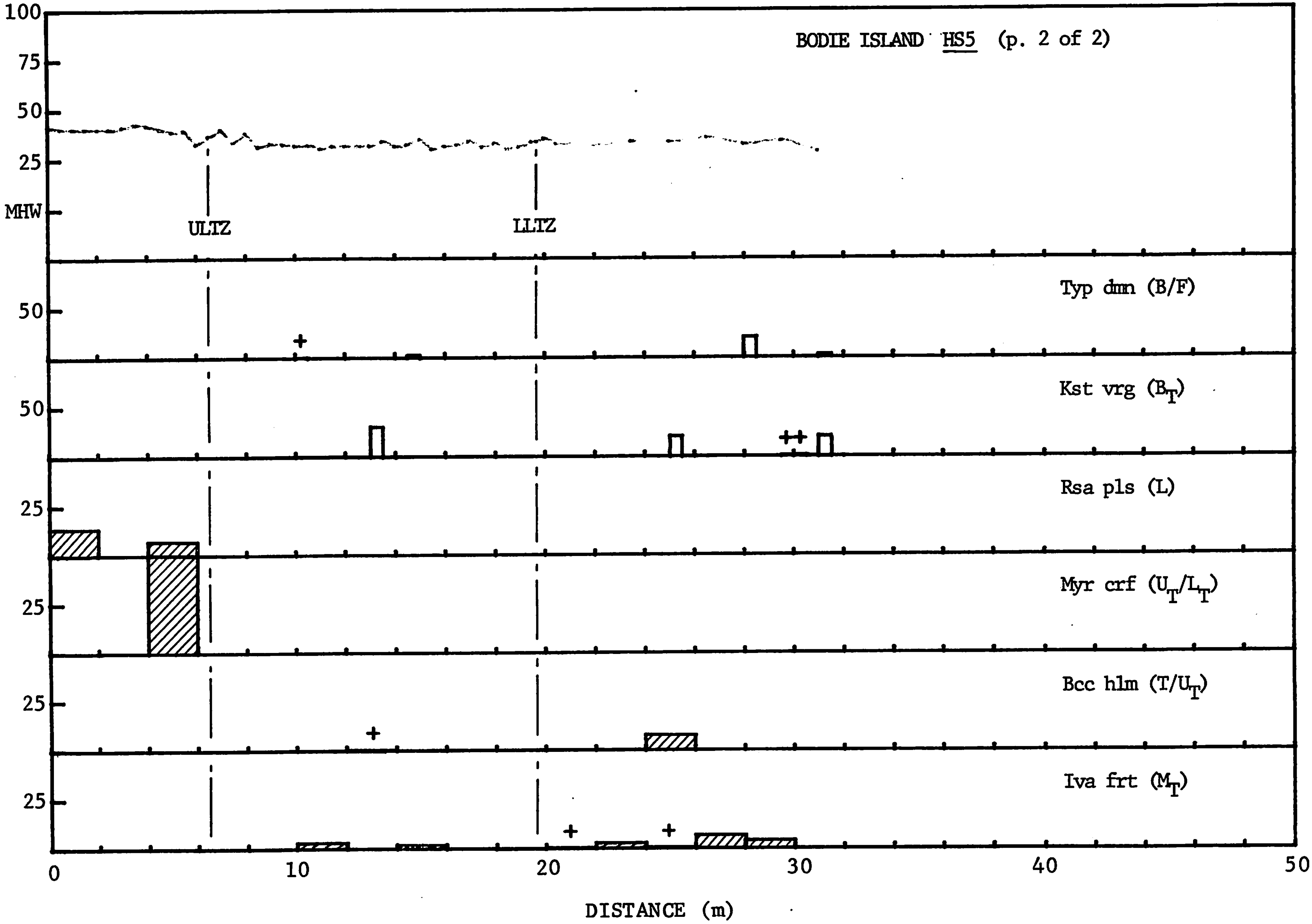

BODIE ISLAND HS4 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Thl pls (B/F)
Mkn scn (L_T)
Kst vrg (B_T)
Typ ang (B/F)
Typ dmn (B/F)
0
10
20
30
40
50
DISTANCE (m)



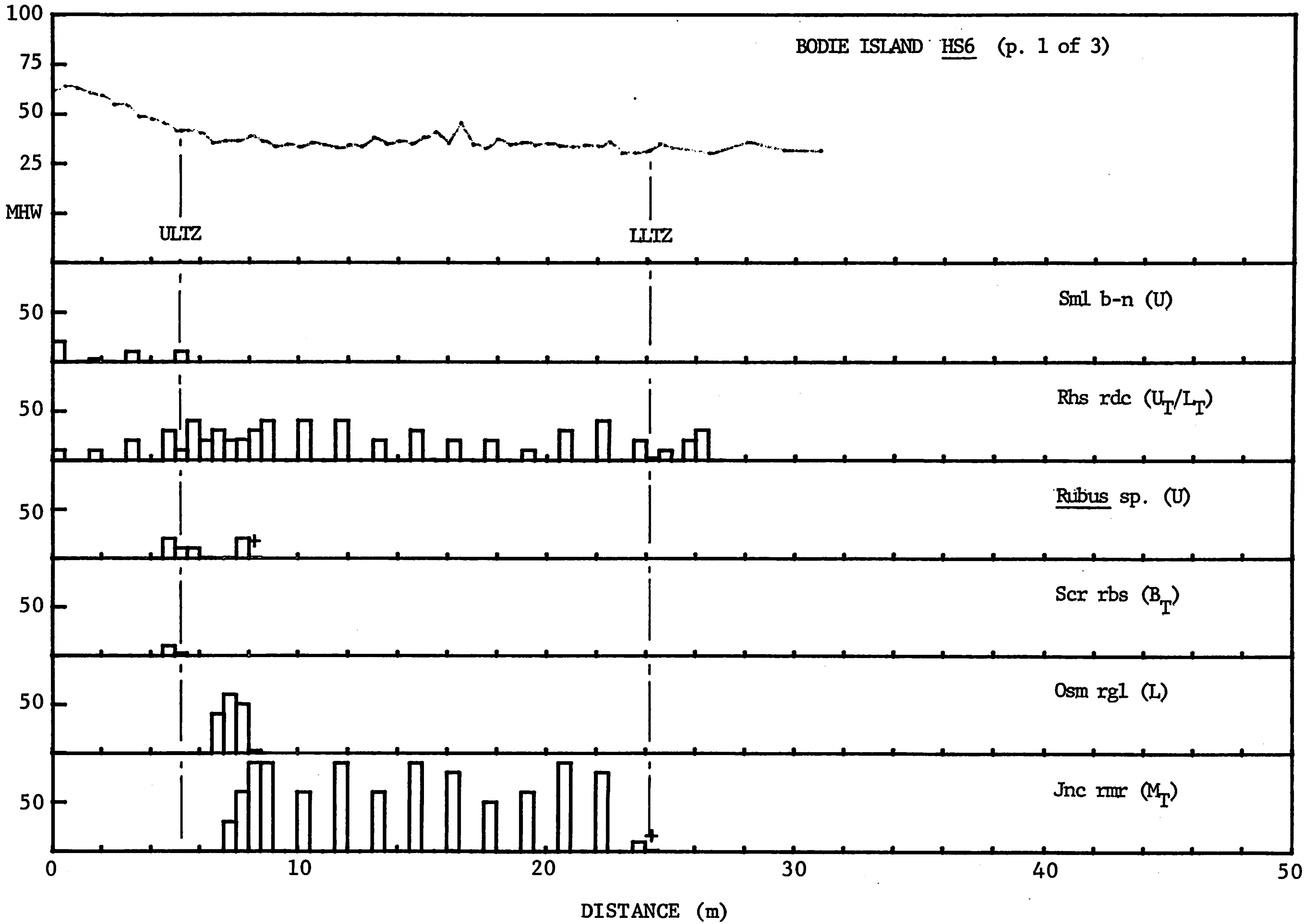
BODIE ISLAND HS4 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
(% coverage)
Rhs rdc (U_T/L_T)
Aml cnd (U/L)
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

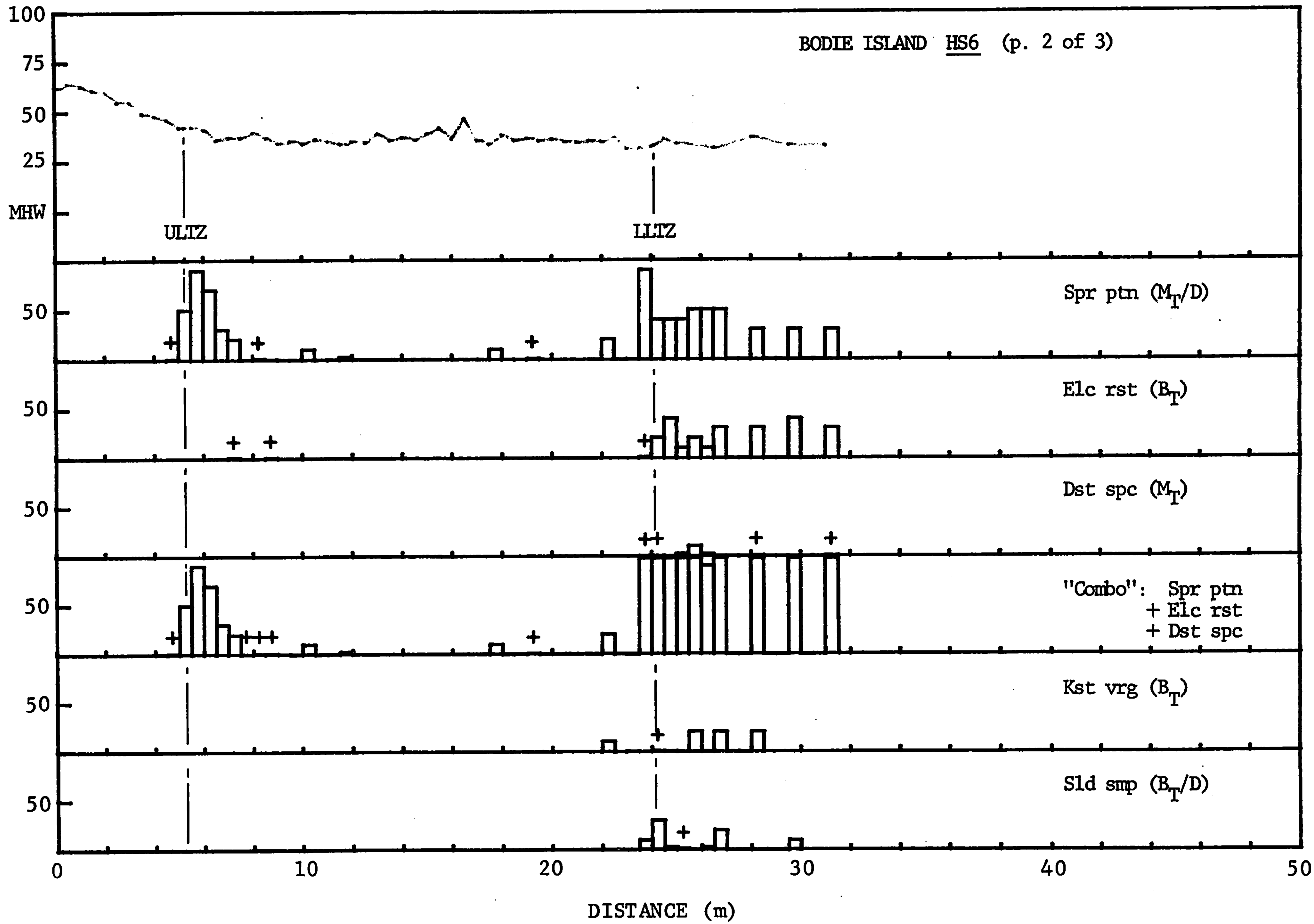


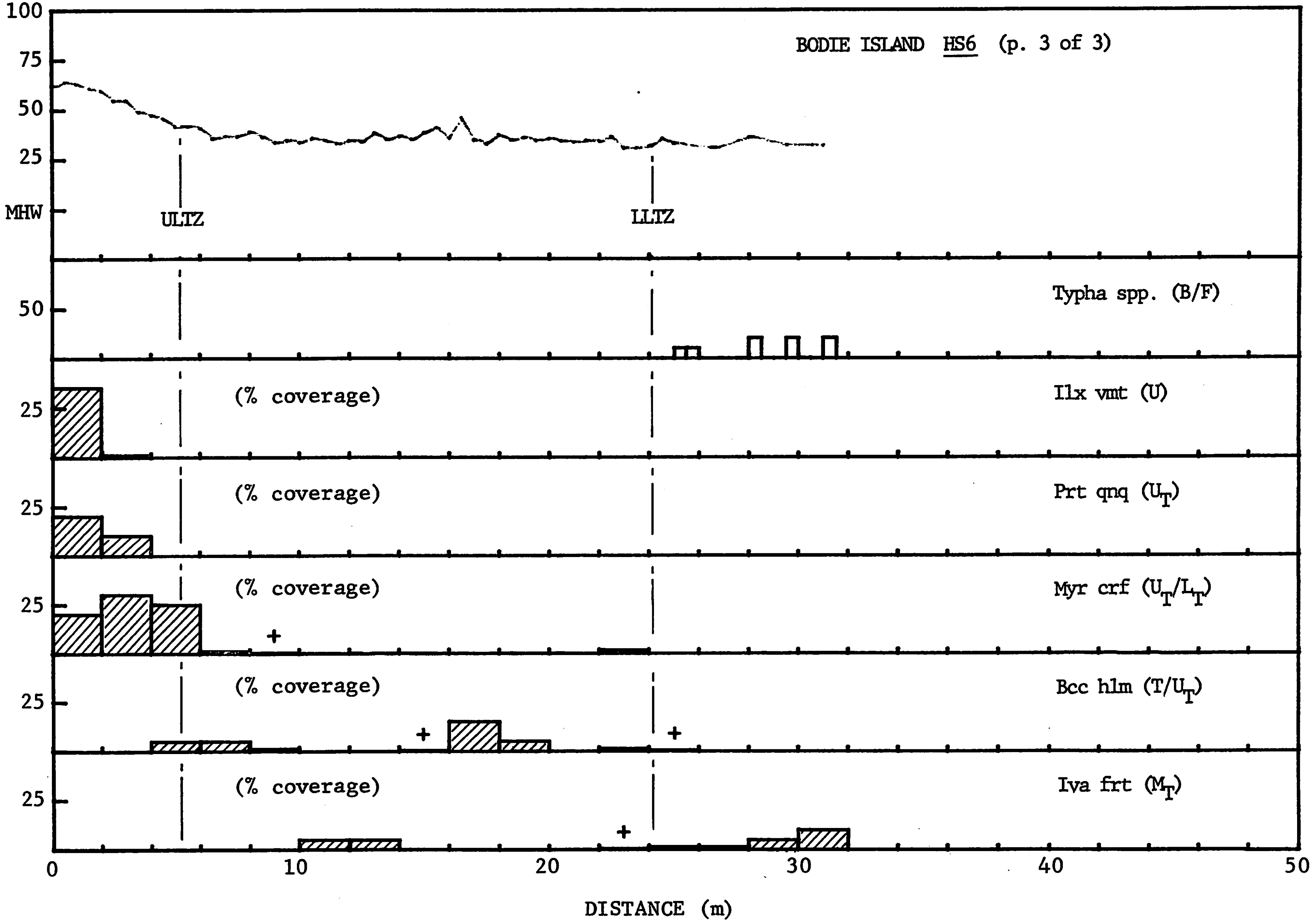
BODIE ISLAND HS5 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Elc rst (B_T)
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Elc rst
+ Spr ptn
+ Dst spc
Typ dmn (B/F)
0
10
20
30
40
50
DISTANCE (m)

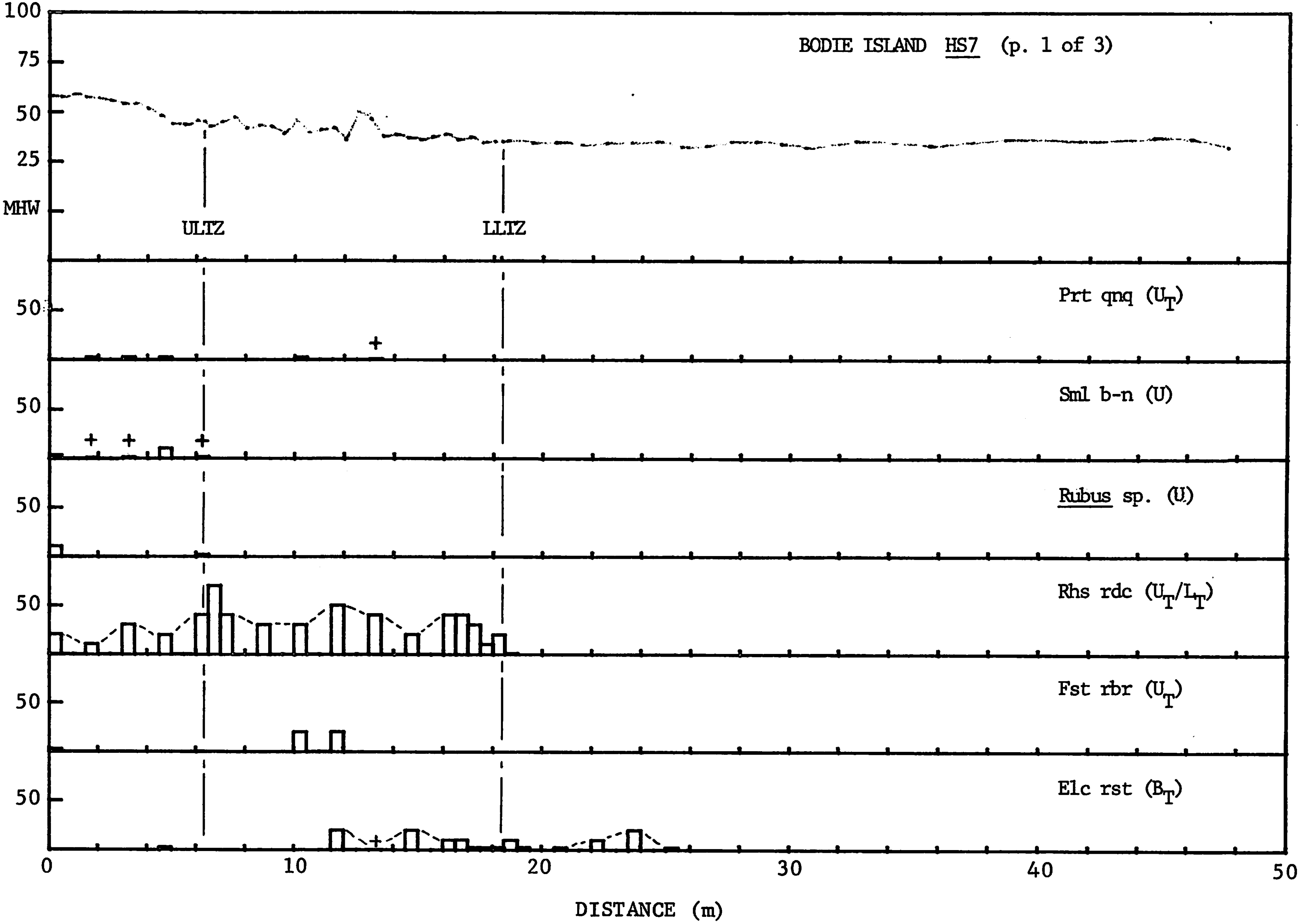


BODIE ISLAND HS5 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Typ dmn (B/F)
Kst vrg (B_T)
Rsa pls (L)
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

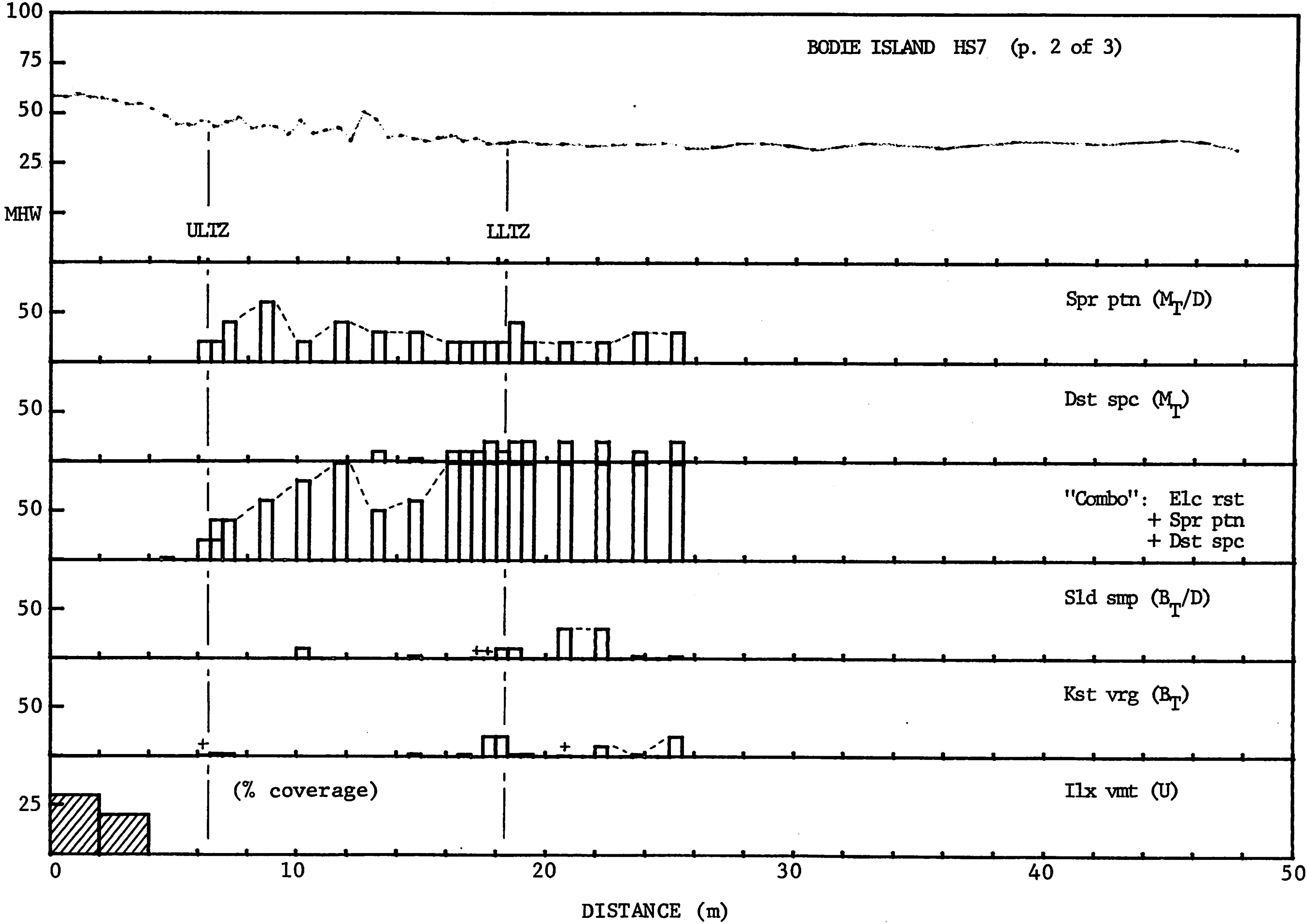

BODIE ISLAND HS6 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Sml b-n (U)
Rhs rdc (U_T/L_T)
Rubus sp. (U)
Scr rbs (B_T)
Osm rgl (L)
Jnc rmr (M_T)
0
10
20
30
40
50
DISTANCE (m)


BODIE ISLAND HS6 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Elc rst (B_T)
Dst spc (M_T)
"Combo": Spr ptn
+ Elc rst
+ Dst spc
Kst vrg (B_T)
Sld smp (B_T/D)
0
10
20
30
40
50
DISTANCE (m)

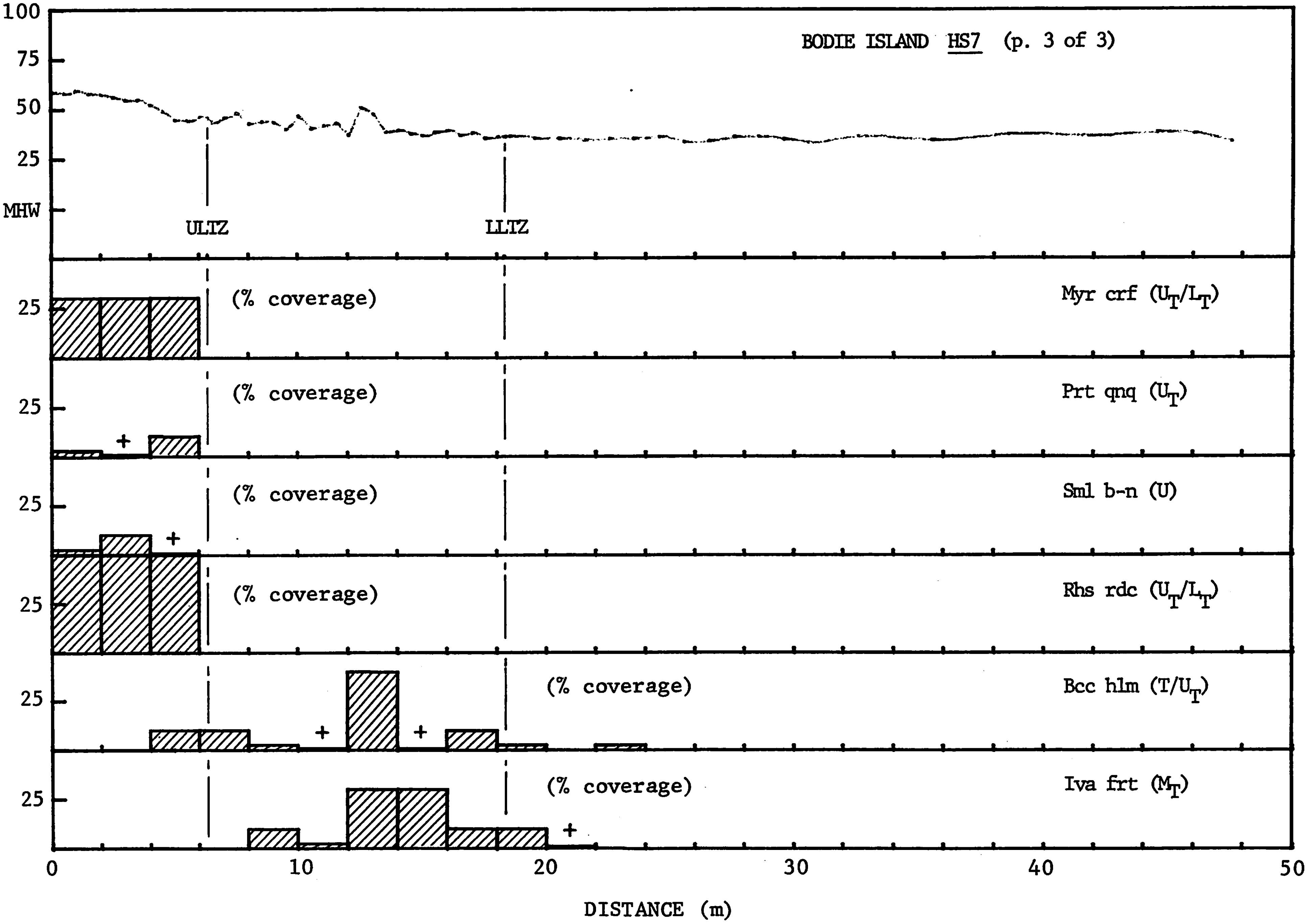

BODIE ISLAND HS6 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Typha spp. (B/F)
50
Ilx vmt (U)
(% coverage)
25
Prt qnq (U_T)
(% coverage)
25
Myr crf (U_T/L_T)
(% coverage)
25
+
Bcc hlm (T/U_T)
(% coverage)
25
+
+
Iva frt (M_T)
(% coverage)
25
+
0
10
20
30
40
50
DISTANCE (m)

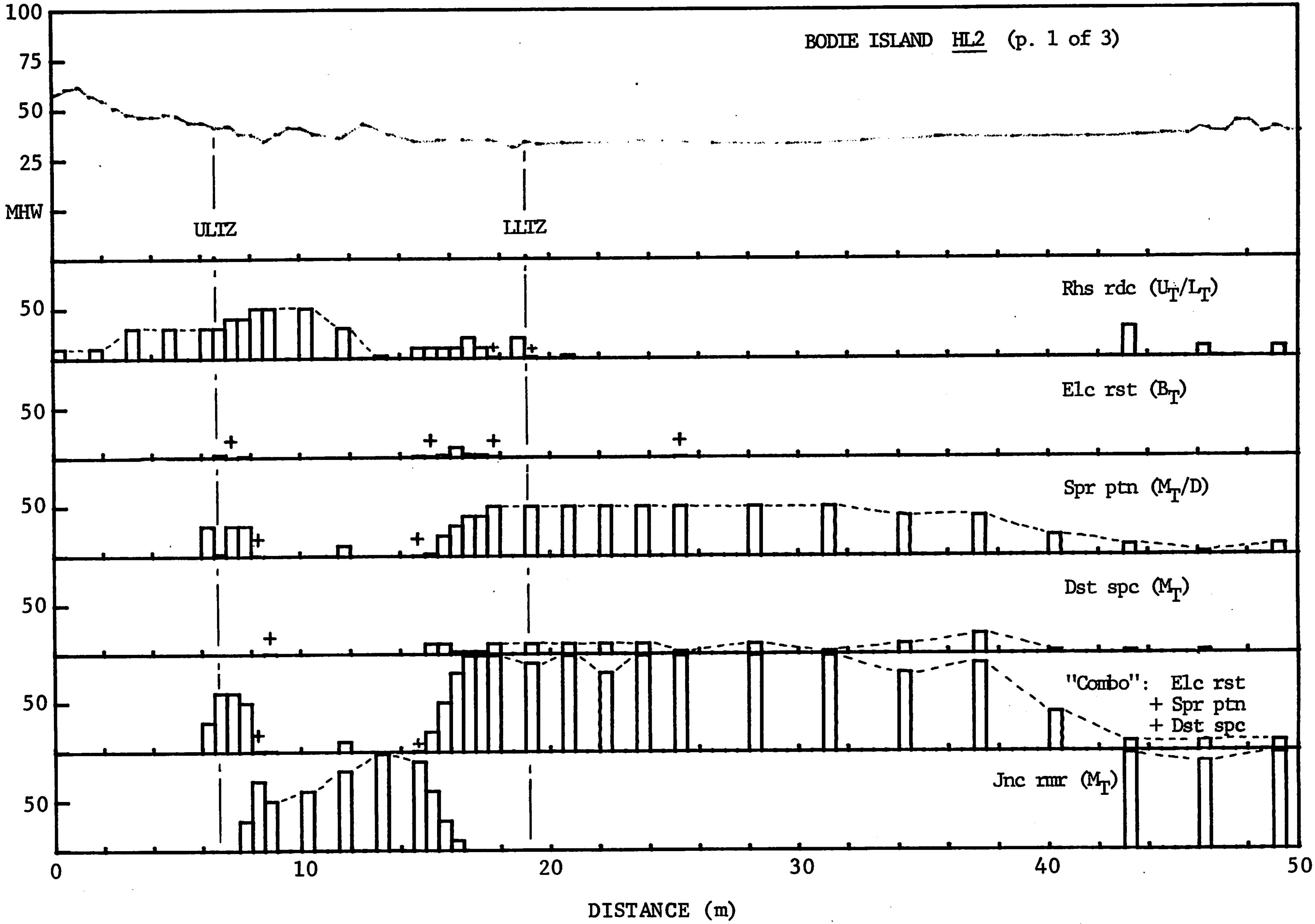


BODIE ISLAND HS7 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Prt qnq (U_T)
Sml b-n (U)
Rubus sp. (U)
Rhs rdc (U_T/L_T)
Fst rbr (U_T)
Elc rst (B_T)
0
10
20
30
40
50
DISTANCE (m)

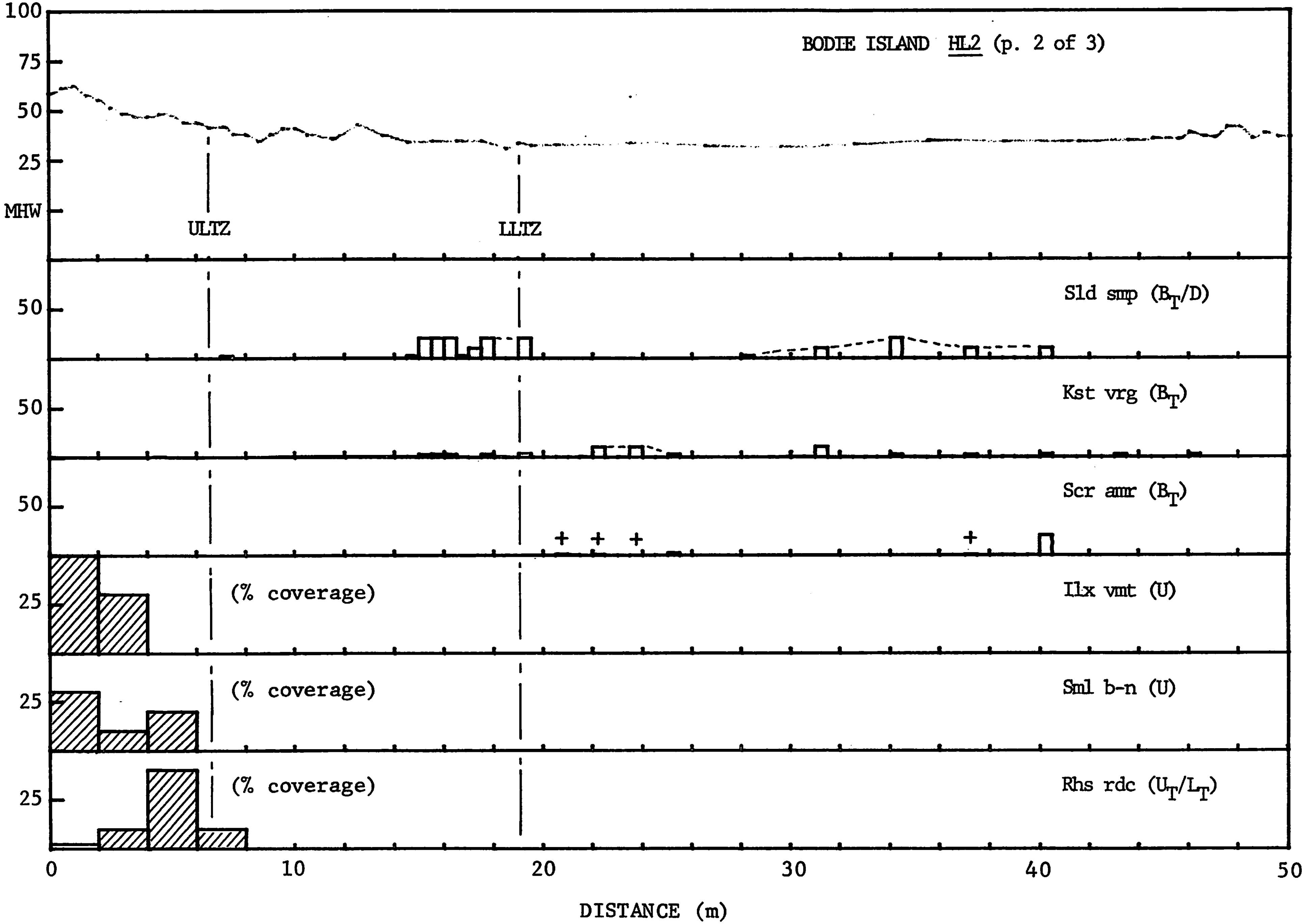


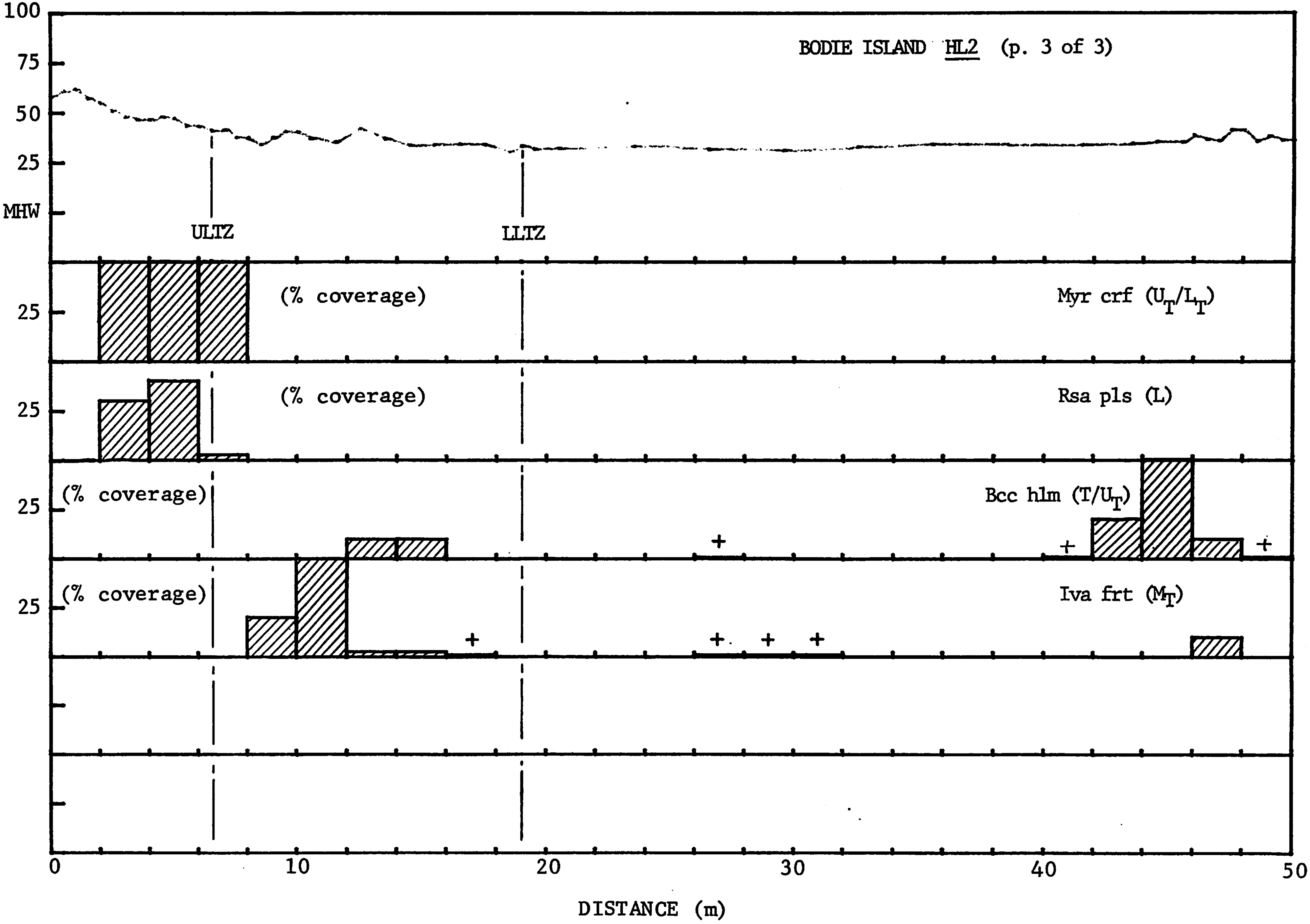
BODIE ISLAND HS7 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Elc rst
+ Spr ptn
+ Dst spc
Sld smp (B_T/D)
Kst vrg (B_T)
Ilx vmt (U)
(% coverage)
0
10
20
30
40
50
DISTANCE (m)


BODIE ISLAND HS7 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
(% coverage)
Myr crf (U_T/L_T)
Prt qnq (U_T)
Sml b-n (U)
Rhs rdc (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
25
+
0
10
20
30
40
50
DISTANCE (m)

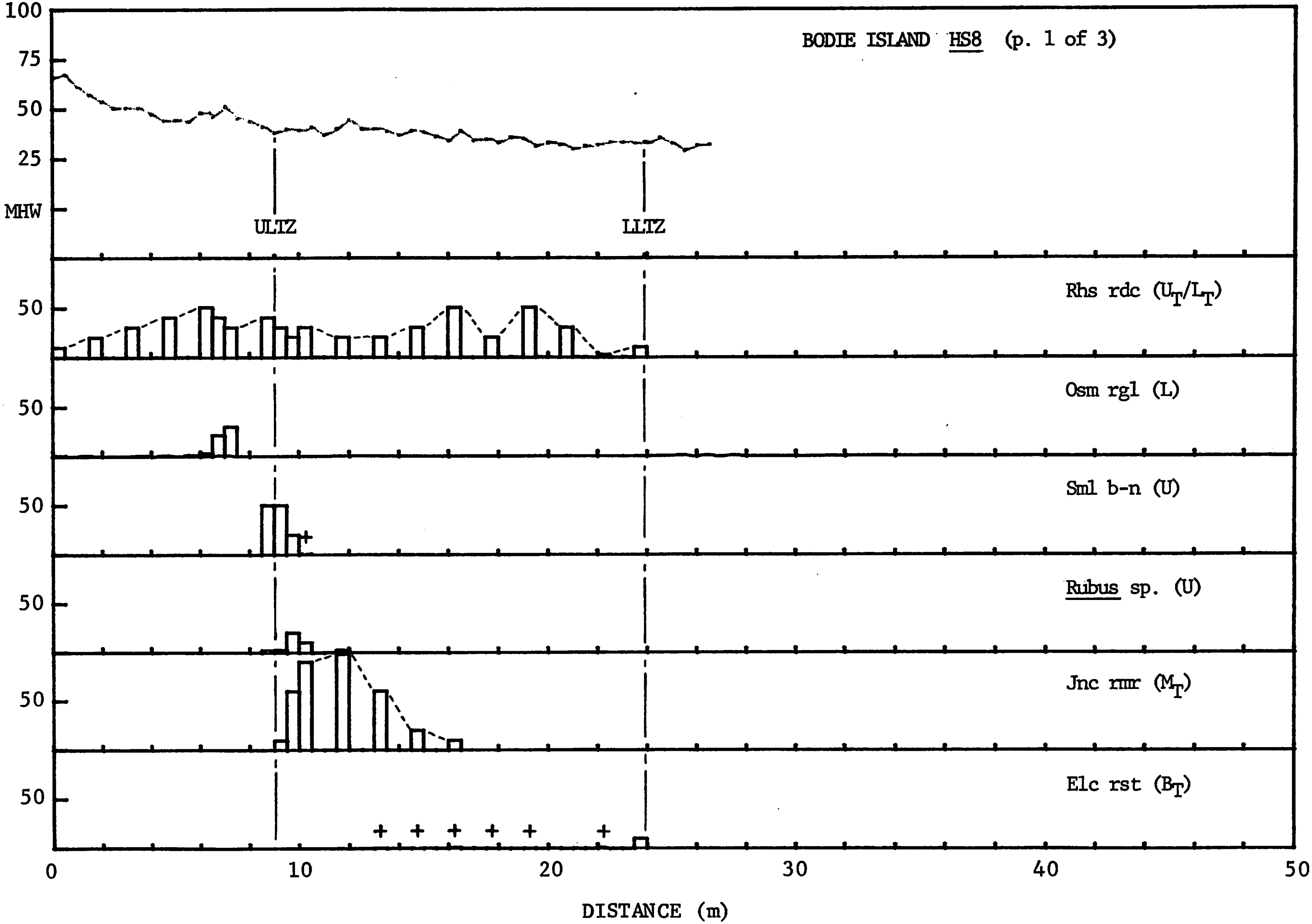


BODIE ISLAND HL2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (UT/LT)
Elc rst (BT)
Spr ptn (MT/D)
Dst spc (MT)
"Combo": Elc rst
+ Spr ptn
+ Dst spc
Jnc rmr (MT)
0
10
20
30
40
50
DISTANCE (m)

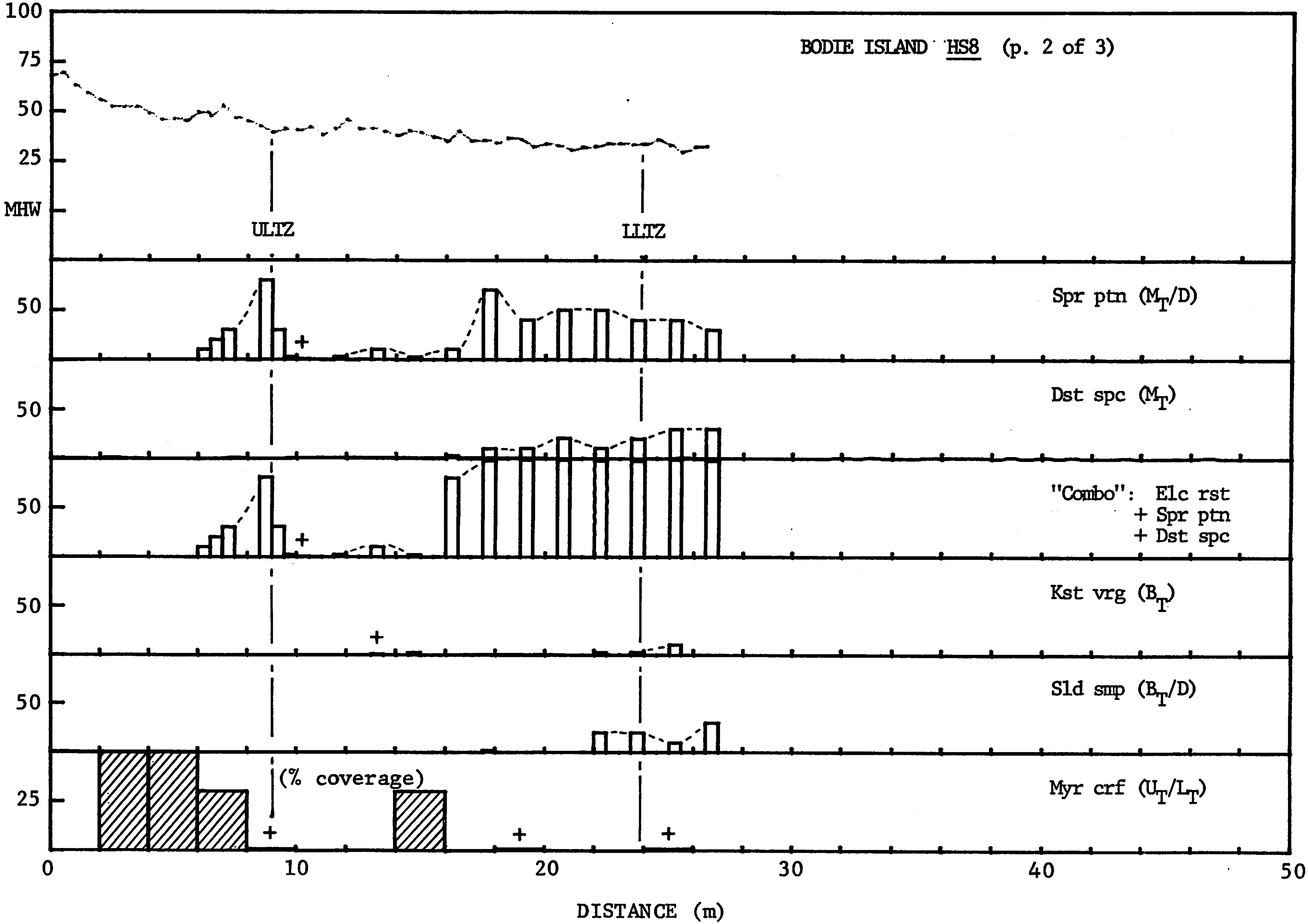

BODIE ISLAND HL2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Sld smp (B_T/D)
50
Kst vrg (B_T)
50
Scr amr (B_T)
25
(% coverage)
Ilx vmt (U)
25
(% coverage)
Sml b-n (U)
25
(% coverage)
Rhs rdc (U_T/L_T)
0
10
20
30
40
50
DISTANCE (m)



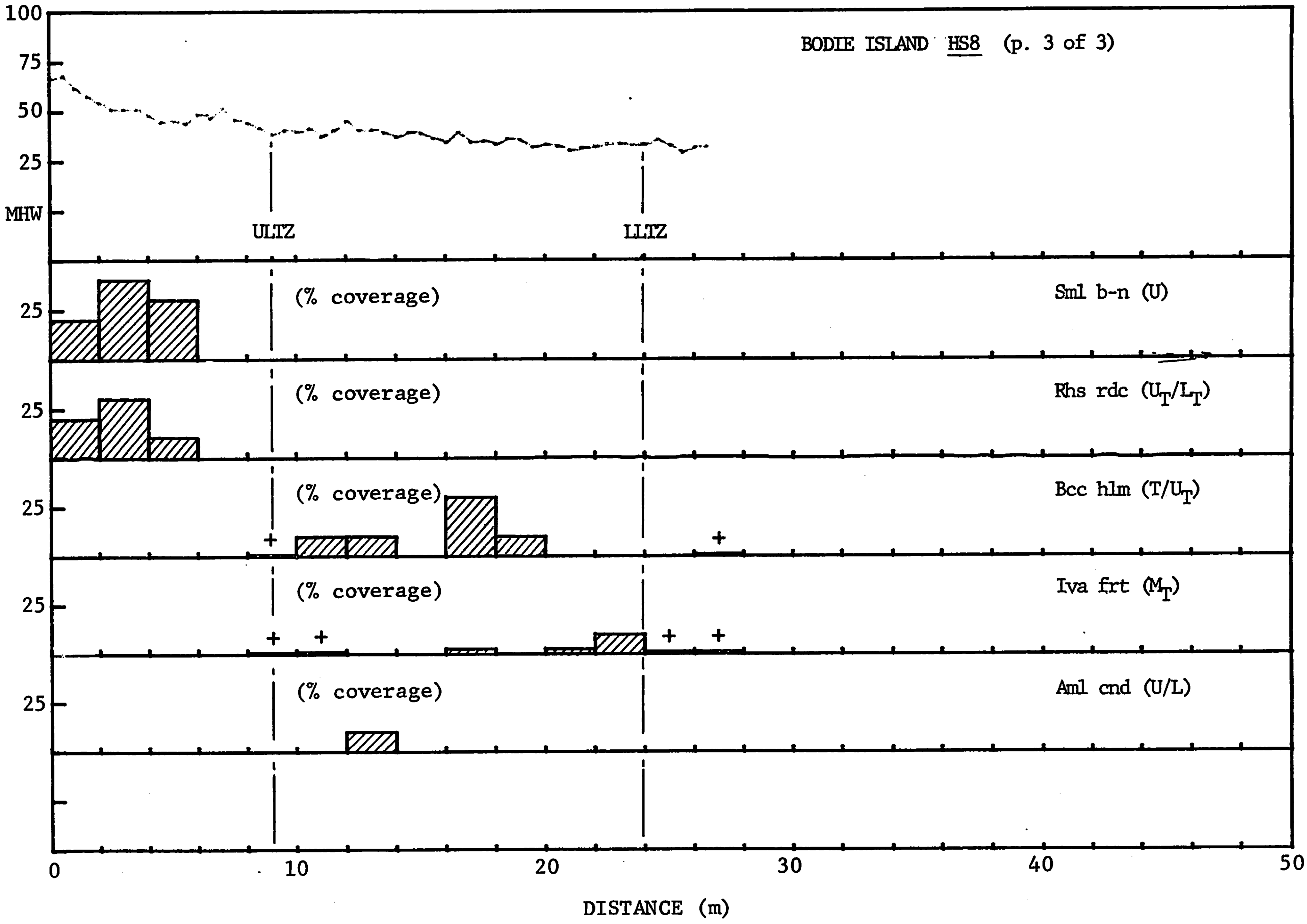
BODIE ISLAND HL2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
(% coverage)
Myr crf (U_T/L_T)
25
(% coverage)
Rsa pls (L)
25
(% coverage)
Bcc hlm (T/U_T)
25
(% coverage)
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)



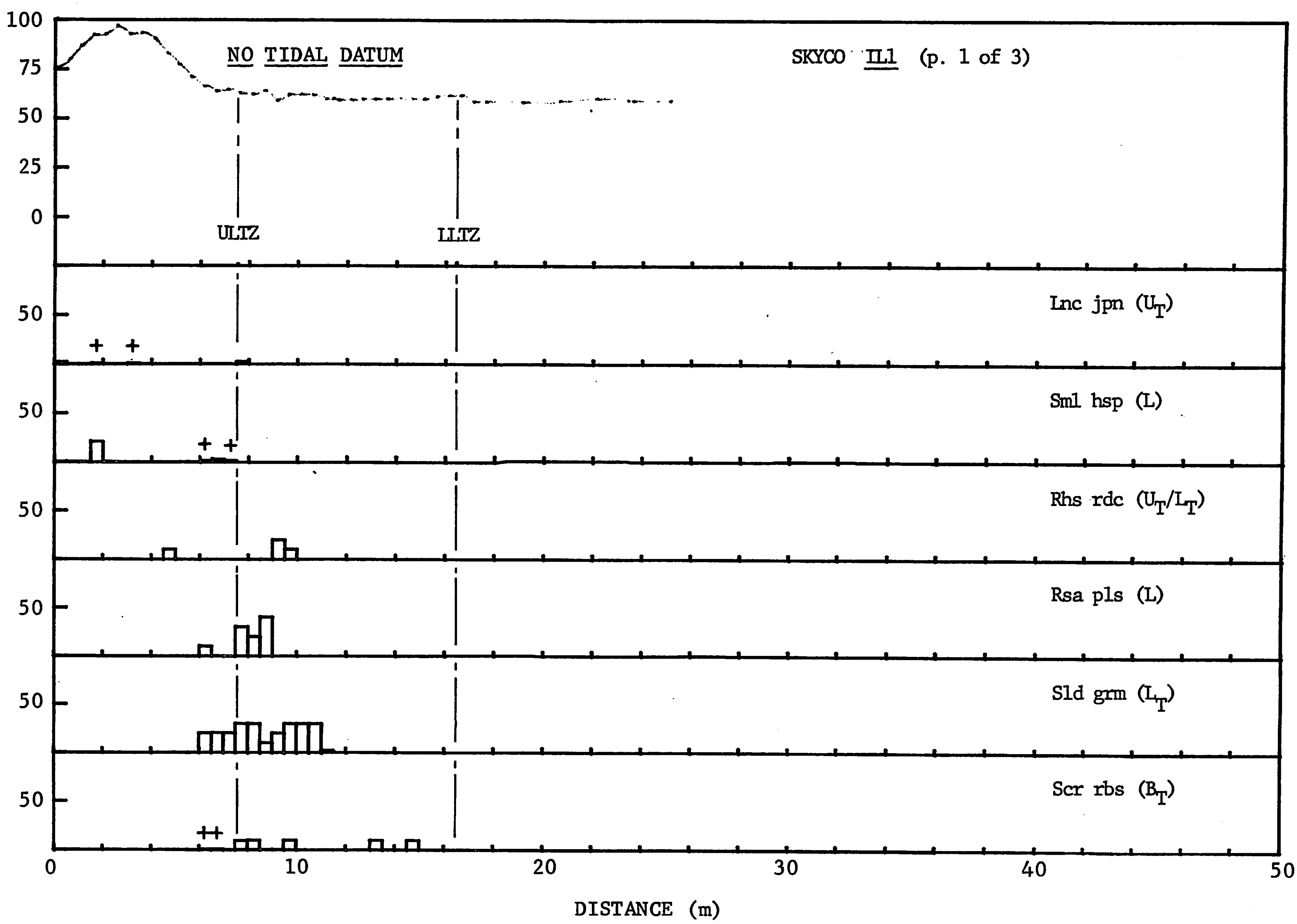
BODIE ISLAND HS8 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (UT/LT)
Osm rgl (L)
Sml b-n (U)
Rubus sp. (U)
Jnc rmr (MT)
Elc rst (BT)
0
10
20
30
40
50
DISTANCE (m)



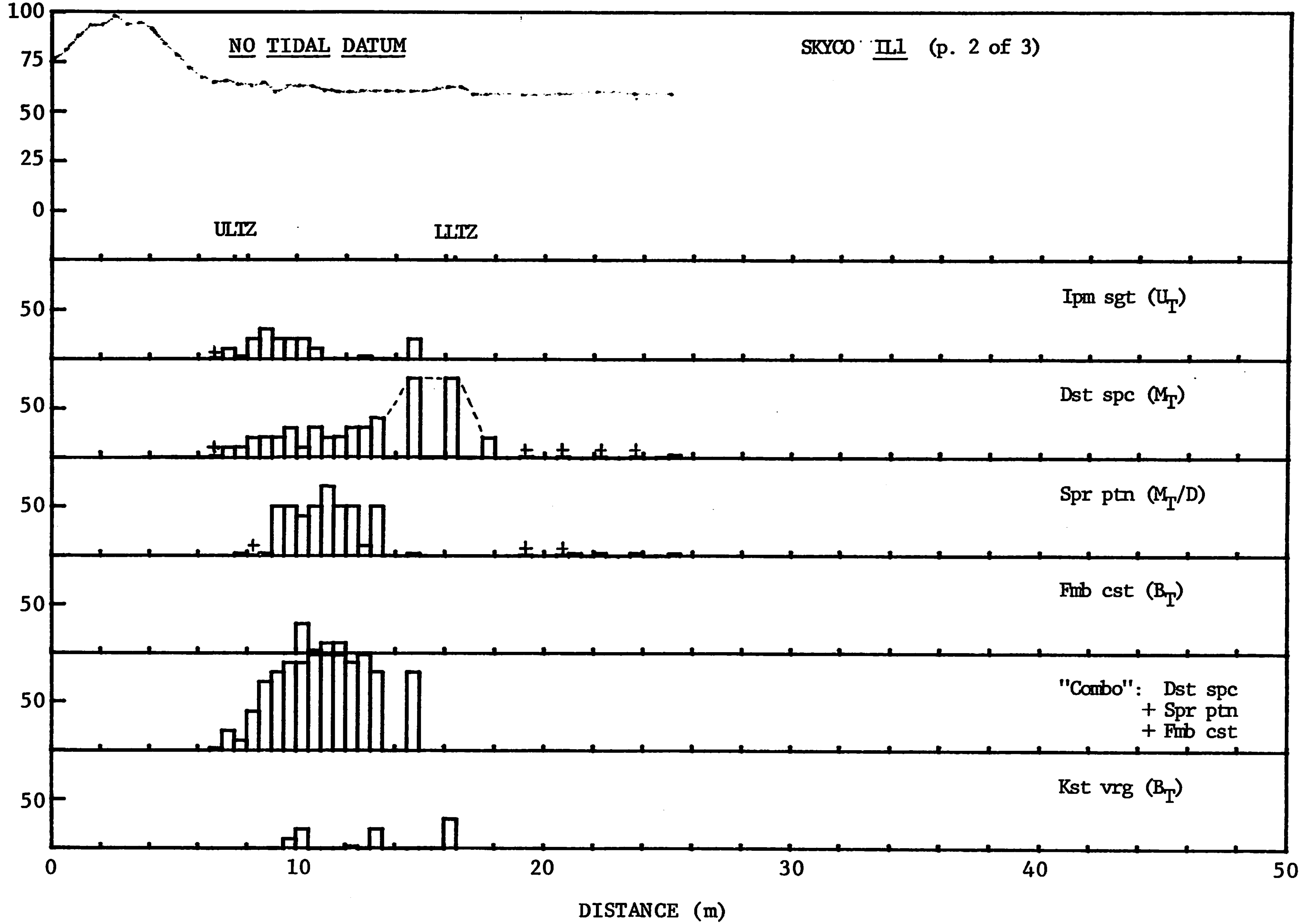
BODIE ISLAND HS8 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Elc rst
+ Spr ptn
+ Dst spc
Kst vrg (B_T)
Sld smp (B_T/D)
(% coverage)
Myr crf (U_T/L_T)
0
10
20
30
40
50
DISTANCE (m)



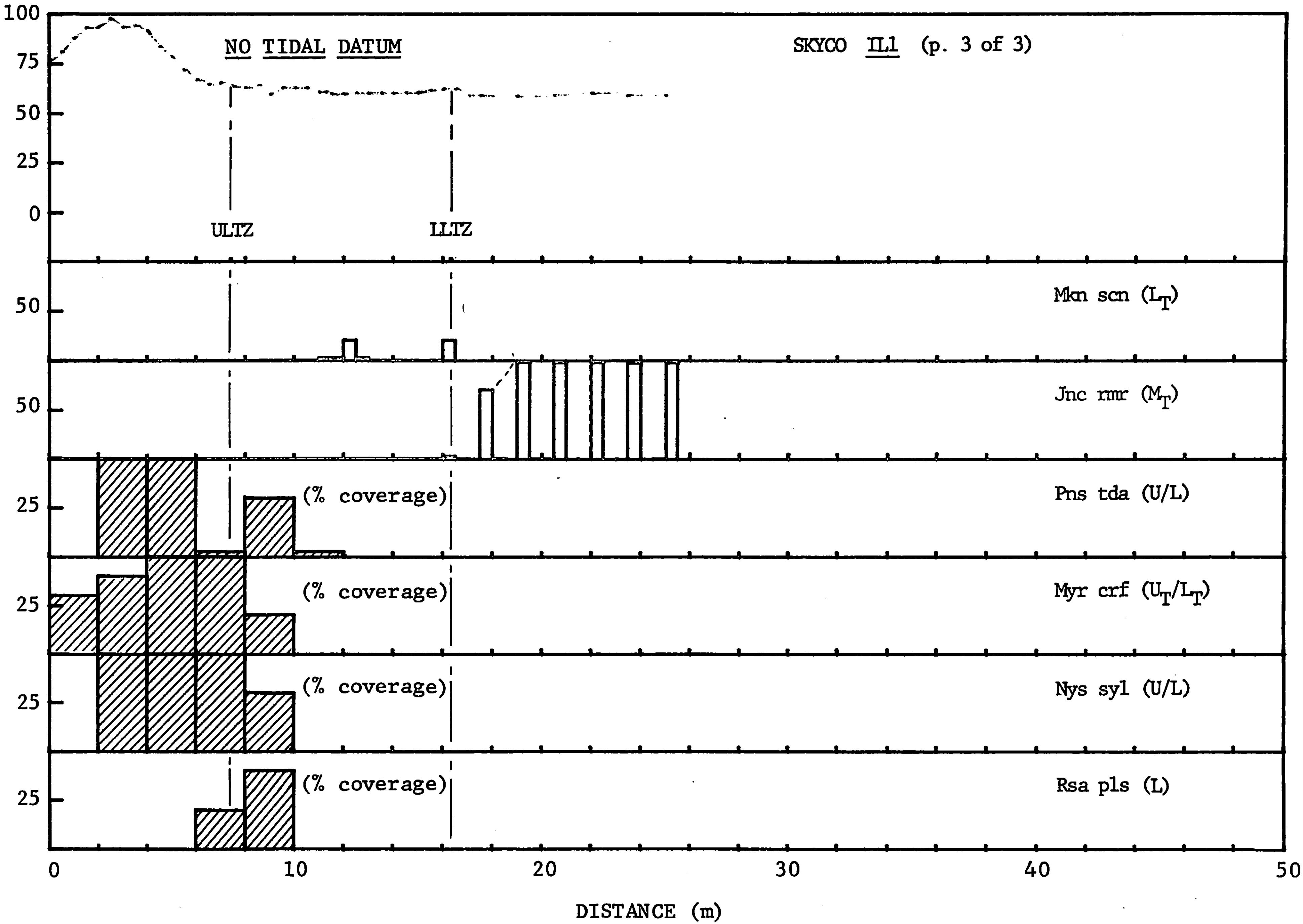
BODIE ISLAND HS8 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
(% coverage)
Sml b-n (U)
Rhs rdc (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
Aml cnd (U/L)
0
10
20
30
40
50
DISTANCE (m)



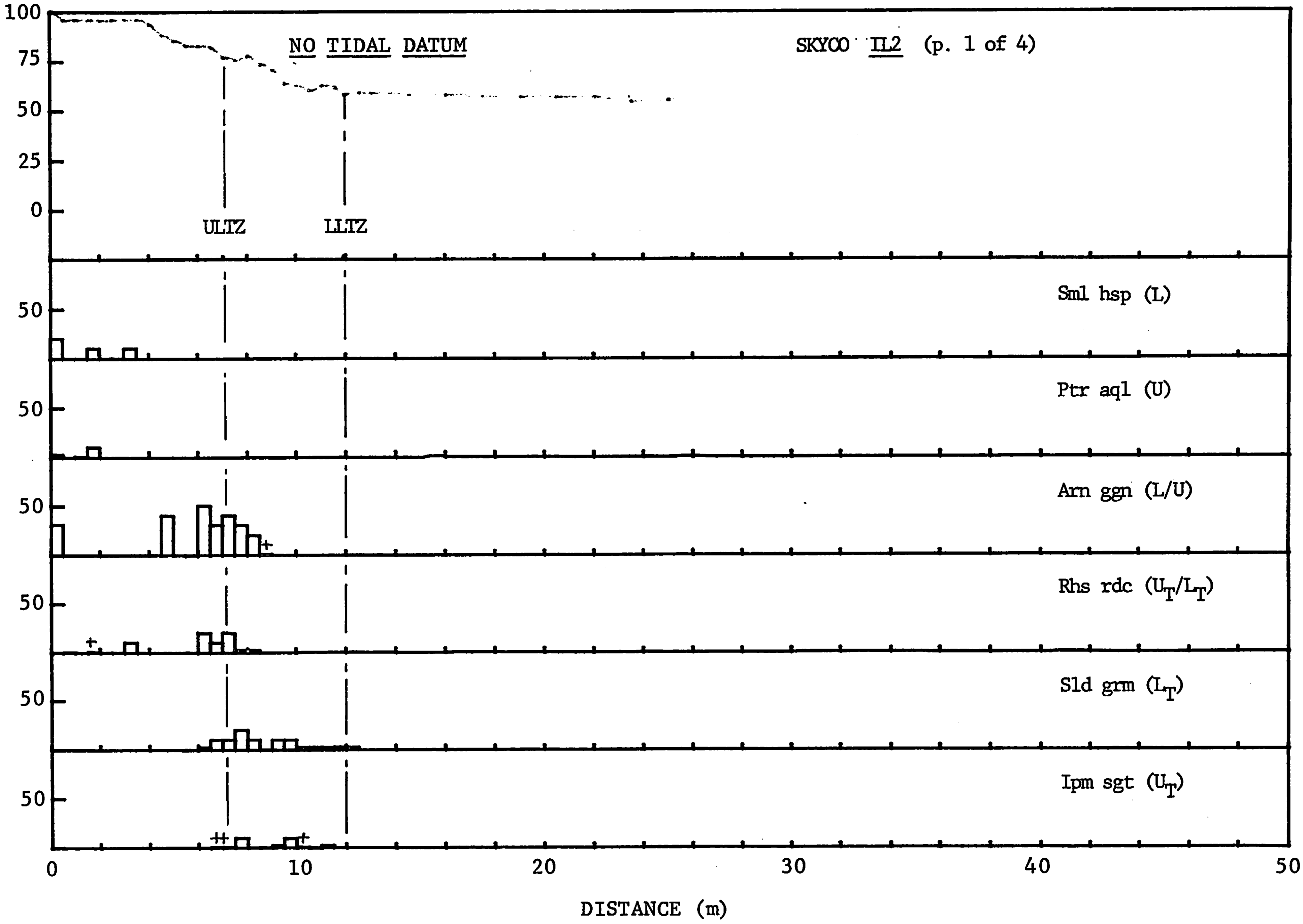
NO TIDAL DATUM
SKYCO IL1 (p. 1 of 3)
100
75
50
25
0
ULTZ
LLTZ
Lnc jpn (U_T)
Sml hsp (L)
Rhs rdc (U_T/L_T)
Rsa pls (L)
Sld grm (L_T)
Scr rbs (B_T)
0
10
20
30
40
50
DISTANCE (m)



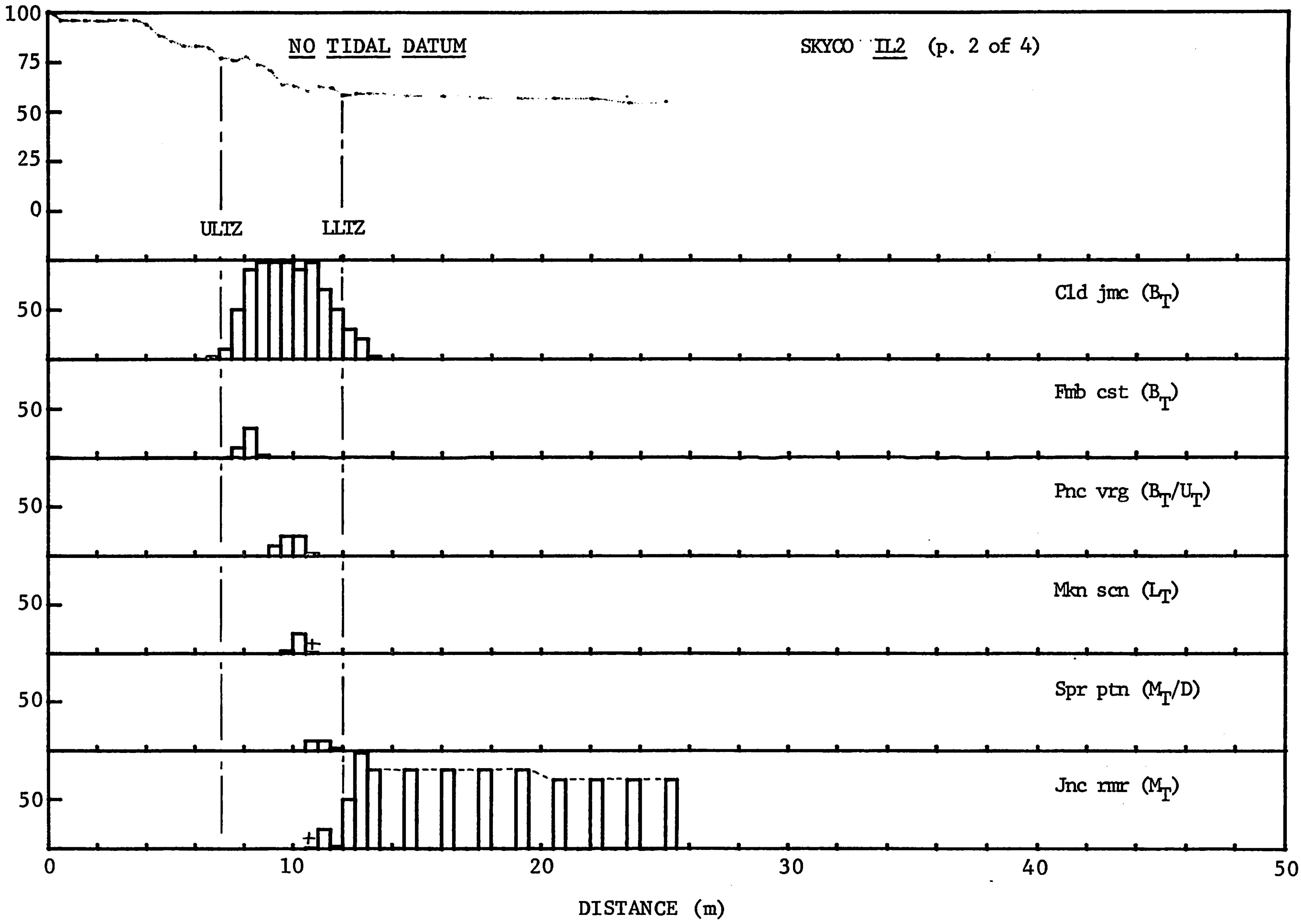
NO TIDAL DATUM
SKYCO IL1 (p. 2 of 3)
100
75
50
25
0
ULTZ
LLTZ
Ipm sgt (U_T)
Dst spc (M_T)
Spr ptn (M_T/D)
Fmb cst (B_T)
"Combo": Dst spc
+ Spr ptn
+ Fmb cst
Kst vrg (B_T)
0
10
20
30
40
50
DISTANCE (m)



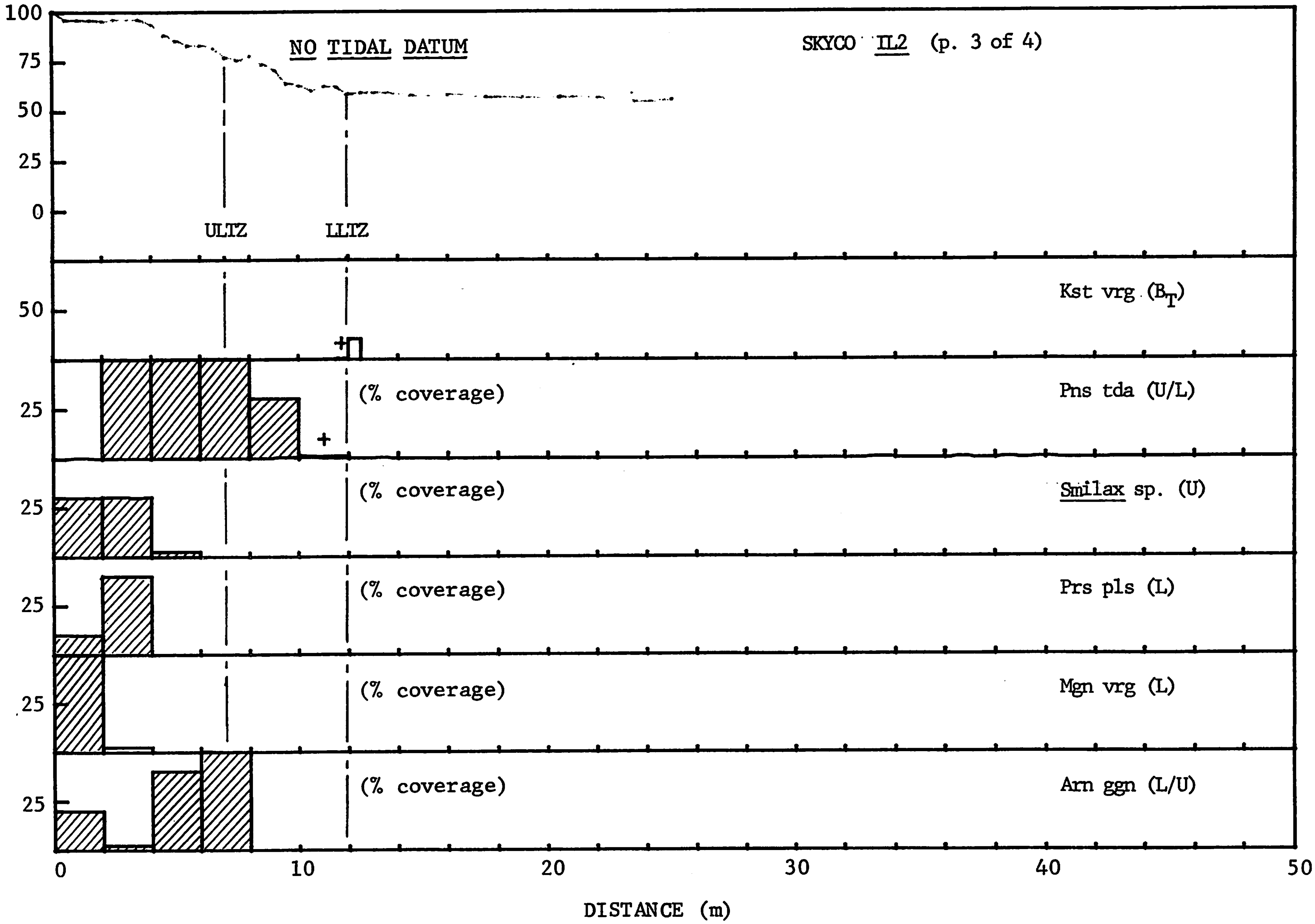
NO TIDAL DATUM
SKYCO IL1 (p. 3 of 3)
100
75
50
25
0
ULTZ
LLTZ
Mkn scn (L_T)
Jnc rmr (M_T)
Pns tda (U/L)
Myr crf (U_T/L_T)
Nys syl (U/L)
Rsa pls (L)
(% coverage)
0
10
20
30
40
50
DISTANCE (m)



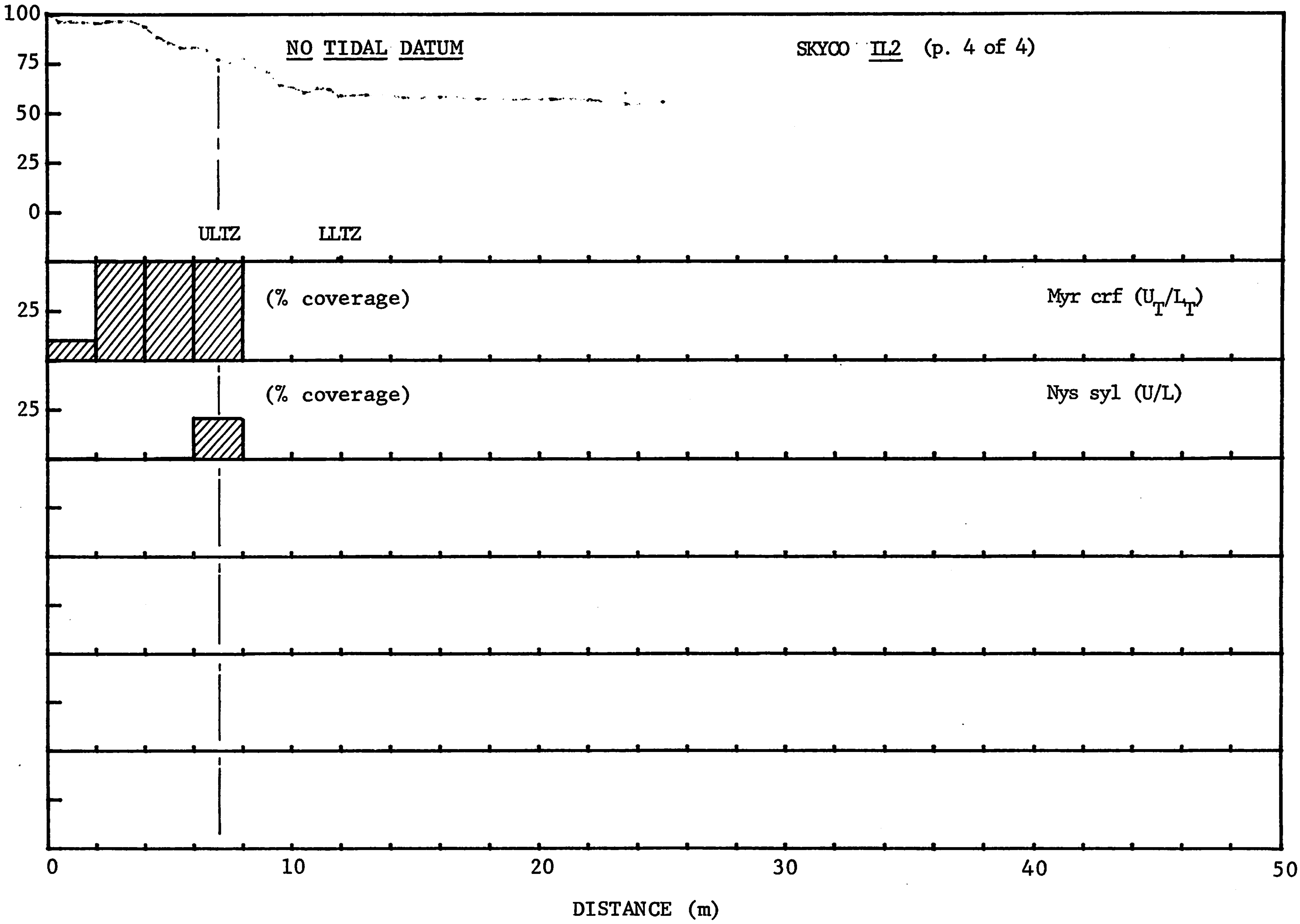
NO TIDAL DATUM
SKYCO IL2 (p. 1 of 4)
100
75
50
25
0
ULTZ
LLTZ
Sml hsp (L)
Ptr aql (U)
Arn ggn (L/U)
Rhs rdc (U_T/L_T)
Sld grm (L_T)
Ipm sgt (U_T)
0
10
20
30
40
50
DISTANCE (m)



100
75
50
25
0
NO TIDAL DATUM
SKYCO IL2 (p. 2 of 4)
ULTZ
LLTZ
50
Cld jmc (B_T)
50
Fmb cst (B_T)
50
Pnc vrg (B_T/U_T)
50
Mkn scn (L_T)
+
50
Spr ptn (M_T/D)
50
Jnc rmr (M_T)
+
0
10
20
30
40
50
DISTANCE (m)

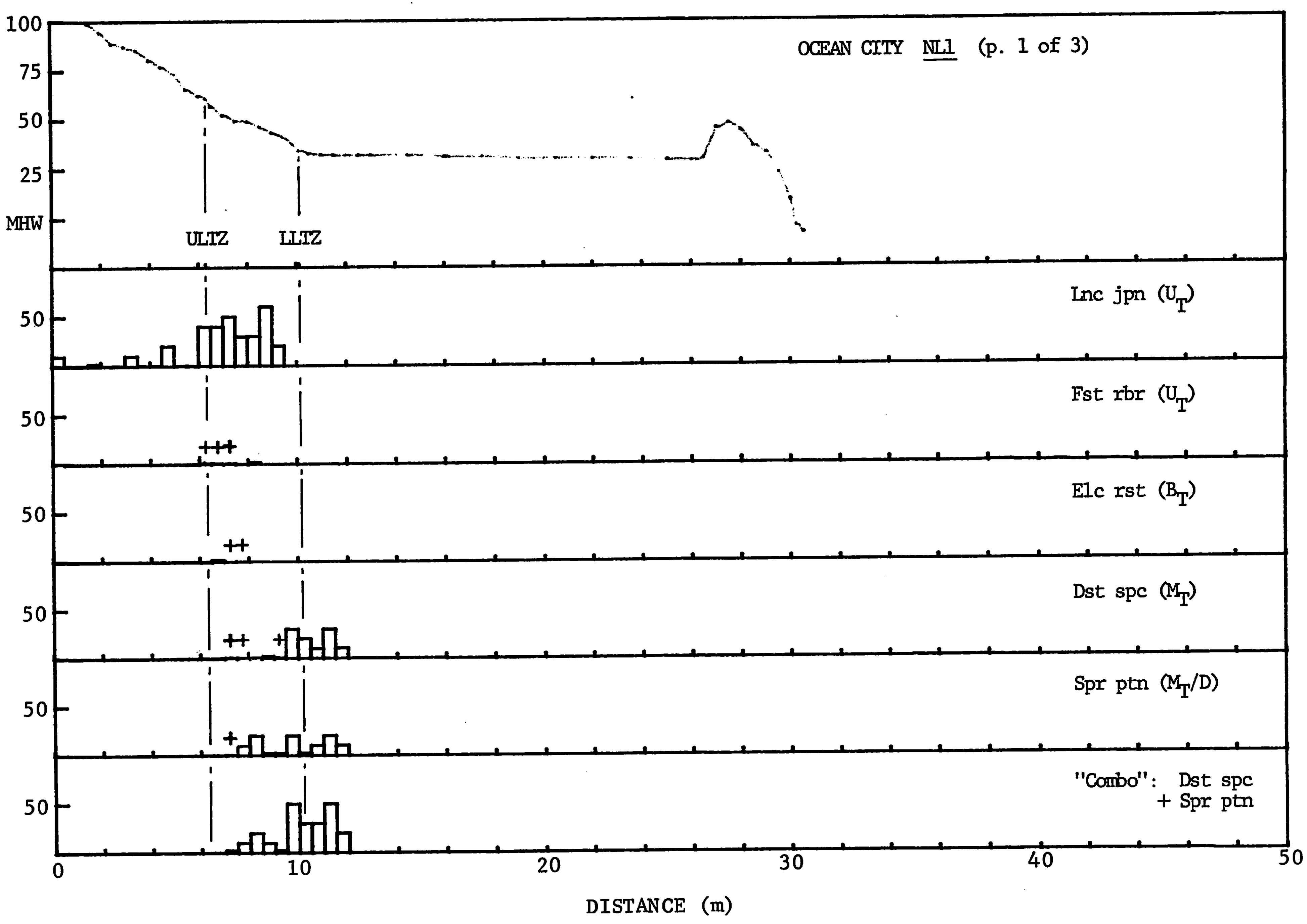


NO TIDAL DATUM
SKYCO IL2 (p. 3 of 4)
100
75
50
25
0
ULTZ
LLTZ
Kst vrg (BT)
50
Pns tda (U/L)
(% coverage)
25
Smilax sp. (U)
Prs pls (L)
Mgn vrg (L)
Arn ggn (L/U)
0
10
20
30
40
50
DISTANCE (m)

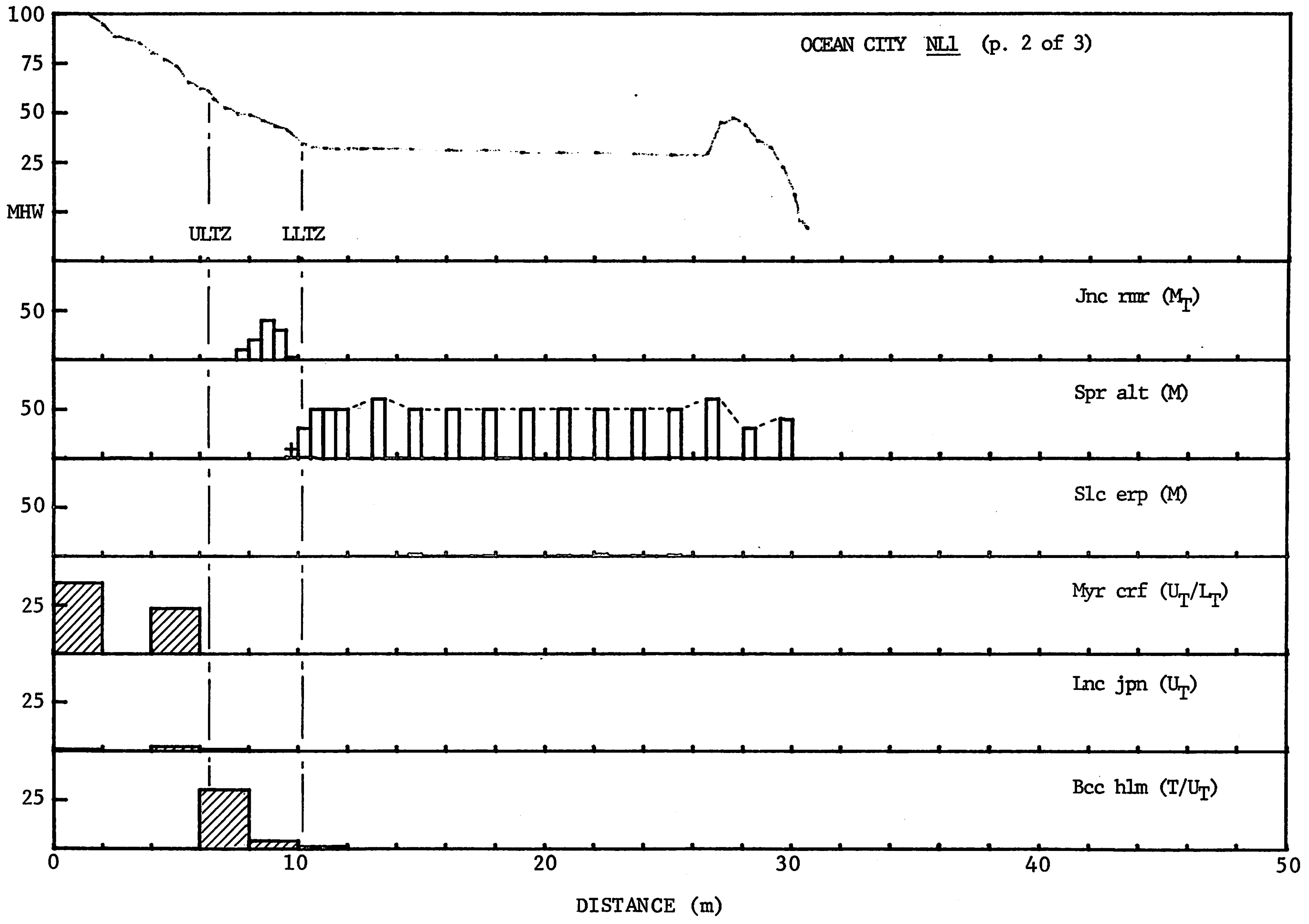

NO TIDAL DATUM
SKYCO IL2 (p. 4 of 4)
100
75
50
25
0
ULTZ
LLTZ
25
(% coverage)
Myr crf (U_T/L_T)
25
(% coverage)
Nys syl (U/L)
0
10
20
30
40
50
DISTANCE (m)

PROFILE DATA - OCEAN CITY SUBREGION(MARYLAND)

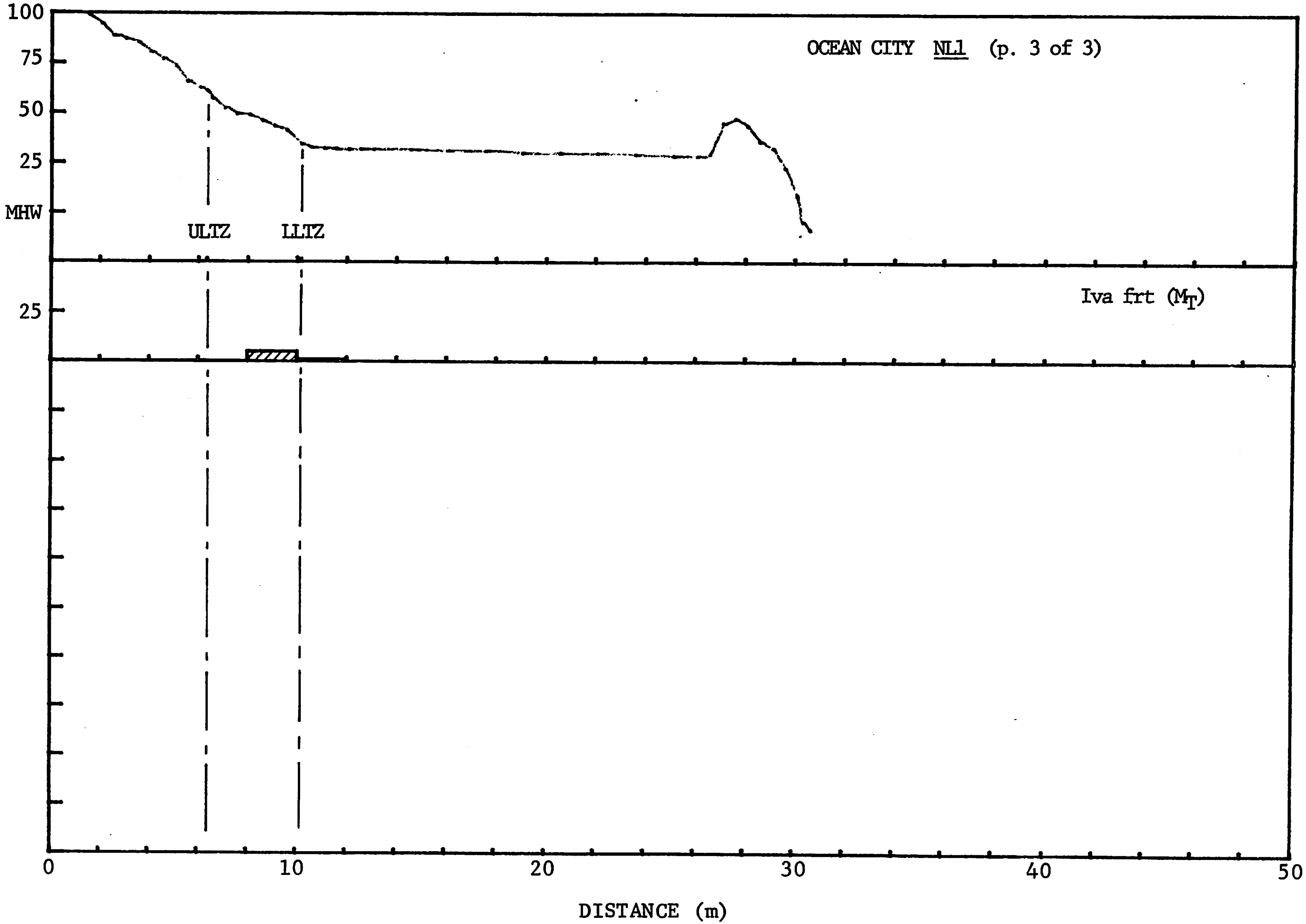
OCEAN CITY(PRIMARY)
ISLE OF WIGHT



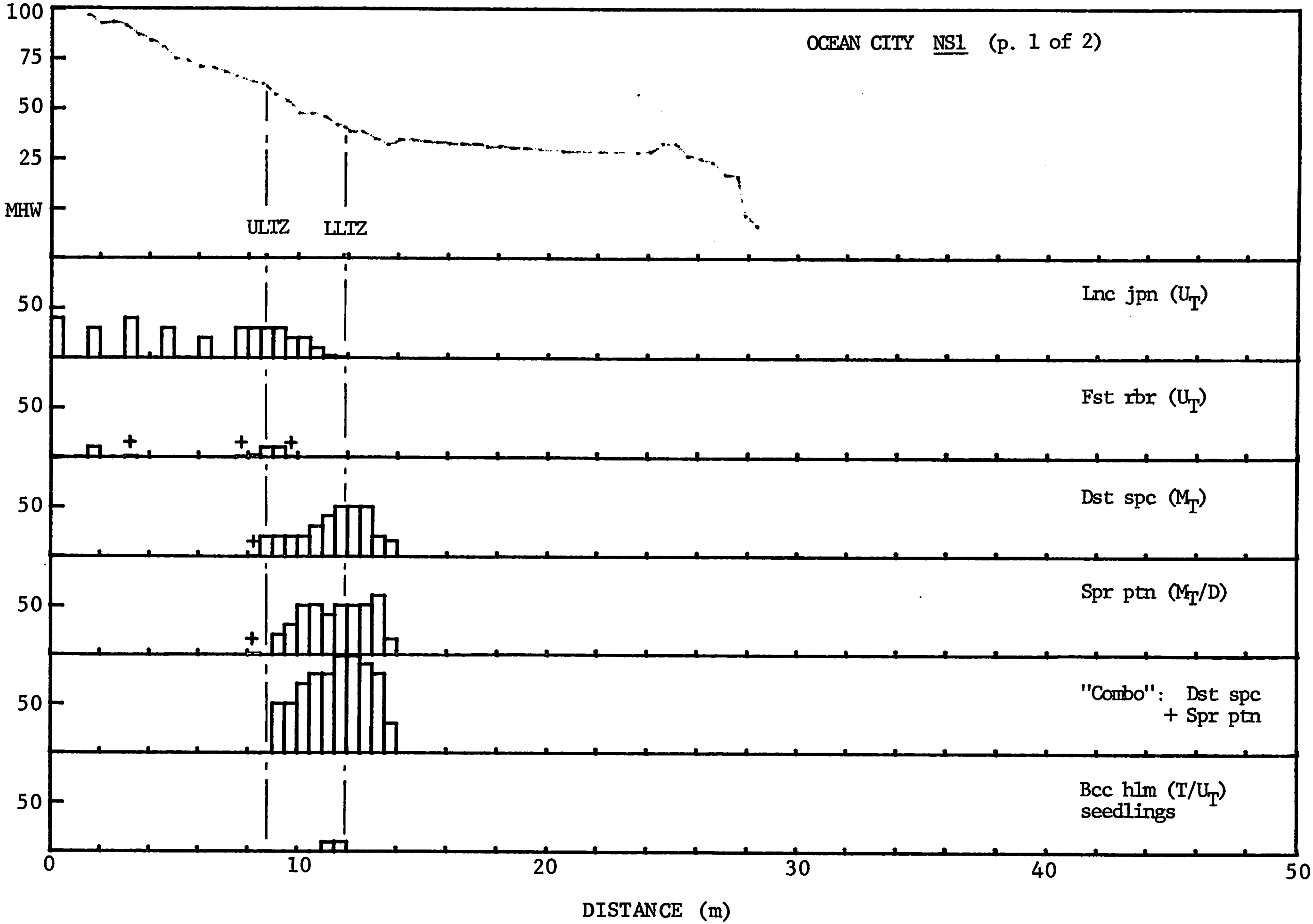
OCEAN CITY NL1 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Fst rbr (U_T)
Elc rst (B_T)
Dst spc (M_T)
Spr ptn (M_T/D)
"Combo": Dst spc
+ Spr ptn
0
10
20
30
40
50
DISTANCE (m)



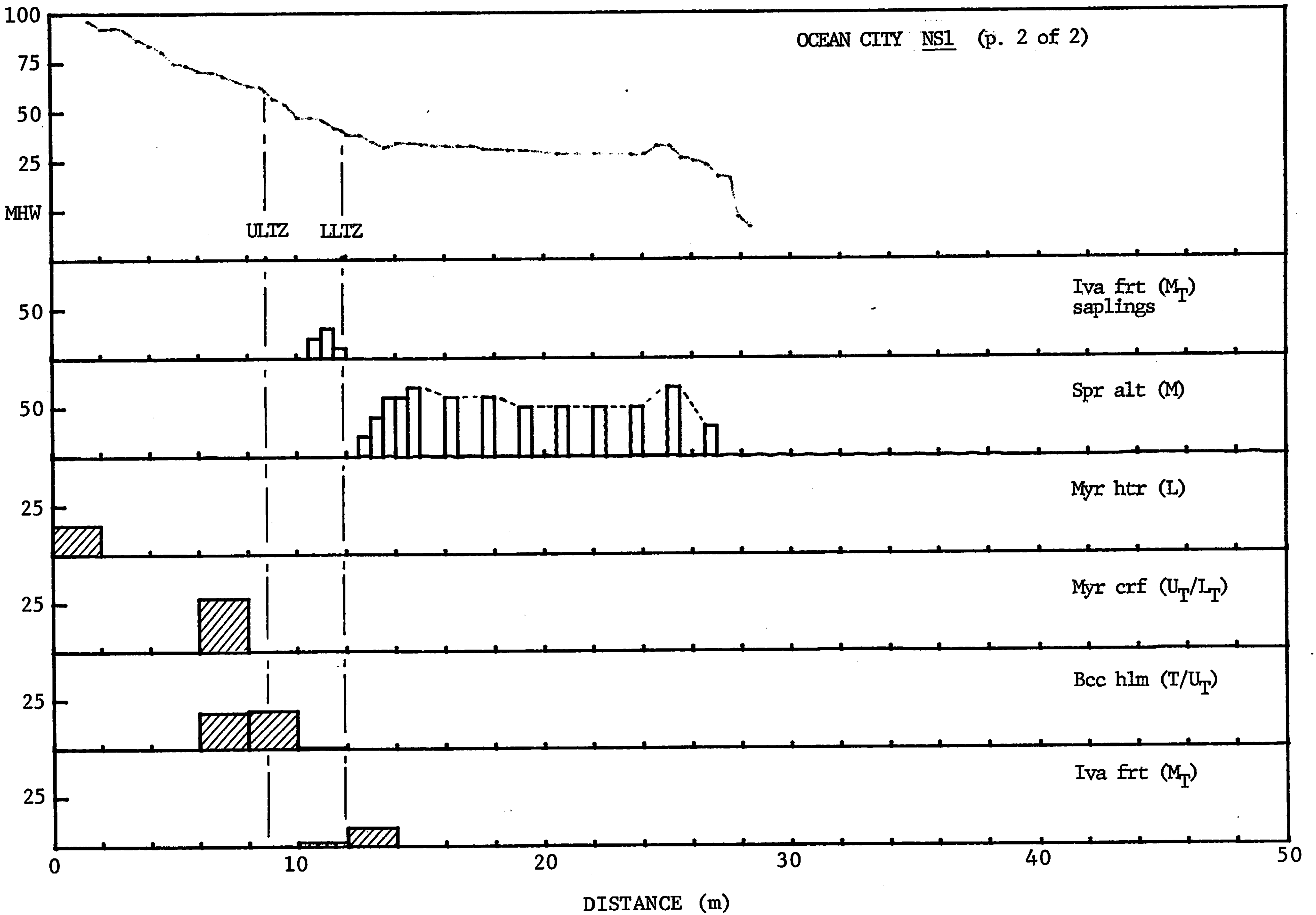
OCEAN CITY NL1 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Jnc rmr (M_T)
50
Spr alt (M)
50
Slc erp (M)
50
Myr crf (U_T/L_T)
25
Inc jpn (U_T)
25
Bcc hlm (T/U_T)
25
0
10
20
30
40
50
DISTANCE (m)



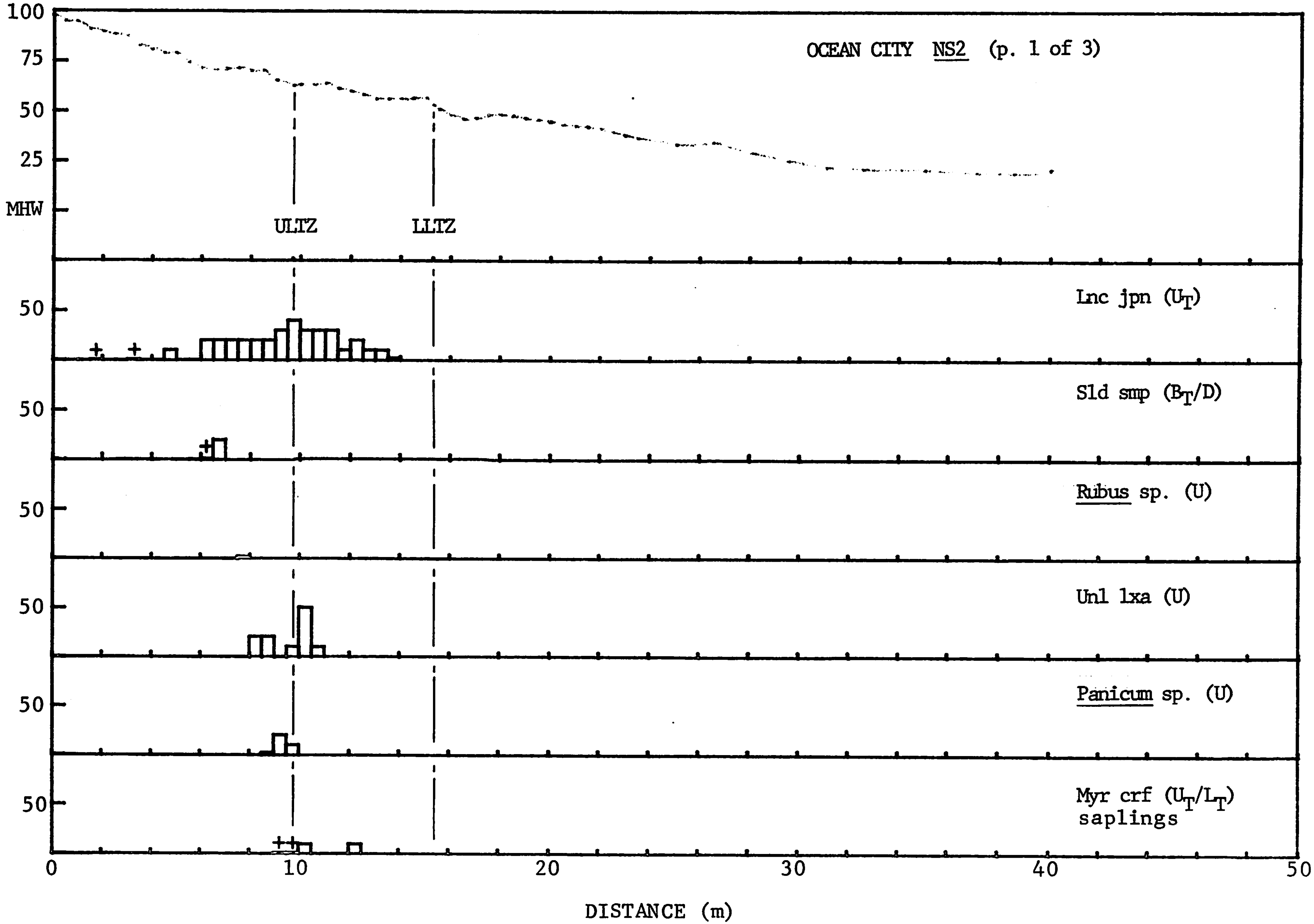
OCEAN CITY NL1 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Iva frt (MT)
25
0
10
20
30
40
50
DISTANCE (m)

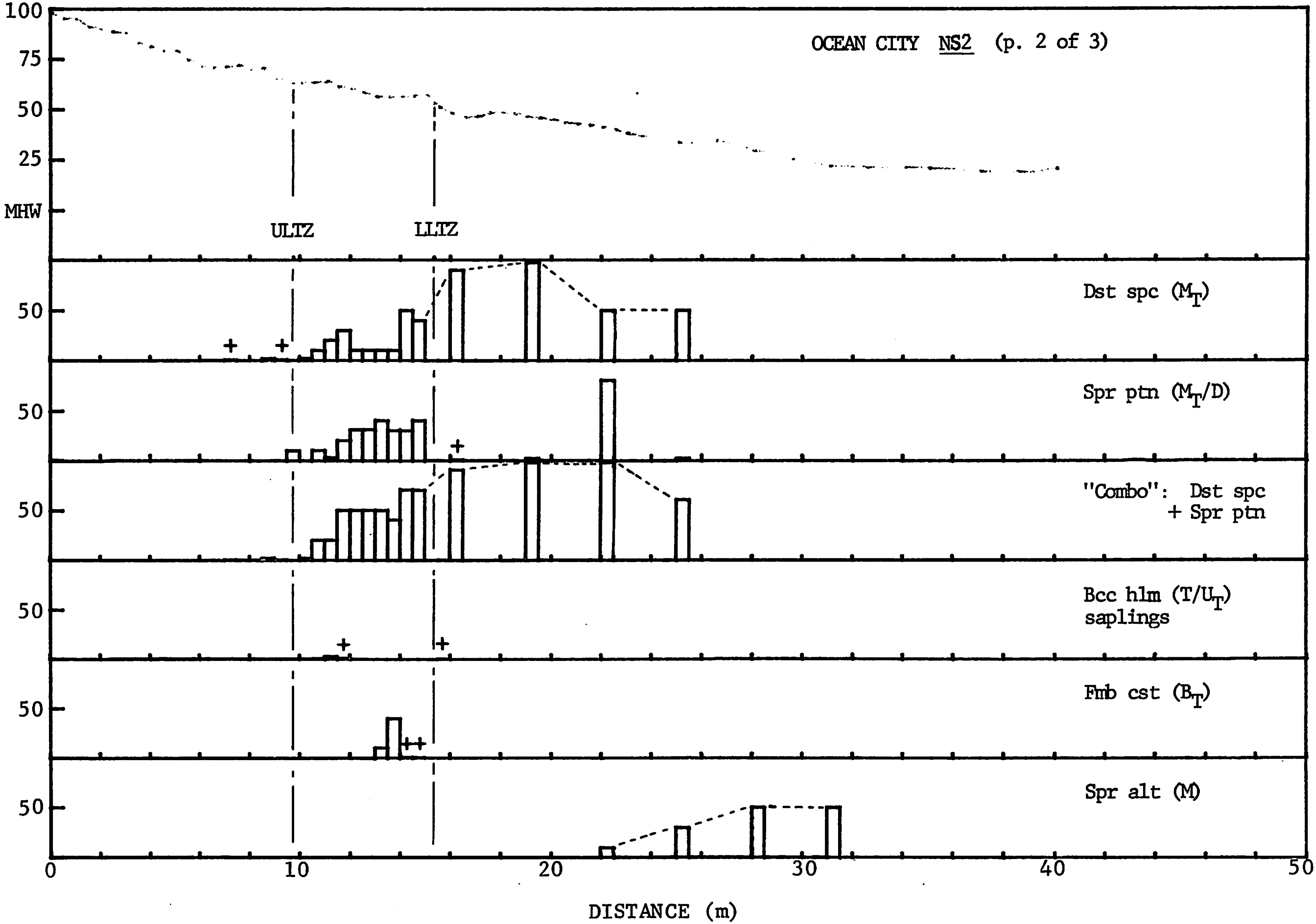


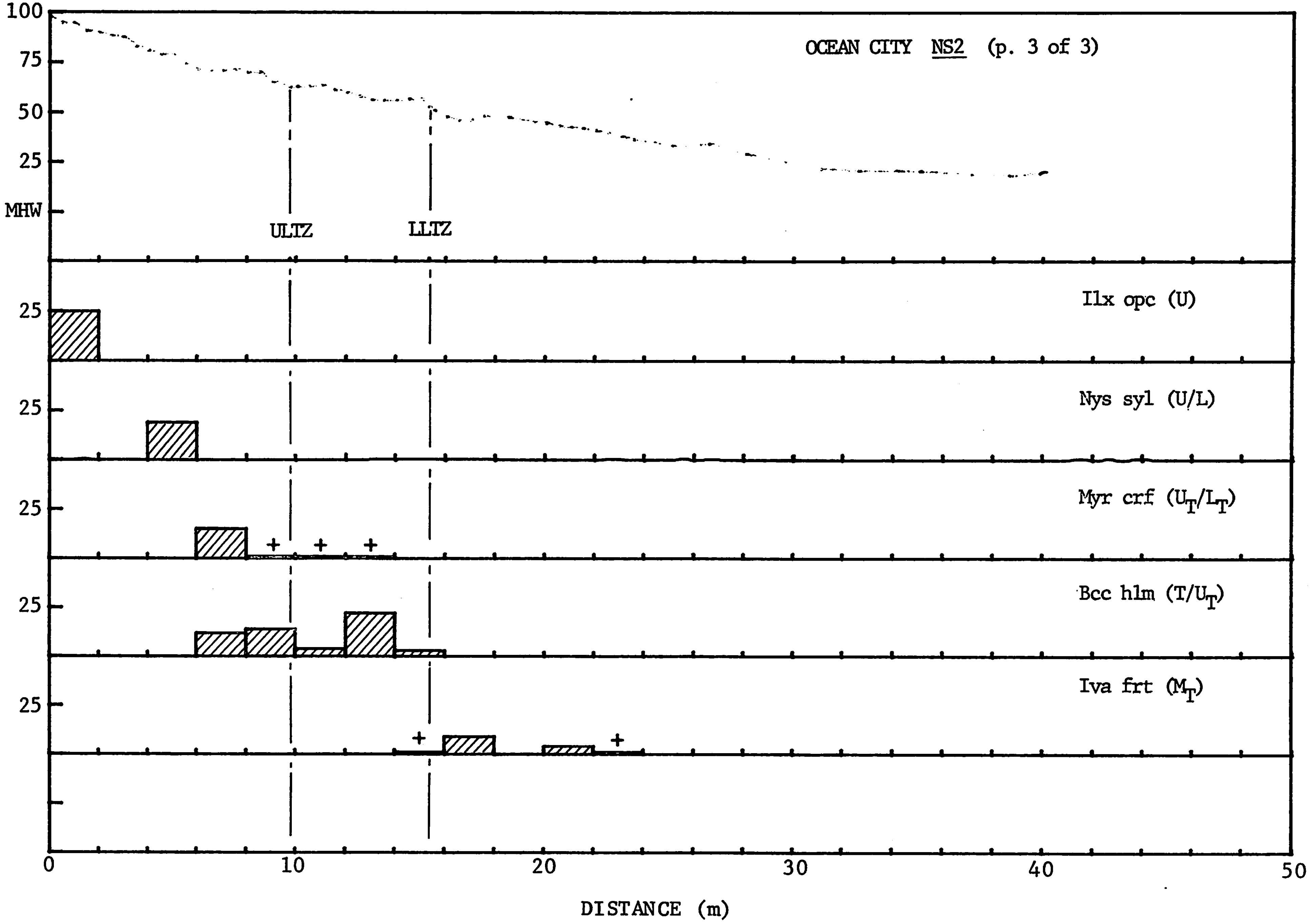
OCEAN CITY NS1 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Fst rbr (U_T)
Dst spc (M_T)
Spr ptn (M_T/D)
"Combo": Dst spc + Spr ptn
Bcc hlm (T/U_T) seedlings
0
10
20
30
40
50
DISTANCE (m)



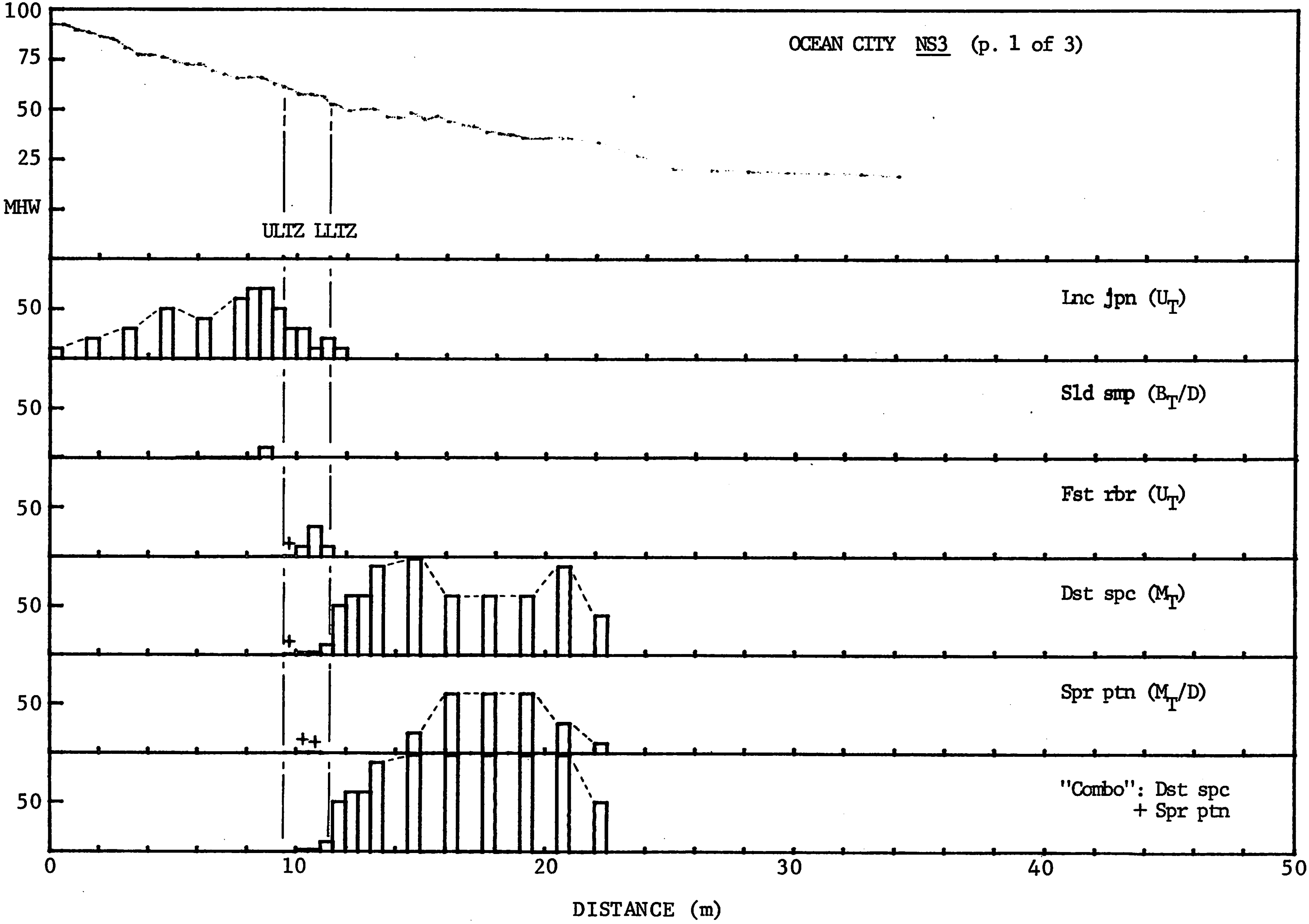
OCEAN CITY NS1 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Iva frt (M_T)
saplings
50
Spr alt (M)
50
Myr htr (L)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)

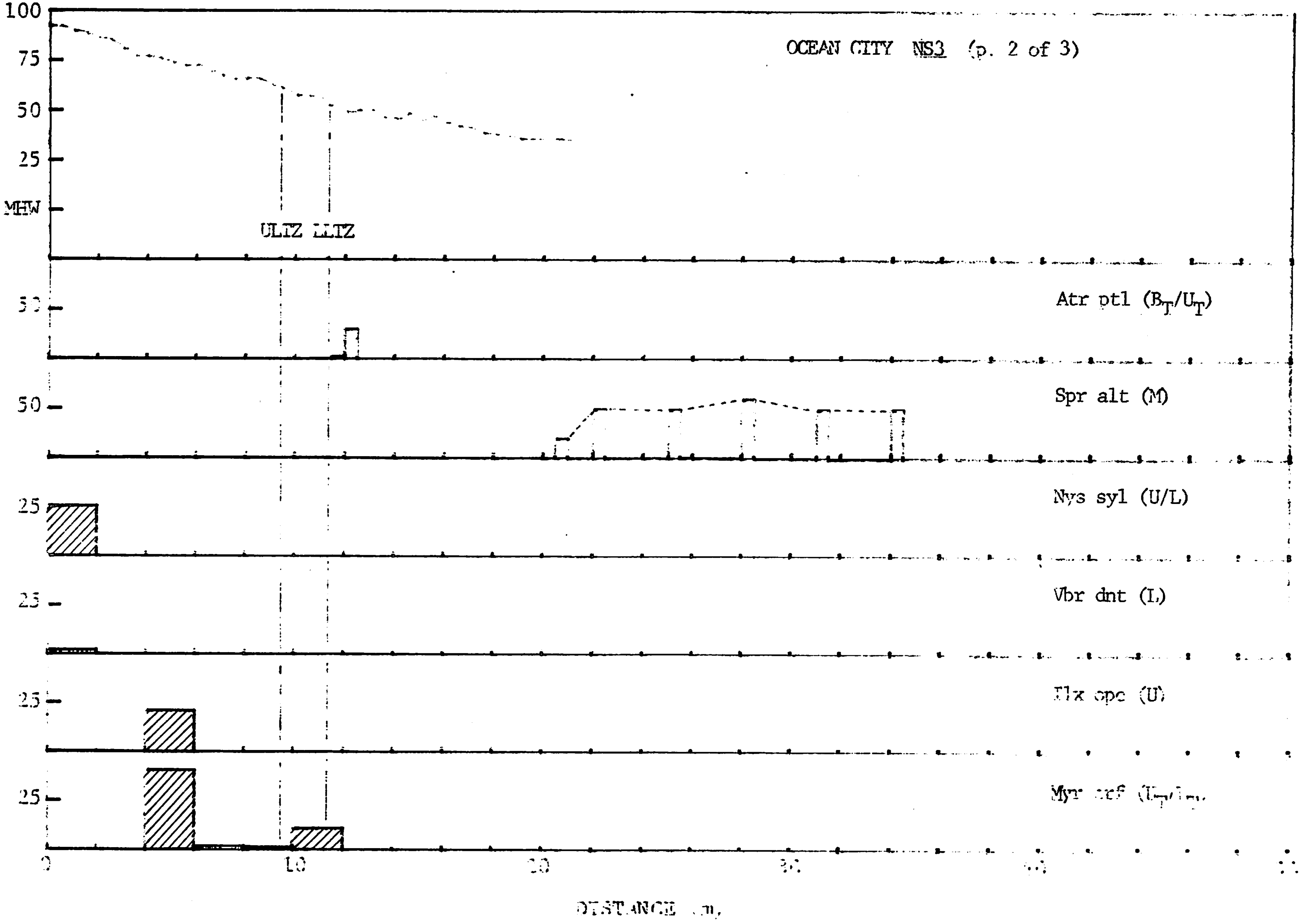

OCEAN CITY NS2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Sld smp (B_T/D)
Rubus sp. (U)
Unl lxa (U)
Panicum sp. (U)
Myr crf (U_T/L_T)
saplings
0
10
20
30
40
50
DISTANCE (m)


OCEAN CITY NS2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Dst spc (M_T)
Spr ptn (M_T/D)
"Combo": Dst spc
+ Spr ptn
Bcc hlm (T/U_T)
saplings
Fmb cst (B_T)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)

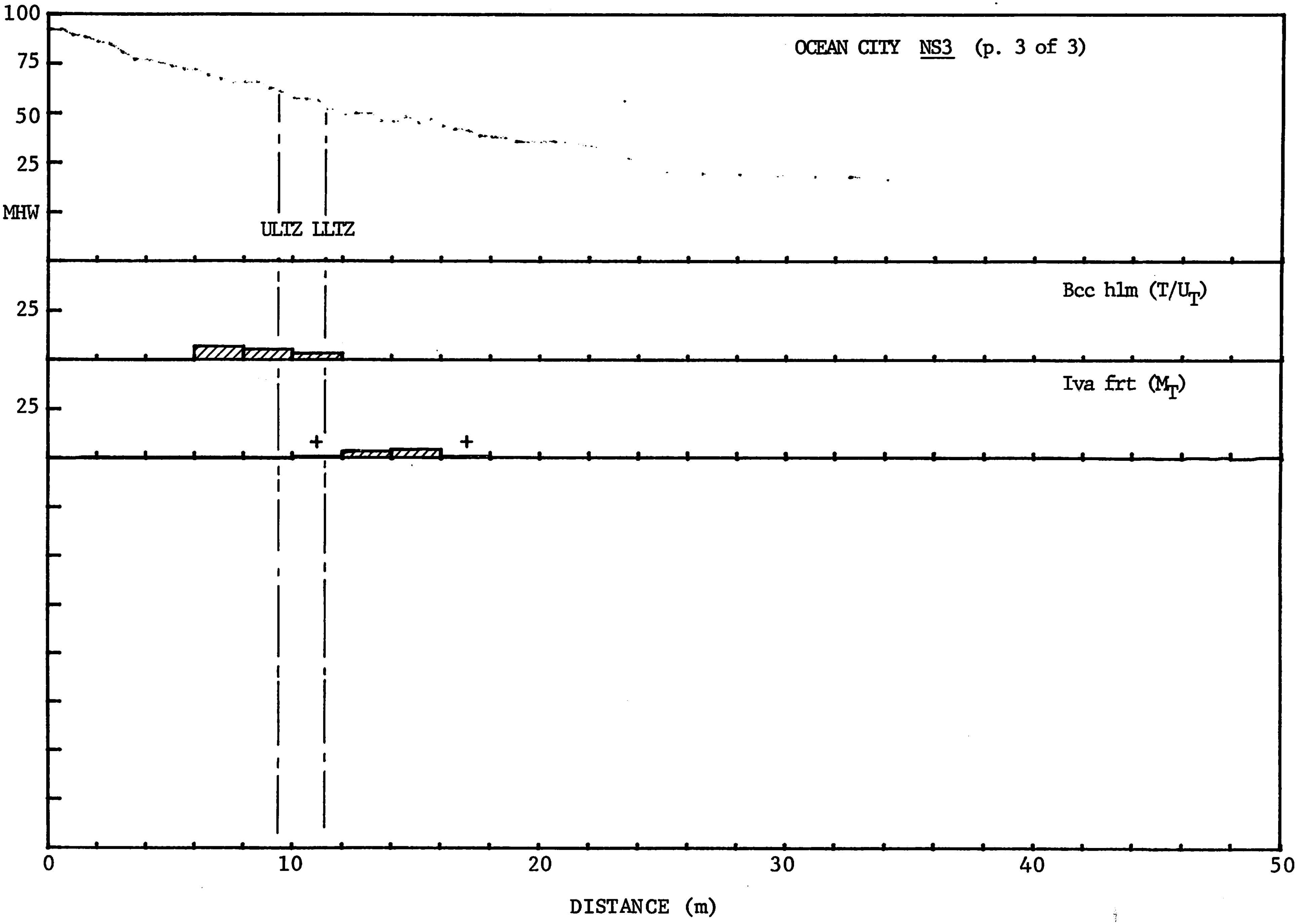


OCEAN CITY NS2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Ilx opc (U)
25
Nys syl (U/L)
25
Myr crf (U_T/L_T)
+
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
+
0
10
20
30
40
50
DISTANCE (m)

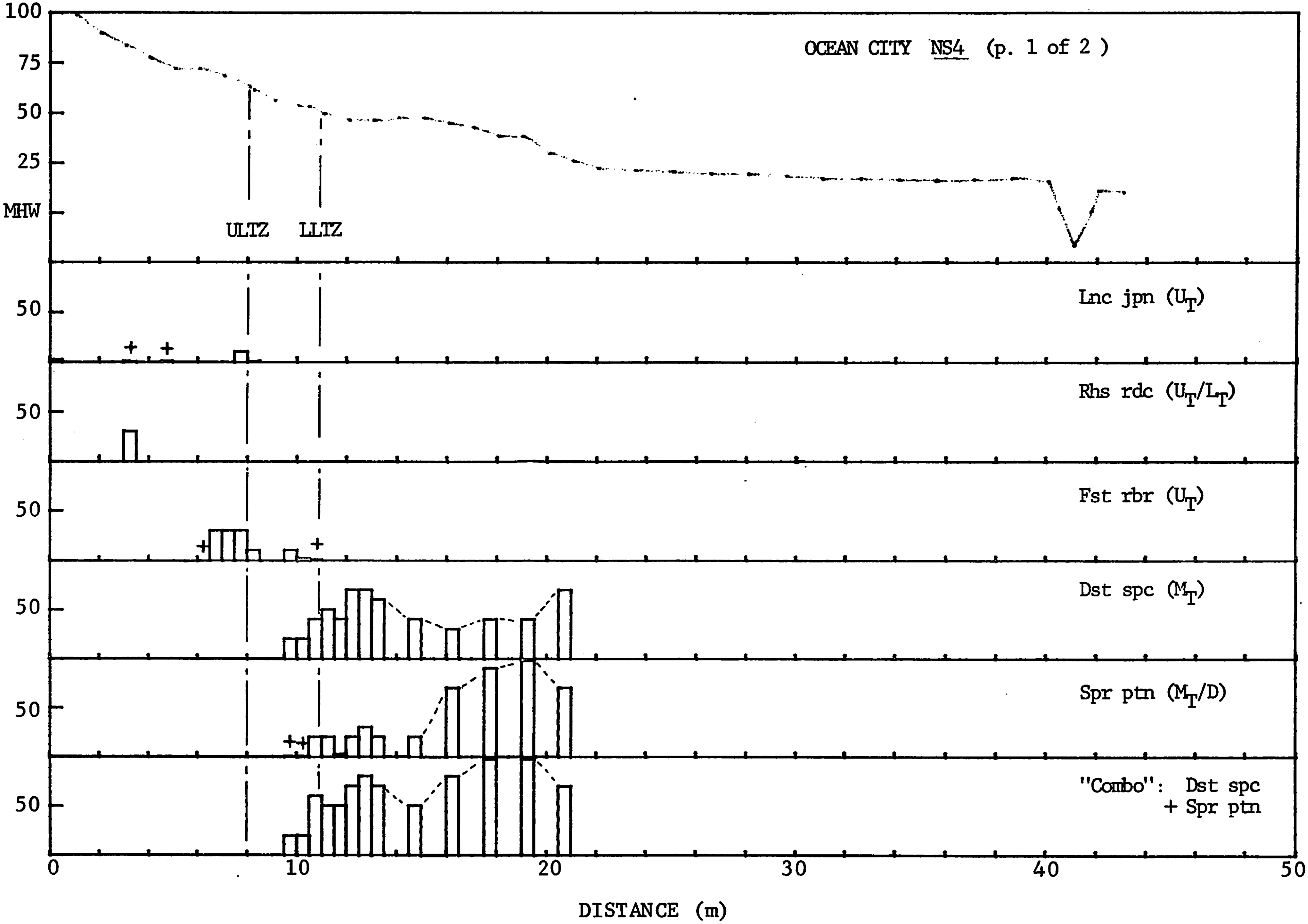

OCEAN CITY NS3 (p. 1 of 3)
100
75
50
25
MHW
ULTZ LLTZ
Lnc jpn (U_T)
Sld smp (B_T/D)
Fst rbr (U_T)
Dst spc (M_T)
Spr ptn (M_T/D)
"Combo": Dst spc
+ Spr ptn
0
10
20
30
40
50
DISTANCE (m)



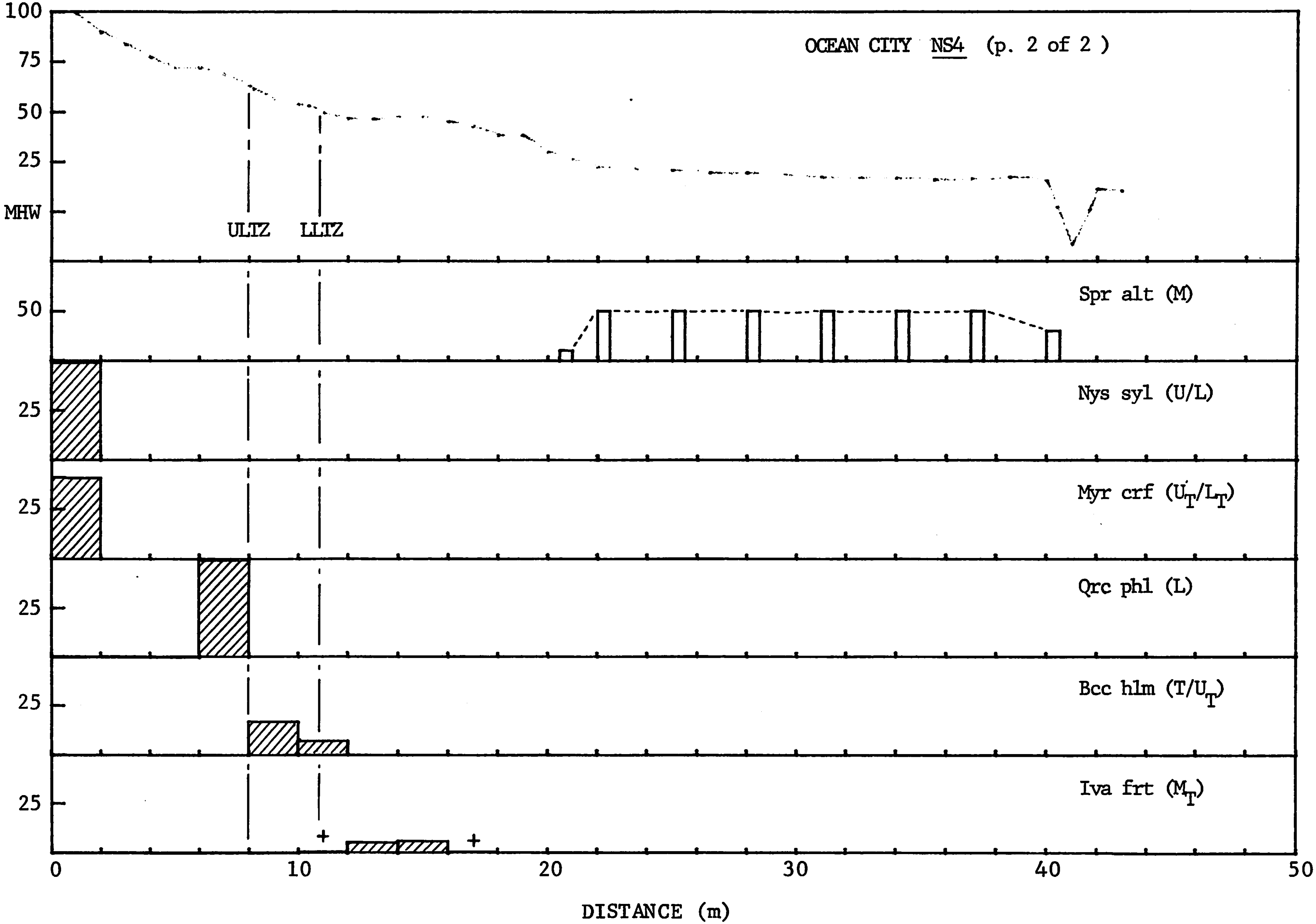
100
75
50
25
MHW
OCEAN CITY NS3 (p. 2 of 3)
ULTZ LLTZ
50
Atr ptl (B_T/U_T)
50
Spr alt (M)
25
Nys syl (U/L)
25
Vbr dnt (L)
25
Flx opc (U)
25
0
10
20
DISTANCE



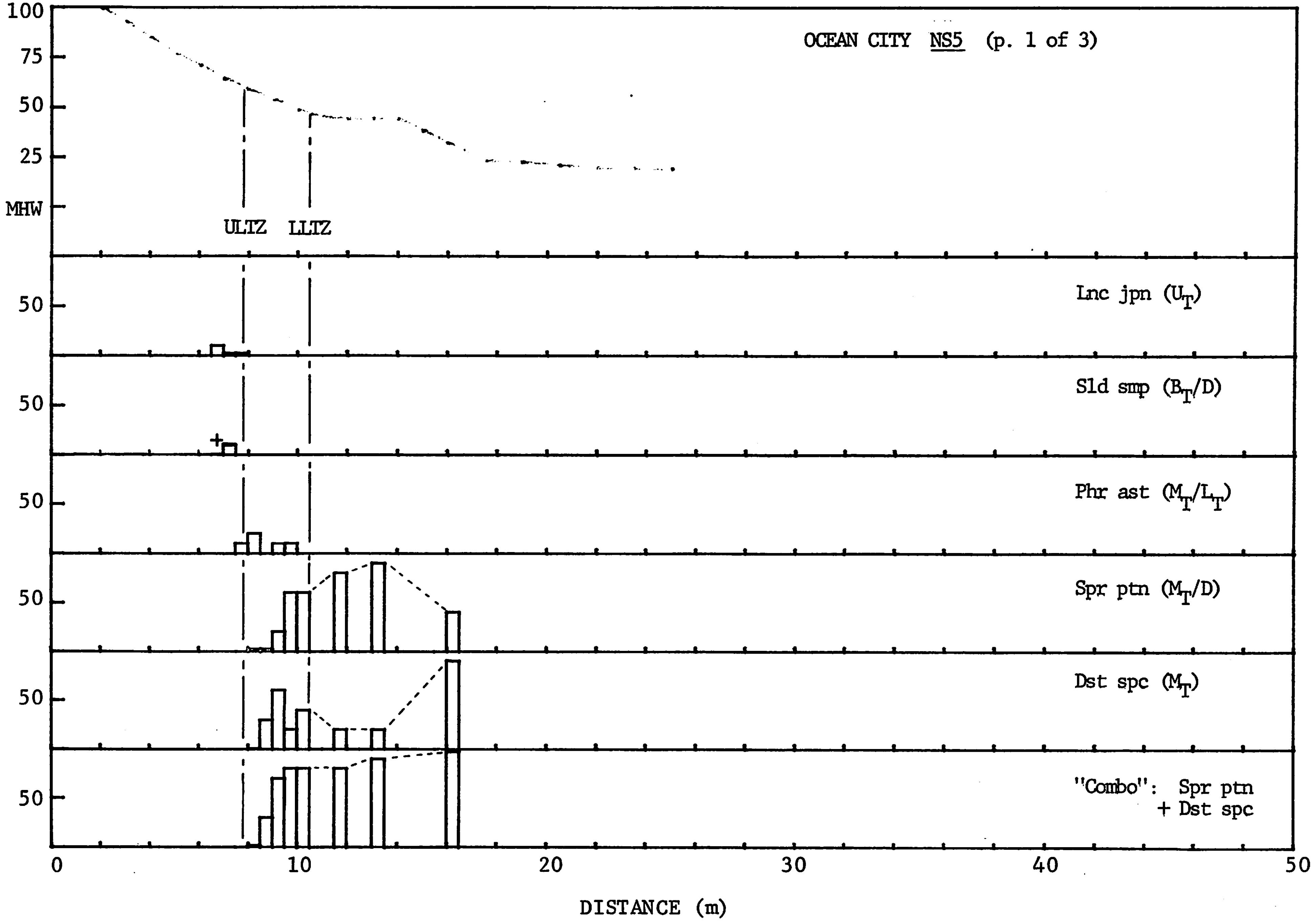
OCEAN CITY NS3 (p. 3 of 3)
100
75
50
25
MHW
ULTZ LLTZ
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
+
+
0
10
20
30
40
50
DISTANCE (m)



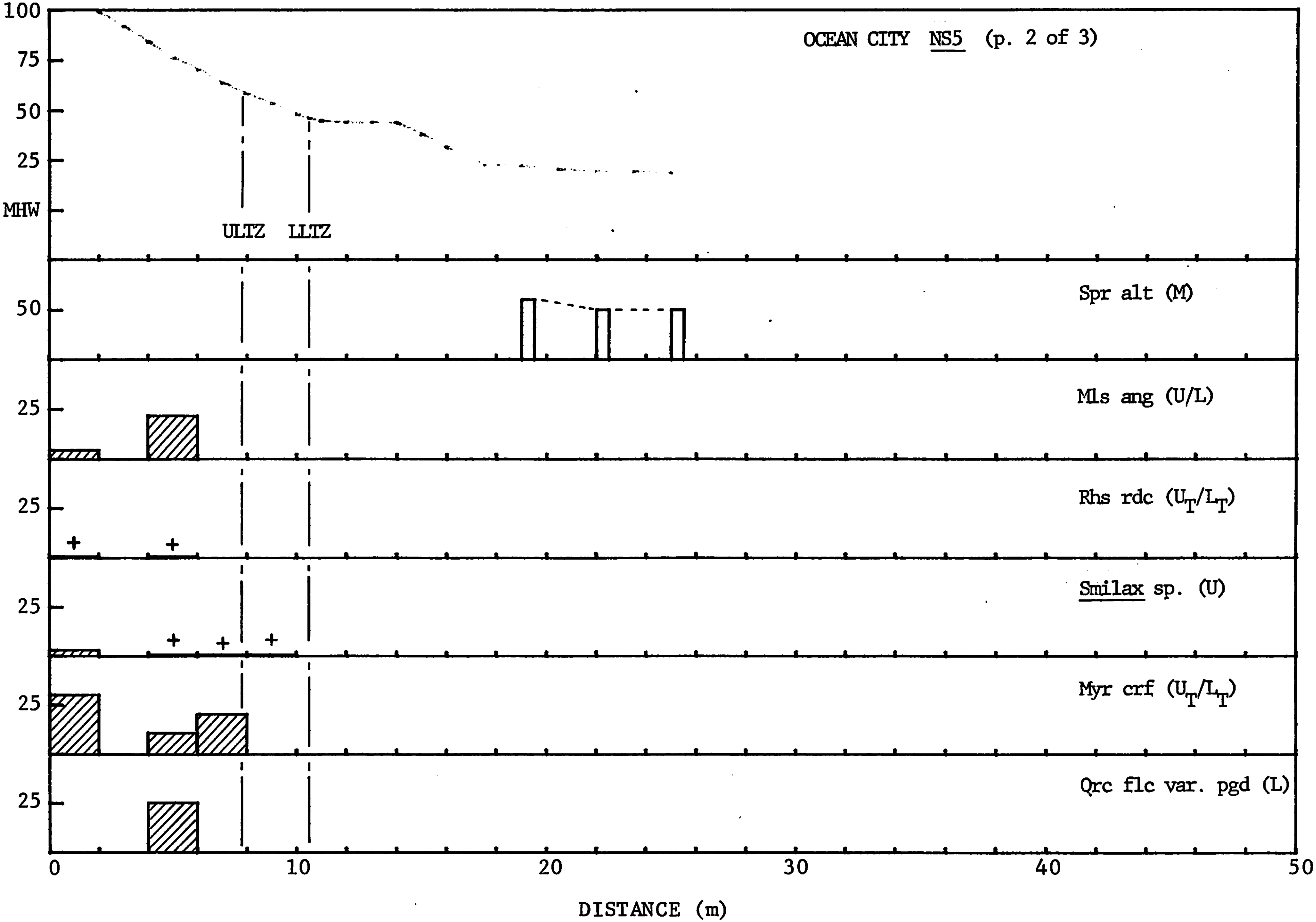
OCEAN CITY NS4 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Rhs rdc (U_T/L_T)
Fst rbr (U_T)
Dst spc (M_T)
Spr ptn (M_T/D)
"Combo": Dst spc + Spr ptn
0
10
20
30
40
50
DISTANCE (m)



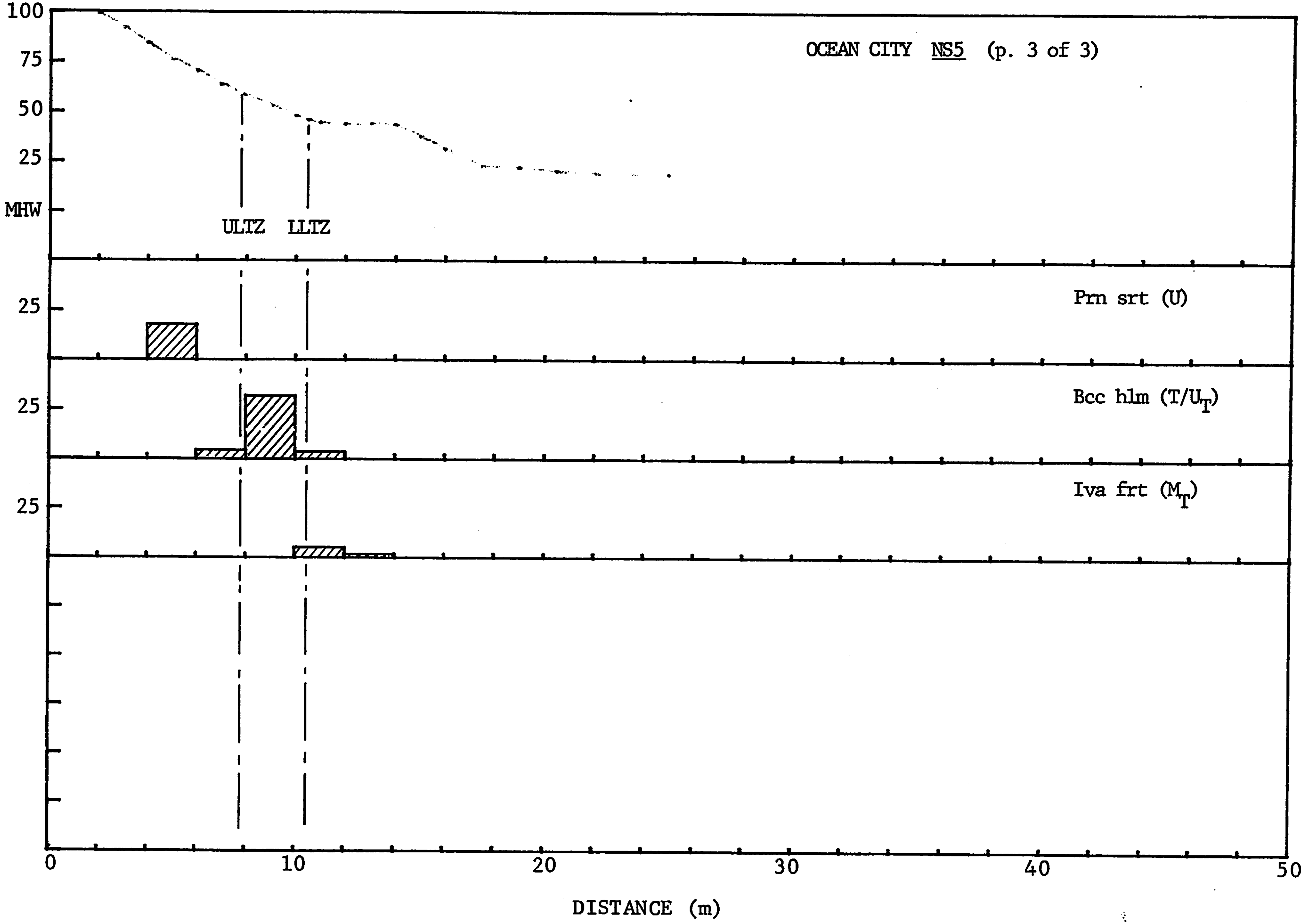
OCEAN CITY NS4 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
50
Nys syl (U/L)
25
Myr crf (U_T/L_T)
25
Qrc phl (L)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
+
+
0
10
20
30
40
50
DISTANCE (m)



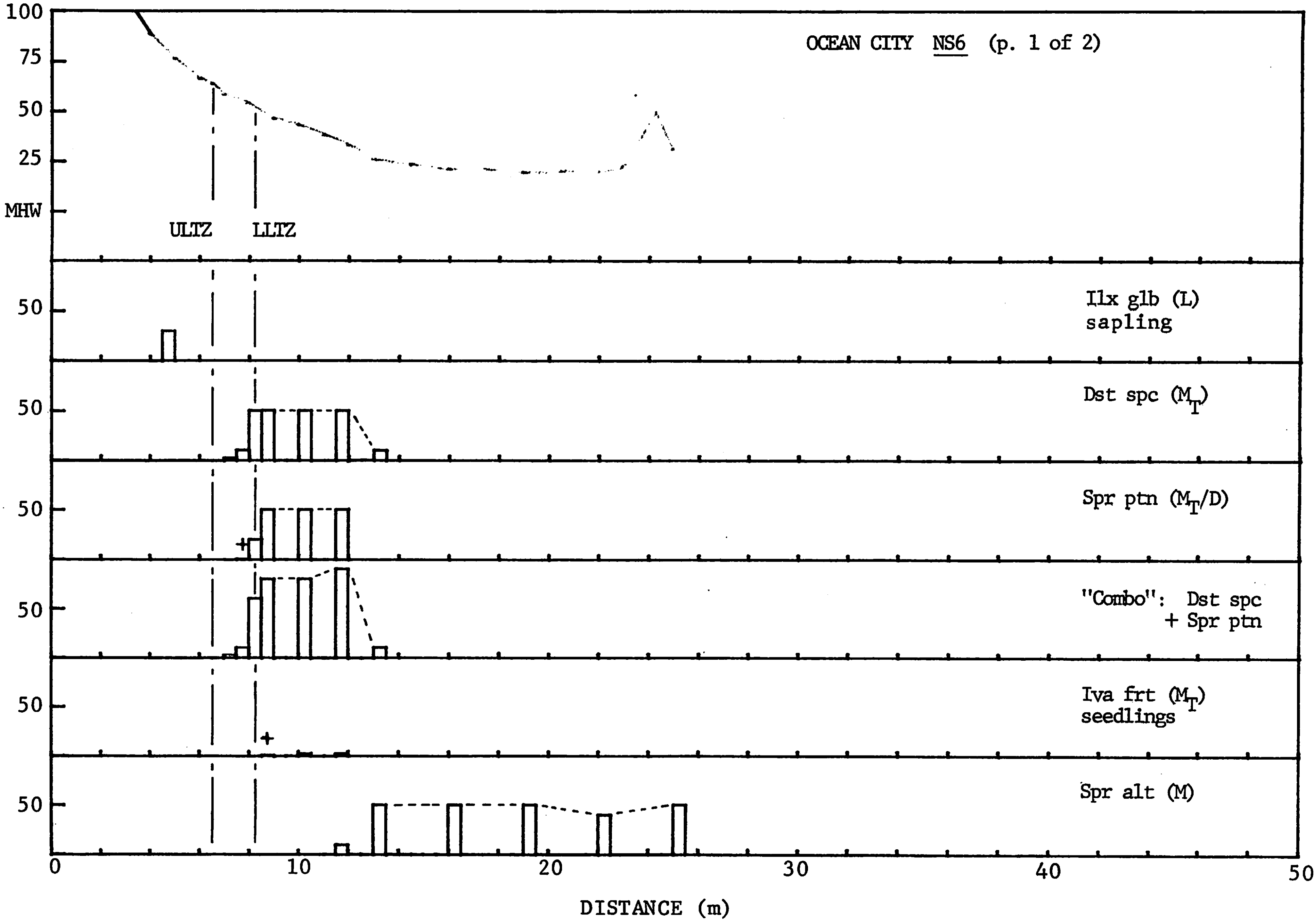
OCEAN CITY NS5 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Sld smp (B_T/D)
Phr ast (M_T/L_T)
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn + Dst spc
0
10
20
30
40
50
DISTANCE (m)

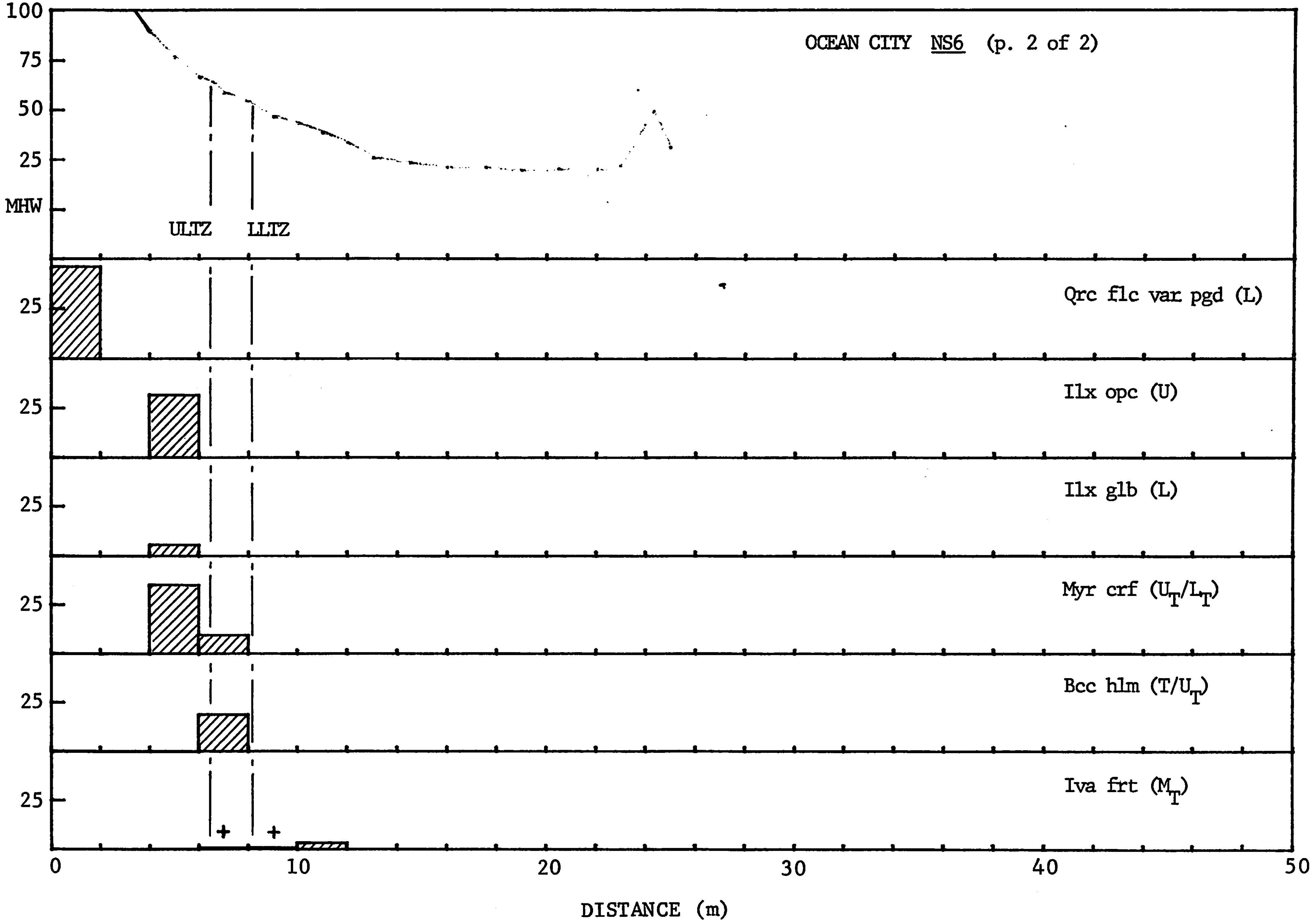


OCEAN CITY NS5 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
Mls ang (U/L)
Rhs rdc (U_T/L_T)
Smilax sp. (U)
Myr crf (U_T/L_T)
Qrc flc var. pgd (L)
0
10
20
30
40
50
DISTANCE (m)

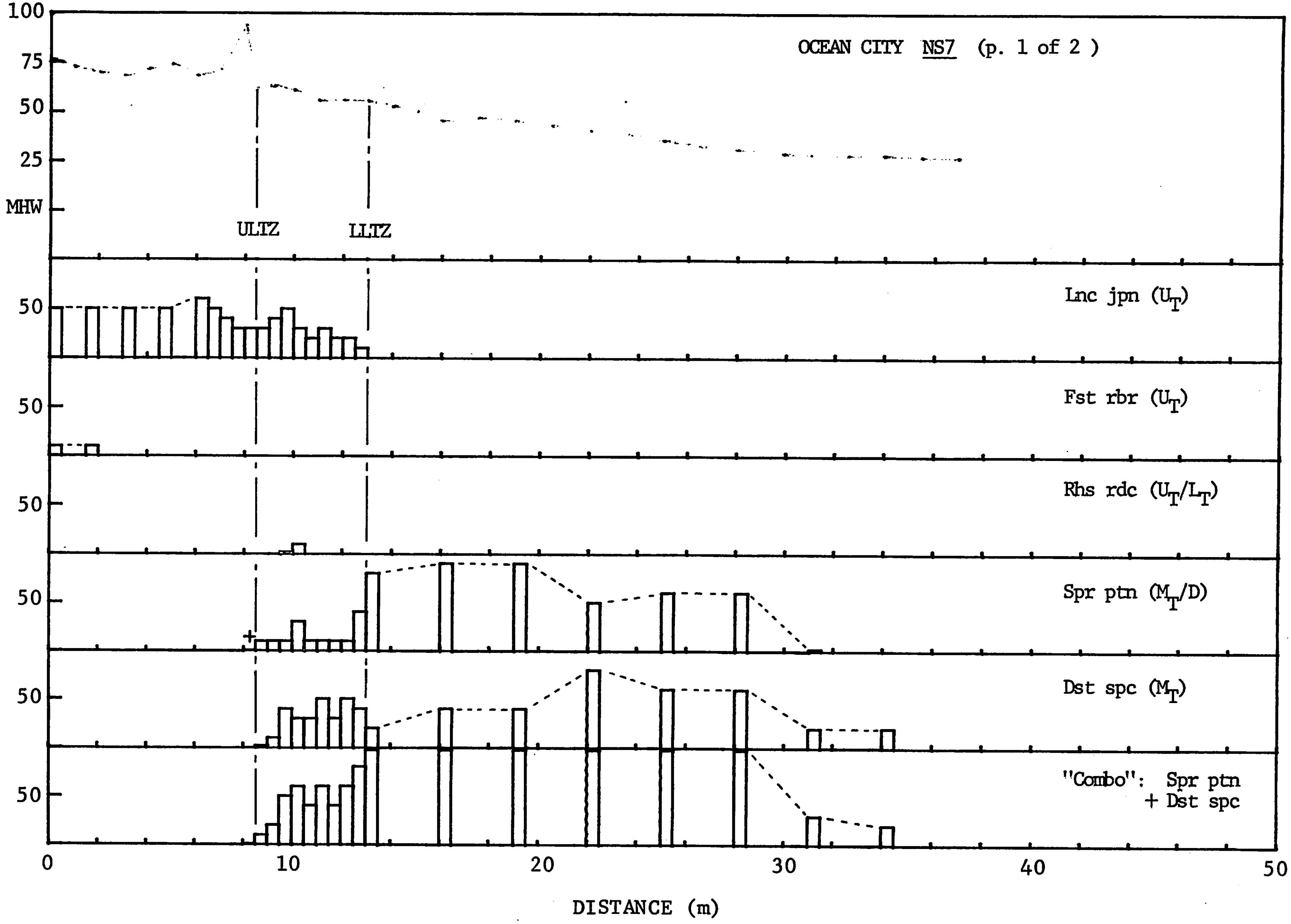


OCEAN CITY NS5 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Prn srt (U)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)

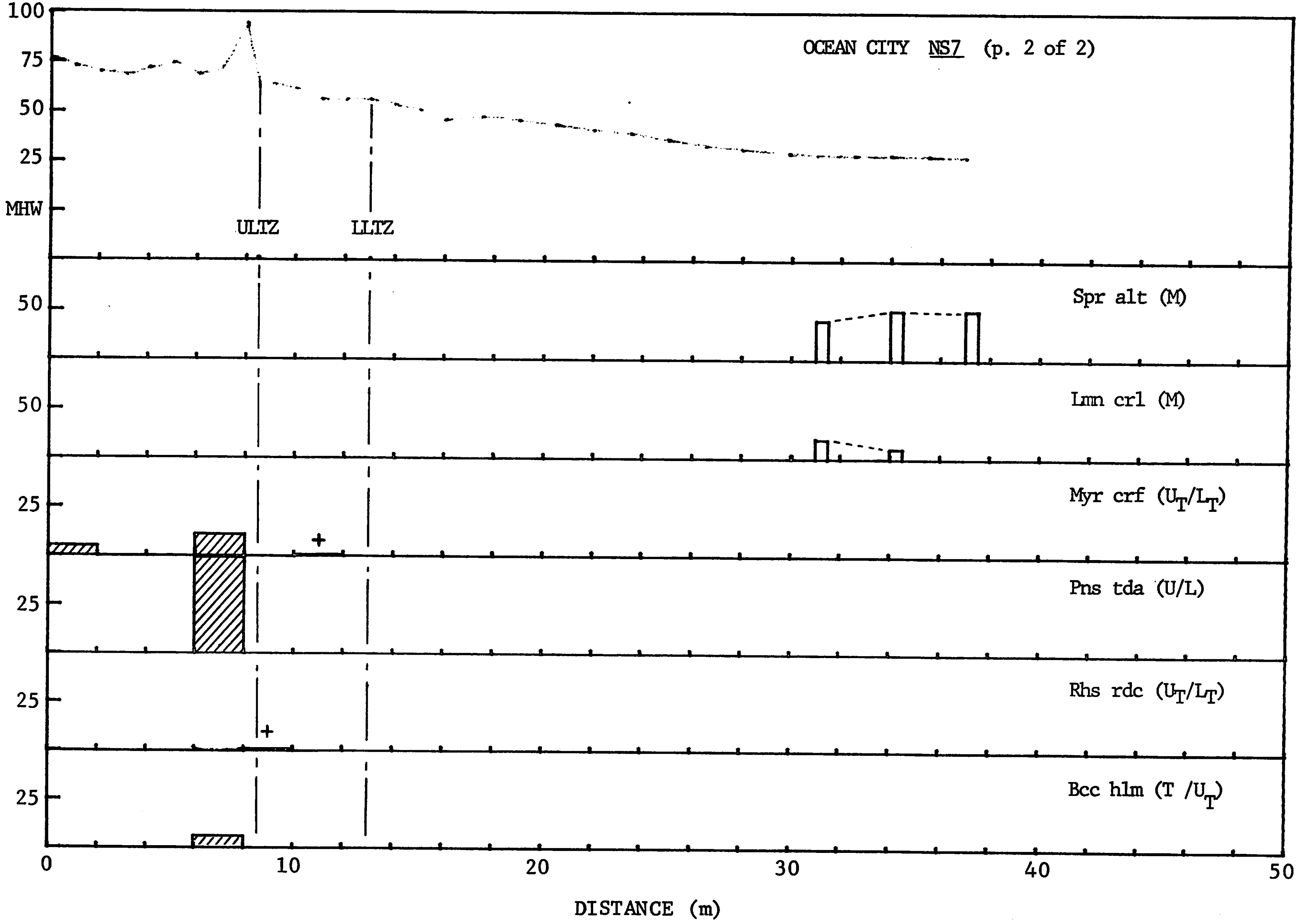

OCEAN CITY NS6 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Ilx glb (L) sapling
Dst spc (M_T)
Spr ptn (M_T/D)
"Combo": Dst spc + Spr ptn
Iva frt (M_T) seedlings
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)



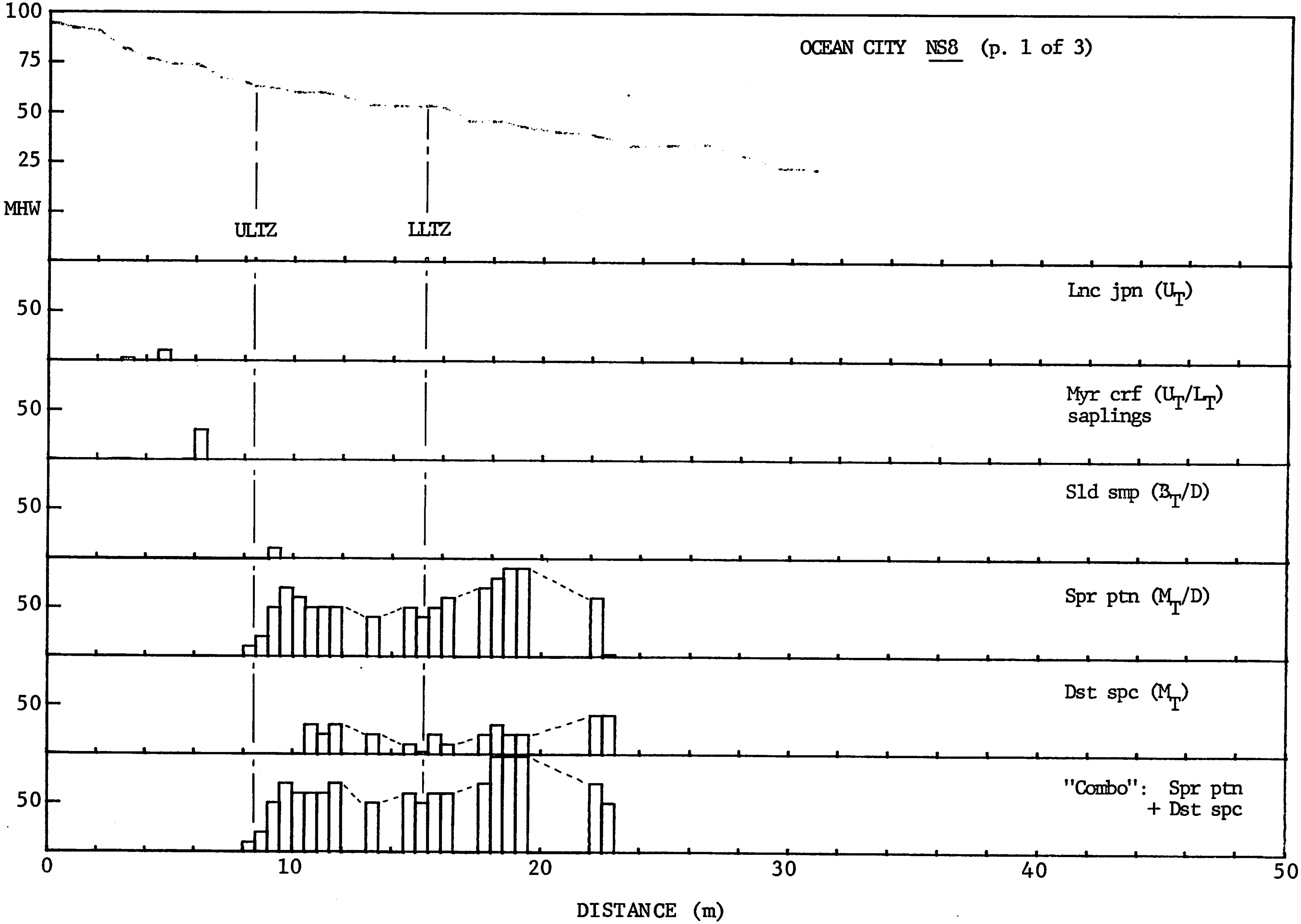
OCEAN CITY NS6 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Qrc flc var pgd (L)
Ilx opc (U)
Ilx glb (L)
Myr crf (U_T/L_T)
Bcc hlm (T/U_T)
Iva frt (M_T)
+
+
0
10
20
30
40
50
DISTANCE (m)



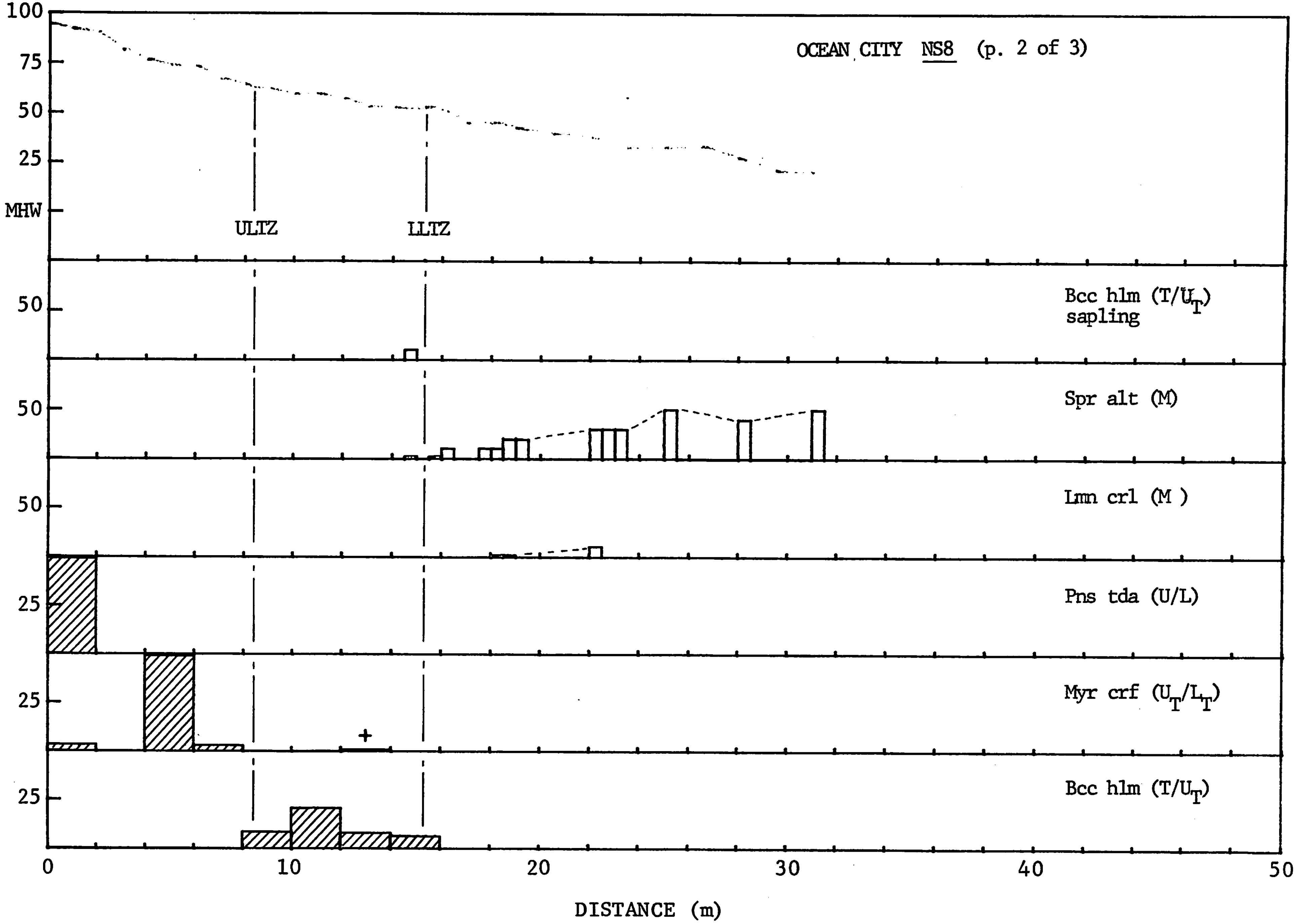
OCEAN CITY NS7 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Fst rbr (U_T)
Rhs rdc (U_T/L_T)
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn + Dst spc
0
10
20
30
40
50
DISTANCE (m)



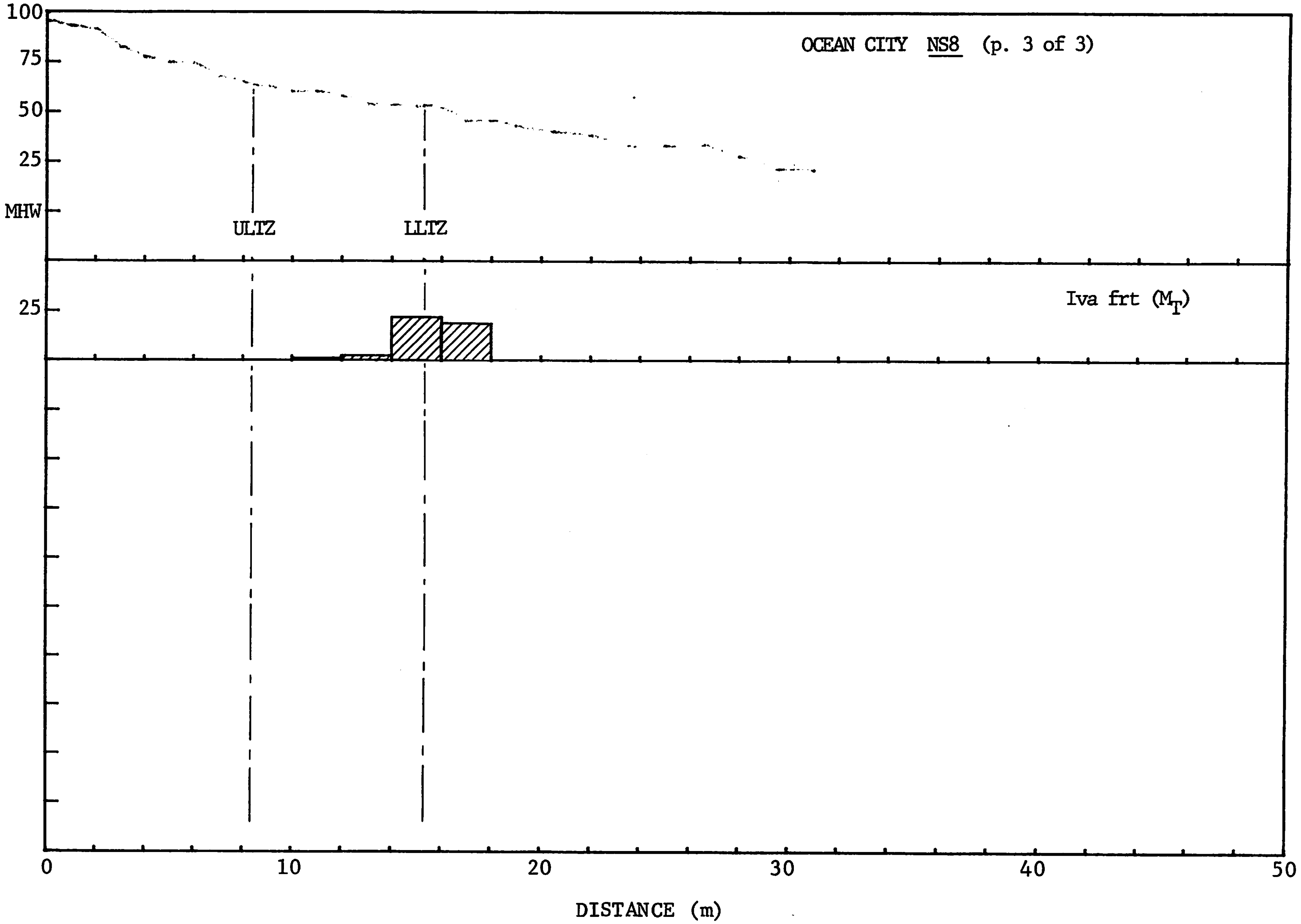
OCEAN CITY NS7 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
50
Lmn crl (M)
50
Myr crf (U_T/L_T)
25
Pns tda (U/L)
25
Rhs rdc (U_T/L_T)
25
Bcc hlm (T /U_T)
25
0
10
20
30
40
50
DISTANCE (m)



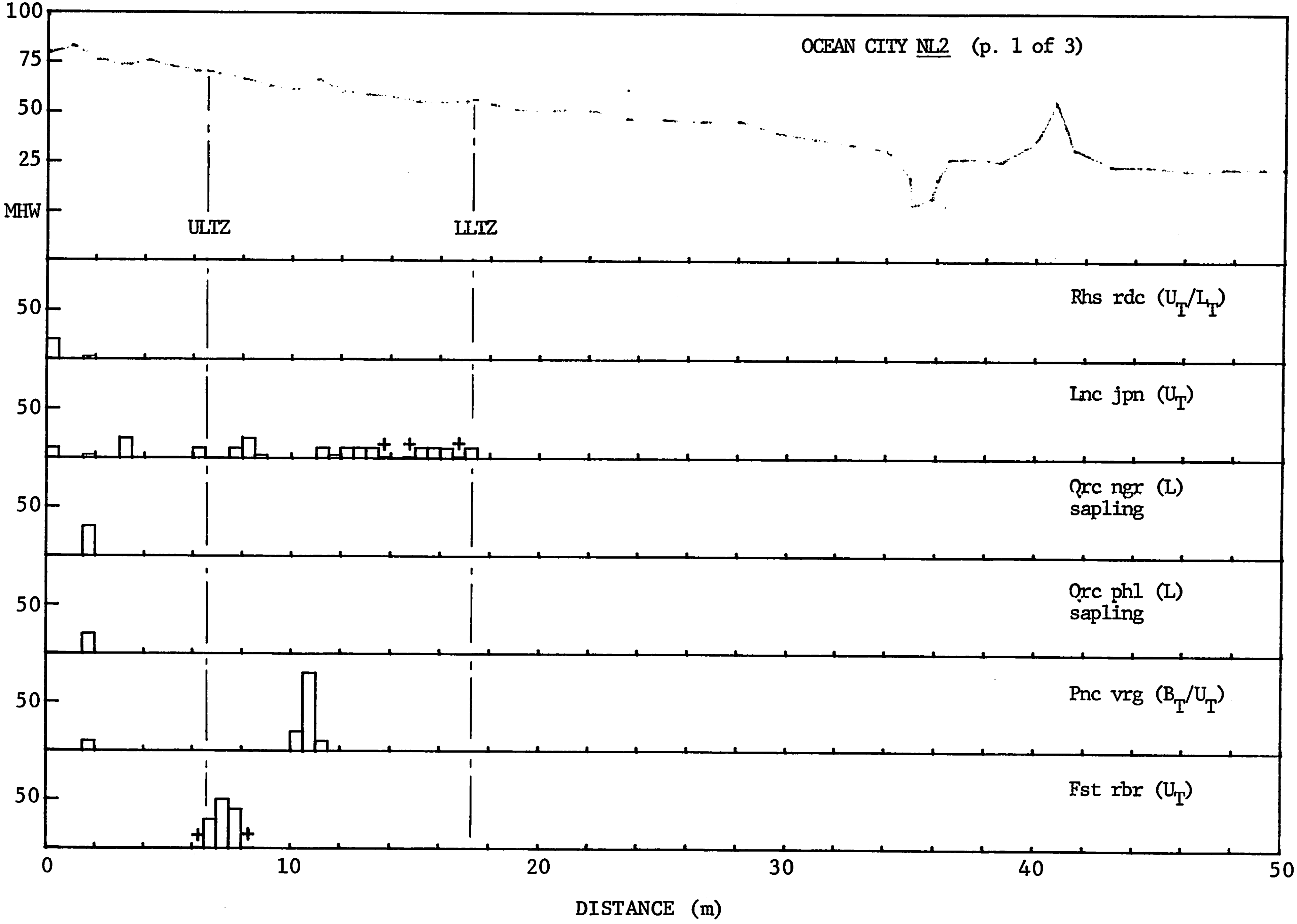
OCEAN CITY NS8 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Myr crf (U_T/L_T) saplings
Sld smp (B_T/D)
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn + Dst spc
0
10
20
30
40
50
DISTANCE (m)



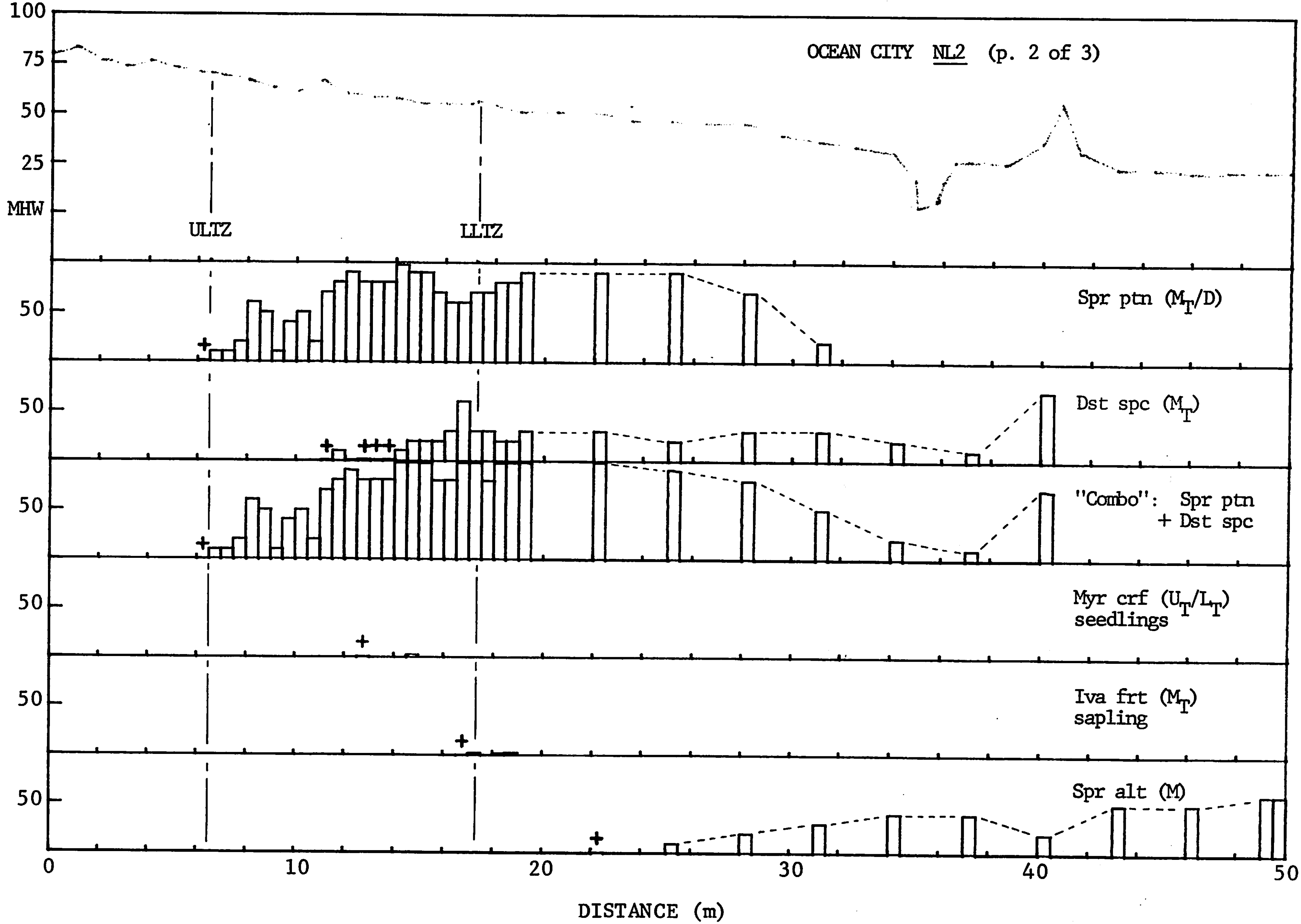
OCEAN CITY NS8 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Bcc hlm (T/U$_T$)
sapling
50
Spr alt (M)
50
Lmn crl (M)
25
Pns tda (U/L)
25
Myr crf (U$_T$/L$_T$)
+
25
Bcc hlm (T/U$_T$)
0
10
20
30
40
50
DISTANCE (m)



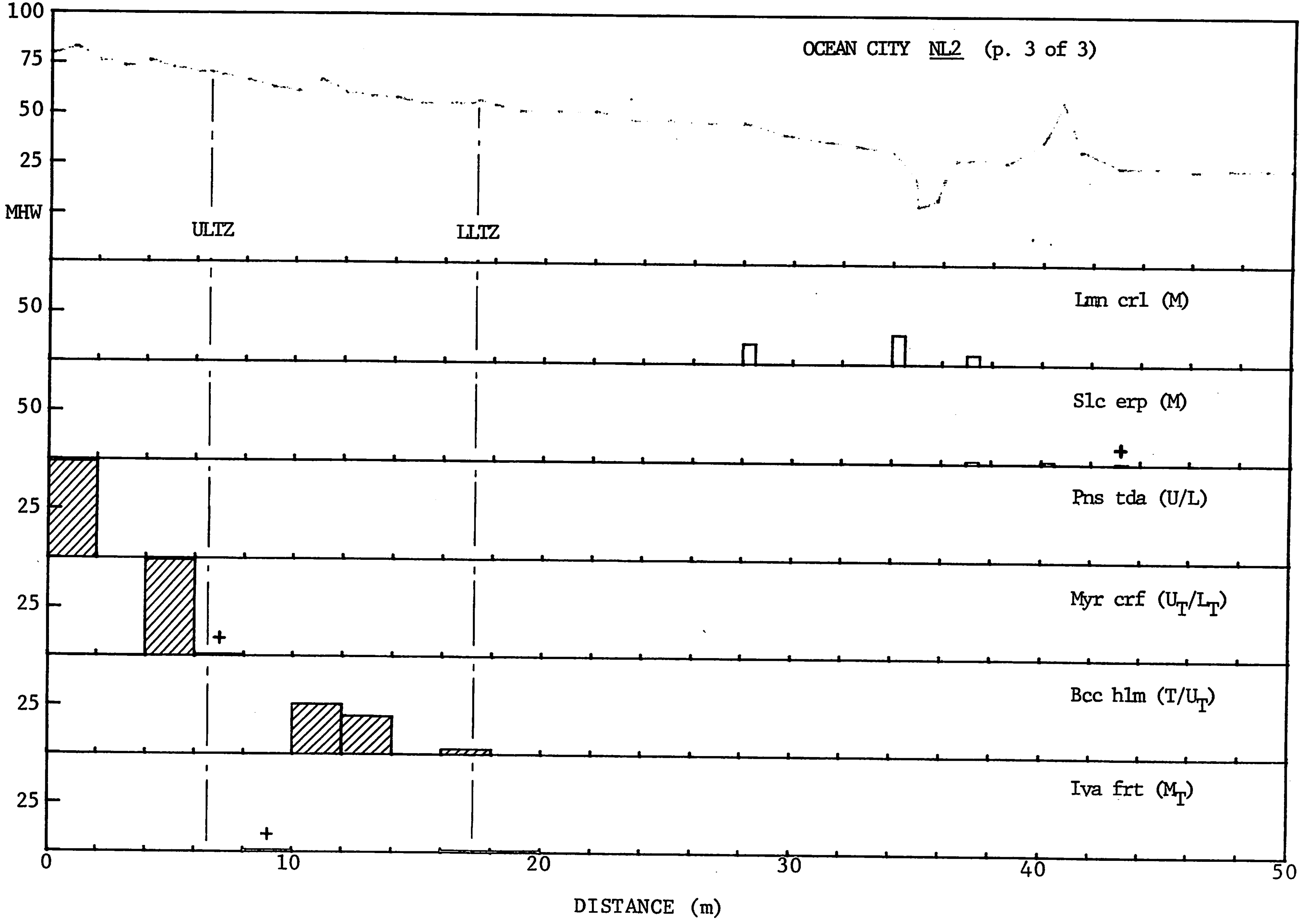
OCEAN CITY NS8 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)



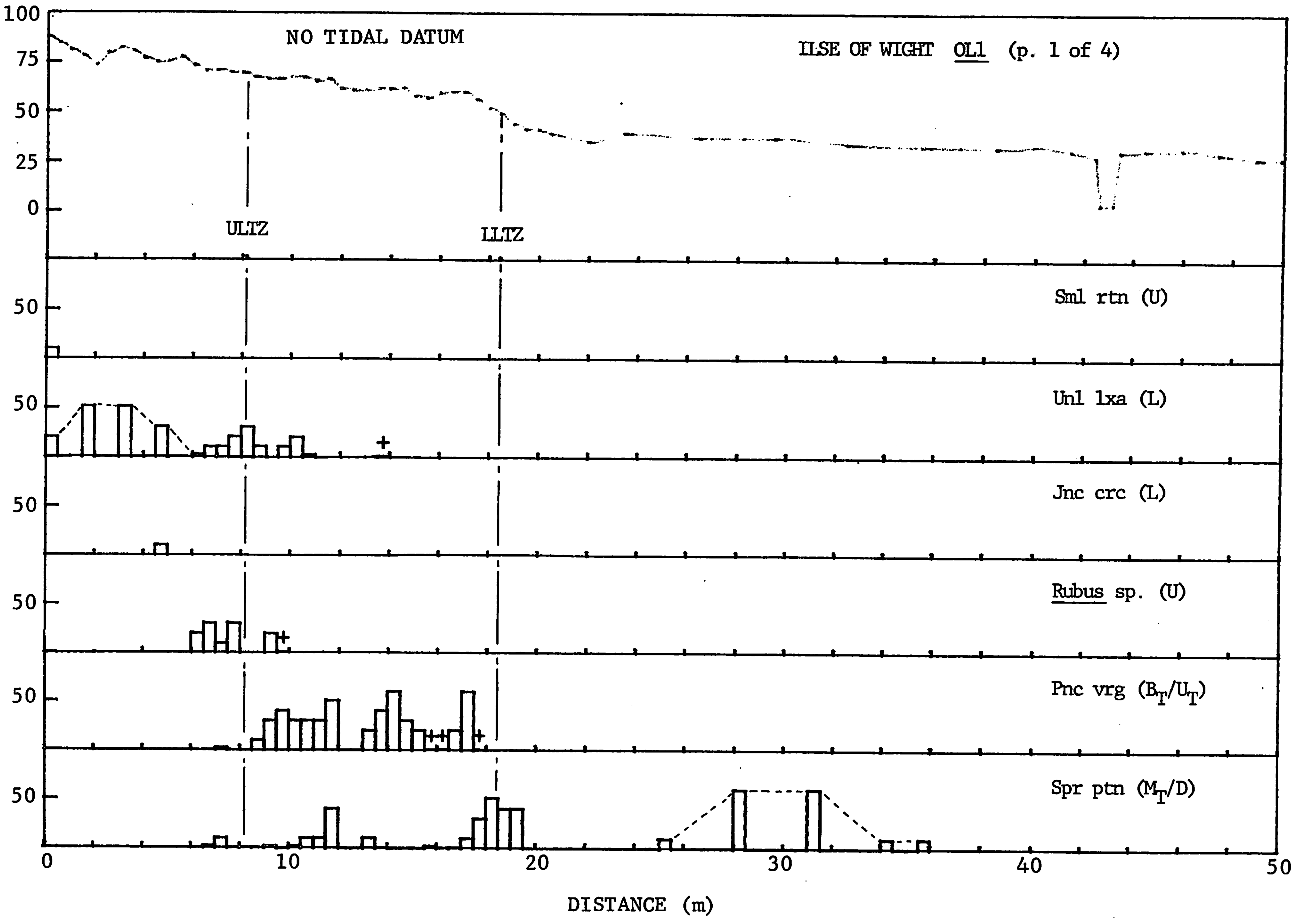
OCEAN CITY NL2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (UT/LT)
Lnc jpn (UT)
Qrc ngr (L) sapling
Qrc phl (L) sapling
Pnc vrg (BT/UT)
Fst rbr (UT)
0
10
20
30
40
50
DISTANCE (m)

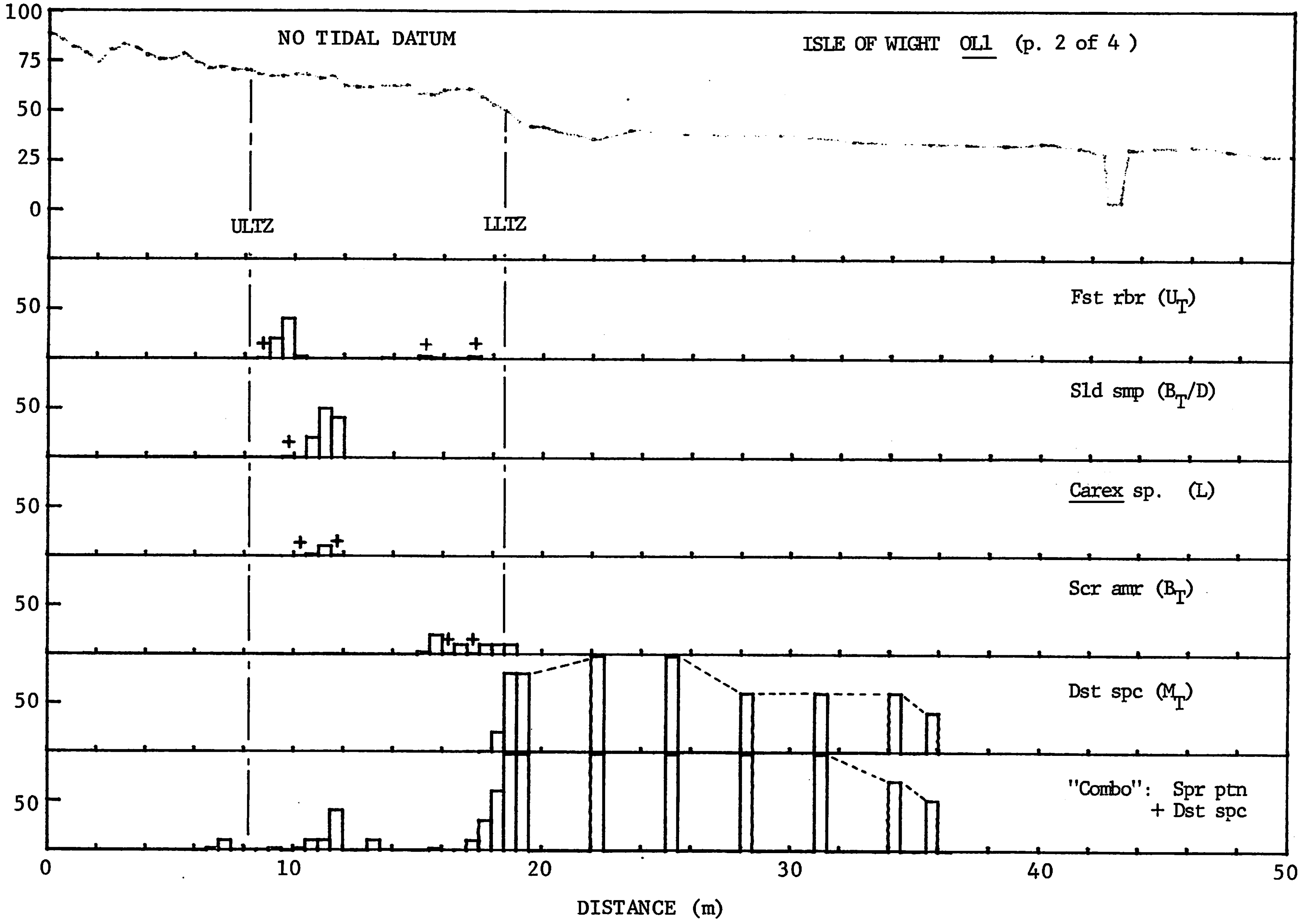


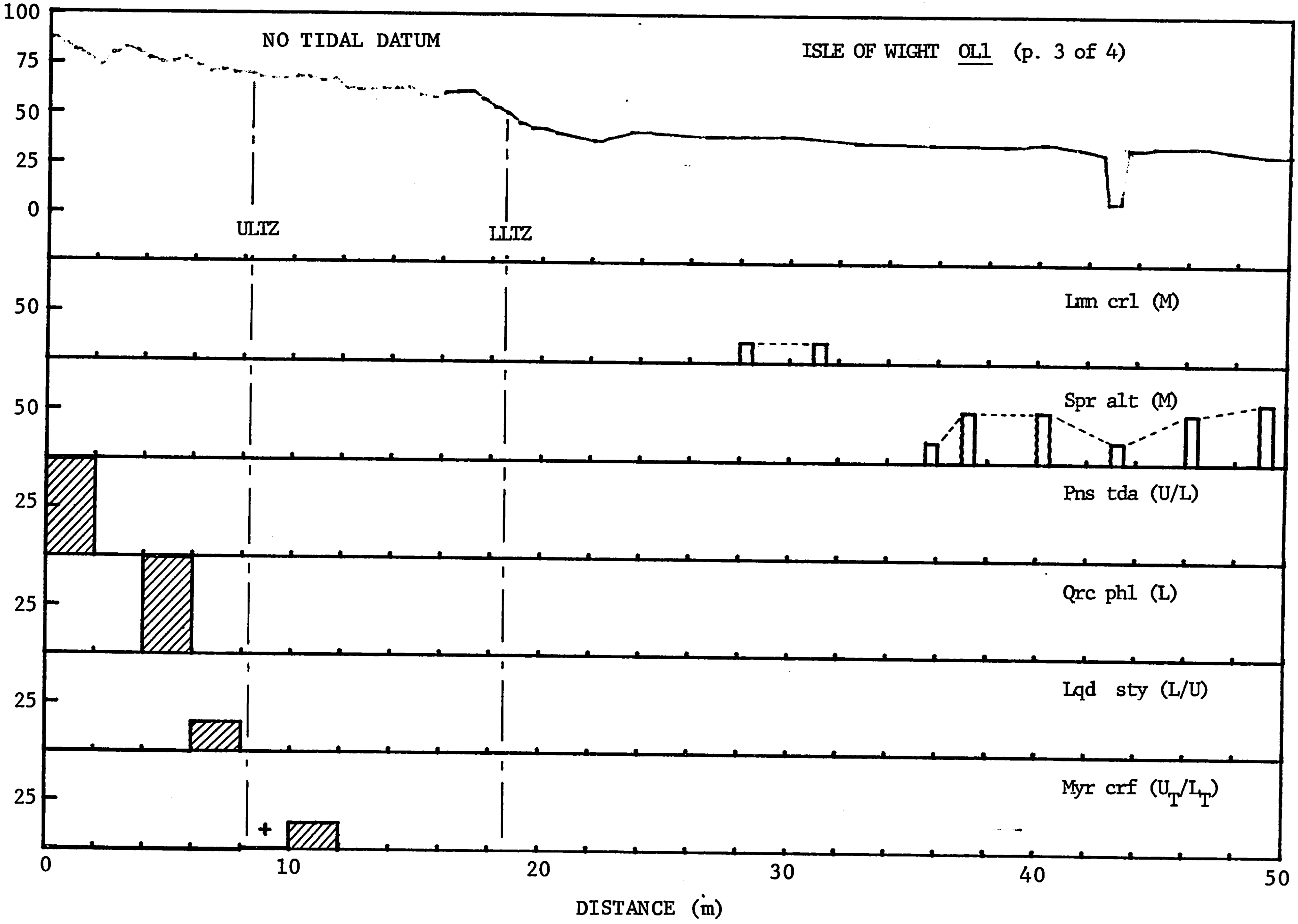
OCEAN CITY NL2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn + Dst spc
Myr crf (U_T/L_T) seedlings
Iva frt (M_T) sapling
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)



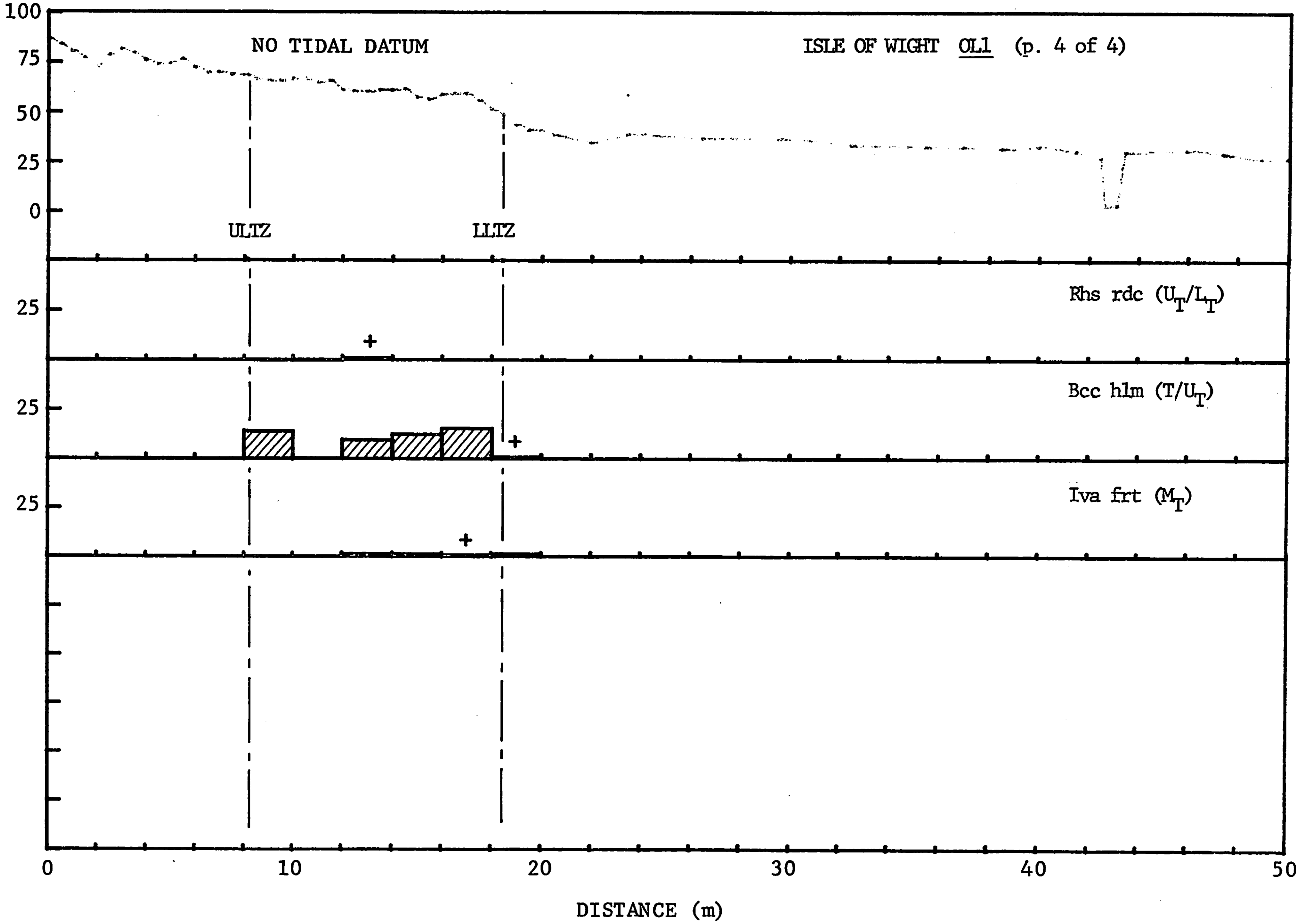
OCEAN CITY NL2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Lmn crl (M)
50
Slc erp (M)
25
Pns tda (U/L)
25
Myr crf (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

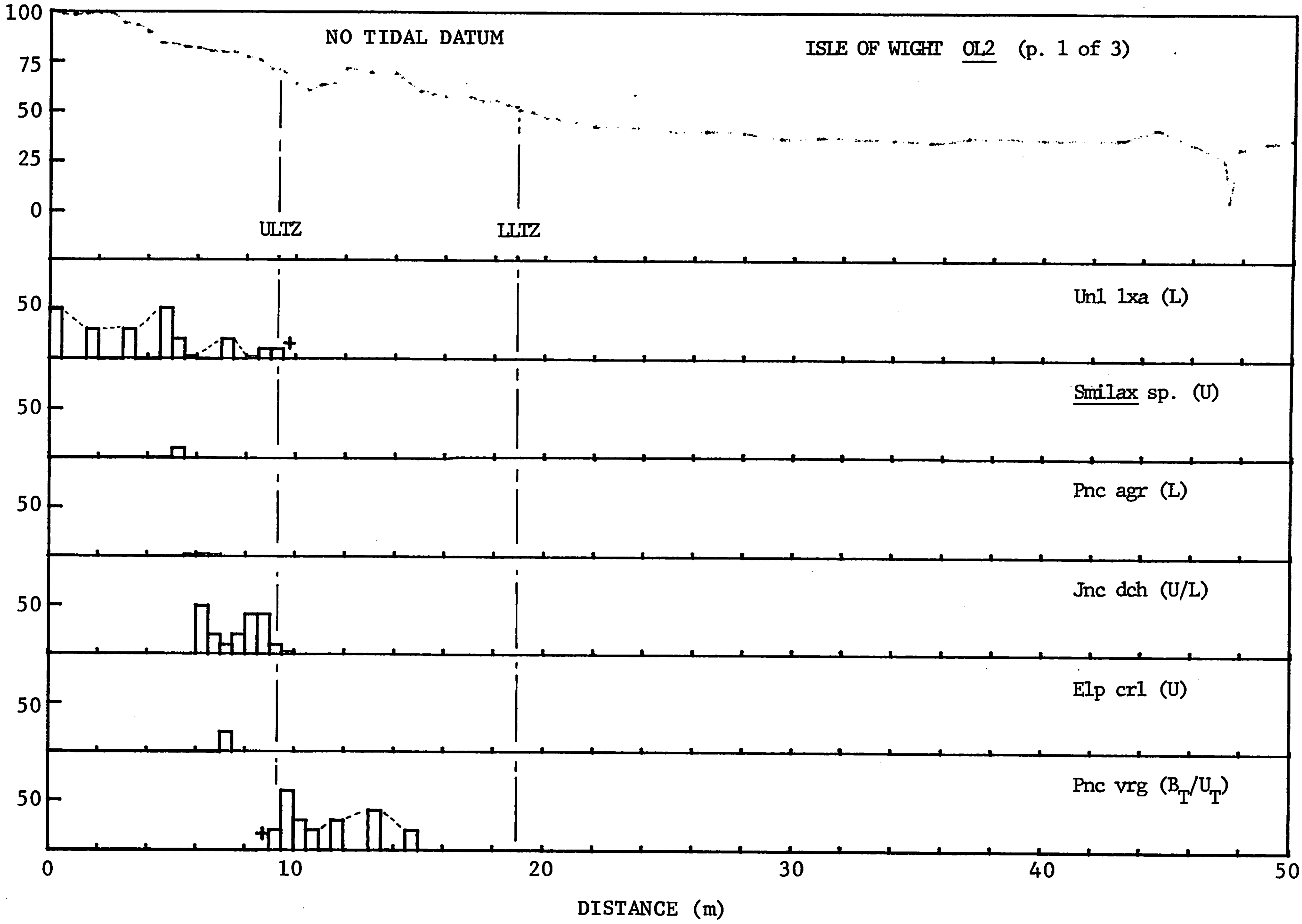

NO TIDAL DATUM
ILSE OF WIGHT OL1 (p. 1 of 4)
100
75
50
25
0
ULTZ
LLTZ
Sml rtn (U)
Unl lxa (L)
Jnc crc (L)
Rubus sp. (U)
Pnc vrg (BT/UT)
Spr ptn (MT/D)
0
10
20
30
40
50
DISTANCE (m)


NO TIDAL DATUM
ISLE OF WIGHT OL1 (p. 2 of 4)
100
75
50
25
0
ULTZ
LLTZ
Fst rbr (U_T)
Sld smp (B_T/D)
Carex sp. (L)
Scr amr (B_T)
Dst spc (M_T)
"Combo": Spr ptn
+ Dst spc
0
10
20
30
40
50
DISTANCE (m)

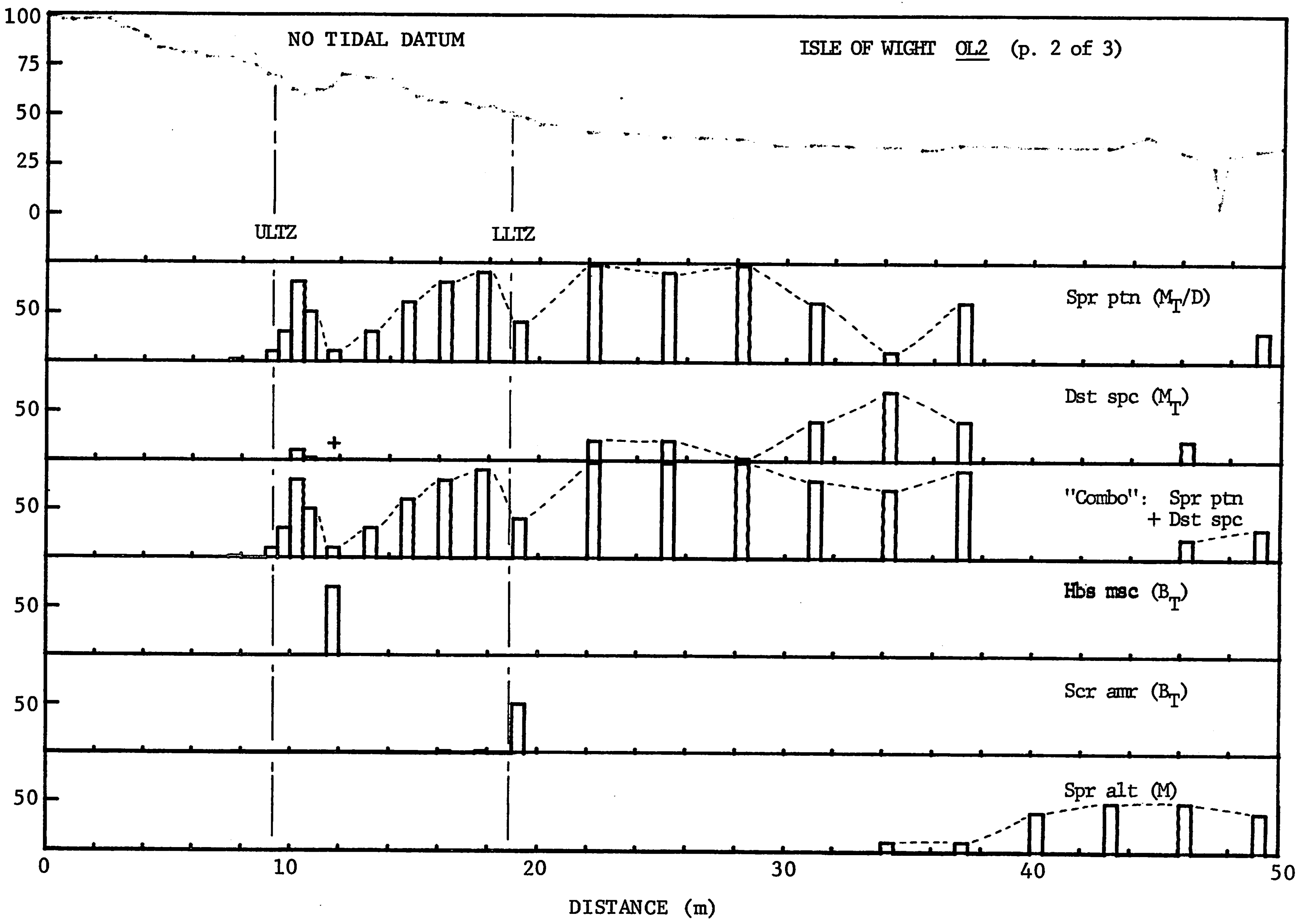


NO TIDAL DATUM
ISLE OF WIGHT OL1 (p. 3 of 4)
100
75
50
25
0
ULTZ
LLTZ
50
Lmn crl (M)
50
Spr alt (M)
25
Pns tda (U/L)
25
Qrc phl (L)
25
Lqd sty (L/U)
25
Myr crf (U_T/L_T)
+
0
10
20
30
40
50
DISTANCE (m)

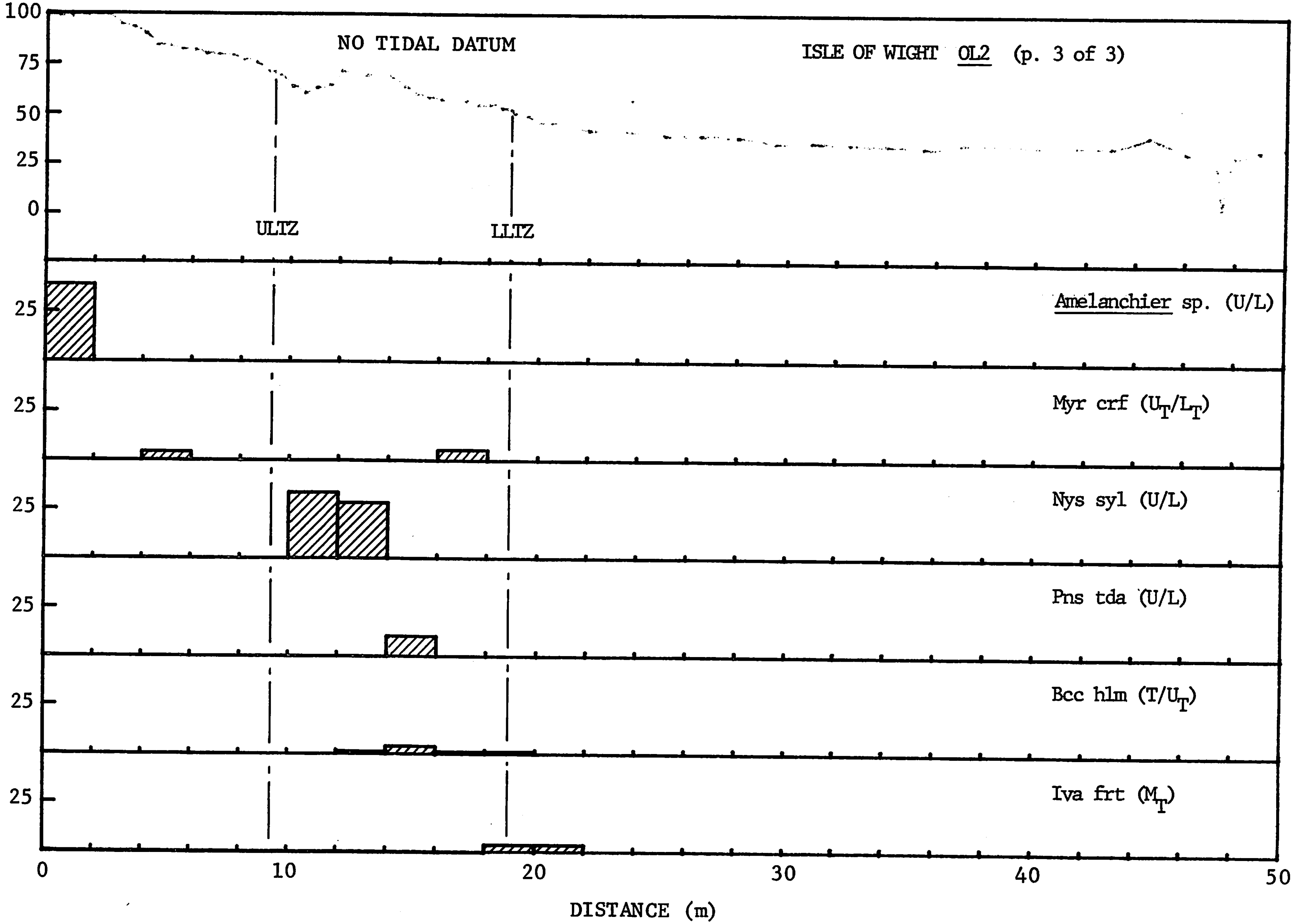

NO TIDAL DATUM
ISLE OF WIGHT OL1 (p. 4 of 4)
100
75
50
25
0
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
25
0
10
20
30
40
50
DISTANCE (m)



NO TIDAL DATUM
ISLE OF WIGHT OL2 (p. 1 of 3)
100
75
50
25
0
ULTZ
LLTZ
Unl lxa (L)
Smilax sp. (U)
Pnc agr (L)
Jnc dch (U/L)
Elp crl (U)
Pnc vrg (B_T/U_T)
50
0
10
20
30
40
50
DISTANCE (m)



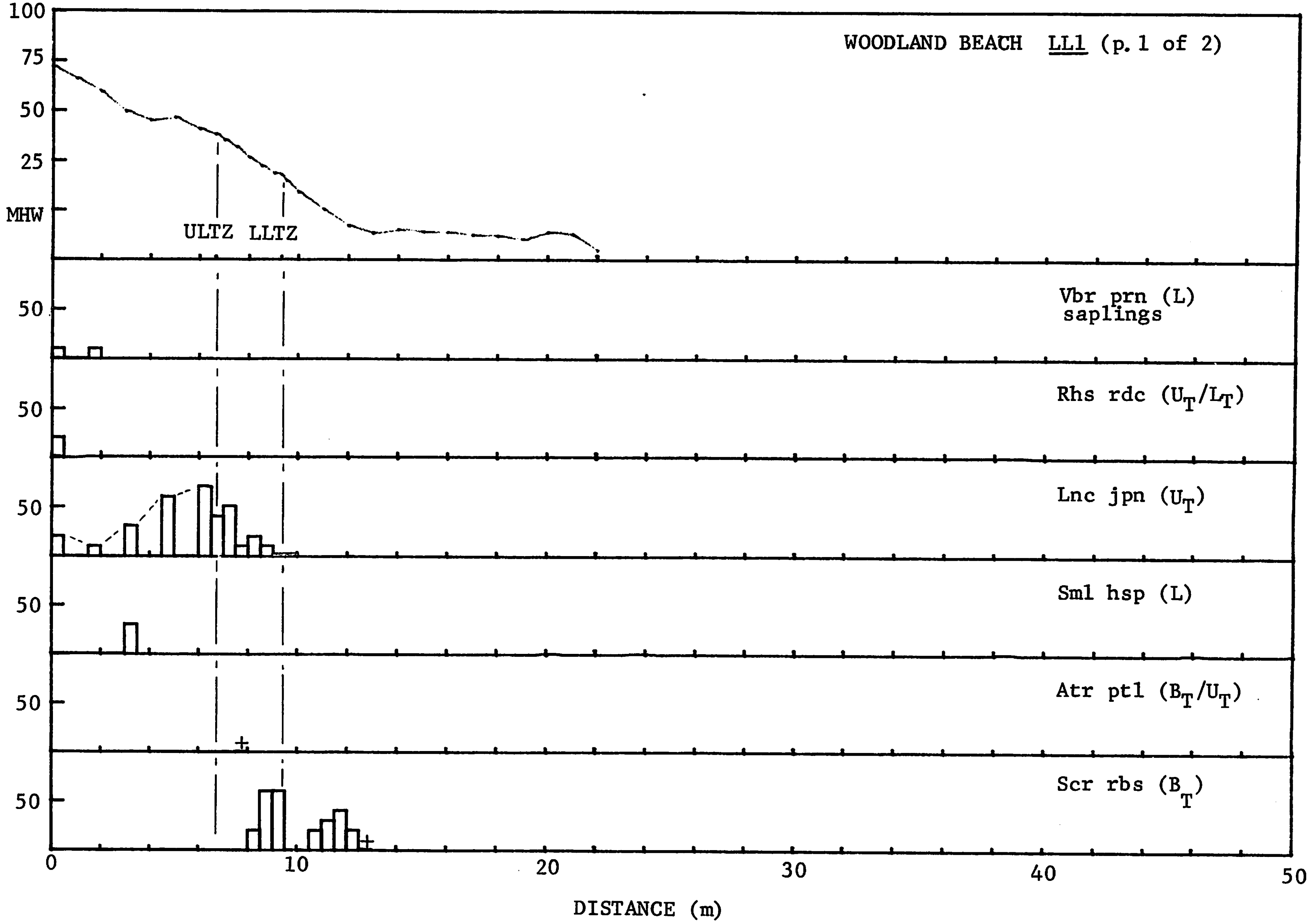
NO TIDAL DATUM
ISLE OF WIGHT OL2 (p. 2 of 3)
100
75
50
25
0
ULTZ
LLTZ
Spr ptn (M_T/D)
Dst spc (M_T)
"Combo": Spr ptn + Dst spc
Hbs msc (B_T)
Scr amr (B_T)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)

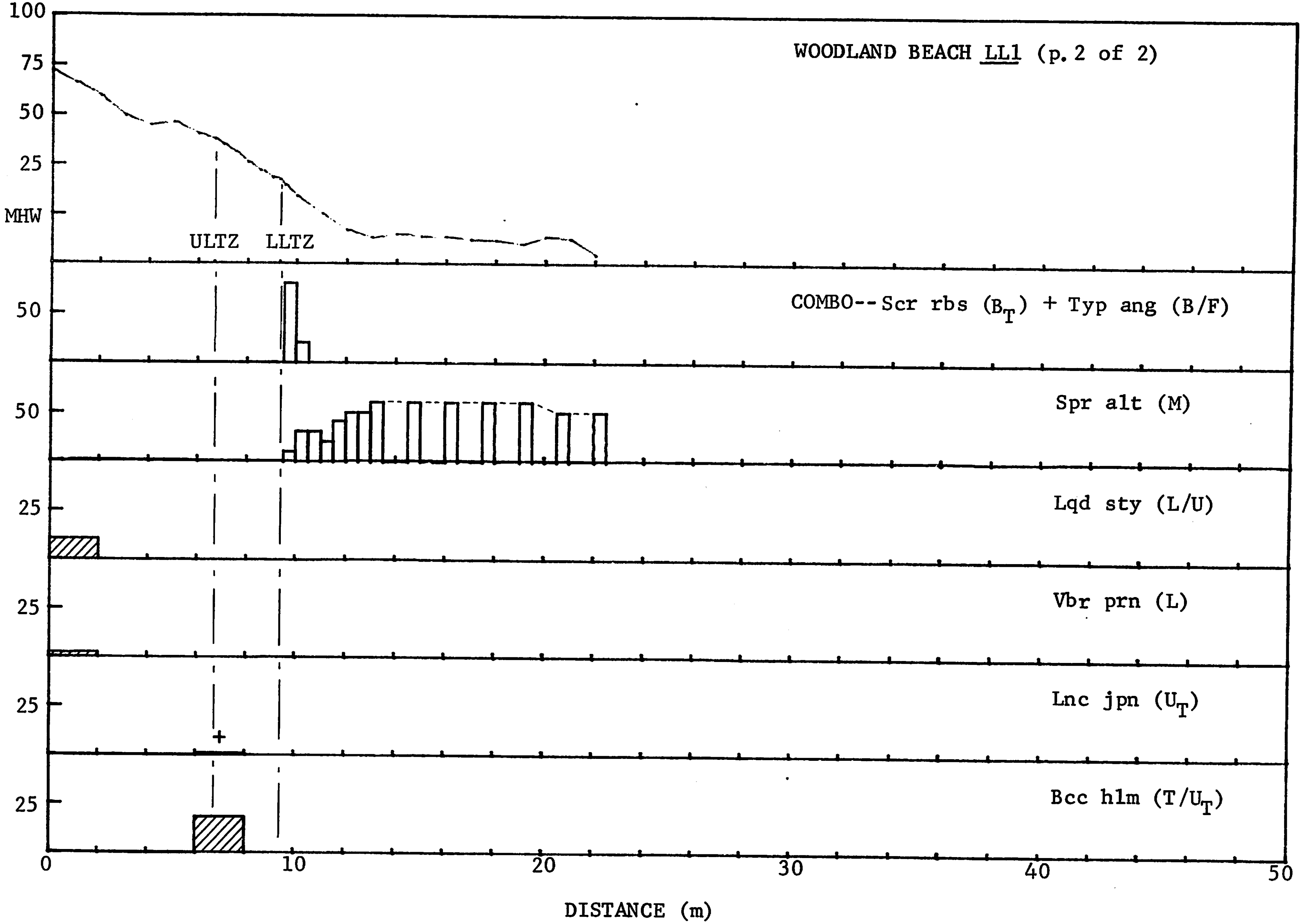


NO TIDAL DATUM
ISLE OF WIGHT OL2 (p. 3 of 3)
100
75
50
25
0
ULTZ
LLTZ
Amelanchier sp. (U/L)
Myr crf (U_T/L_T)
Nys syl (U/L)
Pns tda (U/L)
Bcc hlm (T/U_T)
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)

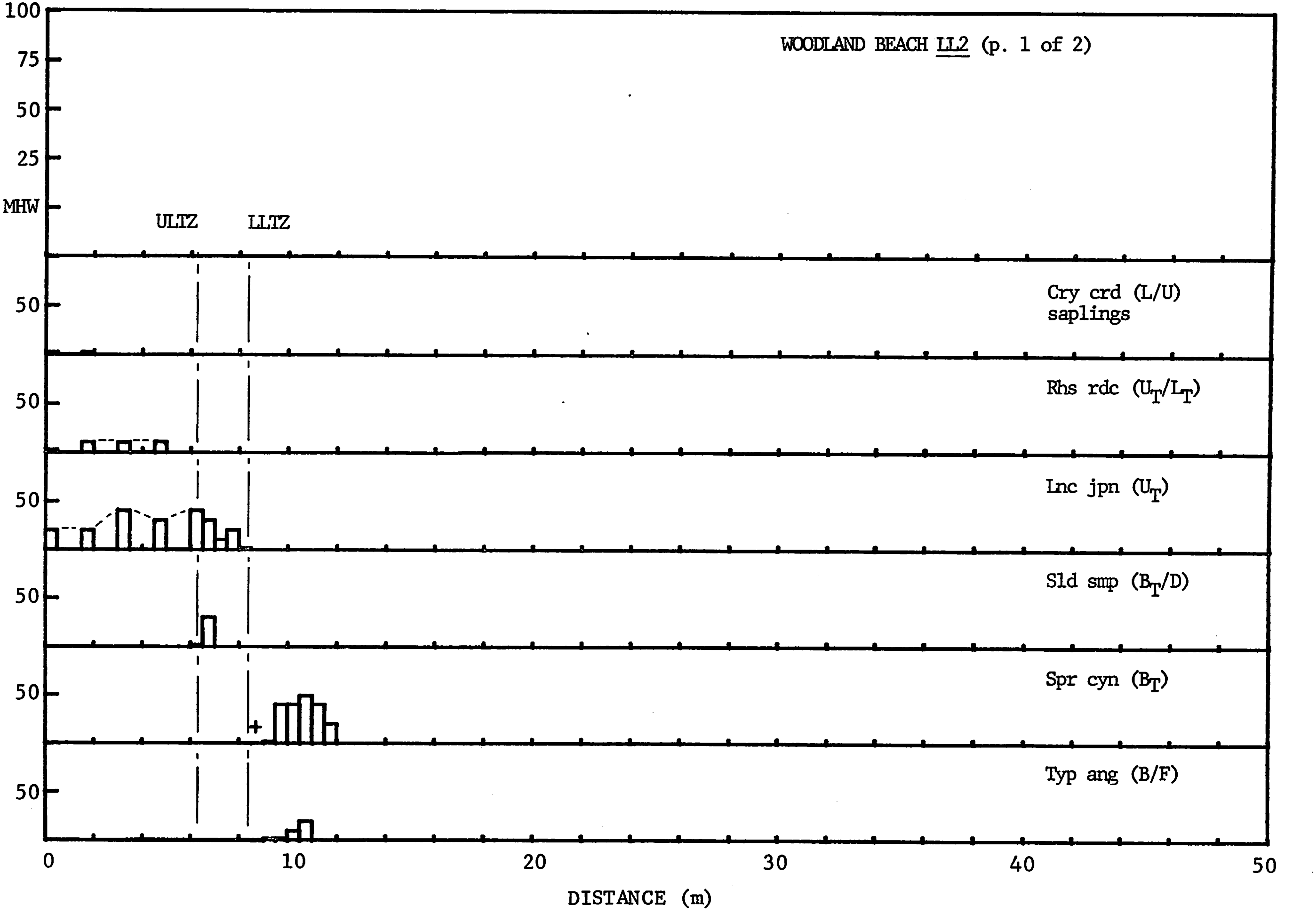
PROFILE DATA - WOODLAND BEACH SUBREGION(DELAWARE)

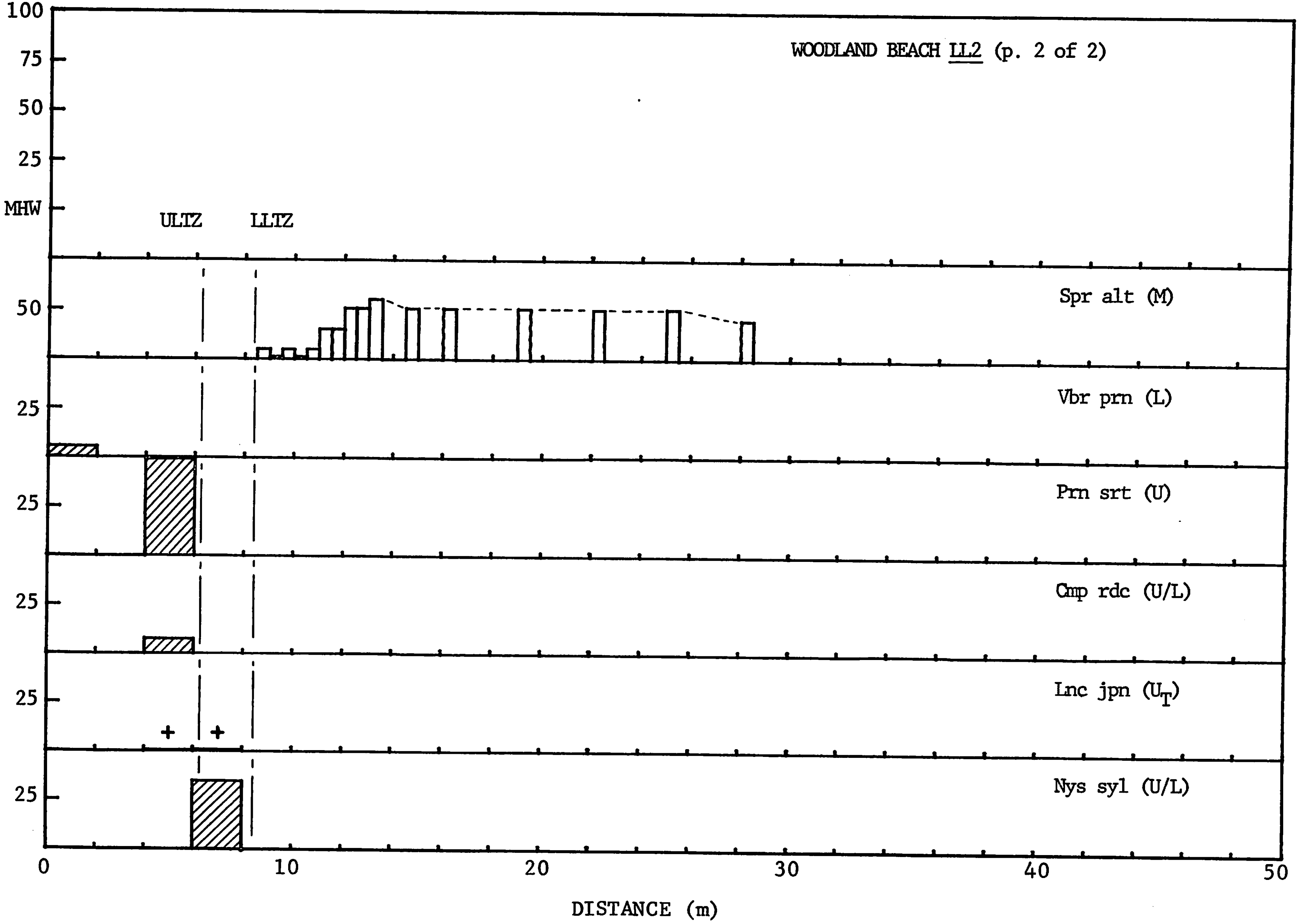
WOODLAND BEACH(PRIMARY)
WHITE CREEK

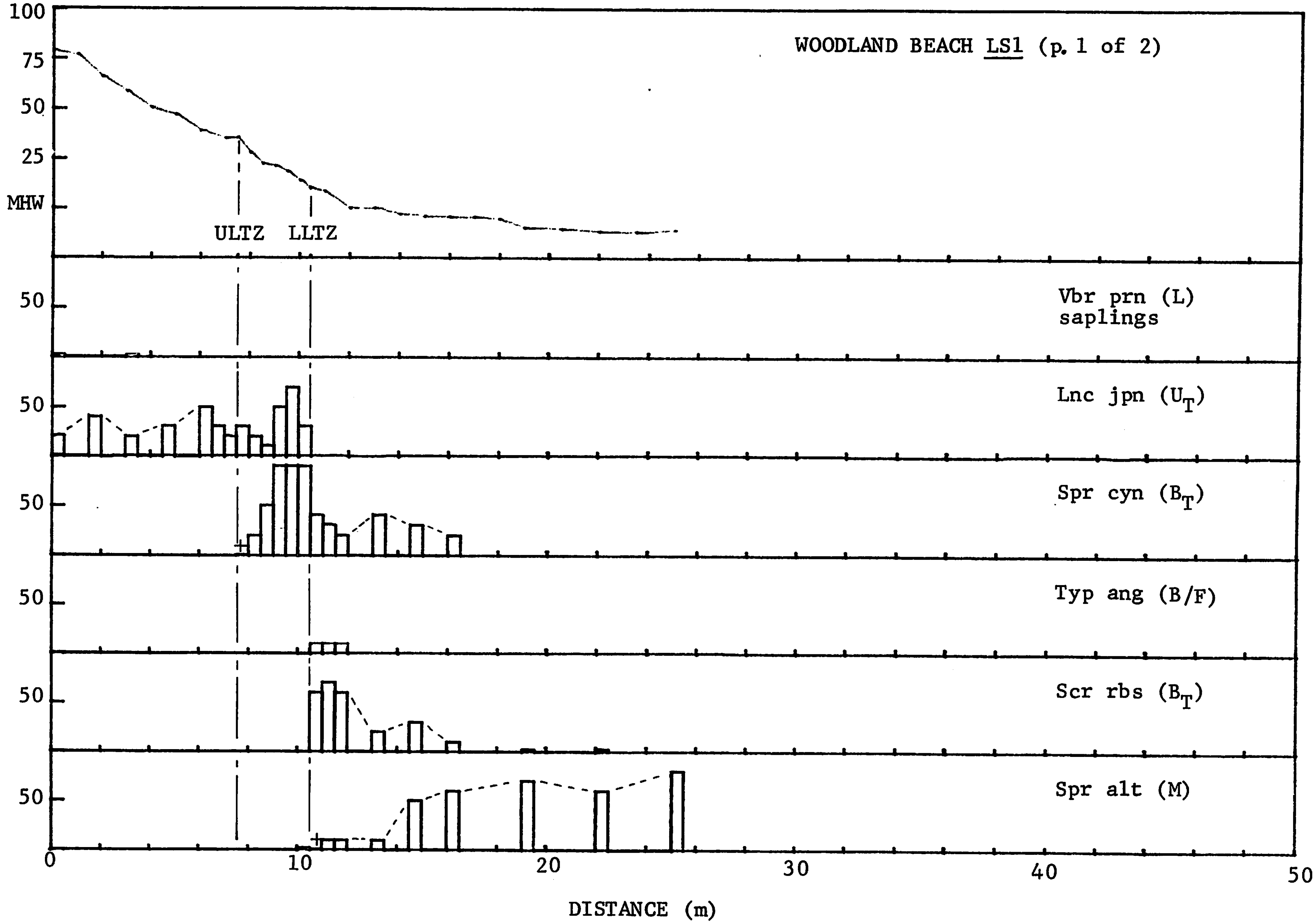

WOODLAND BEACH LL1 (p. 1 of 2)
100
75
50
25
MHW
ULTZ LLTZ
Vbr prn (L) saplings
Rhs rdc (U_T/L_T)
Lnc jpn (U_T)
Sml hsp (L)
Atr ptl (B_T/U_T)
Scr rbs (B_T)
0
10
20
30
40
50
DISTANCE (m)

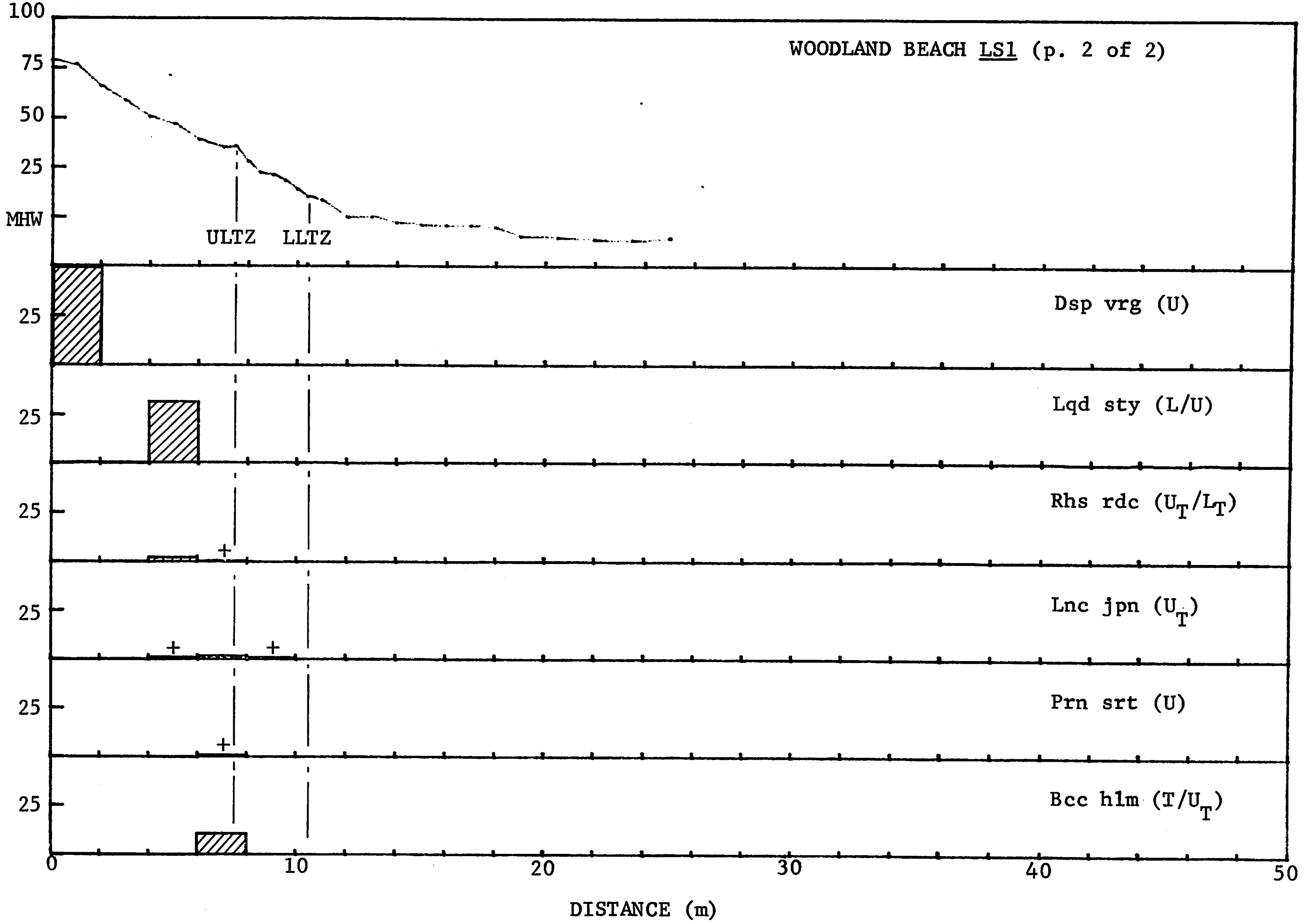


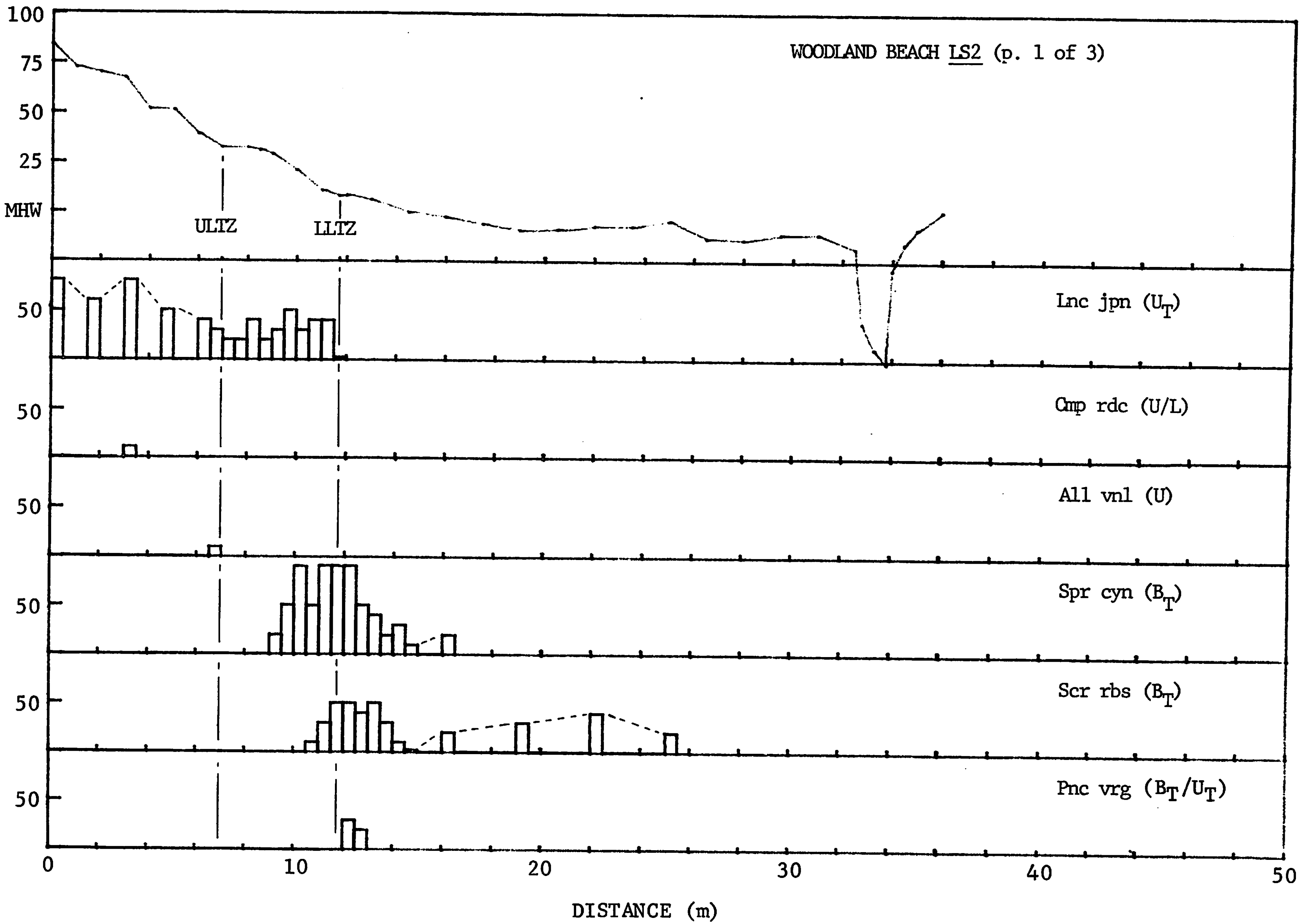
WOODLAND BEACH LL1 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
COMBO--Scr rbs (B_T) + Typ ang (B/F)
50
Spr alt (M)
50
Lqd sty (L/U)
25
Vbr prn (L)
25
Lnc jpn (U_T)
25
+
Bcc hlm (T/U_T)
25
0
10
20
30
40
50
DISTANCE (m)

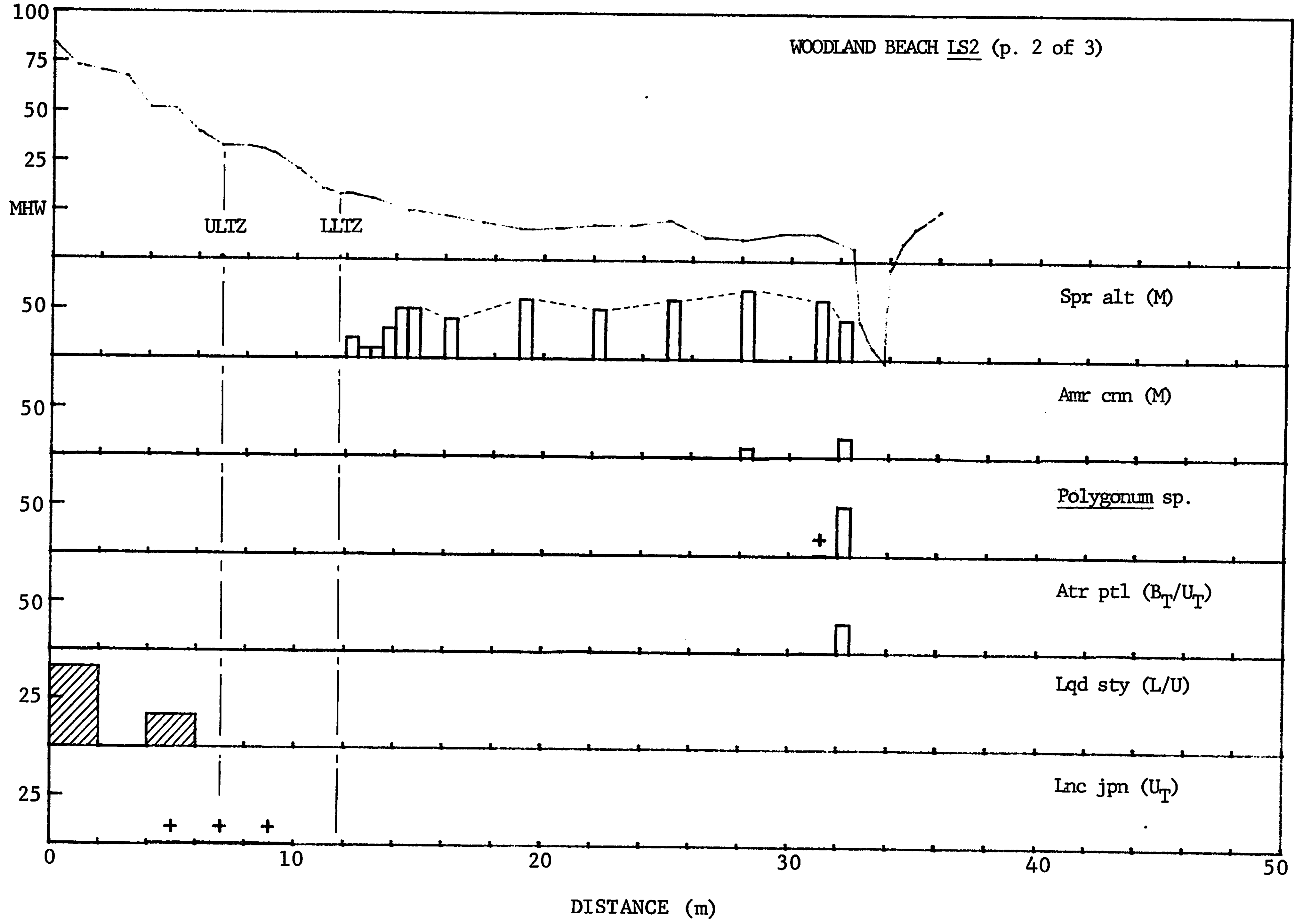

WOODLAND BEACH LL2 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Cry crd (L/U) saplings
Rhs rdc (U_T/L_T)
Lnc jpn (U_T)
Sld smp (B_T/D)
Spr cyn (B_T)
Typ ang (B/F)
0
10
20
30
40
50
DISTANCE (m)


WOODLAND BEACH LL2 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
50
Vbr prn (L)
25
Prn srt (U)
25
Cmp rdc (U/L)
25
Lnc jpn (U_T)
25
Nys syl (U/L)
25
0
10
20
30
40
50
DISTANCE (m)

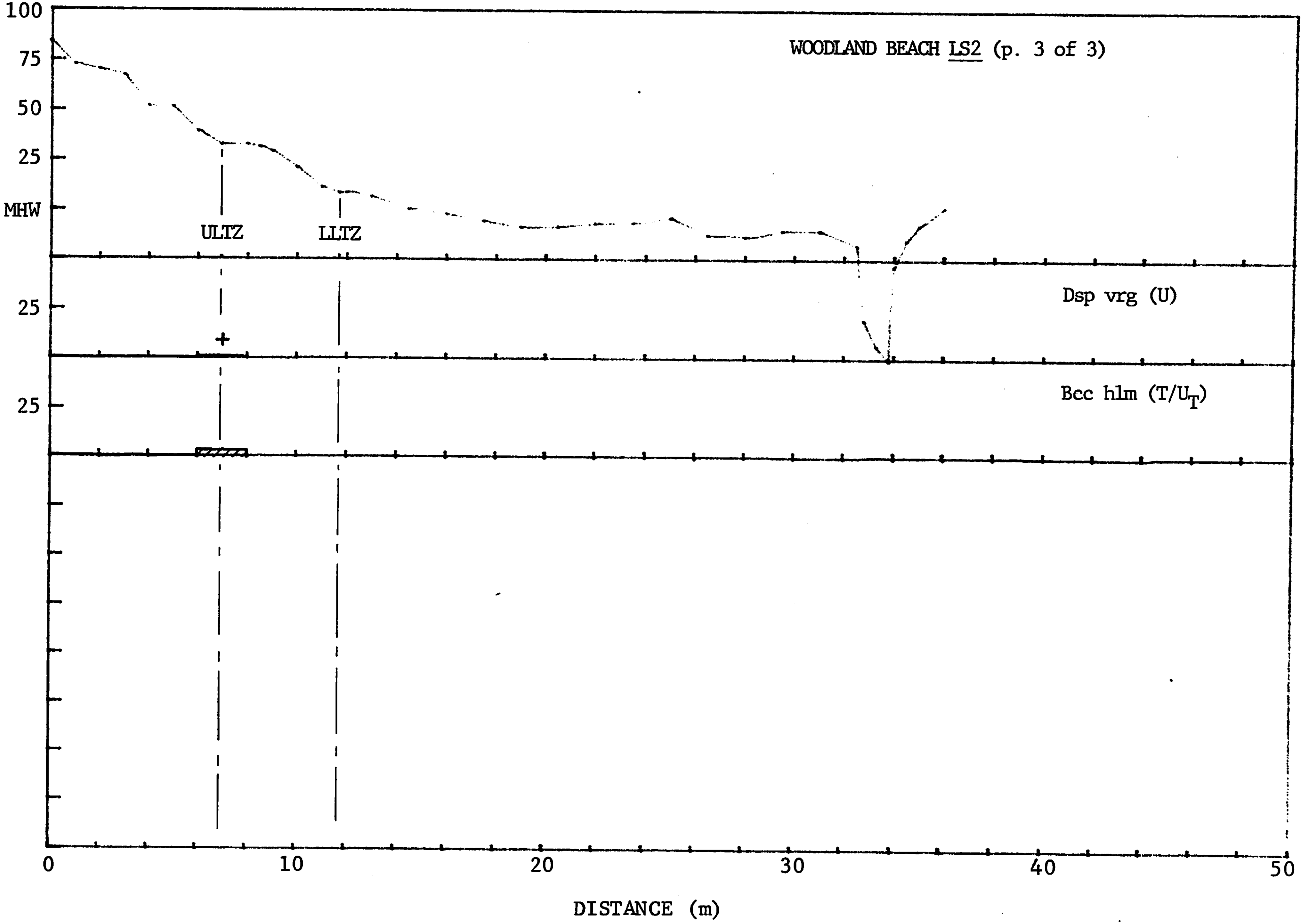

WOODLAND BEACH LS1 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Vbr prn (L) saplings
Lnc jpn (U_T)
Spr cyn (B_T)
Typ ang (B/F)
Scr rbs (B_T)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)

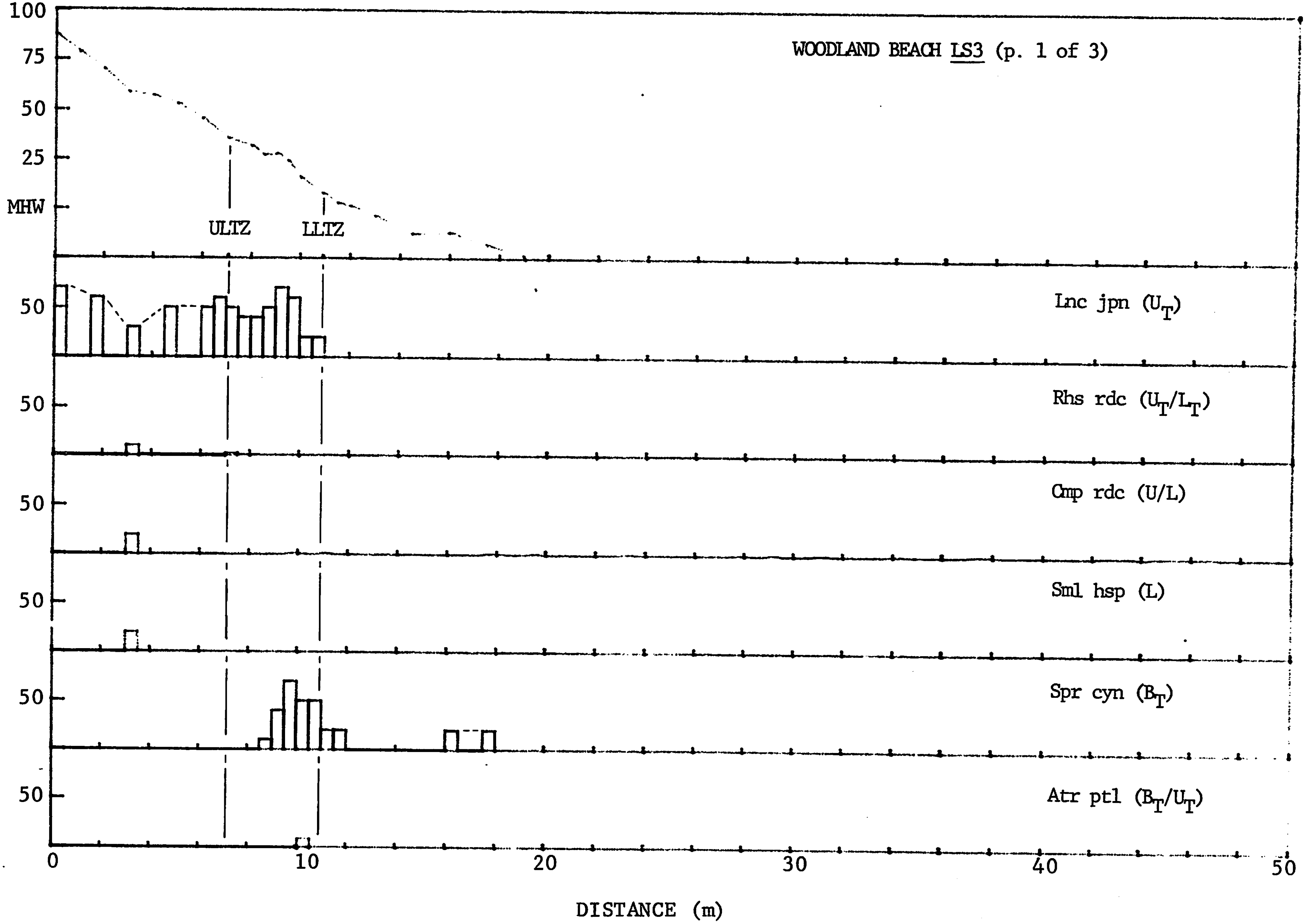

WOODLAND BEACH LS1 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Dsp vrg (U)
Lqd sty (L/U)
Rhs rdc (UT/LT)
Lnc jpn (UT)
Prn srt (U)
Bcc hlm (T/UT)
0
10
20
30
40
50
DISTANCE (m)


WOODLAND BEACH LS2 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Cmp rdc (U/L)
All vnl (U)
Spr cyn (B_T)
Scr rbs (B_T)
Pnc vrg (B_T/U_T)
0
10
20
30
40
50
DISTANCE (m)

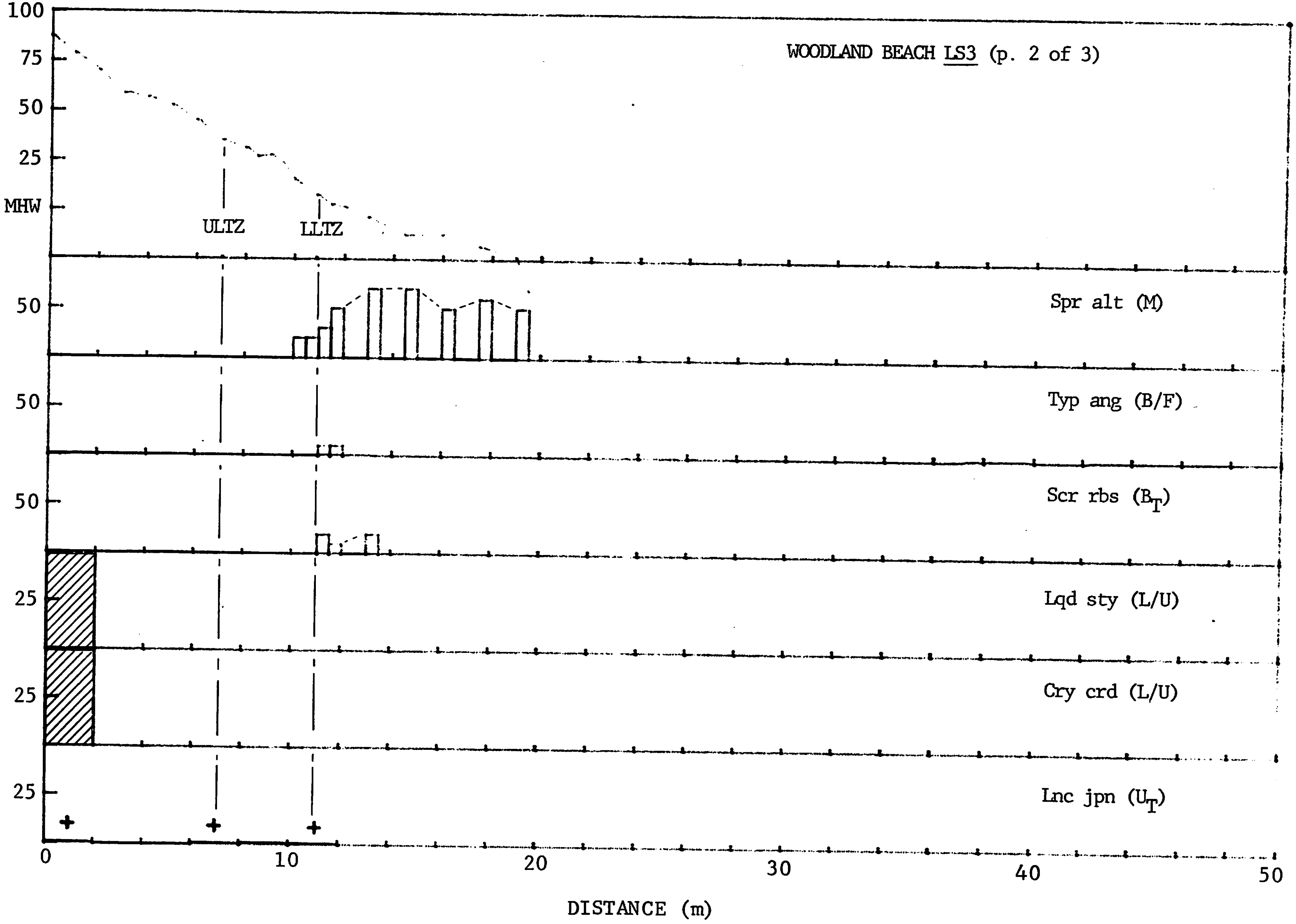


WOODLAND BEACH LS2 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Spr alt (M)
Amr cnn (M)
Polygonum sp.
Atr ptl (B_T/U_T)
Lqd sty (L/U)
Lnc jpn (U_T)
0
10
20
30
40
50
DISTANCE (m)

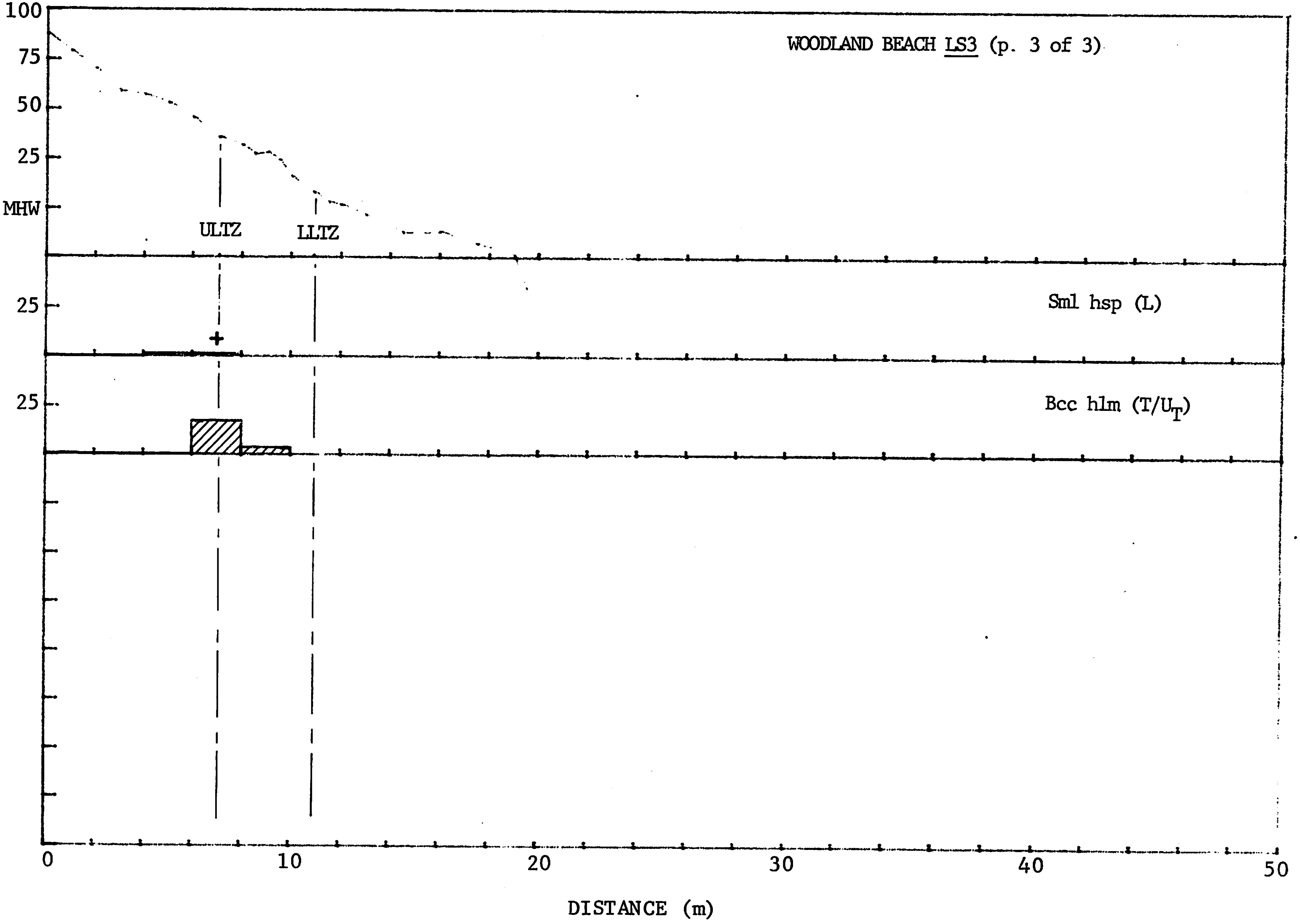

WOODLAND BEACH LS2 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Dsp vrg (U)
25
Bcc hlm (T/U$_T$)
25
0
10
20
30
40
50
DISTANCE (m)

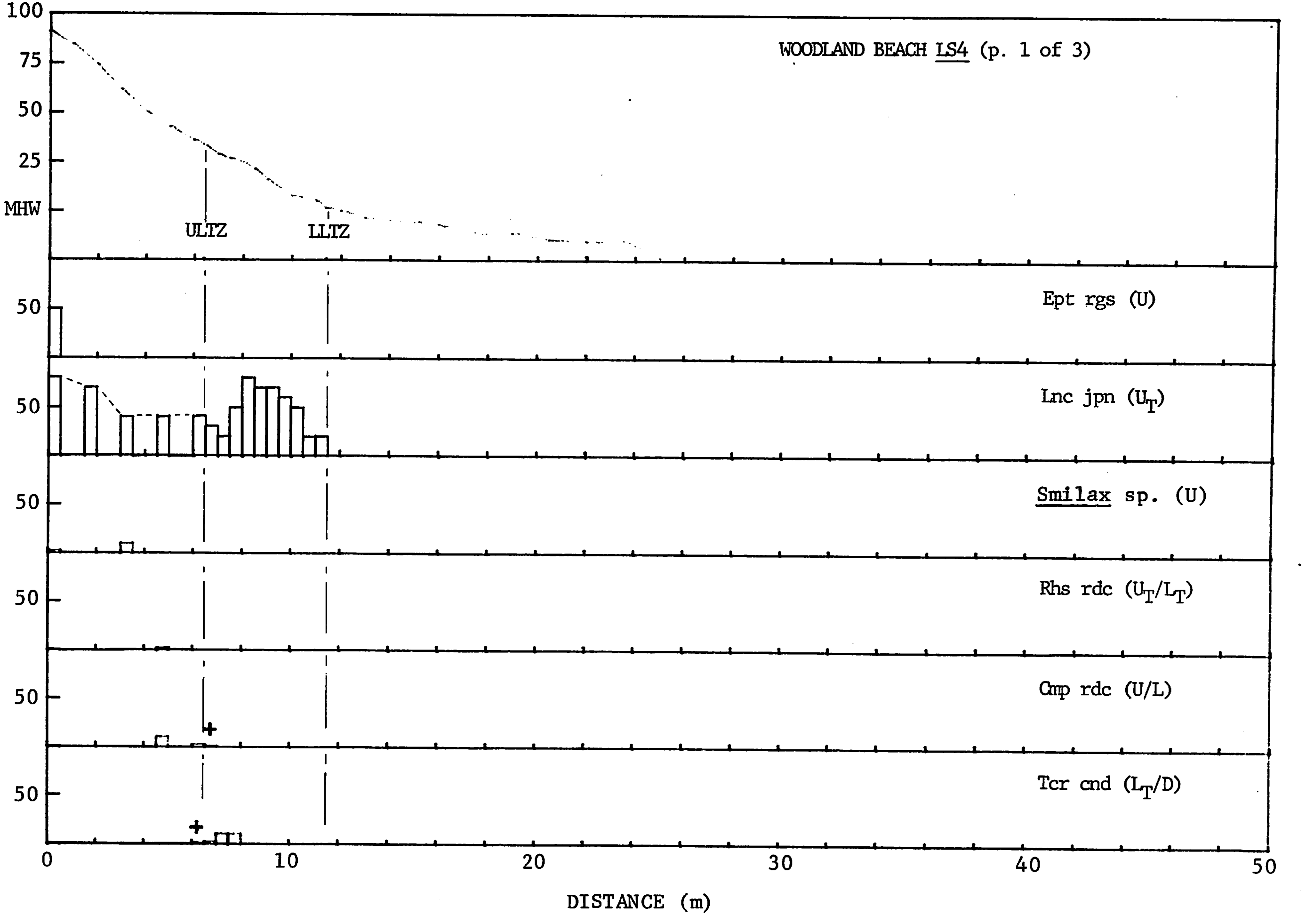


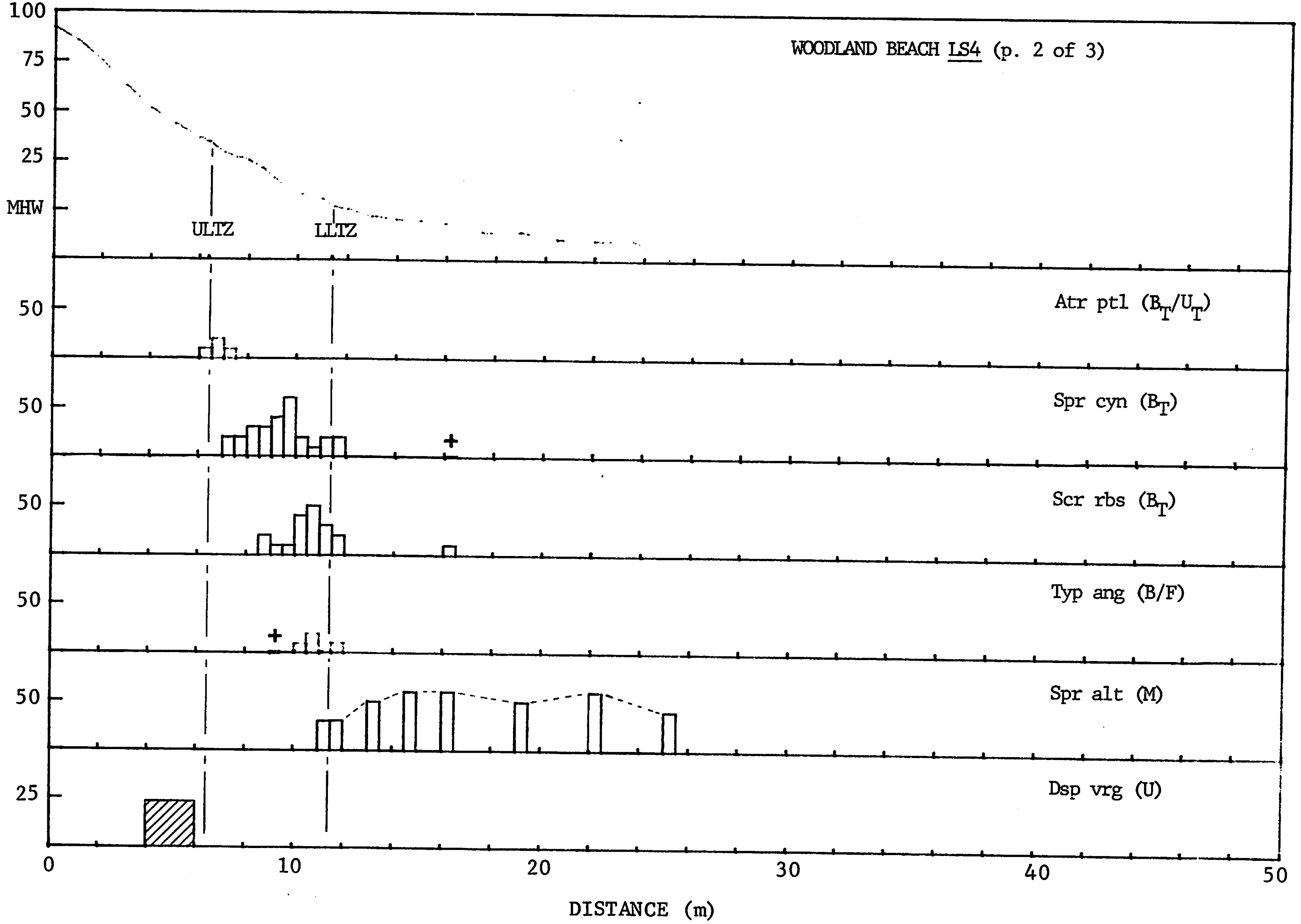
WOODLAND BEACH LS3 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Lnc jpn (U_T)
50
Rhs rdc (U_T/L_T)
50
Cmp rdc (U/L)
50
Sml hsp (L)
50
Spr cyn (B_T)
50
Atr ptl (B_T/U_T)
0
10
20
30
40
50
DISTANCE (m)



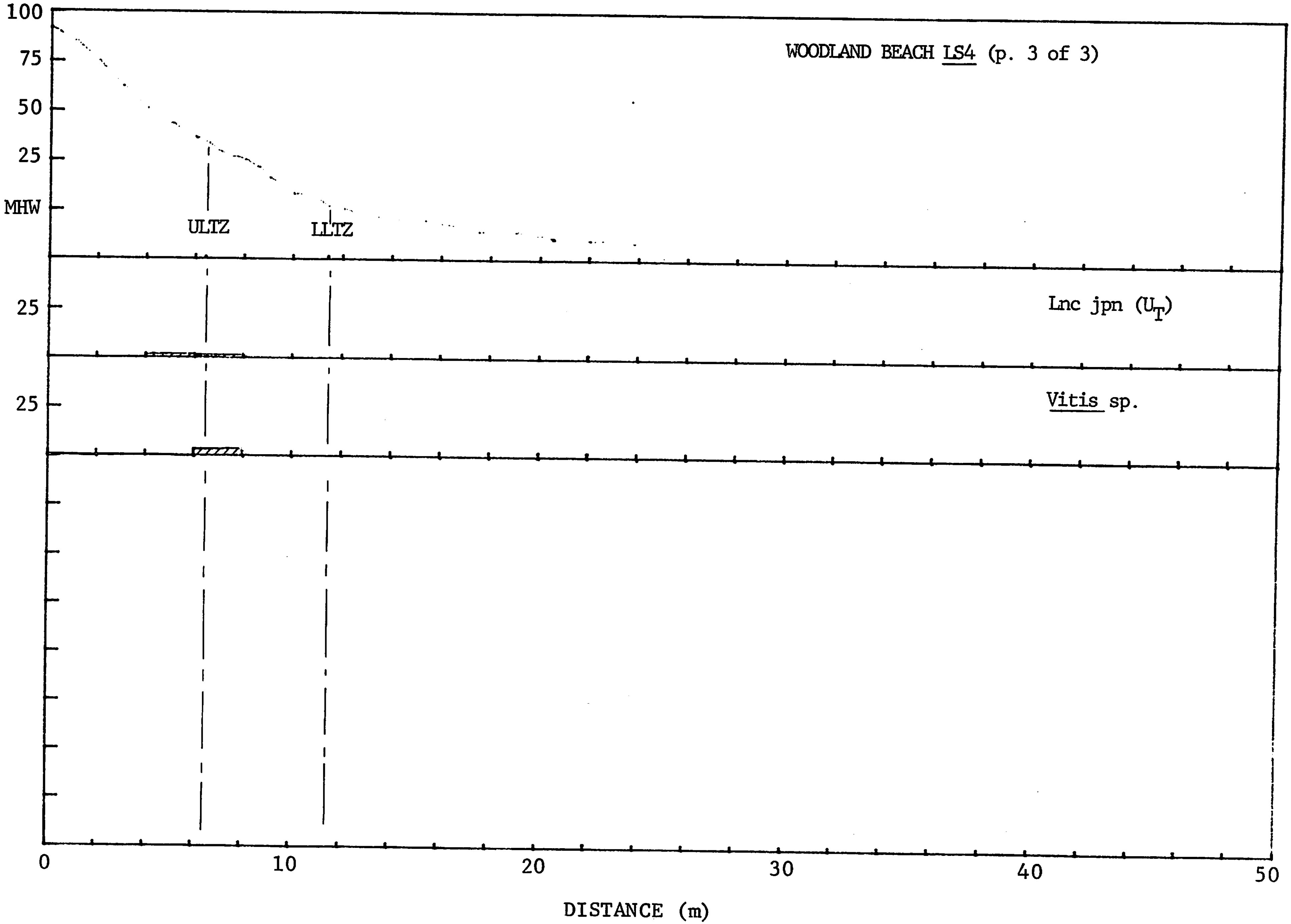
WOODLAND BEACH LS3 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
50
Spr alt (M)
50
Typ ang (B/F)
50
Scr rbs (B_T)
25
Lqd sty (L/U)
25
Cry crd (L/U)
25
Lnc jpn (U_T)
0
10
20
30
40
50
DISTANCE (m)

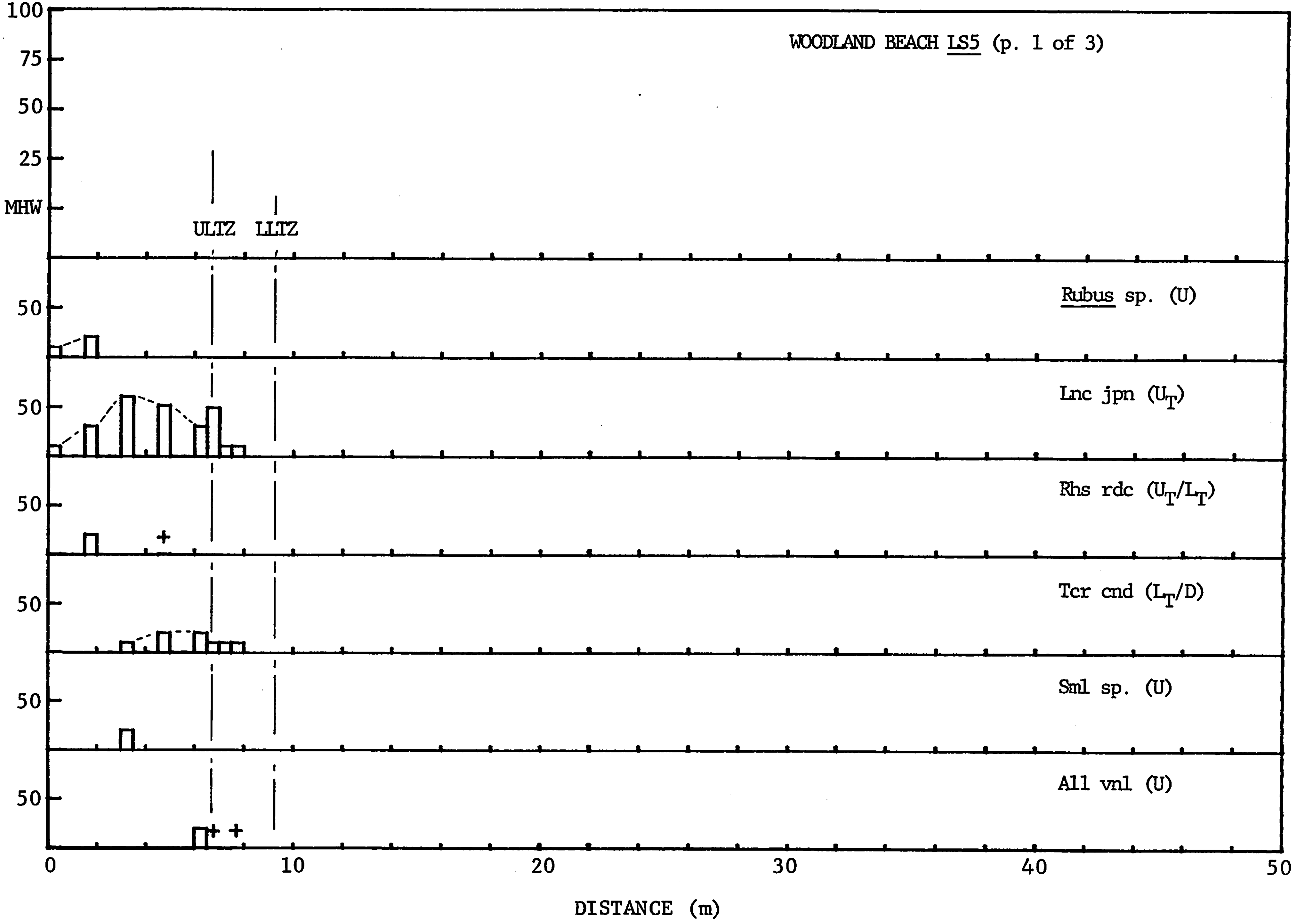

WOODLAND BEACH LS3 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Sml hsp (L)
+
25
Bcc hlm (T/U_T)
0
10
20
30
40
50
DISTANCE (m)


WOODLAND BEACH LS4 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ept rgs (U)
Lnc jpn (U_T)
Smilax sp. (U)
Rhs rdc (U_T/L_T)
Cmp rdc (U/L)
Tcr cnd (L_T/D)
0
10
20
30
40
50
DISTANCE (m)

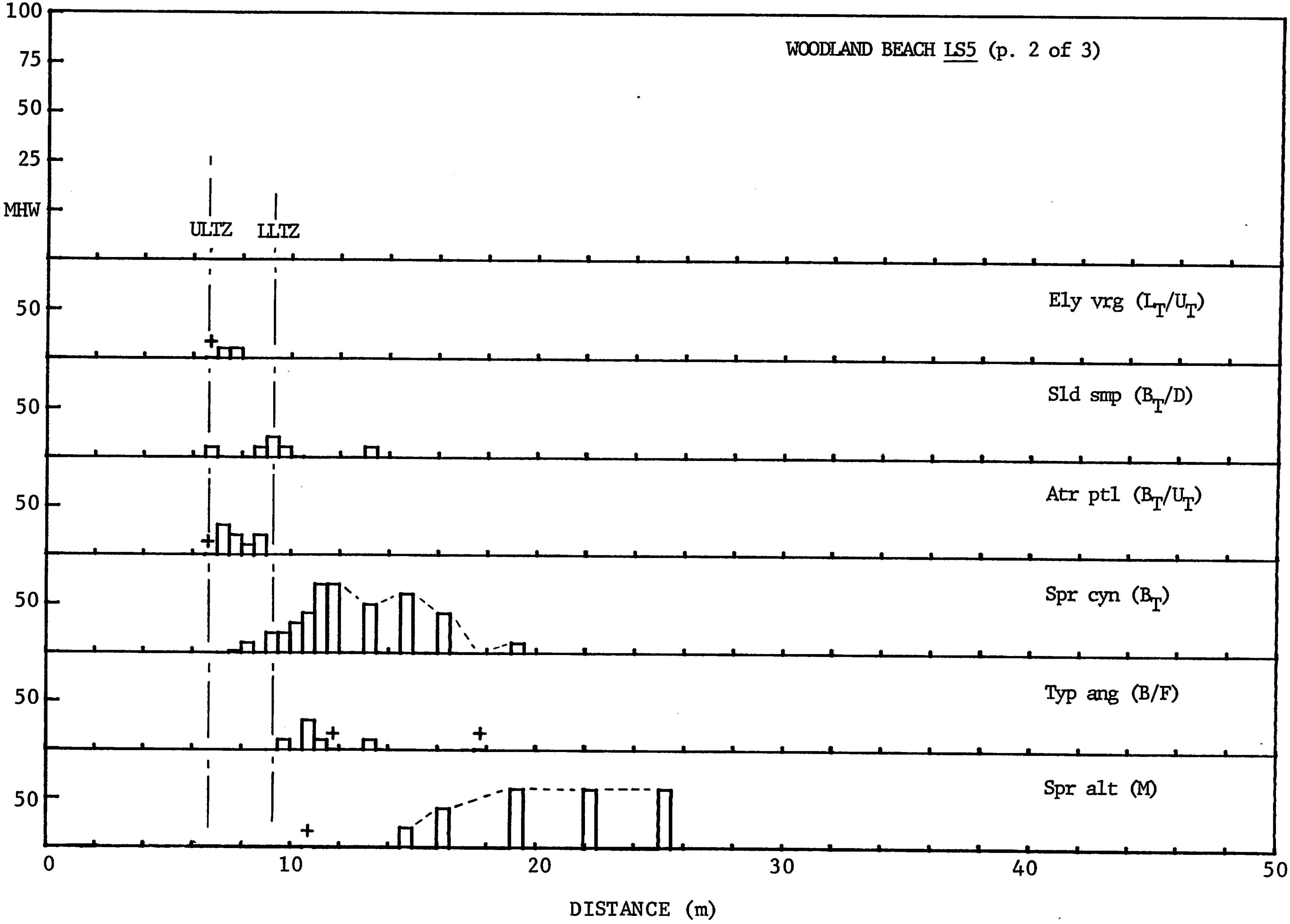


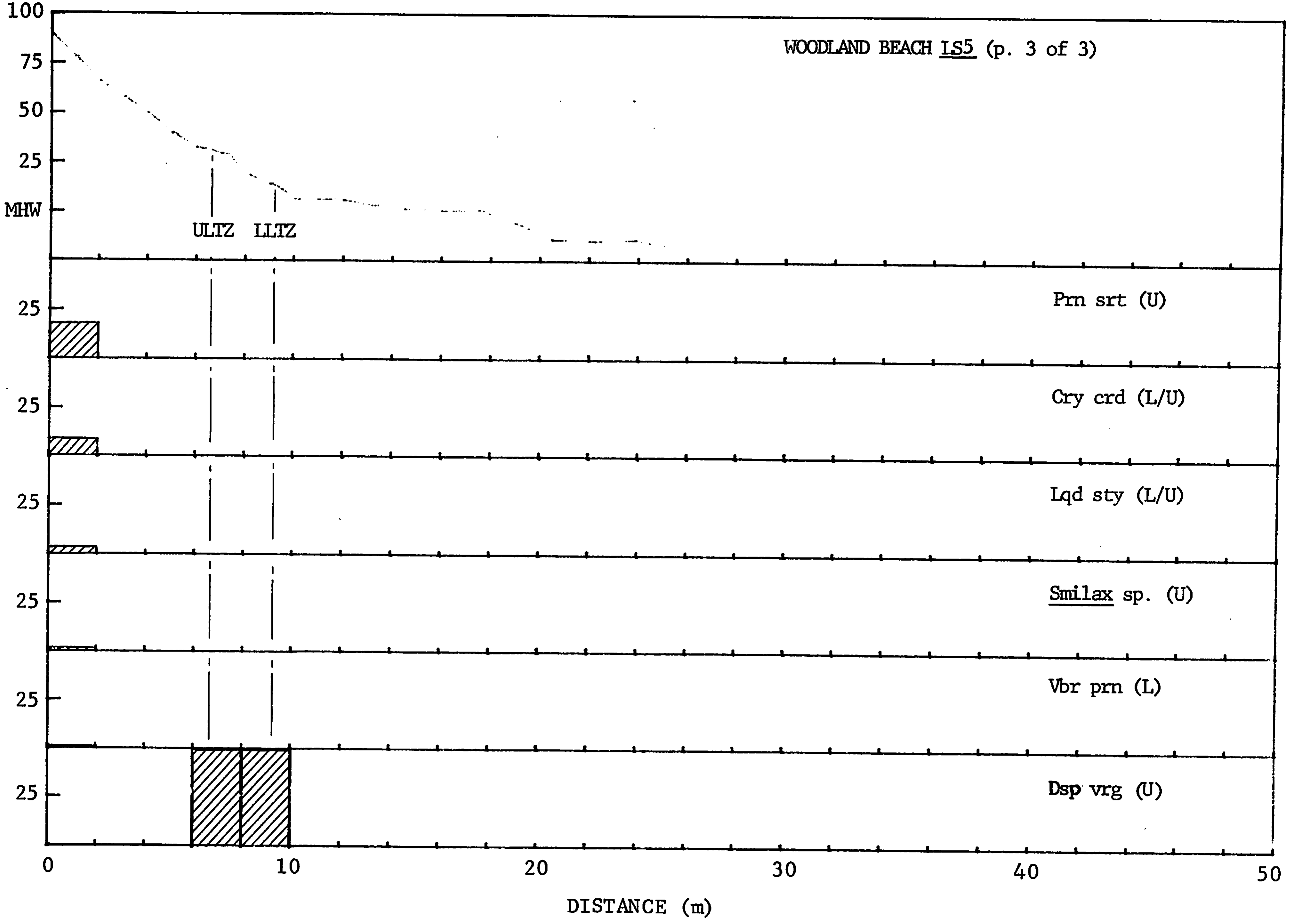
WOODLAND BEACH LS4 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Atr ptl (B_T/U_T)
Spr cyn (B_T)
Scr rbs (B_T)
Typ ang (B/F)
Spr alt (M)
Dsp vrg (U)
0
10
20
30
40
50
DISTANCE (m)

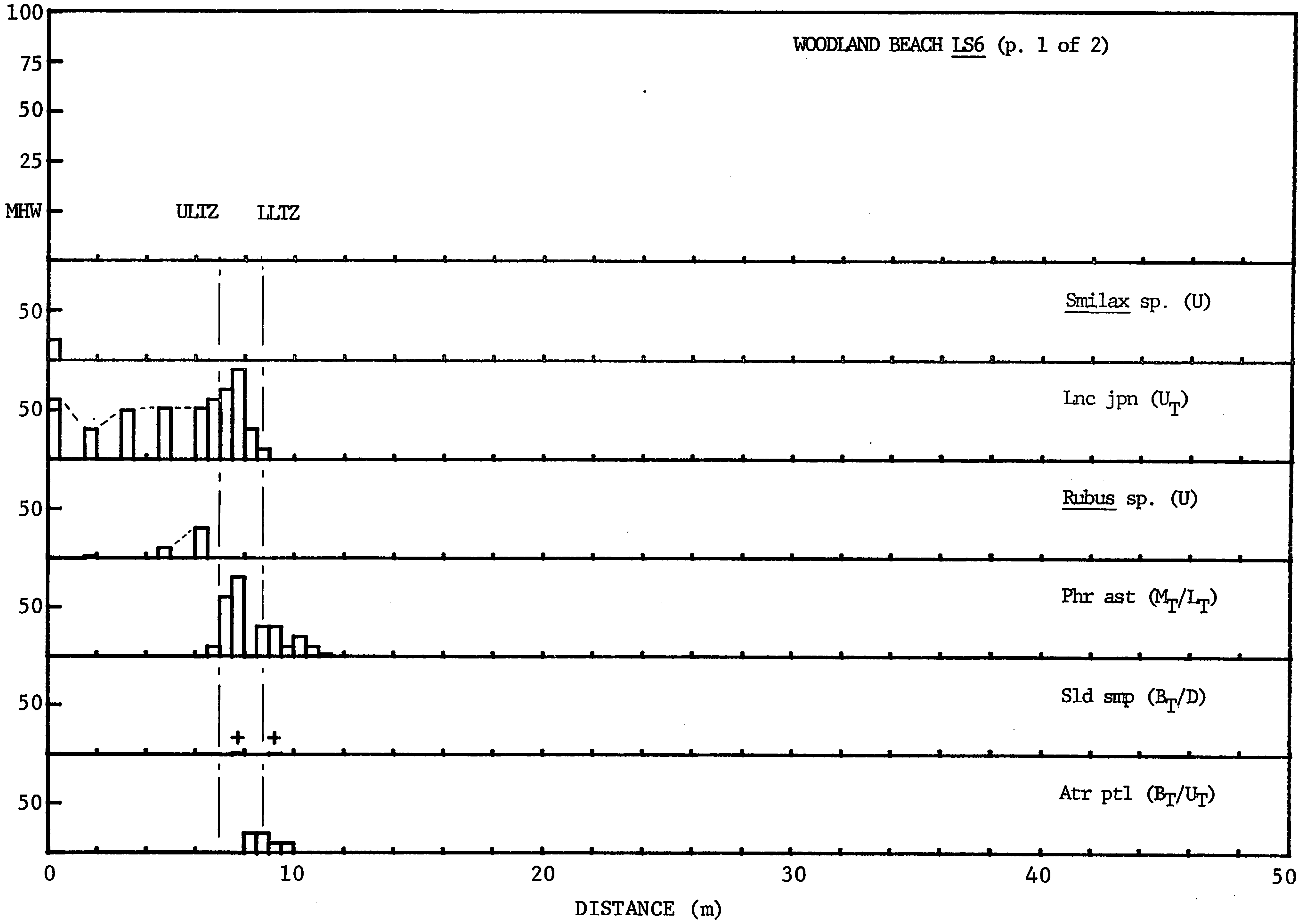

WOODLAND BEACH LS4 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Lnc jpn (U_T)
25
Vitis sp.
0
10
20
30
40
50
DISTANCE (m)



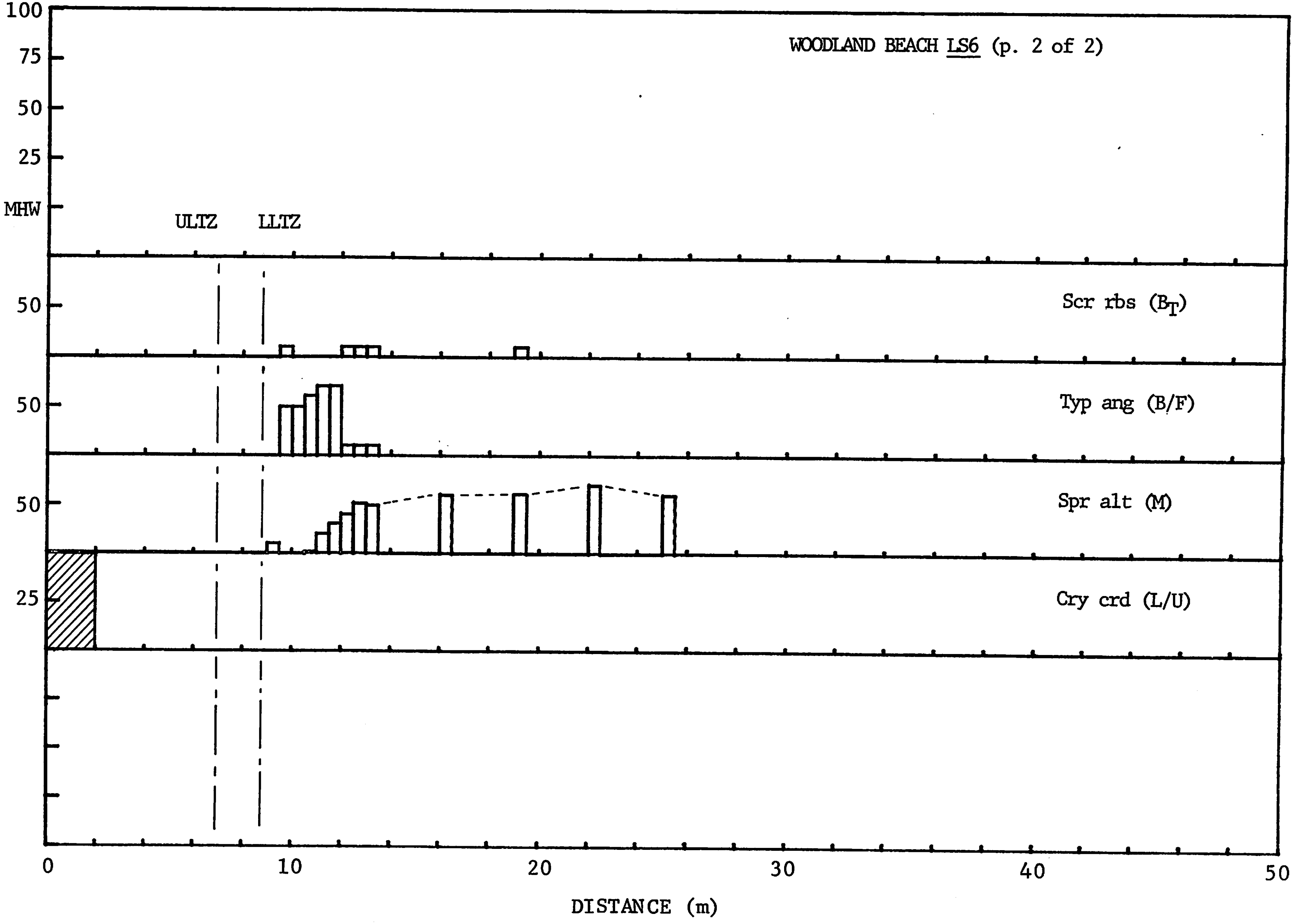
WOODLAND BEACH LS5 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rubus sp. (U)
Lnc jpn (U_T)
Rhs rdc (U_T/L_T)
Tcr cnd (L_T/D)
Sml sp. (U)
All vnl (U)
0
10
20
30
40
50
DISTANCE (m)

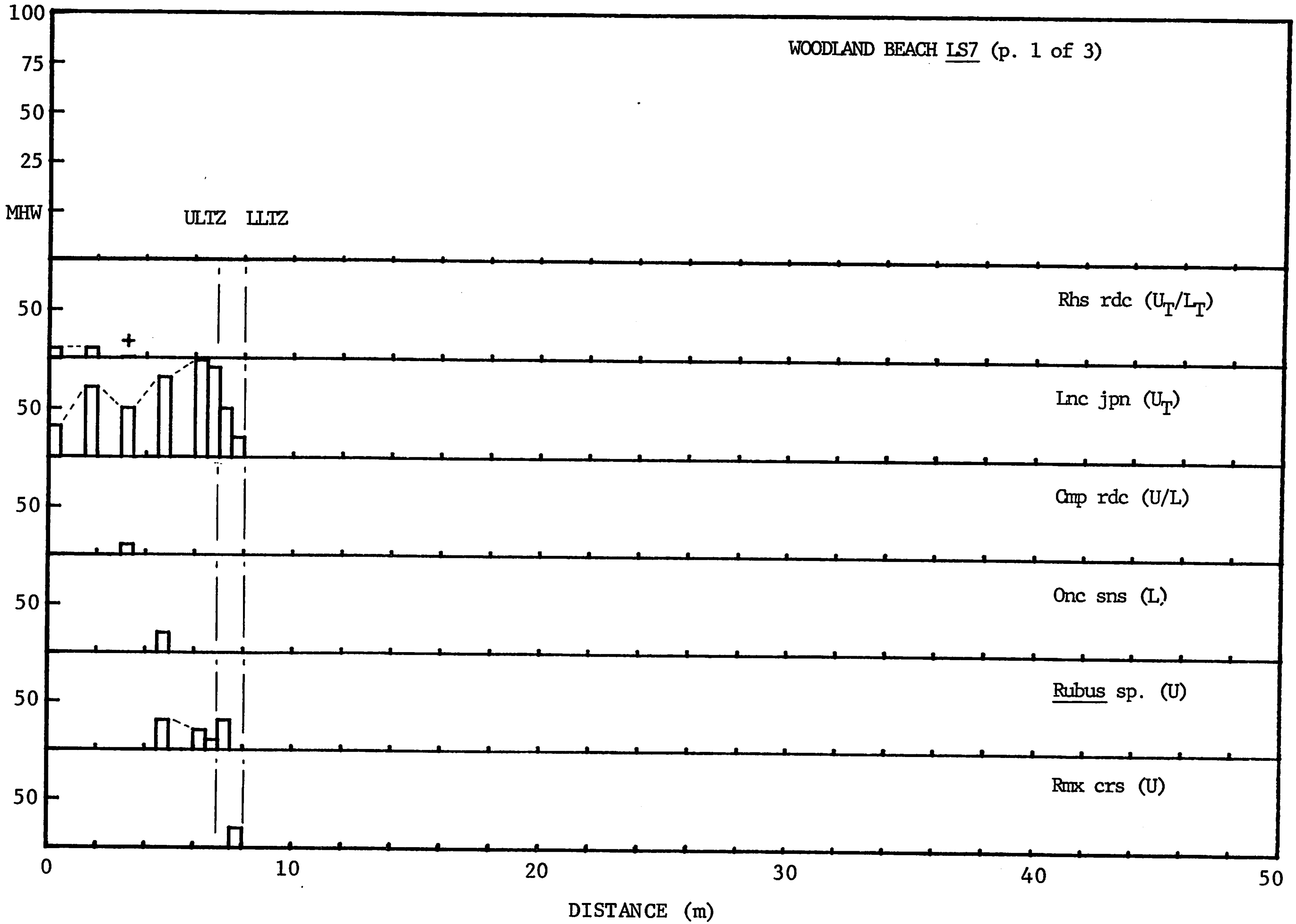

WOODLAND BEACH LS5 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Ely vrg (L_T/U_T)
Sld smp (B_T/D)
Atr ptl (B_T/U_T)
Spr cyn (B_T)
Typ ang (B/F)
Spr alt (M)
0
10
20
30
40
50
DISTANCE (m)

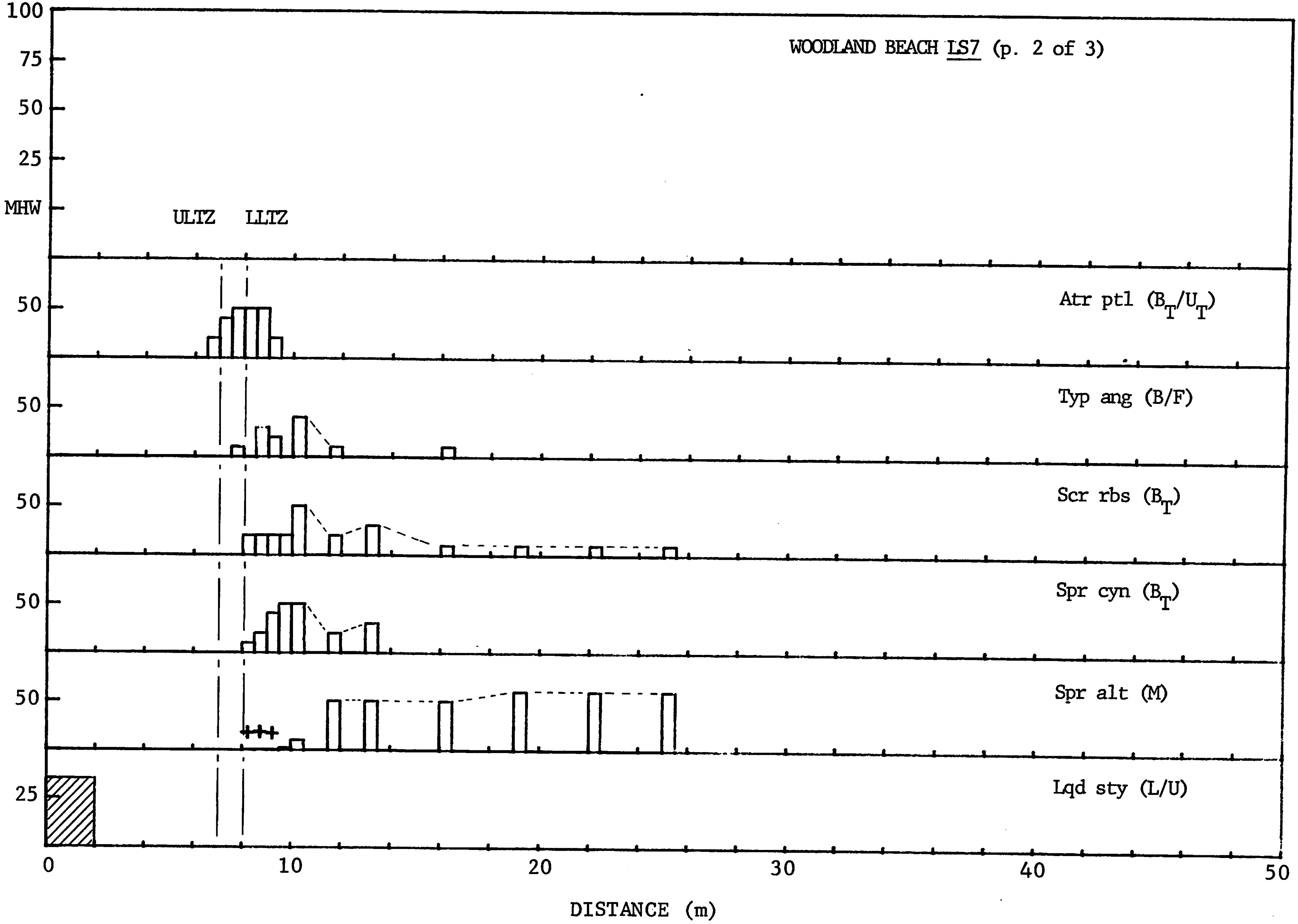

WOODLAND BEACH LS5 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
25
Prn srt (U)
25
Cry crd (L/U)
25
Lqd sty (L/U)
25
Smilax sp. (U)
25
Vbr prn (L)
25
Dsp vrg (U)
0
10
20
30
40
50
DISTANCE (m)

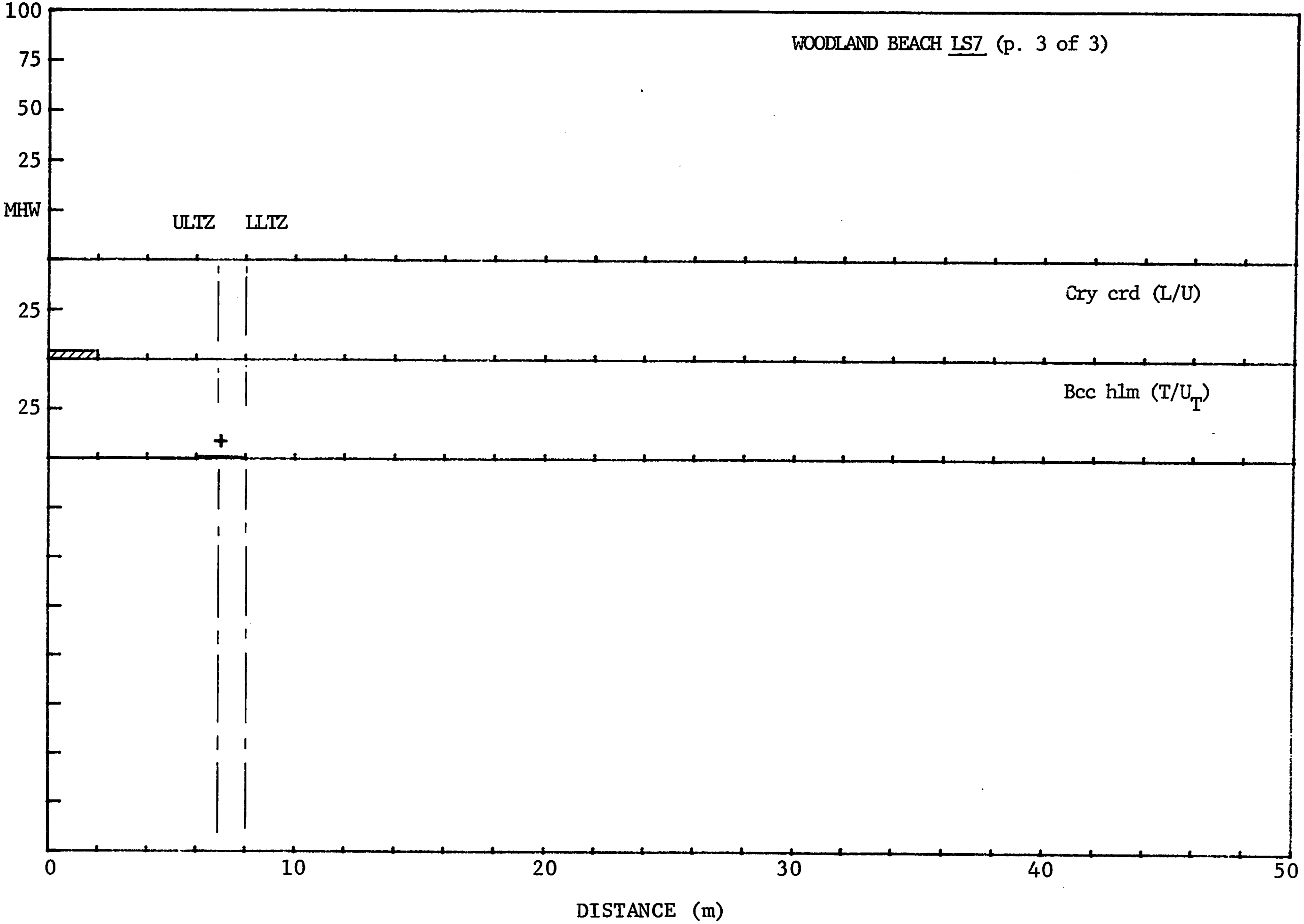


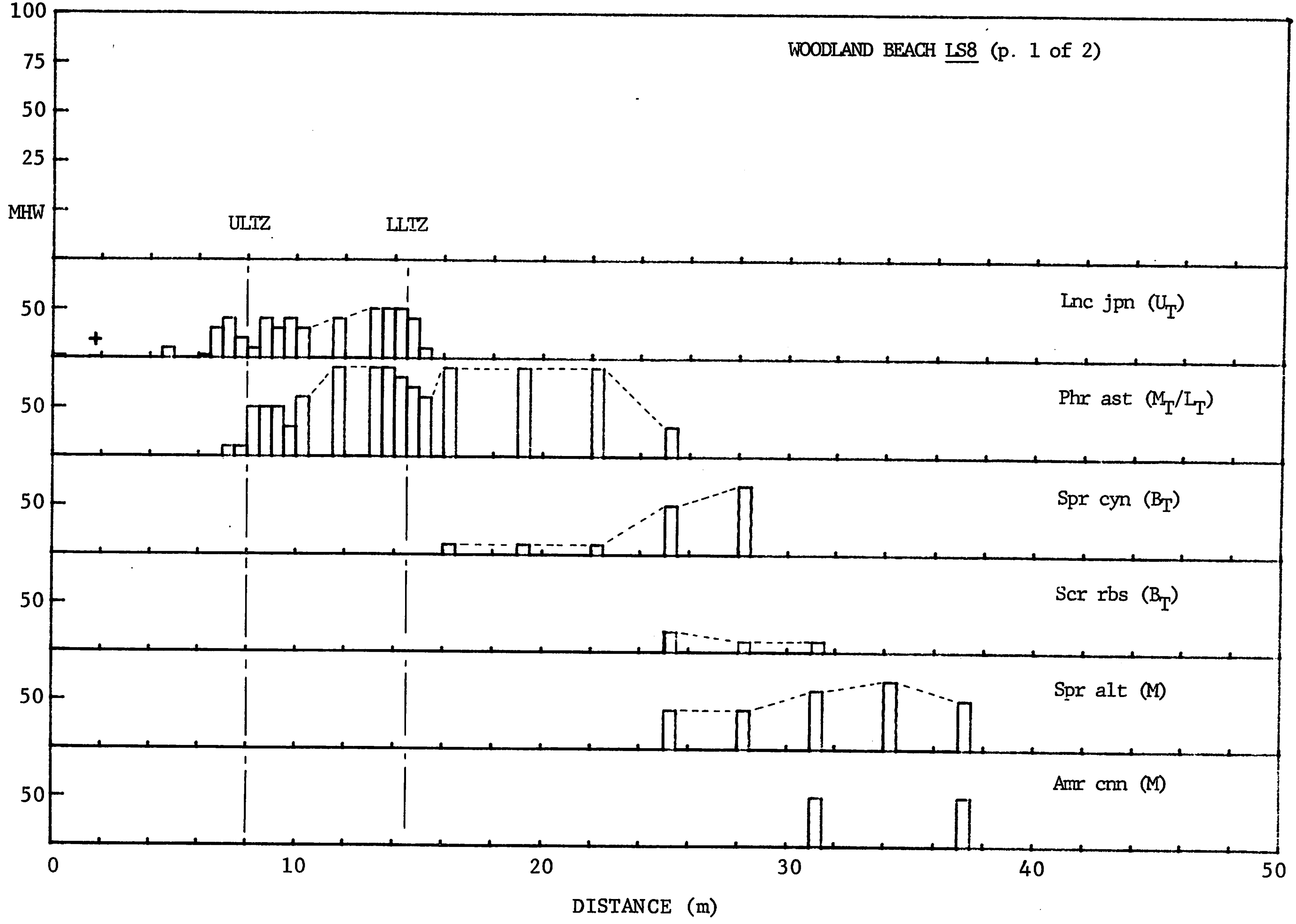
WOODLAND BEACH LS6 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Smilax sp. (U)
Lnc jpn (U_T)
Rubus sp. (U)
Phr ast (M_T/L_T)
Sld smp (B_T/D)
Atr ptl (B_T/U_T)
0
10
20
30
40
50
DISTANCE (m)

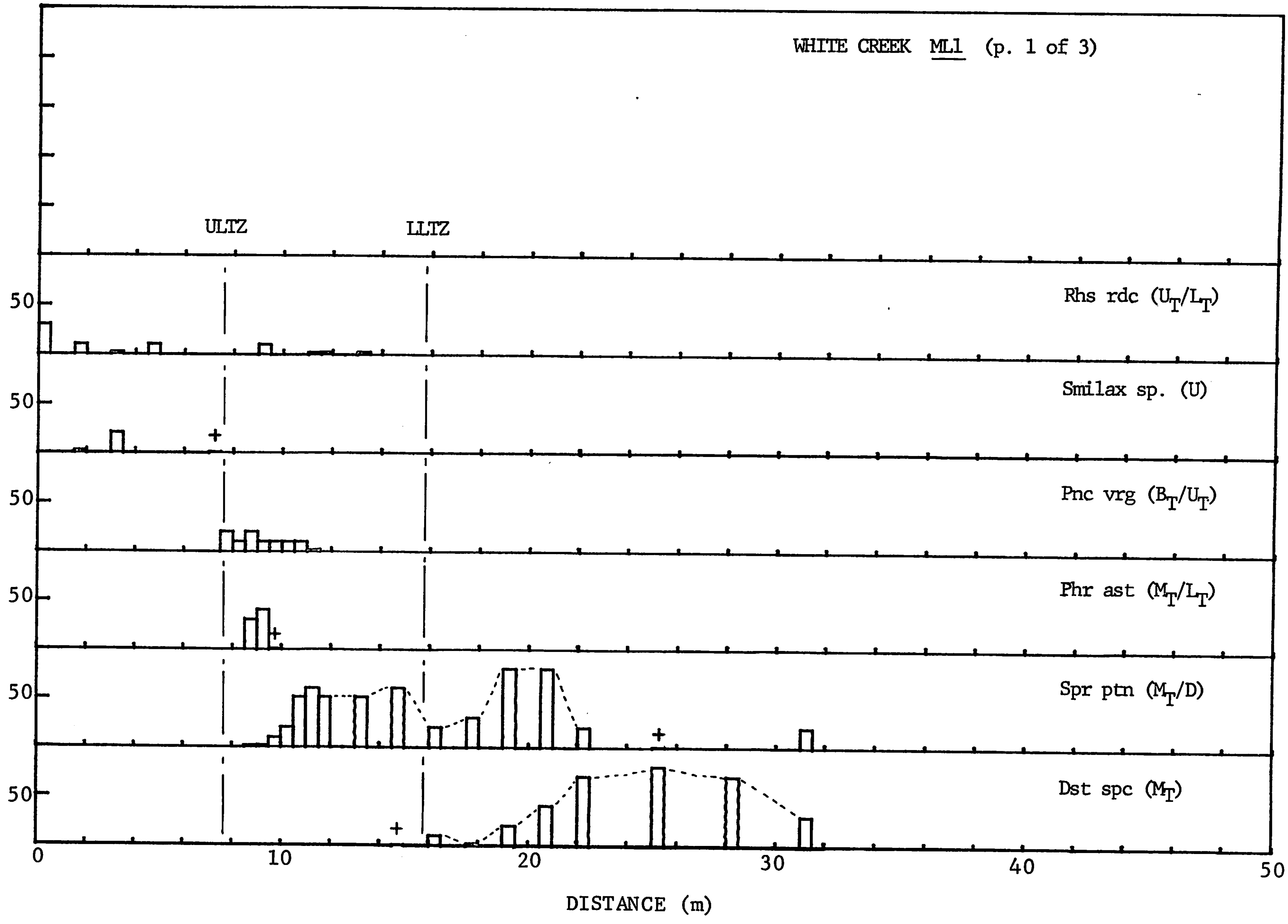

WOODLAND BEACH LS6 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
50
Scr rbs (B_T)
50
Typ ang (B/F)
50
Spr alt (M)
25
Cry crd (L/U)
0
10
20
30
40
50
DISTANCE (m)


WOODLAND BEACH LS7 (p. 1 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
50
+
Lnc jpn (U_T)
50
Cmp rdc (U/L)
50
Onc sns (L)
50
Rubus sp. (U)
50
Rmx crs (U)
50
0
10
20
30
40
50
DISTANCE (m)

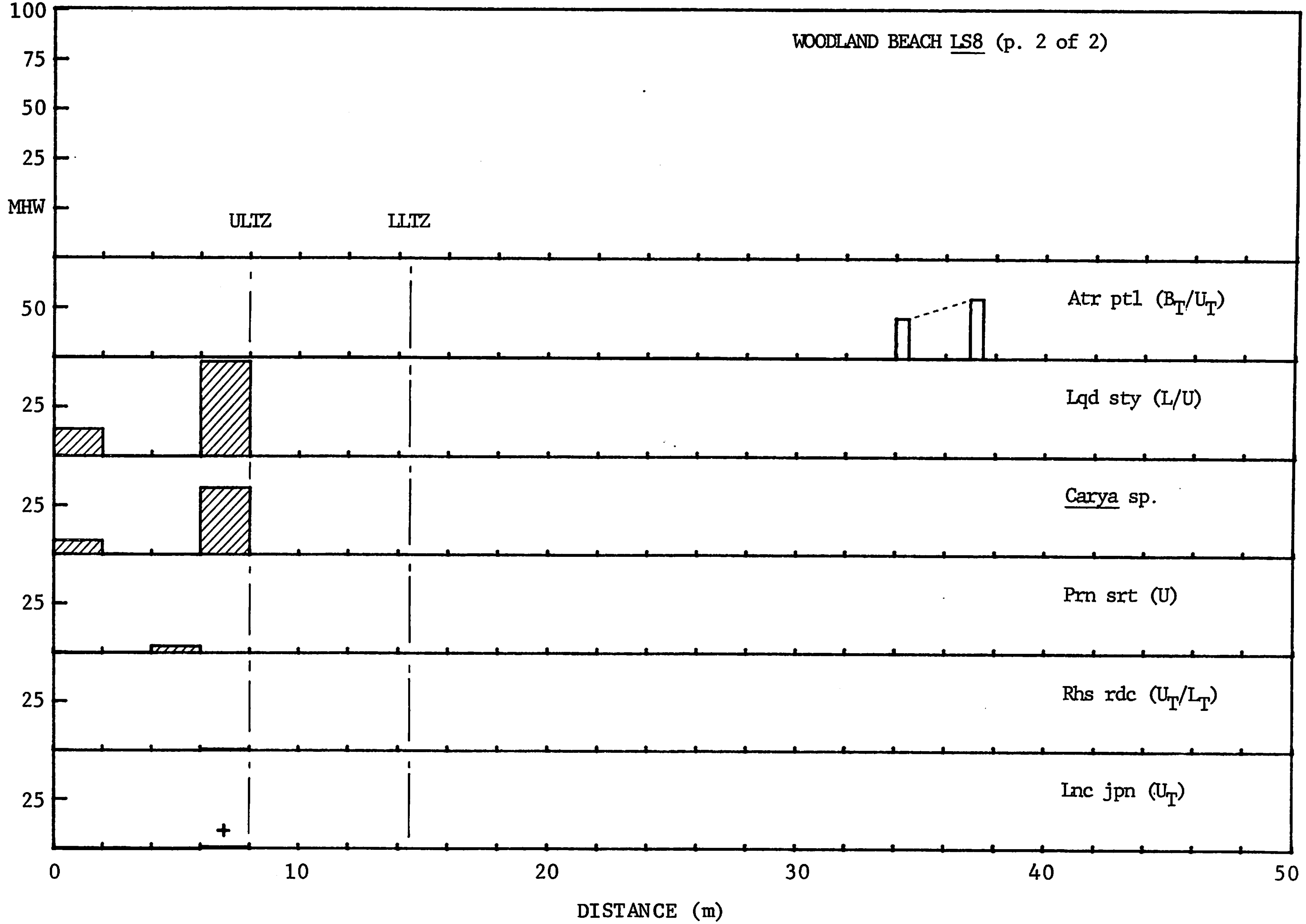

WOODLAND BEACH LS7 (p. 2 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Atr ptl (B_T/U_T)
Typ ang (B/F)
Scr rbs (B_T)
Spr cyn (B_T)
Spr alt (M)
Lqd sty (L/U)
0
10
20
30
40
50
DISTANCE (m)


WOODLAND BEACH LS7 (p. 3 of 3)
100
75
50
25
MHW
ULTZ
LLTZ
Cry crd (L/U)
25
Bcc hlm (T/U_T)
25
0
10
20
30
40
50
DISTANCE (m)

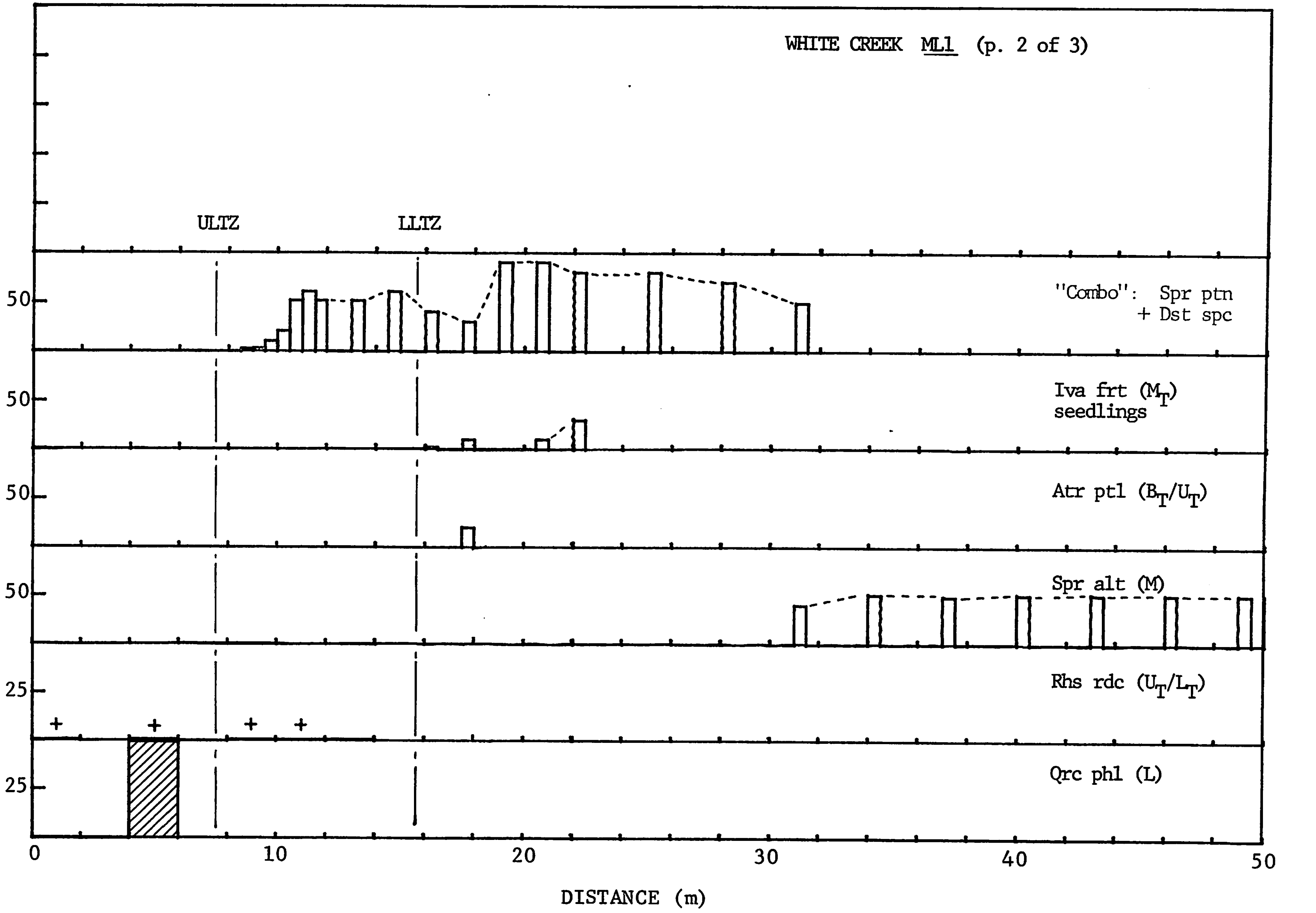

WOODLAND BEACH LS8 (p. 1 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
Lnc jpn (U_T)
Phr ast (M_T/L_T)
Spr cyn (B_T)
Scr rbs (B_T)
Spr alt (M)
Amr cnn (M)
0
10
20
30
40
50
DISTANCE (m)

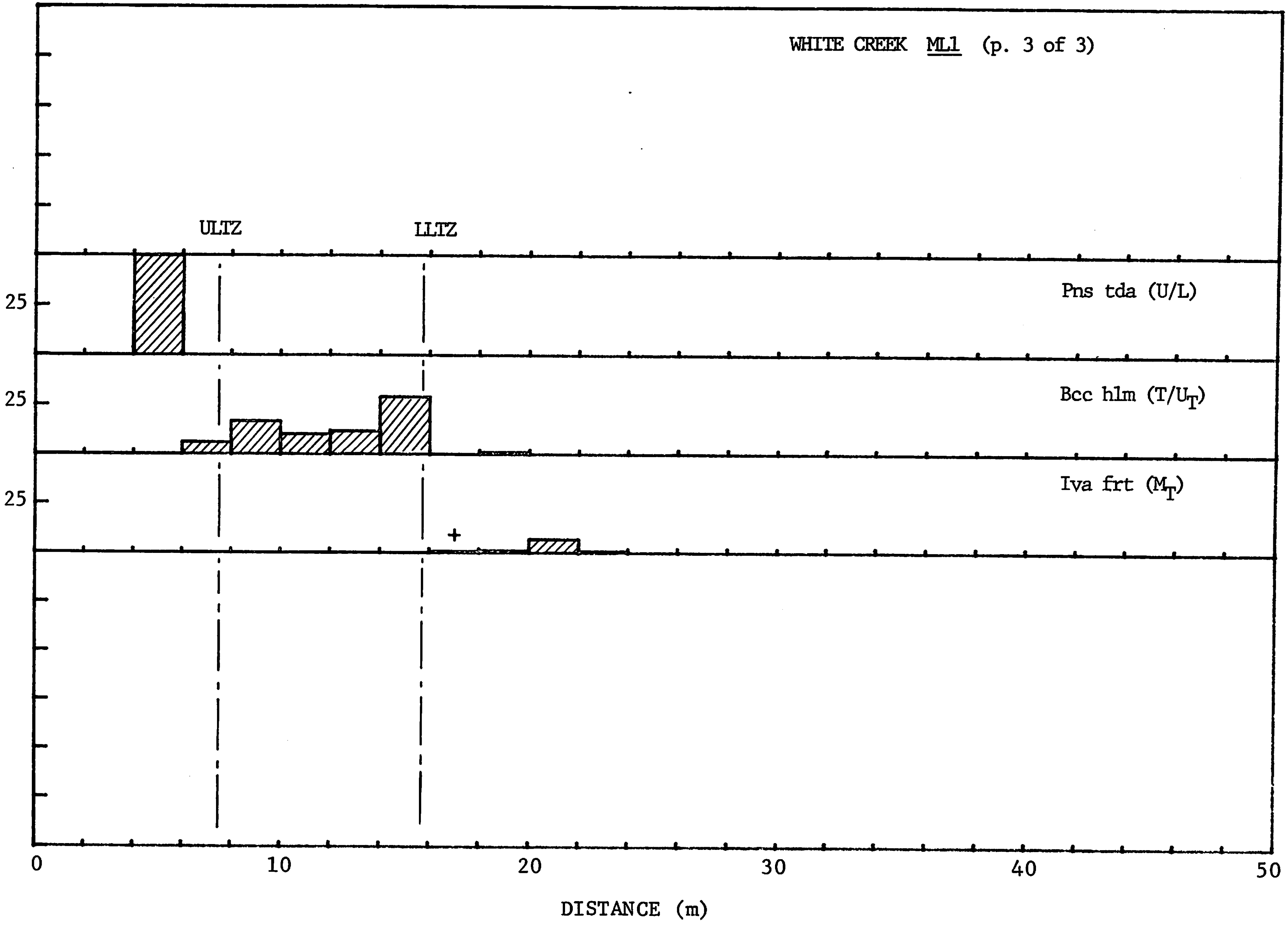


WHITE CREEK ML1 (p. 1 of 3)
ULTZ
LLTZ
Rhs rdc (U_T/L_T)
Smilax sp. (U)
Pnc vrg (B_T/U_T)
Phr ast (M_T/L_T)
Spr ptn (M_T/D)
Dst spc (M_T)
50
50
50
50
50
50
+
+
+
+
0
10
20
30
40
50
DISTANCE (m)

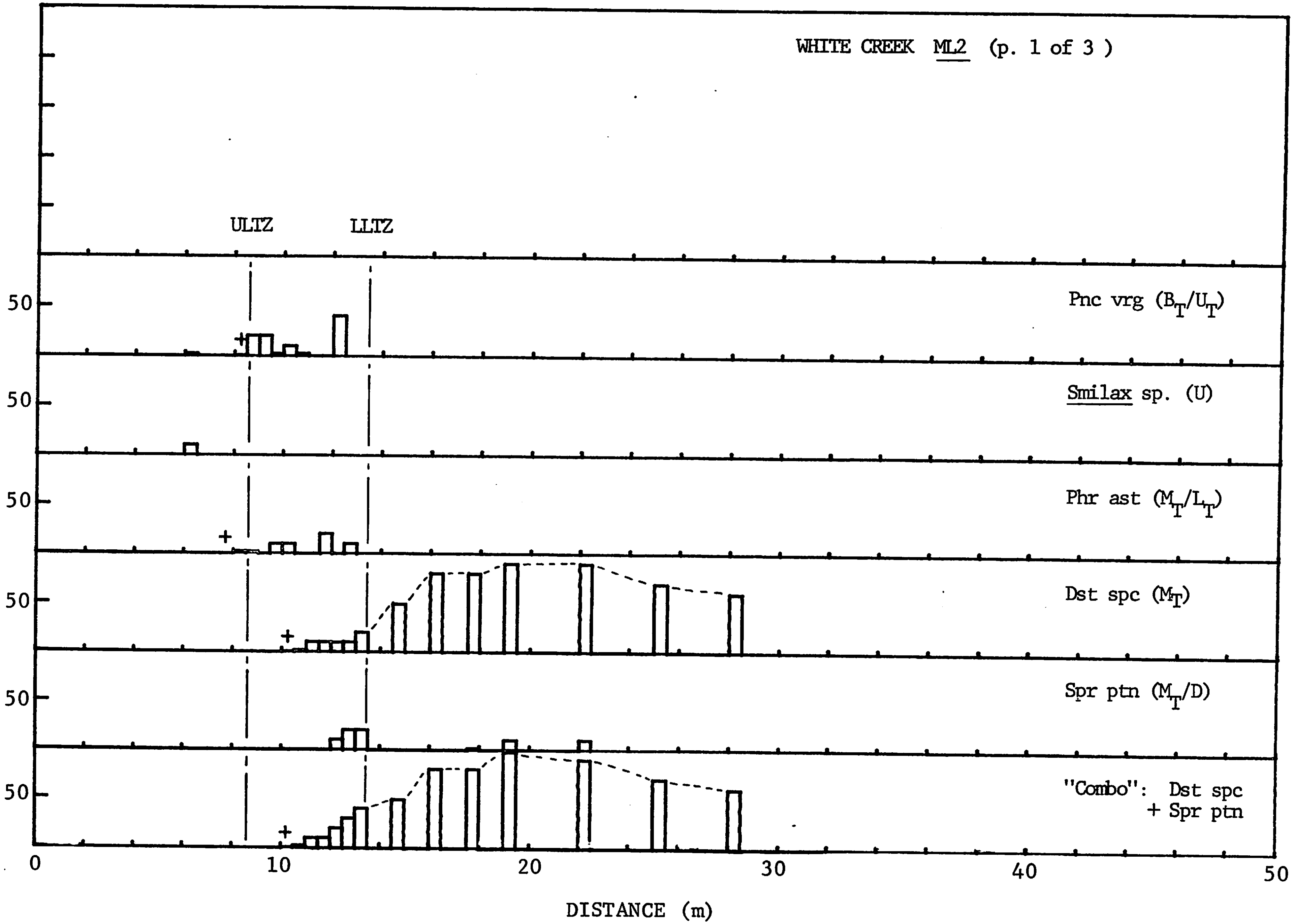


WOODLAND BEACH LS8 (p. 2 of 2)
100
75
50
25
MHW
ULTZ
LLTZ
50
Atr ptl (B_T/U_T)
25
Lqd sty (L/U)
25
Carya sp.
25
Prn srt (U)
25
Rhs rdc (U_T/L_T)
25
Lnc jpn (U_T)
+
0
10
20
30
40
50
DISTANCE (m)

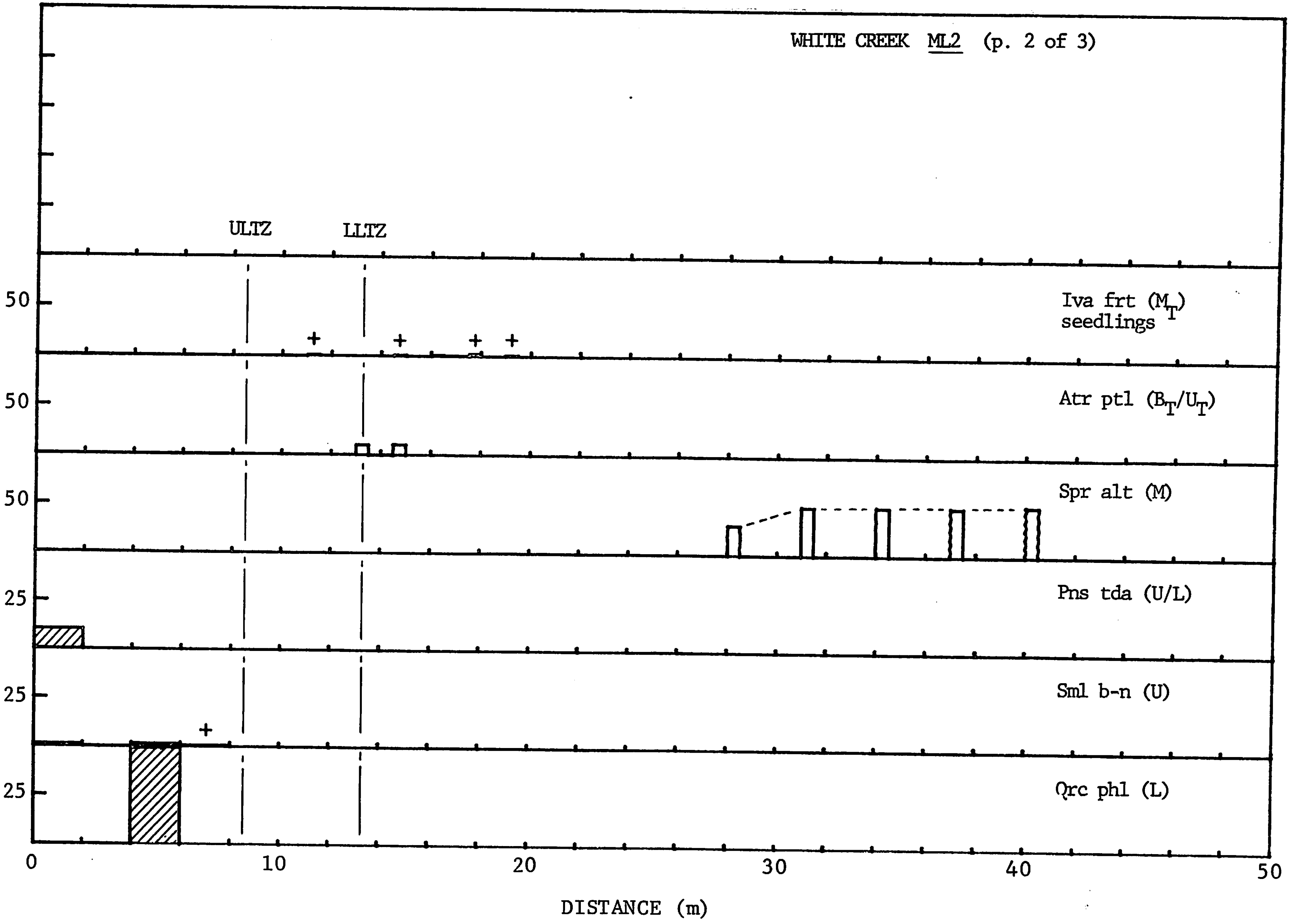

WHITE CREEK ML1 (p. 2 of 3)
ULTZ
LLTZ
"Combo": Spr ptn + Dst spc
Iva frt (M_T) seedlings
Atr ptl (B_T/U_T)
Spr alt (M)
Rhs rdc (U_T/L_T)
Qrc phl (L)
50
25
0
10
20
30
40
50
DISTANCE (m)

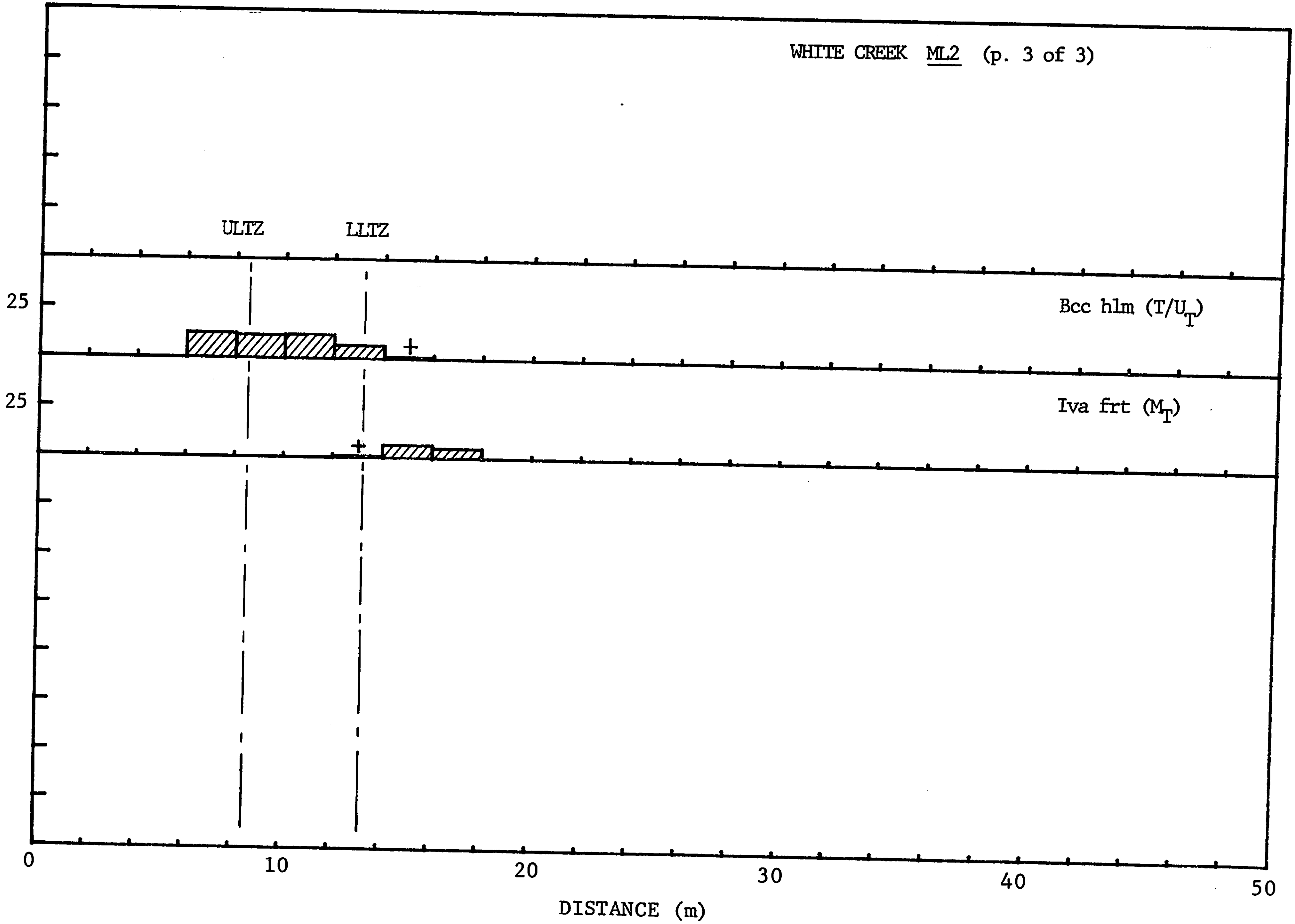


WHITE CREEK ML1 (p. 3 of 3)
ULTZ
LLTZ
Pns tda (U/L)
Bcc hlm (T/U_T)
Iva frt (M_T)
25
25
25
+
0
10
20
30
40
50
DISTANCE (m)



WHITE CREEK ML2 (p. 1 of 3)
ULTZ
LLTZ
50
Pnc vrg (B_T/U_T)
50
Smilax sp. (U)
50
Phr ast (M_T/L_T)
50
Dst spc (M_T)
50
Spr ptn (M_T/D)
50
"Combo": Dst spc
+ Spr ptn
0
10
20
30
40
50
DISTANCE (m)


WHITE CREEK ML2 (p. 2 of 3)
ULTZ
LLTZ
Iva frt (M_T) seedlings
Atr ptl (B_T/U_T)
Spr alt (M)
Pns tda (U/L)
Sml b-n (U)
Qrc phl (L)
50
50
50
25
25
25
0
10
20
30
40
50
DISTANCE (m)


WHITE CREEK ML2 (p. 3 of 3)
ULTZ
LLTZ
25
Bcc hlm (T/U_T)
25
Iva frt (M_T)
0
10
20
30
40
50
DISTANCE (m)