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Wet Site Archaeology

Barbara A. Purdy

CRC Press
Taylor & Francis Group

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CRC Press
Taylor & Francis Group
Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

First published 1988 by CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

Reissued 2018 by CRC Press

Library of Congress Cataloging-in-Publication Data

Wet site archaeology/edited by Barbara A. Purdy.
p. cm.
Proceedings of International Conference on Wet Site Archaeology, Gainesville, Fl., Dec.
12—14, 1986; sponsored by National Endowment for the Humanities and University of Florida.
Includes bibliographies.
ISBN 0–936923–07–5: $50.00. ISBN 0–936923–08–3 (pbk.): $32.50
1. Water-saturated sites (Archaeology)—Congress.
2. Archaeology—Methodology—Congresses. 3. Wetlands—Congress. I. Purdy, Barbara A. II.
International Conference on Wet Site Archaeology (1986: Gainesville, Fl.) III. National
Endowment for CC77.W48W48 1988
930.1'028—dc19

A Library of Congress record exists under LC control number: 87033911

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ISBN 13: 978-1-315-89865-0 (hbk)
ISBN 13: 978-1-351-07775-0 (ebk)

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CRC Press Web site at http://www.crcpress.com

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PREFACE

ARCHAEOLOGICAL WET SITES are found in permanently saturated deposits that entomb and preserve organic objects that seldom survive elsewhere. This description distinguishes wet sites from shipwrecks and from inundated terrestrial sites where degradation preceded submergence.

Wet sites are often located along old shorelines, like the famous Swiss Lake dwellings, or result from a catastrophic event such as Ozette Village on the Olympic Peninsula and Herculaneum in Italy. In other places, preservation occurs because materials were buried intentionally in organic deposits; examples include bog bodies of northern Europe and skeletons with surviving brain tissue from several sites in Florida.

This volume is the outcome of an International Conference on Wet Site Archaeology held in Gainesville, Florida, December 12–14, 1986. Papers cover waterfronts from Newfoundland to Chile, from Polynesia to Florida, and from the Late Pleistocene to the twentieth century. Despite this broad space and time representation, some unifying characteristics of wet site archaeology can be identified. These recur as common themes in many of the papers:

—Wet sites are invisible because they are entombed in organic deposits.
—Wet sites are usually discovered accidentally during development projects that often destroy them.
—Innovative methods to locate and excavate wet sites are required.
—Innovative methods to analyze and preserve materials from wet sites are required.
—Organic remains recovered from wet sites are very fragile and must be preserved immediately to avoid degradation.
—Wet sites offer new knowledge about past environments, subsistence, technologies, artistic expressions, skeletal structure, and pathologies.
—The unique and abundant biological and cultural remains from wet sites require adequate funding for processing, identification of species, preservation, and analyses. Archaeologists and granting agencies who are experienced with remains from terrestrial sites only should become aware of these increased needs.
—Erosion of wetland deposits results from accelerated modern activities such as drawdowns, commercial or recreational traffic on waterways, agriculture, dredging, and increased population.
—It is urgent that archaeologists, developers, and government bodies reach satisfactory agreements about ways to excavate or protect wet sites when modifications of wetland areas are unavoidable.

Other issues addressed in this volume concern the establishment of priorities for excavating wet sites given the realities of available funding and other considerations, and how to determine when enough of a wet site has been sampled.

Wet sites, such as those in Denmark, Switzerland, and Florida, have been reported since the nineteenth century. They have provided views of past cultures and people never known before. The information from wet sites can be preserved for future generations if it is recovered systematically and for the public welfare, instead of for personal gain. The increasing capability to alter the landscape using modern machinery, however, may raze them before investigations can be conducted. It is curious that most archaeologists, while realizing the anthropological potential of wet sites, do not actively search for them. Perhaps this volume will stimulate greater emphasis on wet site projects. The results are as rewarding as going to outer space or diving to the deepest parts of the ocean.

Florida is a logical place to hold a conference about archaeological wet sites. Rapid population increase has necessitated the development of hitherto undisturbed areas in the state, many of which are in wetland locations. As a result, paleontological and archaeological finds are constantly encountered. A dramatic example of this situation occurred during the first day of the conference when a dugout canoe was found during peat mining operations at Stricklin Peat Co. near Grandin, Florida. We took advantage of this opportunity and visited the site. The canoe was eventually radiocarbon dated at A.D. 1450. Mr. and Mrs. Ollie Stricklin have cooperated on many occasions when canoes, wooden bowls, and other items were found on their property.

The International Conference on Wet Site Archaeology was funded by the National Endowment for the Humanities and the University of Florida with additional contributions from the Florida State Museum and the Division of Sponsored Research at the University of Florida, and the Florida Phosphate Council. I acknowledge with gratitude the financial support from these sources and I am equally grateful for the time and services furnished by many individuals. Conference participants took a fieldtrip to the Windover Farms Archaeological site in Titusville where the owners, Mr. and Mrs. James Swann hosted a barbeque and hay ride for the entire group. (See the paper by Doran and Dickel for additional information about this site and the generosity of the owners.) Elise V. LeCompte, a graduate student in the Department of Anthropology at the University of Florida, shouldered a major portion of the burden of organizing the conference.

The success of any event depends upon the people invited. In this case, the success of the conference can be attributed to the speakers whose experience in diverse aspects of wet site investigations is unparalled. Future conferences should attract other well known archaeologists who have worked at archaeological wet sites not represented here.

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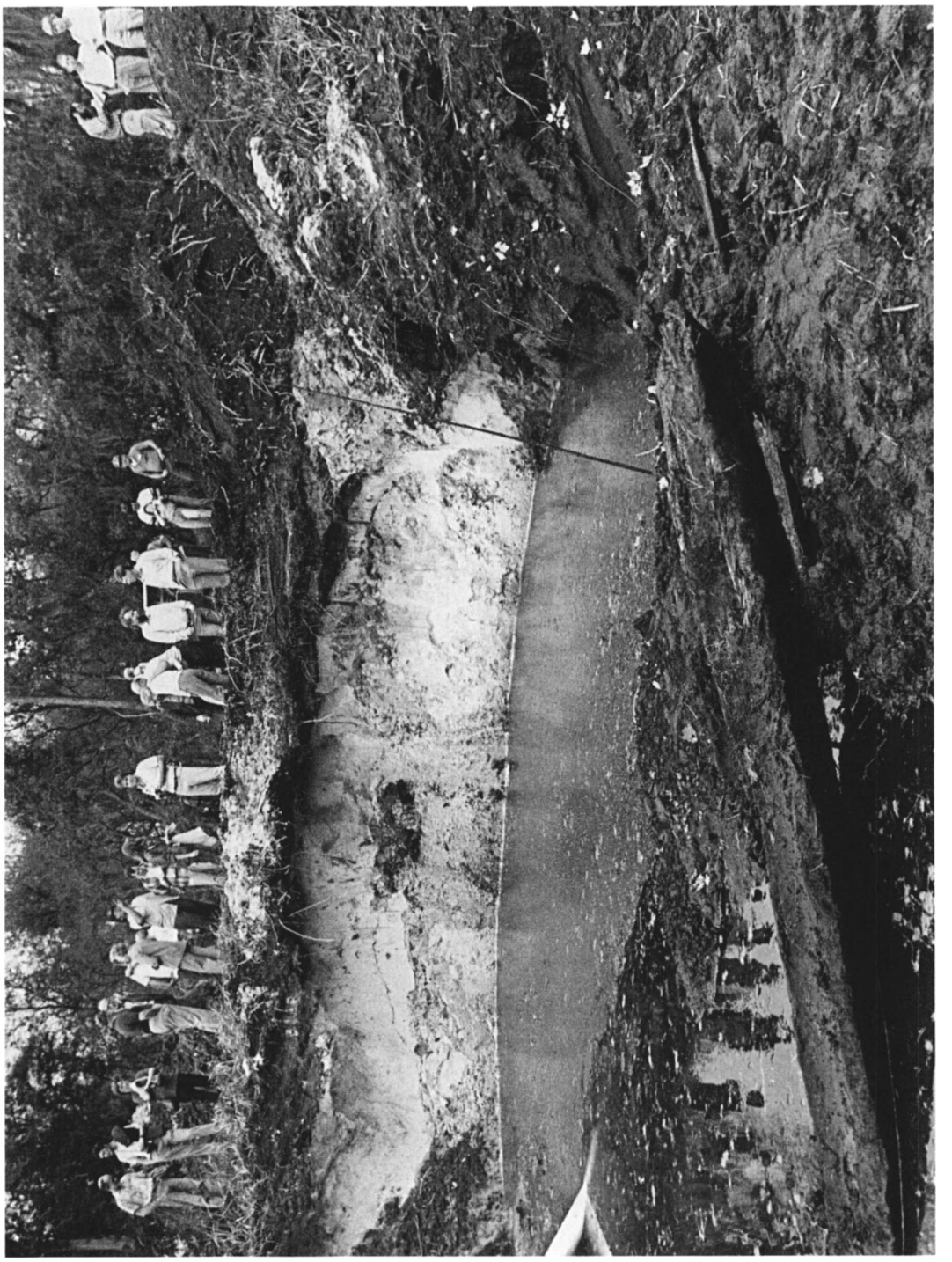
June 1987



Conference participants viewing a dugout canoe found at the Strickland Peat Company near Grandin, Florida.

A WETLAND PERSPECTIVE

John M. Coles

WETLANDS, those flat dreary waterlogged lands that are found in many parts of the world, do not appeal to everyone. Attractive to some, but unloved by many, wetlands conjure an overwhelming vision of endlessness and, to some, even a malevolence. Their dark fields, dank vegetation, and swirling mists can create a lack of focus that is unnerving when first encountered. One of Europe's largest wetlands, the Fens of eastern England, has inspired this description:

> And what are the Fens, which so imitate in their levelness the natural disposition of water, but a landscape which, of all landscapes, most approximates to nothing? Every Fenman secretly concedes this, every Fenman suffers now and then the illusion that the land he walks over is not there, is floating.... (Swift 1984).

Yet within these wetlands, whether they be swamp, marsh, fen or bog, landlocked, estuarine or coastal, is sheltered a myriad of wildlife unseen in other environments. Within the unprepossessing swamps and bogs there also lie vast arrays of cultural material, unique in the surviving world of ancient human craftsmanship. Also held in quiet balance in the marshes and bogs all over the world are the waters upon which we depend, cushioned against too ready a release and flooding, filtered to purity, and held in even flows for an unappreciative mankind. All of these wetlands are at risk today, threatened by modern life; many have perished and lie exposed, withering away in the winds, no longer housing life either present or past. There is no more depressing scene than a dead and abandoned wetland.

Other wetlands in a more restricted archaeological sense include drowned regions, lands once dry and inhabited by all manner of life until flooding by rising lakes or seas or collapse or subsidence of land, sealed them with waterborne silt or peat formation, or buried them in depths of water with sand or gravel. Here too the tide of modern life erodes, with quarrying on land and under the sea, alteration of natural water levels, or imposition of roads, factories or houses upon drained lands. Such wetlands have less impact upon natural wildlife but their cultural importance is as great as that of swamp or bogland.

The reason why we as archaeologists are interested in all these wetlands is obvious. But even without an accompanying cultural element, wetlands should interest us as part of living populations and societies. Wetlands are the last refuge of

a multitude of plants and animals once widespread and now threatened by extinction. They also represent a living model of that environmental change and impact which we humans profess to comprehend in the dead world. For archaeology, the wetlands of the world hold the key to understanding past human behavior. No one could argue that this is as important as nature conservation or water purification, yet in its way it has a claim to be so elevated; the relevance of the past to the present has been debated many times and will not be repeated here.

What wetland archaeologists are after is the evidence of the past, and a better documentation than has been retrieved from desiccated and eroded landscapes in the past century. In America and Europe such sites have occupied well over 90% of archaeologists' time and over 95% of the funds and support for excavations even in the past decade. Doubtless the same tale is true for other regions of the world where wetlands exist. We seek today better data for the questions that remain unanswered after a century of dryland work and education in a dryland context. Through this, our expectations have been set so low that we can barely begin to grasp what is available to us with wetland survey and excavation. Our archaeological models are so fragmentary and skeletal that a gram of flesh and blood evidence may collapse them, and rightly so. Models used to explain the past must be suspect if they are based on fragmentary, desiccated, decayed, eroded, and ephemeral evidence of the kind that dry sites yield. What is needed is a reversal of the archaeological process, a time, all too short, to extract and retrieve new kinds of data, a time to create new models of the past, and a time to test current interpretations and to rethink the aims and possibilities for archaeology.

It is important to realize that there are various types of wetlands and that their ancient exploitation differed. Archaeological residues from these areas will also be of unequal quality and quantity. Some wetlands were used only for the gathering of wildlife, or were traversed by pathways leading into and out of the wet areas (Fig. 1). Others were exploited for crops, for animal grazing, or provided space for settlement and industry. Because wetlands are varied, were used differently, and have undergone unequal post-depositional processes, their archaeological contents will also be unstandardized. Some will be full of wood while others will astronish with their yield of materials of all kinds which were submerged in the wet deposits and sealed by peat, clay or silt. Protected from scavengers and from many of nature's own erosional forces, the structures and other artifacts remain in conditions of survival only dreamed of when excavating dryland sites (Fig. 2). Some entire landscapes, where ancient settlements have survived by waterlogging and bog formation, can be identified by field reconnaissance using field-walking, aerial surveys, remote sensing, and sub-surface coring. This can yield remarkable information about settlement patterns.

Wetlands of most types also yield immense quantities of environmental and economic data, including pollen and macroscopic plant remains of leaves, bark, and seeds; beetle, spider, and fly fragments; and larger animal remains and molluscs. Such an abundance of evidence can sometimes deter archaeologists and those who fund our work; however, without exploiting every opportunity, there is little point in arguing the case for wetland research. In addition, the results of detailed

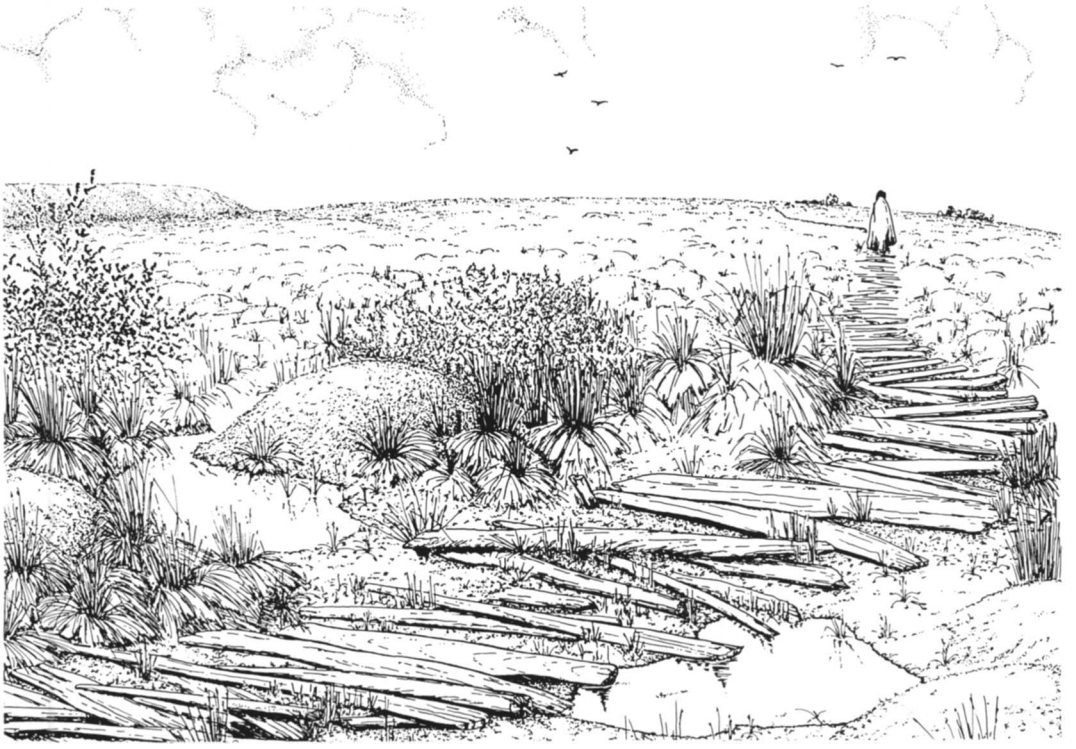


FIGURE 1 Reconstruction of a prehistoric wetland exploited for wildlife, and traversed by wooden roadways. The preservation of a variety of environmental indicators allows a high degree of precision in this environmental reconstruction. By a combination of archaeological, pollen, macroplant, and beetle and bird pellet analyses, all of these wetland plants and pools, birds, and wooden structures, can be envisaged in precise detail. (Drawn by R. Walker.)

extractive and analytical work can be impressive because they are precise. Precision in environmental reconstruction, for example, allows us to picture extinct landscapes down to individual tussocks of grass, boggy pools of water, a teaming insect life, and a detail for our interest in human activities that is quite beyond the reach and comprehension of dryland mentalities. Precision in another wetland sense comes from the tree-ring dating of preserved wood, which can provide not only absolute time (without the imprecision of radiocarbon dating), but also refinements of seasonality and the life and repair of individual structures, virtually imposing a dynamism of behavior upon the archaeologist (Fig. 3).

From time to time, wet sites also provide unexpected evidence that we could never have imagined existed—details about life and death, artistry and craftsmanship, and symbolism and ideology. Ethnographic and historic records assert that many societies do not create representations of their symbols of existence or their artistic achievements upon inert stone; rather they carve, engrave, weave and paint elements of their ideology on organic matter such as wood, textiles, and hides.

FIGURE 2 Part of the structural foundations and platform supports of the Bronze Age lakeside settlement at Fiavé, Lake Carera, Italy (cal 2000–1700) showing the extraordinary depth of preservation in a wet environment. (Perini 1984.)

These artifacts may survive in wet sites (Fig. 4) and, without such sites, we would be totally ignorant of many of these symbols of societies.

It is not only ourselves that we must satisfy by our archaeological work. The public supports our endeavors, and in the long run it is the public who will determine the fate of our subject. Without question wet sites allow the public to gain a better appreciation of the past. These sites are often spectacular and better preserved than dry sites, and therefore are more understandable. We can see

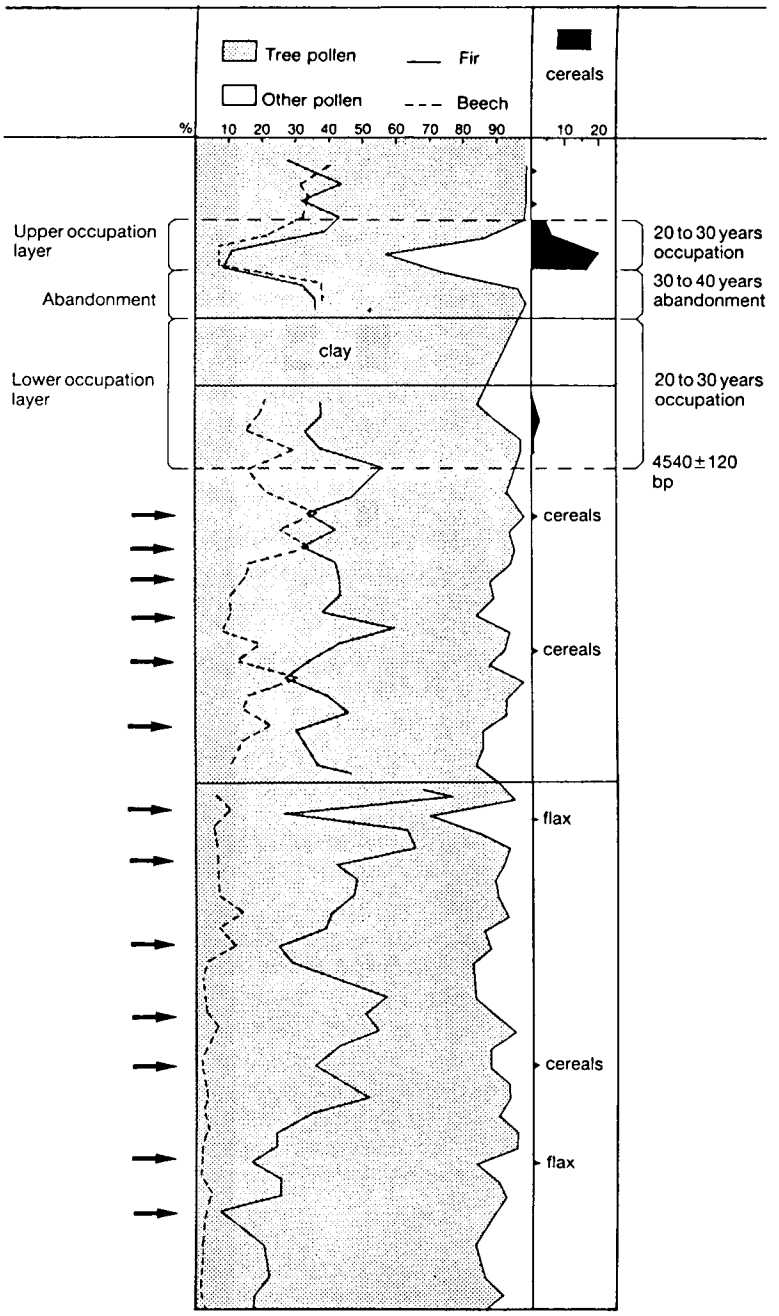


FIGURE 3 Pollen diagram of the Neolithic settlement Les Baigneurs at Charavines, France. The stratigraphy shown represents 600–700 years of sediments, with arrows indicating phases of deforestation of fir, some coinciding with episodes when cereals or flax were grown. The precision of chronological events from cal 3300 BC is based on dendrochronological analysis of the wooden structures. (Bocquet et al. 1987.)

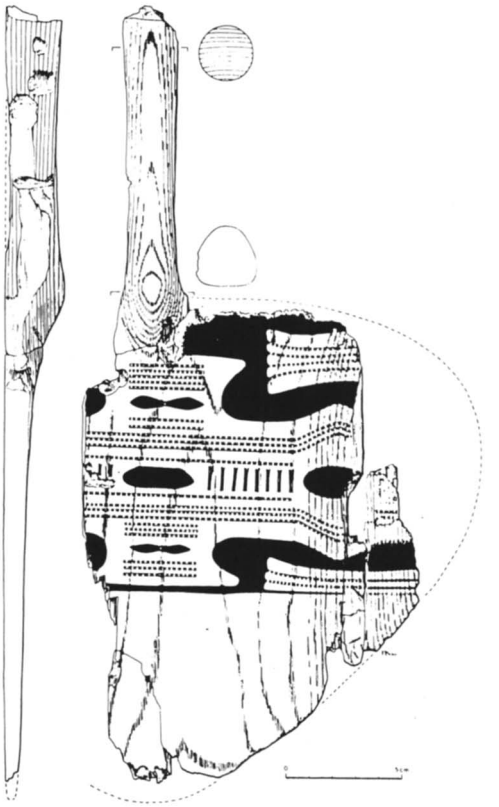


FIGURE 4 Decoration imprinted and painted with ochre on a paddle of ash from the Tybrind Vig Mesolithic settlement, Denmark, now submerged due to isostatic and eustatic factors. Date cal 4800 BC (Andersen 1985.)

houses, palisades, cattle stalls, tools with handles, wagons, and sometimes the people themselves (see the article on bog bodies in this volume). Our reconstructions can be more accurate and more precise, and will therefore encourage the public to believe that archaeologists really do know what they are talking about, so long as they speak a comprehensible human language.

In this discussion I am not necessarily trying to say that dryland sites, where only stains, stones, and bones survive, are no longer of any value. Not everyone in the past, or present, lived in or near a wetland, and the range of archaeological sites and landscapes is not all represented in wetland environments. It is patently obvious that drylands and wetlands hold complementary sets of evidence. But dryland archaeology has had over a century of sustained work and has generally failed to deliver the goods. That is, it has failed to inform us about the past in the ways we want to be informed: how did people live, what did they look like, what did they wear, what did they do and for how long, how did they organize themselves in their settlements and in their houses, what were their patterns of behavior, what were their social and economic systems, and what did they believe in? Wet sites

allow us to put a shape on the dry and bare bones of past lives, to answer parts of these questions, and to pose new questions.

Dry sites give us a narrow perspective of the past. If we believe that the economic and social ordering of ancient people is preserved in the material record, then we have a very poor representation of that record in desiccated sites and landscapes (Fig. 5). On dry sites, 80–100% of all materials found are imperishable inorganics; we are left to ascribe an importance to these remains possibly far beyond their value to the society which used them. In contrast, wet sites provide a broader perspective where materials like stone can be seen to be relatively unimportant, and where we can get a very rich representation of material evidence for

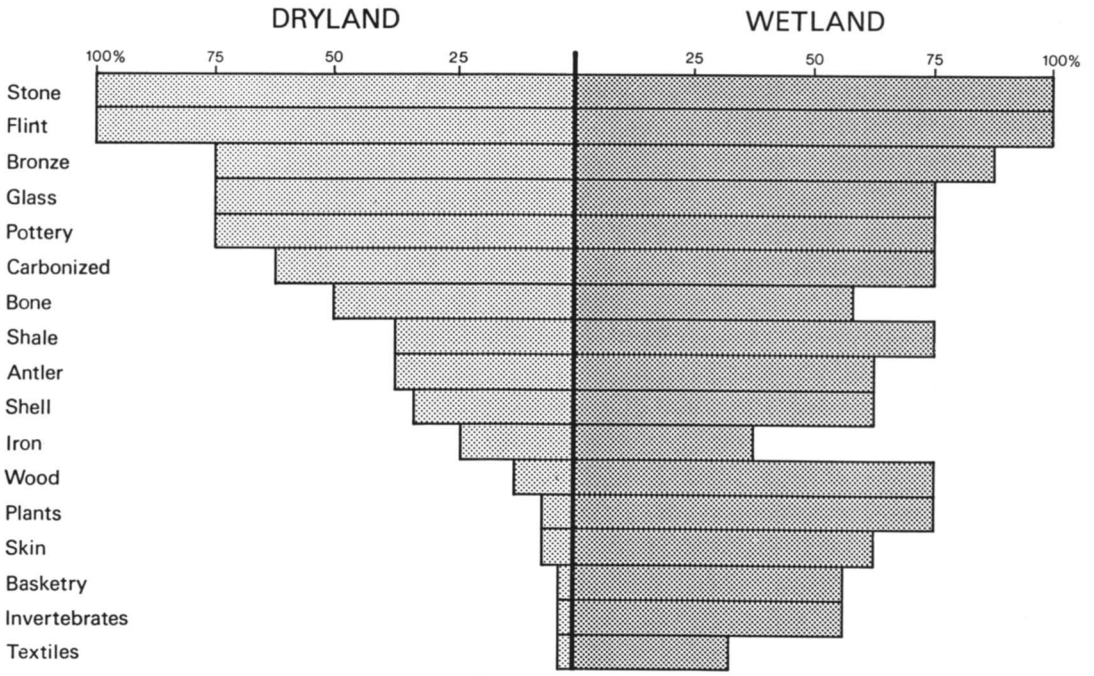


FIGURE 5 A general comparison of the preservation of materials on dry and wet sites, to demonstrate the greater variety of remains recoverable from wet sites. For example, stone will be preserved on all sites, dry or wet. Bone will be preserved on 50% of dry sites, 60% of wet sites. Wood will be preserved on 15% of dry sites, 75% of wet sites. Textiles will rarely be found on dry sites, but on 30% of wet sites. The percentages are based on a wide sample of European prehistoric and early historic sites in different environments.

our interpretations. Inorganic material comprises only 10–25% of a wet site assemblage, while organic remains such as wood, plants, skin, textiles, basketry, invertebrates, and other elements never encountered on dry sites account for 75–90% of the material recovered. On wet sites we can observe that inorganic materials like stone were used to help fashion, but were not themselves, the important artifacts for human life. Our enquiries should surely be directed towards those sites and regions where this scale of evidence survives.

Such an extension to archaeological enquiries will be expensive, as anyone involved in wetland work can attest. Field archaeology, conservation, and analytical work all cost far more than comparable activities on dry sites, yet the growth of wetland archaeology in western Europe, for example, has been remarkable. Here there has been widespread recognition of the worth of wetland research, as well as acknowledgment that wetland evidence is severely threatened. Support for archaeology does not increase in proportion to the threats and opportunities; thus it behoves us to consider what importance we attach to projects, in devising priorities for the future.

If we accept that the purpose of wetland archaeology is to expand our knowledge, then we must agree that not all wetlands are equally important. Table 1 attempts to set out certain priorities for wetlands and wet sites; much of it will be self-explanatory.

Table 1. Wetlands: archaeological priorities

ACADEMIC POTENTIAL

1. *Significance*
   - A. national or international, unique or nearly so
   - B. national importance, high priority
   - C. regional importance, good example of type
2. *Extent of archaeological remains*
   1. whole area or major site intact or nearly so
   2. significant area or substantial part of major site
   3. minor area only, or minor site, or small part of major site
3. *Current condition of surviving area*
   - a. undamaged or nearly so, or minor damage only
   - b. partially damaged and/or in process of being damaged
   - c. severely damaged, significant truncation
4. *Quality and range of evidence*
   - I. most materials, no significant exceptions
   - II. some organic materials survive, others decayed
   - III. no or few organic materials survive

HERITAGE AIMS

5. *Preservation*
   - i. intact preservation possible
   - ii. preservation in part or to some degree possible
   - iii. preservation impossible, or severe damage likely
     (other agencies: $ positive: conservation aid
     − negative: exploitation)
6. *Display potential*
   - H. possible *in situ* reconstruction and/or display, devoted museum
7. *Costs* (survey, excavation, conservation, analyses, etc.)
   $ −$$ −$$$ = low − medium − high costs

8. *Current action* (agency at work, potential, record to date)
   x. short record of work, publications, etc.
   xx. long record

1. A site may be of international, national, or regional importance because of its character (settlement, cemetery, etc.) within a particular territorial context.

2–3. The extent and the condition of the available area will help determine the probable scale of enquiry and its importance.

4. One crucial factor is the quality and range of evidence on the site—a wet site has to be in excellent condition to justify major archaeological work. It must have good organic preservation to warrant support; there is little sense in putting funds into a site where survival is poor. We all know that almost every ancient community used organic materials for houses, fences, tools, containers, clothing and so on, so it is not revolutionary to find traces of wood for example, on any site. It is only important if the materials are in a good enough state to give us more knowledge about woodlands, carpentry, chronology, food, use-wear of tools, clothing, decoration, and other aspects of culture. A dried-out infested plank, an eroded potsherd, or a bare bone is not much use if we are seeking new information. These aspects of site potential seem to me to sum up our aims and opportunities. But there are other aspects of wetland research to consider when we try to justify the work to a wider audience. It is not, in my opinion, the right or the role of archaeologists today to seize every seemingly intact and well-preserved site for excavation.

5. Many wetlands are indeed under serious threat and do require some rescue or salvage action, but others may be in positions where their preservation can be attempted. Therefore in assessing our priorities we should take into account these opportunities to preserve some areas for future research. Other agencies will, without doubt, also be interested in wetlands.

6. The public too deserves recognition when making decisions; we need to determine if displays, museums, or reconstructions are possible.

7–8. As resources for archaeology are finite, some indication of likely costs, as well as the existence of an archaeological agency already trained in wet site excavation, will have to be assessed; wetland archaeology is expensive and mistakes through inexperience are costly in terms of money and lost information. The growth of wetland research is assured in many areas of the world now that its fruits have been sampled, and there is a good case for training programs to be developed and offered.

The proof of any pudding, of course, is in its affect on the consumer, and it is tempting to produce here a priority list of wetland projects. Take the Fenland of eastern England, for example. Here is an immense area of wetland (400,000 ha) with thousands of archaeological sites, now discovered through wetland field surveys (Fig. 6). Its national significance is great (A) and much of the area is available for survey (2), but it is damaged now in the process of being drained (b). The quality of the evidence in places is extremely high, but generally variable (II). The Fens after having been drained and ploughed for centuries (Fig. 7), cannot be preserved intact (iii). They are too large for a single specialized museum and the archaeological

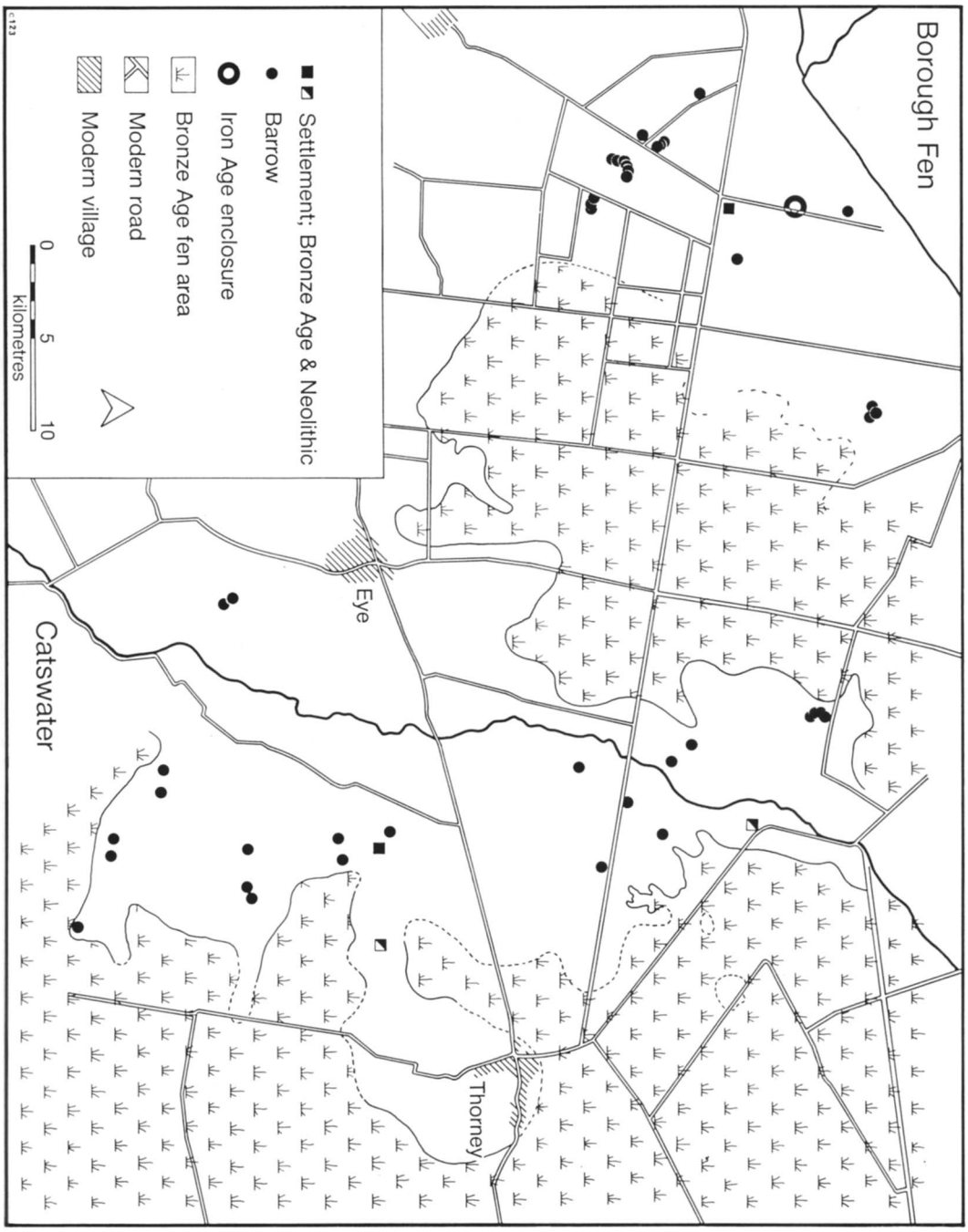


FIGURE 6 Distribution of ancient sites in Borough Fen, the Fenlands, England, to show the results of survey over a drying wetland. Most of the sites marked were invisible until drainage and erosion reduced the organic soils, thus allowing the still intact monuments to "emerge" from the flat landscape. Based on surveys by David Hall, Fenland Field Officer.

FIGURE 7 The Holme Fen post, Fenland, England. The post was driven into bedrock under Fenland peats in 1848, with its top exactly at ground level. The height now seen (over 3 m) represents shrinkage (not cutting) of the peat due to drainage of the area.

survey and excavation, now underway by experienced teams (xx), is costly ($$$). The sum of the assessments indicates the significance of the area, the rate of damage and the need for work, the likelihood of important yields, and the feasibility of excavation. A list of similar projects has appeared elsewhere[1], but several of the projects presented in this volume seem to me to fall at or near the top of any priority scheme. Except for Ireland, these are on-going projects which have already yielded much information (Table 2).[2]

Table 2. Wetland projects: an assessment

Sites	Significance	Extent	Condition	Quality	Preservation	Display	Costs	Action
Hauterive-Champréveyres	A	1	a	I	iii−	H	$$$	xx
Sweet Track	A	2	b	I	ii+	H	$$	xx
Ozette	A	2	b	I	ii	H	$$	xx
Windover	A	1	a	II	ii		$$	xx
Areas								
Fenland	A	2	b	II	iii−		$$	xx
Assendelver	A	2	b	II	ii−	H	$$	xx
Central Ireland	B	⅔	c	II	iii−		$$	

For wetlands only now recognized as potentially important, assessment should pose no difficulties. A small input of time and funds for field survey, sampling for environmental coring, and perhaps remote sensing, allied to standard literature searches particularly of early records of exploitation and exploration, can provide a clear appraisal of the region's potential. In this way the major projects in the English Fens, in the Somerset Levels, and in German Lower Saxony were initiated. Other more specific sites can emerge through underwater survey (Tybrind Vig, Denmark; Hauterive-Champréveyres, Switzerland), ditch survey (Flag Fen, England), river and lake-edge search (Hontoon Island, Florida), coastal wave erosion

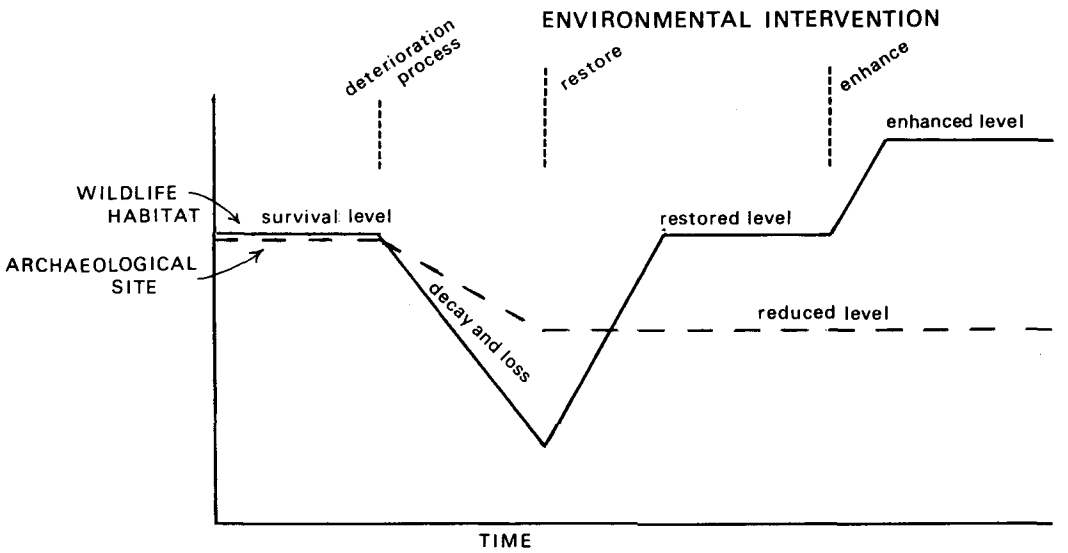


FIGURE 8 Environmental intervention in a wetland. Although survival levels of wildlife and of wet site archaeological remains may be held at broadly comparable levels (left), once drainage commences decay and deterioration of both elements will start to take effect unequally. Should the restoration of wet conditions occur, however, it is possible to recreate or even to enhance the wetland aspects of the wildlife plants and animals (although probably of different composition than the original). For archaeology, such restoration is impossible; the loss of waterlogged remains is irreversible.

(Ozette, Washington State), or drainage and peat extraction (Fiavé, Italy); in these cases it may not be necessary to demonstrate the significance of the site other than by trial excavation and sampling (e.g., Flag Fen, Tybrind Vig), or by recourse to earlier records of artifacts and structures at the site (e.g., Hauterive-Champréveyres, Ozette).

In conclusion, why should we be concerned about wetland archaeology? It has produced outstanding results by any method of assessment, and although it sometimes suffers from common but not universal delays in publication, its contribution to the record of the past is already very considerable. The reason why archaeologists cannot merely continue a rather opportunistic approach to wetland research is because the pace of change in the world has quickened. The slow and gradual uncovering of wet sites and the exposure of ancient wetland landscapes by traditional methods have now been accelerated by modern drainage, by deeper ploughing, by harbor, motorway and marina developments, by reservoir construction, and by levelling and filling of the land for housing or factories. Current governmental policies do little either to help preserve wetlands or to permit their investigation in advance of damage. For archaeology, this damage is irreversible (Fig. 8). A wetland once drained may be restored in part for nature conservation by the reintroduction of water, but once organic archaeological evidence has decayed, it is gone forever and no amount of fresh flooding or wetland wildlife will do any good. This is why archaeologists should not only join others in efforts to protect wetlands but should take the lead in the preservation movements; if we do not, we are playing a part in the destruction of the raw materials of our own subject.

Acknowledgments

Some of the general comments made in this paper are the result of contact and communication with many wetlanders in Europe and America, and to all these archaeologists, environmentalists, and conservators I extend my thanks.

Footnotes

1. A more detailed explanation of the priority statement, and a commentary on a variety of wet sites and wetlands, appears in J.M. Coles, 1986 Precision, Purpose and Priorities in Wetland Archaeology, *The Antiquaries Journal* (66):227–247.
2. Most of the European examples mentioned here are reported in a volume of papers presented at the Wetland Conference of the Prehistoric Society held in 1983: *European Wetlands in Prehistory*, J.M. Coles and A.J. Lawson (eds.), Oxford University Press, 1987.

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PROBLEMS AND RESPONSIBILITIES IN THE EXCAVATION OF WET SITES

Richard D. Daugherty

THE PAPERS presented in this volume cover a wide range of topics, including: the purpose and significance of wet site archaeology, different types of wet sites, special techniques associated with the excavation of wet sites, descriptive reports on the excavation of wet sites, special studies associated with wet site excavations, and problems specifically linked to wet site excavation. The fact that this conference was held, and that the range of topics discussed was so broad (essentially as diverse as that for any archaeology conference), certainly indicates that wet site archaeology has developed into a vital aspect of our discipline.

But, as with any developing field, it takes time for some of the problems to achieve general recognition, not only within our own profession at large, but also with governmental agencies, sources of funding, and the public in general. It is to some of the special problems associated with wet site archaeology, as well as the attendant responsibilities, that I shall address my remarks. I shall use my experience of over eleven years of directing the excavation of the Ozette Site to illustrate the points I wish to make.

Ozette Village (45–CA–24) is the southernmost of the five main villages of the Makah Indian tribe of the Cape Flattery area of Washington State. The Makah are closely related socially and linguistically to the Nitinat of southern Vancouver Island. Linguistically, all are Nootkan speakers.

Ozette Village is located on the Pacific coast of Washington, 14 miles south of Cape Flattery at Cape Alava (Fig. 1). The offshore area immediately in front of the site is a broad rock shelf which is exposed during most low tides. Offshore islands, Ozette and the Bodeltehs, and the tidal island, Tskawahyah or Cannonball, are a part of the Ozette Site complex. The main part of the site lies on a narrow bench, 75 m at its widest and varying in elevation above high tide from 1 to 5 m. Behind the site is a sharply rising hillside which levels off to form another bench at about 30 m in elevation. The offshore shelf and islands, as well as the village's elevation of above mean high tide, usually protect it from both surf and storm winds. The sheltered local surf conditions allow for the easy launching of canoes in most weather conditions.

Ozette subsistence economy focused on maritime resources. Whale hunting was a major economic activity. Hair seals and sea otters were taken from nearby

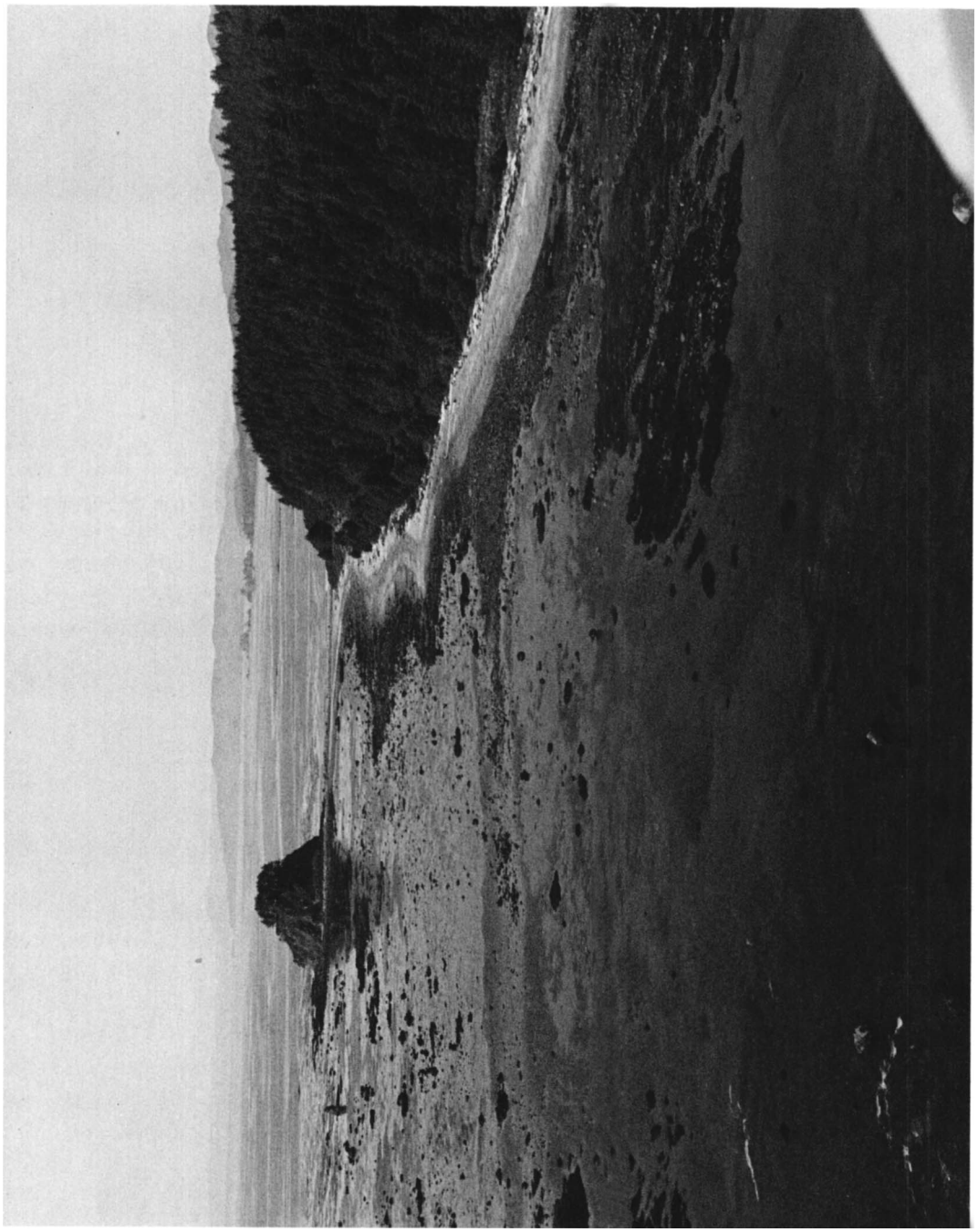

FIGURE 1 Ozette village is located on the low bench bordering the beach opposite Cannonball or Tskawahyah Island. The rocky reef in front of the site is exposed at low tide. In the distance are Point of Arches, Cape Flattery, and Vancouver Island (Photo by Ruth and Louis Kirk.)

kelp beds and sea lions from nearby rocks. The site lies close to the migratory route of the pelagic fur seal. Archaeological evidence from the site indicates that all these mammals were taken prehistorically (Gustafson 1968; Heulsbeck 1983).

Bottom fish, such as red snapper and ling cod, abound in the waters offshore from Ozette. To the northwest of Tatoosh Island at Cape Flattery lie excellent halibut banks. Along the littoral zone, resources such as kelp and various shellfish were harvested. Rivers such as the Ozette yielded salmon, including the sockeye, coho, chinook, and chum (Heulsbeck 1980, 1983).

Augmenting the maritime resources were forest products, including deer, elk, salmon berry, salal berry, and various other plants. Although the plants do not appear to have contributed a large amount to the diet, they may have been an essential source of certain minerals and vitamins.

The Ozette Village was occupied into the early twentieth century. It was abandoned when families moved to Neah Bay to be in compliance with Bureau of Indian Affairs regulations stipulating that all Native American children attend agency schools. By the 1920s, the village site was being used only as a seasonal fishing and hunting camp.

The initial excavations at Ozette, in the summers of 1966 and 1967, demonstrated that the site had extensive, thick midden deposits, and that occupation extended from the historic period back to 2010 ±190 B.P. (WSU−1123). The material culture and faunal remains reflected a well-developed maritime adaptation (Gustafson 1968; McKenzie 1974). Cultural features included historic house floors, and a succession of prehistoric house floors documented in the stratigraphic profile. The extent and the time depth of the deposits, as well as the preservation of various perishable materials at the site, made it obvious that the site could provide unique contributions to understanding past cultures on the coast.

The Ozette deposits were severely jeopardized in January of 1970. Abnormal winter storms had deeply eroded the bank, undercutting the midden and causing it to slump onto the beach, depositing bentwood box fragments, baskets, mats, arrows, boards, and stakes which were being collected by local beach walkers. This situation was brought to the attention of the Makah Tribal Council members who requested that I return to Ozette and start salvage excavations in the area where the midden was slumping onto the beach.

A visit was made to the site in January of 1970 to appraise the situation. Shortly thereafter a camp was established to recover exposed artifacts, and to provide security for the site. In the following months, an hydraulic excavation procedure was perfected. The method was well-adapted for this situation because one could create a pressurized flow of water strong enough to erode the matrix but weak enough to preserve the perishable artifacts. While the system had the capability of working for very delicate recovery, it could, with increased flow and pressure, remove the massive clays overlying and between the cultural deposits.

Also during this period, techniques were developed for the field stabilization of the water-saturated wooden artifacts. Although most of these artifacts had not been subjected to fungal decay, there had been some alteration of the cell wall structure. Earlier experience had taught that many artifacts would either check or develop

radial splits when they were air-dried. After soaking in a 50% solution of polyethylene glycol and water, however, the artifacts held their shape and rarely checked or split. Additional benefits of this approach were that the baskets and other woven artifacts maintained their pliability.

The stratigraphy revealed a thin historic level (Unit I) underlain by Unit II, a massive clay deposit. Below this was another thin historic layer of preserved midden (Unit III), which in turn, was underlain by Unit IV, another massive clay deposit. Under Unit IV, there was a relatively thick midden deposit (Unit V) containing numerous planks of buried houses. Under Unit V, there was another clay deposit (Unit VI), which was underlain by the earliest cultural deposits in this area of the site (Unit VII). Unit VII rested on unconsolidated sands and gravels.

Excavations revealed a wealth of information. Units I and III contained ceramics, glass, and metal artifacts recovered in conjunction with wooden artifacts. Unit V was a protohistoric deposit dating to 440 ±90 B.P. (WSU−1778). This unit had many preserved wooden artifacts, but ceramic or glass artifacts were not encountered. Metal artifacts, not of any obvious European design, were recovered however. This was the first incontrovertible evidence for the use of iron and steel on the coast before known European contact. Numerous structural remains of houses also were recovered in Unit V. The most important of the structural remains was the lower portions of three sides of a house, which were still standing. Not only did these yield much information on house construction (Mauger 1978), but they provided a clear, culturally defined boundary between interior house floor deposits and exterior midden deposits. The mud slides at Ozette had preserved not only much of the material culture, but also some of the boundaries of the living space in which these artifacts had been used.

The excavations revealed that the Unit IV clay slide had hit this portion of the village and covered it almost instantaneously, removing all contact with air. The aerobic fungi responsible for the decay of wood and vegetal fiber became dormant or died. Consequently, these materials remained nearly as they were when the slide hit the village. So perfect was the preservation that leaves were still green when first exposed to air.

During the eleven years of year-round excavations (1970−1981), the remains of at least eight houses were uncovered. The house boundaries were determined by the remnants of the lower house walls consisting of wall planks, poles driven into the ground to serve as their supports, and roof support timbers. The house floor areas delineated by the walls were roughly rectangular areas that were as large as 21×11.5 m. The long axis of the structure was either parallel or perpendicular to the beach.

The slightly sloping terrace in this area of the village had been levelled to create house platforms by digging out high portions of the terrace and depositing the backdirt in the low spots. More than one house might occupy serially the same house platform. A house would be built, occupied, and abandoned; after an unspecified period, another structure would be built on the same platform. Two such platforms have been fully excavated at the site. One platform contained a single house (House 1; Fig. 2) and the other platform contained two houses (Houses 2 and

FIGURE 2 Sleeping benches, complete and broken house roof and wall planks, and the lower portion of the south wall of House #1 partially exposed. The pond is a settling basin for sediments washed from the site during excavation, and was constructed by the crew to protect the marine environment of the reef in front of Ozette Village. (Photo by Ruth and Louis Kirk.)

5). House 5, the first house built on its platform, was apparently abandoned because of the inability of its inhabitants to deal effectively with the massive amounts of water from hillside seeps that flowed across the house floor. Houses 1 and 2 were destroyed by the massive Unit IV mudslide that covered this part of the site.

The excavated area consisted primarily of interior midden. The houses were built close together, usually within 2 m of one another. The spaces between the houses appeared to have been refuse dumps, pathways, and drainage areas. There was no indication that these between-house areas were used for production or processing activities. Within the immediate area of the village such activities probably occurred on the beach in front of the site during warm, dry periods and within the dwellings during colder, wet periods of the year. Recovery of manufacturing and cooking byproducts around the hearth areas within the houses supported the concept of the houses as a location for production and processing activities.

Over 50,000 artifacts, in addition to faunal items and structural remains, were recovered. Three of the eight houses encountered were completely excavated. The Unit V deposit proved to be complex, with various episodes of rebuilding and reoccupation. A series of drainage features was also found in association with the structures.

Because of the unique conditions of preservation at the Ozette Site, an amazing collection of normally perishable artifacts survived. Of the artifacts recovered, over 29,000 were from the prehistoric and protohistoric levels, and most of these were made of wood or fiber. During the excavations, 179 categories of artifacts were identified in the field. Some of the categories of perishable artifacts not usually found in an archaeological context, but recovered at Ozette are:

Woven Materials

1330	baskets
1466	mats (Fig. 3)
142	hats
37	cradles
96	tump lines
49	harpoon sheaths

Weaving Equipment

14	loom uprights (Fig. 4)
14	roller bars
10	swords
23	spindle whorls
6	spools

Hunting

115	wooden bows
1534	arrow shafts
5189	wooden arrow points
124	harpoon shafts
22	harpoon finger rests
161	plugs from seal skin floats

FIGURE 3 Cedar bark matting and crushed wooden box exposed on floor of Ozette House #2. (Photo by Ruth and Louis Kirk.)