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VIA FEDERAL EXPRESS

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February 1, 1997

T.G. Cheleotis
Clerk of Court
U.S. District Court
301 North Miami Ave.
Miami, Florida 33128

Re: United States v. Fisher, et al.,
Case No. 92-10027-Davis, *consolidated with*
Motivation, Inc. v. Unidentified Vessel, etc.,
Case No. 95-10051-Davis

Dear Clerk:

Enclosed for filing please find an original and two copies of the following documents: NOTICE OF FILING OF EXPERT REPORTS (and accompanying report of Larry E. Murphy); and CERTIFICATE OF SERVICE. Please also note that balance of the United States' expert reports (the reports of Joseph C. Zieman, Mark S. Fonseca, Brian E. Julius, Wiley R. Wright, III and Curtis R. Kruer) were sent to you under separate cover on January 30, 1997 via overnight mail. If you have any questions, please do not hesitate to contact me at (202) 305-0248. Thank you in advance for your assistance.

Sincerely,

Caroline M. Zander

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Environment and Natural
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General Litigation Section

cc: Michael R. Barnes
William Vandercreek
Richard G. Rumrell

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA
KEY WEST DIVISION

UNITED STATES OF AMERICA, Plaintiff, v. MELVIN A. FISHER, KANE FISHER, SALVORS, INC., a Florida corporation, *in personam*; M/V BOOKMAKER, M/V DAUNTLESS, M/V TROPICAL MAGIC, their engines, apparel, tackle, appurtenances, stores and cargo, *in rem*, Defendants.	)	CASE NO. 92-10027-CIVIL-DAVIS *Consolidated with*
MOTIVATION, INC., Plaintiff, v. UNIDENTIFIED, WRECKED AND ABANDONED SAILING VESSEL, etc., Defendant.	)	CASE NO. 95-10051-CIVIL-DAVIS

UNITED STATES' NOTICE OF FILING OF EXPERT REPORTS

Pursuant to Rule 26 of the Federal Rules of Civil Procedure, the United States hereby files the reports of its expert witnesses in the above-referenced matter.[1]

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[1] Please note that only the expert report of Larry E. Murphy is included with this NOTICE OF FILING OF EXPERT REPORTS. The remainder of the United States' expert reports were submitted for filing under separate cover and sent via overnight mail on January 30, 1997, and should be considered to be filed herewith.

Dated: February 1, 1997

Respectfully submitted,

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United States v. Melvin A. Fisher et al.
Case No. 92-1127-CIVIL-DAVIS

Report

Submitted by:
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Introduction

This report discusses archeological consequences of 1992 commercial treasure hunting excavations of Coffins Patch, an area within the NOAA Florida Keys National Marine Sanctuary. Three vessels under Mel Fisher's direction, *Dauntless*, *Tropical Magic* and *Bookmaker* ("Fisher vessels" or "Fishers"), used prop wash deflectors to dig approximately 600 holes (blowholes) in search of historical artifacts of commercial value.

Statement of Opinions

The Fisher vessels destroyed archeological context of several historical period shipwrecks while searching for treasure and artifacts of commercial value on Coffins Patch, an area off shore Marathon, Florida, and within the NOAA Florida Keys National Marine Sanctuary. The purpose of my testimony is to assist in identifying appropriate compensation to the United States for archeological damage occurring within its jurisdiction to enable a partial restoration of lost archeological and historical data.

1) It is my opinion that archeological information was lost and publicly accessible cultural resources were diminished for scientific, interpretive and recreational purposes as a result of Fishers' treasure hunting activities.

2) Archeological information was lost from approximately four known sites in the excavation area, all of which are located in the Sanctuary. Had basic field methods and recording been conducted by Fisher, as established for commercial treasure hunting operations elsewhere, some of the information lost would have been recorded, and damage to sites of little commercial interest minimized.

3) If the work outlined in the damage assessment section of this report is conducted, I believe that recovery of some of the information lost from the Sanctuary's historical resources in this case can be obtained.

Context and Archeological Process

The archeological or material record, is generally considered the entirety of material produced, altered and used by humans in the past. Because the past is not directly accessible, knowledge of past human behavior must rely upon material residues, in particular artifacts and their context. While archeology is the sole source of knowledge for the prehistoric past, historical archeology draws from the multiple sources of documents, oral traditions plus the physical evidence of the material record. Even for historical archeology, much of the past is revealed only in the material record. For example, mundane daily activities are typically poorly documented historically; non-elite groups like sailors, who were mostly illiterate, are often not documented at all; illicit activities like smuggling, piracy and slavery, for obvious reasons, may be poorly represented in historical documents. Historical archeology also examines larger social processes than could have been perceived by historical chroniclers, for example colonization, acculturation and development and historical progression of trade routes and markets. Operations of trade routes and markets can be studied by investigating multiple shipwrecks that have occurred in an area over time. Consequently, shipwreck study can provide unique information about the multinational formation of the world economic system of today, which was largely the result of large-scale maritime activities. Much of the information that can be derived archeologically is available in no other way.

Shipwrecks are remarkable cultural resources for several reasons. Unlike most land sites formed by lengthy processes involving artifact loss, discards and site abandonments that can be affected by later occupations, shipwrecks are lost as a single event. As a result, material from a wreck has some important characteristics that give credence to the notion of a shipwreck being a "time capsule": site material was all in use at the time of loss, it is all undeniably associated, and it provides a detailed snapshot of the past. Typically, even in high-energy environments, shipwrecks can be much better preserved and contain much more information than land sites of a comparable age.

Archeology uses a general process of inquiry to obtain information about the past. The objective of archeological study is to provide a credible or reliable view of the past. There can be competing views of the past based on different interpretations of the same archeological evidence, just like there can be different interpretations of a scientific or medical experiment. However, unlike an experiment, archeological excavation cannot be repeated, so very good information must be collected and retained the first time. Sometimes additional techniques are developed that allow better or different data to be collected from archeological materials. For example, invention of Carbon 14-dating allowed organic material in museum collections to be accurately dated, which led to a more reliable view of European population migration. To determine which archeological interpretation or view of the past may be more reliable, questions are posed and answered by consulting excavation field notes, environmental data and reanalysis of artifacts, sometimes repeatedly by several archeologists. In archeology, like any other science, no absolute truth exists, but rather a movement to a better understanding of past human behavior based on refinements of data, application of better and more accurate techniques and resolving more difficult questions that are based upon cumulative evidence. When field notes are inadequate or absent, insufficient environmental data collected and artifacts lost, it becomes increasingly difficult to ask meaningful questions about the past through use of excavated

materials.

A scientific approach to archeology starts with questions, makes observations, collects data, which are related to the questions, tests hypotheses, tests conclusions and then compares with other cases. Aspects of this sequence are typically laid out in advance in a research design, which guides data collection techniques. Because getting "all the data" is not practical, posing specific questions and data requirements prior to excavation makes it easier for someone else to use the information collected when one's work is used by others for additional research unanticipated at the time of original fieldwork.

Other archeologists studying the same material, provided it is adequately recorded, can use excavated material and documentation to ask altogether different questions or refine the interpretations of others if they can have access to the material and sufficient field notes have been taken. Questions can be as simple as "What was life aboard an 18th Century ship like for sailors?" or as complex as "What was the nature of colonial British and Spanish maritime competition?"

Two archeological principles are basic to archeological inquiry about the past that guide archeological excavation:

1) association - objects resting in undisturbed ground belong together, and

2) stratification - which is, barring disturbances and assuming orderly sequence, the oldest is overlain by the youngest. This principle is less important in shipwreck archeology than terrestrial archeology because material from a shipwreck is of the same general age. What stratigraphic association can tell is about site disturbance and about an artifact's structural position aboard the ship. Sometimes, in a multiple-wreck situation, stratigraphic data can be important to deciding what artifacts are associated with others.

Controlling for these principles is a large part of archeological reasoning, and they are important in all scientific archeological excavation. Both basic principles relate to provenience, which is the position of artifacts and other materials on the earth's surface and in relation to other materials. Loss of provenience is loss of most of the ability to gain information from a site through archeology.

Whatever the question about the past, archeologists must access material remains to develop knowledge. All artifacts are analyzed in terms of form--what it looks like; space-where it is; and time-how old it is. The most important consideration after these fundamentals are established is context, which is an artifact's relationship to other objects nearby or in a site or region. Without context, little beyond the specifics of the artifact can be derived from archeology, no spatial patterns can be observed and few questions about the past other than those about technology or design can be answered. Virtually, all archeological inference about the past ultimately relies on context.

The archeological process is not just documenting, rather, documenting is but the first step to understanding material remains in terms of explaining their relationship to the site as a product of a combination of human behavior and natural processes like waves, current etc. Context is the relationship of archeological material with other materials, natural and cultural, that comprises an archeological site. Without context, artifacts exist in relative "isolation", and thus few data remain for archeologists to use for knowledge about the past.

Potential for Archeological Context at Coffins Patch

There are two commonly held, but inaccurate, notions about shipwreck context that pertain to work done on Coffins Patch: 1) the area has been heavily damaged by other treasure hunters who have destroyed the area, and no viable context remains, and 2) shallow-water shipwrecks have little context because of natural forces, particularly heavy wave action.

Establishing how much digging has been done on Coffins Patch by treasure hunters in the last few decades is impossible, very little real documentation about their past activities exists. Coffins Patch sites have been known for more than thirty years, and prop wash deflectors have apparently been widely used. An estimation of the impact of treasure hunting can be made through comparisons with other shipwrecks dug in a like fashion for a similar time period. The 1715 Spanish Plate Fleet shipwrecks off the Florida east coast have been dug since the early 1960s, mostly with prop wash deflectors.

During the mid-1970s, treasure hunters believed these sites were "worked out," and little remained to warrant commercial excavation. However, with application of systematic methods, increased mapping accuracy and diligent efforts, these sites continue consistently to produce archeological materials under management of the State of Florida Bureau of Archeological Research. Based on the intensity of work by multiple treasure hunters working under contract to the State of Florida, I estimate Coffins Patch has received but a fraction of the digging effort of the 1715 sites.

Four observations imply the amount of past excavation, which may be greatly exaggerated, has not eliminated viable context. A) That the Fisher treasure hunting operation in 1992 produced more than 300 artifacts worthy of recovery shows a very high potential for context. In shipwreck archeology, even attribution of an artifact to a particular wreck can be important context for some archeological questions. B) If areas dug in 1992 had already been dug, why did that many artifacts deemed commercially valuable enough to retrieve and incur conservation costs remain through more than thirty years of digging by others? C) One wreck near which digging occurred was the *Adelaide Baker*, called the "New Wreck" or "1872 Wreck" in the vessel recovery logs. This vessel contains sufficient context that it was recommended by an independent archeological group and selected for the NOAA Shipwreck Trail to be opened and interpreted for diving visitors. The 1992 excavations impacted this site and artifacts were removed that could have been publicly interpreted from public access. D) Presence of seagrass areas suggests at least some areas dug in 1992 had not been dug in the recent past. Slow growing seagrass has a significant mitigating effect on wave energy, which improves artifact and hull structure preservation beneath it. Seagrass removal allows more sediment to be suspended in storm events and oxygenates the sediment, both of which subject previously stabilized artifacts to a new cycle of deterioration and restabilization at a lower level of preservation. It was my observation during prop wash excavations as a State of Florida Salvage and Exploration Field Agent assigned to commercial treasure hunting operations in the 1970s, and in fieldwork since, that some of the best preserved hull structure and artifacts lie beneath intact seagrass beds.

Shallow water shipwrecks can contain very high levels of context, and they can be very well preserved. In 1978, as a project archeologist for the State of Florida, I worked with a commercial treasure hunting company who agreed to allow me to direct the field operations on a 1715 shipwreck. The site had produced prehistoric artifacts, and I was interested in conducting research to learn the nature of the earliest deposits. In particular, I wished to conduct field work

in a way that would allow retrieval of information from a potential inundated terrestrial site beneath the shipwreck. Most of the work was in 10-15 feet of water and about 5 feet of sand.

During the work I experimented with the prop wash deflector by attaching metal plates and other material to the intake area to reduce the volume and pressure of the water to less than what was possible with idle engine speed alone. This attenuation technique worked well, and I could record sediment layers and collect samples for analysis, including Carbon 14, pollen, and geochemical samples. This project proved stratigraphic excavation with a prop wash deflector was possible — if used in a very controlled manner, which has been rarely applied by treasure hunters because it slows excavation. An inundated terrestrial prehistoric site lay beneath the shipwreck as indicated by prehistoric artifacts and bones, including both animal and human, and results of environmental analysis. The site dated to 5000 years before present (BP).

An important observation was that all the heavy Spanish material (coins and iron artifacts) lay directly above the 5000-year-old layer. Both the prehistoric and historical materials were well preserved, appeared to be stabilized in their depositional context, and were under no observable environmental threat. What this shows is that the bottom of the deepest wave disturbance since the 1715 wreck had only reached to the present top of the 5000-year-old sediment. It evidenced that shipwreck material migrates downward in the sand during storms until it reaches the deepest level disturbed by the largest storm waves and stabilizes. All indications are that high specific-gravity artifacts do not move horizontally very much. Additional evidence is that gold jewelry and coins, which are very soft and easy to scratch, rarely show signs of sand wear. Sand wear would be evident if waves move gold coins around horizontally. Of the 1600+ gold coins in the State of Florida collection, only a few show signs of sand wear.

Based on my own fieldwork and observations, it is my opinion that the area of Coffins Patch, with deeper water and deeper sand than the 1715 shipwreck upon which I conducted research, has a very high potential for spatial (horizontal) and environmental context. This context can be retrieved, as can stratigraphic and environmental information, if propwash deflectors are carefully used. If properly used, prop wash deflectors are a lot like bull dozers, which can be very useful for removing sterile sediment, but when misused can quickly decimate fragile archeological remains. In addition, it is my opinion that the Coffins Patch artifacts were stabilized in their original depositional context and, like the 1715 artifacts, were in no threat other than human intervention. My opinion is that artifacts typically stabilize in deep sand soon after initial shipwreck deposition.

Assessment of Archeological Aspects of Fisher Treasure Hunting Operations

The documents provided by the Fishers contain insufficient data to allow a determination of how the prop wash deflectors were used in 1992. A primary weakness of the data collected and reported in Fisher's field note log sheets is the near total lack of environmental data, such as artifact location depth and stratigraphic descriptions. Loss of environmental context reduces information about the wrecks that can be extracted from their work.

The State of Florida established minimum standards for excavation with prop wash deflectors, or blowers, in the "Guidelines for Conducting Salvage under Contract with the Florida Division of Historical Resources" (popularly known as the "Cobb Coin Guidelines")

agreed to by Mel Fisher and others involved in excavating the Florida east coast 1715 Spanish Plate Fleet vessels. East coast treasure hunters use optical sextant angles from the vessel to surveyed shore positions for determining position. The Guidelines state that each hole should be positioned, with sextant angles shot twice for each blow hole. The sextant should be able to read to at least one minute-of-angle, which will give a positional accuracy of a few meters to about a half-mile offshore.

These guidelines also state that:

> representative and all unusual blower hole [prop wash deflector] profiles will be recorded noting the general order and thickness of recognizable sediments and the location of artifacts, fossils or other useful information. Profiles which indicate that an earlier blower hole is being reopened should be noted. When possible a more accurate location description for important artifacts should be recorded, for example, in which quarter of the blower hole and from what sediment. Finally, any interpretaions of stratification of association which might be useful in understanding the process of artifact scatter and deposition should be noted.

From the documents provided, the Fishers apparently collected no data at all on Coffins Patch regarding bottom stratigraphy. In my opinion and in accordance with the Cobb Coin guidelines, such data that should be collected includes minimally depth below the seabed of artifact locations and sedimentary characteristics. In addition, there is no indication in the log forms that sediment samples or other information for analysis were collected. This environmental information is essential for any archeological interpretation of the sites affected by excavation, and environmental information collection is basic archeological methodology. Had this information been recorded, there would likely be little question about the level of extant context on the Coffins Patch sites.

Another problem in the 1992 Coffins Patch excavation is accuracy of vessel positioning. The basic task of responsible archeological recovery is producing a map of areas dug with an acceptable level of accuracy to depict archeological associations and context. The Fisher vessels did not generate position accuracy anywhere near the level of accuracy required by the "Cobb Coin Guidelines." The Fisher vessels were so far offshore that they had to rely on electronic positioning rather than sextants. Electronic positioning can potentially be very accurate. In my opinion, accuracy of the electronic positioning conducted by Fishers' vessels is less than that required for archeological purposes. These vessels used LORAN and GPS, Global Positioning System. LORAN has a high level of repeatability, but a very low level of absolute accuracy. As I indicated above, the accuracy of vessel positioning is essential to determining archeological association and context when using hull-mounted digging devices. Civilian GPS, with no differential corrections, is reliably accurate to no more than 300 feet because of intentional satellite signal degradation by the Department of Defense for security purposes. US Coast Guard stations were not supplying differential GPS corrections for navigation in 1992; consequently, I assume non-differential GPS was used for blowhole positioning in the absence of contrary information.

In addition, conversion from LORAN time delays to geographic coordinates compromises accuracy further. Confusion over geodetic datums can be another source of

potential error. Geodetic datums used for the Fisher vessels positioning cannot be determined from Fisher's field notes. GPS coordinates are usually provided in World Geodetic System (WGS) 1984, while LORAN is generally in North American Datum (NAD) 1927. Uncorrected geodetic datum shift between these datums creates about 50 feet of error in the Florida Keys area.

In sum, results of the Fisher treasure hunting excavation amount to collection of artifacts with no stratigraphic provenience at all, and horizontal provenience circles of error between 300 and 2500 ft, the instrumental accuracy of LORAN. Accuracy was much less than that required by the State of Florida Guidelines, which are considered an absolute minimum, and less than required by NOAA Archeological Guidelines for Research/Recovery. Apparently, the Coffin Patch treasure hunters made no maps of their work, and low position fix accuracy and lack of critical data severely compromises anyone else from producing a map of sufficient accuracy for archeological interpretation. It is my opinion that archeological context of the 1992 Coffin Patch blow holes containing artifacts has been lost.

Site Impact

In all, at least four sites were impacted during Fishers' 1992 Coffin Patch treasure hunting operations. All four of these sites are listed in the NOAA site inventory. Most blow holes occurred near three of these wrecks: State of Florida Site No.137, which is apparently the West Turtle Shoals Wreck, *Ignacio* or another unidentified 1733 Plate Fleet wreck, and *Nell O*, a schooner. The fourth impacted site is *Adelaide Baker,* from which, according to the Fisher's logs, material was also removed. This site was referred to as the "New Wreck" in Fisher's daily field logs. The *Adelaide Baker*, a 19th Century wreck, was obviously not of sufficient age to be carrying treasure.

There appears to be at least one mid-18th Spanish vessel present, here called *Ignacio* from the 1733 Spanish Plate Fleet. Indications are that No. 137 is an earlier vessel, perhaps late 16th century or early 17th century. This estimate is based on a map of the site in the State of Florida files drawn by Gordon Watts, a state employee in 1972. Structural features shared with other vessels of this period suggest this early date.

Portions of all vessels may have been encountered during the 1992 excavation. Lack of contextual information, provenience information and mixing of the artifacts resulting from inaccurate position fixes make any chances of reconstructing the archeological information of the 1992 digging remote. Excavation of *Adelaide Baker* suggests Fishers' treasure hunting interest was not confined to old or treasure wrecks.

In all, few data, other than the artifacts themselves, were obtained. Few fieldnotes other than a basic blow hole log were kept by Fisher. No in situ recording took place during the excavation, and no map or report, as required even by the Cobb Coin Guidelines was done. In sum, the Cob Coin Guidelines, which are considered minimal, were not followed in any of the 1992 Coffins Patch excavation.

Blowhole Damage Assessment

To compensate for the archeological information lost through the Fishers' treasure hunting activities, an assessment of the multiple-site impact should, in my opinion, be conducted.

Such an assessment would capture as much remaining data from the sites as possible. In addition, the Fishers should return all artifacts recovered from Coffins Patch to NOAA as public trustee [1]. The following represents, in my opinion, a very conservative damage assessment,

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[1] Congress has also spoken on the consequences of excavating, removing, damaging or otherwise altering or defacing any archeological resources located on federal lands in the Archeological Resources Protection Act of 1979 (16 U.S.C. 470) ("ARPA"). If applying ARPA requirements to this situation, the measure of archeological value for the Fishers' 1992 Coffins Patch treasure hunting activities of 1992 would be as follows.

The Fishers dug approximately 600 blow holes in 1992. To generate a damage amount, I asked two professional maritime archeological contractors what they would charge to excavate 600 holes of comparable size to the 1992 excavation in Coffins Patch. Included in this request was a square mile of remote sensing survey with magnetometer and fathometer and Differential GPS positioning to a maximum circle-of-error level of 3-5 meters. Contractor A gave me a total of $363,900 that included mobilization of a dive vessel, investigation of targets, weather days (1 every 10), field stabilization of the artifacts only, demobilization and report preparation. The price for a square mile remote sensing survey, which would have to be conducted before excavation, was $7,500. These figures give a total cost of about $620.00 per hole.

Contractor B costs for remote sensing survey of a square mile including analysis and report were $13,335. This contractor anticipated 10% of the blow holes would require controlled dredging along with the prop wash deflector, and added an additional 10% overall for backfilling and stabilizing the impacted area. This contractor stated field work and report would meet the Standards and Guidelines established in 36 CFR Part 66, Recovery of Scientific, Prehistoric, Historic and Archaeological Data: Methods, Standards and Reporting Requirements, (Federal Register Vol 42, No 19) and Archeology and Historic Preservation: Secretary of Interior Guidelines (Federal Register Vol 48 No 190) and any applicable NOAA and State of Florida Guidelines. The total included analysis and report preparation. The cost estimate was $657,800.00, for an overall total of about $1100.00 per hole.

For calculations I used an average cost derived from each contractor to arrive at an estimated cost of $860.00 per blow hole.

Although the 1992 treasure hunters dug approximately 600 blow holes, they reported artifacts for only 210 holes. On land sites the practice is to use the total amount of damged area within a site for archeological assessment. It can be argued that in this particular case, archeological context was only compromised in the holes dug containing artifacts because the Fishers were digging widely scattered shipwrecks whose boundaries have not been established through remote sensing or other means. If this were an ARPA violation, my recommendation would be to establish site boundaries through remote sensing and test excavations and use the total damaged area for archeological value determination.

Using archeological contractors' average of $860, it would cost an estimated $180,600.00 to conduct a remote sensing survey of one square mile, excavate 210 blow holes, field stabilize artifacts, complete background work, analysis and prepare a professional report.

ARPA also requires an artifact conservation estimate. This estimate, if NOAA were to have decided to apply ARPA, the damages for this estimate would be determined as discussed below.

which at a minimum will allow NOAA to have sufficient data for evaluation of site damage and to determine the extent of remaining archeological materials. The way in which NOAA will be able to obtain this data is through: 1) generating a comprehensive research design, 2) conducting a systematic remote sensing survey, 3) completing a very limited test excavation that includes environmental context investigation, 4) conserving artifacts recovered for analysis during test

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NOAA personnel generated a data base of approximately 345 artifacts recovered from Coffins Patch by the Fishers. Consistent with the State of Florida's practice, roughly 30 % of those artifacts were "Lost in Cleaning"(LIC). (It should be noted that a state of the art alternative for laboratory conservation of artifacts is now available with an expected loss rate of less than 1%.) To determine the artifact conservation assessment under ARPA, I contacted the contract conservator we use for shipwreck artifacts in National Park Service. John Maseman, conservationist for The South Florida Conservation Center in Pompano is both familiar with local conditions and artifacts, and has consulted for the Mel Fisher Maritime Heritage Preservation Society regarding their practices. He uses alternative treatments, x-rays on site and casts objects that cannot be conserved to preserve form and analytical potential.

His estimate for conservation costs averages about $100.00 per artifact, with cannon and anchor-sized objects running to several thousand. Estimating costs for large objects without inspection is difficult. However, he estimated a 5-foot cannon at $3000-4000 and an eight-foot anchor at $2000.

In addition, I roughly estimate that 10% of the remainder was modern debris labeled by the Fishers as "Junk." That gives about 200 artifacts recovered, treated partially and in need of permanent curation. I used the lower estimate for the number of artifacts remaining after laboratory conservation for the Coffins Patch excavation at $25,000.00.

ARPA also requires costs of curation of recovered artifacts be included in the damage assessment. The National Park Service Southeast Region practice is to estimate curation costs at 5% of the excavation costs. Here, the excavation costs are estimated at $170,000. Five percent of this figure totals $8500.

Damage Assessment Summary Under ARPA

Survey and Excavation (includes remote sensing).	180,600
Conservation	25000.
Curation	8500. (Curation costs were estimated similarly to the National Park Service practice of 5% of excavation costs)
Total Damage:	$214,100.00

While Congress has deemed the ARPA methodology as a viable way of measuring archeological damage in these situations, NOAA has elected not to pursue this approach.

The above represents my evaluation of damages to resources and information and archeological value following the federal guidelines established in ARPA.

excavations, 5) conducting primary historical research, 6)performing artifact analysis, and 7) generating a final report. In addition, NOAA will have to incur future long-term curation expenses.

1) For NOAA to have sufficient data to evaluate site damage and to discern the extent of remaining archeological materials, a systematic remote sensing survey is required. NOAA cannot make future management decisions regarding the Coffins Patch area without the basic knowledge of what remains after the treasure hunting activities. The first step is preparation of a research design addressing project parameters. My estimate is based on National Park Service experience and totals about **$1800.00**.

2) The second step is conducting the systematic remote sensing survey. Although some blow holes were away from the main excavation area, a high-resolution remote sensing survey of a one-square-mile area centered on the main concentration of blow holes should be sufficient for initial assessment purposes. To develop a cost for a square mile of remote sensing survey, I contacted two professional archeological contractors that routinely conduct remote sensing survey. Survey parameters were to include a digital magnetometer, fathometer, and differential GPS positioning on transect spacing of 100 ft (30m), and analysis and report writing. Products would also be in electronic format for direct Geographic Information System application. The first contractor estimate was $7,580.00, the second $13,335.00. Working with an average of these two estimates is appropriate. The estimated remote sensing survey cost is **$10,450.00**

3) The next step is test excavations based on the remote sensing data. This is also known as ground truthing by in water investigation to provide archeological site information. To develop a cost estimate, I used data submitted by two professional archeological contractors to generate a cost for examining 20 remote sensing targets through water dredging in sandy areas that do not adversely impact seagrass or other natural resources. Water dredging allows horizontal movement of sand, minimum sediment suspension and makes avoidance of undisturbed seagrass areas easy because an on site diver is present at all times. Water dredges also allow backfilling and seabed stabilization. This number of test excavations represents a reasonable sample for investigation of areas located through the survey and evaluation of remaining sites. This includes collection of environmental context data.

I estimate water dredging and backfilling will take twice as long to dig a test pit as using a prop wash deflector. To estimate these costs, I asked the two professional archeological contractors to provide an estimate for duplicating the Fishers' work on Coffins Patch using prop wash deflectors. I calculated a price per blowhole for each and averaged the two. I doubled this average blow hole cost to arrive at the estimated dredge hole cost. The average blowhole cost from the two estimates is $860.00 per hole (see footnote 1). The estimated single dredge hole test excavation cost is $1720.00. Estimated cost for examining 25 locations in the square mile study area is $34,400.00. Analysis of environmental samples averaging 2 per hole for 50 samples is estimated to be $30.00 apiece for a total of $1500, giving a final estimated total of **$35,900**.

4) Fishers' treasure hunting activities produced numerous artifacts. Consequently, I anticipate artifacts will be encountered in the test excavations of remote sensing data. Assuming two artifacts per test hole, estimated costs are for conserving 50 artifacts. Costs are based on an estimate of $100 apiece, which was provided by a South Florida conservation contractor experienced with shipwreck materials and with whom the National Park Service consults, giving

a total cost of **$5,000.00**.

5) Historical research, including library research for original shipwreck documents, and other primary materials, is necessary to provide context for site evaluation and documentation for the Coffins Patch wrecks. Based on my experience I estimate this can be accomplished for **$4250.00.**

6) Artifact analysis, which includes identification, documentation, and support research, will cost an estimated **$4250.00**

7) A final report will need to be prepared that presents comprehensive findings, evaluations, history and results. This should be designed to meet professional standards (see footnote 1) and be accessible to the public. It is my opinion that the information presented in this report will go a long way toward replacing what the public has lost by the uncontrolled treasure hunting activities by the Fishers. Final report preparation is estimated to cost **$5000.00.**

Evaluation of Conservation Status of Artifacts Recovered by Fisher. From the documents produced by Fisher, conservation of artifacts has taken place. It is my opinion that if NOAA regains possession of those artifacts, a professional evaluation of the conservation status of those artifacts should be prepared. This should be done by an independent professional conservator who is a member of the American Institute for Conservation of Historic and Artistic Works (AIC). I estimate this evaluation report to cost **$1000.00**. Although this assessment may show a need for additional conservation treatment of the 1992 Coffins Patch artifacts, this can not be estimated, so no cost beyond the assessment is included.

Curation costs. Permanent artifact and record curation costs have been estimated by the National Park Service Southeast Region Archeological Center to cost approximately 5% of the cost for recovering the artifacts. The curation costs of this test excavation project is estimated to be **$1795.00**, based the cost of the test excavation. Since Fisher recovered approximately 300 artifacts, of which about 30% were lost in conservation or declared junk giving a total of 200 artifacts, it is reasonable in my opinion to multiply the costs of the estimated 50 artifacts recovered during the test excavation project by 3 to arrive at an estimated long-term curation cost of **$5385.00**, should NOAA regain possession and incur long-term curation responsibilities. Curation costs are higher for artifacts from underwater because they often need additional conservation treatment, which can not be precisely estimated.

Total for the site damage assessment and determination of remaining cultural resources of archeological interest is **$74830.00** for the square mile of Coffins Patch where most excavation took place.

Damage Assessment Summary

Research Design:	1800.
Remote Sensing	10,450.
Test Excavation	35,900.
Conservation of Study Artifacts	5000.
Historical Research	4250.
Study Artifact Analysis	4250.
Final Report Preparation	5000.
Curatorial Evaluation	1000.

Curation of Study Artifacts	1795.
Curation of Fisher Artifacts	5385.
Total	$74830.00

Conclusions

Completion of these tasks discussed above will produce a scientific evaluation of the impacted Coffins Patch wreck sites, generate a reasonable estimate of the nature and extent of archeological remains, provide NOAA with basic data necessary for future management decisions regarding this area, and provide information to the public regarding these resources through production of a professional report. It is my opinion that the information contained in this report will minimally restore that which has been lost by the Fishers' unpermitted treasure hunting activities on Coffins Patch.

Information Consulted

The following information was consulted in formulation of my opinion and evaluation: "Daily Field Notes and Activity Logs, " "Salvors' Inc. Conservation Lab Artifact Record," Computer-generated artifact list labeled: "Plaintiff's Exhibit 5-2-95" that lists columns: cord, tag, year, site artifact, date in, location, status, dateout, dummy. In addition, I reviewed the deposition transcript of Syd Jones taken in *U.S. v Fisher, et al.*, archeological site information from NOAA site inventory database and State of Florida document: "Guidelines for Conducting Salvage under Contract with the Florida Division of Historical Resources." I also consulted two archeological contracting companies that engage in maritime archeological research and a professional conservator.

Exhibits

The following exhibits will be used in my testimony:
Computer graphics of the Coffins Patch area; archeological site maps and other graphics specific to impacted sites, archeological research and methodology.

Larry E. Murphy

Date: 1-31-97

CERTIFICATE OF SERVICE

I hereby certify that on February 1, 1997, I served a copy of the foregoing NOTICE OF FILING OF EXPERT REPORTS (and accompanying expert report of Larry E. Murphy) via overnight mail to the following counsel of record at the following addresses:

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