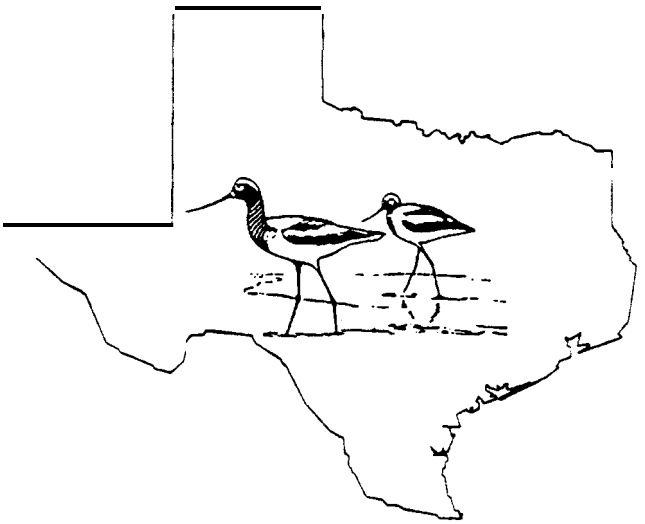
# U.S. Fish and Wildlife Service
## Region 2
## Environmental Contaminants

# FIELD INVESTIGATION REPORT
# EXXON PIPELINE/CHILTIPIN CREEK
# OIL SPILL JANUARY 7, 1992
# SAN PATRICIO COUNTY, TEXAS

by

Allan M. Strand and Thomas W. Schultz



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and
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# EXECUTIVE SUMMARY

On January 7, 1992 at approximately 10:45 a.m., Exxon Pipeline Company spilled approximately 2,950 barrels (bbls) (123,900 U.S. gallons) (U.S. gal.) of API gravity 37 South Texas light crude oil into the Chiltipin Creek natural drainage area, San Patricio County, Texas. This drainage is located approximately 0.5 miles SE of the mouth of Chiltipin Creek where it flows into the Aransas River, in a salt marsh with marginal tidal influence.

The purpose of this report is to provide a chronology of the response actions of the U.S. Fish and Wildlife Service (Service) and other concerned agencies to the spill event, and to provide documentation of field observations by Service personnel on the impacts of the spill and response actions on Service trust resources. Such information will be used as a basis to determine the nature and extent of any potential injury to natural resources as a result of the subject spill.

The spill resulted from a breech in an underground, 16-inch oil transfer pipeline, which crosses the full width of the marsh. There was high water in the marsh from recent rains, and oil flowed through the flooded marsh vegetation and ultimately affected approximately 38.4 acres of marsh.

Emergency response actions resulted in the Texas General Land Office (TGLO) assuming the role of On-Scene-Coordinator (OSC). Exxon Pipeline Company (Exxon PC) undertook responsibility for emergency containment, pipeline repair, and cleanup. The U.S. Fish and Wildlife Service, Ecological Services Office (Service, ES) in Corpus Christi (CC) was notified the morning of January 8, 1992, and assumed an advisory role to the TGLO OSC throughout the emergency response action.

The initial report from Exxon PC indicated that approximately 750 bbls (31,500 U.S. gal.) of crude oil spilled from the pipeline onto two acres of plowed agricultural field. Revised estimates obtained by Service personnel during the afternoon of January 8, 1992 indicated approximately 750 bbls had spilled from the pipeline into between 25 and 50 acres of salt marsh located on private land owned by the H. G. Ritchie Estate, Taft, Texas.

Final estimates from Exxon PC indicate that 2,950 bbls (123,900 U.S. gal.) leaked from the pipeline, with 1,250 bbls (52,500 gal.) being recovered from the blow-out hole, 500 bbls (21,000 gal.) being pumped from the marsh, 50 bbls (2,100 gal.) were recovered in sorbent booms, pads, and porn poms, and approximately 1,150 bbls (48,300 gal.) remaining unaccounted for. On January 11, 1992 Exxon PC received authorization from the TGLO OSC to initiate a burn in the oil impacted area of the marsh, in an attempt to reduce the volume of oil remaining in the dense marsh vegetation. The burn was initiated at 6:20 p.m. on January 11, 1992, and was supervised by Texas Forest Service (TFS) and Terminal Fire Company personnel. Including re-ignition of small pockets of unburned oil, the burning

continued through January 16, 1992. On January 13, 1992 plywood boardwalks were strategically placed throughout the marsh to allow mop-up crews to recover as much unburned oil and burned oil residue as possible, while minimizing damage to the marsh.

During the emergency response action, two live ducks were recovered oiled, and were subsequently rehabilitated and released. Two charred, unidentified birds, a duck and a small wading bird, were found dead after the initial burn, and were retained for evidence. Three dead snakes, three dead rodents, and several hundred small dead fish were also observed. Fresh tracks of mammals and birds were observed almost daily in oiled areas, resulting in the deployment of butane scare cannons to haze wildlife from oil impacted areas. The physical emergency response and mechanical cleanup was terminated by mutual consensus of the responding agencies and Exxon PC on January 27, 1992, when Exxon PC initiated withdrawal of equipment and personnel. The released oil was a South Texas light crude (API gravity 37) that contains significant concentrations of heavy metals and volatile and semivolatile hydrocarbons, which can cause direct and indirect toxicity to a wide variety of aquatic and terrestrial vertebrates and invertebrates and the marsh plant community. Total estimates of bird mortality and potential effects on vegetation, fishes, and benthic organisms are not available at this time. These estimates will require further investigation utilizing the natural resource damage assessment process.

## INTRODUCTION

The purpose of this report is to provide a chronology of the response actions of the U.S. Fish and Wildlife Service (Service) and other concerned agencies to the Exxon Pipeline/Chiltipin Creek oil spill event, and to provide documentation of field observations by Service personnel on the impacts of the spill and response actions on Service trust resources. Such information will be used as a basis to determine the nature and extent of any potential injury to natural resources as a result of the subject spill.

An oil spill occurred at approximately 10:45 a.m. on Tuesday, January 7, 1992 at approximate coordinates 28°04'09" N, 97°16'01" W, in San Patricio County, Texas. The spill was located in a natural salt marsh drainage approximately 0.5 miles southeast of the confluence of the Chiltipin Creek and the Aransas River, just east of the Aransas County line (Fig. 1 and 2 & 2a). The spill was the result of a lo-foot rupture along the welded seam of an underground 16-inch oil transfer line, owned and operated by Exxon Pipeline Company (Exxon PC).

A preliminary report to the Texas General Land Office (TGLO) from Exxon PC indicated 750 barrels (bbls)(31,500 U.S. gal.) of crude oil spilled from the pipeline (line) into two acres of plowed agricultural field. This report proved to be inaccurate, and it was later determined that approximately 2,950 bbls (123,000 U.S. gal.) of South Texas light sweet crude oil (API gravity of 37) had escaped. The oil flowed into a marginally tidally-influenced salt marsh that is part of the Chiltipin Creek drainage system. The line, which had been in use since 1966, was rated at a pressure of 1,104 PSI and was operating at 1,064 PSI at the time of the rupture. Due to a loss of pressure the line was shut down by Exxon PC at 10:45 a.m., Tuesday, January 7, 1992. There are approximately eleven miles between shutoff valves in the section of line which are located near the towns of Refugio and Ingleside. The line capacity between these two points was estimated by Exxon PC to be approximately 16,000 bbls (672,000 U.S. gal.).

Personnel from Exxon PC, TGLO, the Texas Water Commission (TWC), and the Texas Railroad Commission (TRRC) converged at the site the afternoon of January 7, 1992. At approximately 4:45 p.m., Mr. Gabriel Lugo of the TGLO informed Exxon PC that TGLO had assumed the role of OSC Agency. By 6:00 p.m. that evening Exxon PC began deploying a containment boom in the vicinity of the Aransas River. By 8:30 p.m. Exxon PC had begun implementing containment and repair efforts at the site. Service personnel from the U.S. Fish and Wildlife Service, Ecological Services (Service) office in Corpus Christi, Texas, were notified of the spill via telephone on Wednesday morning, January 8, 1992 by the Service's Region Two Office in Albuquerque, N.M.. Service personnel, accompanied by a representative of the Texas Parks and Wildlife Department (TPWD),

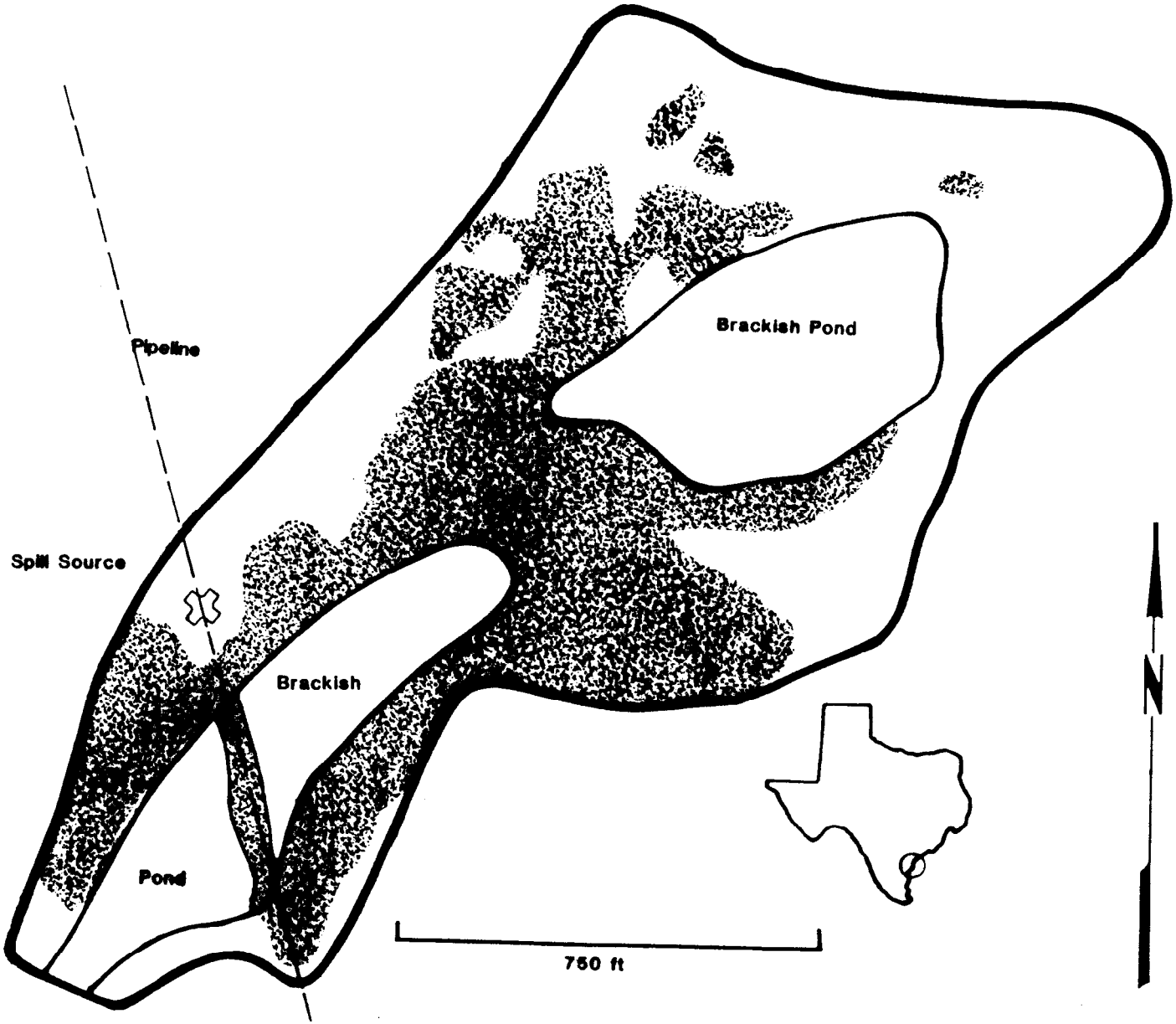


Figure 2a. Chiltipin Creek oil spill site. Shaded area indicates oiled and burned habitat. Uneheded area represent8 oiled – not burned habitat. Outer boundary denotes ● pproximetely 38.4 ● croo of Impacted marsh habitat.

were subsequently dispatched to the spill site, arriving at the Exxon PC command post approximately 2:30 p.m. that same day.

A Service field evaluation was initiated at that time, and considerable visual documentation was assembled throughout the field evaluation effort. A brief overview of that documentation is included in this report, to assist in evaluating the affects of the spill incident and response actions on State and Federal trust resources (Figures 3 through 26).

## FIELD EVALUATION

### WEDNESDAY, January 8, 1992

At 2:30 p.m., Service personnel arrived at the Exxon PC command post, accompanied by TPWD personnel, to investigate the reported oil spill, where they were met by personnel from TGLO and Exxon PC. Information provided at the site indicated that the 16-inch underground pipeline had ruptured and approximately 750 bbls (31,500 U.S. gal.) of South Texas light crude oil had spilled into the brackish marsh located in close proximity to the confluence of Chiltipin Creek and the Aransas River. Agency personnel were informed that the leak was stabilized and containment booms had been deployed in the Aransas River. The actual spill site was 1.5 miles from the Exxon PC command post and access was very difficult due to recent heavy rains and extremely muddy farm roads; Ground transportation to the site was provided by bulldozers towing sleds.

Upon arrival at the spill site, Service personnel observed that containment booms had been deployed in the Aransas River and several areas of the marsh. It was also observed that a large bail hole (approximately fifteen by thirty feet) had been excavated at the break point by backhoes, and the outward flow of oil into the marsh had been stopped. Service and other agency personnel walked the perimeter of the impacted area to ascertain the extent of the spill, which appeared to have impacted between twenty-five to fifty acres of marsh. It was noted that oil migration at the lower northeast end of the spill perimeter had proceeded to move into unimpacted marsh vegetation, and it was recommended to TGLO that additional booms be placed to contain further movement of the oil. It was also observed that Exxon crews were deploying one butane scare cannon to haze birds away from the spill areas.

### THURSDAY, January 9, 1992

Service personnel were notified by TGLO that consideration was being given to burning the oil remaining in the marsh, in an effort to reduce the volume of oil requiring mechanical recovery. After

conferring with appropriate Service and Department of the Interior personnel, the Service notified TGLO via telephone to proceed with attempts to burn the oil. Later in the day Service personnel were also notified by TGLO that two oiled waterfowl had been recovered alive, and had been taken to Texas Wildlife Rehabilitation Coalition (TWRC) personnel; both birds, identified as gadwall, were rehabilitated and later released.

FRIDAY, January 10, 1992

Service personnel arrived at the Exxon PC command post to evaluate a test burn; originally scheduled for 10:00 a.m., it was postponed until later that day to allow for additional preparation. Other agency personnel represented at the site included the TWC, the U.S. Coast Guard (USCG), and the TRRC. While we were waiting for the test burn, TGLO indicated that two butane scare cannons had been deployed, and at least several more were being requested. TGLO also indicated that the recovery hole at the break point had been excavated, but the pipeline was still seeping oil. It was also stated that sorbent booms had been deployed in the marsh, the oil spill was apparently contained, and a four-inch PVC pipeline had been positioned between the command post and spill site to facilitate oil recovery. Due to impassibly muddy farm roads, bulldozer transportation was provided to the spill site by Exxon PC for all agency representatives. In addition, Exxon PC had received approval from the Texas Air Control Board (TACB) through TGLO to burn the oil that had escaped into the marsh. TGLO also indicated that additional work crews, storage tanks, sorbent materials, and other equipment were enroute to the site, and that repair, containment, and cleanup efforts were proceeding.

While enroute to the spill site, Exxon PC provided additional information that the 16-inch line had experienced a rupture about lo-feet in length along a welded seam, and that the cause was unknown. It was also stated that the damaged section would be removed and analyzed by Exxon PC for final determination of the cause of the break, and a sixty-five foot section would be replaced. At the time of the spill the line was operating at 1,064 PSI, and that it was rated at 1,104 PSI. It was also stated that the pipe should be repaired within two hours, approximately 250 bbls (10,500 gal.) had been recovered, and additional storage tanks would be placed on the south side of the marsh to initiate recovery efforts there.

Upon arrival at the site Service personnel proceeded to investigate and document the extent of the spill impact. A single electric air-driven pump with a four-inch line was observed actively recovering oil from the marsh, and a second pump was being deployed. The observed estimate of marsh acreage impacted was in excess of twenty-five acres, and from visual observation the volume of oil spilled appeared much greater than 750 bbls. Service

personnel estimates at that time ranged from 2,000 bbls to 3,000 bbls of oil spilled. Three small brackish water ponds located within the impacted area were heavily oiled, and oil was very thick (½ to 6 inches deep) throughout the emergent marsh vegetation. In many areas dense vegetation had to be physically parted to observe the thick oil layer under leaves and stems. The area was a diverse mixture of fresh and intermediate emergent marsh vegetation, open water estuarine ponds, blue-green algal mats, and nonvegetated mud flats. Ponds in the area were surrounded by dense stands of the bulrush Scirpus maritima. Other species of vegetation noted included Spartina spartinae (sacahuiste), Borrichia frutescens (sea ox-eye daisy), Distichlis spicata (saltgrass), Salicornia bigelovii (glasswort), Batis maritima (saltwort), and Lycium carolinianum (wolfberry), as well as additional species present that were not identified.

A test burn of an isolated pocket of oil was initiated by Exxon PC at about 2:30 p.m.. Varsol was sprayed on the oil to aid in ignition. The oil ignited quickly and burned intensely, giving off dense black smoke. When the flames subsided it appeared that the volume of oil had been reduced by approximately forty to fifty percent, and a residue of unburned oil and a black tar remained. A second burn was attempted over the same area by re-igniting more Varsol, and the same dense black smoke indicated additional oil was burning. At the conclusion of the test it appeared that approximately seventy to eighty percent of the oil had burned. The remaining material consisted of waxy paraffin and a thick, dark, mousse-like residue, along with carbon and some unburned oil. The vegetative rootmass in the area of the burn was sampled and appeared to have survived the heat. It was speculated that this survival was, in part, due to recent heavy rainfalls which had saturated the soil. It was subsequently determined by the agencies present that alternatives to burning, such as mechanical removal, would have resulted in the total loss of the existing marsh community, and that leaving the oil in place would pose a continuing threat to the adjacent unimpacted marsh areas, Chiltipin Creek, and the Aransas River. Based upon the consensus of those resource agencies present, TGLO indicated the burn would take place the following day. It was also determined that the use of boardwalks, placed strategically throughout the marsh, would be used to recover unburned oil residue during post-burn cleanup.

Although Service personnel did not observe any additional oiled birds, several small flocks of waterfowl, small shore birds, and song birds were observed in the immediate vicinity of the spill.

**SATURDAY,** January 11, 1992

Service personnel, the Environmental Protection Agency (EPA), the Texas Forest Service (TFS), and TGLO met with Exxon PC at the site at approximately 10:00 a.m. where TGLO indicated that the burn was

to be delayed until later that afternoon, that repair of the pipeline had not been completed, and in the meantime Exxon PC would proceed with mechanical recovery efforts. It was also indicated that TFS recommendations for safety and fire control would be implemented, and Refinery Terminal Fire Company (RTFC) personnel would be brought in to assist TFS personnel with the burn.

Upon our arrival at the spill site at approximately noon, a sample of oil was collected in close proximity to the pipe break point by Service personnel and retained for possible analysis. The marsh was surveyed for oiled birds and for additional plant identification. Although no oiled birds were located, tracks of small wading birds, species unknown, were found in oiled mud flats on the north side of the large round pond. Additional plant species noted were: Sporobolus virginicus (Virginia dropseed), Limonium nashii (sea-lavender), Monanthochloe littoralis (shoregrass).

The repair of the pipe was completed at approximately 3:00 p.m., and crews commenced to backfill the bail hole and trenches. In preparation for the burn, a bulldozer began cutting a fire break along the interface of the marsh and upland areas; subsequently it was noted that construction of the firebreak undertaken on the north side of the marsh below the field command post destroyed a strip of upland wooded habitat approximately twenty-feet-wide and two-to-three-hundred yards long. At approximately 6:00 p.m., a valve was broken off a storage tank in the field command post area as the tank was being dragged by a bulldozer away from the marsh edge, resulting in a spill of approximately 50 bbls (2,100 gal.) of oil; immediate cleanup was initiated. At 6:20 p.m., the first fires were ignited by TFS and RTFC personnel in the southeast area of the marsh, and by 8:00 p.m., flames were in excess of one-hundred and fifty-feet high and had spread across several hundred yards of marsh. The dense black smoke billowed up three-to four-hundred feet and moved almost due west, creating a huge plume several miles long. Conditions at the time included westerly winds of fifteen to twenty knots, and misty rain. The fire was most intense along the south bluff, where large pools of oil had accumulated. Although no additional fires were ignited after 9:00 p.m., existing fires continued to burn throughout the night, and some were still burning at 10:00 a.m. the following morning.

SUNDAY, January 12, 1992

A ground survey of the spill area by Service personnel following the burn revealed one dead, badly burned waterfowl (species unknown) found in the southeast area of the marsh, and a small dead, burned, unidentified wading bird found in same general vicinity; both were retained for evidence. Although several areas of marsh still contained unburned oil, the burned area appeared to encompass several acres which contained burn residues consisting of carbon, a waxy paraffin, a shiny black tar, and brown and black

mousse-like material. That afternoon Service personnel were informed by TGLO that Exxon PC would continue to burn dense pockets of oil, and that Exxon PC had TACB authority to continue burning. At the request of Service personnel, two control sites were to be staked out and left unburned. One dead, burned snake, and one small dead, burned rodent were observed by Service personnel as the two control sites were staked out in a central area of marsh on the northwest side of the middle pond, in areas that contained a diverse mixture of marsh vegetation, interspersed with a dense layer of unburned oil. Several hundred dead Cyprinodon veriegatus (sheepshead minnows) were also observed in the northeast corner of the middle pond. At 2:15 p.m. TFS and RTFC personnel began reigniting concentrations of unburned oil and Service personnel remained to observe operations at the spill site until 4:30 p.m.

MONDAY, January 13, 1992

Service personnel arrived at the Exxon PC command post at approximately 11:00 a.m., accompanied by a representative of Corpus Christi State University (CCSU) and TGLO to initiate an interagency field inspection of the oil and burn impacted areas. The complete outer perimeter of the impacted vegetation was inspected, and two small seepage points were observed at the east spill barrier, where the sorbent boom had become oil-saturated; upon request, Exxon PC alleviated the problem by doubling the sorbent boom.

The group proceeded to sample the vegetative rootmass in eight burned areas, and found that in most instances the rootmass appeared viable and undamaged by heat. A significant amount of burned oil residue remained in these areas and consensus of opinion was that while vegetation regrowth would be adversely affected unless this thick residue was removed, minimal disturbance of the rootmass during this removal would be essential. Exxon PC crews deployed 2-foot by 8-foot plywood walkways and proceeded with manual cleanup efforts, utilizing absorbent pads and porn poms. It was reiterated to TGLO and Exxon PC that these boardwalks were essential and to keep cleanup crews on the boardwalks and out of the marsh vegetation. It was agreed that burning should continue where there were sufficient volumes of oil remaining. It was also discussed that low pressure, high volume flushing of remaining oil and residue, utilizing on-site water sources, could be attempted. The oil and residue could be diverted to strategic sump locations and removed by pumping or padding. It was felt that this option could be a fast and effective alternative to manual padding and mopping, and in response, Exxon PC agreed to set up a test wash for resource agency personnel to observe. Agency personnel present also requested that Exxon PC continue to use boardwalks as much as possible, make scouting trips each morning around the outer sorbent boom at the east end of the marsh toward the Aransas River, and to set up a test wash the following day. Exxon PC agreed to comply

with all requests, and the test wash was scheduled for 10:00 a.m. the following morning. Exxon PC also indicated that crews would continue to burn remaining pools of oil, and that nine crews (45 people) would continue manual cleanup at the spill site.

TUESDAY, January 14, 1992

Exxon PC conducted a test wash demonstration on the south side of the marsh east of the pipeline right-of-way, below the point of an upland bluff at a location that had been subjected to a very intense burn. Approximately a one-hundred-foot by one-hundred-foot area was boomed off, and two electric air driven pumps with four-inch lines were deployed. Utilizing surface water from the flooded marsh, low pressure, high volume streams were directed to move the thick layer of burned residue toward sumps that were excavated at marsh-upland area interface. Because the residue was very thick and adhered to the burned stems of the vegetation, the residue did not respond as desired, despite utilization of several different nozzle types. Due to concerns that higher pressure would displace the vegetative rootmass, the flushing option was abandoned.

That afternoon Service personnel continued the ground survey of spill impacts, and several hundred small dead fish were observed along the pipeline right-of-way and in the middle and lower round pond. They were identified as predominantly Cyprinodon variegatus (sheepshead minnows), Fundulus grandis (gulf killifish), and Brevoortia patronus (gulf menhaden). The small pond above the right-of-way had a light oil sheen but did not yet appear to have been heavily impacted. Many live, small fish were observed in this pond, and appeared to be primarily sheepshead minnows and gulf killifish. Since the pond had a heavy layer of oil in the emergent vegetation on the north side, it was determined that additional sorbent boom was required, and the freestanding oil needed to be burned. Ten blue-wing teal were observed attempting to land on the large lower pond, but were subsequently hazed away by the human activity. It was also observed that four butane scare cannons were in place, two were active, and two were disabled.

Several fresh mammal tracks were observed in oiled areas and identified as coyote, raccoon, and feral pigs. One dead, burned snake was found at the southeast corner of the right-of-way (species unknown). A common snipe Capella gallinago was observed above the upper pond, although it did not appear to be oiled and departed the area of its own accord. Several species of upland song birds were observed flying in and out of unburned, oiled marsh vegetation. Some species identified were: Mimus polyglottos (mockingbird), Sturnella magna (easternmeadowlark), Xanthocephalus

xanthocephalus (yellow-headed blackbird), and Toxostoms longirostre (long-billed thrasher); it was uncertain whether these birds were oiled, but they were observed feeding and resting in oiled areas.

In response to agency requests, Exxon PC agreed to continue spot burning, abandoned the flushing option, increased effort in manual recovery, reboomed the upper pond and continued to burn oil in vegetation on the northwest side of the area, increased deployment of boardwalks, and kept butane scare cannons working.

WEDNESDAY, January 15, 1992

Service personnel, accompanied by TGLO, proceeded to the spill site at approximately 10:00 a.m. and conducted a complete inspection of the impacted area. During the inspection it was noted that additional sorbent boom had not been placed around north side of the upper pond, and oil in emergent vegetation of the same area had not been burned; TGLO relayed this information to Exxon PC and they responded immediately.

A survey of vegetation types located in two control sites previously established indicated the burn had progressed to the edge of both control sites, but the sites were still intact. Vegetation species identified within the long narrow site were primarily Batis maritima (saltwort), Lycium carolinianum (wolfberry), Salicornia bigelovii (glasswort), Limoniumnashii (sea lavender), and Distichlis spicata (saltgrass). The second site, on higher ground along the narrow middle pond, contained Spartina spartinae (sacahuiste), Salicornia bigelovii (glasswort), Batis maritima (saltwort), Lycium carolinfianum (wolfberry), and some Scirpus maritima (bulrush).

One dead, five foot, western diamond back rattlesnake (Crotalus atrox), was found cut in half by bulldozer tracks on the access road cut through the wooded upland area on north side of the marsh, as were two small, dead, burned rodents (species unknown), observed on lower side of the large round pond. A small flock of seven Mareca americana (American widgeon) were observed attempting to land on the large lower pond; they were subsequently hazed away by butane scare cannons. Two small flocks of unidentified wading birds also were observed feeding in oiled mud flats on the north side of the large lower pond.

FRIDAY, January 17, 1992

Service personnel arrived at the Exxon PC command post at approximately 9:00 a.m., and met with TGLO and a representative for Ritchie Farms Taft Texas, which operates the agricultural land in and around the impacted marsh. It was agreed that subsequent field activities by agency personnel following completion of the

emergency response actions would be coordinated through the Ritchie Farms Office. Exxon PC had removed work crews at 2:30 p.m. the preceding day due to severe weather conditions; heavy rains had fallen over the entire area and water depth in the marsh had increased by three to four inches. Presently a full complement of work crews were again in place and manual cleanup efforts were continuing with some spot burning still taking place, although road conditions had deteriorated and access was very difficult. Upon arrival at the spill site, it was observed that both marked control sites had been burned; TGLO stated that the Exxon PC crew responsible was unaware of the control sites presence and had ignited them accidentally. A survey of the lower eastern perimeter of the sorbent boom indicated no significant oil residue was observed outside the sorbent barrier, although, because of extensive flooding, any escaped material could have moved out to inaccessible areas of the marsh and river system. It was also noted that some boardwalks were floating and had to be redeployed.

WEDNESDAY, January 22, 1992

Field inspection of the spill site by Service and other agency personnel indicated that cleanup efforts were continuing, and high water from recent heavy rains had redistributed and concentrated burned and unburned oil residue, allowing cleanup crews to access residue more efficiently. It was noted that sorbent porn poms appeared to be much more efficient than sorbent pads in adhering to and picking up burned oil residue. Boardwalks in high-foot-traffic areas had created shallow channels through the vegetation and down into the mud; the long-term affects of the channeling on water movement through the marsh system is unknown. TGLO pointed out a small area where Oclansorb (peatmoss) was applied in an attempt to keep oil residue from redistributing itself with the changing wind and high water. Since the results seemed ineffective, it was suggested to TGLO that the use of peatmoss should be kept to a minimum due to the difficulty in recovering it from the remaining vegetation. Agency personnel also observed that while physical cleanup efforts were beginning to reach a point of diminishing returns in relation to the damage being inflicted on the marsh vegetation, there were still small areas which would benefit from further cleanup efforts. It was also noted that the sorbent boom along the north side of the upper pond needed replacing; TGLO subsequently directed Exxon PC crew to replace the boom. It also appeared that all butane scare guns were in place and functioning. An interagency meeting was then conducted to discuss current and future cleanup plans. Due to concern that microbial populations, necessary for biodegradation of petroleum hydrocarbons, may have been heavily damaged or destroyed in those areas of the burn where intense heat had been generated, it was determined that sampling and assessment of those populations should be undertaken to determine if microbes were present in sufficient quantities to

facilitate the natural biodegradation process. It was also agreed that sorbent sweeps should be left in specified areas to catch oil residue that was being redistributed by wind and high water. Service personnel also requested to TGLO that an aerial photo be taken of the spill site to aid the resource agencies in assessing spill impacts; it was agreed that a photo scale of l-inch to 100 ft. would be appropriate on a color photo to help distinguish burned vegetation. It was also agreed that physical recovery efforts could be scaled back as long as problem areas pointed out during the morning field investigation were attended to, and the reduced effort should continue through Friday, January 24, and that boardwalks, butane scare cannons, and perimeter sorbent booms should remain in place during that time. At the conclusion of the meeting it was also agreed that a interagency inspection of the site and a meeting with Exxon PC would take place at 10:00 a.m., Monday, January 27, 1992, to decide if additional cleanup was necessary, or if the emergency response action was completed and Exxon PC could demobilize their equipment and crews.

**MONDAY,** January 27, 1992

An interagency meeting was convened at 10:00 a.m. at the spill site headquarters; those in attendance included representatives from the Service, TPWD, Exxon PC, TRRC, TWC, TGLO, and H.G. Ritchie Estates. A short briefing by TGLO indicated that two to three inches of rain had fallen over the weekend, causing additional high water levels at the spill site, and that road conditions were extremely poor. It was also indicated that no visible oil residue had escaped the boomed perimeter due to high water and increased outflow from the marsh. The final estimate of the oil volume lost in the spill incident was 2,950 bbls (123,900 U.S. gal.), of which approximately 1,250 bbls (52,500 gal.) were recovered from the blow-out hole, 500 bbls (21,000 gal.) were pumped from the marsh, 50 bbls (2,100 gal.) were recovered in sorbent booms, pads, and porn poms, and 1,150 bbls (48,300 gal.) remained unaccounted for. Exxon PC further estimated that 350 bbls (14,700 gal.) of the 1,150 bbls in the marsh evaporated into the air, leaving 800 bbls (33,600 gal.) burned or remaining in the marsh.

A field investigation of the spill site was then conducted by all agency representatives present. Burned and unburned oil residue was observed, a majority of which was dispersed and in quantities difficult to recover without additional damage to the marsh. It was observed, however, some small areas were in need of additional cleanup, and scattered oily trash still had to be removed. As a result of the field investigation agency representatives concluded that mechanical cleanup efforts had reached a point of diminishing returns, and that Exxon PC could begin demobilizing their emergency response personnel and mechanical cleanup equipment. It was also agreed that when boardwalks were removed, additional cleanup should continue as walkways were retracted, and that three butane scare

cannons should remain operating in close proximity to the ponds for at least three weeks. TGLO also agreed to leave sweeps in place and replace as necessary for two to three weeks, to leave sorbent booms around the upper pond for two to three weeks, and to leave wooden stakes marking control sites in place. Also, due to difficult road conditions, Exxon PC agreed to provide transportation to the spill site for agency personnel wishing to make future visits provided they were notified one day in advance, and that all agency personnel notify the Ritchie Farms office anytime they intended to access the property.

FRIDAY February 28, 1992

Dr. John W. Tunnel1 Jr., director of the Center for Coastal Studies, Corpus Christi State University (CCSU) contracted Lannon Aerial Photography Inc., Corpus Christi, Texas to take an aerial photo of the spill site location. This effort was authorized and funded by Dr. Tunnel1 and the Center for Coastal Studies. The photo was black and white in the scale of one inch to one hundred feet. Dr. Tunnel1 subsequently provided a copy of this photo to the Service to assist them in evaluating the spill impacts to Service trust resources.

THURSDAY, March 12, 1992

Service personnel transferred field documentation information onto the aforementioned aerial photograph, including the outer perimeter of marsh area impacted by the oil release, the location of the oil pipeline and break point, the perimeters of burned areas, the perimeters of the damaged upland staging areas, farm roads and marsh access points, and the location of the secondary spill. The above information was utilized to determine the total acreage of the oil impacted marsh, the acreage burned, the acreage unburned, the surface acres of water in the three open water ponds, and the acreage of upland wooded habitat damaged by staging activities. Following delineation of the above features on the photo, the scale was verified at the site by measuring two known points visible on the aerial photo. The physical measurement was taken between two points of the upland bluff along the south side of the marsh. These points were visible on the aerial photo and identifiable on the ground. The measurement was taken in feet utilizing a one-hundred-foot tape measure. The actual measurement between these points was six-hundred-and-eighty-feet. When this measurement was extrapolated to the aerial photo the scale was adjusted to one-inch equals one-hundred-and-seven-feet.

During the ground-truthing and field evaluation, forty-five waterfowl were observed on the large lower pond resting and exhibiting feeding activities. Species identified included blue-winged teal (Anas discors), American widgeon (Marica americana),

shoveler (Spatula clypeala), and gadwall (Anas strepera). Two pair of mottled ducks (Anas fulviqula) were observed, apparently nesting in the area just east of the lower pond. Two small flocks of unidentified shore birds were observed flying in and out of the marsh and feeding in the oiled mud flats. Tracks of large wading birds, which appeared to be great blue heron (Ardea herodias), were observed in several oiled areas. Several killdeer (Charadrius vociferus) were observed feeding throughout the marsh flats. Many species of upland song birds, some carrying nesting material, were seen flying in and out of the impacted area. Numerous mammal tracks (including coyote, raccoon, feral pig, and white-tailed deer) were also observed throughout the oiled flats.
Some regrowth of vegetation was observed. Clumps of sacahuiste (Spartina spartinae) were showing green shoots and some new stalks of bulrushes (Scirpus spp.) were emerging in burned oiled areas. Burned and unburned oil residue was still visible throughout the impacted area of the marsh.

TUESDAY March 17, 1992

Estimates of the extent of marsh affected by the spill was determined by Service personnel using aerial photography, field inspection information, and an electronic graphics calculator. Such determination was made by outlining the perimeter of the impacted area of the marsh, the area burned, and the areas of open water on the aerial photo utilizing field inspection information and visual documentation collected throughout the field investigation. The surface acreage of these three categories were then measured utilizing the electronic graphics calculator. The estimated impacted area of the marsh was 38.4 acres, with 16.4 acres of that physically burned and 5.2 acres consisting of shallow open water (total of three ponds). In addition to the impacted marsh approximately 1.5 acres of upland wooded habitat was also heavily impacted as a result of staging activities during the emergency response.

THURSDAY March 19, 1992

Service personnel and staff from CCSU arrived at the spill site to map the remaining marsh vegetation and to note additional physical impacts. The vegetation was mapped on the aforementioned aerial photo and classified according to a habitat zoning scheme devised by Dr. Tunnell, Corpus Christi State University (CCSU). The vegetation species in each segment was listed and the area was further described as either oiled, burned and oiled, damaged or natural. Minanthochloe littoralis and Distichlis spicata were the dominant species throughout the area. Lycium carolinianurn, Salicornia biglovii, Batis martitima, Borrichia frutescens, and Limonium nashi were also found throughout the site. Scirpus sp. was found in a ring around the three ponds. The vegetation survey was

undertaken in anticipation of potential needs for short term and long term monitoring of the marsh recovery as part of any potential damage assessment process.

During'the field investigation, approximately sixty waterfowl were observed feeding and resting in the large lower pond. Species identified were blue-winged teal, shovelers, American widgeon, and gadwall. Several killdeer were feeding in oiled mud flats, and a common snipe (Capella gallinago) was observed in a patch of Distichlis below the large pond. A marsh hawk (Circus cyaneus) was also seen gliding over the marsh exhibiting hunting behavior and tracks of large wading birds were observed (probably great blue heron). Many species of upland song birds were also observed flying in and out of the, impacted area. Mammal tracks in heavy patches of oil residue found throughout the marsh and were identified as coyote, raccoon, feral pig and white-tailed deer.

## RECOMMENDATIONS

Results of Service field investigations indicate that approximately 38.4 acres of marsh were heavily impacted due to oiling and subsequent cleanup of the subject oil spill, causing documentable injury to Service trust resources. Subsequent discussions with the affected State and Federal natural resource trustees have indicated the need for more information regarding the extent of injury to natural resources, in order to quantify the magnitude of injury, so that suitable action to restore, replace, or otherwise compensate for the resources lost can be taken.

To accomplish this objective, it is our recommendation that Natural Resource Damage Assessment Procedures be implemented. Concurrently, Service Law Enforcement personnel are considering criminal charges against Exxon Pipeline Company for taking migratory birds in violation of the Migratory Bird Treaty Act.

Fig. 25. 03/19/92. Central marsh, below right-of-way, oil impacted and burned area, vegetation regrowth.

Fig. 26. 03/19/92. Central marsh, oil impacted and burned, new vegetation regrowth in background, mostly Spartina spartinae, no regrowth in foreground.