

Pipeline emplacement: mitigating environmental impacts on wetlands

by Michael A. Krone

Pipeline emplacement on wetlands offers a special challenge because wetlands are environmentally sensitive to the needed labor-intensive activity and use of heavy equipment.

Michael A. Krone is a member of the research and development staff for the United Gas Pipe Line Company, headquartered in Houston, TX. This paper was first presented to a November 1984 Minerals Management Service Information Meeting.

The value of wetlands

For hundreds of years it was widely assumed that swamps and wetlands had only two uses: to be dredged for lakes and river channels or filled for farms and factory sites. Governmental policy was directed primarily to the elimination of wetlands until about the mid-1900's. It was not until the 1970's that the values of wetlands became widely recognized and documented by the scientific community, and wetlands received governmental protection at both the state and federal level.

Wetlands are among the most productive ecosystems on earth (see figure 1). This productivity nurtures marine commercial and sport fishing, waterfowl, and many furbearing animals — all of which are dependent on wetlands at some point in their life cycle. Consider the following: 1) On the South Atlantic and Gulf Coasts 90% of the commercially important fish and shellfish are dependent on coastal marshes for part or all of their cycle. In 1980 62.7% of the 7 billion pounds of commercial fish caught by American fishermen was

dependent on estuarine areas and their associated wetlands, 2) Waterfowl and other waterbirds are extremely dependent on wetlands. Ducks and geese form the base of a multi-million dollar industry through the money spent by more than 2.7 million waterfowl hunters, 3) Many furbearing animals are dependent on wetlands. Muskrat, mink, beaver, otter, raccoon and nutria are almost always associated with water and wetlands. The total harvest of mink, muskrat and nutria exceeded 8 million animals worth more than \$33 million in 1975-1976.

Two other important values of wetlands involves flood control and water quality maintenance. The flood control values of wetlands have been documented at numerous sites. Coastal wetlands and those along large lakes are effective at dissipating the energy from wave action created by storms. And in some areas, it has been demonstrated that wetlands can retain 50-79% of the total runoff from most storms. Water quality maintenance and purification of polluted water are valuable functions of most wetlands. Wetlands are actively used to help cleanse effluent waters from sewage treatment processes and some industrial and agricultural practices.

In this context, the natural gas pipeline industry uses a lot of current tech-

niques to minimize construction impacts on wetlands. Installing a pipeline is essentially a balancing act where engineering options are measured against economic considerations, safety and environmental requirements, service and market realities, and other factors which directly affect the pipeline, such as landowner preferences in right-of-way (ROW) treatment. This paper will offer examples of how United Gas Pipe Line Company (United) integrates environmental considerations into new pipeline construction projects.

United's 10,000 miles of interstate natural gas pipe is located throughout the Gulf South including about 4,700 miles of gathering and transmission pipe in Louisiana. Our Louisiana system is part of a major network which transports Louisiana's rich offshore natural gas reserves to onshore distribution networks. Much of this system is located and maintained in brackish marshes and wetlands along Louisiana's coastal zone. The local residents, who are known as cajuns, say that land is too thin to walk on and too thick to drink.

United is not actually in the pipeline construction business but we do own, operate, and maintain our own system. We manage contractors to ensure that pipeline projects are built to our specifications and quality standards. Our 60-plus years of construction management



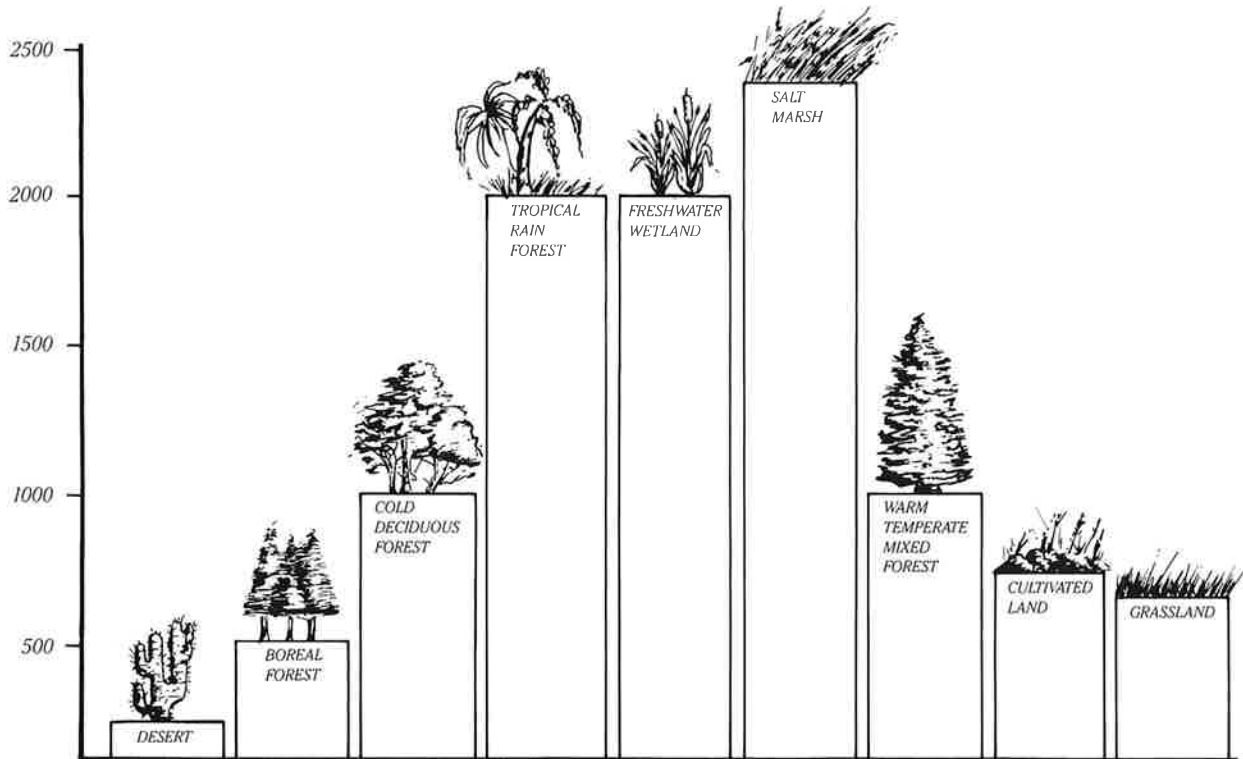


Figure 1. Relative productivity of wetland ecosystems in relation to others. IN: Tiner, Jr. 1984.

experience ensures site specific construction practices which are both environmentally sound and cost-effective.

Wetlands loss and pipeline construction

The increasing rate of wetlands loss is a matter of concern. Most of the coastal wetlands in Louisiana are the result of 5,000 years of Mississippi River delta building. In fact, 40% of coastal wetlands in the contiguous U.S. are found in Louisiana. This long-term deltaic growth process has been reversed in recent history by a complex interaction of physical, chemical, and biological factors. Recent estimates of annual wetlands loss to open water in Louisiana approximate 47 square miles per year (Senate and House Committees on Natural Resources, 1981).

It is currently difficult to predict construction impacts on wetlands because there is very little literature published on the subject. Most literature (Darnell, 1976, MMS, 1983) suggests that *pipeline emplacement impacts are localized and of short duration*. This suggests that either wetlands are more resilient that

previously thought or pipeline emplacement activities are compatible in this environment. Whatever combination of reasons is good because pipelines are the safest, most efficient, and most extensive energy distribution system available today. Some researchers suggest that existing pipeline and navigation canals contribute to the total yearly wetlands loss in Louisiana. Estimates vary from 2-4% (Craig et al, 1979, Wicker et al, 1982) and higher. Natural gas pipeline canals represent the old approach to pipeline emplacement and are generally not acceptable under the current regulatory climate because they tend to erode about 2-14% per year and encourage salt water intrusion unless measures have been taken to prohibit boat traffic and control water flow.

Recreational and commercial boat traffic creates a shore wash which erodes and widens the banks where the canals are open to traffic. Pipeline companies cannot control boat traffic but they do have regular maintenance programs to control erosion on their right-of-ways. Where new installations cross existing pipeline canals we can and do, with landowner's permission, minimize

the problem.

Louisiana's wetlands are under a lot of pressure. The natural causes of wetlands loss in Louisiana include:

- Subsidence and rising sea levels which enhance salt water intrusion (Adams et al, 1976, Gagliano, 1981)
- Erosion of wetland perimeters and barrier islands (Van Sickle et al, 1976)
- Catastrophic events like hurricanes and fires (Johnson, 1981)
- Changes in the patterns of sediment deposition (Gordon, 1981) and
- Natural succession and biotic factors like overgrazing.

The man-induced causes of wetlands loss in Louisiana include:

- Land reclamation due to farming, housing, and landfill (Craig et al, 1979, Gagliano, 1973)
- Flood control (Keown et al, 1981) and reservoir construction
- Dredging for navigation channels
- Canals associated with oil and gas extraction
- Strip mining and peat mining
- Groundwater extraction and waste disposal.

Regional variations in subsidence and sea level make it difficult to isolate the