U.S. Fish and Wildlife Service

Oil and Gas

Too Much Salt Destroys Wildlife Habitat

Hagerman NWR

Established in 1946

Located at the Big Mineral arm of Lake Texoma in north-central Texas approximately 10 miles east of Dennison.

Almost 12,000 acres

The refuge provides stop-over, wintering, and breeding habitat for more than 300 species of migratory birds. Bottomland hardwoods along the creeks provide habitat for deer, bobcats, river otters, and a variety of other wildlife.

Oil and gas exploration and production has occurred on the refuge since 1951.

Trees and other vegetation killed by brine spill, Hagerman NWR, TX
P Ramirez USFWS

It takes decades for trees in the Eastern Cross Timbers area of north-central Texas to grow into mature woodlands. It takes less than a day and 75 barrels of oilfield brine to destroy them. A release of brine from aging oilfield pipes and equipment at Hagerman National Wildlife Refuge in north-central Texas in February 2012 killed 84 hardwood trees consisting of oaks, ash, cottonwoods, and hackberry. Two trees over 2-feet in diameter were estimated to be over 150-years old. The Refuge contains one of the largest remaining tracts of contiguous Eastern Cross Timbers in the state of Texas. The Cross Timbers area is not so much a forest as a mosaic of prairies, savanna, and woodlands. The Cross Timbers forms a boundary between the heavily forested regions of the Eastern United States and the almost treeless region of the Great Plains. Fortunately, spill responders contained the brine spill before it could enter a drainage leading to Lake Texoma, a little less than a half-mile away. Had it done so, the salty brine water and residual oil could have caused a fish kill and exposed waterfowl to oil. Another brine spill occurred at the same site in April 2014 approximately 200 feet south of the 2012 release. The April 2014 spill affected 1.25 acres and resulted in the loss of numerous trees, shrubs and grasses.

Hagerman National Wildlife Refuge was established in 1946 to provide a sanctuary and breeding area for migratory birds and other wildlife. Hagerman NWR is located approximately 75 miles north, northeast of Dallas, Texas and lies on the Big Mineral Arm of Lake Texoma which is on the Red River between Texas and Oklahoma. The Cross Timbers defines the western habitat limit of many mammals and insects. Hagerman NWR is home to more than 300 species of birds, 34 species of mammals, 65 species of reptiles and amphibians, 62 species of fish, and 800 species of plants. Numerous species of neotropical migratory birds inhabit the woodlands at Hagerman NWR.

Corroded flowlines release oil and brine into the refuge environment, Hagerman NWR, TX/USFWS

Shortly after the Refuge was established, oil and gas was discovered in the area. Since most of the minerals underlying the Refuge are privately owned, the U.S. Fish and Wildlife Service has a legal obligation to allow the mineral owners to develop their mineral resources. Highly saline formation water or brine is extracted along with the oil and gas. The saltwater is collected in storage tanks and injected under pressure back into the formation to force more oil out of the ground. A network of pipes or flowlines moves the brine from the oil wells to storage tanks and to injection wells. Most of these flowlines were installed 40 to 50 years ago. Pipe failures and small leaks are not uncommon due to the corrosive nature of the brine. Since 1973, refuge staff have documented 13 brine spills ranging in volume spilled from less than a barrel (42 gallons) to 3,500 barrels. Flowline leaks due to corrosion are the cause of most brine spills at the refuge. The aging and deterioration of flowlines, storage tanks, and other oil and gas production equipment is a major cause of oilfield brine leaks in national wildlife refuges.

Oilfield brine released into the environment will kill the grasses, shrubs, and trees and eventually render the affected area devoid of any vegetation. These barren areas, referred to as salt scald, are susceptible to erosion and degrade the water quality. Destruction of the vegetation eliminates habitat for many species of wildlife. The U.S. Fish and Wildlife Service estimated that it would cost over $154,000 to replace the trees in the 2-acre area damaged by the 2012 brine spill. Negotiations between the refuge and the oil operator resulted in the operator agreeing to develop a flowline management plan and to deposit $30,000 into the Oil and Gas Mitigation Fees Fund. The Fund was established under Public Law 106-113 and allows the U.S. Fish and Wildlife Service to recover site-specific damages to National Wildlife Refuge System lands in Texas and Louisiana resulting from the exercise of privately-owned oil and gas rights. The flowline management plan addresses replacement of the aging flowlines with better pipe, potentially relocating flowlines away from sensitive areas, and providing the refuge with GPS (Global Positioning System) coordinates of all flowlines on the Refuge. The flowline management plan is still pending two years after the spill. Restoration requirements for the 2014 brine spill are pending an assessment of damages to refuge habitat.

Replacing the dead vegetation is not easy. Continuing drought reduces the survival rate of newly planted trees and lengthens the time for trees to develop into the mature woodlands that existed before the spill. Removing the salt from the soil is very difficult and expensive. This usually is limited to removing the soil, adding soil amendments such as gypsum, or flushing the salt out of the soil with freshwater.

Nationwide, State regulations vary on cleanup and restoration requirements for brine spills. Proposed revisions to existing regulations would increase the U.S. Fish and Wildlife Service's ability to ensure that oil operators implement best management practices to prevent brine spills or minimize the damages when spills do occur. The revisions would also allow the U.S. Fish and Wildlife Service to recover damages and restore refuge lands and waters harmed by brine spills.

Contact

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