

Historical Economic Impact Estimates of New World Screwworm (NWS) in the United States

1930–1940s

Though NWS was present in the southwestern United States (map below) since at least 1842, the pest was first documented as a significant problem in the Southeast in 1933, following shipments of infested animals from the Southwest. Inundated by calls for help from producers in the rapidly-expanding NWS affected areas, USDA and the southeastern States engaged in the Screwworm Educational Program in 1935 to instruct producers on how to prevent livestock infestations. The Federal government and the State of Florida committed \$978,463* to this program over nearly three years, in addition to undocumented contributions from other States. In 1941, the USDA announced the success of a \$60,000* program to develop a targeted NWS insecticide (Smear 62) to mitigate producer losses, which were valued at \$5–10 million* per year nationwide during this period. During these decades, USDA scientists had developed a method to raise large numbers of NWS larvae and began to look for a method to sterilize flies so they could not reproduce. [*Indicates figure is not adjusted for inflation]

1950–1960s

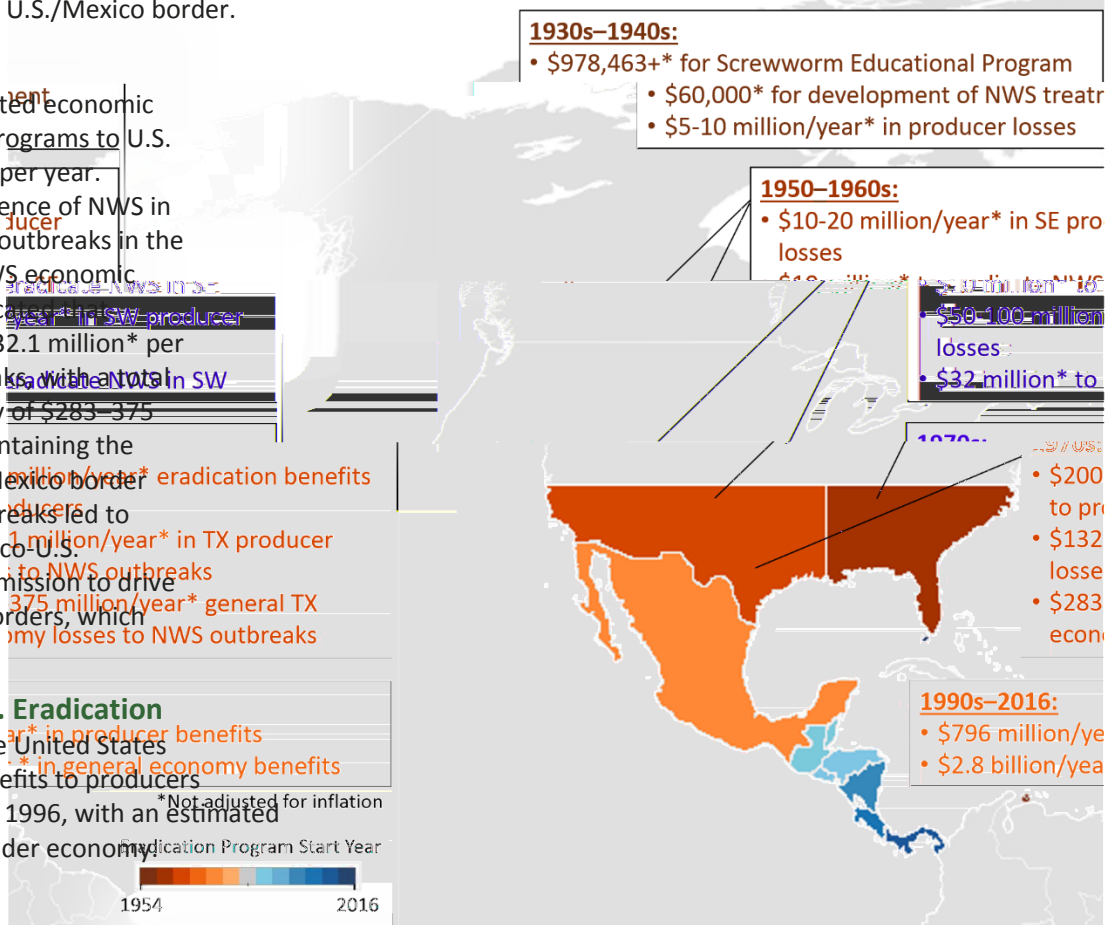
Radiation was discovered as an effective method to sterilize NWS flies; in the fall of 1951, the first test site was established in Florida. Experiments continued in the early 1950s, demonstrating success of the Sterile Insect Technique (SIT). Producers in the southeastern United States experienced losses up to \$10–20 million* per year prior to NWS eradication in 1959. This eradication was the result of over a year of SIT and an investment of \$10 million* from the Federal government and the State of Florida. At this time, producers in the southwestern United States lost between \$50–100 million* annually due to NWS. Presumably, these increased losses in the Southwest were due to higher livestock populations, larger geographic area, and/or greater potential for NWS to overwinter. The success of the eradication program in the Southeast led to the initiation of an eradication program for the Southwest in 1962. Funded by the Federal government, States in the Southwest Eradication Area (Texas, New Mexico, Arkansas, Louisiana, and Oklahoma), and the rancher-led nonprofit, Southwest Animal Health Research Foundation, this eradication program was declared a success in 1966. It ultimately cost \$32 million* to complete, establishing a NWS barrier zone along the U.S./Mexico border.

1970s

By the mid-1970s, the estimated economic benefit of NWS eradication programs to U.S. producers was \$200 million* per year. However, the continued presence of NWS in Mexico resulted in recurrent outbreaks in the Southwest. An analysis of NWS economic impacts in Texas in 1976 indicated that livestock producers spent \$132.1 million* per year to manage NWS outbreaks, with an overall impact to the Texan economy of \$283–375 million*. The difficulty of maintaining the barrier zone along the U.S./Mexico border and the impact of these outbreaks led to the creation of the joint Mexico-U.S. Screwworm Eradication Commission to drive NWS to Mexico's southern borders, which was achieved in 1986.

Economic Benefits of U.S. Eradication

The eradication of NWS in the United States yielded annual economic benefits to producers estimated at \$796 million* in 1996, with an estimated \$2.8 billion* benefit to the wider economy.



Costs Associated with NWS Infestations

Before eradication, producers experienced significant losses due to NWS, including costs from the following:

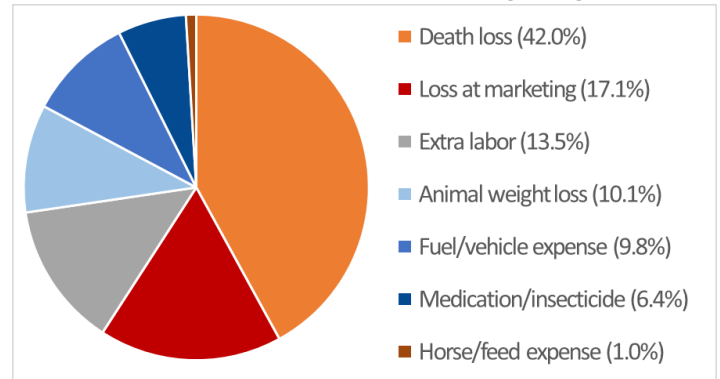
- ◆ Animal deaths
- ◆ Decreased livestock production
- ◆ Decreased availability of draught animals and manure
- ◆ Increased need for veterinary services
- ◆ Increased need for medication and insecticide
- ◆ Extra labor and vehicle costs for the inspection and treatment of infested animals.

Costs of response activities, paid for by States, the Federal government, and nonprofits, included

- ◆ public education,
- ◆ research for more effective treatments,
- ◆ surveillance activities, and
- ◆ SIT expenditures.

Example Breakdown of Producer Costs

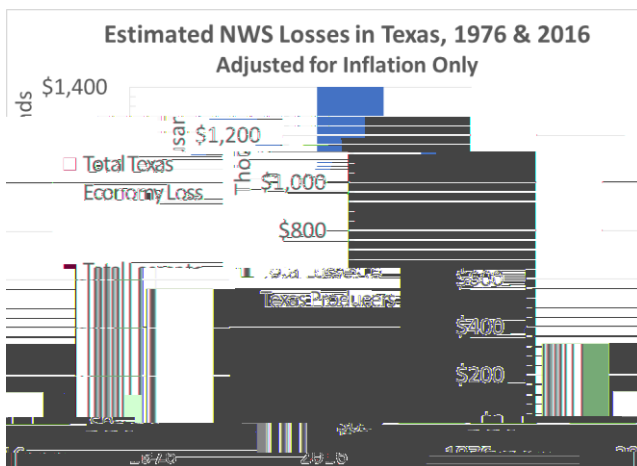
An analysis of producer costs due to an NWS outbreak in Texas in 1976 indicated that producers spent \$132.1 million (not adjusted for inflation) that year in response to the pest, with the total cost broken down into the following categories:



Potential Economic Impact of NWS in 2016

Despite the maintenance of a barrier zone barrier zone along the U.S./Mexico border after the eradication of NWS in the U.S. in 1966, southwestern States experienced recurrent Mexican-origin NWS outbreaks. Along with vigilant surveillance and prompt isolation and treatment of infested animals, outbreaks were managed using SIT until the barrier zone moved south of the U.S./Mexico border. An economic analysis¹ of the 1976 NWS outbreak in Texas indicated that 1,488,256 cattle and 332,600 sheep and goats were infested with NWS that year. Assuming equivalent livestock populations and NWS infection rates as in the case study in 1976 Texas, the total cost per NWS case was adjusted for inflation to 2016 dollars. The table to the right shows the livestock populations, NWS infestation rates, and costs included in this calculation.

NWS Losses: Texas Data	1976 Results	2016 Results (adjusted for inflation only)
Cattle Population	7,224,515	-
Cattle Infestation Rate	20.60%	-
Cattle Cost/Case	\$81.51	\$346.28
Sheep & Goat Population	3,654,945	-
Sheep & Goat Infest. Rate	9.10%	-
Sheep & Goat Cost/Case	\$32.38	\$137.56
Total Cattle Cost	\$121,307,258	\$515,351,210
Total Sheep & Goat Cost	\$10,769,588	\$45,752,456
Texas Producers Losses	\$132,076,846	\$561,103,666
Texas Economy Loss	\$329,598,005	\$1,400,235,237



The results of adjusting for inflation indicate that a NWS outbreak of the roughly moderate magnitude of the 1976 outbreak could cost Texas producers \$561 million per year and the Texas economy a loss of \$1.4 billion. Numerous factors make this comparison, over forty years after NWS eradication, difficult. The cattle population of Texas in 2016 is significantly larger (11 million) while the sheep and goat population is lower (1.6 million). There are a multitude of other factors that could affect the economic impact of NWS in 2016 and require further quantification, including husbandry and veterinary practices, economic output multipliers, costs of response activities, and potential NWS infection rates. The results presented here demonstrate the potential of NWS infestations in the United States to have a significant economic impact.

¹ Thomas, J.G. (1978). 1977 Screwworm Program in Texas: "Mission 77 - Stamp Out Screwworms." USDA National Agricultural Library Special Collections. Retrieved from <https://www.nal.usda.gov/exhibits/speccoll/items/show/7228>.