

# **Southeast Drought Workshop: Forest Health Impacts**

Elizabeth Graham, PhD

Entomologist

USDA Forest Service, Forest Health Protection

Forestry Sciences Lab Juneau, AK



# Forest Health Protection

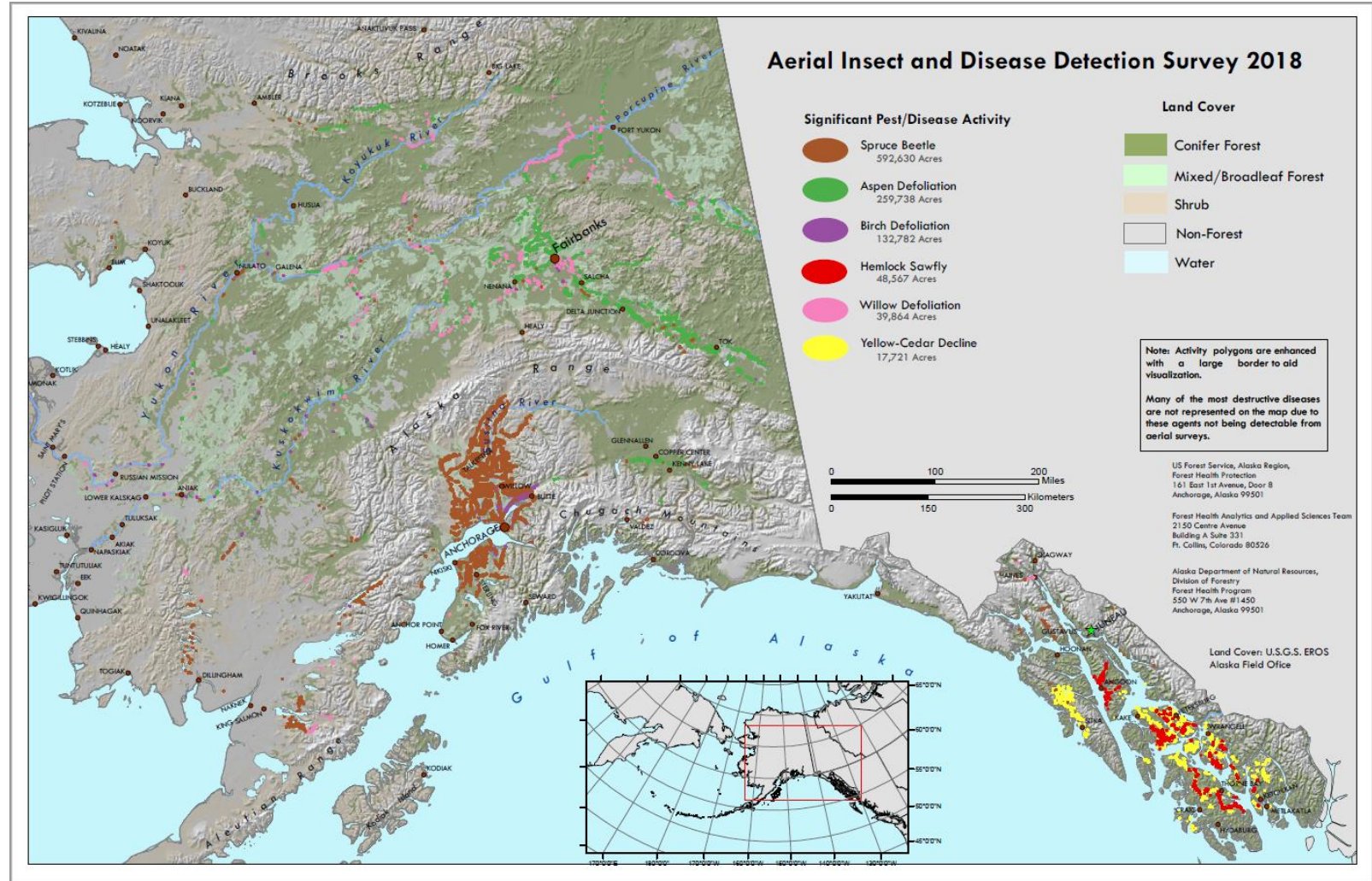


- Our mission:
  - Protect and enhance forest health by providing landowners and managers with information and resources.
  - Monitor the extent and impacts of damaging insects, diseases and invasive plants and offer technical and financial assistance to prevent and control forest pest outbreaks.
- <https://www.fs.usda.gov/detail/r10/forest-grasslandhealth>



# Aerial Insect and Disease Detection Survey

- 28 million acres
- 1.14 million acres of damage
- Spruce beetle, aspen defoliation, birch defoliation, and hemlock defoliation were among the top damage reported



# Signs of Drought Stress

Sitka spruce with pronounced fall color and older needle shed

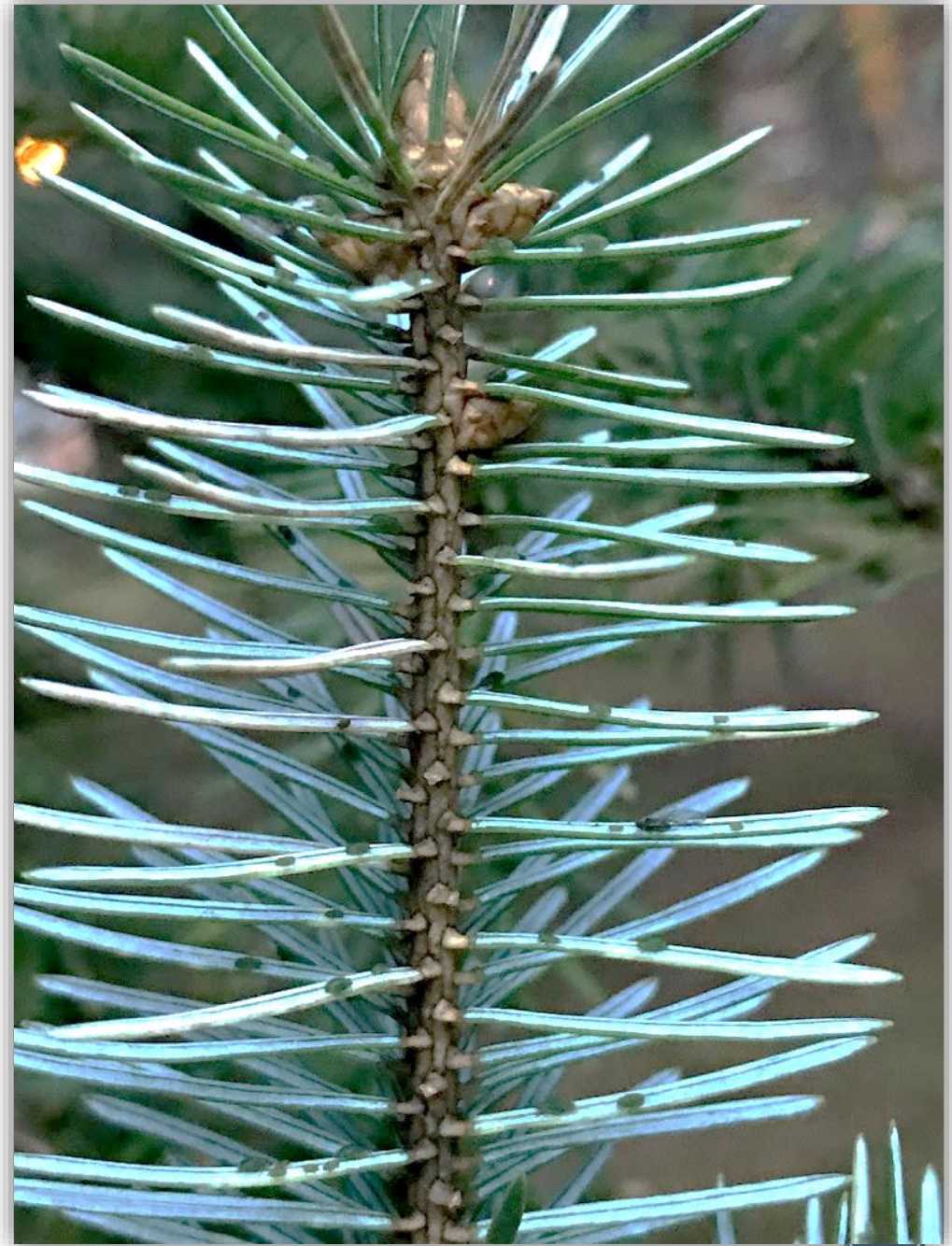


Western redcedar with significant flagging



# Spruce aphid

- 126 acres in small pockets of Southeast
- Defoliation continues to be active in Craig and Metlakatla
- Mild fall temperatures have resulted in increased population
- Cold winter temperatures help maintain populations and could prevent an outbreak
- Spruce aphids preferentially attack stressed trees but extended drought would negatively impact their development



# Yellow-cedar decline

- Yellow-cedar decline is caused by fine-root freezing injury. It occurs on sites with shallow soils and low snowpack.
- Over 500,000 acres of decline have been mapped in Southeast
- <18,000 acres of active yellow-cedar mortality occurred in 2018



# Hemlock Sawfly

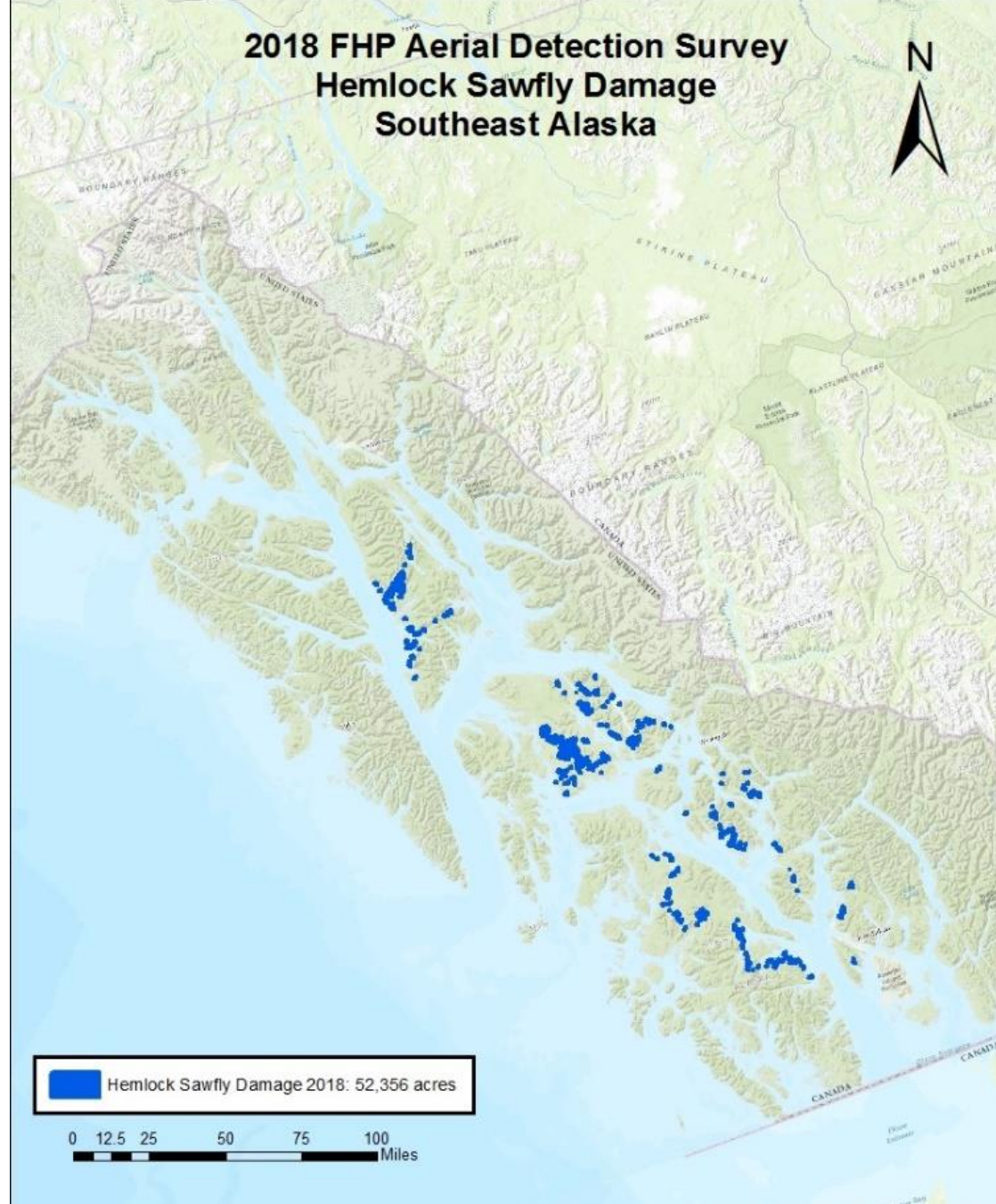
- Reports started to come in late July of discolored trees near Angoon and Petersburg
- FHP conducted site visits on western Admiralty Island on 8/10/18
- Confirmed causal agent as hemlock sawfly
- >52,000 acres of defoliation recorded during aerial detection survey
- First major outbreak since 2013 (13,300 acres)
- Defoliation often concentrated on stands with south to west facing slopes along bays, inlets, or drainages







# 2018 FHP Aerial Detection Survey Hemlock Sawfly Damage Southeast Alaska





# *Wasteful Feeders*

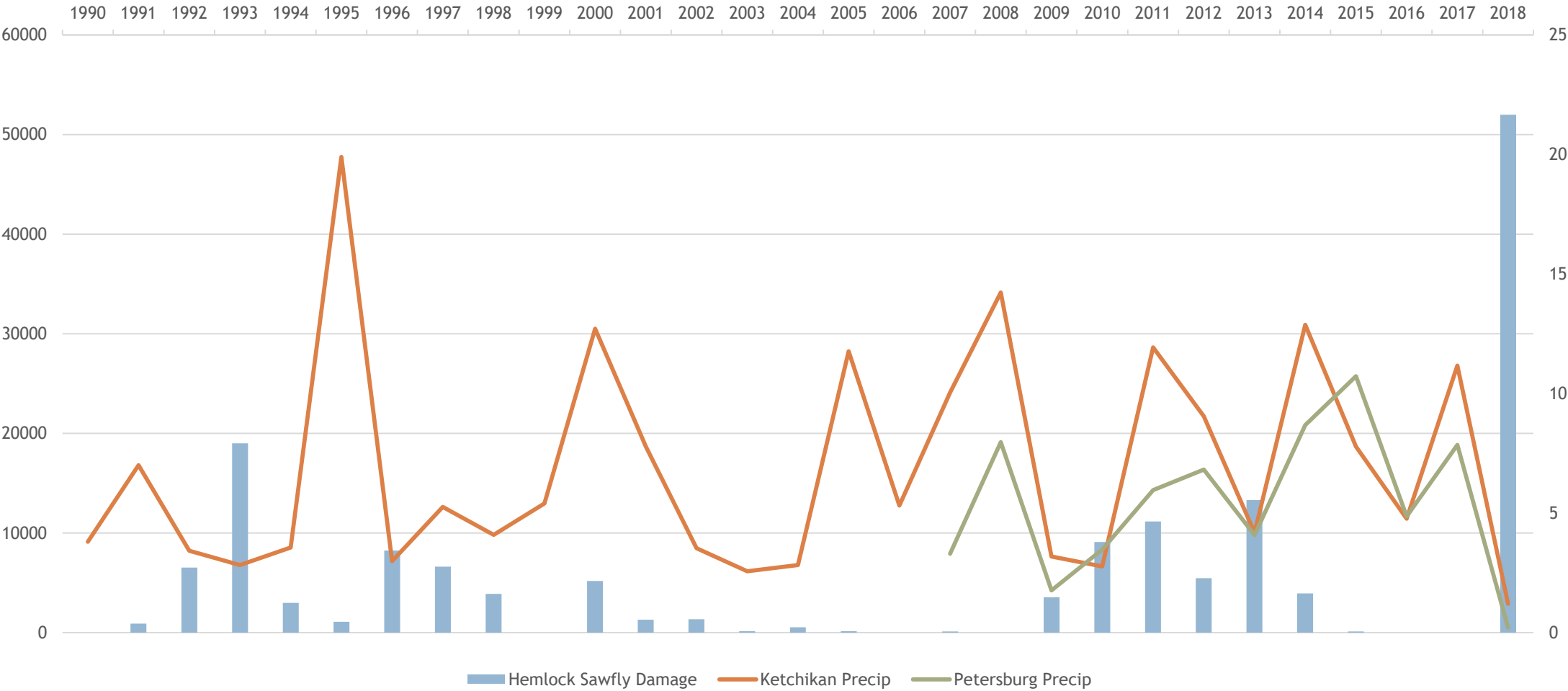


# Historic Hemlock Sawfly Activity

- Reports of hemlock sawfly outbreaks date back to 1917 continued until 1921
- Another outbreak occurred in the late 1940's into early 1950's
  - Led to the first entomologist stationed in Alaska
  - Experimented DDT
  - 1955- reported “defoliation on 1.2 million gross acres”
  - 1956- “moderate activity in a few scattered locations”
  - 1957- “hemlock sawfly outbreak of recent years has completely ended”
  - 1959- increase in larvae collected but fizzled out in coming years



# Hemlock Sawfly Damage vs Precipitation



# Hemlock Sawfly Impacts

- Western hemlock is preferred host, can feed on other conifers
- Larvae feed on old foliage, cannot complete development on new growth
- Damage results in reduction in radial growth
- Occasionally results in top-kill, rarely mortality
- Mortality can occur when outbreak coincides with western blackheaded budworm outbreak
- May continue to see defoliation in 2019



# Hemlock Sawfly Population Controls

- Cold Summer/Fall- delays larval development and shortens mating season
- Frequent rainfall- promotes spread of entomopathogenic fungi
- Dry weather- increased parasitization of pupae



Healthy Hemlock Sawfly Larva



Hemlock Sawfly Larva Infected  
w/*Entomophthora* Fungi



Hemlock Sawfly Parasitoid,  
*Itoplectis quadricingulatus*

# Pupae surveys



- Hemlock sawfly pupae were collected from several areas by FHP staff as well as Tongass National Forest district staff
  - N = 272 pupae from 7 different locations
    - Admiralty, Wrangell, Prince of Wales, Mitkof islands
  - Emergence rates:
    - Female- 14%
    - Male- 8%
    - Parasitized- 5%
    - No Emergence- 73%
      - Fungal Infection- 66%
      - Incomplete Development- 33%
      - Extended diapause- 1%

Hemlock Sawfly Pupae Success Rate



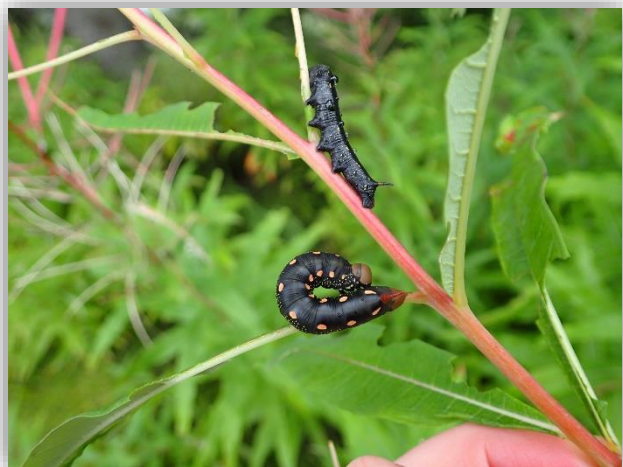
■ Successful Emergence    ■ Parasitoid Emergence    ■ No Emergence





# Defoliators in abundance!

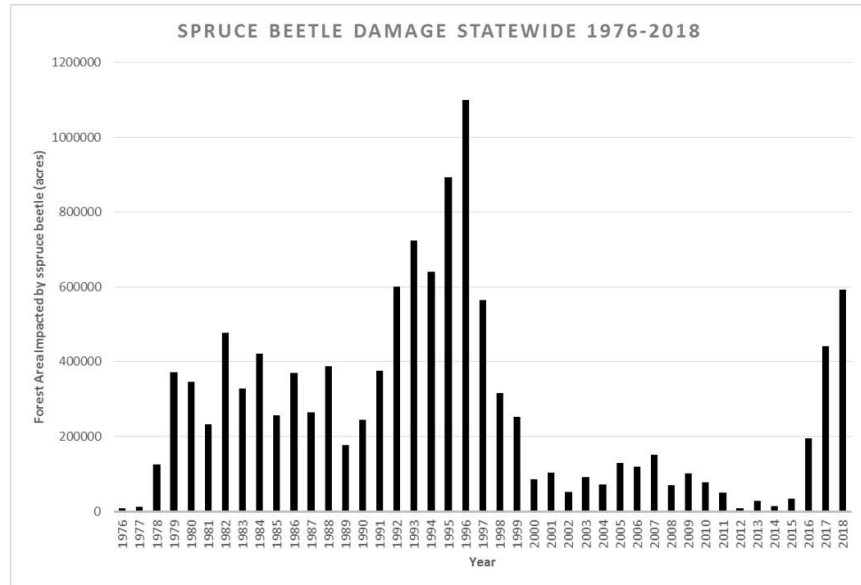
- Woolly alder sawfly causing heavy defoliation in parts of Southeast
- Green alder sawfly causing defoliation in parts of the Mat-Su
- Alder defoliation in the Chugach Mountains by striped alder sawfly



# Spruce Beetle



- 592,000 acres of damage recorded in 2018
- Cumulative damage >900,000 acres



Spruce beetle damage mapped statewide during annual aerial forest insect and disease detection surveys since 1976





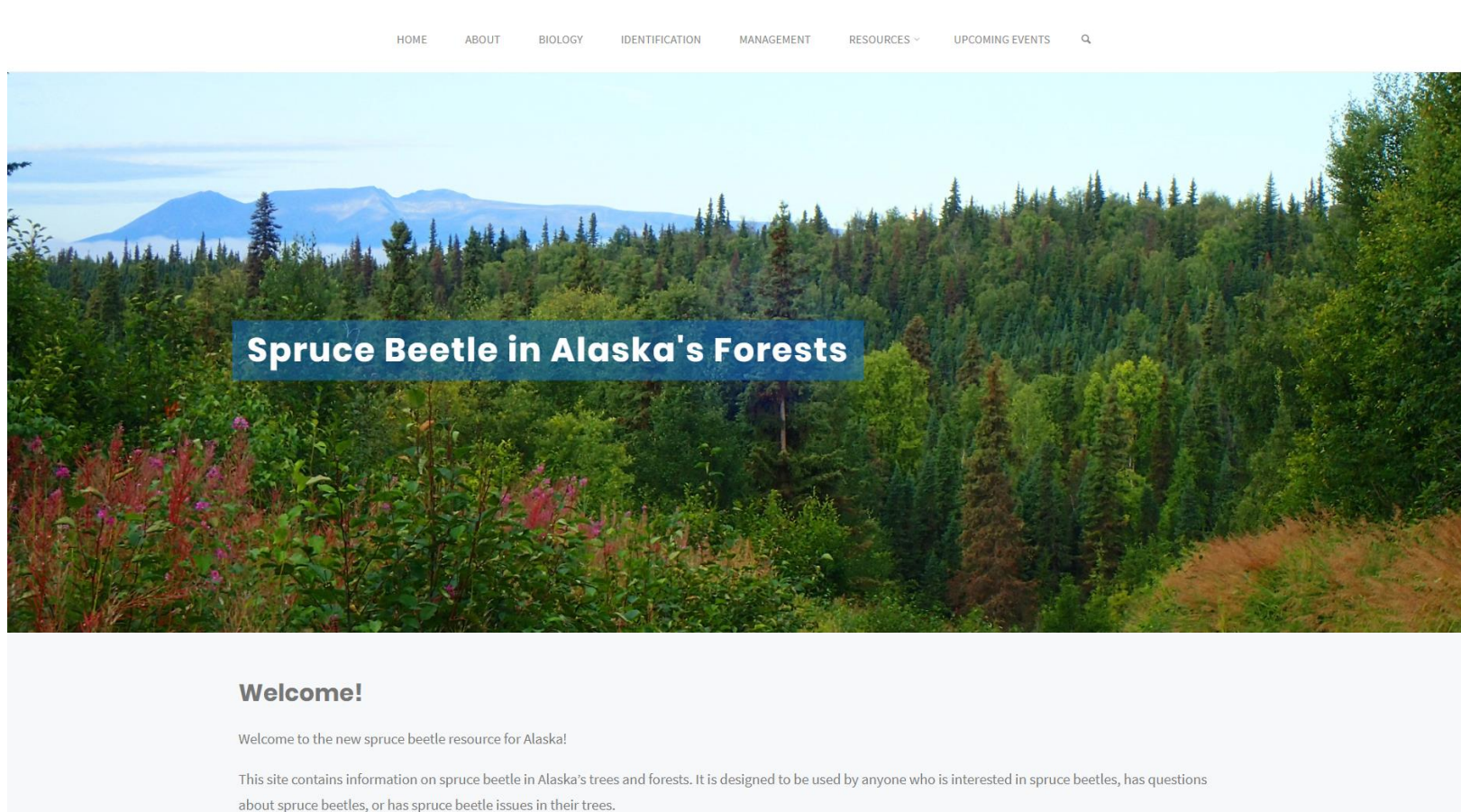
# Spruce beetle in Southeast





# More information

- [www.alaskasprucebeetle.org](http://www.alaskasprucebeetle.org)



HOME ABOUT BIOLOGY IDENTIFICATION MANAGEMENT RESOURCES ▾ UPCOMING EVENTS 🔍

## Spruce Beetle in Alaska's Forests

**Welcome!**

Welcome to the new spruce beetle resource for Alaska!

This site contains information on spruce beetle in Alaska's trees and forests. It is designed to be used by anyone who is interested in spruce beetles, has questions about spruce beetles, or has spruce beetle issues in their trees.



# Questions?

Elizabeth Graham  
907-586-8883  
[elizabeth.e.graham@usda.gov](mailto:elizabeth.e.graham@usda.gov)

