

Observations on the Health of Gambel Oak Forests near Castle Rock, Douglas County Colorado – May 2012

By
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Introduction

Observations on the health of Gambel oak, *Quercus gambeli*, forests were made 8 May 2012 in portions of Douglas County, CO. Purpose of these observations was to assess an on-going outbreak of a defoliating insect that caused extensive damage in Gambel oak forests south of Castle Rock in 2011 and to determine if a special aerial survey to map 2012 defoliation is needed. Areas examined included several locations along Dillon Drive in the Twin Oaks subdivision, located on a ridge west of Interstate 25 and south of Castle Rock, and areas east of Larkspur and along the base of Hunt Mountain immediately east of I-25.

Key Findings

Occurrence of large numbers of caterpillars on Gambel oak was reported by Kelly Southerlin, a resident of the Twin Oaks subdivision, on 29 April 2012. Her property is located in an area that suffered the heaviest and most extensive defoliation in 2011. No other reports of caterpillars and/or defoliation have been received so far this year by the Colorado State Forest Service's (CSFS) Franktown District Office. In 2011, a large number of reports were received from concerned landowners by both CSFS and the Douglas County office of the Colorado State University (CSU) Extension Service.

Several areas along Dillon Drive, including the Southerlin property, again had heavy populations of larvae feeding on Gambel oak foliage. Dillon Drive was the only area where larvae and/or feeding damage were seen on 8 May. Examination of larvae indicated that they were inchworms of the family Geometridae and contained an atrophied proleg on the fifth abdominal segment characteristic of larvae of the fall cankerworm, *Alsophila pometaria* (Wagner 2005, Fig. 1). During November 2011, a large moth flight was observed in the area by Dave Leatherman, former entomologist CSFS, and Joe Julian, Douglas County Extension Agent. They reported that female moths were wingless. Moths examined by Paul Opler of CSU were determined to be "*Alsophila* sp." Only a single species of *Alsophila*, *A. pometaria*, is known from North America. Several other species are known from Eurasia. Therefore, for the purpose of this report, the insect involved is considered to be fall cankerworm, *Alsophila pometaria*.

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Figure 1 – Fall cankerworm larvae, Twin Oaks subdivision near Castle Rock CO, showing color variation and atrophied proleg on fifth abdominal segment (arrow)

At the time of the observations, most larvae were about 1/2 inch (13 mm.) long, suggesting that they were in the third of five instars. Feeding damage thus far was restricted to “shotholes” in the foliage and was not yet conspicuous unless the foliage was examined closely (Fig. 2).

Fall cankerworm is a common defoliator of broadleaf trees, primarily in eastern North America, but has also been reported from several western states including Colorado (Furniss and Carolin 1977). Outbreaks are relatively common both in natural forests and urban areas and the larvae have a wide host range that includes many species of trees and shrubs. This insect has been in epidemic status within the city limits of Charlotte, NC for the past 20 years (City of Charlotte 2012).

Fall cankerworm overwinters as eggs deposited on branches of host trees. Egg hatch coincides with spring bud burst of host trees and in Colorado larvae feed during April and May. Pupation occurs in the soil in late May/early June and moths emerge in late autumn. Females are wingless. They climb up boles of host trees, mate and deposit an egg mass of about 100 eggs on tree branches.



Figure 2 – “Shothole feeding by early instar fall cankerworm larvae as seen in the Twin Oaks subdivision, 8 May 2012

Frost Injury

Foliage of most of the Gambel oak stands in and near the Twin Oaks subdivision have dried and blackened foliage characteristic of injury caused by a late frost. From a distance these stands appear as though they have suffered severe defoliation. Some of the damaged foliage contains tiny shotholes and profuse webbing suggesting that the frost event may have occurred after fall cankerworm egg hatch (Fig. 3). Damaged foliage of other trees lack the shothole damage (Fig. 4). The apparent frost damage is widespread and in most areas of the Twin Oaks subdivision only a scattering of trees or portions of trees escaped the frost. These are now infested by fall cankerworm larvae. The frost event will severely limit the amount of suitable food for the larvae and could result in a decline or collapse of the outbreak.

Temperature records for Castle Rock accessed from AccuWeather for April 2012 (AccuWeather 2012) indicate that low temperatures approached or were below freezing on three separate occasions (Fig. 5):

April 2-10

April 13-18 (29° F - 16 April)

April 28-29 (35° F - 28-29 April)



Figure 3 – Gambel oak foliage with evidence of frost damage, “shothole” feeding and webbing caused by fall cankerworm larvae



Figure 4 – Gambel oak foliage with symptoms suggestive of frost injury

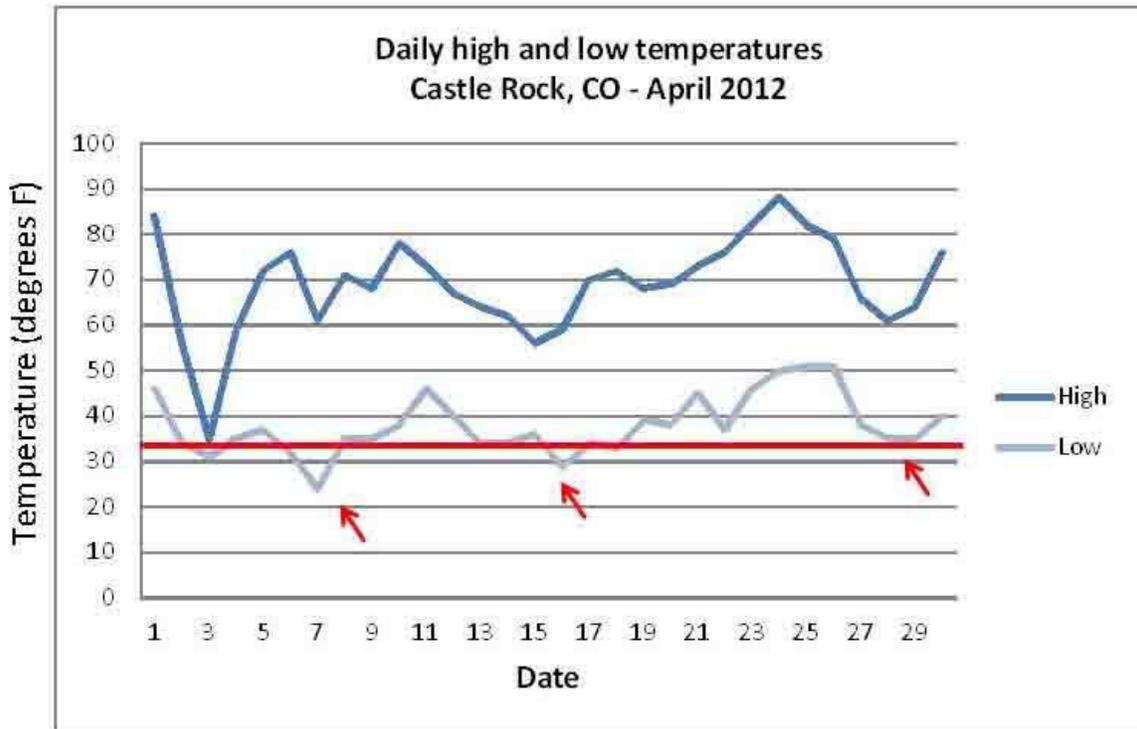


Figure 5 – AccuWeather data for Castle Rock, CO, April 2012, showing three periods where low temperatures approached or dropped below freezing (arrows)

Castle Rock has an elevation of 6,224 feet and the Twin Oaks subdivision is at an elevation of 6,560 feet (2,000 meters according to the USGS 1:100,000 scale metric map of Castle Rock). Therefore daily lows can be expected to be several degrees lower in Twin Oaks than in Castle Rock. The early April period of low temperatures probably occurred prior to bud burst. However, the later two episodes may have caused extensive foliage damage.

Foliage Diseases

Some Gambel oak stands throughout the area still retain a portion of leaves from the 2011 season. This is believed to be the result of infection cause by a leaf fungus, which turned the leaves brown during the previous summer. Two leaf diseases are known to occur on Gambel oak: taphrina leaf blister caused by *Taphrina caerulescens* and anthracnose disease caused by *Apoignomonina quercina*. Areas of discolored Gambel oak foliage were reported from Douglas County during late summer 2011.

Other Factors

Widespread thinning and brown coloration of Gambel oak stands was observed between Franktown and Castle Rock and along the entire I-25 corridor between Castle Rock and Larkspur (Fig. 6) Examination of several areas near Larkspur and an Open Space along the western slope of Hunt Mountain suggest several factors are causing this appearance. These include:

1. Late bud burst and foliage development of some Gambel oak stands
2. Varying degrees of frost damage
3. Patches of leaf fungus infection from 2011
4. Heavy flower crops in some stands. Gambel oak flowers are golden brown in color and trees with heavy flower crops tend to have a brown cast during spring (Fig. 7)

Many of these stands appear to be heavily defoliated even though defoliation by fall cankerworm is not expected to become conspicuous until at least mid-late May.



Figure 6 – Overview of Gambel oak stands looking west along the I-25 corridor with foliage thinning and discoloration due to a combination of frost injury, late foliage development and heavy flower crops



Figure 7 – Foliage and flowers on Gambel oak. An exceptionally heavy flower crop can give trees a brown cast in mid-late spring

Discussion and Conclusions

Several factors are currently affecting the condition of Gambel oak forests in Douglas County. These are mimicking insect defoliation. A late spring frost has damaged foliage in several areas. In addition, foliage remaining on trees from leaf diseases that occurred in 2011 and an unusually heavy flower crop are giving some stands a brown cast.

Fall cankerworm infestations are continuing in some areas but due to a late spring frost event, their available food supply is limited. This could result in a decline or collapse of populations. Moreover, the overall area of infestation appears to be reduced over 2011.

These observations indicate that unless more reports of insects and defoliation are received, especially from areas unaffected by the frost, there is no need for a special aerial survey.

References

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