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# TURF INSECTS: Vertebrate Foraging for Soil Insects

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## Synopsis:

White grubs and leatherjackets are highly sought by foraging vertebrates such as skunks, raccoons and birds. In many instances, the predators can cause more disruption than the insect pests themselves. When certain site and seasonal conditions coincide, "grubbing" damage is likely.

## In a Nutshell:

- In their search for insect prey, raccoons, skunks and birds are the most common culprits behind turf disruption.
- The most sought after prey are white grubs and leatherjackets.
- Factors that influence susceptibility to foraging damage include prey density, accessibility and species, predator density and habitat proximity, and local microclimate.
- Mitigating damage depends on preventive grub control, short-term repellents, trapping and raking with reseeding.

## Introduction

Many times it is not so much the number of grubs per square foot, but the number of varmints per acre that impacts turf quality. Grass in late fall and early spring can often outgrow the damage from low populations of white grubs. But those same non-damaging populations can attract the highly damaging activity of vertebrate predators. In their search for grub, mammals can cause very severe disruption to turf.

## Range of Predators and Prey

Raccoons and skunks are the most common culprits behind foraging problems. Both mammals use site and smell to locate prey near the soil surface. Skunks leave golf-ball sized pits that funnel down to where they have dug out an individual prey. Raccoons tear up, roll back and turn over larger chunks of sod. Other occasional mammalian predators include black bears and domestic dogs. Birds are also active predators of

surface-feeding insects. Although starlings and grackles are the most common foragers, damage can be attributed to crows, gulls and wild turkeys. Bird damage is not just from pecking and the pencil-sized holes left behind, it is also from scratching and tufting up the surface.

Until recently, "grubbing" was an accurate term for the disruptive activities of predators searching for insect prey. White grubs, or the soil-dwelling larvae of scarab beetles, are the overwhelming targets of choice for most of the disruptive vertebrate foraging in turf stands. With the arrival of invasive crane flies, however, their larvae, or "leatherjackets," are now on the menu and entice foraging behavior from the same array of predators as do the white grubs. The size of late-stage larvae, as well as their population density as invasive exotics, makes grubs and leatherjackets so popular in comparison to other turf-infesting insects. With the exception of birds preying on surface-dwelling caterpillars such as sod webworms and black cutworms, the other range of turf-infesting insects seldom contribute to problematic foraging behavior.

### **Turfgrass Susceptibility**

There are no insect thresholds for risk of vertebrate foraging. Turfgrass susceptibility is influenced by prey density, accessibility and species, by predator density and habitat proximity, and by local microclimate. Mammalian foraging for early stage grubs and early stage crane fly larvae is uncommon; it usually takes place when grubs are third instars and crane fly larvae third to fourth instars. Mammals forage where prey are easy to locate and extract, such as a stand already under direct damage from grubs, sandy loam soils that make foraging easier, and nearby protective habitat. Pockets of foraging activity in early spring can be linked to warmer local conditions found on south facing slopes and building sides, or within curbed islands. Microclimate conditions may bring overwintering grubs back up to the surface earlier than in other areas of the grounds, exposing only select areas of the ground to the foraging activities of predators and in advance of other spring time foraging opportunities.

### **Seasonal Considerations**

White grubs are most targeted by vertebrates in the late fall and early spring. During those seasonal windows the larvae are as large as they are going to get (third instars) and thereby most attractive. As the most cold hardy species, European chafer populations are more targeted than other grub species, especially in the spring after they have resurfaced to begin feeding just as the foraging activity of overwintered mammals is reinvigorated.

The establishment of invasive crane flies has effectively lengthened the season when vertebrates can be problematic, later into the fall and earlier in spring, and also during the summer when white grubs are too small to attract attention. In the late fall, after grubs have already descended in the soil profile or otherwise become inactive due to declining temperatures, late stage larvae of the crane fly *Tipula oleracea* are sought out. This species is more attractive to vertebrates at this time of year than its relative, *Tipula paludosa*, as they have already advanced to late stage larvae (third to fourth instar), whereas *T. paludosa* is still mid stage (second to third instar). Size of the maggot makes a difference. In the spring, it is the larvae of *T. paludosa* that are most targeted because they are late stage larvae in April and May, while *T. oleracea* is transitioning from pupae to adults and eggs. By July and August, late stage *T. oleracea* larvae are once again available, while larvae of *T. paludosa* are quiescent, inactive and probably unattractive to vertebrates.

## Mitigating Damage

In areas affected year after year, a preventive approach is to suppress grub populations the previous summer/fall so they do not promote grubbing activity in the late fall or early spring. Prey populations are kept at unattractively low levels. Curative control of prey populations is another approach. One main dilemma is that predators may stay active at the site of application for several more days before giving up. Moreover, in the case of white grubs, insecticidal control in spring is not recommended because curative control products have relatively poor efficacy against large third instar white grubs that are vigorous from feeding on the flush of spring growth. Some practitioners have had positive results through an application of Milorganite, which is a fertilizer product with reputed repellent effects on mammals. It may also be useful for quelling the activities of skunks and raccoons for a few days until a curative control is fully effective. Rescue approaches include trapping out individual skunks or raccoons. Under many circumstances, recovery may entail raking and reseeded while removing any grubs at the surface.



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