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Mr. Harden Blackwell
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Dear Harden:

As requested during our meeting on July 28 2011 with representatives from the HOA and management company, I'm providing a general overview of my observations and recommendations concerning the rodent problem on Figure Eight Island. Based on the pictures that you sent to me earlier in the week and from what I saw on the island that you are likely have both Norway rats and roof rats. While they are closely related species, these rats exhibit marked differences in behavior that make community-wide management of them 'challenging' to say the least.

I hope this information helps your community resolve the rodent problem. If you have any questions, please do not hesitate to contact me.

Sincerely yours,



Michael Waldvogel, PhD.
Extension Associate Professor
Structural and Industrial Pests

Recommendations on Addressing the Rodent Problem on Figure Eight Island

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Summary of Observations and Recommendations

1. The island has both Norway (“brown”) rats, *Rattus norvegicus*, and roof (“black”) rats, *Rattus rattus*.
2. The number of residences actually experiencing rodent problems is yet undetermined although a few residences have experienced some level activity including damage to the structure. There is unconfirmed reports that rats are damaging natural and planted landscaping.
3. The impact of the resident feral cat population on rat control is considered minimal (positively or negatively).
4. A coordinated community-wide rodent management program is needed to bring the problem under control:
 - a. The program is best executed by licensed pest control services.
 - b. The location and estimated size of infestations is important to initiating the program
 - c. Poison baits in the form of paraffinized blocks are the best choice for reducing the rat population quickly in this type of setting.
 - d. Baits must be deployed in secured, tamper-resistant bait stations no more than 30 feet apart around a structure. A shorter spacing should be used where substantial rodent activity has been documented. Homes with significant tree/shrub canopies conducive to roof rat nesting should deploy additional bait stations in these areas.
 - e. Baiting of common (undeveloped) areas should be considered pending the status of a USEPA ruling that prohibits baiting more than 50 feet from a structure.
5. The raccoon activity on the island should not be directly affected by the rodent control program other than enhanced sanitation efforts may reduce some activity around homes. Although raccoons are susceptible the effects of the baits, the use of tamper-resistant bait stations should minimize the risk of accidental poisoning.
6. Recommend extending an invitation to all pest control companies to meet and discuss coordinated and effective efforts on rodent control for their customers.

First, let me address several questions that were raised:

How did the rodents get to the island?

There are several possibilities. First, rats are very capable swimmers. The distance between the island and the mainland in some areas may be less than 200 yards. Also, the numerous small “islets” between the mainland and the developed areas of the island along with land exposed during low tide afford the rodents with potentially suitable habitats and means of moving to new areas. As their numbers increase in these small areas (or those areas flood), some rats move and inevitably reach Figure Eight Island. Of course, it’s equally possible that they simply crossed over by using the bridge or “hitch-hiked” in trucks and equipment moved at various times to the island in earlier years as construction increased. It’s difficult to say when the problem probably started because those “early rodent settlers” probably escaped attention. The dense shrub and brush on the island provides ideal harborage and nesting sites particularly for roof rats. These same habitats are also choice locations for other small mammals, such as raccoons and opossums, as well as for ground and arboreal (tree nesting) birds which in turn are a food source for the rodents, raccoons, and opossums. Rats are “omnivorous” and have a varied diet which is usually dictated by what is readily accessible to them. Aside from the birds that I mentioned, rats commonly eat fruits, nuts/seeds, insects, slugs & snails. In coastal areas, roof rats also feed on crabs and fish. Basically, rats can invade areas and survive quite well without the “help” of people.

Why is the problem getting worse?

It could be a combination of factors. First, you could simply have more residents reporting rodent problems whereas in previous years they may not have noticed rats or may not have reported problems for various reasons (this point will be discussed later). Second, construction activities on the island displace rodents which then relocate to other areas nearby. As rodent populations increase in a given area either due to an influx of displaced rats or simply due to new offspring, their numbers overwhelm the available natural food resources and so the rats expand their foraging activity greater distances in search of additional food sources. While rats have somewhat poor eyesight compared to many other mammals, their keen sense of smell which may often attract them to foods at homes (outdoor grills, trash, etc.)

I know there has been some speculation that rats are damaging landscaping on the island. Certainly when there is a shortage of food, rats will eat (or try to eat) virtually anything including the more tender parts of plants or perhaps even bark. However, during our limited tour of the island I did not see any obvious evidence that the rats may have been gnawing on the trees and shrubs that are dead or in declining health.

Will the feral cats living on the island impact on the rat population?

While cats are very good predators of mice and juvenile rats, they are less likely to tangle with adult rats. Researchers at the University of Nebraska reported that house mice, Norway rats and pigeons are less subjected to cat predation as are other native species (<http://www.ianrpubs.unl.edu/sendIt/ec1781.pdf>). While the idea of using the cats as a natural control seems to make sense, it comes with a significant negative effect. These same researchers cite data from other sources that point to cats killing an estimated 480 million birds annually with an estimated impact exceeding \$17 million. I doubt the feral cat population on the island is having any significant impact on the rat population. On another note, the question was raised about whether the food provided daily to the cats in various locations around the island was also providing an additional food source for the rodents. Basically, that would depend on how much food is made available to the cats, how quickly the cats consume the food, and if any food remains overnight (and accessible to rodents). If the latter is true, then limiting the feeding time of the cats and remove excess food before dark would resolve that issue.

Community-Wide Rodent Management Program

I use the term “community-wide rodent management” for two reasons. First, everyone on the island must cooperate to make the program work. During our meeting, the term “Nuke Plan” was used. Given the suspected extent of rodent activity, the best approach would be to attack the rats island-wide so that you avoid leaving “refuges” (areas where rats escape any control measures). However, a rodent control program in the common areas on the island is complicated logistically, economically, and environmentally. Your initial rodent management program needs to include at least all residential properties on the island. The HOA determines the need and ability to expand the program into common areas but there are some complicating factors that I will address below. Furthermore, since rodent populations fluctuate seasonally as reproduction drops off in the winter, I would recommend starting the program as soon as possible. Obviously, some residents may prefer a “do-it-yourself” approach as opposed to contracting the services of a pest management professional. From my perspective, a “DIY” approach for a significant rodent problem is often flawed because the property owner may not maintain the level or participation needed. The end result of this community-wide effort IF everyone cooperates and does their part, should be a substantial (probably not total) reduction of the rodent population to ‘manageable’ levels by an ongoing resident-driven management program preferably using the services of local pest management professionals.

Identifying Rodent Species of Concern and “Hot Spots”

We’ve already discussed that the problem is primarily roof rats and Norway rats. I suspect that the problem is not uniformly distributed across the island but more likely is occurring in “pockets” that are related to local “favorable conditions” (both naturally occurring and man-made). A community-wide program will help identify these “hot spots” and allow you to address those locations in order to keep the problem from spreading. It’s imperative to engage all of the property owners to provide information on whether they have seen rodents (or their pest control service has seen rodent activity) in their area. Obviously, this is difficult because there is no way to gather data anonymously and some residents will be reluctant to admit to a rat infestation. However, all residents must understand that they are either part of the problem or part of the solution.

Reduce sources of attraction to residences

Once you’ve identified the hot spots, the next step is to identify the rodent-conducive conditions that exist in these areas and determine to what extent they can be “modified” to reduce rodent activity near the residences. In most cases, if rodents have abundant “natural” food sources, then they should not be invading homes. However, as I mentioned previously, as food (and water) become limiting factors, the rats are more likely to forage around (and in) homes in their area (typically within 50-100’). In most cases, the first line of defense is to make sure that trash and harborage are not causes for concern. This is where educating property owners and renters becomes critical:

1. Discourage people from leaving food or food remnants outdoors overnight (when rodents are most active). This includes food leftover from the previous evening’s meals/parties, leaving grills uncleaned and uncovered (grease attracts rodents) and discarding food around the property. It is not unusual for people to discard food remnants (e.g., melon rinds, partially-eaten items, etc.) into adjacent areas figuring that these items will “break down naturally”. Such situations create rodent problems in and around residences.
2. Encourage all residents to secure their trash in containers equipped with properly-fitting lids and that they make sure trash is collected and removed. Bags of garbage should not be placed on the ground particularly overnight. This is equally important (or perhaps more important) for pests such as raccoons and opossums.
3. Landscaping – it’s extremely important to keep all landscaping at least 12” away from the buildings. This is particularly important for shrubbery which can disguise both ground and arboreal rodent nesting sites and also provide the rats with another means of reaching parts of a building without encountering control measures (see below)

4. Sources of fresh water – rats in particular have a need for water on a daily basis. In a situation such as the island, the most likely sources will be irrigated areas, lowlying areas where stormwater runoff may accumulate, swimming or decorative pools, receptacles (barrels, buckets, etc.), the condensate lines from AC units. Some of these situations are unavoidable (or uncorrectable) but just make homeowners aware of them.

Rodent Control Measures

Options for rodent control are somewhat limited but focus using mechanical traps (snap traps, glue board traps, “live traps”) and/or poison baits. Many people perceive the mechanical traps as ‘inhumane’ and so that is something to consider in pursuing their use with your community. Outdoors, mechanical traps should be placed inside “secured” tamper-resistant stations (e.g., the *Aegis* or *Protecta* brands) to prevent children, pets or wildlife from accessing them accidentally. “Secured” means that the stations cannot be moved or that children, pets and wildlife (including raccoons) cannot access whatever is inside the station (e.g., a trap or a poison bait). This can be done simply by attaching the station to a paver stone, to the foundation, or to a spike that is driven into the soil to anchor the station. The drawback to using mechanical traps (snap traps or glue traps) in this setting is that they really need to be checked several times weekly to check for trapped/dead rodents and to make sure the trap hasn’t been triggered and needs to be reset). For the most part, the same issues apply for live trapping as well.

Some residents may view the rodent bait/trap boxes as unsightly and “bad PR” (i.e., telling guests that the island has a rat problem). This could be addressed to some extent by using less bait boxes that have been designed to resemble rocks. Some businesses (e.g., restaurants, museums and zoos, etc.) use these boxes because they are less conspicuous to the public. However, when they are placed in very public areas that are devoid of landscaping or real rocks, they may actually stand out more and draw people’s attention. Resident education about baiting is extremely important in this regard as well.

The most effective approach would be the use of poison baits. The most commonly used rodent baits are anti-coagulants, i.e., they cause the rodent to die from internal bleeding. Another common bait product uses bromethalin which is a neurotoxin. Rodent baiting in residential areas requires exercising great care. State law requires that when acutely toxic rodent baits are used in publicly-accessible areas (even on private property) they need to be in secured, tamper-resistant bait stations as I described above. Additionally, I strongly discourage the use of the pellet bait (particularly the bait packs) even within bait stations since they can be dislodged and removed by the rats. We have had instances where, rats have removed and dropped bait packs in open areas (e.g., two rats fighting over the food or a predator scaring a

rodent while it's carrying the bait pack). Under no circumstances should bait packs be placed down into active burrows in residential areas. It creates a hazardous situation where children, pets, and wildlife might accidentally consume the bait.

The number of baits stations per site needed will obviously vary with the location. Around the perimeter of a house, I would suggest placing them no more than 30 feet apart. If a resident has had a significant rodent problem (based on visual sightings, damage, etc.), they could decrease the spacing to 15 feet at least at this initial phase. Additionally, for houses that have dense canopies of low-growing trees, it would be prudent to place bait stations in or at least along the canopy because these are prime nesting sites for roof rats. In areas where roof rats have been identified as the primary pest species, bait stations could be secured to the underside of upper floor decks around homes since roof rats often use the siding or deck supports to access the upper levels of homes. It's important when baiting to make sure that rats are not actually nesting inside the home (e.g., inside walls) because there is the possibility that poisoned rats will die inside the house creating an odor and subsequent fly problem. Any nests inside the house must also be removed otherwise it creates conditions that attract insect pests such as dermestid beetles and stored product pests that feed on seed and other food that the rats brought back to their nests.

Also, another concern with baiting is "secondary exposure" which occurs when an animal such as a dog, raccoon, or scavenging bird eats a rodent that is dead or dying from rodenticide poisoning. For that reason, it's important that the community be aware of the use of baits and make sure that any dead rodents that found on their property are properly discarded in a trash bag as soon as possible. This may pose a greater problem if the baiting program was expanded to include the common areas on island. However, baiting common areas may not be feasible. Effective June 2011, the US Environmental Protection Agency initiated a policy in the interest of public safety (particularly for children) that rodent bait stations cannot be placed more than 50 feet from a structure. At this time, the rodent bait manufacturers have initiated a lawsuit against the USEPA concerning their new rodent bait restrictions (which include more restrictions than just the 50' issue) and so it is unclear if the Agency is actually enforcing this new rule. For this reason, I would postpone expanding the program into common areas until we can get clarifications from the EPA.

Coordinating Efforts by Pest Control Services

Given that you're not dealing with a single infestation (i.e., a single home or adjacent homes), another impediment to effective community-wide rodent management is that you have several pest management companies servicing customers on the island and in some instances you residences that have do not use a routine pest control service at all. Residences without a pest control service and which may be occupied only part of the seasonally can create "refuges" for the rodents. This doesn't mean all of these

unserviced houses are (or will be) a problem, but simply that they can complicate a rodent management program. For the rest of the residences that have pest control services, the problem is one of not knowing the level of consistency in how these companies approach rodent management. We only looked at a few houses but from what I saw it appears that most of the attempts at management are using the “standard” distribution of bait stations around house foundations which addresses Norway rats more effectively than roof rats. As mentioned earlier, with roof rats, you must target their nesting sites which are likely in/under thick brush as well as baiting areas up high on structures if that is a concern.

As we discussed during the meeting, it would be good idea to bring in the technical representative from one of the rodenticide manufacturers and hold a meeting open to all of the pest control companies that service the island. The idea here is not necessarily to get them to use the same product line as much as it is to make sure the service technicians are aware of the challenges of rodent control on the island and how a more unified approach to dealing with the rodents means success for all of them.

Raccoons

I was asked to comment on the issue of other wildlife such as raccoons. You can expect raccoons to be an ongoing problem because they are very capable swimmers (more so than even the rats) and can easily use the bridge as well to reach the island. Apparently there was some concern about a rodent management program being counterproductive to raccoon control efforts. Quite the contrary, the details I outlined above about sanitation are equally critical to reducing raccoon problems in and around homes. Also, contrary to what one resident has stated, raccoons ARE susceptible to all of the currently used rodent baits. Whether or not they will die from the bait is a matter of how much bait they consume. Considering that a typical full-grown rat rarely weighs more than one pound while a raccoon will weigh 10-23 pounds, a raccoon obviously has to ingest far more toxic bait for it to have an acutely lethal effect. However, the raccoon could acquire a lethal dose over time if it was to repeatedly feed on bait and/or consume poisoned rats. As to the concern that the bait could provide a food source for raccoons, the use of tamper-resistant secured bait stations should prevent that problem from occurring.

Regarding raccoon control, NC Wildlife Resources Commission regulations prohibit relocating raccoons in part because they are the largest source of rabies in wildlife populations. That’s not to say that the raccoons on Figure Eight Island are rabid but simply that raccoons make up the largest portion of rabies cases in North Carolina. If the raccoons are not released on the same property on which they were trapped, they must either be killed on-site (and then discarded appropriately, such as at an approved landfill) or removed and euthanized by a licensed wildlife damage control agent who issues a “Depredation Permit” to the homeowner before removing the animal from the property.