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REGIONAL MUNICIPALITY

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Environment and Sustainability Committee
May 5, 2011

TO: Chair and Members of Environment and Sustainability Committee

SUBMITTED BY: Phillip Townsend, Director, Infrastructure and Asset Management

DATE: April 15, 2011

SUBJECT: **European Fire Ants**

ORIGIN

Staff

RECOMMENDATION

It is recommended that this information report be forwarded to Regional Council.

BACKGROUND

European Fire Ants have been identified in Halifax Regional Municipality (HRM) as one of many invasive species.

HRM was fortunate to find a partnership with local graduate student Susan Horton in 2010, and she provided HRM with the most up-to-date information on European Fire Ants.

DISCUSSION

Susan has provided HRM with a report (Attachment One): Summarily, European Fire ants are well established and all around the Halifax peninsula. No eradication methods have been confirmed. Residents and staff can continue to manage infestations using a multi-pronged approach. HRM will continue to provide best information available at: http://www.halifax.ca/environment/InvasiveSpecies.html. She has now completed her graduate degree and without funding, it is not anticipated that local study of European Fire Ants will continue in HRM. Staff will continue to monitor information from the University of Maine for current findings and research.

To clarify, the role of HRM as related to invasive species is to:

1. Diligently Manage impacts on municipally owned property; and
2. Provide residents with links to adequate information from other levels of government or stakeholders.

Research and private property remediation activities, is not within the scope of SEMO nor the mandate of the municipality. We look for this work from other levels of government.

BUDGET IMPLICATIONS

There are no budget implications to this report.

There is no budget capacity in the currently proposed 2011/2012 budget for any or continued research related to European Fire Ants.

FINANCIAL MANAGEMENT POLICIES / BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Project and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Project and Operating reserves, as well as any relevant legislation.

COMMUNITY ENGAGEMENT

No community engagement related to this report.

ALTERNATIVES

Committee or Council could direct staff to resource continued investigation and research related to European Fire Ant Control or Management. Essentially, this alternative would require the creation of a new FTE such as an Environmental BioDiversity Officer, with a cost of approximately $70,000.

ATTACHMENTS

Attachment: Report from Susan Horton

A copy of this report can be obtained online at http://www.halifax.ca/commcoun/cc.html then choose the appropriate Community Council and meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Richard MacLellan, Manager, Sustainable Environment Management Office, 490-6056

Report to HRM

Research on the European Fire Ant, *Myrmica rubra,* in the HRM 2010/11

Susan Horton *BSc, PGCE, MSc* (2011)
Saint Mary's University

Introduction

Myrmica rubra, commonly known as the European Fire Ant, is an invasive species introduced to North America from Europe and Asia. The first documented case was in Massachusetts in the early 1900s in an area landscaped with plants from England (Wheeler 1908). Given the history of Halifax as a thriving port, it is possible that the species was also introduced early in its history but was not documented nor considered an issue until the last ten to fifteen years. It has only recently been officially confirmed by the CFIA. This pestiferous species of ant is aggressive in its introduced habitat (Groden *et al.* 2005) and is causing many residents to be unable to use their outdoor property for fear of being stung. Homeowners are worried about their children, pets and property value.

M. rubra is species perfectly suited to our environment with a wide tolerance of temperature, moisture, and disturbance, with little competition for resources and no identified predators. Reports indicate that the populations may be increasing exponentially. It is a highly adaptable species with no history of being eradicated once established but researchers at the University of Maine are working on biological control such as species specific fungi. There has been very limited success with chemical control but trials in HRM were begun in the summer of 2010 with a well known bait station. If this is successful it would act as one method of management in the arsenal. It is essential to continue to monitoring, control throughout the active season and conduct proper scientific trials if meaningful management options are to be obtained. It is also important to continue public education as new infestations are the result of transfer of contaminated material by people.

The aims of the research were to determine the preferred habitat in an urban environment, create a map of the general locations of infestations in the HRM region and understand the mechanisms of spread.

Illustration 1: Susan Horton measuring soil moisture and temperature in a M. rubra nest in Halifax. August 2010.

Characteristics of the Species

Illustration 2: Fig 1 M. rubra worker front view.

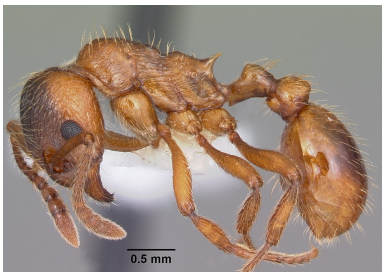


Illustration 3: M. rubra worker side view.

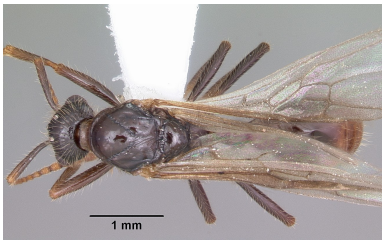


Illustration 4: M. rubra male top view.

Photos: http://www.antweb.org/description.do?rank=species&genus=Myrmica&name=rubra&project

Workers are a yellowish brown to reddish brown and 3.5-5mm in length; males are dark brown/black and 4.5-5mm; and queens are a darker reddish brown and 5.5-7mm (Klotz *et al.* 2008).

This is a polygynous (multiple queens) and polydomous (multiple nests) species. These are two unusual features which make it much more difficult to control than an infestation of a native ant with only one nest and one queen. *M. rubra* expands its territory through colony budding, creating new nests throughout the summer. Although they have wings, they do not fly in North America. They have large colonies; in Maine they have been found to have between 297 and 10000 workers and up to 194 queens.


Illustration 6: Two M. rubra queens amongst workers.


Illustration 5: Twelve queens with workers in ground nest under paving slab. Acadia National Park, Maine- May 2010.

Colonies take around a decade to mature which means residents may be unaware of the problem until the population becomes dense enough to interfere with daily activities. Pets may bring ants in on fur and there are some reports of dogs being stung on the paws and noses.

Illustration 7: M. rubra farming aphids.

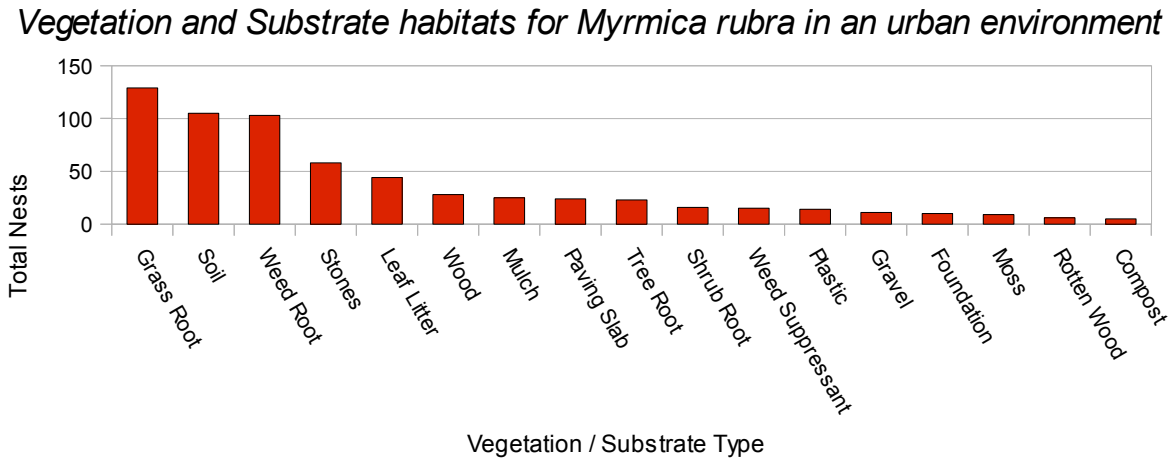
Illustration 8: Collecting protein. Halifax. June 2010.

Food sources include protein and honeydew. During the spring and summer months workers are often seen carrying other invertebrates such as caterpillars or other ants to nests. Honeydew, a sugary substance produced by homopterans (e.g. aphids, leafhoppers, lacewings) is another main source of food. This is an outdoor nesting species, only going inside buildings to forage if an opportunity arises. Pet food and [children's] sweets are known to have lured ants into houses but there is no evidence of nests in houses. The distance scouts and foraging workers have been known to travel, is on average 8 metres from the nest with an extreme range of 32 metres. In a city environment this can account for a multitude of properties.

The first recorded activity in 2010 was April 2nd and in 2011 was March 31. Both winters were considered mild. The summer of 2010 saw a high level of infestation and 2011 may follow suit. The ants slow down activity over the winter but do not all die off. There is a brood laid in autumn which overwinters ready to hatch in spring along with a supply of workers and queens. Eggs are not laid until spring but there may be many reproductive stages in one nest by late spring. Winged reproductives emerge mid July and continue until September.

Habitat

In the native environment, habitats include: under stones; along pasture edges; moss tussocks in open pine forests; and rotten wood in wet, shady woodlands. In rural Maine the introduced habitat includes: lawns and gardens; old field habitats; scrub-shrub; wetlands; deciduous forests; and the edge of intertidal zones. The urban environment in Halifax was recorded as two categories: nests amongst vegetation and nests against a hard surface (substrate). There is a large variety of habitat possibilities under each category as people personalize their outdoor environment, but patterns have emerged. See the graoh below for a breakdown of the variety of micro-habitats.



The graphs below show the habitats grouped into similar types. This allows for better comparison results between urban and rural habitats (from Maine) (Groden *et al.* 2005).

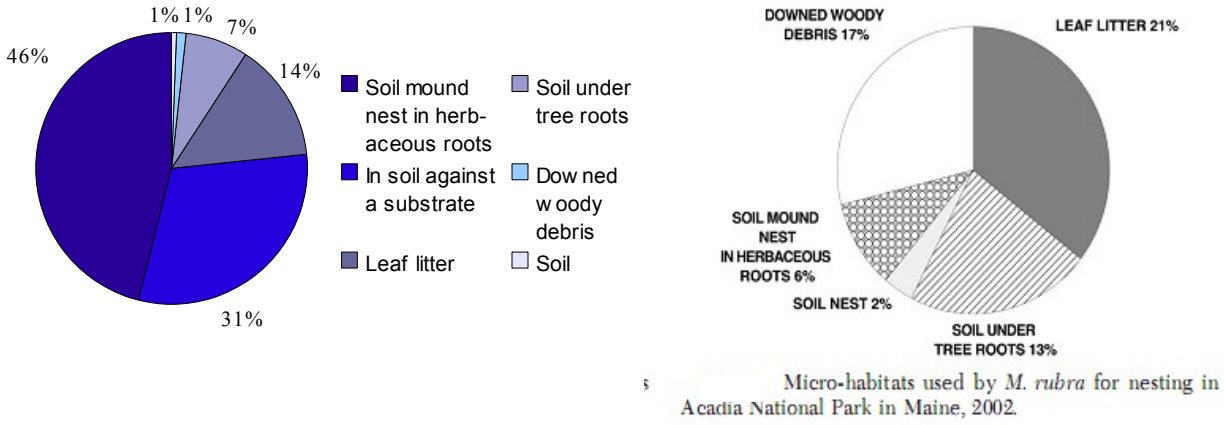


Illustration 9: Micro-habitats used by M. rubra for nesting in an urban environment, 2010

It was found that the most numerous micro-habitat for nesting in HRM is in the root systems of herbaceous plants such as grass and weeds, followed by soil under or against a hard surface, such as a paving slab, sidewalk or foundation. Nests were also found in rotten tree stumps, decomposing material including leaf litter and compost, and along tree roots. The abundance of nesting locations is another reason for the difficulty in controlling the spread. It is possible that people may be inadvertently moving infested material during landscaping maintenance.

Although *M. rubra* use non soil nests such as leaf litter, where it was used there was a preference of slightly acidic soil composed of around one fifth organic material. The average soil temperature was 20°C with an average air temperature of 25°C, therefore the nests were on average 5°C cooler than

the surrounding environment. Soil moisture was an average of 12% but with a wide tolerance range of (nearly) 0 to 39%. Ambient light ranged from 5%-100% with a Mode of 40%, so overall preference of slightly shaded areas. These figures indicate the diversity and adaptability of the species.

Nest density calculated within property boundaries (infested and non infested areas) showed a similarity to that expected in a native range but when sampling the infested areas of each property, the density exceeds those found in the native environment and in the introduced rural environment. In England the average number of nests was 0.02-0.13 nest/m^2. In Maine's Acadia National Park there was an average of 1.24 nests/m^2 and a concentration of localized nests ranging from 0 to 4 nests/m^2 (Groden *et al.* 2005). In the urban environment results show an average density per infested property to be 0.12 nests/m^2 but preliminary results show infested areas within each property to have a concentration of up to 6 nests/m^2.

Illustration 12: Nests were found under logs and stones. May 2010

Illustration 10: Almost every log had a nest underneath. May 2010.

Illustration 11: Overturned ground flora nest showing brood, males and workers. July 2010

Locations

Most of the locations were determined by reports and are therefore unconfirmed, but extrapolation of the known data shows that the greatest concentration to be the peninsula. However, this may also be due to the higher human population and more mature neighbourhoods.

It should be noted that this problem is not localized to HRM and that many areas of Nova Scotia are also infested. Some residents have reported infestations at their cottages after moving plant and other organic material from the city.

The map below shows the locations of infestations in the Halifax Regional Municipality. Please note: the map has been made purposefully vague due to Ethics Board restrictions. More detailed maps are available for the use of approved persons.

There were almost no reports outside of the Metro area. It is unclear whether this was due to lack of knowledge of the study or lower density of nests per property in more rural areas. There were some reports outside of the map area, from both Seabright and Seaforth.

Almost every park in the old City of Halifax has some infestation and it is possible all may be affected.

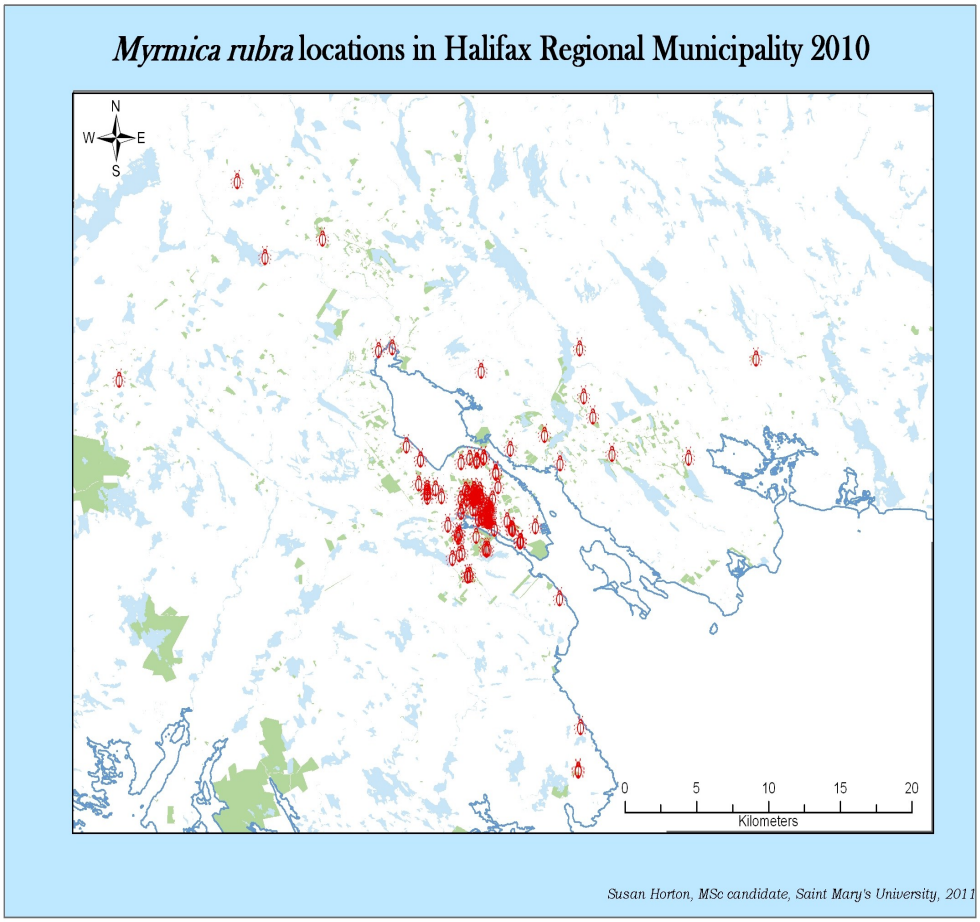
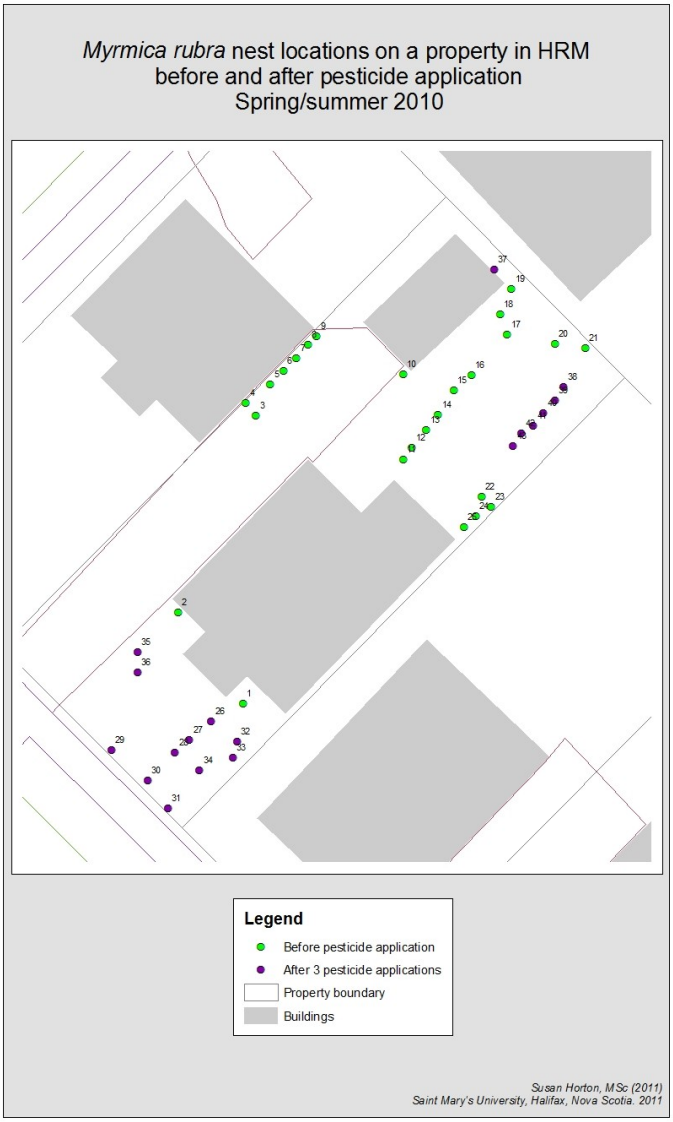


Illustration 13: Geocoded map of M. rubra locations in the metro area of HRM 2010. The red indicates an infestation.

Control

There are no known methods to eradicate colonies. Individual nests can be managed in an ongoing manner and ant populations can be reduced. It is still misunderstood by the public as to how to control infestations. Many people emailed with 'solutions' on how to kill ants. This is not an unknown. Ants can be killed by boiling water, freezing, burning, stepping on, and a variety of chemicals including boric acid (component of borax). The problem is the difficulty in eliminating the queens and therefore stop the re-infestations. There are trials being conducted in Maine on biological controls which are promising but may take years before becoming commercially available.



At the moment a multi-pronged approach is most likely the best method of control. This means a continuous removal of nests, reduction of habitat, targeting queens, and if chemicals are used then it is preferable to bait for ants than apply a broad spectrum pesticide. It is unknown whether native species are helping to slow down the spread but reducing biodiversity will in theory only allow an invader to move in more quickly. However, it may be effective to reduce the number of fire ants by chemical means if there is no evidence of any other ant species.

If a professional company is engaged, there is no guarantee of significant control. The insecticides do reduce the number of ants but multiple applications may be needed in the same year and repeated each year following. This is especially likely if the resident is the only property to have a treatment. The result of one study showed that a resident on the peninsula who had a company spray three times had a reduction of thirteen nests and a movement of all. See map above (note: nests 11-18 (green) were under logs, and 38-43(purple) were against the wooden edge of a raised vegetable garden). The insecticide currently being used is 'Demand' (Lambda-Cyhalothrin 100g/L). One characteristic of the compound is repulsion. This means ants are less likely to nest in areas which have been sprayed and may move to another area of the property or an adjacent property.

Conclusions

There are many invasive organisms in HRM, some of which are highly detrimental to biodiversity, but the ones which appear most troublesome are those which negatively affect human health and well being. Fortunately, not all introduced species become invasive but those that do, have the characteristics of adaptability and/or lack of natural controls. This species has both.

This research is unique as no other studies on this species have been conducted in Canada nor any research on the ecological parameters of the habitat in an urban environment. It is important to understand the species in an urban context and to monitor regularly for changes. This was an essential baseline study on which to build and conduct further work. It is also important to continue to provide public education to help slow the progress of the infestations. If the populations are left unmanaged, they could become so concentrated that control efforts may become extremely expensive and may no longer be effective: such is the situation with *Solenopsis invicta* (Red Imported Fire Ants) in the USA. Already there are new reports from cities across the country (Wetterer and Radchenko 2011 and personal communication-unpublished data). If the populations become unmanageable there will be both environmental and economic consequences. Examples are: loss to native biodiversity, loss to tourism, and effects on the housing market. Beyond HRM, detrimental effects may occur in the agricultural industry, forest industry and again, real estate and tourism.

Recommendations include continuation of a baseline study to monitor the species; further engagement with the public; continuing public education; conducting trials of management techniques; continued communication and collaboration with researchers at the University of Maine; and recruiting the Province and Federal Government to help fund research and management.

It would be recommended to employ a 'Biodiversity Officer' who would coordinate activities and liaise with universities. This would be a scientist (biologist) who has experience with invasive species so as to take an ecosystem approach, and has particular expertize with the fire ant.

Bibliography

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