Operational plan for management of *Wasmannia auropunctata* (Little Fire Ant) in East Sepik Province, Papua New Guinea

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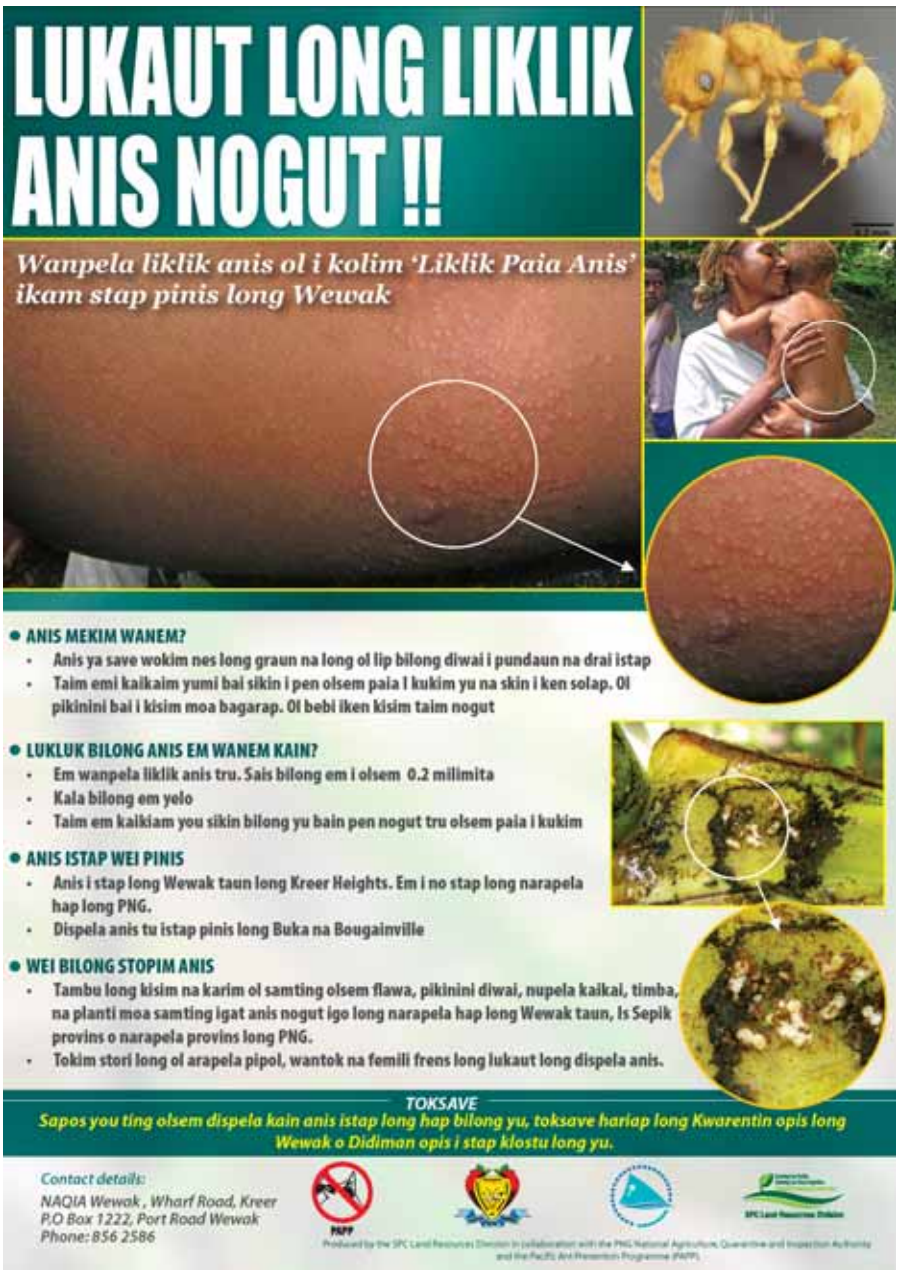

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Executive Summary

Wasmannia aurpounctata (the Little Fire Ant) has recently been discovered on the Papua New Guinea mainland. This species is rapidly spreading through the western Pacific region and in places where it has become established, has proven to have severe environmental, economic and social impacts.

Little Fire Ants are a shade-loving ant that inhabit the ground, vegetation and domestic structures. It is a pest of agriculture but the most severe impacts in PNG would be experienced by people living subsistence lifestyles.

Currently, this species has been recorded in two locations in the East Sepik province: Wewak and the district of West Yangoru. In both cases, the area infested is relatively small – being 6 hectares and 2-4 hectares respectively.

Extensive surveillance at nine ports throughout PNG suggests the distribution of this pest is likely to be very limited, and as a result, there is scope for successful eradication or containment.

Effective methods to control this pest are available and have been used on the Wewak infestation with good early results.

A management plan including public awareness, further delimiting and ongoing treatment is recommended.

Purpose and Scope

The purpose of this document is to outline the impacts associated with the presence and spread of *Wasmannia auropunctata* (Little Fire Ant) in Papua New Guinea, report the history of incursion management to date and provide recommendations for future management of this pest.

Section 1: Background

Biology of Little Fire Ants

Ants are social insects closely related to bees and wasps. As a rule they live in a colony with one or more queens. Workers are sterile females who perform specialised roles including caring for brood (larva), feeding and attending to the needs of the queen(s), foraging for food and defence of the colony. Worker ants are dispensable as the queen produces a regular supply of replacement workers.

Males are notably absent from day to day life and are produced seasonally for breeding purposes. After mating, their purpose is served and they die. Most ant species spread by means of production of winged reproductive casts (male and female) which leave the parent nest in synchronized nuptial flights. Mating takes place in the air and fertilized female queens then return to the soil surface and establish new colonies independent from the parent colony.

Many invasive ant species including Little Fire Ants do not use this dispersal method. Rather, mating occurs within the parent colony (or close nearby) and newly fertilized queens either remain there or disperse on foot taking with them a small number of workers (to care for them and the new brood which the queen will produce). Often, these nests remain connected with the parent colony and the tasks of territory defence and food gathering are shared. This results in a polydomous, unicolonial “supercolony” with no intraspecific aggression between workers and queens. The loss of workers and even queens does not threaten the viability of the colony as production of new workers and queens occurs constantly.

The dispersal strategy and social nature of invasive ant species makes them a formidable enemy to competitors and prey in habitats they have invaded. Indeed the impacts of these invasions are all the greater due to this feature. They are able to monopolise resources and overpower competitors through sheer force of numbers. In the case of Little Fire Ants, assessments of abundance is measured in billions per hectare.

Dispersal over distances greater than a few metres are almost always human-mediated. Small colony fragments “hitch-hike” with personal possessions, freight or produce and establish a colony in a new location. This is the most likely means by which Little Fire Ants were introduced to the East Sepik province of Papua New Guinea.

Spread in the Pacific region

Little Fire Ants originated in South America and over the last century have spread to USA, Africa and the Pacific region. Sites currently infested with this species are shown in Figure 1. The populations in Gabon and New Caledonia (former French colonies), Hawaii and Tahiti are closely related while Little Fire Ants in PNG, the Solomons, Australia and Vanuatu are phylogenetically more similar to the USA and Carribean populations. Two main invasion "waves" appear likely (Mikheyev and Mueller 2007, J. Foucaud, unpublished data)

Over the last two decades, Little Fire Ants appear to be spreading more rapidly than before, probably facilitated by increased trade within the Pacific region. Since the 1990s, new infestations have been discovered in Vanuatu, Cairns, Tuvalu, Hawai (Wetterer and Porter 2003) and more recently, Papua New Guinea.

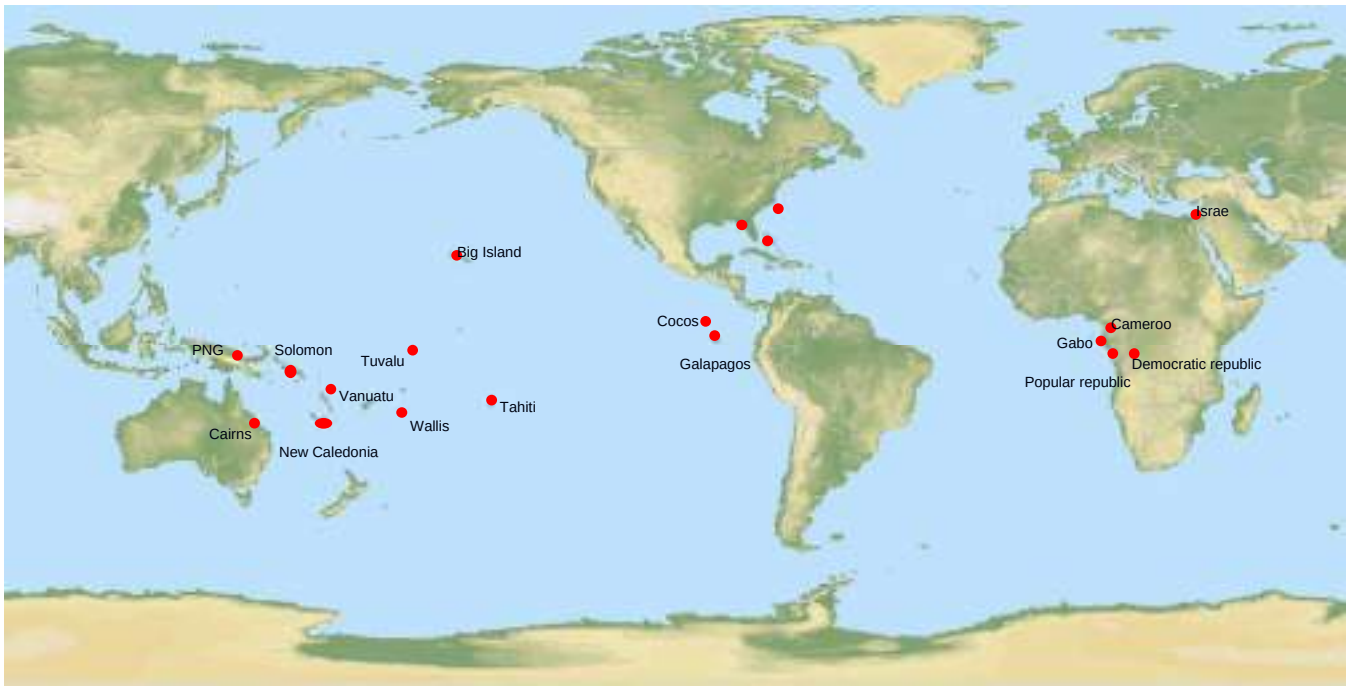

Figure 1. Sites with introduced Little Fire Ant populations

Impacts

Economic impacts

Wasmannia auropunctata is a shade-loving species that nest in vegetation and on the ground. Little Fire Ants interfere with production in agricultural systems such as coffee and citrus where they promote scale insects and interfere with biological control organisms (Fabres and Brown 1978). Workers have refused to harvest or tend orchards infested with this species in Hawaii[1] .

[1] See http://hawaiihealthguide.com/healthtalk/display.htm?id=613&hhsid=0c022d71674bd3e3df465f733b25ddb1

Arguably a more serious threat to PNG's economy is the impact that Little Fire Ants have in subsistence gardens. A large part of the population in PNG relies heavily on food grown in village and family "food gardens", usually a mixture of tree (coconut, banana, paw paw, mango, breadfruit etc) and ground crops (maize, taro, yams, aibika, kangkong, pitpit etc). These food gardens are a haven for Little Fire Ants who will inhabit both the ground layer and tree trunks and canopies. Here they promote crop pests especially homoptera and sting people tending their crops and harvesting food. As workers move through their gardens, they disturb the foliage dislodging ants which then become entangled in the workers' clothes, stinging them. Little Fire Ants have been found in the crowns of mature coconut trees, making harvesting of even this commodity difficult and painful.

Environmental impacts

One immediately noticeable impact on natural ecosystems invaded by this ant is the virtual absence of other ant species. Indeed, the boundary between invaded areas and un-invaded areas are most easily delineated by the presence of other ant species in un-invaded areas. Other environmental impacts have been reported by Jourdan *et al.* (2001) who describes impacts on reptiles. There is also considerable anecdotal evidence that Little Fire Ants sting domestic and wild animals especially on the eyes, causing blindness.

Social impacts

Little Fire Ants forage and nest in houses and outbuildings and this puts them into direct contact with people. Once they have infested houses, it is common for children and adults to be stung regularly and for the ants to spoil prepared food items in kitchens and pantries. While stings are only moderately painful to adults, children appear to be much more sensitive and often are stung multiple times in their sleep. The high cost and non-availability of medical facilities can make this a difficult issue for families to manage.

Control methods

Baits (a food matrix attractive to ants which has been laced with a toxin) are regarded as best practice for control of ants generally. However, most commercial ant baits are manufactured in granular form for easy distribution over the soil surface where most ant species forage. Among these baits there are several formulations that have been used against Little Fire Ants nesting in soil with varying degrees of success. These take a similar form and are comprised of pre-gel defatted corn grit mixed a combination of vegetable oil and a toxin.

Little Fire Ants forage and nest in both in soil, vegetation and other structures. Indeed, their preferred habitat is in vegetation, building small nests in any available crack crevice or hollow. Typical residential areas in the Pacific region offer a host of such habitats: in food gardens, crop areas, in buildings and other structures. Here, they gain much of the energy needed for rapid colony growth and dispersal by tending homoptera which provide them with an abundant supply of carbohydrates. Protein is needed for brood development and queen maintenance. Often, sources of protein are in shorter supply and may be a factor limiting colony growth.

A bait made from a protein attractant and manufactured in a form suitable for distribution on trees and foliage will logically be a good candidate for control of Little Fire Ants. Maxforce

Ant Granules®[2] are made from a base of silkworm pupae (protein), however, it is only available in granular form making it unsuitable for arboreal distribution. Additionally, test feeding demonstrated a reluctance by Little Fire Ants to recruit to this product. A New Zealand manufactured product, Xstinguish™ is a paste bait manufactured on a lipid and protein base. It is marketed primarily for control of Argentine Ants (*Linepithema humile*) but is effective for a broad range of ants.

A combination of treatment of the ground layer with granular baits (Maforce Fire Ant Bait® or similar, containing hydramethylnon as the active ingredient), and treatment of vegetation with a paste bait (Xstinguish® containing fipronil as the active ingredient) has been demonstrated as an effective control method for Little Fire Ants (Vanderwoude *et al.* 2007).

The costs associated with such a baiting strategy may be high, and while it is desirable to use commercially available bait products, The per-hectare cost of a single bait treatment is approximately (PNG) k1000 (US$450). Several applications over 2-3 years may be needed. Additionally, the costs associated with transporting these products to infested locations can also be high.

An alternative approach has been tested on an existing infestation in Kreer Heights, Wewak. Here fipronil (supplied as Termidor™ termiticide, 100g/l a.i) was mixed with peanut butter at a rate of 0.005% a.i. (0.5ml termidor to 1kg peanut butter). This mixture was applied to vegetation and other structures at a rate of 3-5 kg/ha in combination with a granular bait for the ground surface in May 2008. Recruitment to baits was excellent (see figure 1) and the following day, the few ants observed in the treatment area were suffering symptoms typical of fipronil toxicity (shaky and un-co-ordinated gait, inability to traverse vertical surfaces). The estimated cost of such a treatment is approximately PNG k200 (US$90) per hectare. This method could be considered for future control operations.

Section 2: Overview of current situation in Papua New Guinea and East Sepik Province

Little Fire Ants have been present in Bougaineville (North Solomons) province for some years and much of the island of Buka is already infested. The sheer economic cost of conducting large scale eradications mean that it is unlikely Buka will ever be completely rid of Little Fire Ants. There is however, considerable scope to mount targeted control operations which have the potential to reduce impacts on the economy, the people and the environment there. Aside from this infestation only two confirmed outbreaks exist in PNG – both in East Sepik Province.

Kreer Heights

Kreer Heights is a residential area of Wewak, East Sepik province in northern Papua New Guinea (Figure 2). In 2005, the National Agriculture Quarantine Inspection Agency (NAQIA) detected *Wasmannia auropunctata* at this site after a report from one of the residents there.

[2] Maxforce Ant Granules® and Maxforce Fire Ant Bait® are different products.

After the specimen identity was confirmed, a preliminary delimiting survey was conducted in early 2006. At this time it was estimated that the infestation extended over approximately 6 hectares (Vanderwoude and Numbuk, 2006).

In May 2007, the area was baited with a combination of Maxforce® Fire Ant granules and Xstinguish® applied as a containment treatment. The infested area was also surveyed more carefully in order to determine the exact boundary.

Between August and November 2007, NAQIA, with funding from USDA through the Secretariat of the Pacific Community, conducted a public awareness programme and baited the infested area on two occasions. As a result of the public awareness programme, an additional infestation was detected at Bonihitaim (West Yangoru district). The two baiting treatments at Kreer Heights reduced the infested area to drainage lines and isolated hot-spots (Figure 3).

During the wet season of 2007-2008, the remaining fire ant colonies spread out from the drainage line and the hot-spots. In May 2008, the infested areas were again treated with Sumitomo granular bait (donated by Sumitomo Australia). Trees, vegetation and structures were treated with Xstinguish® and the peanut butter bait described previously. Intensive post-treatment monitoring was not carried out but a post treatment inspection revealed greatly reduced ant numbers in previously infested areas.

Figure 2. Aerial image of Wewak showing the infested site (yellow marker).

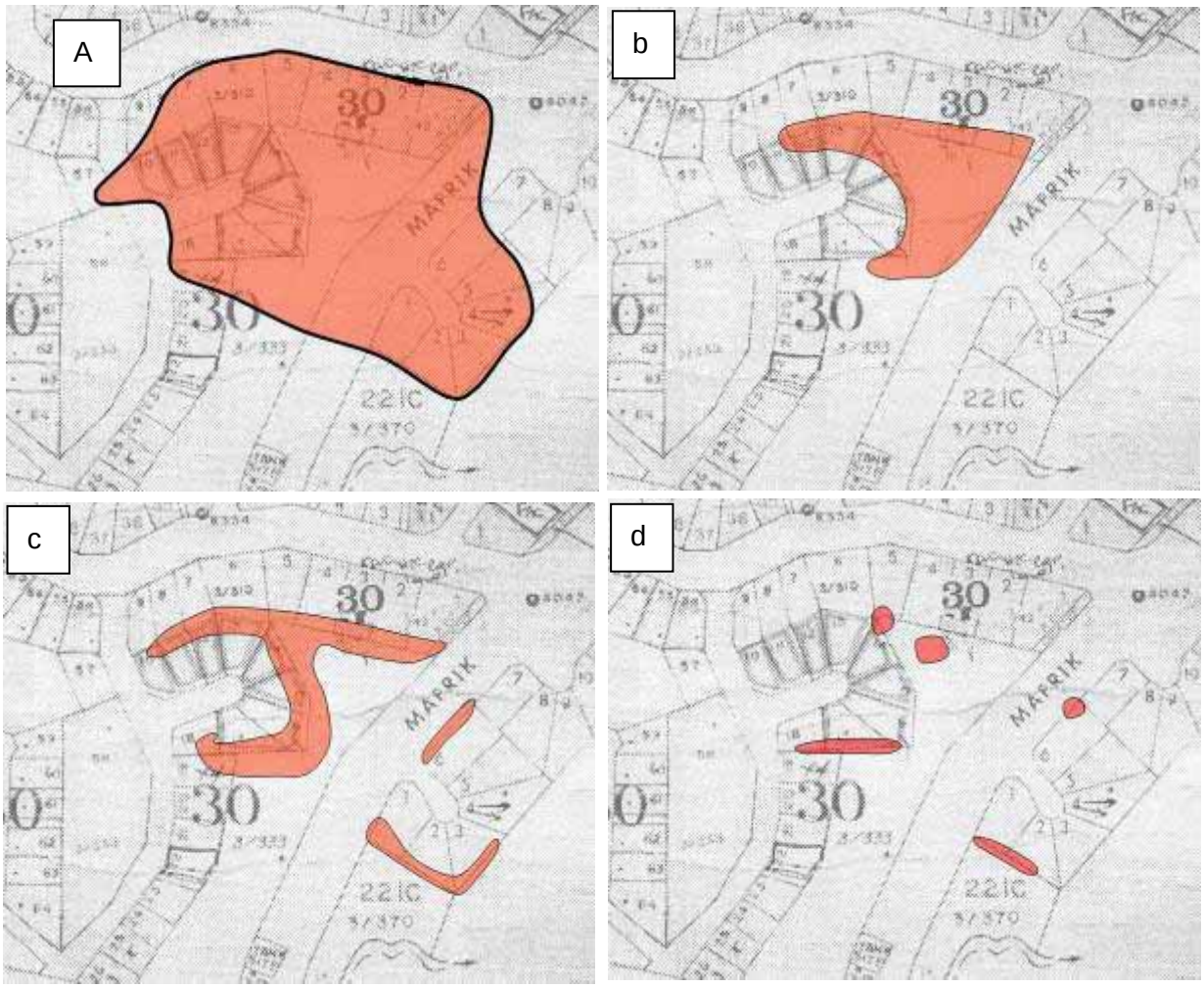

Figure 3. Maps showing infested area in Kreer Heights, (a) prior to treatment in Aug 07, (b) after treatment in Aug 07, (c) prior to treatment in Oct 07 and after treatment in Oct 07 (the infested area has increased slightly during the 2007-8 wet season).

West Yangoru

Bonihitaim is a small village in the hills of West Yangoru district (Figure 4), and does not have vehicular access. In November 2007, following up on a trace-forward report from the Kreer Heights area, a NAQIA officer and the writer traveled to Bonihitaim to assess whether Little Fire Ants were present. The village was spread along a track of 1 kilometre which was entirely infested by Little Fire Ants. Residents were extremely concerned at the impact and spread of this new pest. They reported that sleeping and food preparation was being severely hampered by the presence of the ant and that domestic animals, especially pigs, had been blinded by ant stings. However, no blinded pigs were observed on this visit.

The surrounding forest was not surveyed due to lack of time and steep terrain but it is likely Little Fire Ants extend into the adjoining forest. The total infested area at this site is estimated between 2 hectares and 4 hectares in area. The more severely infested houses

were treated with Xstinguish® bait at this time in order to provide some short-term relief to residents.

Figure 4. Partial map of East Sepik Province showing approximate location of Bonihitaim village.

Angoram

During treatment of Kreer Heights in May 2008, an additional trace-forward report was received from Angoram. This report has not yet been investigated, however it is credible and will quite possibly become a new detection once investigated.

Section 3: Management recommendations

Little Fire Ants spread by two means – at local scales through budding and at larger scales by "jump dispersal" – small colonies accidentally moved to new locations by human activity (usually the transport of infested produce, plants or personal belongings). Once transported to another location, colonies detach themselves from the vector, establish at the new location and begin to spread by budding. Natural spread by budding is relatively slow and occurs at rates measured in metres per year. In time however, the infestations will spread to such an extent that they are virtually present everywhere.

In many ways, the ant's dispersal strategy can be used to advantage by those wishing to manage spread or eradicate the new incursion. This is especially so in the early stages of an

invasion. Each location where fire ants are present can be thought of like an island surrounded by uninfested land.

A strategy to eradicate or contain Little Fire Ants should consist of two main priority areas: preventing further jump-dispersal; and treating known infested sites. Treatment of sites can occur independently of each other. As infested sites are treated, the risks of further dispersal from those loci are dramatically reduced even from the early stages of a control programme.

Containment and prevention of long distance dispersal can be achieved through a combination of movement controls, public awareness and community engagement. Destruction of infestations is achieved through a combination of delimiting, treatment and monitoring. Each component is a vital and necessary part of the total management strategy.

Containment of long distance dispersal

Movement controls

For pests and diseases of agricultural products, imposing controls over the movement of vectors into non-infested areas is relatively simple (albeit, at times expensive in terms of resources). The majority of agricultural products are commercially grown and direct liaison with the relevant organizations can prevent the movement of these vector items. Additional efforts preventing the movement of domestic vectors completes the task. Little Fire Ants however, do not infest specific vectors but are likely to be found in a wide range of commodities and possessions. The imposition of mandatory movement controls would be almost impossible to enforce as it would necessitate imposition of an almost total quarantine in infested areas. Movement of all produce, possessions and even vehicular traffic would need to be controlled. For Little Fire Ants, enforcement of mandated restrictions is therefore unlikely to be accomplished successfully.

Public awareness

Raising the public awareness and understanding about the impacts of Little Fire Ants on the daily lives of people is very likely to result in greater self-scrutiny of produce and possessions that are about to be transported to new locations. Not ideal, this will help to substantially reduce the risk of new infestations arising from hitherto undetected outbreaks. This, coupled with an appeal to report the presence of nuisance ants loosely fitting the description of *Wasmannia*, will provide numerous leads for investigation and provide management with a clearer picture of the extent of the problem within PNG.

During the 2007 public awareness programme, posters, leaflets press releases and radio broadcasts on the NBC Didiman programme were planned and implemented. The impact nationally was extremely good, serving to raise the profile of this issue. The outreach was sufficient for the cartoonist of the National Newspaper to use it as the topic for the 30 August 2007 cartoon (Figure 5). Even today, people as far away as Port Moresby remember the reports and are able to associate them with the programme in Wewak.

Additional public awareness activities are vital for continued management of this issue, Fortunately, there are many opportunities for low cost or free public awareness through the radio, television and print media. Further, excellent posters have already been produced by SPC which could be re-printed for this task (see example appended).

Figure 5. cartoon in the National Newspaper, Papua New Guinea – 30 August 2007.

Community engagement

Communities already affected by Little Fire Ants, and those living nearby existing infestations should be provided with additional information and closer engagement than other communities. Such engagement should include personal representations and presentations, information on the impacts, spread vectors, and control options available. Any treatment activities will require one-on-one relationships in any case in order to facilitate access to properties for treatment and monitoring. Personal relationships with communities that adjoin infested areas is particularly important because they will be the first people likely to detect if Little Fire Ants have encroached on their properties. Prompt reporting of such events will make control efforts easier and less expensive.

Destruction of existing infestations

Delimiting (national)

Good intelligence about the current infestation state of the PNG mainland is vital to allow decision-makers to determine policy. If Little Fire Ants are already widely distributed, it may be more appropriate to change to a policy of containment rather than eradication. Further, if decision-makers can be reasonably confident that the outbreaks are contained to a small number of sites, a policy to attempt eradication may be justified.

In 2007, the Secretariat of the Pacific Community co-ordinated a Pacific-wide survey for invasive ants with funding from NZ-AID. NAQIA were enthusiastic participants in this process and surveyed nine ports: Port Moresby, Jackson Field, Vanimo, Madang, Wewak, Lae, Kimbe, Rabaul and Lihir. Over the entire programme, over 100 NAQIA, Lands, Provincial Government and Primary Industries officers were trained in surveillance methods and briefed on Little Fire Ants. During this time, no additional Little Fire Ant outbreaks were discovered, which adds confidence that they are not widely distributed in PNG.

Delimiting (local)

Once a new outbreak is discovered, it is important to delimit the infestation in order to determine exactly where the boundary between infested and un-infested land. The standard operating procedure for this task (adapted from Vanderwoude *et al* 2007) is detailed below.

This standard operating procedure describes recommended methods for delimiting a newly discovered outbreak of Little Fire Ant (*Wasmannia auropunctata*) and monitoring ant activity before and following treatment. Collection of data necessary for proper record keeping is also described.

Materials

1. Smooth peanut butter
2. 60 cc sample vials
3. GPS unit with cables and software for downloading waypoints

Method

An operator familiar with the biology and habitat preferences of Little Fire Ant should be present at all times during the survey and should be responsible for all visual surveillance. Starting from the point of detection, the operator should walk away from this point on several radii, visually inspecting locations where Little Fire Ants may be present. These locations include but are not limited to:

1. Leaf axils in banana suckers and palms
2. On or near leaves where hemiptera (scales, aphids etc) are apparent
3. In dead wood, hollows and branch junctions of trees and shrubs
4. In cracks or crevices under stones and debris
5. Immediately adjacent to structures such as houses, outbuildings, coral outcrops and stone walls
6. The stem, trunk and leaves of all scale-susceptible plants including papaya, soursop, mango, breadfruit, jakfruit, citrus and other fruiting or flowering trees.

Once the limits of detectability have been reached (when it becomes difficult to find LFA), sample vials baited with a smear of peanut butter are to be placed at 10m intervals. They should be placed in the shade close to the habitats listed above. Where shade is not available, the vials should be covered with a section of banana leaf or similar. The vials need to be exposed for 30-60 minutes to allow ants the opportunity of finding the baits and recruit to them. The period between 11.30am and 1.30 pm is generally too warm for adequate ant recruitment and this period should not be counted in the waiting time.

After 30-60 minutes exposure, the operator is to collect each vial, take a GPS reading, record the waypoint number on the vial. If a GPS is not available, the operator should sketch the approximate layout of the surveyed area and clearly mark each vial with a sample number which should also be recorded on the sketch.

The GPS (or downloaded waypoint file) should be returned with the samples to the person

responsible for identifying the samples. Identifications should be recorded against the waypoint number of the vial. Instructions for use of the GPS and recording of other details (taken from 2007 ant survey instructions) are appended.

Once the new outbreak has been delimited, the site should be treated or a containment procedure

Containment

This standard operating procedure describes recommended methods for containing a newly discovered outbreak of Little Fire Ant (*Wasmannia auropunctata*) and for ongoing prophylactic containment of existing outbreaks.

Materials

1. Maxforce Fire Ant Granules, Amdro or similar product
2. "Scott" brand bait spreader

Method

The intent of establishing a containment line is to create a treated buffer between areas known to be infested and areas believed to free of Little Fire Ants. It may be thought of as a prophylactic treatment that provides an extra level of security. Maxforce™ Fire Ant Granules, Amdro™ or similar products are easily distributed using a "Scott" brand bait spreader. The aperture is set at "1" (Figure 6) and the operator winds the spreader handle at approximately 60 rpm while walking at 3 km/h (Figure 7). The swath width thus created is approximately 4 metres. Therefore three passes along the containment line should be sufficient to deliver a 10-15 metre treated zone.

It is important that the same zone is treated on successive operations as this provides a continuous barrier to spread by Little Fire Ant colonies. The path taken by the operator should be carefully selected and wherever possible, a track or open area should be chosen. The centre of the containment path should be as close as practically possible to the edge of the treatment area.

Figure 6. Image of a "Scott" bait spreader showing the winding handle (a), the aperture adjustment (b) and correct grip. Set the aperture at "1".

Figure 7. Walk at a steady 3km/h pace while winding spreader handle at approximately 60rpm.

Treatment

Treating a site infested with Little Fire Ants requires that the ground, structures and vegetation be simultaneously treated. No single bait product is suitable for all situations so a combination of bait granules and paste baits should be used. Granular baits are the easiest and least expensive to apply and is suitable for treatment of bare ground, soil, pasture, garden beds, around buildings and lawns. Paste baits are most suitable for treating vegetation, tree canopies, above ground structures, cracks and crevices.

Bait granule application

Materials

1. Maxforce™ Fire Ant Granules, Amdro™ or similar product
2. "Scott" brand bait spreader

Method

The intent of treatment with granular baits is to deliver an even distribution of the bait over the soil surface at an approximate rate of 2kg product per hectare. Maxforce Fire Ant Granules, Amdro and similar products are easily distributed using a "Scott" brand bait spreader. The aperture is set at "1" and the operator winds the spreader handle at approximately 60 rpm while walking at 3 km/h (see standard operating procedure for containment). The swath width thus created is approximately 4 metres. An overlapping series of parallel swathes is recommended. This is accomplished by starting on one boundary of an infested site and proceeding 1 metre inside the boundary. Once the operator reaches the end of the treatment area, he or she takes 2-3 paces towards the untreated area and returns parallel to the original path (see Figure 8). Continuing this process, the designated area can be systematically covered. It is important that all ground is treated including spaces between buildings and corners of gardens. An additional sweep around buildings, garden edges and other structures is recommended.

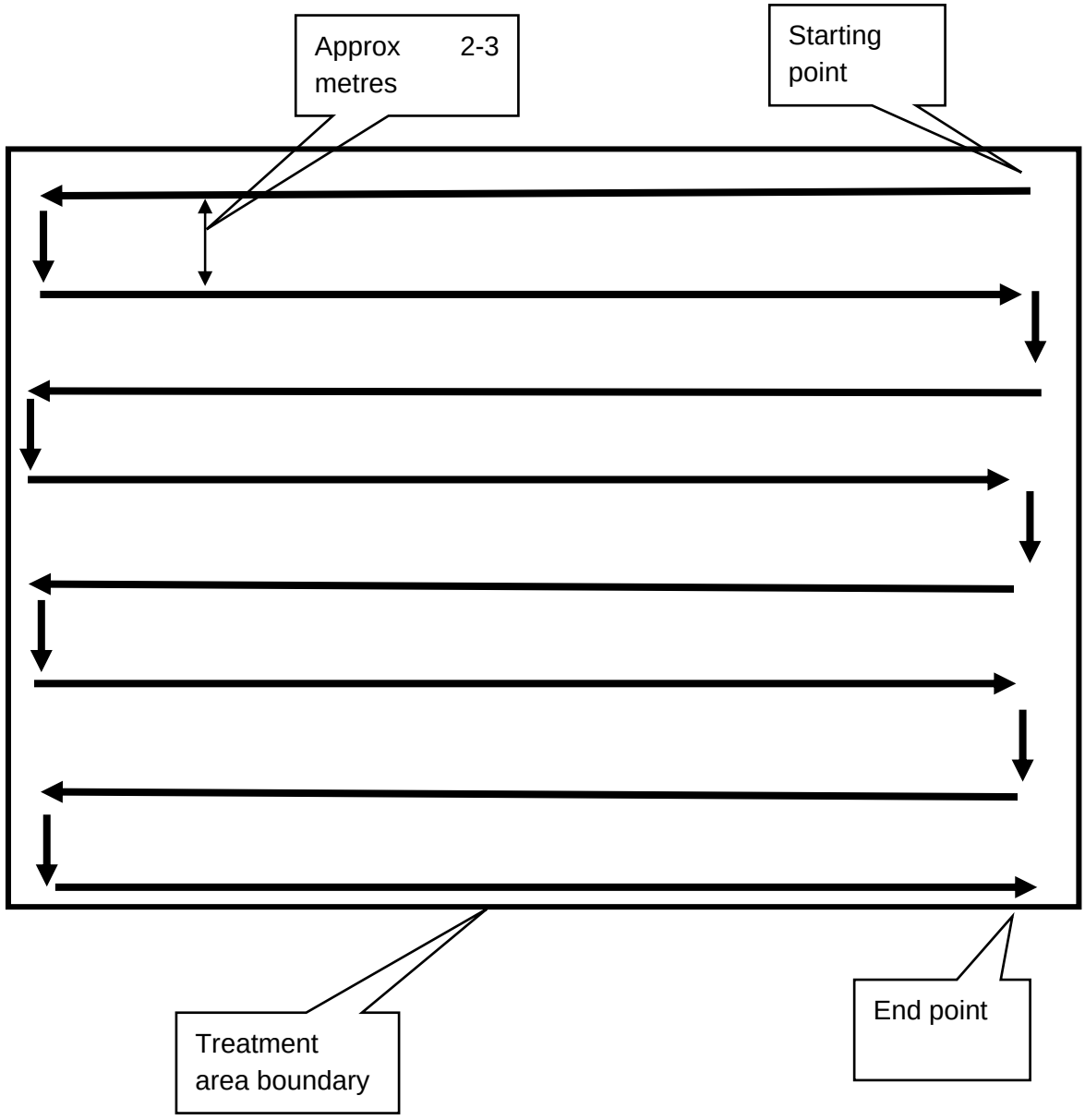

Figure 8. recommended method for distribution of ant bait granules

Past bait application

Materials

1. Xstinguish™ Ant Bait or peanut butter baits as described previously
2. 250mm caulking gun
3. sharp knife or blade for opening bait
4. ladder or other means of climbing vegetation

Method

The intent of treatment with Xstinguish™ bait is to ensure areas not adequately covered by granular baits are also treated. Little Fire Ants are predominantly arboreal and most trees, shrubs, structures and buildings will harbor small ant colonies. Many such colonies do not forage great distances and therefore they may not always reach the ground-applied bait

granules.

Xstinguish™ is a paste bait with fipronil as the active ingredient. It is supplied in 325 gram tubes and applied using caulking guns available at most hardware stores (Figure 9). The bait is easily applied to cracks, crevices, branches, vertical surfaces etc and it is therefore very suitable for use on trees, shrubs and buildings. The correct application rate is 3kg per hectare (approximately 9-10 tubes)

Every tree, shrub, structure building is to be treated as follows:

Trees

Large trees need to be climbed. Go as high as it is safe to do so and apply a small amount of bait (enough to cover your small fingernail) to suitable locations such as branch junctions, hollows, areas with dead wood, areas where debris has collected and along branches. If Little Fire Ants are seen, place additional amounts of bait along foraging trails. The bait should be placed at approximately 1 metre intervals. Always start from the top of the tree and work down. Stepping on bait may cause the operator to slip and fall. On palms and coconuts, several spots need to be placed in the crown, near dead or dying fronds, and in foot holds and hollows of the trunk.

Bananas

Banana clumps are regarded as perfect habitat for Little Fire Ants. In infested areas, almost all the spaces between leaf axils and the stem will house a small colony. It is important to place an amount of bait in each of these leaf axils. Also examine the trash around the banana clump and place some bait along fallen or cut trunks.

Shrubs and small trees

Flowering plants, fruit bearing trees and small shrubs are often used by Little Fire Ants for food gathering. These are generally too fragile to climb but place spots of bait in branch junctions, hollows, cracks and crevices. If a foraging trail is seen, follow it to the ground and/or to the nest and place some bait there also.

Buildings and structures

The bases of buildings and other structures are places where Little Fire Ants will be found. Work around each building, placing spots of bait at 1-2 metre intervals. The best spots to place baits are cracks crevices, hollows and places where foraging trails can be seen. If ants are seen foraging up walls or posts, place additional bait as high as can be safely reached. Always choose the shady side of posts to place bait as Little Fire Ants prefer to forage in shady locations.

Figure 9. A tube of Xstinguish™ housed in a caulking run and ready for use. The small amount of bait (coloured green) next to the nozzle is approximately the correct amount to apply in each spot.

Monitoring

Measuring the extent and density of the Little Fire Ant population during treatment is necessary to confirm treatment efficacy and determine treatment boundaries for subsequent rounds of treatment. Placement of vials baited with peanut butter as described in the delimiting section is a suitable way of collecting this information. The treatment area should be sampled at a density of approximately 30 baits a hectare. This is equivalent to a grid layout at spacing of approximately 15 metres between baits, or around 4 baits per residential allotment. Data should be collated against the waypoints recorded with the GPS.

Once the population has been reduced to isolated pockets, thorough visual monitoring is more appropriate. The surveyor should carefully inspect all likely habitat locations on each infested property and record those sites where Little Fire Ants are detected. These spots can be treated during the same operation, saving time and effort. Monitoring needs to be conducted regularly for two years after the last Little Fire Ant detection in order for area freedom to be confirmed.

Section 4. Suggested management schedule

Public awareness

A substantial public awareness programme was implemented in August 2007, including media releases, radio interviews presentations to affected communities and distribution of posters and flyers. This programme should be continued as resources permit. The message should focus on potential impacts and a description of the ant sufficient for reporting suspect ants at new locations. The public should be encouraged to report possible new outbreaks. Communities in affected areas should be consulted and informed of progress and communities adjoining affected areas should receive additional information by the way of one-on-one contact perhaps co-ordinated through the local council system.

National delimiting

The Pacific Invasive Ant Survey included training of over 100 government officers (chiefly from NAQIA and DAL) and intensive surveys at nine major ports in PNG. No new outbreaks were discovered during this survey. While there is a possibility that outbreaks beyond the East Sepik province do exist, it is not likely that they would be widespread. A request for continued vigilance by NAQIA and DAL staff, and awareness training for operational offices not previously exposed to ant surveillance is recommended to ensure no other infestations exist. Efforts should be concentrated in areas where major pathways from Bougaineville and East Sepik have been identified.,

Regional delimiting

The search for new infestations within East Sepik Province should be driven by public response to public awareness activities. All reports and results should be carefully documented in order that the extent of surveillance can be reported. A centrally located collection point for suspect samples will assist in the processing and collection of data. In addition to receiving samples of suspect ants, some reports will require a visit by suitably qualified staff to search for and collect suspect samples. Resources to accomplish this will need to be available.

Treatment

Kreer Heights

The infestation at Kreer Heights has been well documented and delimited. Affected residents have been comprehensively briefed and neighbouring communities have also been involved. Treatment began in August 2007 and the entire site has now been treated on three occasions. The infestation is now much reduced and limited to the drainage lines where heavier forest exists and some isolated hot-spots. Ongoing management of this site is recommended as follows:

1. Monthly monitoring by a trained person who will treat nests with paste bait as they are detected.
2. The entire site to be re-treated in August-October 2008
3. The site to be monitored using bait vials both before and after the August treatment

Bonihitaim, West Yangoru district

Little Fire Ants have been detected at this site but no treatment or delimiting has occurred. The community at Bonihitaim has requested assistance on several occasions. One issue here is that access to the site is difficult as no vehicular access is possible. Initial surveillance and treatment needs to be conducted by trained personnel, however, one or more persons living permanently in the village could be trained to conduct regular monitoring

and spot treatments. Recommended management of this site should include the following actions:

1. Delimiting surveillance over the infested area
2. Initial treatment with granular and paste baits in August-September
3. Follow-up post treatment monitoring
4. Additional treatment in October-November
5. Training local residents to conduct treatment on an ongoing basis
6. Six-monthly or annual follow-up visits for monitoring purposes

Angoram

A credible report of Little Fire Ants has been received from this area. This report should be followed up by a site visit to determine if Little Fire Ants are present. If the site is positive, a similar management strategy recommended for Bonihitaim is suggested.

References

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Appendix I. sample of public awareness poster prepared by the Secretariat of the Pacific Community.