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REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND RURAL DEVELOPMENT

DEPARTMENT OF WATER AFFAIRS

THE *SALVINIA MOLESTA* CONTROL PROJECT IN THE EASTERN CAPRIVI WETLANDS.

1996-1998 REPORT

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JANUARY 1999

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Figure 1 Hydrograph for the Zambezi River at Katima Mulilo from 1/9/96 to 30/8/97

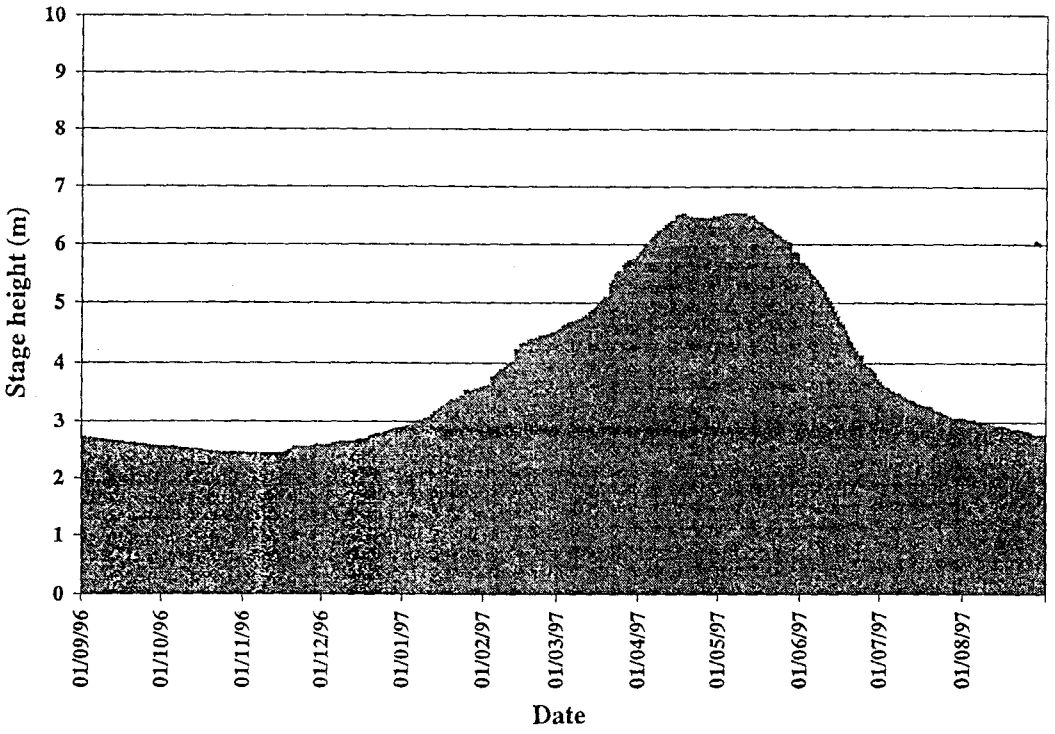
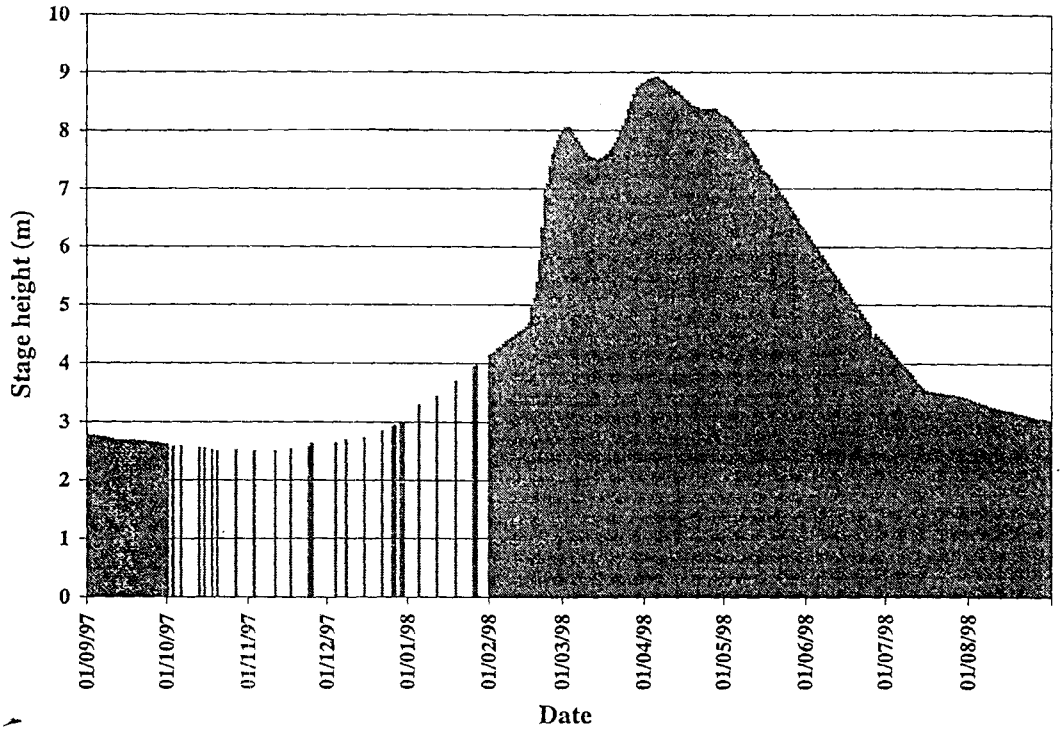


Figure 2 Hydrograph for the Zambezi River at Katima Mulilo from 1/9/97 to 30/8/98



1 INTRODUCTION

1.1 Background

The *Salvinia molesta* research and control programme has been run by the Research Division of the Department of Water Affairs since 1980. At the beginning of this program an entomologist, Mr CHG Schlettwein, was based with the project team in the eastern Caprivi area. He left this post in 1987 and the project team in Katima continued with the programme with direction from Windhoek but remained without direct supervision in the Caprivi. This situation continued until May 1996 when an aquatic ecologist, recruited through the British organisation Voluntary Service Overseas (VSO), was installed in the Caprivi. At this time a comprehensive survey was initiated to determine the current level of *Salvinia molesta* infestation in the eastern Caprivi floodplains and associated beetle densities. It was from this that recommendations for the future monitoring of *S. molesta* in the area were made (Taylor, 1997) and annual monitoring has been carried out since then.

1.2 Rationale

This report presents and discusses the results of the annual monitoring surveys of *S. molesta* carried out in the eastern Caprivi area (1996 – 1998 inclusive). Surveys were carried out in accordance with the methods set down in Taylor (1997) although some changes were made to the methods first used in 1996 – these are described in this report. Results from the three years have been combined and contrasted in order to give a more accurate picture of how *Salvinia* infestations changed in the area between May 1996 and the end of October 1998.

1.3 Hydrology 1996-1998

The surveys described in this report were carried out over a three-year period encompassing two rainy seasons, 1996-97 and 1997-98. Good rains fell in 96-97 (627.1mm Oct-Apr) for the 1st time in approximately six years (average of 521.4mm Oct-Apr) and caused inundation of pools and mulapos in the area that had been dry for sometime. The Zambezi river also rose to a height of 3.90m (Katima gauge plate) on the 11th May 1997 and the very far eastern part of the floodplain was inundated. Although rainfall was less in 97-98 (518.4mm Oct-Apr) flooding was extensive, partly as the area was till wet from rains and flooding in 96-97 but mostly as the river rose to 6.27m (Katima gauge plate) on 7th April 1998 due to good rainfall in the upper catchment area. At the height of the flood in April 1998, nearly the whole of the area to the north and east of the Ngoma road was completely inundated. Water pushed up the entire length of the Chobe River and even entered the bottom of Lake Liambezi (2.24m at Chobe Outflow on June 3rd 1998) which it hadn't done since 1988. The flooding had as big, if not bigger, an effect on the number and location of *Salvinia* infestations during this period as did the actions of the control agent.

2 MATERIALS AND METHODS

2.1 Survey methodology

A check sheet (see Appendices 5&6) was drawn-up in order to record standard details about all localities, the presence/absence of *S. molesta*, the status of the infestation as well as the number of controlling beetles, if any, associated with this.

The details recorded were:-

1. Area. The name given to the area of the eastern Caprivi in which the study locality was found.
2. Associated river. The name of the river associated with that particular part of the floodplain formation.
3. Locality. The name given to the specific waterbody by the local people.
4. Whether the site was wet or dry.
5. A latitude and longitude reading using Geographical Positioning System (GPS)
6. Habitat type. These were broad categories given to waterbodies occurring at a study locality and were defined in Taylor (1997). The habitats were main-channel, side-channel, backwater – open, backwater -flood channel, backwater – marsh and mulapo.
7. The status of the *S. molesta* mat at each locality was recorded on a scale from 1-5. The definitions of these categories are shown in Table 1.

Table 1 Categories of *S. molesta* mat coverage

Category	Description
1	Mat covering entire water surface
2	Mat/s covering some of water surface
3	*S. molesta* among other plants at edges
4	Only a few *S. molesta* plants
5	No *S. molesta*

8. Health of *S. molesta* plants. The health of *S. molesta* plants was assessed on a scale of 1 to 5, based on plant colour, for localities with a mat status 1-3 (shown in Table 2), these are shown in Table 2.

Table 2 Categories of plant health

Category	Description
1	All green and healthy
2	Mostly green and healthy
3	Half green, half brown
4	Mostly brown and sick
5	All brown and dying

9. Number of beetles. The number of beetles per 20 standard plants was assessed for localities with a mat status 1-3 (shown in Table 1).
10. Other comments
11. Photograph
12. Name of recorder

3 RESULTS

3.1 Details of localities

A total of 241 localities are now registered on the *S. molesta* database in Katima (see Appendix III) of which 192 (*circa* 80%) have had a habitat classification done and a GPS reading taken. 140 of these registered localities were visited in 1996, 181 in 1997 and 198 in 1998. These results are summarised in Table 3.

Table 3 Numbers of localities visited and numbers wet / dry

Year	Localities visited	% of total registered	No. wet	% total	No. dry	% total
1996	140	58%	110	79%	30	21%
1997	181	75%	148	82%	33	18%
1998	198	82%	168	85%	30	15%

3.2 Wet / Dry status

Of the 140 localities visited in 1996, 30 (21%) were dry and 110 (79%) were wet. In 1997, 33 (18%) of the 181 localities visited were dry and 148 (82%) were wet. In 1998, 30 (15%) of the 198 localities visited were dry and 168 (85%) were wet. These results are given in Appendix I and also summarised in Table 3. As *Salvinia* was only a threat in the wet localities, only they were considered further.

3.3 Mat status

Of the 110 wet localities visited in 1996, 40 (36%) were free of *S. molesta* and 70 (64%) had some form of *S. molesta* infestation. Of these 70 localities, 3 (4%) had a mat covering the entire water surface, 12 (17%) had a mat or mats covering some of the water surface and 39 (56%) had *S. molesta* plants at the edges among other indigenous fringing vegetation and 17 (23%) localities had a few isolated *S. molesta* plants only.

Of the 148 wet localities visited in 1997, 99 (66%) were free of *S. molesta* and 50 (34%) had some form of *S. molesta* infestation. Of these 50 localities, 4 (8%) had a mat covering the entire water surface, 6 (12%) had a mat or mats covering some of the water surface, 25 (50%) had *S. molesta* plants at the edges among other indigenous fringing vegetation and 15 (30%) localities had a few isolated *S. molesta* plants only.

Of the 168 wet localities visited in 1998, 134 (80%) were free of *S. molesta* and 34 (20%) had some form of *S. molesta* infestation. Of these 34 localities, 1 (3%) had a mat covering the entire water surface, 2 (6%) had a mat or mats covering some of the water surface, 22 (65%) had *S. molesta* plants at the edges among other indigenous fringing vegetation and 9 (26%) localities had a few isolated *S. molesta* plants only.

These results are given in Appendix I and summarised in Table 4.

Table 4 **Numbers of localities with and without weed and their mat status**

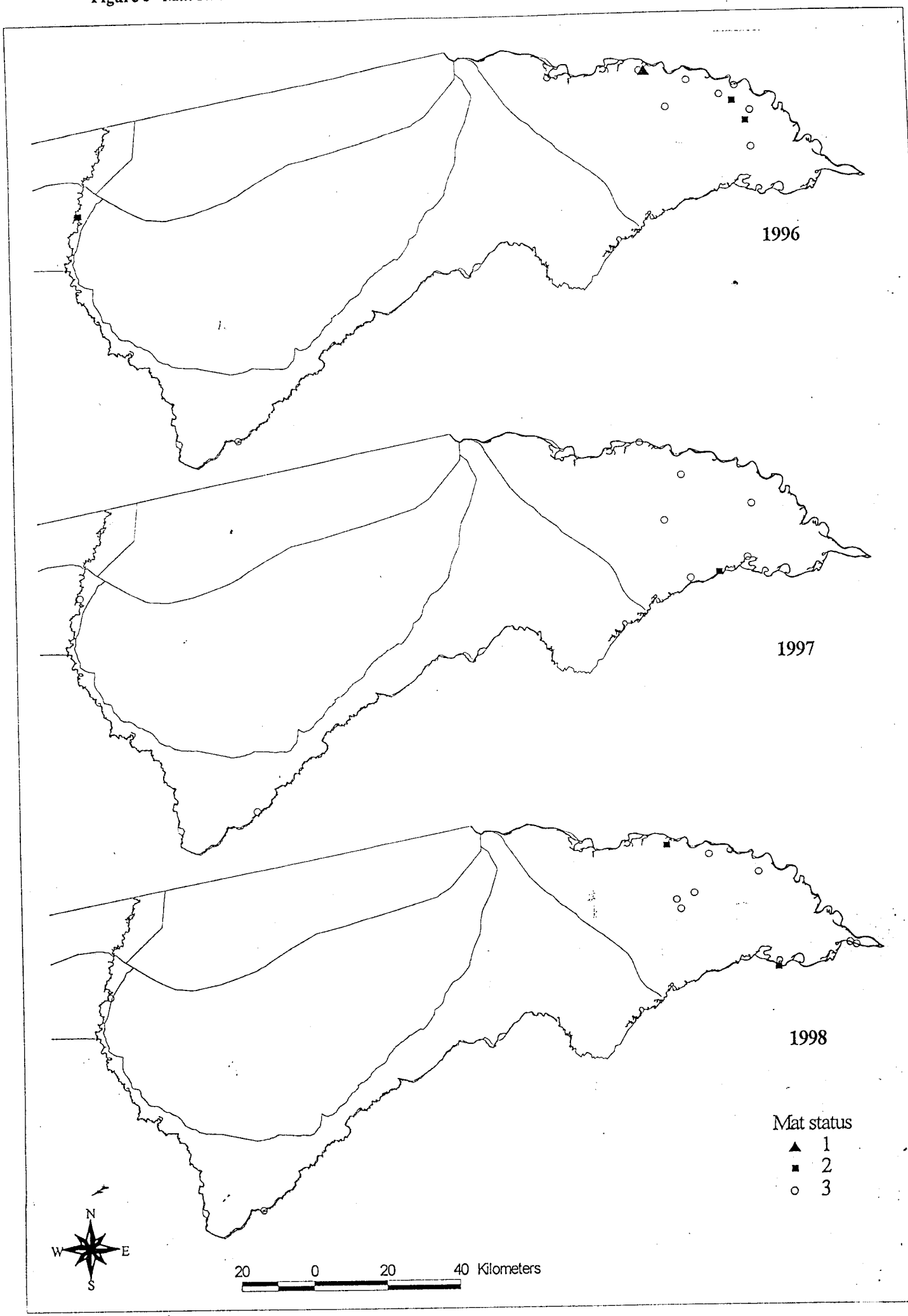
			Mat Status				
Year	Total without weed	Total with weed	1	2	3	4	5
1996	40	70	3	12	39	17	40
1997	99	50	4	6	25	15	99
1998	134	34	1	2	22	9	134

3.4 Beetle density

Beetles were only counted at localities with a mat status of 1 – 3 inclusive.

Of the 54 wet localities at which beetle numbers were counted in 1996, 13 (24%) had too few beetles to effect control. Of these 13 localities only one (8%), at Ilomba in the Malindi area, had a mat covering the entire water surface. Three, Kasaya and Mpukano in the Ikaba/Muzee area and Sundano in the Sangwali area, had a mat/or mats covering some of the water surface. The other nine, comprising Butala, Mukwiza, Musuma and Nyuni II in the Ikaba/Muzee area, Bwanunga in the Malindi area, Lisikili I in the Ngoma area, Lyadura in the Sangwali area and Kasaya III and Nsinde in the Schuckmannsberg area, had *S. molesta* among other plants at the edges only. In the remaining 41 (76%) localities there were sufficient beetles present to effect control of *S. molesta*.

Figure 3 Mat status for all sites with insufficient beetles to effect control in 1996, 1997 and 1998



Of the 35 wet localities at which beetle numbers were counted in 1997, 15 (43%) had too few beetles to effect control. Of these 15 localities only one (7%), at Old Safari camp II in the Sangwali area, had a mat covering the entire water surface. Two, Ihaha III in the Ihaha area and Isale in the Malindi area, had a mat/or mats covering some of the water surface. The other 12, comprising Chiwonzo in the Kasika area, Mutwalwizi I, Nasisangani and Vuvu in the Ihaha area, Mpukano in the Ikaba/Muzee area, Ihanza and Mishuwa in the Malindi area, Lupala island, Namushasha lodge and Sundano in the Sangwali area and Kakuni and Kasaya I in the Schuckmannsberg area, had *S. molesta* among other plants at the edges only. In the remaining 20 (57%) localities there were sufficient beetles present to effect control of *S. molesta*.

Of the 25 wet localities at which beetle numbers were counted in 1998, 15 (60%) had too few beetles to effect control. Of these 15 localities none had a mat covering the entire water surface. Two, a site in Chobe National Park and Ilomba in the Malindi area, had a mat/or mats covering some of the water surface. The other 13, comprising Sitwela in the Ikaba/Muzee area, channel off the Chobe, Kwachingo II, Namakuni and Safari village on and around Impalila island, Lyadura and Sitwa in the Sangwali area and Kasaya I, Kasaya II, Nkanza IIII, Nsinde and Nzobwe in the Schuckmannsberg area, had *S. molesta* among other plants at the edges only. In the remaining 10 (40%) localities there were sufficient beetles present to effect control of *S. molesta*.

These results are given in Appendix I, tabulated in Tables 5 & 6 and shown in Figure 1.

Table 5 **Localities with mat status 1-3, indicating the presence or absence of beetles**

Year	No. localities where beetles were counted (localities with mat status 1-3)	No. localities with enough beetles (1 or more per 20 standard plants)	No. localities without enough beetles (0 per 20 standard plants)
1996	54	41	13
1997	35	20	15
1998	25	10	15

3.5 Plant health

The plant health category was found to be of little use in the assessment of the severity of a *S. molesta* infestation. No results for this category were analysed or presented here. This section of the methodology has been removed from future surveys and a new check sheet drawn up (see Appendix 6).

Table 6 **Localities with mat status 1-3 and insufficient beetles 96-98**

Mat status	(Area) Name of affected locality 1996	1997	1998
1	(Malindi) Ilomba	(Sangwali) Old Safari camp II	
2	(Ikaba/Muzee) Kasaya Mpukano (Sangwali) Sundano	(Ihaha) Ihaha III (Malindi) Isale	(Malindi) Ilomba (Chobe NP) Site III
3	(Ikaba/Muzee) Butala Mukwiza Musuma Nyuni II (Malindi) Bwanunga (Ngoma) Lisikili I (Sangwali) Lyadura (Schuckmannsberg) Kasaya III Nsinde	(Kasika) Chiwonzo (Ihaha) Mutwalwizi I Nasisangani Vuvu (Ikaba/Muzee) Mpukano (Malindi) Ihanza Mishuwa (Sangwali) Lupala island Namushasha lodge Sundano (Schuckmannsberg) Kakuni Kasaya I	(Ikaba/Muzee) Sitwela (Impalila) channel off the Chobe Kwachingo II Namakuni Safari village (Sangwali) Lyadura Sitwa (Schuckmannsberg) Kasaya I Kasaya II Nkanza IV Nsinde Nzobwe

Table 7 List of localities proposed for beetle release

Area of Caprivi	Name of Localities	GPS co-ordinates
Ikaba Muzee	Nangwali	S1734651 E2458341
	Nantungu I	S1738852 E2504061
	Nsundwa	S1740113 E2454125
	Sitwela	S1736012 E2457483
Sangwali	Lianshulu lodge	S1808019 E2322781
	Lyadura	S1826001 E2343047
	Sundano	S1751910 E2319920
Schuckmannsberg	Kasaya I	S1741557 E2446060
	Kasaya II	S1740126 E2445450
	Mazanga	S1744377 E2444397
	Nesanza	S1733560 E2451550
	Nkanza IV	S1732672 E2453420
	Nsinde	S1733160 E2450250
	Nzobwe	S1739138 E2448074
Malindi	Ilomba	S1731656 E2444132
	Isale	S1731618 E2444202

3.6 Beetle releases

No releases of beetles were made during the period of this report. This was due to the fact that the beetle appeared to be widespread and doing a good job. Based on the analysis of the data contained in this report recommendations are made for the release of beetles, the sites at which releases are recommended are listed in Table 7 and shown in Figure 2.

3.7 Localities visited in every year, 1996-1998 inclusive

A total of 73 localities (see Appendix II) were visited in all three years of surveying using the new methodologies. Results from these 73 localities are presented here as indicators of the general changes observed in *S. molesta* infestations throughout the three-year period.

Of these 73 localities, 12 (16%) never had any *S. molesta* present. 46 (63%) improved, i.e. went from some form of infestation to being free of *S. molesta*, 3 (5%) had the same amount in each year and the remaining 12 (16%) got worse, i.e. went from being clear or with little weed to having some weed or a heavy infestation. Release of beetles is now recommended at these sites. Data from these sites are shown in Tables 8 and in Figure 3.

Table 8 Summary of data from 73 localities visited annually from 1996 - 1998

Status of *S. molesta* 96-98	Number of localities	Percentage of total
Never any weed	12	16
Improvement	46	63
Same amount each year	3	5
Deterioration	12	16

Figure 4 Sites at which beetle releases are proposed for 1999

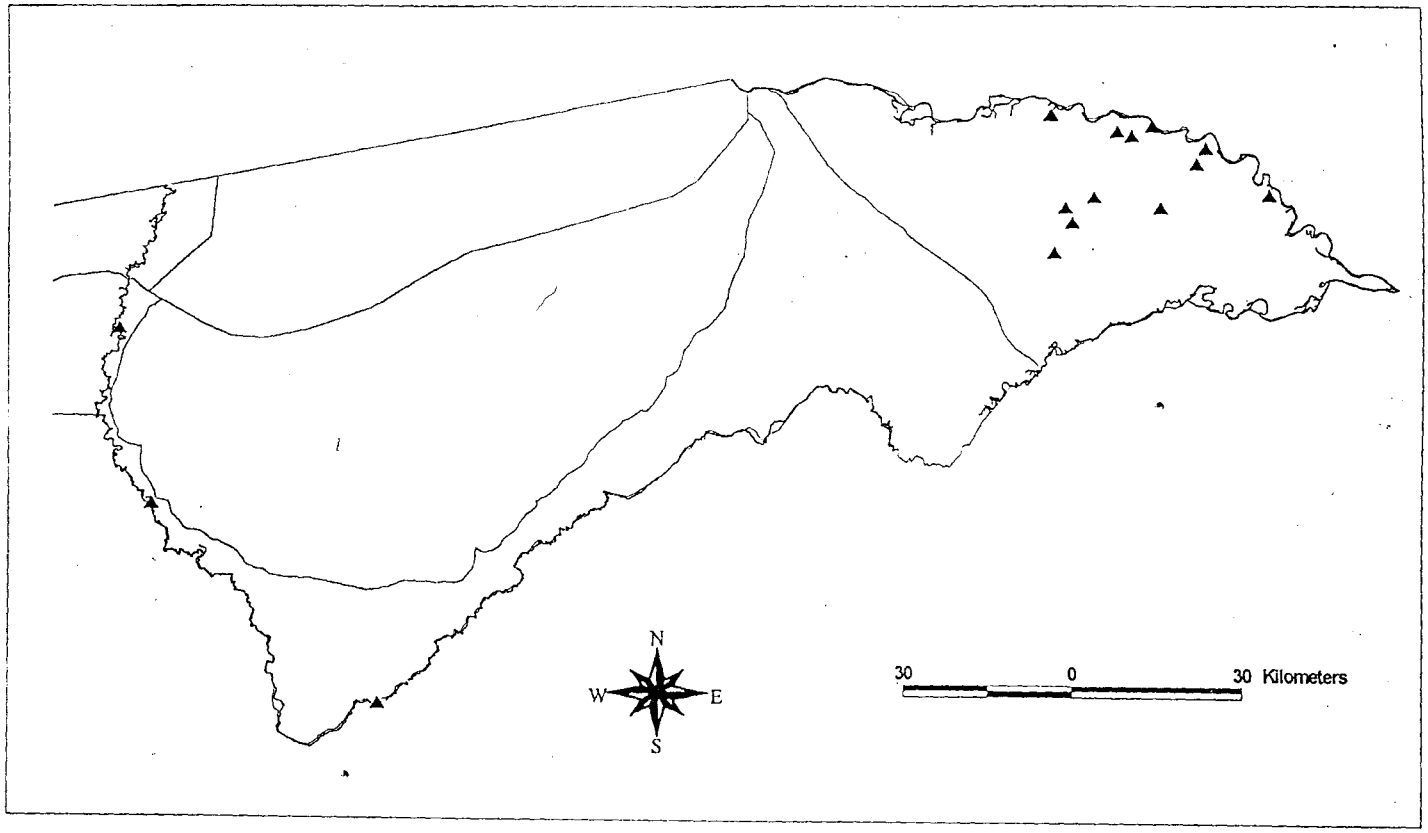
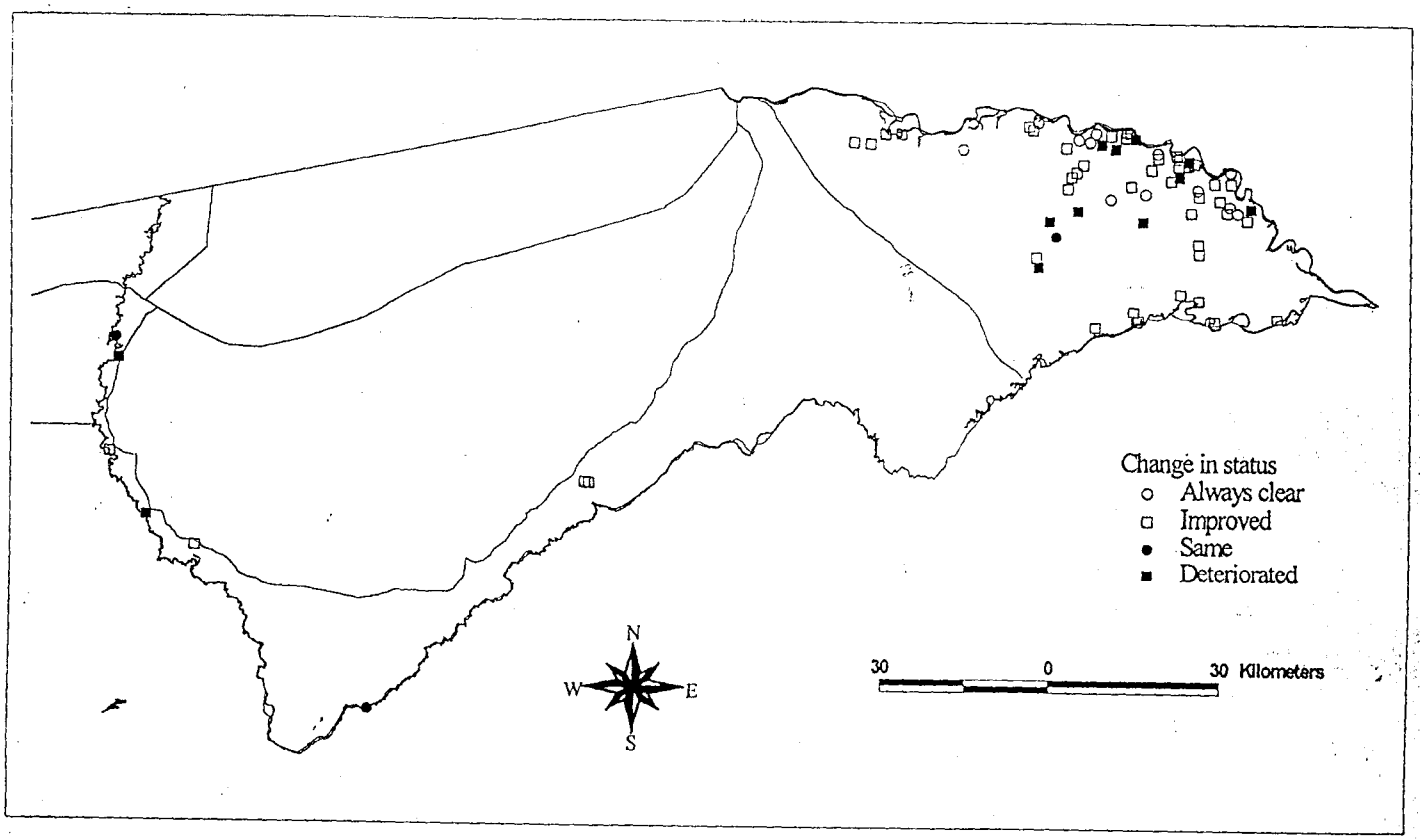


Figure 5 73 sites visited in all three years, indicating how *Salvinia molesta* infestation changed



4 DISCUSSION

4.1 Current situation

The number of localities registered as currently having, or having had, a *S. molesta* infestation has now risen to 241 in the eastern Caprivi area. It is unlikely that many more localities will be added to this database but the *S. molesta* control section is always vigilant for and responsive to reports of new infestations. 80% of these localities have been visited in the last three years and had a GPS reading taken which will enable continuation of the monitoring, even if the current *S. molesta* control team should change.

Changes in the way in which *S. molesta* infestations were assessed, e.g. by moving away from counting leaf and bud damage to the current quick mat status assessment and beetle count, has led to an increasing number of localities being visited each year. This rose from 140 in 1996 to 198 in 1998 with the new methodology thus allowing the control team to cover a larger area and more localities and still obtain useful information.

Concomitant with the increasing number of localities visited there has been a reduction in the percentage of the number of dry localities. Obviously no new dry localities have been added as such places would be free of *S. molesta*, but there was a slight reduction in the number which were dry and an increase in the overall number visited. There was a corresponding increase in the percentage of wet localities. This resulted from a combination of an increase in the number of localities visited, from heavy rain and reasonable flooding in 1997 and from the large flood experienced in 1998. There did not appear to be any direct correlation between the time of year in which sites were visited and whether they were wet or dry, probably due to the relatively small data set. There also did not appear to be any correlation between the geographical location of sites and their wet/dry status. It was, however, apparent that sites closer to the Zambezi, particularly in the far eastern part of the Caprivi, were flooded at certain times of year. Generally speaking, flooding made whole area impossible to reach rather than just inundating a few previously dry locations. This was true until 1997/98 flood during which sites that had been dry for many years were inundated and remained wet until long after the actual flood had receded.

The number and seriousness of *S. molesta* infestations decreased in the eastern Caprivi between 1996 and 1998. There was a drop in the overall number of localities with weed, from 70 to 34 and in each mat status category (4 to 1 in category one, 12 to 2 in two, 39 to 22 in three and 17 to 9 in four). There was a concomitant rise in the number of localities with no weed, from 40 to 134. The decrease in the amount of weed was thought to be a result of the combined effects of the biological control programme and of the increasingly extensive flooding experienced in the Caprivi in 1997 and '98. The former, leading to a reduction in the quantity of weed by physical damage and the latter, literally washing the infestations away.

With the decrease in the number of serious *S. molesta* infestations there was a corresponding decrease in the number of localities at which beetles were counted. At the sites where counts were made, there was a drop in the number that had enough beetles to affect control and although the number at which there were insufficient beetles remained

almost static (13 in 1996, 15 in '97 and '98), this became an increasingly larger percentage of the total, rising from 24% to 60% in the three years of monitoring. This apparent drop in beetle coverage of *S. molesta* infestations was probably directly related to, and compounded by, the same factors that reduced the quantity of weed in the area. The effect of the beetles on *Salvinia molesta* infestations was to make it sink and rising floodwaters washed plants away. Both actions led to a reduction in the quantity of weed available and thus to direct reduction in beetle numbers, in that they were also washed away or sank with the weed they were feeding on. A reduction in the amount of weed in the floodplain would also have resulted in an indirect reduction in beetle numbers due to a loss in the number of potential feeding and breeding sites.

Results from the 73 sites visited in all three years showed the same. Combining and using three years worth of data, as was done in this report, appeared to be a very good way of assessing overall changes in the situation and in accurately making decisions for the control project, e.g. in determining where beetles should be released. Using long-term information in this way is recommended. Decisions made from only a single or two years worth of data are likely to be less reliable, e.g. releasing beetles at a locality to find that the *S. molesta* there is immediately washed away by flooding.

The three year survey has provided an up to date record of the extent of *S. molesta* infestation in the eastern Caprivi area as well as its potential for spread. This has shown that although *S. molesta* still exists in the eastern Caprivi floodplain the level of infestation is generally low and appears to be falling. Despite the apparent reduction in the number of beetles on infestations, many localities with weed still had an appropriate number of beetles to prevent uncontrolled plant growth and the beetle was generally widespread. With further releases to be made in the near future (proposed for after the flood in 1999) the number of beetles in the area will increase.

Salvinia molesta is a permanent feature of the eastern Caprivi floodplain ecology, as is its controlling agent *Cyrtobagous salviniae*. Total eradication of this plant is impossible considering the nature and extent of its infestation and it seems unlikely at this time that either the plant or the beetle will ever disappear from the system. The most likely scenario would appear to be that both will exist at a low level for the foreseeable future.

Monitoring using the current methodologies and to the timetable drawn up in Taylor (1997) should continue, the data collected should be added to the established database and the same, or similar, analysis as was done for this report carried out every three years and recommendations made.

4.2 Factors that may affect the current situation

In the 1996 report it was suggested that one of the factors which may adversely affect the number of *S. molesta* infestations might be widespread flooding. It was suggested that large floods may bring *S. molesta* plants to previously clear sites and that the nutrient release experienced during flooding would feed these plants. In fact the flooding experienced in 1998 had the opposite effect and removed a large quantity of weed. Many newly inundated areas were free of weed, as were previously wet localities that had had weed before the floodwaters arrived. The nature of the flooding experienced in the Caprivi varies, however, from year to year and different intensities and duration of floods may have

different effects on *Salvinia molesta* infestations than those observed in 1998. For example a slowly rising flood, that penetrates a long way into the floodplain and stays for an extended period may spread weed more effectively than a fast rising flood that recedes quickly and thus washes weed away with it.

It was also suggested that increasing agriculture, and in particular the combined effects of insecticides and fertilisers, may cause a deterioration in the situation, i.e. an increased growth rate of *S. molesta* and a decrease in the numbers of beetles. This is still a real threat and provides the greatest incentive to continue with monitoring.

4.3 Community awareness training and involvement

Taylor (1997) suggested the establishment of community involvement in the *S. molesta* control project. This was to a fairly high level of involvement with the communities trained to actually make assessments of infestations, count beetles and fill in data return forms.

After consultation with other organisers of various other community-based projects it was decided that the "return rate" to the community would be too high. That is to say that community mobilisers would have to be visited monthly in order to collect the forms and encourage continuing participation in the project. At such a high return rate one of the objects of using the community, i.e. to reduce travelling costs and time spent in the field, would be almost entirely negated.

For this reason, it is suggested that the manner in which the community is involved be changed, but not abandoned: Community involvement is still vital to the success of this and indeed any project in communal areas such as the Caprivi. Meetings should be arranged with tribal authorities across the eastern Caprivi area and the biological control project described. Apologies would need to be made for having not approached communities before about this project, but once that has been done help can be sought. The *Salvinia* control team needs to encourage members of the public to report any *S. molesta* infestations, particularly new ones, anywhere in the area to the office in Katima so that an investigation can be carried out. These sites can then be added to the list of routinely monitored sites and releases of beetles made where necessary. A representative of the control team should follow up the report by visiting the village that reported the infestation, inspect the infestation and give feedback.

This work should be initiated as soon as possible and should start with the tribal authority in the Bukalo area as this is best known to the control team staff. Once the format for the presentation has been tested and perhaps modified other authorities in the area could also be approached.

4.4 International and regional co-operation

Staff from the Departments of Water Affairs in Katima, Namibia and Maun, Botswana carried out two joint surveys of *S. molesta* infestations in the Chobe River in 1996 and a further three during the flooding in 1998. Such joint co-operation not only allowed a larger number of sites to be covered than usual but also an exchange of information about the latest developments in the control projects in each country to take place.

People working on the control of both *Salvinia* and other exotic weeds, e.g. *Eichhornia crassipes* and *Pistia stratiotes* in the region, e.g. Zimbabwe, Zambia and South Africa were contacted about a possible meeting to discuss control projects in these countries. Efforts were also made to reach other international colleagues, successfully in the case of Australia but unfortunately unsuccessfully in the case of Kenya and Uganda. Contact details for such other researchers are given in Appendix IV.

The possibility of holding a workshop or conference in Katima (possibly at Lianshulu lodge) and hosted by the Department of Water Affairs was discussed among such researchers and many people expressed an interest in attending. A tentative request for funding was put to The World Conservation Organisation's (IUCN) "Zambezi Wetlands Conservation and Resource Utilisation Project" staff officer in Katima and should now be followed up with an official request for funds to enable DWA to host such a conference or workshop.

5 RECOMMENDATIONS

It is recommended that:

1. This report is accepted in principle.
2. This report, and the one of Taylor (1997), is sent to all members of the SADC sub-committee for control of aquatic weeds and water quality.
3. Beetles are released at the sites listed in Table 7 by August 1999.
4. Regular monitoring of *Salvinia molesta* infestation continues based on the programme outlined in this report and in Taylor (1997) in order to maintain the continuity established over the last three years.
5. That an approach be made to local media, politicians and tribal authorities to explain the project and encourage greater involvement in the work and this is started in the Bukalo area.
6. Funding be sought from IUCN to hold an international "Control of aquatic weeds" conference/workshop in the Caprivi.
7. Co-operation with other similar weed control research projects be maintained (e.g. with Botswana) and established with neighbouring countries (particularly Zambia).
8. Annual joint weed surveys and meetings continue with DWA Botswana and be expanded to include parties from other similarly affected countries both regional and international as and when possible.

6 APPROVAL OF RECOMMENDATIONS

This report is approved for submission to the Director: Resource Management.

Dr. JS de Wet

DEPUTY DIRECTOR: WATER ENVIRONMENT

DATE: 12/2/99

I support the recommendations contained in this report and submit it the Deputy Permanent Secretary for the Ministry of Agriculture, Water and Rural Development.

Mr. P. Heyns

DIRECTOR: RESOURCE MANAGEMENT

DATE: 16/02/99

The recommendations in this report are approved / ~~not approved~~

Mr. K. Kahimire

DEPUTY PERMANENT SECRETARY, MAWRD

DATE: 22/02/1999

7 REFERENCES

Taylor, E.D. (1997) The status of *Salvinia molesta* infestation in the eastern Caprivi wetlands – 1996 report, update and recommendations. DWA Report WE/97/1, 16pp

8 ACKNOWLEDGEMENTS

This work would not have been possible without the help, advice and dedication of staff in the Caprivi and my heartfelt thanks go to Mr. Vincent Simana and Mr. Alfred Makumbi and Mr. Richard Siloiso in that respect. Thanks are also due to Dr. Nicholas Clarke for his ideas and initial input into the project prior to my arrival and to Shirley Bethune for her comments on the manuscript and general input into the project. I would especially like to

thank Kevin Roberts and Shirley Bethune for their friendship and generosity throughout my time in Namibia.

It has been a pleasure working with everyone in the Department of Water Affairs and although too many to mention by name my thanks goes equally to all.

Compiled by Dr. Eliot Taylor

APPENDIX I

1996 Salvinia data

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Far East/Kasika	Ijambwe	7	W	3	2	8
Far East/Kasika	Ikaba	7	W	5	N/A	N/C
Far East/Kasika	Kabulabula	7	W	4	N/A	N/C
Far East/Kasika	Kasika 1	7	W	4	1	N/C
Far East/Kasika	Lyankunga	8	W	5	N/A	N/C
Far East/Kasika	Mbasi	8	W	5	N/A	N/C
Far East/Kasika	Sigwe	8	W	5	N/A	N/C
Ihaha	Chisambilo	7	W	5	N/A	N/C
Ihaha	Ihaha 1	7	W	5	N/A	N/C
Ihaha	Ihaha 2	7	W	5	N/A	N/C
Ihaha	Ihaha 3	7	W	3	1	4
Ihaha	Ishuwa	7	D	5	N/A	N/C
Ihaha	Kachelwa	7	W	5	N/A	N/C
Ihaha	Mutwalwizi 1	7	W	3	3	4
Ihaha	Mutwalwizi 2	7	W	3	4	20
Ihaha	Mutwalwizi 3	7	W	4	N/A	N/C
Ihaha	Namasesi	7	W	5	N/A	N/C
Ihaha	Nasisangani	7	W	5	N/A	N/C
Ikaba/Muzee	Bulila	8	W	3	4	6
Ikaba/Muzee	Bukuzu		W	2	4	4
Ikaba/Muzee	Butala	9	W	3	1	0
Ikaba/Muzee	Chitwela (Sitwela)	8	W	5	N/A	N/C
Ikaba/Muzee	Jimu	8	W	2	1	N/C
Ikaba/Muzee	Jojo	8	W	5	N/A	N/C
Ikaba/Muzee	Kakangala	8	W	3	4	1
Ikaba/Muzee	Kasaya	9	W	2	1	0
Ikaba/Muzee	Kasaya Lake	9	W	4	N/A	N/C
Ikaba/Muzee	Kasumba	9	W	3	2	1
Ikaba/Muzee	Kazuka	8	W	5	N/A	N/C
Ikaba/Muzee	Matonsu	8	W	5	N/A	N/C
Ikaba/Muzee	Matowa	9	W	5	N/A	N/C
Ikaba/Muzee	Mpukano	8	W	2	1	0
Ikaba/Muzee	Mukwiza	8	W	3	4	0
Ikaba/Muzee	Munono	9	W	5	N/A	N/C
Ikaba/Muzee	Musahamule	9	W	2	2	1
Ikaba/Muzee	Musekezi	9	W	2	2	2
Ikaba/Muzee	Musuma	8	W	3	1	0
Ikaba/Muzee	Muzee	8	W	1	3	1
Ikaba/Muzee	Namakuni	9	W	5	N/A	N/C
Ikaba/Muzee	Nangwali	9	W	2	2	6
Ikaba/Muzee	Nangwena	9	W	5	N/A	N/C
Ikaba/Muzee	Nantungu 1	8	W	3	2	2
Ikaba/Muzee	Nantungu 2	8	W	4	N/A	N/C
Ikaba/Muzee	Nantungu 3	8	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Ikaba/Muzee	Nsundwa	9	W	5	N/A	N/C
Ikaba/Muzee	Nyuni 1	9	W	3	3	2
Ikaba/Muzee	Nyuni 2	9	W	3	3	0
Ikaba/Muzee	Sichamputu	9	W	5	N/A	N/C
Ikaba/Muzee	Sigaba	8	W	3	1	1
Ikaba/Muzee	Sitwela	9	W	5	N/A	N/C
Ikaba/Muzee	Tembamuhwe	9	W	3	1	2
Malindi	Bulyankala	8	W	4	2	1
Malindi	Bwanunga	8	W	3	2	0
Malindi	Ihanza	8	D	5	N/A	N/C
Malindi	Ilomba	8	W	1	1	0
Malindi	Izanza	8	D	5	N/A	N/C
Malindi	Kabulanonzi	8	W	5	N/A	N/C
Malindi	Kaloyawe	8	D	5	N/A	N/C
Malindi	Kashelana	8	W	3	3	2
Malindi	Kasika	8	W	5	N/A	N/C
Malindi	Kasuzu	8	W	2	1	3
Malindi	Luwu	8	W	5	N/A	N/C
Malindi	Lyamato	8	D	5	N/A	N/C
Malindi	Lyamisika	8	D	5	N/A	N/C
Malindi	Manyonga	8	W	3	2	2
Malindi	Mishushu	8	W	2	2	N/C
Malindi	Mpunga	8	W	3	4	1
Malindi	Mutwi	8	W	2	1	1
Malindi	Namalweza	8	W	1	1	1
Malindi	Namasimanwe	8	D	5	N/A	N/C
Malindi	Nambao	8	D	5	N/A	N/C
Malindi	Nambula	8	D	5	N/A	N/C
Malindi	Nanombe	8	W	5	N/A	N/C
Malindi	Ndulwabayenda	8	D	5	N/A	N/C
Malindi	Nkwansanga	8	D	5	N/A	N/C
Malindi	Numwa	8	W	4	2	N/C
Malindi	Sihompwe	8	D	5	N/A	N/C
Malindi	Simpuho	8	W	5	N/A	N/C
Malindi	Sipopa	8	D	5	N/A	N/C
Malindi	Sisao (Chisao)	8	W	5	N/A	N/C
Malindi	Sisinta	8	W	5	N/A	N/C
Ngoma	Kalembeza	7	W	4	N/A	N/C
Ngoma	Lisikili 1	5	W	3	1	0
Ngoma	Lisikili 2	5	W	3	3	2
Ngoma	Lisikili 3	5	W	3	2	12
Ngoma	Munambeza	8	W	5	N/A	N/C
Ngoma	Sinda	8	W	5	N/A	N/C
Sangwali	Balelwa camp	5	W	3	2	4
Sangwali	Bathobaja	5	D	5	N/A	N/C
Sangwali	Chinchimane	5	D	5	N/A	N/C
Sangwali	Halupati	5	D	5	N/A	N/C
Sangwali	Kanaboyo	5	D	5	N/A	N/C
Sangwali	Kongola	5	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Sangwali	Lianshulu 2 Lodge	5	W	5	N/A	N/C
Sangwali	Linyanti 1	5	W	4	N/A	N/C
Sangwali	Linyanti 2	5	W	4	N/A	N/C
Sangwali	Lizauli	5	W	3	1	3
Sangwali	Lupala Island	5	W	4	N/A	N/C
Sangwali	Lyadura	5	W	3	2	0
Sangwali	Mwanamujwakayi	5	D	5	N/A	N/C
Sangwali	Nakatwa	5	W	3	4	1
Sangwali	Namushasha Lodge	5	W	5	N/A	N/C
Sangwali	Nkasa Island	5	W	4	N/A	N/C
Sangwali	Police camp	5	D	5	N/A	N/C
Sangwali	Sangwali	5	D	5	N/A	N/C
Sangwali	Shishika	5	W	4	N/A	N/C
Sangwali	Sitwa	5	W	3	1	9
Sangwali	Sundano	5	W	2	1	0
Sangwali	Vuvu camp	5	W	4	N/A	N/C
Sangwali	Xhoko 1	5	D	5	N/A	N/C
Sangwali	Xhoko 2	5	D	5	N/A	N/C
Schuckmannsburg	Chikanjuli	7	D	5	N/A	N/C
Schuckmannsburg	Ihwiza	7	D	5	N/A	N/C
Schuckmannsburg	Kakuni	7	W	3	1	2
Schuckmannsburg	Kasaya 1	7	W	3	1	1
Schuckmannsburg	Kasaya 2	7	W	4	4	N/C
Schuckmannsburg	Kasaya 3	7	W	3	1	0
Schuckmannsburg	Kasika	7	W	3	3	1
Schuckmannsburg	Lusese	7	W	5	N/A	N/C
Schuckmannsburg	Lutanga	7	W	3	2	10
Schuckmannsburg	Lyansenzi	7	D	5	N/A	N/C
Schuckmannsburg	Malaha	7	W	3	3	3
Schuckmannsburg	Mazanga	7	W	5	N/A	N/C
Schuckmannsburg	Mbile	7	W	5	N/A	N/C
Schuckmannsburg	Mbumwe	7	D	5	N/A	N/C
Schuckmannsburg	Musungi	7	W	3	1	2
Schuckmannsburg	Mwamba	7	W	5	N/A	N/C
Schuckmannsberg	Nakabungo	7	D	5	N/A	N/C
Schuckmannsburg	Nelulwe	7	W	5	N/A	N/C
Schuckmannsburg	Nesanza	7	W	2	1	3
Schuckmannsburg	Nkanza 1	7	W	4	N/A	N/C
Schuckmannsburg	Nkanza 2	7	W	3	1	5
Schuckmannsburg	Nkanza 3	7	W	3	N/A	N/C
Schuckmannsburg	Nkanza 4	7	W	3	N/A	N/C
Schuckmannsburg	Nsanzwe	7	W	5	N/A	N/C
Schuckmannsburg	Nsinde	7	W	3	4	0
Schuckmannsburg	Ntiyentiye	7	D	5	N/A	N/C
Schuckmannsburg	Nzobwe	7	W	3	1	1
Schuckmannsburg	Sibilo	7	W	4	3	N/C
Schuckmannsburg	Sifwamcyi	7	D	5	N/A	N/C
Schuckmannsburg	Sikalume	7	D	5	N/A	N/C

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Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Far East/Kasika	Che e	10	W	5	N/A	N/C
Far East/Kasika	Chiwonzo	10	W	3	2	0
Far East/Kasika	Ibilibinzi	10	W	5	N/A	N/C
Far East/Kasika	Ibolokwa	10	W	5	N/A	N/C
Far East/Kasika	Ijambwe	10	W	3	4	4
Far East/Kasika	Ikaba	10	W	1	4	10
Far East/Kasika	Ikota	10	W	5	N/A	N/C
Far East/Kasika	Impalila Island	7	W	3	2	5
Far East/Kasika	Kabulabula	10	W	3	4	11
Far East/Kasika	Kasika 1	10	W	5	N/A	N/C
Far East/Kasika	Kasika 2	10	W	5	N/A	N/C
Far East/Kasika	Kasika 3	10	W	5	N/A	N/C
Far East/Kasika	Kaulu	10	W	5	N/A	N/C
Far East/Kasika	Lyankunga	10	W	5	N/A	N/C
Far East/Kasika	Makoma	10	W	5	N/A	N/C
Far East/Kasika	Mazizi	10	W	5	N/A	N/C
Far East/Kasika	Mbalasinte	10	W	5	N/A	N/C
Far East/Kasika	Mbasi	10	W	3	3	10
Far East/Kasika	Mbowe	10	W	3	4	8
Far East/Kasika	Nansimba	10	W	5	N/A	N/C
Far East/Kasika	Samba	10	W	5	N/A	N/C
Far East/Kasika	Sigwe	10	W	5	N/A	N/C
Far East/Kasika	Zambabwiza	10	W	5	N/A	N/C
Ihaha	Ihaha 1	7	W	3	1	3
Ihaha	Ihaha 2	5	W	3	1	6
Ihaha	Ihaha 3	5	W	2	2	0
Ihaha	Mutwalwizi 1	5	W	3	2	0
Ihaha	Nasisangani	5	W	3	1	0
Ihaha	Ndeleki	7	W	5	N/A	N/C
Ihaha	Vuvu	5	W	3	3	0
Ikaba/Muzee	Bulila	11	W	5	N/A	N/C
Ikaba/Muzee	Bukuzu	11	W	5	N/A	N/C
Ikaba/Muzee	Butala	11	W	5	N/A	N/C
Ikaba/Muzee	Chabantuntu	11	W	5	N/A	N/C
Ikaba/Muzee	Jimu	11	W	5	N/A	N/C
Ikaba/Muzee	Jojo	11	W	5	N/A	N/C
Ikaba/Muzee	Kakangala	11	W	5	N/A	N/C
Ikaba/Muzee	Kasaya	11	W	5	N/A	N/C
Ikaba/Muzee	Kasaya Lake	11	W	5	N/A	N/C
Ikaba/Muzee	Kasumba	11	W	4	4	10
Ikaba/Muzee	Katanga	11	W	4	5	N/C
Ikaba/Muzee	Kazuka	11	W	5	N/A	N/C
Ikaba/Muzee	Matonsu	11	W	5	N/A	N/C
Ikaba/Muzee	Matowa	11	W	5	N/A	N/C
Ikaba/Muzee	Mpukano	11	W	3	1	0
Ikaba/Muzee	Mukwiza	11	W	5	N/A	N/C
Ikaba/Muzee	Munimandombe	11	W	5	N/A	N/C
Ikaba/Muzee	Munono	11	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Ikaba/Muzee	Musahamule	11	W	5	N/A	N/C
Ikaba/Muzee	Musekezi	11	W	5	N/A	N/C
Ikaba/Muzee	Musuma	11	W	5	N/A	N/C
Ikaba/Muzee	Muzee	11	W	5	N/A	N/C
Ikaba/Muzee	Namakuni	11	W	5	N/A	N/C
Ikaba/Muzee	Nanchinga	11	W	5	N/A	N/C
Ikaba/Muzee	Nangwali	11	W	5	N/A	N/C
Ikaba/Muzee	Nangwena	11	W	5	N/A	N/C
Ikaba/Muzee	Nantungu 1	11	W	5	N/A	N/C
Ikaba/Muzee	Nantungu 2	11	W	5	N/A	N/C
Ikaba/Muzee	Nantungu 3	11	W	5	N/A	N/C
Ikaba/Muzee	Nsundwa	11	W	5	N/A	N/C
Ikaba/Muzee	Nyuni 1	11	W	5	N/A	N/C
Ikaba/Muzee	Nyuni 2	11	W	5	N/A	N/C
Ikaba/Muzee	Sitwela	11	W	5	N/A	N/C
Ikaba/Muzee	Tembamuhwe	11	W	4	1	N/C
Malindi	Bungi	3	W	5	N/A	N/C
Malindi	Bwanunga	3	W	5	N/A	N/C
Malindi	Ihanza	3	W	3	3	0
Malindi	Isale	3	W	2	1	0
Malindi	Kabulanonzi	3	D	5	N/A	N/C
Malindi	Kaonzo	3	D	5	N/A	N/C
Malindi	Luwu	3	D	5	N/A	N/C
Malindi	Lyamato	3	W	4	3	N/C
Malindi	Lyamisika	3	W	5	N/A	N/C
Malindi	Manyonga	3	D	5	N/A	N/C
Malindi	Mishushu	3	W	3	2	0
Malindi	Namalweza	3	W	5	N/A	N/C
Malindi	Namasimanwe	3	W	5	N/A	N/C
Malindi	Nambula	3	D	5	N/A	N/C
Malindi	Nanombe	3	W	5	N/A	N/C
Malindi	Ndulwabayenda	3	W	5	N/A	N/C
Malindi	Ngolwa	3	W	5	N/A	N/C
Malindi	Nkwansanga	3	W	5	N/A	N/C
Malindi	Numwa	3	D	5	N/A	N/C
Malindi	Sihompwe	3	D	5	N/A	N/C
Malindi	Simpuho	3	D	5	N/A	N/C
Malindi	Sipopa	3	W	5	N/A	N/C
Malindi	Sisao (Chisao)	3	W	5	N/A	N/C
Malindi	Tumahule	3	W	5	N/A	N/C
Ngoma	Chisekechabanyayi	2	D	5	N/A	N/C
Ngoma	Chisubasuba	2	D	5	N/A	N/C
Ngoma	Ilonga	2	D	5	N/A	N/C
Ngoma	Kabbe	2	W	5	N/A	N/C
Ngoma	Kalembeza	2	W	5	N/A	N/C
Ngoma	Kanyundulelo	2	W	5	N/A	N/C
Ngoma	Lisikili 1	2	W	4	N/A	N/C
Ngoma	Lisikili 2	2	W	5	N/A	N/C
Ngoma	Lisikili 3	2	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Ngoma	Mahundu 1	2	W	5	N/A	N/C
Ngoma	Mahundu 2	2	D	5	N/A	N/C
Ngoma	Mahundu 3	2	D	5	N/A	N/C
Ngoma	Mahundu 4	2	D	5	N/A	N/C
Ngoma	Mahundu 5	2	D	5	N/A	N/C
Ngoma	Maningimanzi 1	2	D	5	N/A	N/C
Ngoma	Maningimanzi 2	2	W	3	2	N/C
Ngoma	Maningimanzi 3	2	W	5	N/A	N/C
Ngoma	Masika	2	W	5	N/A	N/C
Ngoma	Munambeza	2	D	5	N/A	N/C
Ngoma	Musuma	2	W	5	N/A	N/C
Ngoma	Mutikitila	2	W	5	N/A	N/C
Ngoma	Muyako	2	D	5	N/A	N/C
Ngoma	Nangoma	2	D	5	N/A	N/C
Ngoma	Ngoma 2 (Chobe)	2	W	5	N/A	N/C
Ngoma	Ngoma 3 (bridge)	2	W	5	N/A	N/C
Ngoma	Nkuzwe	2	W	5	N/A	N/C
Ngoma	Sikabila	2	W	5	N/A	N/C
Ngoma	Sinda	2	D	5	N/A	N/C
Sangwali	Bathobaja	2	W	4	N/A	N/C
Sangwali	Chinchimane	2	D	5	N/A	N/C
Sangwali	Halupati	2	D	5	N/A	N/C
Sangwali	Kanaboyo	2	D	5	N/A	N/C
Sangwali	Kongola	2	D	5	N/A	N/C
Sangwali	Lianshulu 1	5	W	4	N/A	N/C
Sangwali	Lianshulu 2 Lodge	5	W	3	1	1
Sangwali	Linyanti 1	2	W	4	N/A	N/C
Sangwali	Linyanti 2	2	W	5	N/A	N/C
Sangwali	Lizauli	2	W	5	N/A	N/C
Sangwali	Lupala Island	2	W	3	1	0
Sangwali	Lupala (main)	10	W	4	2	0
Sangwali	Lyadura	7	W	3	3	6
Sangwali	Malengalenga	2	W	4	1	N/C
Sangwali	Mawe	2	W	2	3	1
Sangwali	Mwanamujwakayi	2	D	5	N/A	N/C
Sangwali	Nakatwa	2	D	5	N/A	N/C
Sangwali	Namushasha 1	2	W	3	1	1
Sangwali	Namushasha Lodge	2	W	3	2	0
Sangwali	Nkasa Island	2	W	5	N/A	N/C
Sangwali	Old safari camp 1	5	W	1	3	16
Sangwali	Old safari camp 2	7	W	1	3	0
Sangwali	Old safari camp 3	5	W	1	4	19
Sangwali	Police camp	5	W	5	N/A	N/C
Sangwali	Safari camp	2	D	5	N/A	N/C
Sangwali	Samudunc	2	W	4	N/A	N/C
Sangwali	Sangwali	2	D	5	N/A	N/C
Sangwali	Shishika	2	D	5	N/A	N/C
Sangwali	Sitwa	2	W	5	N/A	N/C
Sangwali	Sundano	2	W	3	1	0

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Sangwali	Vuvu camp	2	W	3	1	5
Sangwali	Xhoko 1	2	W	4	N/A	N/C
Sangwali	Xhoko 2	2	D	5	N/A	N/C
Schuckmannsburg	Chikanjuli	12	D	5	N/A	N/C
Schuckmannsburg	Ihwiza	12	W	5	N/A	N/C
Schuckmannsburg	Kakuni	12	W	3	2	0
Schuckmannsburg	Kasaya 1	12	W	3	3	0
Schuckmannsburg	Kasaya 2	12	W	2	4	40
Schuckmannsburg	Kasaya 3	12	W	2	4	20
Schuckmannsburg	Kasaya 4	12	W	2	4	11
Schuckmannsburg	Kasika	12	W	5	N/A	N/C
Schuckmannsburg	Lusese	12	W	5	N/A	N/C
Schuckmannsburg	Lutanga	12	W	5	N/A	N/C
Schuckmannsburg	Lyansenzi	12	D	5	N/A	N/C
Schuckmannsburg	Mabungo	12	W	4	N/A	N/C
Schuckmannsburg	Malaha	12	W	5	N/A	N/C
Schuckmannsburg	Mazanga	12	W	5	N/A	N/C
Schuckmannsburg	Mbalinde	12	W	5	N/A	N/C
Schuckmannsburg	Mbile	12	W	5	N/A	N/C
Schuckmannsburg	Mbumwe	12	W	5	N/A	N/C
Schuckmannsburg	Musungi	12	W	4	3	14
Schuckmannsburg	Mwamba	12	W	5	N/A	N/C
Schuckmannsburg	Nakabungo	12	D	5	N/A	N/C
Schuckmannsburg	Namatanga	12	W	5	N/A	N/C
Schuckmannsburg	Nelulwe	12	W	5	N/A	N/C
Schuckmannsburg	Nesanza	12	W	5	N/A	N/C
Schuckmannsburg	Nkanza 1	12	W	5	N/A	N/C
Schuckmannsburg	Nkanza 2	12	W	5	N/A	N/C
Schuckmannsburg	Nkanza 3	12	W	5	N/A	N/C
Schuckmannsburg	Nkanza 4	12	W	4	2	N/C
Schuckmannsburg	Nsanzwe	12	W	3	5	N/C
Schuckmannsburg	Nsinde	12	W	5	N/A	N/C
Schuckmannsburg	Ntiyentiye	12	W	5	N/A	N/C
Schuckmannsburg	Nzobwe	12	W	5	N/A	N/C
Schuckmannsburg	Sifwameyi	12	W	5	N/A	N/C
Schuckmannsburg	Sikalume	12	W	5	N/A	N/C

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Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Chobe Nat. Park	1	4	W	4	1	0
Chobe Nat. Park	2	4	W	3	2	0
Chobe Nat. Park	3	4	W	2	2	0
Chobe Nat. Park	4	4	W	3	2	2
Chobe Nat. Park	5	4	W	3	2	N/C
Chobe Nat. Park	6	4	W	4	1	N/C
Chobe Nat. Park	7	4	W	5	N/A	N/C
Far East/Kasika	Chiwonzo	8	W	5	N/A	N/C
Far East/Kasika	Ibilibinzi	8	W	5	N/A	N/C
Far East/Kasika	Ijambwe	8	W	5	N/A	N/C
Far East/Kasika	Ikaba	8	W	5	N/A	N/C
Far East/Kasika	Kabulabula	8	W	5	N/A	N/C
Far East/Kasika	Kasenu	8	W	5	N/A	N/C
Far East/Kasika	Kasika 1	8	W	5	N/A	N/C
Far East/Kasika	Kasika 2	8	W	5	N/A	N/C
Far East/Kasika	Kasika 3	8	W	5	N/A	N/C
Far East/Kasika	Mbalasinte	8	W	5	N/A	N/C
Ihaha	Chisambilo	8	W	5	N/A	N/C
Ihaha	Ihaha 1	8	W	5	N/A	N/C
Ihaha	Ihaha 2	8	W	5	N/A	N/C
Ihaha	Ihaha 3	8	W	5	N/A	N/C
Ihaha	Ishuwa	8	W	5	N/A	N/C
Ihaha	Kachelwa	8	W	5	N/A	N/C
Ihaha	Namasesi	8	W	5	N/A	N/C
Ihaha	Nasisangani	8	W	5	N/A	N/C
Ihaha	Ndelcki	8	W	5	N/A	N/C
Ikaba/Muzee	Bukuzu	10	W	5	N/A	N/C
Ikaba/Muzee	Bulila	10	W	5	N/A	N/C
Ikaba/Muzee	Butala	10	W	5	N/A	N/C
Ikaba/Muzee	Chabantuntu	10	W	5	N/A	N/C
Ikaba/Muzee	Jimu	10	W	5	N/A	N/C
Ikaba/Muzee	Jojo	10	W	5	N/A	N/C
Ikaba/Muzee	Kakangala	10	W	5	N/A	N/C
Ikaba/Muzee	Kasaya	10	W	5	N/A	N/C
Ikaba/Muzee	Kasaya Lake	10	W	5	N/A	N/C
Ikaba/Muzee	Kasumba	10	W	5	N/A	N/C
Ikaba/Muzee	Katanga	10	W	5	N/A	N/C
Ikaba/Muzee	Kazuka	10	W	5	N/A	N/C
Ikaba/Muzee	Matonsu	10	W	5	N/A	N/C
Ikaba/Muzee	Matowa	10	W	5	N/A	N/C
Ikaba/Muzee	Mpukano	10	W	5	N/A	N/C
Ikaba/Muzee	Mukwiza	10	W	5	N/A	N/C
Ikaba/Muzee	Munimandombe	10	W	5	N/A	N/C
Ikaba/Muzee	Munono	10	W	5	N/A	N/C
Ikaba/Muzee	Musahamule	10	W	5	N/A	N/C
Ikaba/Muzee	Musekezi	10	W	5	N/A	N/C
Ikaba/Muzee	Musuma	10	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Ikaba/Muzee	Muzee	10	W	5	N/A	N/C
Ikaba/Muzee	Namakuni	10	W	5	N/A	N/C
Ikaba/Muzee	Nanchinga	10	W	5	N/A	N/C
Ikaba/Muzee	Nangwali	10	W	4	3	1
Ikaba/Muzee	Nangwena	10	W	5	N/A	N/C
Ikaba/Muzee	Nantungu 1	10	W	4	N/A	1
Ikaba/Muzee	Nantungu 2	10	W	5	N/A	N/C
Ikaba/Muzee	Nantungu 3	10	W	5	N/A	N/C
Ikaba/Muzee	Nsundwa	10	W	4	1	0
Ikaba/Muzee	Nyuni 1	10	W	5	N/A	N/C
Ikaba/Muzee	Nyuni 2	10	W	5	N/A	N/C
Ikaba/Muzee	Sichamputu	10	W	5	N/A	N/C
Ikaba/Muzee	Sitwela	10	W	3	1	0
Ikaba/Muzee	Tembamuhwe	10	W	5	N/A	N/C
Impalila	Channel off Chobe	6	W	3	1	0
Impalila	Impalila Island lodge	2	W	4	4	N/C
Impalila	Kamabozu	2	W	5	N/A	N/C
Impalila	Lwansingo (bridge)	2	W	5	N/A	N/C
Impalila	Lwansingo 2	2	W	3	1	0
Impalila	Namakuni	2	W	3	2	0
Impalila	Safari village	2	W	3	1	0
Impalila	Sinkanka	2	W	5	N/A	N/C
Malindi	Bulyankala	1	W	5	N/A	N/C
Malindi	Bwanunga	1	W	5	N/A	N/C
Malindi	Ihanza	1	W	5	N/A	N/C
Malindi	Ilomba	1	W	2	1	0
Malindi	Isale	1	W	1	1	1
Malindi	Izanza	1	W	5	N/A	N/C
Malindi	Kabulanonzi	1	W	5	N/A	N/C
Malindi	Kaloyawe	1	D	5	N/A	N/C
Malindi	Kaonzo	1	W	5	N/A	N/C
Malindi	Kashelana	1	W	5	N/A	N/C
Malindi	Kasika	1	W	5	N/A	N/C
Malindi	Kasuzu	1	W	5	N/A	N/C
Malindi	Lulungu	1	D	5	N/A	N/C
Malindi	Luwu	1	W	5	N/A	N/C
Malindi	Lyamato	1	W	5	N/A	N/C
Malindi	Lyamisika	1	D	5	N/A	N/C
Malindi	Manyonga	1	W	5	N/A	N/C
Malindi	Mishushu	1	D	5	N/A	N/C
Malindi	Mpunga	1	W	3	3	3
Malindi	Mutwi	1	W	5	N/A	N/C
Malindi	Namalweza	1	W	5	N/A	N/C
Malindi	Namasimanwe	1	W	5	N/A	N/C
Malindi	Nambao	1	D	5	N/A	N/C
Malindi	Nambula	1	D	5	N/A	N/C
Malindi	Nanombe	1	W	5	N/A	N/C
Malindi	Ndulwabayenda	1	W	5	N/A	N/C
Malindi	Ngolwa	1	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Malindi	Nkwansanga	1	D	5	N/A	N/C
Malindi	Pahama	1	D	5	N/A	N/C
Malindi	Sigaba	1	W	3	3	5
Malindi	Sihompwe	1	D	5	N/A	N/C
Malindi	Simpuho	1	W	5	N/A	N/C
Malindi	Sipopa	1	W	5	N/A	N/C
Malindi	Sisao (Chisao)	1	W	5	N/A	N/C
Malindi	Sisinta	1	W	5	N/A	N/C
Malindi	Tumahule	1	W	5	N/A	N/C
Ngoma	Bukalo channel	8	D	5	N/A	N/C
Ngoma	Chisekechabanyayi	8	W	5	N/A	N/C
Ngoma	Chisubasuba	8	W	5	N/A	N/C
Ngoma	Chobe outflow	4	D	5	N/A	N/C
Ngoma	Ilonga	8	W	5	N/A	N/C
Ngoma	Kabbe	8	W	5	N/A	N/C
Ngoma	Kalembeza	8	W	5	N/A	N/C
Ngoma	Kaongonja	8	W	5	N/A	N/C
Ngoma	Lisikili 1	8	W	5	N/A	N/C
Ngoma	Lisikili 2	8	W	5	N/A	N/C
Ngoma	Lisikili 3	8	W	5	N/A	N/C
Ngoma	Mahundu 1	4	D	5	N/A	N/C
Ngoma	Mahundu 2	4	D	5	N/A	N/C
Ngoma	Mahundu 3	4	W	5	N/A	N/C
Ngoma	Mahundu 4	4	W	5	N/A	N/C
Ngoma	Mahundu 5	4	W	5	N/A	N/C
Ngoma	Masika	4	W	5	N/A	N/C
Ngoma	Munambeza	4	W	5	N/A	N/C
Ngoma	Mutikitila	8	W	5	N/A	N/C
Ngoma	Muyako	4	D	5	N/A	N/C
Ngoma	Nangandu	8	W	5	N/A	N/C
Ngoma	Ngoma 1 (gate)	4	W	5	N/A	N/C
Ngoma	Ngoma 2 (Chobe)	8	W	5	N/A	N/C
Ngoma	Ngoma 3 (bridge)	8	W	5	N/A	N/C
Ngoma	Nombe	8	W	5	N/A	N/C
Ngoma	Sikabila	8	W	5	N/A	N/C
Ngoma	Sinda	4	W	5	N/A	N/C
Sangwali	Balelwa camp	4	W	4	3	0
Sangwali	Bathobaja	4	D	5	N/A	N/C
Sangwali	Ciinchimane	4	D	5	N/A	N/C
Sangwali	Halupati	4	D	5	N/A	N/C
Sangwali	Kanaboyo	4	D	5	N/A	N/C
Sangwali	Kongola	4	W	5	N/A	N/C
Sangwali	Lianshulu 1	4	W	3	3	4
Sangwali	Lianshulu 2 Lodge	4	W	3	3	2
Sangwali	Linyanti 1	4	W	5	N/A	N/C
Sangwali	Linyanti 2	4	W	5	N/A	N/C
Sangwali	Lizauli	4	W	5	N/A	N/C
Sangwali	Lupala (main)	4	W	5	N/A	N/C
Sangwali	Lupala Island	4	D	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Sangwali	Lyadura	4	W	3	3	0
Sangwali	Malengalenga	4	D	5	N/A	N/C
Sangwali	Mawe	4	W	3	3	4
Sangwali	Mwanamujwakayi	4	D	5	N/A	N/C
Sangwali	Nakatwa	4	W	5	N/A	N/C
Sangwali	Namushasha 1	4	W	4	3	0
Sangwali	Nkasa Island	4	D	5	N/A	N/C
Sangwali	Old safari camp 1	4	D	5	N/A	N/C
Sangwali	Old safari camp 2	4	D	5	N/A	N/C
Sangwali	Old safari camp 3	4	W	5	N/A	N/C
Sangwali	Police camp	4	D	5	N/A	N/C
Sangwali	Safari camp	4	W	5	N/A	N/C
Sangwali	Samuduno	4	D	5	N/A	N/C
Sangwali	Sangwali	4	D	5	N/A	N/C
Sangwali	Shishika	4	D	5	N/A	N/C
Sangwali	Sitwa	4	W	3	3	0
Sangwali	Sundano	4	W	3	3	1
Sangwali	Vuvu camp	4	W	5	N/A	N/C
Sangwali	Xhoko 1	4	D	5	N/A	N/C
Sangwali	Xhoko 2	4	D	5	N/A	N/C
Schuckmannsburg	Chikanjuli	10	W	5	N/A	N/C
Schuckmannsburg	Ihwiza	10	W	5	N/A	N/C
Schuckmannsburg	Kakuni	10	W	5	N/A	N/C
Schuckmannsburg	Kasaya 1	10	W	3	1	0
Schuckmannsburg	Kasaya 2	10	W	3	N/A	0
Schuckmannsburg	Kasaya 3	10	W	5	N/A	N/C
Schuckmannsburg	Kasaya 4	10	W	5	N/A	N/C
Schuckmannsburg	Kasika	10	W	5	N/A	N/C
Schuckmannsburg	Lutanga	10	W	5	N/A	N/C
Schuckmannsburg	Lyansenzi	10	W	5	N/A	N/C
Schuckmannsburg	Mabungo	10	W	5	N/A	N/C
Schuckmannsburg	Malaha	10	W	5	N/A	N/C
Schuckmannsburg	Mazanga	10	W	4	N/A	0
Schuckmannsburg	Mbalinde	10	W	5	N/A	N/C
Schuckmannsburg	Mbile	10	W	5	N/A	N/C
Schuckmannsburg	Mbumwe	10	W	5	N/A	N/C
Schuckmannsburg	Musungi	10	W	5	N/A	N/C
Schuckmannsburg	Mwamba	10	W	5	N/A	N/C
Schuckmannsburg	Nakabungo	10	W	5	N/A	N/C
Schuckmannsburg	Namatanga	10	W	5	N/A	N/C
Schuckmannsburg	Nchulwe	10	W	5	N/A	N/C
Schuckmannsburg	Nesanza	10	W	3	3	2
Schuckmannsburg	Nkanza 1	10	W	5	N/A	N/C
Schuckmannsburg	Nkanza 2	10	W	5	N/A	N/C
Schuckmannsburg	Nkanza 3	10	W	5	N/A	N/C
Schuckmannsburg	Nkanza 4	10	W	3	1	0
Schuckmannsburg	Nsanzwe	10	W	5	N/A	N/C
Schuckmannsburg	Nsinde	10	W	3	1	0
Schuckmannsburg	Ntiyentiye	10	W	5	N/A	N/C

Area	Locality	Month visited	Wet/Dry	Mat status	Plant health	No. of beetles
Schuckmannsburg	Nzobwe	10	W	3	3	0
Schuckmannsburg	Sibilo	10	W	5	N/A	N/C
Schuckmannsburg	Sifwameyi	10	W	5	N/A	N/C
Schuckmannsburg	Sikalume	10	W	5	N/A	N/C

APPENDIX II

The 73 sites visited in 1996 – 1998

Area	Locality	Month visited	Wet/Dry	Mat status	Plant Health	No. of Beetles	Year
Far East/Kasika	Ijambwe	7	W	3	2	8	96
		10	W	3	4	4	97
		8	W	5	N/A	N/C	98
Far East/Kasika	Ikaba	7	W	5	N/A	N/C	96
		10	W	1	4	10	97
		8	W	5	N/A	N/C	98
Far East/Kasika	Kabulabula	7	W	4	N/A	N/C	96
		10	W	3	4	11	97
		8	W	5	N/A	N/C	98
Far East/Kasika	Kasika 1	7	W	4	1	N/C	96
		10	W	5	N/A	N/C	97
		8	W	5	N/A	N/C	98
Ihaha	Ihaha 1	7	W	5	N/A	N/C	96
		7	W	3	1	3	97
		8	W	5	N/A	N/C	98
Ihaha	Ihaha 2	7	W	5	N/A	N/C	96
		5	W	3	1	6	97
		8	W	5	N/A	N/C	98
Ihaha	Ihaha 3	7	W	3	1	4	96
		5	W	2	2	0	97
		8	W	5	N/A	N/C	98
Ihaha	Nasisangani	7	W	5	N/A	N/C	96
		5	W	3	1	0	97
		8	W	5	N/A	N/C	98
Ikaba/Muzee	Bukuzu		W	2	4	4	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Bulila	8	W	3	4	6	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Butala	9	W	3	1	0	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Jimu	8	W	2	1	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98

Area	Locality	Month visited	Wet/Dry	Mat status	Plant Health	No. of Beetles	Year
Ikaba/Muzee	Jojo	8	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Kakangala	8	W	3	4	1	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Kasaya	9	W	2	1	0	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Kasaya Lake	9	W	4	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Kasumba	9	W	3	2	1	96
		11	W	4	4	10	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Matonsu	8	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Matowa	9	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Mpukano	8	W	2	1	0	96
		11	W	3	1	0	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Mukwiza	8	W	3	4	0	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Munono	9	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Musahamule	9	W	2	2	1	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Muskezi	9	W	2	2	2	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Musuma	8	W	3	1	0	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Muzee	8	W	1	3	1	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Namakuni	9	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Nangwali	9	W	2	2	6	96
		11	W	5	N/A	N/C	97
		10	W	4	3	1	98

Area	Locality	Month visited	Wet/Dry	Mat status	Plant Health	No. of Beetles	Year
Ikaba/Muzee	Nangwena	9	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Nantungu 1	8	W	3	2	2	96
		11	W	5	N/A	N/C	97
		10	W	4	N/A	1	98
Ikaba/Muzee	Nantungu 2	8	W	4	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Nantungu 3	8	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Nsundwa	9	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	4	1	0	98
Ikaba/Muzee	Nyuni 1	9	W	3	3	2	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Nyuni 2	9	W	3	3	0	96
		11	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Ikaba/Muzee	Sitwela	9	W	5	N/A	N/C	96
		11	W	5	N/A	N/C	97
		10	W	3	1	0	98
Ikaba/Muzee	Tembamuhwe	9	W	3	1	2	96
		11	W	4	1	N/C	97
		10	W	5	N/A	N/C	98
Malindi	Bwanunga	8	W	3	2	0	96
		3	W	5	N/A	N/C	97
		1	W	5	N/A	N/C	98
Malindi	Namalweza	8	W	1	1	1	96
		3	W	5	N/A	N/C	97
		1	W	5	N/A	N/C	98
Malindi	Nanombe	8	W	5	N/A	N/C	96
		3	W	5	N/A	N/C	97
		1	W	5	N/A	N/C	98
Malindi	Sisao (Chisao)	8	W	5	N/A	N/C	96
		3	W	5	N/A	N/C	97
		1	W	5	N/A	N/C	98
Ngoma	Kalembeza	7	W	4	N/A	N/C	96
		2	W	5	N/A	N/C	97
		8	W	5	N/A	N/C	98
Ngoma	Lisikili 1	5	W	3	1	0	96
		2	W	4	N/A	N/C	97
		8	W	5	N/A	N/C	98
Ngoma	Lisikili 2	5	W	3	3	2	96
		2	W	5	N/A	N/C	97
		8	W	5	N/A	N/C	98

Area	Locality	Month visited	Wet/Dry	Mat status	Plant Health	No. of Beetles	Year
Schuckmannsburg	Mazanga	7	W	5	N/A	N/C	96
		12	W	5	N/A	N/C	97
		10	W	4	N/A	0	98
Schuckmannsburg	Mbile	7	W	5	N/A	N/C	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Musungi	7	W	3	1	2	96
		12	W	4	3	14	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Mwamba	7	W	5	N/A	N/C	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Nelulwe	7	W	5	N/A	N/C	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Nesanza	7	W	2	1	3	96
		12	W	5	N/A	N/C	97
		10	W	3	3	2	98
Schuckmannsburg	Nkanza 1	7	W	4	N/A	N/C	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Nkanza 2	7	W	3	1	5	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Nkanza 3	7	W	3	N/A	N/C	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Nkanza 4	7	W	3	N/A	N/C	96
		12	W	4	2	N/C	97
		10	W	3	1	0	98
Schuckmannsburg	Nsanzwe	7	W	5	N/A	N/C	96
		12	W	3	5	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Nsinde	7	W	3	4	0	96
		12	W	5	N/A	N/C	97
		10	W	3	1	0	98
Schuckmannsburg	Nzobwe	7	W	3	1	1	96
		12	W	5	N/A	N/C	97
		10	W	3	3	0	98

Area	Locality	Month visited	Wet/Dry	Mat status	Plant Health	No. of Beetles	Year
Ngoma	Lisikili 3	5	W	3	2	12	96
		2	W	5	N/A	N/C	97
		8	W	5	N/A	N/C	98
Sangwali	Lianshulu 2 Lodge	5	W	5	N/A	N/C	96
		5	W	3	1	1	97
		4	W	3	3	2	98
Sangwali	Linyanti 1	5	W	4	N/A	N/C	96
		2	W	4	N/A	N/C	97
		4	W	5	N/A	N/C	98
Sangwali	Linyanti 2	5	W	4	N/A	N/C	96
		2	W	5	N/A	N/C	97
		4	W	5	N/A	N/C	98
Sangwali	Lizauli	5	W	3	1	3	96
		2	W	5	N/A	N/C	97
		4	W	5	N/A	N/C	98
Sangwali	Lyadura	5	W	3	2	0	96
		7	W	3	3	6	97
		4	W	3	3	0	98
Sangwali	Sitwa	5	W	3	1	9	96
		2	W	5	N/A	N/C	97
		4	W	3	3	0	98
Sangwali	Sundano	5	W	2	1	0	96
		2	W	3	1	0	97
		4	W	3	3	1	98
Sangwali	Vuvu camp	5	W	4	N/A	N/C	96
		2	W	3	1	5	97
		4	W	5	N/A	N/C	98
Schuckmannsburg	Kakuni	7	W	3	1	2	96
		12	W	3	2	0	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Kasaya 1	7	W	3	1	1	96
		12	W	3	3	0	97
		10	W	3	1	0	98
Schuckmannsburg	Kasaya 2	7	W	4	4	N/C	96
		12	W	2	4	40	97
		10	W	3	N/A	0	98
Schuckmannsburg	Kasaya 3	7	W	3	1	0	96
		12	W	2	4	20	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Kasika	7	W	3	3	1	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Lutanga	7	W	3	2	10	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98
Schuckmannsburg	Malaha	7	W	3	3	3	96
		12	W	5	N/A	N/C	97
		10	W	5	N/A	N/C	98

APPENDIX III

List of registered sites in the eastern Caprivi area

Area	Locality	Latitude	Longitude	Floodplain feature
Chobe Nat. Park	1	174958.3	250645.7	Floodwater
Chobe Nat. Park	2	175002.1	250303.3	Floodwater
Chobe Nat. Park	3	175019.4	250016.4	Floodwater
Chobe Nat. Park	4	175014.5	250008.1	Floodwater
Chobe Nat. Park	5	174850.3	245623.6	Floodwater
Chobe Nat. Park	6	175013.6	245250.5	Floodwater
Chobe Nat. Park	7	175105	244938.5	Floodwater
Far East/Kasika	Che e			
Far East/Kasika	Chwonzo	1747263	2457876	Mulapo
Far East/Kasika	Ibilibinzi	1747327	2455817	Mulapo
Far East/Kasika	Ibolokwa			
Far East/Kasika	Ijambwe	1749412	2500705	Backwater - open
Far East/Kasika	Ikaba	1746811	2457581	Backwater - open
Far East/Kasika	Ikota			
Far East/Kasika	Kabulabula	1747415	2459285	Mulapo
Far East/Kasika	Kamabozu			
Far East/Kasika	Kasenu	1748504	2503455	Main-channel
Far East/Kasika	Kasika 1	1749149	2506502	Backwater - open
Far East/Kasika	Kasika 2	1749159	2506380	Backwater - open
Far East/Kasika	Kasika 3	1749391	2506145	Backwater - open
Far East/Kasika	Kasikili			
Far East/Kasika	Kaulu			
Far East/Kasika	Kayanga			
Far East/Kasika	Lwansingo			
Far East/Kasika	Lyankunga	1744671	2459647	Backwater - flood channel
Far East/Kasika	Makoma			
Far East/Kasika	Mazizi			
Far East/Kasika	Mbalasinte	1747624	2501213	Mulapo
Far East/Kasika	Mbasi	1743815	2500326	Backwater - flood channel
Far East/Kasika	Mbowe			
Far East/Kasika	Namacata			
Far East/Kasika	Nansimba			
Far East/Kasika	Nkoza			
Far East/Kasika	Samba			
Far East/Kasika	Sigwe	1743612	2501669	Backwater - open
Far East/Kasika	Zambabwiza			
Ihaha	Chisambilo	1746737	2453590	Mulapo
Ihaha	Ihaha 1	1749623	2453504	Main-channel
Ihaha	Ihaha 2	1748548	2453242	Mulapo
Ihaha	Ihaha 3	1749394	2453698	Backwater - open
Ihaha	Ishuwa	1747700	2454674	Backwater - open
Ihaha	Kachelwa	1748124	2453358	Mulapo
Ihaha	Mutwalwizi 1	1744983	2452180	Backwater - open

Area	Locality	Latitude	Longitude	Floodplain feature
Ihaha	Mutwalwizi 2	1743867	2451355	Backwater - open
Ihaha	Mutwalwizi 3	1742612	2450025	Backwater - open
Ihaha	Namasesi	1746234	2452381	Mulapo
Ihaha	Nasisangani	1750206	2449645	Backwater - open
Ihaha	Ndeleki	1749359	2453724	Mulapo
Ihaha	Vuvu			
Ikaba/Muzee	Bukuzu	1736867	2453046	Backwater - open
Ikaba/Muzee	Bulila	1736571	2502257	Backwater - open
Ikaba/Muzee	Butala	1735400	2454905	Backwater - open
Ikaba/Muzee	Chibantuntu	1736109	2457628	Backwater - marsh
Ikaba/Muzee	Chitwela (Sitwela)			
Ikaba/Muzee	Jimu	1736542	2500724	Mulapo
Ikaba/Muzee	Jojo	1735516	2502200	Mulapo
Ikaba/Muzee	Kakangala	1738124	2501200	Backwater - marsh
Ikaba/Muzee	Kalulwe			
Ikaba/Muzee	Kaonzo			
Ikaba/Muzee	Kasaya	1736342	2456731	Backwater - marsh
Ikaba/Muzee	Kasaya Lake	1742212	2459232	Mulapo
Ikaba/Muzee	Kasumba	1735046	2457397	Backwater - open
Ikaba/Muzee	Katanga	1738185	2501101	Backwater - marsh
Ikaba/Muzee	Kazuka	1740035	2458473	Mulapo
Ikaba/Muzee	Lulungu			
Ikaba/Muzee	Matonsu	1738644	2502099	Backwater - marsh
Ikaba/Muzee	Matowa	1737153	2459193	Backwater - open
Ikaba/Muzee	Mpukano	1739262	2458593	Backwater - open
Ikaba/Muzee	Mukwiza	1737736	2459300	Backwater - open
Ikaba/Muzee	Munimandombe	1738785	2503864	Backwater - marsh
Ikaba/Muzee	Munono	1738060	2451119	Backwater - open
Ikaba/Muzee	Musahamule	1734355	2455526	Backwater - open
Ikaba/Muzee	Musekezi	1734987	2458317	Backwater - open
Ikaba/Muzee	Musuma	1743094	2459311	Backwater - open
Ikaba/Muzee	Muzee	1739217	2501873	Backwater - marsh
Ikaba/Muzee	Namakuni	1733927	2455478	Backwater - open
Ikaba/Muzee	Nanchinga	1736268	2456245	Backwater - marsh
Ikaba/Muzee	Nangwali	1734651	2458341	Backwater - open
Ikaba/Muzee	Nangwena	1737576	2454367	Backwater - open
Ikaba/Muzee	Nantungu 1	1738852	2504061	Backwater - marsh
Ikaba/Muzee	Nantungu 2	1739932	2503717	Backwater - open
Ikaba/Muzee	Nantungu 3	1739278	2502841	Backwater - marsh
Ikaba/Muzee	Nsundwa	1740113	2454125	Backwater - open
Ikaba/Muzee	Nyuni 1	1734391	2457443	Backwater - open
Ikaba/Muzee	Nyuni 2	1734096	2457197	Backwater - open
Ikaba/Muzee	Sichamputu	1736027	2457807	Backwater - marsh
Ikaba/Muzee	Sitwela	1736012	2457483	Backwater - marsh
Ikaba/Muzee	Tembamuhwe	1734822	2458842	Backwater - open
Impalila	Channel off Chobe			Side-channel
Impalila	Impalila Island lodge	1745117	2510179	Side-channel
Impalila	Kamabozu	1745210	2510195	Main-channel
Impalila	Kachingo (bridge)	1746313	2510281	Backwater - flood channel
Impalila	*Kwachingo 2*	*1746704*	*2510739*	*Backwater - flood channel*

Area	Locality	Latitude	Longitude	Floodplain feature
Impalila	Namakuni	1747102	2511787	Main-channel
Impalila	Safari village	1746760	2510827	Main-channel
Impalila	Sinkanka	1745535	2510764	Main-channel
Malindi	Bulyankala	1732019	2440222	Backwater - open
Malindi	Bungi			
Malindi	Bwanunga	1731634	2443504	Mulapo
Malindi	Ihanza	1731343	2444589	Backwater - open
Malindi	Ilomba	1731656	2444132	Mulapo
Malindi	Isale	1731618	2444202	Mulapo
Malindi	Izanza	1735516	2440540	Mulapo
Malindi	Kabulanonzi	1730677	2439980	Mulapo
Malindi	Kaloyawe	1756779	2423452	Mulapo
Malindi	Kalulwe			
Malindi	Kaonzo	1731500	2446301	Backwater - open
Malindi	Kashelana	1731379	2443799	Backwater - marsh
Malindi	Kasika	1730428	2444157	Mulapo
Malindi	Kasuzu	1730265	2441122	Backwater - open
Malindi	Lulungu	1732162	2438728	Backwater - marsh
Malindi	Luwu	1732383	2444397	Backwater - open
Malindi	Lyamato	1732020	2444634	Mulapo
Malindi	Lyamisika	1733103	2444246	Mulapo
Malindi	Manyonga	1731370	2444362	Backwater - open
Malindi	Mishushu	1730075	2442661	Backwater - open
Malindi	Mpunga	1731075	2444305	Backwater - open
Malindi	Mutwi	1731894	2445491	Backwater - open
Malindi	Namalweza	1731944	2443897	Backwater - open
Malindi	Namasimanwe	1730091	2443450	Backwater - marsh
Malindi	Nambao	1733319	2443048	Mulapo
Malindi	Nambula	1732614	2442713	Mulapo
Malindi	Nanombe	1733683	2437339	Backwater - open
Malindi	Ndulwabayenda	1732263	2442966	Mulapo
Malindi	Ngolwa	1735328	2441021	Mulapo
Malindi	Nkwansanga	1733663	2437339	Mulapo
Malindi	Numwa	1730649	2444603	Backwater - open
Malindi	Pahama	1732190	2441564	Mulapo
Malindi	Sigaba	1731590	2443191	Backwater - open
Malindi	Sihompwe	1734144	2441733	Mulapo
Malindi	Simpuho	1734978	2439884	Backwater - marsh
Malindi	Sipopa	1731961	2444497	Mulapo
Malindi	Sisao (Chisao)	1731264	2444358	Backwater - open
Malindi	Sisinta	1730949	2442378	Backwater - open
Malindi	Tumahule	1732500	2441268	Mulapo
Ngoma	Bukalo channel	1743137	2431002	Mulapo
Ngoma	Chisekechabanyayi	1756437	2441276	Mulapo
Ngoma	Chisubasuba	1739252	2436661	Mulapo
Ngoma	Chobe outflow	175713.8	242450.8	Mulapo
Ngoma	Ilonga	1739569	2437024	Mulapo
Ngoma	Kabbe	1739659	2439523	Mulapo
Ngoma	Kalembeza	1732376	2431495	Side-channel
Ngoma	Kanyundulelo			

Area	Locality	Latitude	Longitude	Floodplain feature
Ngoma	Kaongonja	1737398	2435424	Mulapo
Ngoma	Katima Mulilo			Main-channel
Ngoma	Lisikili 1	1732360	2430000	Backwater - open
Ngoma	Lisikili 2	1733274	2428633	Backwater - open
Ngoma	Lisikili 3	1733155	2427077	Backwater - open
Ngoma	Mahundu 1	175926.9	242800.2	Mulapo
Ngoma	Mahundu 2	180033.4	242851.2	Mulapo
Ngoma	Mahundu 3	175858	242729.3	Mulapo
Ngoma	Mahundu 4	175852.4	242734.2	Mulapo
Ngoma	Mahundu 5	175754.2	242727.4	Mulapo
Ngoma	Maningimanzi 1			
Ngoma	Maningimanzi 2			
Ngoma	Maningimanzi 3			
Ngoma	Masika	175751.3	242705.3	Mulapo
Ngoma	Munambeza	1756775	2423446	Mulapo
Ngoma	Musuma			
Ngoma	Mutikitila	1759177	2435726	Mulapo
Ngoma	Muyako	175255.6	242349.7	Backwater - open
Ngoma	Nangandu	1738259	2435799	Mulapo
Ngoma	Nangoma			
Ngoma	Nebangwe			
Ngoma	Ngoma 1 (gate)	175456.8	244248.3	Main-channel
Ngoma	Ngoma 2 (Chobe)			
Ngoma	Ngoma 3 (bridge)			
Ngoma	Nkuzwe			
Ngoma	Nombe	1740111	2437688	Mulapo
Ngoma	Ntongola			
Ngoma	Sikabila	1739917	2438101	Mulapo
Ngoma	Sinda	1757035	2424290	Mulapo
Sangwali	Balelwa 1			
Sangwali	Balelwa 2			
Sangwali	Balelwa camp	1812637	2327581	Backwater - open
Sangwali	Bathobaja			
Sangwali	Chinchimane			
Sangwali	Halupati			
Sangwali	Kanaboyo			
Sangwali	Kongola	1747200	2321100	Main-channel
Sangwali	Lianshulu 1 (Backwater U/S lodge)			
Sangwali	Lianshulu 2 Lodge	1808019	2322781	Side-channel
Sangwali	Linyanti 1	1804690	2402553	Backwater - open
Sangwali	Linyanti 2	1804760	2402936	Backwater - open
Sangwali	Lizauli	1802375	2319433	Main-channel
Sangwali	Lupala Island	1823673	2345600	Mulapo
Sangwali	Lupala main			
Sangwali	Lyadura	1826001	2343047	Main-channel
Sangwali	Malengalenga			
Sangwali	Mawe	181443.4	233023	Mulapo
Sangwali	Mwanamujwakayi	1823805	2338926	Mulapo
Sangwali	Nakatwa	181000	232442	Backwater - open
Sangwali	Namushasha 1	1800000	2319000	Side-channel

Area	Locality	Latitude	Longitude	Floodplain feature
Sangwali	Namushasha Lodge			
Sangwali	Nkasa Island	1823259	2336346	Side-channel
Sangwali	Old safari camp 1	1825415	2336016	Mulapo
Sangwali	Old safari camp 2			Mulapo
Sangwali	Old safari camp 3			Mulapo
Sangwali	Police camp			
Sangwali	Safari camp	180925.6	232303.2	Side-channel
Sangwali	Samuduno			
Sangwali	Sangwali			
Sangwali	Shishika	1824307	2337646	Backwater - open
Sangwali	Sitwa	1753790	2320160	Backwater - marsh
Sangwali	Sundano	1751910	2319920	Backwater - open
Sangwali	Vuvu camp	1810824	2327204	Backwater - open
Sangwali	Xhoko 1			
Sangwali	Xhoko 2			
Schuckmannsburg	Chikanjuli	1735285	2449420	Mulapo
Schuckmannsburg	Ihwiza	1735818	2445935	Mulapo
Schuckmannsburg	Kakuni	1735000	2448586	Backwater - open
Schuckmannsburg	Kasaya 1	1741557	2446060	Backwater - open
Schuckmannsburg	Kasaya 2	1740126	2445450	Backwater - open
Schuckmannsburg	Kasaya 3	1737131	2447148	Backwater - open
Schuckmannsburg	Kasaya 4	1741614	2445937	Backwater - open
Schuckmannsburg	Kasika	1736092	2447503	Backwater - open
Schuckmannsburg	Lusese	1744091	2447679	Mulapo
Schuckmannsburg	Lutanga	1732400	2451155	Backwater - open
Schuckmannsburg	Lyansenzi	1738393	2443600	Mulapo
Schuckmannsburg	Mabungo	1742193	2445527	Backwater - open
Schuckmannsburg	Malaha	1733500	2446983	Mulapo
Schuckmannsburg	Mazanga	1744377	2444397	Backwater - open
Schuckmannsburg	Mbalinde	1737116	2449643	Backwater - open
Schuckmannsburg	Mbile	1732190	2449745	Side-channel
Schuckmannsburg	Mbumwe	1744382	2449186	Mulapo
Schuckmannsburg	Musungi	1735700	2447950	Backwater - open
Schuckmannsburg	Mwamba	1732995	2449178	Backwater - open
Schuckmannsburg	Nakabungo	1742060	2443630	Mulapo
Schuckmannsburg	Namatanga	1734405	2446488	Mulapo
Schuckmannsburg	Nelulwe	1732800	2448127	Mulapo
Schuckmannsburg	Nesanza	1733560	2451550	Backwater - open
Schuckmannsburg	Nkanza 1	1732546	2452499	Backwater - open
Schuckmannsburg	Nkanza 2	1732200	2452900	Mulapo
Schuckmannsburg	Nkanza 3	1732050	2452570	Side-channel
Schuckmannsburg	Nkanza 4	1732672	2453420	Backwater - open
Schuckmannsburg	Nsanzwe	1743494	2444218	Backwater - open
Schuckmannsburg	Nsinde	1733160	2450250	Backwater - open
Schuckmannsburg	Ntiyentiye	1735900	2448800	Mulapo
Schuckmannsburg	Nzobwe	1739138	2448074	Backwater - open
Schuckmannsburg	Sibilo	1734868	2447520	Backwater - open
Schuckmannsburg	Sifwameyi	1738590	2447300	Mulapo
Schuckmannsburg	Sikalume	1739455	2444553	Mulapo

APPENDIX IV

Contact details of other scientists working on exotic aquatic weeds

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APPENDIX VI

"STATUS OF SALVINIA" SURVEY SHEET

SECTION A. DATA TO BE COLLECTED FOR ALL LOCALITES

Area: _____ Date: _____

Associated River: _____

Locality Name: _____

Locality Wet? YES ☐ NO ☐

Status of Salvinia Mat

1	Mat covering entire water surface	☐
2	Mat/s covering some of the water surface	☐
3	*Salvinia* among other plants at edges	☐
4	Only a few Salvinia plants	☐
5	No *Salvinia*	☐

NUMBER OF BEETLES PER 20 STANDARD PLANTS ☐
(Buds + next 4 leaf pairs + branches)

SECTION B. DATA TO BE COLLECTED FOR NEW SITES OR SITES NOT YET REGISTERED

Habitat Type

Main-channel	☐
Side-channel	☐
Backwater - Open	☐
Backwater - Marsh	☐
Mulapo	☐

GPS Reading

South _____

East _____

SECTION C INFORMATION FOR PHOTOGRAPHIC RECORDS (ALL SITES)

Photograph Number: _____

Photograph Comments: _____

_____

Any other comments? Record completed by:

APPENDIX V

"STATUS OF SALVINIA" SURVEY SHEET

SECTION A. DATA TO BE COLLECTED FOR ALL SITES

Area: _____ Date: _____

Associated River: _____

Site Name: _____

Site Wet? YES ☐ NO ☐

Status of Salvinia Mat

1	Mat covering entire water surface	☐
2	Mat/s covering some of the water surface	☐
3	Salvinia among other plants at edges	☐
4	Only a few Salvinia plants	☐
5	No Salvinia	☐

Appearance of plants

1	All green and healthy	☐
2	Mostly green and healthy	☐
3	Half brown, Half green	☐
4	Mostly brown and sick	☐
5	All brown and dying	☐

NUMBER OF BEETLES PER 20 STANDARD PLANTS (Buds + next 4 leaf pairs + branches) ☐

SECTION B. DATA TO BE COLLECTED FOR NEW SITES OR SITES NOT VISITED IN 1996

Habitat Type

1	Main-channel	☐
2	Side-channel	☐
3	Backwater - Open	☐
4	Backwater - Flood channel	☐
5	Backwater - Marsh	☐
6	Mulapo	☐

GPS Reading

S _____

E _____

ALT _____

PDOP _____

SECTION C. INFORMATION FOR PHOTOGRAPHIC RECORDS (ALL SITES)

Photograph Number: _____

Photograph Comments: _____

_____

Any other comments?

_____

_____

_____

Record completed by:

_____