



Indigenous partnership for better strategic control of salvinia in Kakadu and targeting 'sudds'

Matthew Rawlinson¹, Margaret Rawlinson¹, Louis Elliott²

¹Djurrubu Rangers (Gundjehmi Aboriginal Corporation)

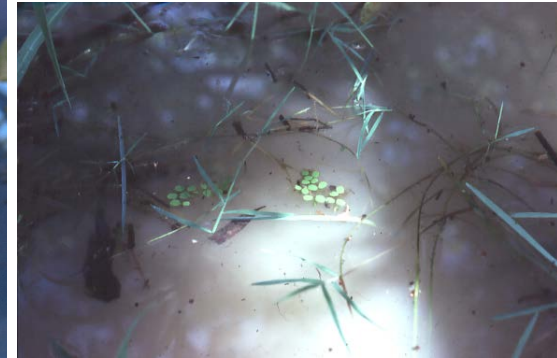
²NT Weed Management Branch, Department of Environment and Natural Resources

November 2018



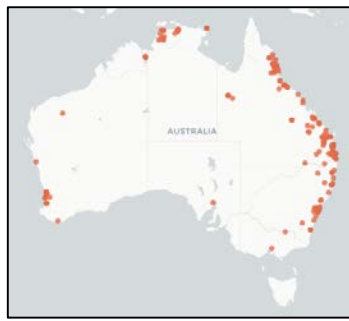
What is salvinia?

- *Salvinia molesta*
- Aquatic floating fern native to Brazil
- Introduced as an aquarium plant
- Weed worldwide
- Forms dense mats
- Takes over billabongs and waterways
- High impact on aquatic wildlife
- Weed of National Significance
- Does not flower – all plants are clones



Global distribution (GBIF 2018)

Arrival

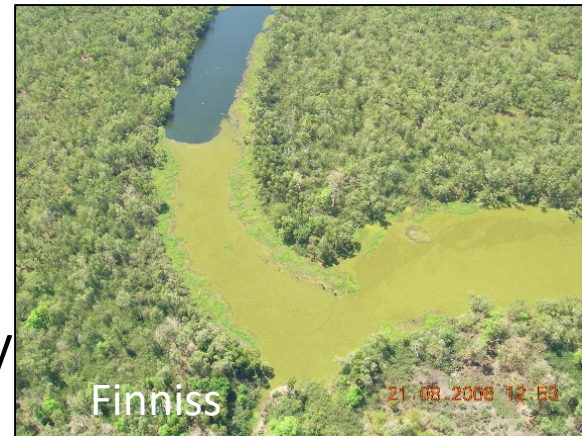


GUNDJEIHMI

ABORIGINAL CORPORATION



- 1952 First appeared in NSW
 - Rapid spread up East coast
- 1976 Arrived in a Darwin plant nursery
 - Then, Nhulunbuy lagoon
- 1977-88 Ten more infestations in NT
 - Half of these eradicated
- 1983 First infestation in Kakadu (Magela)
- Now also in the East and South Alligator, Wildman, parts of western Arnhemland, Howard, Finnis and Daly River systems.



Control options

Advantages vs Disadvantages



Physical



Chemical



Biological



Weevil warriors



- Salvinia weevil
- *Cyrtobagous salviniae*
- Native to South America
- Only eats species of salvinia
- First released by CSIRO in 1980
- Great biological control success story
- Can reduce 99% of salvinia within 12 months
- Reduces spread
- Dynamic populations in Top End

Typical browning off and
containment of edge by weevils
(Yellow Waters)



Biocontrol on open water



April



September



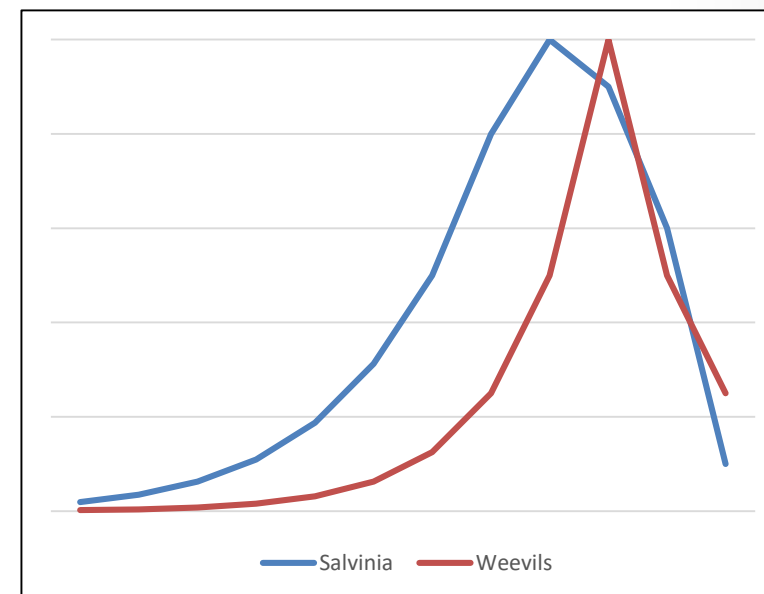
October



November

Jabiluka billabong (1992)

- Weevils prefer open areas with high nutrient salvinia
- Maximum around September, then
- Population crash around October – December
- Cause – low nutrient level of salvinia / sinking of salvinia
- Then salvinia grows faster than weevils can breed
- Weevil numbers remain low Feb – April
- Result: annual cycles



Improving biological control



REDISTRIBUTION

Moving weevil-infested salvinia to green salvinia

- Does not require any infrastructure
- Improves some situations
- When weevil numbers are high, it is too late in the year



AUGMENTATION

Rear extra weevils in breeding tanks

- Requires tanks and labour
- Fertiliser increases weevil numbers
- Ability to release weevils any time of year
- Boosts numbers in key locations



Djurrubu Weevil Breeding Project



- 2014 Salvinia levels became increased problem in Kakadu
- 2016 Traditional Owners are concerned about impact on traditional fishing and hunting practices Kakadu Waterways
- 2016 GAC began to work with NT weeds branch on possible solutions to issue using biocontrol. GAC board approved project to build weevil breeding facility
- March 2017 Construction of weevil rearing facility, 8 x 10 000 L tanks



Djurrubu Weevil Breeding 2017



- September 2017 – First release at Malabanjbanjdiu
- Successfully contained the spread of Salvinia throughout Billabong
- Early October 2017- Release at 4- Mile Hole
- Weevil population crashed October 2017 end of season
- Focus on improving process for breeding in 2018



Djurrubu Weevil Breeding 2018



- May – October 2018 weevil release at 3 sites in Kakadu,
 - Gurruk
 - Yellow Waters
 - 4 Mile
- Total 18 000 weevils released so far in 2018 with 3 tanks ready to release
- Maintained weevil population through use of fertiliser
- Improved efficiency
- Noticeable visible impact on Salvinia at release sites
- Future Plans regarding sudds



Before



After

Yellow Waters release site

Challenges – Sudds

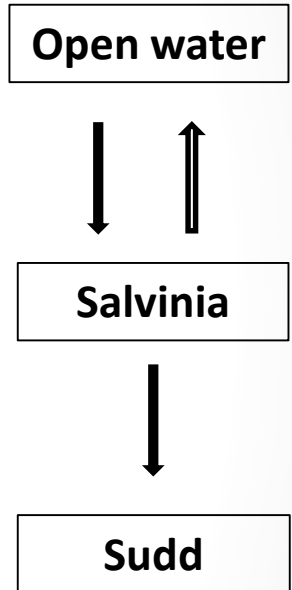


Different types

- Plugs
- Floating mats
- Multilayered

Major Problem

- Won't flush from floodwaters
- Won't sink from weevils
- Can get worse from year to year
- Chemical and physical removal





Sudds Treatment

- Salvinia has created sudd in waterways across Kakadu
- At Gurruk we have trialled a combination of chemical and biocontrol methods to breakdown the sudd
- Chemical application was trialled successfully
- Weevils were then released in the Billabong





Future Directions

- Further improvements to efficiencies in breeding – increase weevil numbers
- Integration of chemical and biological control methods
- Continued development of indigenous partnership to reduce the impact of Salvinia on key waterways
- Build on previous research and apply to current management

Acknowledgments



This work is built on the legacy and support of many others including but not restricted to:

- CSIRO
- Gundjeihmi Aboriginal Corporation Board (Traditional Mirarr owners)
- Violet Lawson (Traditional owner, Yellow Waters)
- Anthony Mann (Kakadu National Park)
- Matt Quinn (Kakadu National Park)
- Brett Skinner (Manager Coinda Lodge)
- Territory Natural Resource Management
- Wangamatj Landcare Group and Malak Malak Rangers (Daly River)
- Thamarrurr Rangers (Port Keats)
- Peter Christophersen (Kakadu Native Plants)