

Physical and mechanical control of *Crassula helmsii* and *Ludwigia peploides*.

Is it a realistic option?

Johan van Valkenburg, INBO & Natuurmonumenten

Norwich, October 17th 2013



Reducing the Impact of
Non-native Species in Europe
www.rinse-europe.eu

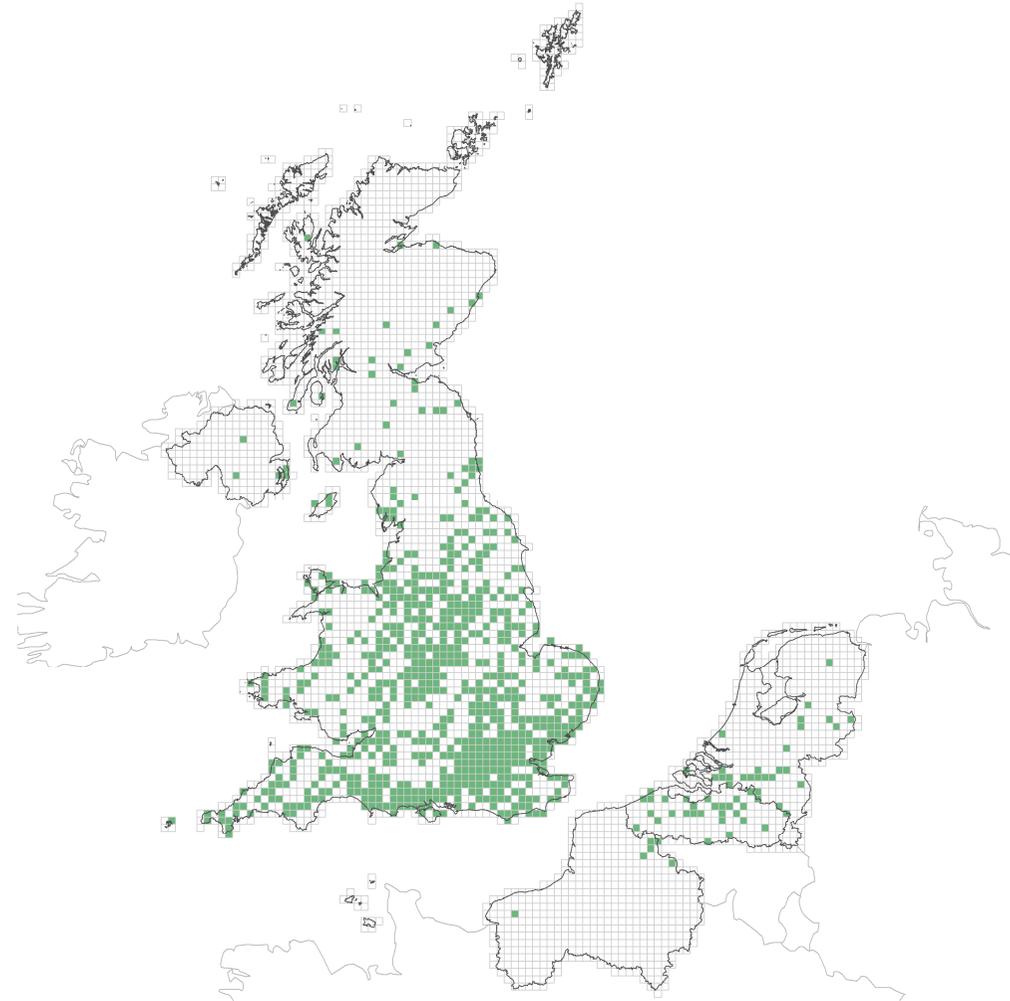
“Investing in your future”

Crossborder cooperation programme 2007-2013 Part-financed by the European Union (European Regional Development Fund)

Crassula helmsii

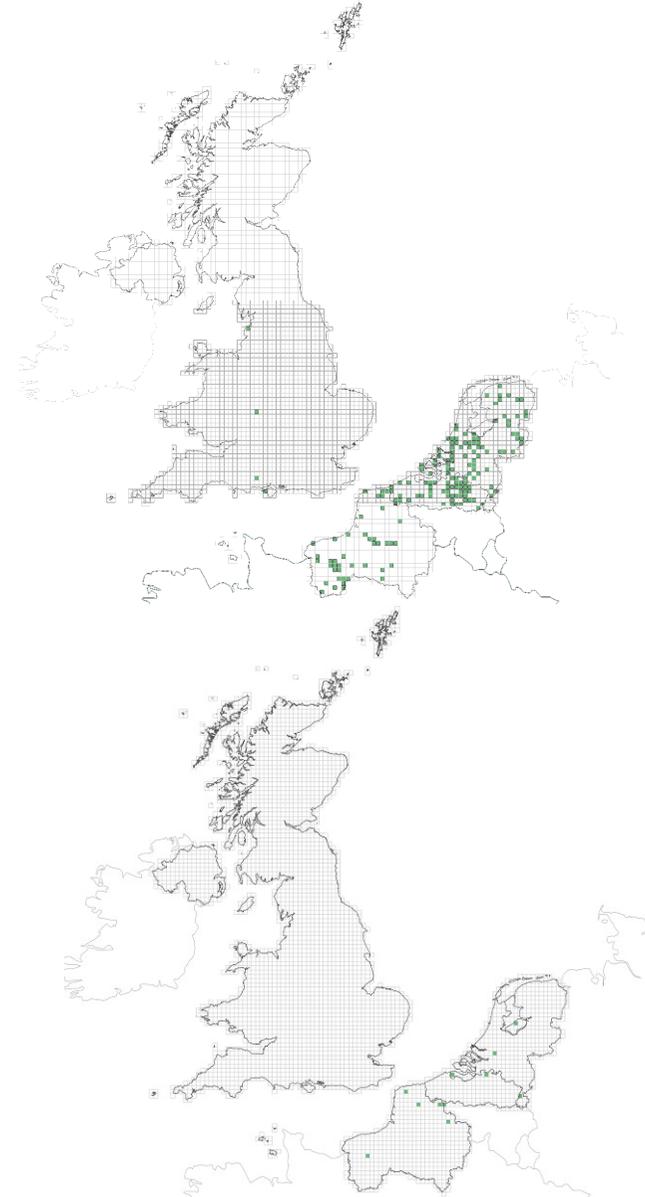


- Truly amphibic,
- Often overlooked
- Low nutrient levels (tolerance)
- Well established in UK
- Increasing fast in NL, B (and FR?)



Ludwigia grandiflora & *Ludwigia peploides*

- Both species posing the same problem, often misidentified
- High nutrient levels
- Recent arrival in UK (*L. grandiflora*)
- Well established NL, B & FR (*L. grandiflora*)
- Very limited NL, B, FR (*L. peploides*)



Activities in NL prior to RINSE EUPHRESCO DeCLAIM



	
	<p>Areas at Risk of Colonisation in the UK. <i>L. grandiflora</i> has been found in low lying ponds adjacent to the coast. However, there are several sites where it has been deliberately planted as an ornamental. It is tolerant of British winter temperatures and its occurrence is predicted to be widespread in ponds anywhere at low altitudes.</p> 
<p><i>Ludwigia grandiflora</i> (Water Primrose)</p> <p>Field Recognition Guide</p> <p>Preferred habitat: static shallow water-courses, ponds, ditches, with gently sloping muddy margins. Dead stems are visible in winter with green growth starting in March or early April. Flowers from July onwards.</p> <p>Key features: Deltoid (triangular) bracteoles at base of petiole. Prostrate form: leaves alternate on stem, oval in shape with distinct petiole and obvious opposite veins. Adventitious roots at nodes. Upright form: Leaves alternate on stem, elongated with obvious opposite veins. Flowers bright yellow 5 with petals.</p> <p>Reporting: please inform the Non Native Species Secretariat at www.nonnative-species.org giving grid reference, extent of infestation, photograph and date of observation, and the Biological records centre at http://www.brc.ac.uk/contact.htm</p> <p>Further action: Assess the risk of the population you have observed using the risk assessment sheet provided in this pack.</p>	

Ludwigia grandiflora (Michx.) Greuter & Burdet

A guide to Identification, Risk Assessment and Management



© S. Hathaway

Plant Protection Service, Wageningen, NL
Centre for Ecology and Hydrology - Wallingford, UK
June 2011

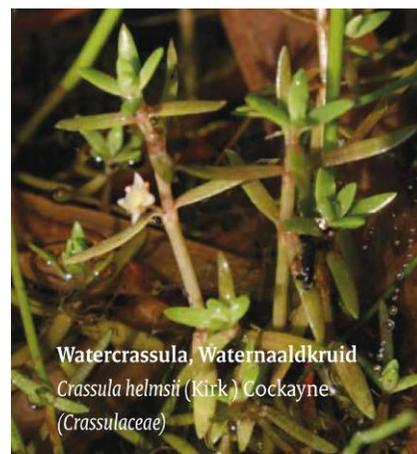
Field guide invavise aquatics NL / INVEXO project



Target species of management trials

- *Hydrocotyle ranunculoides*
- *Myriophyllum aquaticum*
- *Ludwigia grandiflora*

Crassula helmsii part of
communication project as such



Kenmerken

- Oeverplant, komt ook half- of geheel ondergedoken voor
- Hoogte 0,05 - 0,3 m
- Bladeren 0,5 - 1 cm lang
- Zeer tenger
- Dunne ronde kruipend-opstijgende stengel
- Tegenoverstaande vlezige bladeren
- Bloeitijd: juli - september
- Ten onrechte *Crassula* naam genoemd

Gelijke soorten

Vetmuur, sterrenkroos

	Watercrassula	Vetmuur	Sterrenkroos
Bloem	4 kroonbladen	5, soms 4 kroonbladen	Meer dan 5 kroonbladen
Blad	Vlezig, lijn- tot lierdriehoekig, 0-15 mm lang	Vlezig, lijnvormig, 1-10 mm	Vlezig, lijn- tot spitsbovig, 1-15 mm lang
Bladtop	Spits, soms met korte steekpunt	Met duidelijke steekpunt	Somp of uiterand
Stengel	Wit tot rood, alden groen	Groen	Groen
Groei vorm	Zakvormend	Straligwijzig vanaf 1 punt	Lange stengels met rozettes

16 Planten in de Nederlandse Dier- en Plantenwereld van de Nederlandse Natuur en Voedselwetenschappen

Actuele verspreiding

Recent sterk toegenomen.

Herkomst

Australië, Nieuw-Zeeland

Ecologie

Watercrassula vormt een dichte vegetatie op oevers en in ondiep water. Hierbij wordt de bodem volledig bedekt. Watercrassula heeft een zeer brede ecologische amplitude en komt in tegenstelling tot de meeste andere invasieve waterplanten ook voor in voedselarme milieus. Watercrassula is wintergroen. Verspreiding gebeurt door kleine fragmenten en overwinteringsknoppen.

Bedreiging

Watercrassula kan een zeer dichte vegetatie vormen op oevers en in voedselarme wateren. Hierdoor vormt het een ernstige bedreiging voor inheemse flora en fauna. Aangroei ook zeer kleine fragmenten snel kunnen uitgroeien is bestrijding erg problematisch.

Bestrijding

Zo volledig mogelijk verwijderen. Zeer kleine delen kunnen uitlopen op de kale bodem die bij bestrijding ontstaat. Fragmentatie voorkomen en nazorg is noodzakelijk.



Watercrassula, Waternaaldkruid
© 2014, Invexo

17 Invasieve waterplanten in Nederland / Vrijgelo

Information on Q-bank fact sheets



Q-Bank Factsheet

Crassula helmsii (Kirk) Cockayne Fam: Crassulaceae
Australian swamp stonecrop, New Zealand pigmyweed

Synonyms: *Tillaea helmsii* Kirk, *T. recurva* (Hook.f.) Hook.f., *Bullaria recurva* Hook.f., *Crassula recurva* (Hook.f.) Oestf. non N.E. Br.

Ecology: Australian swamp stonecrop forms dense mats of vegetation on banks and in shallow water. Australian swamp stonecrop has a very wide ecological amplitude and occurs, unlike other invasive aquatic plants, in nutrient-poor conditions. The species is evergreen. It is dispersed by small fragments and turions. In the Netherlands Australian swamp stonecrop is found mainly in pools and fens.

Threat: Australian swamp stonecrop can form a very dense mat of vegetation on banks and in nutrient-poor watercourses. This seriously reduces abundance of indigenous flora and fauna. The plant requires only a very small fragment to reproduce, and grows very rapidly.

Control: Remove plants as completely as possible. Tiny fragments can re-grow on bare soil created by eradication measures. Avoid fragmentation and ensure monitoring of treated areas. Digging up the plant and coverage with light-blocking cloth for one year helps reducing waste removal problems. Material and shoes should be thoroughly cleaned after being in an area infested with this plant to avoid further spread.

Identification / similar species: Australian swamp stonecrop is similar to pearlwort (*Sagina* spp.) and water-starwort (*Callitriche* spp.). The stem of this plant is usually white to red and the flower has 4 corolla leaves (pearlwort 5, rarely 4; water-starwort with tiny flowers without corolla leaves).

The screenshot also shows a large photograph of the plant, a distribution map of Australia, and smaller images of the plant's leaves and flowers. Logos for RINSE, Mera Seis Zeeën, NIERO.V.A., and the European Union are visible at the bottom.

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Identification / espèces similaires: Les stipules de la Jussie fausse-péplide sont rondes à ovales et gonflées, alors que celles de la Jussie à grandes fleurs sont triangulaires, étroites et plates. De plus, les anthères de la Jussie fausse-péplide mesurent 1 à 1,8 mm et celles de la Jussie à grandes fleurs 2 à 3 mm.

Q-Bank Factsheet

Ludwigia peploides (Kunth) P.H. Raven Famille: Onagraceae
Jussie fausse-péplide

Synonyms: *Jussiaea peploides* Kunth, *Jussiaea montevidensis* Spreng.

Ecologie: Écologiquement, la Jussie fausse-péplide s'apparente à la Jussie à grandes fleurs (*L. grandiflora*). La Jussie fausse-péplide est quant à elle autofécondée et une seule plante peut produire des graines.

Dangers: La Jussie fausse-péplide peut supplanter la végétation indigène dans l'eau et sur les rives. La végétation flottante peut faire entrave à la circulation de l'eau et réduire le teneur en oxygène de l'eau.

Contrôle: Il convient de retirer la Jussie fausse-péplide le plus complètement possible et il faut éviter la fructification. Il faut également éviter la fragmentation.

Identification / espèces similaires: Les stipules de la Jussie fausse-péplide sont rondes à ovales et gonflées, alors que celles de la Jussie à grandes fleurs sont triangulaires, étroites et plates. De plus, les anthères de la Jussie fausse-péplide mesurent 1 à 1,8 mm et celles de la Jussie à grandes fleurs 2 à 3 mm.

The screenshot also shows a large photograph of the plant with yellow flowers, a distribution map, and smaller images of the plant's leaves and flowers. Logos for RINSE, Mera Seis Zeeën, NIERO.V.A., and the European Union are visible at the bottom.

Ludwigia a brief history for NL



- First record *L. grandiflora* as invasive 2000
- First record *L. peploides* as invasive 2007
→ approval for eradication action in nature restoration project

Verification November 2007



Verification November 2007



Verification November 2007



Eradication November 2007



Mangement advice



- Topsoil removal to a depth of 10 – 30 cm and contaminated soil to be stockpiled
- Emergent creeping vegetation marked and the soil excavated to a depth of 30 cm
- Drainage of ditches prior to excavation
- Holes to be dug at the site in areas where no *L.peploides* is present, and contaminated topsoil with fragments and plants to be buried at least 1 m deep.
- Reprofilng ditches and margins after removal

Eradication November 2007



Eradication November 2007



Eradication November 2007



Eradication November 2007



Eradication November 2007

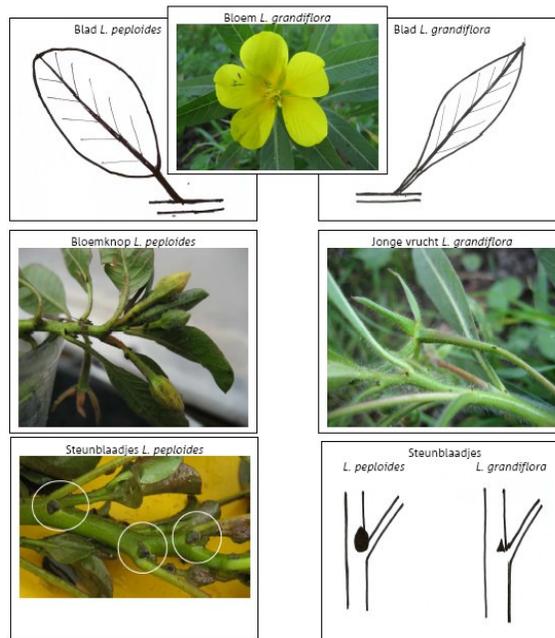


Follow-up Biesbosch 2008-2009

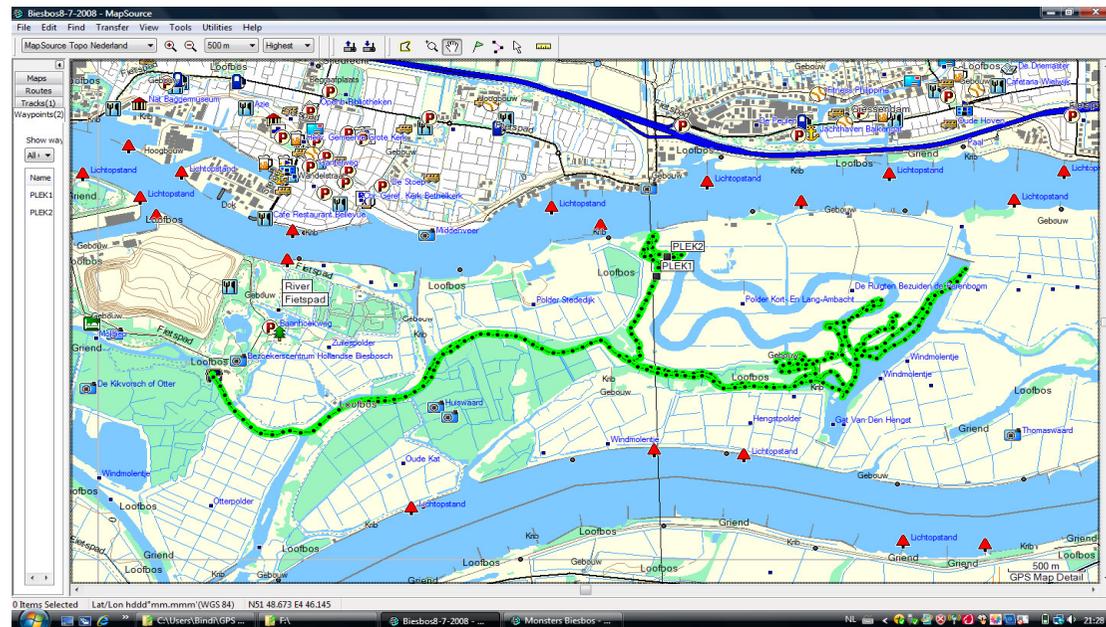


Datasheets Fytobewaking

	<i>L. peploides</i>	<i>L. grandiflora</i>
Steunblaadjes	Rond tot ovaal, gezwollen	Driehoekig, dun en plat
Bladeren op bloeiende stengel	Duidelijke bladsteel en bladschijf	Bladschijf aflopend



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 Ingangdatum: 14-9-2008
 Pagina 2 van 2



Bestrijding kleine waterteunisbloem op Tiengemeten | Natuurmonumenten - Mozilla Firefox

Bestand Bewerken Beeld Geschiedenis Blgdwijzers Extra Help

www.natuurmonumenten.nl/nieuws/bestrijding-kleine-waterteunisbloem-op-tiengemeten

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 **Natuurmonumenten**

NATUURGEBIED

Tiengemeten

WORD NU LID

Speelnatuur
Hollands dagje uit
De Wildernis in
Tickets & Tijden
Overzicht Tiengemeten

Tiengemeten

- Over dit natuurgebied
- Beleef Tiengemeten

NIEUWS

Bestrijding kleine waterteunisbloem op Tiengemeten

02 okt 2012, 14:50

Op Tiengemeten is de kleine waterteunisbloem (*Ludwigia peploides*) aangetroffen. Deze soort komt van nature niet in Nederland voor, kan zich explosief ontwikkelen en kan een bedreiging vormen voor inheemse soorten. Daarom neemt Natuurmonumenten maatregelen om verdere verspreiding van deze invasieve soort te voorkomen.

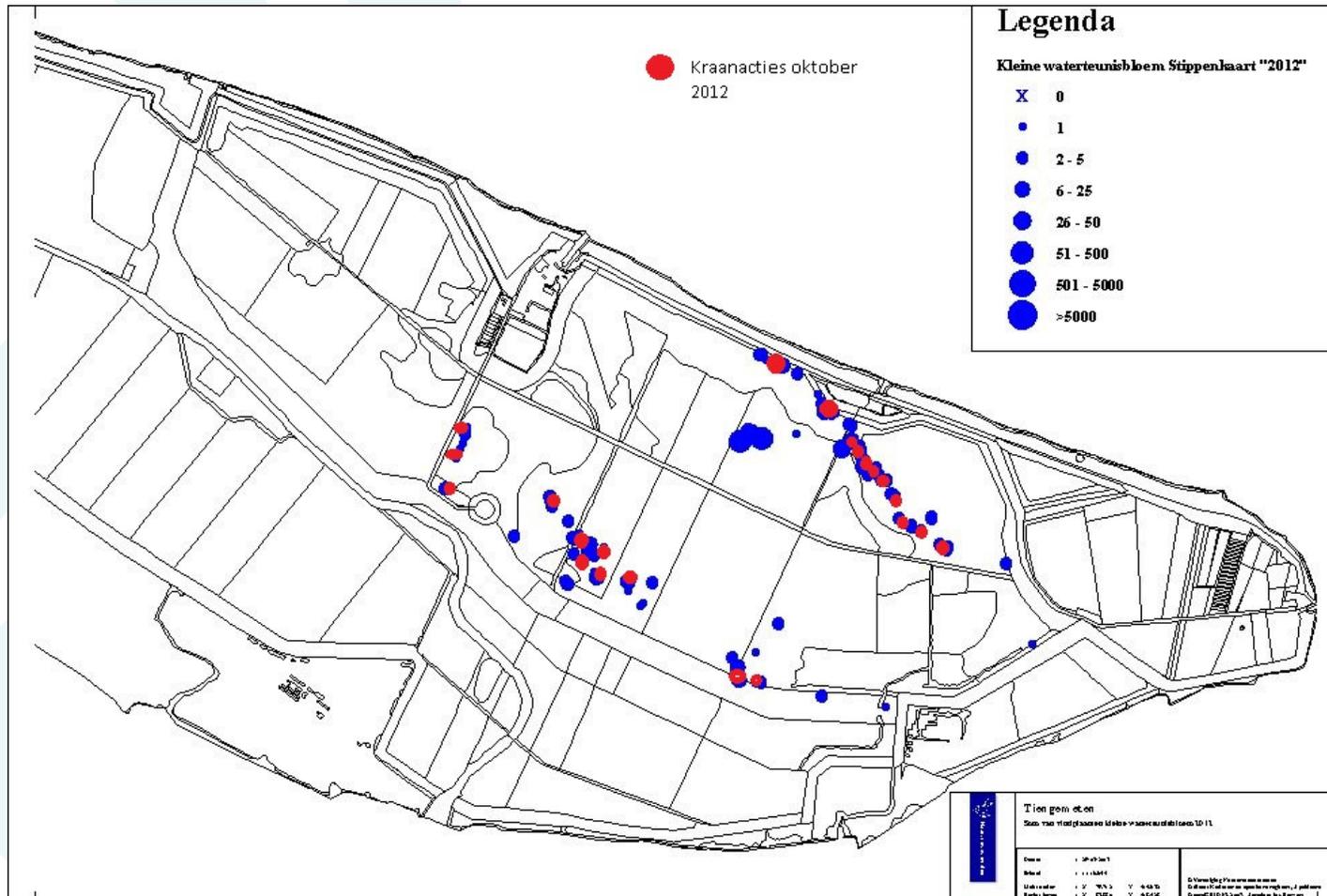
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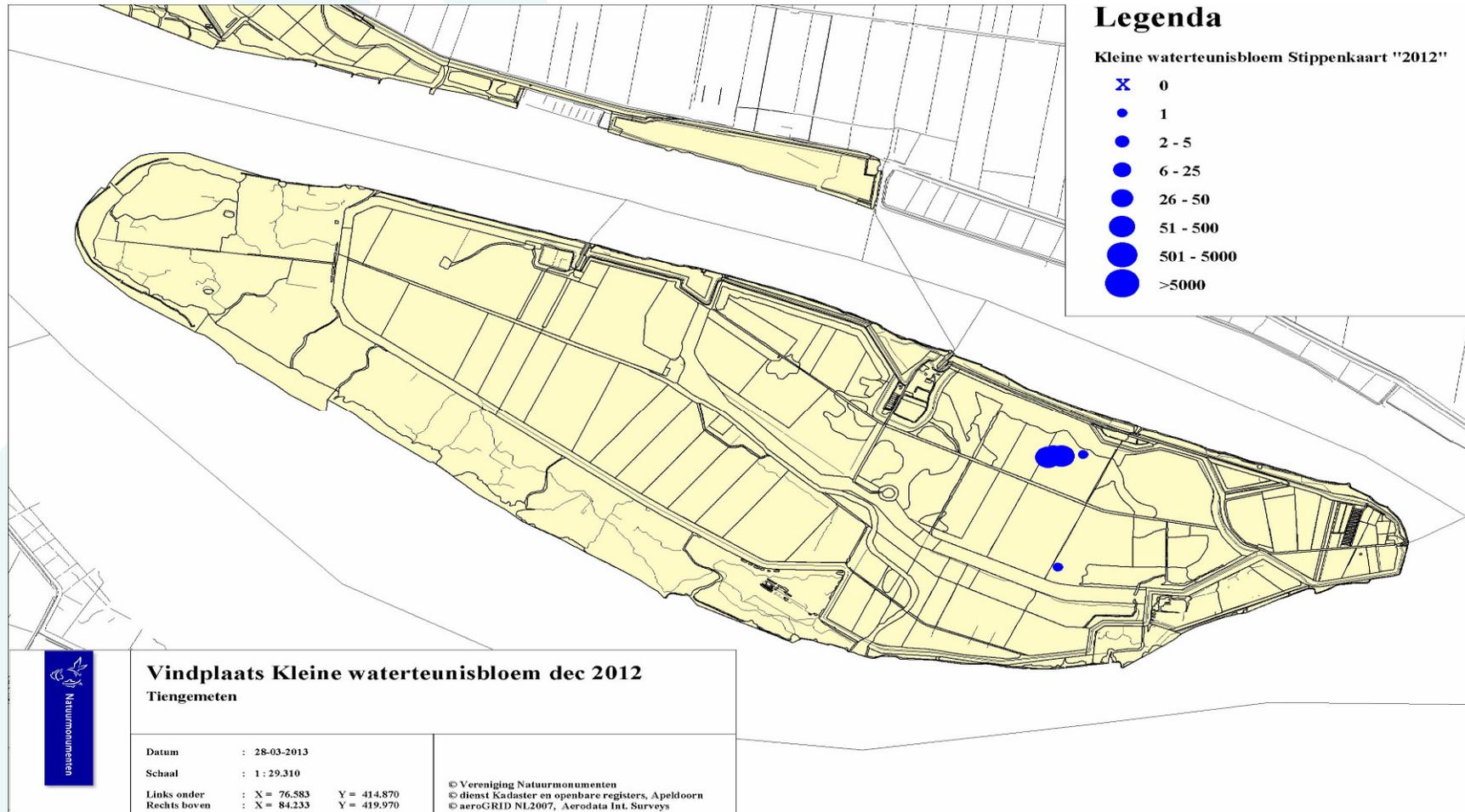
Distribution 2012



Tiengemeten 2012 nature restoration project



December 2012 survey



Mechanical and manual actions 2013



Mechanical and manual actions 2013



RINSE



Mechanical and manual actions 2013



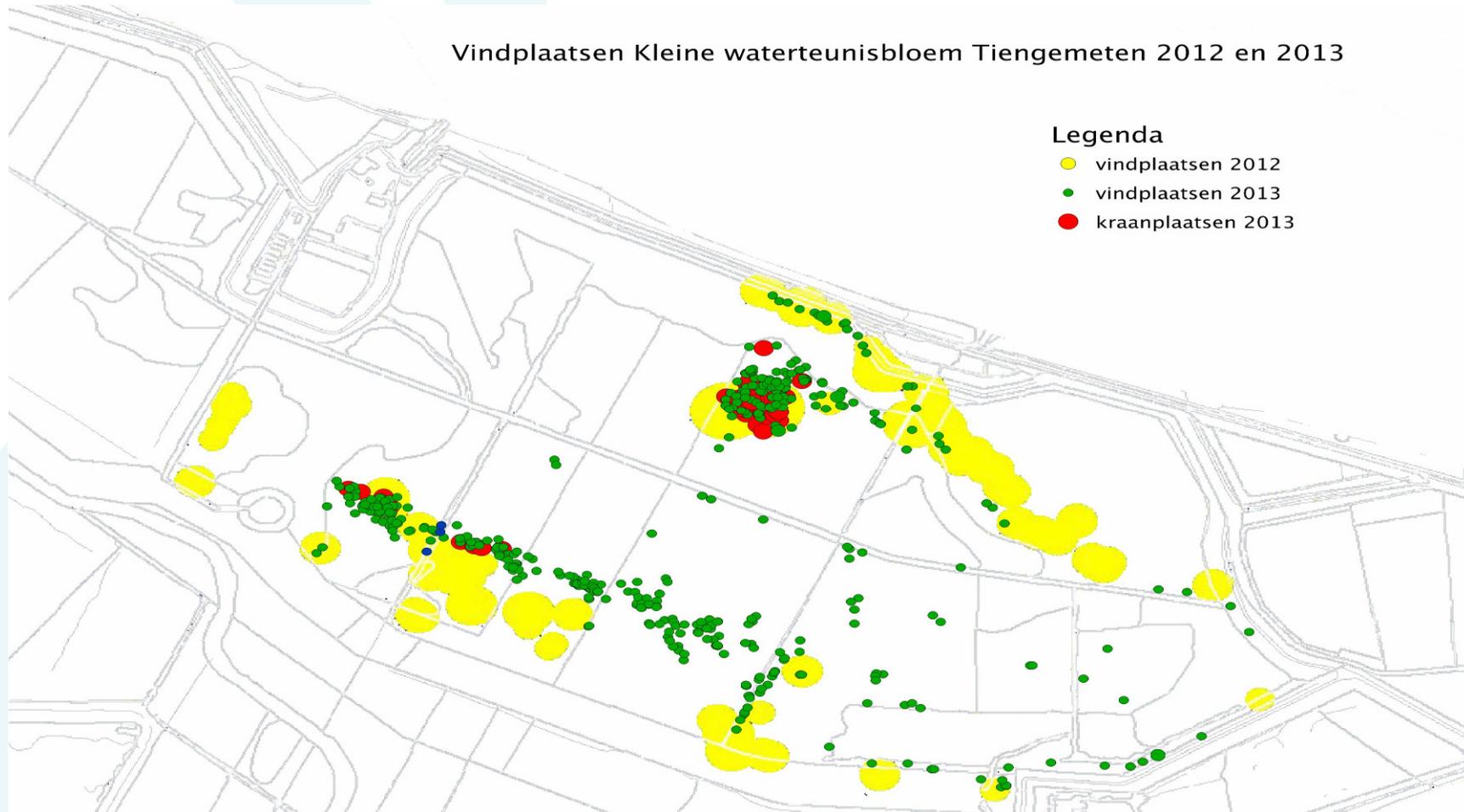
Facilitators of establishment



Results 2013 survey regrowth treated sites and new infestations



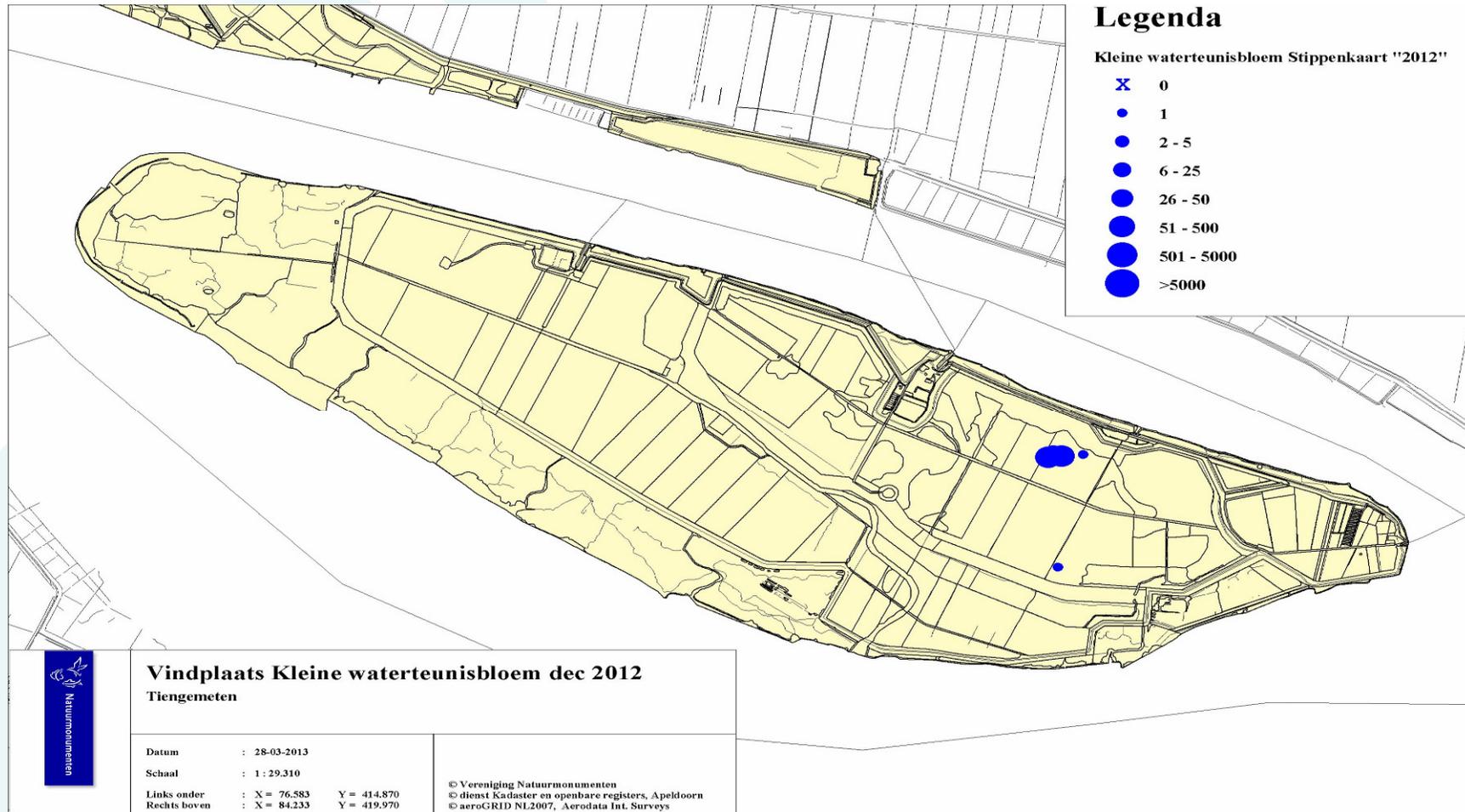
Vindplaatsen Kleine waterteunisbloem Tiengemeten 2012 en 2013



Legenda

- vindplaatsen 2012
- vindplaatsen 2013
- kraanplaatsen 2013

December 2012 survey



Financial aspects of actions



	2012	2013
Excavator	€ 3.400	€ 1.700
Amphibic excavator		€ 9.400
Materials		€ 300
Employees	160 hours	252 hours
Volunteers	60 hours	414 hours

Crassula a brief history for NL



- First record in 1995
- Reluctance to act in the absence of impact on drainage systems
- Gradual acknowledgement as a problem for nature restoration projects, dune valleys also susceptible.
- Increasing presence in ponds for conservation of amphibians

First involvement Noordenveld nature restoration project



Bestrijding hardnekkig woekerende watercrassula | Natuurmonumenten - Mozilla Firefox

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- › Activiteiten
- › Routes
- › Wandelingen
- › Dieren en planten
- › Projecten
- › Nieuws
- › Info en contact

NIEUWS

Bestrijding hardnekkig woekerende watercrassula

15 okt 2012, 15:59

NATUURMONUMENTEN STRIJDT TEGEN WATERPLANT OM ANDERE SOORTEN TE REDDEN

Watercrassula maakt ander leven onmogelijk
Dit waterplantje, ook wel waternaaldkruid genoemd, groeit zo snel, dat het binnen korte tijd alle andere water- en oeverplanten verstikt. Het is gevonden in een van de Vossenbergse vennen in

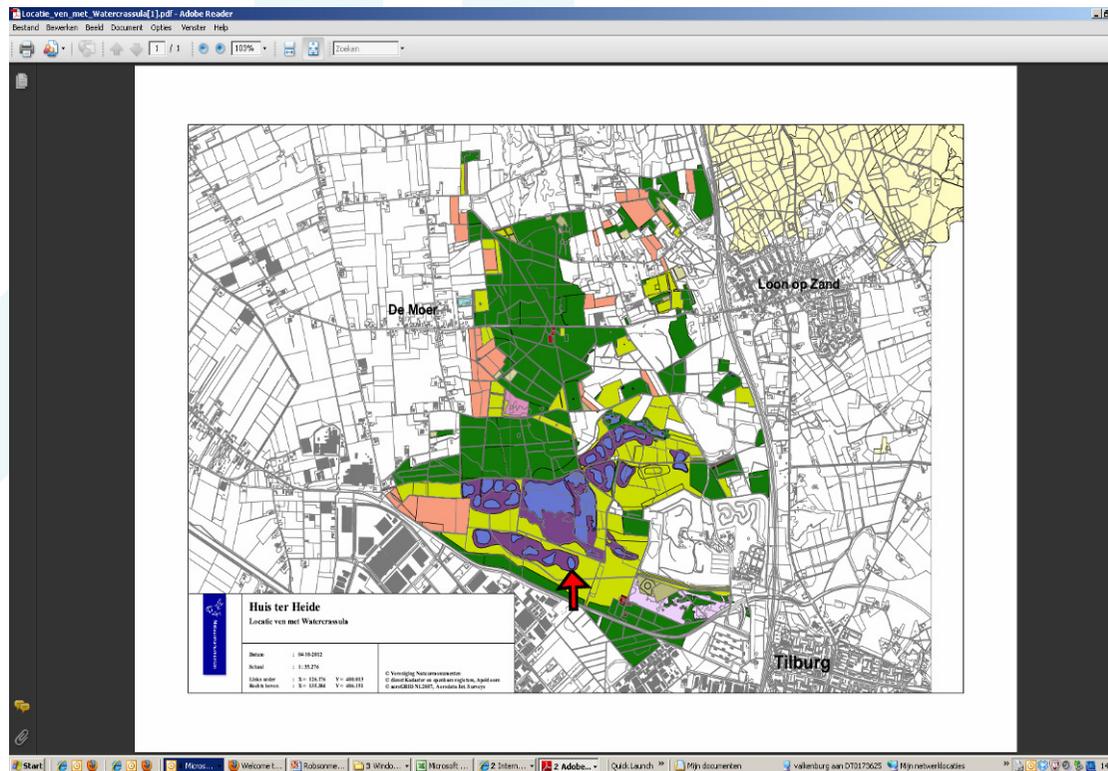


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Crassula helmsii at Huis ter Heide



- June 2012 request for management advice by Erwin de Hoop



Site visit June 2012



Site visit June 2012



Observations June 2012



RINSE

- Scattered plants on dry land
- Varying levels of infestation on the periodically flooded pools
- Massive infestations on the bank of the large pond
- Probably present at greater depth
- All infestations at some time of the year connected with the large pond

Advice based on visit June



- Containment of the infestation
- Exclude grazers from the site
- Start draining the pond
- Remove topsoil upper 20 cm
- Bury contaminated soil on site

July 2012 pump at full swing



July 2012 effect of drainage



Status activities end of July 2012



RINSE

- After weeks of pumping minimal achievable depth has been reached due to pressure from groundwater
- At centre of pond still 50 cm depth
- Start of removal of 20 cm topsoil on drained pond and dry land areas

Visit August 2012



- Topsoil removed of exposed pond bottom
- Water level rising
- Topsoil removed from originally delimited areas
- Additional surveys initiated



Visit August 2012



Status of the project August 2012



RINSE

- 3400 cubic meters of soil removed
- Still 1200 cubic meters to go
- Remnant population at the bottom of the lake is a permanent source of propagules
- Application of dye becomes an option to consider

October 2012



- Volunteers involved in survey of all new ponds
- Administrative search to obtain permission for application of dye initiated
- New sightings at 2 additional ponds
- INBO on board to monitor vegetation development



Visit October 9 2012



RINSE



Visit October 9 2012



RINSE



Recommendations & follow up



- Bare banks of the pond to be covered in 'plastic'
- Monitoring plots to be established
- New infestations to be signalled and removed or isolated
- Surveying fragments that wash ashore

Oktober - November 2012



Financial aspects of actions



Some figures so far (December 2012)

- Draining, scraping, burying € 55.000
- 1500 m of fabric (4 m wide) € 5.500
- 750 m of fencing material € 1.500
- Staff time Natuurmonumenten & volunteers (877 hours) € 21.000
- Dye (30 kg) € 600
- Staff time INBO p.m.
- Staff time NVWA p.m.

January 2013



- Water level rising above initial covered surface
- Fragmenst washing ashore
- Volunteers cleaning shores every week

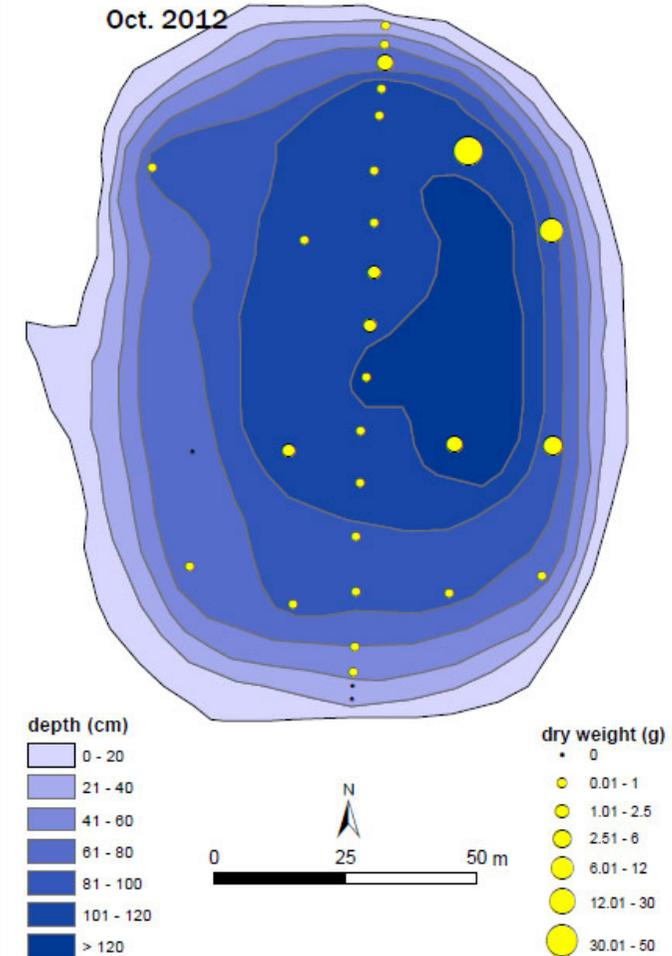


Application of dye 2013



RINSE

- First application January 16 kg
- Pond c. 150 m across
- Central part 150 cm deep

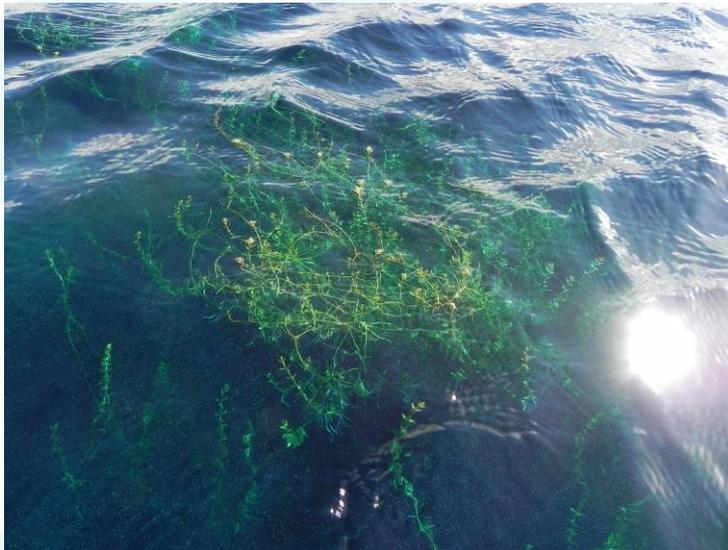


Application of dye 2013



RINSE

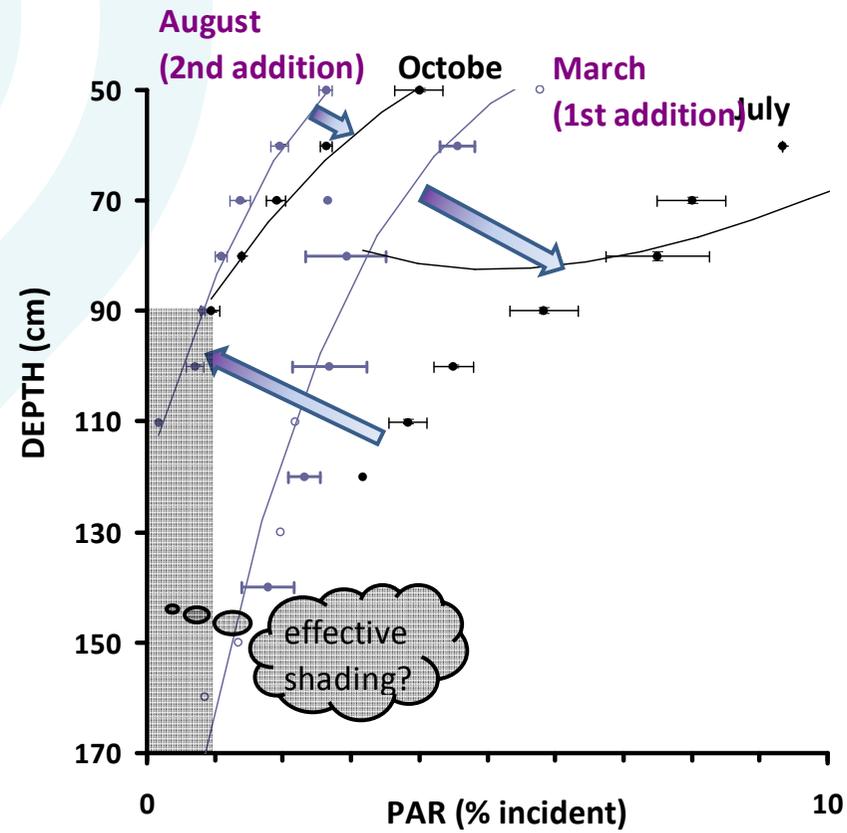
- Topping up March 14 kg
- 2nd load 30 kg August



State-of-the-art autumn 2013



Huis ter Heide: light availability 2013



Volunteer actions 2nd & 3rd pond



RINSE



October surprises



Financial aspects of actions 2013



- Costs of dye € 1200
- Volunteers 482 days
- Staff time 95 days
- Staff NVWA p.m.
- Staff INBO p.m.

- Natuurmonumenten >4600 hours

Every method tested



RINSE



Is it feasible?



Ludwigia peploides:

- Yes with stamina and preferably at an early stage of infestation (2nd year)

Crassula helmsii:

- Only with extreme sanitary measures in dry land areas
- Scale dependant
- In amphibic situations highly problematic
- Prepare for a serious battle (if you see a little there is far more!!)
- Management guidance document in preparation

Special thanks to:



- Astrid Withagen, Esther Dijkstra, Menno van Zuijen (Natuurmonumenten – Beheereenheid Haringvliet / Krammer Volkerak) & all volunteers
- Erwin de Hoop, Donald van Hoek, Gerard van den Burg (Natuurmonumenten – Midden Brabant) & all volunteers
- Tim Adriaens, Jo Packet, Wouter Van Landuyt, Lon Lommaert, Sander Devischer, Kris Decleer, Bart Vandevoorde (INBO)