

Wave riders: using seed dispersal characteristics to develop the surveillance programme for *Euphorbia paralias* (sea spurge) in New Zealand



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Background

Sea spurge (*Euphorbia paralias*) is a coastal weed that has the potential to cause significant environmental impact to coastal sand dunes. Juvenile and mature plants (Fig. 1) were detected in 2012 on the west coast of the North Island and an eradication programme was initiated by MPI soon after. Activities included management of the detection site to prevent further seed production and coastline surveys to prevent establishment of new populations.

Sea spurge seed can float and survive in sea water for over a year giving this species the ability to spread on coastal and ocean currents. To establish a new population seed must be deposited on land well above the high tide mark where there is sufficient time for germination, flowering and seed development before being washed back in to the sea during subsequent storm events. Seed washed off these sites may then be deposited further along the coastline. This is likely to have occurred at the detection site due to erosion of the seaward embankment (Fig. 2).

The objective of the surveillance programme was to detect new populations of sea spurge on the coastline near the original site before seed development could occur, thus minimising propagule pressure from local sources.



Fig 1: Sea spurge adult plant



Fig 2: Detection site showing flotsam deposits and erosion of seaward embankment.

Materials and methods

- Aerial photos were used to identify sites where conditions were suitable for seed deposition and plant establishment.
- Suitable sites are those with flotsam deposits and vegetation above the high tide mark.
- The search zone at these sites was between the high tide mark and the highest reach of storm surges.
- Each site was identified with GPS coordinates for easy location by field staff undertaking the surveys (Fig. 3).

Tool	Purpose	Target	Uses
One-off 200km helicopter survey.	Detect other populations in the region to inform response options.	Priority sites only. Visually distinctive populations or larger individual plants.	Broad-brush approach. Not suitable for detection of small populations or small plants.
Annual 30km land-based survey.	Prevent establishment of daughter populations from detection site.	Whole coastline with emphasis on priority sites. All plant sizes.	Intensive search suitable for high risk areas.
Detection site visits 3 per year.	Prevent seed development.	Detection site and immediate surrounds.	Maintain zero population density at detection site.
Communication with organisations with coastal interests.	Surveillance assistance and early notification.	Government agencies and contractors working on the New Zealand coastline.	Suitable for raising general awareness and early notification.
Publicly available information.	Raise awareness and encourage early notification.	General public.	Suitable for raising general awareness and early notification.

Discussion

The fourth year of the 10 year eradication programme was successfully completed in April 2016 and the original detection site remains the only known location of sea spurge in New Zealand. The eradication programme requires a suite of surveillance techniques that targets the two key intervention points.

1. Local sea spurge seed production is prevented by maintaining the detection site at zero population density for sea spurge; and,
2. Annual intensive surveys near the detection site reduce the risk of daughter populations establishing from seed that was produced at the site prior to the eradication programme commencing (Fig 4).

These surveys will continue for 10 years or until the viable seed reserve has been exhausted.

Continuing propagule pressure from Australia requires wider surveillance to prevent establishment of populations elsewhere in New Zealand. Drift studies indicate that it is feasible for viable seed to enter New Zealand on ocean currents from Australia. However, given that sea spurge has been established on the east coast of Australia for ~30 years and only one population is known to have established in New Zealand the likelihood of such an event occurring is considered to be low.

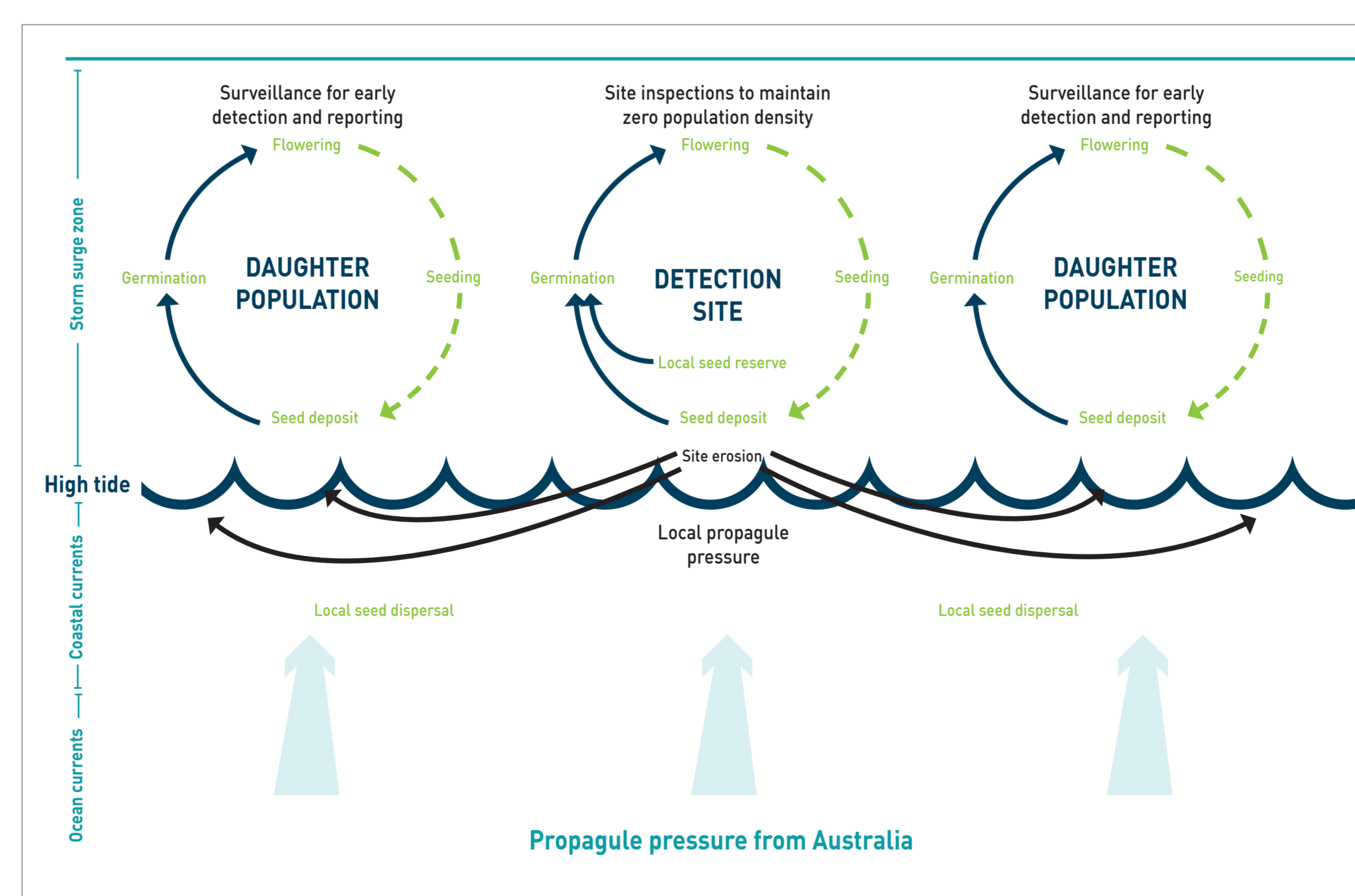


Fig 4: Interventions for eradication

References

- Heyligers, P. C. (2002). The spread of the introduced *Euphorbia paralias* (*Euphorbiaceae*) along the mainland coast of south-eastern Australia. *Cunninghamia* 7(3): 263-278 2002.
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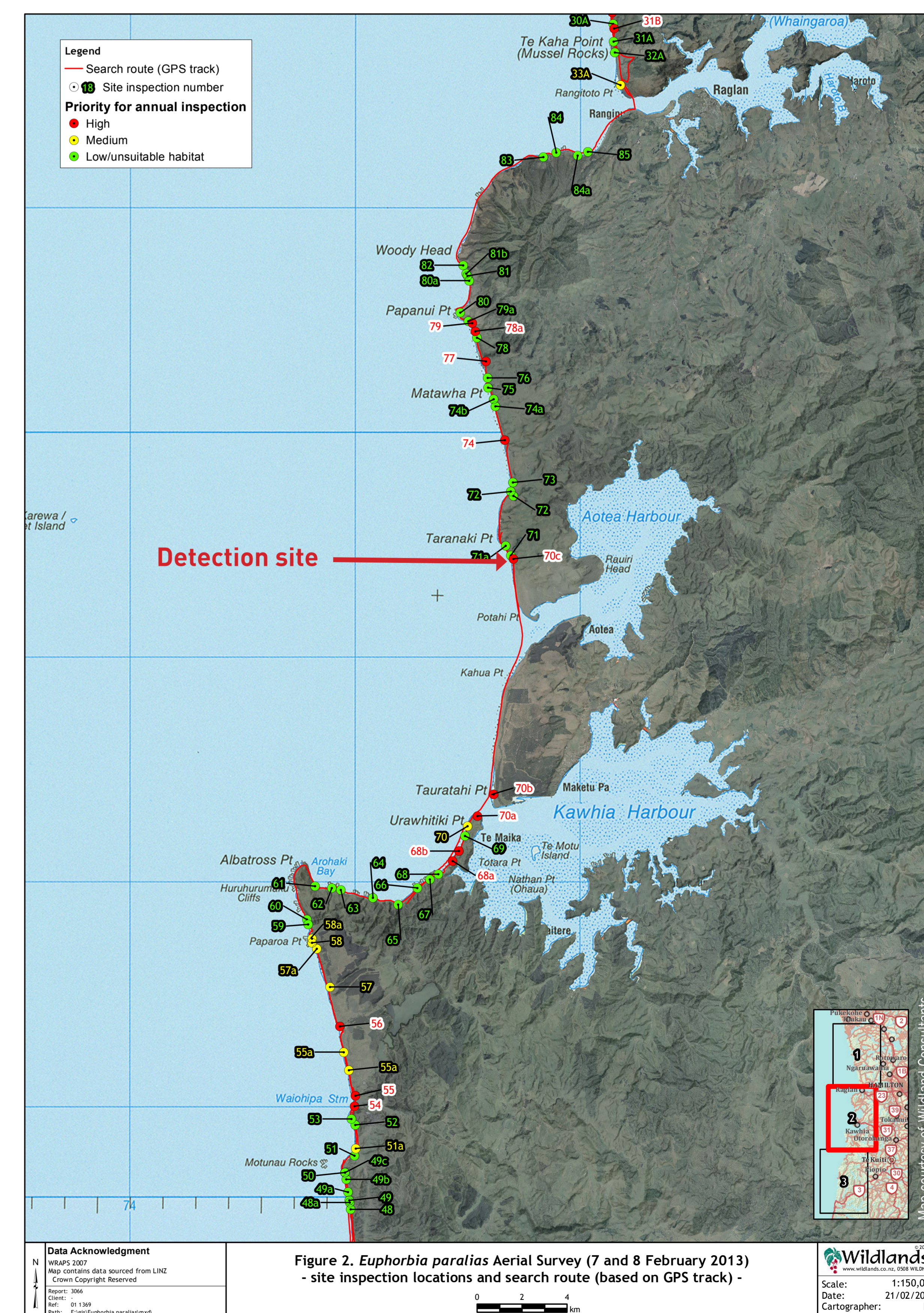


Fig 3: Aerial map showing priority survey sites

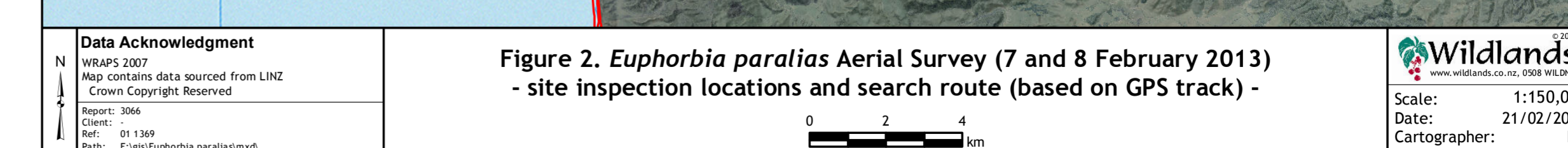


Figure 2. *Euphorbia paralias* Aerial Survey (7 and 8 February 2013) - site inspection locations and search route (based on GPS track) -

Wildlands
Scale: 1:150,000
Date: 21/02/2013
Cartographer: FW
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