SIMULATING AVIAN WEED SPREAD AND CONTROL STRATEGIES:
RHAMNUS ALATERNUS ON RANGITOTO ISLAND, NZ.

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A complex species-led problem within a commercial environment

Needs to offer transparency and flexibility for all parties

A need to close the “knowing-doing” gap

Needs to be simple, understandable and objective
Auckland Region
Approx. 600 years old
AN ISLAND OF A MILLION ISLANDS

Approx 2300 hectares (5,700 acres)

CONTEXTUALLY RICH RANGITOTO ISLAND
LARGE EXPANSES OF LAVA

IRREGULAR SHAPED VEGETATION ISLANDS
DENSE MATURE FORESTS

DEEP CRACKS AND CREVICES
EVERGREEN BUCKTHORN AS AN INVASIVE PLANT

Medium sized evergreen tree
Imported to NZ as an ornamental plant 1880’s
First recorded on Motutapu 1930’s

dioecious
matures 3-12 years
low germination rate if uneaten
SPATIAL DATA OVERLAY

DEVELOPING A CONTEXTUAL DATA SET
HOW CAN WE DEAL WITH SUCH A LARGE AND COMPLEX INVASION EFFICIENTLY AND EFFECTIVELY?
“Predictions about invasions must be context-specific. The search for all-encompassing rules for invasions is therefore futile”

EFFECTS OF SPATIAL PATTERN / LANDSCAPE STRUCTURE

STAGES OF INVASION

INTRODUCTION
Intentional or accidental

COLONIZATION

ESTABLISHMENT
Positive population growth

DISPERsal

SPATIALLY DISTRIBUTED POPULATIONS

INVASIVE SPREAD

DISPERAL KERNELS

Blackbird
(Terdus merula)

Silvereye, Waxeye
(Zosteropops lateralis)

Song thrush
(Turdus philomelos)

Rattus spp.


Popay (unpublished) Rhamnus and its germinatin, rhamnus and rats and birds and so on.

*Internal document. Department of Conservation.*
Context specific landscape, vector and plant variables provide environmental flexibility that effects invasion characteristics.

Cellular automata- pixels used for storing variables

- simultaneous neighbourhood related actions
CONTROL STRATEGIES

“the art of projecting and directing the larger military movements and operations of a campaign” as opposed to “the art of handling forces in battle or in the immediate presence of the enemy”

MEASURING CONTROL EFFORT

I = L + D + B + C

Where I = impedance
L = logistic considerations
D = weed detect ability
B = weed biological characteristics
C = control effectiveness

Adjusted for high incidence using operational data

CONTROL STRATEGIES; "MIN-MAX-Y-MAX-MIN-O" VERSUS OLD (CONTROL EFFORT = 3800)

CONTROL STRATEGY SUCCESS (CONTROL EFFORT = 4000)

BEST MANAGEMENT SCENARIO WITH BUDGET CONSTRAINTS
IMPLEMENTATION FOCUS ONE

FOCUS ON AREAS CONDUCIVE TO:

High growth rate
High dispersal rate
Shorter maturation rate
Higher pollination rate
Greater habitat fragmentation
Low impedance score

AND:
Adjacent to pest free areas with these properties
IMPLEMENTATION FOCUS TWO

FOCUS ON AREAS CONducIVE TO:

Low growth rate
Low dispersal rate
Longer maturation rate
Lower pollination rate
Low habitat fragmentation
High impedance score

AND:

Starting with areas adjacent to previously controlled areas during focus one
Where are we at operationally?
Thinking about pest plants in context...

Helps determine an efficient strategy of control
(it may be different to what you would expect)

This model has provided us with guidance to a solution to a complex problem

And is assisting the efficiency and effectiveness of the control operation

A big thanks to everybody