SPARTINA

1. Description of the problem

(a) Location of the case-study

In New Zealand, spartina is making an impact in Northland, Southland, Marlborough and the Bay of Plenty. This case study focuses mainly on efforts in the Bay of Plenty.

(b) History (origin, pathway and dates, including time-period between initial entry/first detection of alien species and development of impacts) of introduction(s)

The grass originates in north and south America. New Zealand farmers deliberately planted it during the 1950s and 1960s to bind erosion-prone stopbanks, trap sediment to help reclaim estuaries, and for stock grazing.

(c) Description of the alien species concerned: biology of the alien species (the scientific name of species should be indicated if possible) and ecology of the invasion(s) (type of and potential or actual impacts on biological diversity and ecosystem(s) invaded or threatened, and stakeholders involved)

Spartina, also known as cord grass, is a perennial rhizomatous grass, up to 100 centimetres tall.

Two species and one hybrid are found in New Zealand. The hybrid, *S. x townsendii*, is rare and has never been found north of Kaipara Harbour, near Auckland. The species *S. alterniflora* is the most robust (stems over eight millimetres diametre) and forms more open clumps. It is most common in Northland and seldom flowers. *S. anglica* is smaller (stems over five mm diametre) and forms dense clumps and meadows.

Spartina can be distinguished from the tall fescue (*Festuca arundinacea*) by the deeply ribbed upper leaf surface. It can be distinguished from couch (*Elymus* spp) by the short fleshy rhizomes.

It can be found in wetlands, especially estuaries. The properties that make it so popular with farmers are the same that cause it to be a huge ecological problem. It colonises mudflats, accretes sand and affects wading bird habitat, fisheries, tidal flows and channels. *S. alterniflora* causes the greatest concern in the North Island. Estuary habitat for other plants (such as eel grass) and animals is completely lost, and the back up of trapped water can cause flooding.

Only *S. anglica*, the less common species, spreads by seed. Both species spread by rhizomes and fragments that break off and disperse by water.

Overseas the plant is also a problem in Australia and Washington State in the United States.

(d) *Vector(s) of invasion(s) (e.g. of deliberate importation, contamination of imported goods, ballast water, hull-fouling and spread from adjacent area. It should be specified, if known, whether entry was deliberate and legal, deliberate and illegal, accidental, or natural.)*

Spartina spp. were deliberately introduced for erosion control, reclamation and stock feed. Planting and transplanting is a major cause of spartina invasion. Although spartina is a classified as a noxious plant and is prohibited from propagation, sale and distribution, some farmers are still planting spartina today.

(e) *Assessment and monitoring activities conducted and methods applied, including difficulties encountered (e.g. uncertainties due to missing taxonomic knowledge)*

In most sites where spartina spp. are being controlled, annual monitoring takes place to gauge the effectiveness of control and/or any spread. For example, in Tauranga Harbour, in the Bay of Plenty, the Department of Conservation (DOC) has mapped each site where spartina has been found using a Global Positioning Satellite (GPS). These sites are visited each year, and some have photo points which are also monitored annually. As well, DOC staff recently walked the entire margins of the harbour, a task that took several months, to make sure plants are not re-establishing.

During the annual checks, any re-growth is noted and in sprayed during summer.

2. Options considered to address the problem

(a) *Description of the decision-making process (stakeholders involved, consultation processes used, etc.)*

In places where spartina is a significant problem the plant is listed in the Regional Pest Management Strategies as a 'total control' plant. These strategies are developed by Regional Councils and the process involves full consultation with local communities and agencies such as DOC, the Ministry of Agriculture and Forestry (MAF) and independent science research institutes such as the National Institute of Water and Atmospheric Research (NIWA).

Further decisions relate to the type of control – the plant pesticide to be used and the method of application.

(b) *Type of measures (research and monitoring; training of specialists; prevention, early detection, eradication, control/containment measures, habitat and/or natural community restoration; legal provisions; public education and awareness)*

Many methods have been tried over the years, both organic and chemical. Organic control includes hand pulling the grass, cutting or mowing it, laying weed matting or grazing with stock.

Hand pulling the grass or cutting it is often unsuccessful as it hard to remove all rhizomes, and it easily grows back from root fragments. Laying matting only works over small areas – the matting is expensive and can be awkward to apply.

Grazing is not recommended as rhizome fragments caused by trampling can be transported downstream where they may take hold.

The most common control in New Zealand is chemical control, and today the most common chemical is Gallant, a grass selective spray that can be safely used where native species, such as mangroves and *Juncus sp* are also present. It does not leach and breaks down relatively quickly. It's down-side is that it is moderately toxic to fish. Tests on shellfish have revealed no effects. Other chemicals used are Roundup, Diquat and Pulse.

In the early days, chemicals were usually applied by operators wearing a knapsack. Since then the techniques and technology for applying the chemicals have improved and today's controllers have the option of helicopter spraying, hovercraft, amphibious vehicles, physically dragging hoses over mudflats or - a knapsack.

Raising public awareness has been a big feature of control programmes in the Bay of Plenty. This is in part because some people still favour the grass, and in part because control involves using toxic chemicals in the marine environment. This means resource consents are required, which means extensive consultation with local Maori (iwi) and interest groups, such as the Royal Forest and Bird Protection Society and a local anti-toxins group. Iwi were concerned that they could lose traditional shellfish harvesting beds in the harbour.

Press releases and signs were used during the actual spraying operation to alert the public.

(c) Options selected, time-frame and reasons for selecting the options

In the Bay of Plenty, the Department of Conservation has chosen to use the most effective chemical, Gallant in Tauranga Harbour. Despite its moderate toxicity to fish, it was considered unlikely to adversely impact the harbour's ecology because it holds a large volume of water which flushes regularly to dilute the chemical. The harbour covers 20,000 hectares, with spartina covering just one hectare.

Control has been underway for four years.

(d) Institutions responsible for decisions and actions

Decision-making and actions depend on which agency manages the land in question. For example, in the Bay of Plenty work to control spartina is a joint effort between DOC and the local Regional Council. This is because the plant is found on land managed by DOC, the council and private landowners. On one site, in the Tauranga Harbour, DOC is taking the lead role because most plants are on DOC-managed land. In another site, Makatu Estuary, a large part of the infestation is on privately owned land. In this case, the Regional Council is taking the lead, with DOC providing some funds.

Research by NIWA has helped allay concerns about the impact of chemicals on shellfish.

3. Implementation of measures, including assessment of effectiveness

(a) Ways and means set in place for implementation

In the Bay of Plenty, costs for control are shared by the Department of Conservation, the Regional Council and local City and District councils, depending on who has jurisdiction over the land.

(b) Achievements (specify whether the action was fully successful, partially successful, or unsuccessful), including any adverse effects of the actions taken on the conservation and sustainable use of biodiversity

Spartina control in Tauranga Harbour is on target to have the plant pest fully eradicated in five years' time.

While eradication is also the long-term aim at Makatu, the Regional Council is meeting resistance from landowners who value Spartina for its erosion control and reclamation abilities. Some are still planting the grass. Therefore, the council has set its medium term sights on containment and is putting work into advocacy and raising awareness.

(c) Costs of action

4. Lessons learned from the operation and other conclusions

(a) Further measures needed, including transboundary, regional and multilateral co-operation

More education is needed to convince private landowners of the harm caused by spartina and encourage them to (1) stop planting the species, and (2) help eradicate it off their land.

As well, engineering solutions to deal with landowners' needs for erosion control need to be investigated and resourced. The problem here is that such 'hard' solutions are generally much more expensive in the short-term than planting spartina, even though it is now obvious that the long-term control and environmental costs of the latter are high.

(b) Replicability for other regions, ecosystems or groups of organisms

Control methods used in the Bay of Plenty are also used in other parts of New Zealand. The method is largely determined by the local terrain, the size of the problem and the views of the local communities.

(c) Information compilation and dissemination needed

Further research about the impacts or otherwise of toxins in the aquatic environment are needed. For example, every year in the Bay of Plenty complaints are made about shellfish dying as a consequence of the control programme. However, a year-long research project by NIWA on benthic fauna, commissioned by DOC, concluded the plant pesticide Gallant has no effect on benthic communities. In fact, these communities increased after spraying because they no longer had to compete with the spartina.