

State Plan target

By 2015 there will be a reduction in the impact of invasive species.

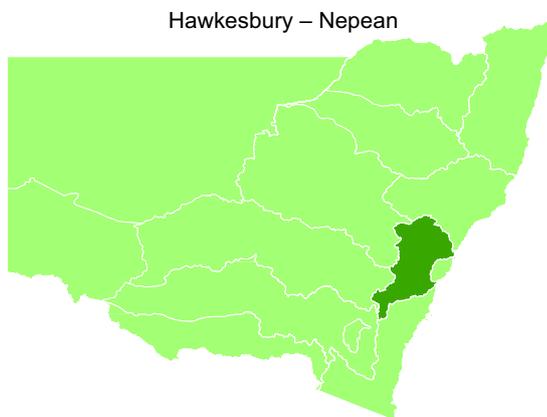
Background

'Invasive species' is the collective term used to describe weed, pest animal, aquatic pests or invertebrate pest species. These species have been assessed as likely to have significant impacts – or are already impacting significantly – on the environment, production, human health or amenity. Invasive species impact (act as a pressure) on natural resource condition.

A detailed technical report describes the methods used to derive the information contained in this report. At the time of publication of the *State of the catchments (SOC) 2010* reports, the technical reports were being prepared for public release. When complete, they will be available on the I&I website: www.industry.nsw.gov.au/info/mer.

Note: All data on natural resource condition, pressures and management activity included in this SOC report, as well as the technical report, was collected up to January 2009.

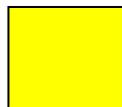
Map of the catchment



Assessment

Pressures

Overall assessment across indicators



Moderate

Trend

?

Confidence

Medium

Invasive species' impact as a pressure on biodiversity themes

The overall assessment is an average of the three indicators: new, emerging and widespread.

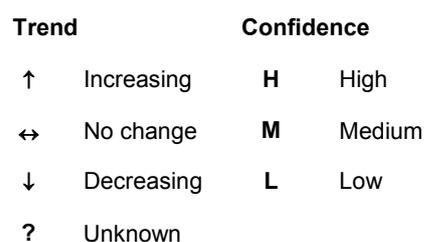
While not all invasive species are monitored across New South Wales, these indicators represent some of the highest impacting species. The level of impact assessment (moderate) is unlikely to change in the short term, but the trend for overall impact of the species monitored can show the level of success of invasive species management to exclude and eradicate new threats, protect biodiversity at selected sites from established invasive species, and lessen the negative socio-economic impacts of established invasive species.

Table 1 Indicator summary

	Pressure	Baseline data	New data	Trend	Confidence
New invasive species				?	M
Weeds		7		?	M
Emerging invasive species				?	M
Freshwater pests		7		?	H
Marine pests		1		?	L
Pest animals		2		?	M
Weeds		34		?	M
Widespread invasive species				↓	M
Foxes			decreasing	↓	M
Freshwater pests		36.62%		?	H
Wild dog losses		2934		?	L



No data



New invasive species

Indicator 1 – Number of new invasive species; definitions and measurement

New invasive species are any introduced species that have not been recorded in NSW previously and whose impacts are likely to be significant; alternatively, they are species previously recorded in NSW that have since exhibited invasiveness.

This indicator is measured as the change in number of new invasive species in the region relative to the number reported 12 months previously. Table 1 shows baseline data only, as recorded at the

date of this first report. Data is being collected on new priority weeds, new marine pests, new pest animals and new freshwater pests.

Freshwater pests

There are no new freshwater pest species reported in the Hawkesbury–Nepean region.

Marine pests

There are no new marine pest species reported in the Hawkesbury–Nepean region.

Pest animals

There are no new pest animal species reported in the Hawkesbury–Nepean region.

Weeds

There are seven new weed species reported in the Hawkesbury–Nepean region.

Table 2 New weed species reported in the Hawkesbury–Nepean region by local government

Scientific Name	Common Name
<i>Cyperus teneristolon</i>	cyperus teneristolon
<i>Ludwigia peruviana</i>	ludwigia
<i>Ludwigia repens</i>	red ludwigia
<i>Psidium cattleianum</i>	cherry guava
<i>Pueraria lobata</i>	kudzu
<i>Sporobolus pyramidalis</i> (<i>S. natalensis</i>)	giant rat’s tail grass
<i>Thunbergia laurifolia</i>	laurel clock vine

Emerging invasive species

Indicator 2 – Distribution and abundance of emerging invasive species; definitions and measurement.

An emerging species is a newly established species whose distribution and abundance is increasing.

This indicator is the net change in species trends. For example, 34 species increasing distribution and abundance compared to 11 species decreasing equates to a net increasing trend for this indicator. Data is being collected on emerging priority weeds, emerging marine pests, emerging pest animals and emerging freshwater pests.

Freshwater pests

There are seven emerging freshwater pest species reported in the Hawkesbury–Nepean region.



Table 3 Emerging freshwater pest species reported in the Hawkesbury–Nepean region by Industry & Investment NSW (I&I)

Scientific Name	Common Name
<i>Cyprinus carpio</i>	common carp
<i>Gambusia affinis</i>	mosquitofish
<i>Carassius auratus</i>	goldfish
<i>Oncorhynchus mykiss</i>	rainbow trout
<i>Perca fluviatilis</i>	redfin perch
<i>Salmo trutta</i>	brown trout
<i>Misgurnus anguillicaudatus</i>	oriental weatherloach

Marine pests

There is one emerging marine pest species reported in the Hawkesbury–Nepean region.

Table 4 Emerging marine pest species reported in the Hawkesbury–Nepean region by I&I

Scientific Name	Common Name
<i>Caulerpa taxifolia</i>	caulerpa

Pest animals

There are two emerging pest animal species reported in the Hawkesbury–Nepean region.

Table 5 Emerging pest animal species reported in the Hawkesbury–Nepean region by Livestock Health and Pest Authorities

Scientific Name	Common Name
<i>Equus caballus</i>	feral horses
<i>Dama, Cervus, Axis</i> spp.	feral and wild deer

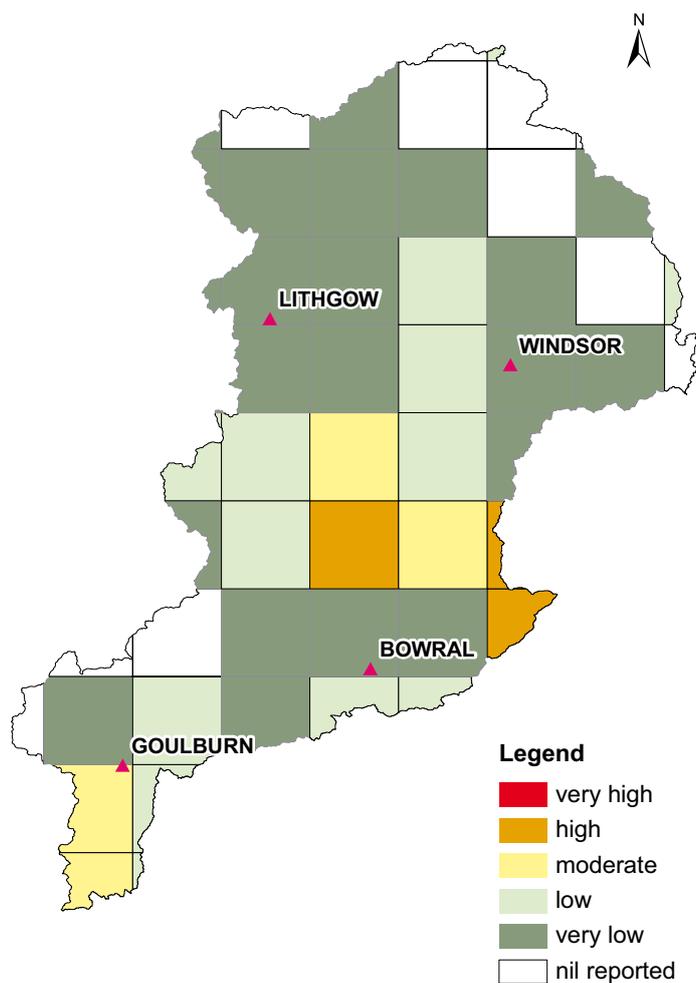


Figure 1 New and emerging pest animal index (aggregation of pest animal data for indicators 1 and 2)

The pest animal index is measured by adding the density scores (Table 6) for all pest animals monitored for each grid square. Species monitored are camels, horses, donkeys, deer and cane toads.

The index classes are:

Very high	8–10
High	6–7
Moderate	4–5
Low	2–3
Very low	1

Table 6 Density classes for pest animal and weed scores

Density classes	Score	Density
Present-occurrence unknown	1	?
Occasional and localised	1	<1%
Occasional and widespread	2	1% to 10%
Common and localised	3	11% to 50%
Common and widespread	4	11% to 50%
Abundant and localised	5	>50 %
Abundant and widespread	6	>50 %

Weeds

There are 34 emerging weeds reported in the Hawkesbury–Nepean region.

Table 7 Emerging weeds reported in the Hawkesbury–Nepean region

Scientific Name	Common Name
<i>Acetosa sagittata</i>	rambling dock/turkey rhubarb
<i>Baccharis halimifolia</i>	groundsel bush
<i>Cabomba caroliniana</i>	cabomba
<i>Caesalpinia decapetala</i>	mysore thorn
<i>Celtis sinensis</i>	Chinese celtis
<i>Dipogon lignosus</i>	dipogon
<i>Eichhornia crassipes</i>	water hyacinth
<i>Equisetum</i> spp.	horsetail
<i>Gloriosa superba</i>	glory lily
<i>Gymnocoronis spilanthoides</i>	temple plant/Senegal tea plant
<i>Heliotropium amplexicaule</i>	blue heliotrope
<i>Heteranthera reniformis</i>	kidneyleaf mudplantain
<i>Hieracium</i> spp.	hawkweed/orange hawkweed

Scientific Name	Common Name
<i>Hygrophila costata</i>	yerba de hicotea/hygrophila
<i>Hyparrhenia hirta</i>	coolatai grass
<i>Lantana montevidensis</i>	lantana (creeping)
<i>Ludwigia longifolia</i>	long-leaf willow primrose
<i>Moraea</i> spp.	cape tulips
<i>Nassella trichotoma</i>	serrated tussock
<i>Parietaria judaica</i>	pellitory
<i>Paspalum quadrifarium</i>	tussock paspalum
<i>Pennisetum setaceum</i>	fountain grass
<i>Pennisetum villosum</i>	long-style feather grass
<i>Phyla</i> spp.	lippia
<i>Phyllostachys</i> spp.	rhizomatous bamboo
<i>Pistia stratiotes</i>	water lettuce
<i>Sagittaria platyphylla</i>	sagittaria
<i>Schinus terebinthifolius</i>	broad-leaf pepper tree
<i>Solanum seaforthianum</i>	Brazilian nightshade
<i>Sorghum</i> sp. hybrid cultivar	silk forage sorghum
<i>Sorghum x almum</i>	Columbus grass
<i>Tecoma stans</i>	yellow bells
<i>Triadica sebifera</i>	Chinese tallow tree
<i>Vachellia farnesiana</i>	mimosa bush



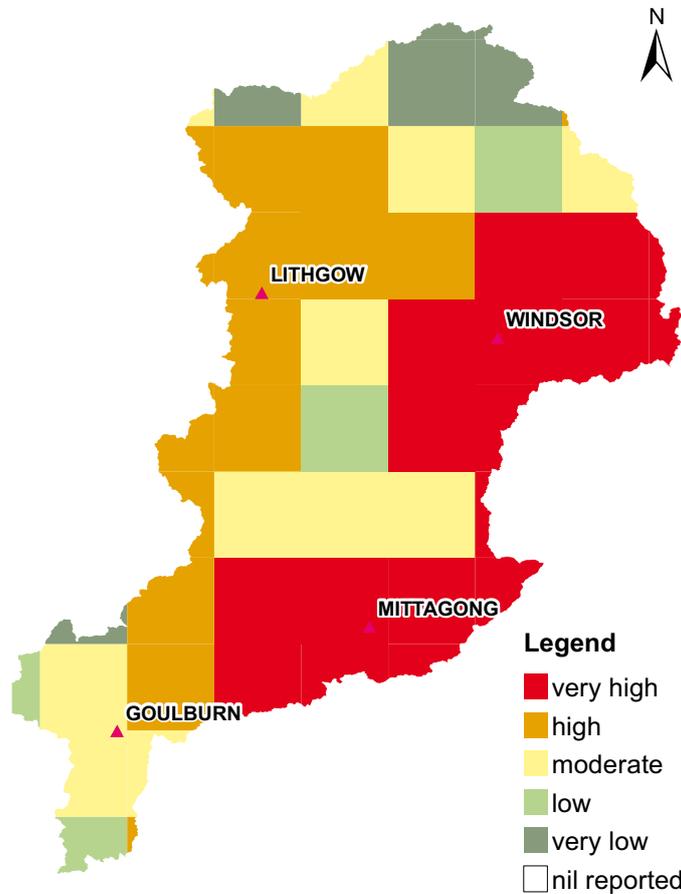


Figure 2 New and emerging weeds index (aggregation of weeds data for indicators 1 and 2)

The index is measured by adding the density scores (see Table 6) for all weeds monitored for each grid square. There were 134 priority weed species mapped across NSW.

The index classes are:

Very high	12+
High	7–11
Moderate	4–6
Low	3
Very low	1–2

Widespread invasive species

Indicator 3 – Impact of widespread invasive species at priority sites; definitions and measurement

A widespread species is any species widely distributed in NSW.

This indicator is measured by the change in impact of all the widespread pest species monitored. Data is being collected on the change in impacts of foxes on threatened species at priority sites and bitou bush on threatened plant species at priority sites, the number of stock losses attributed to wild dogs, and the number of alien fish as a percentage of total fish at sampling sites.

Bitou Bush and Boneseed Threat Abatement Plan (Bitou TAP)

The Bitou TAP is coordinated by DECCW. The planning stage commenced in late 2006. The Bitou TAP has identified 167 species of native flora under threat by bitou bush along the NSW coast.

The degree of success of bitou bush control at priority sites will be reported progressively until 2011.

Fox Threat Abatement Plan (Fox TAP)

The NSW Threat Abatement Plan for predation by the red fox (Fox TAP) establishes priorities for fox control for the conservation of biodiversity across NSW. In particular, the plan identifies which threatened species are most likely to be impacted by fox predation and the sites at which these impacts are predicted to be most critical. In addition, the plan includes monitoring programs to measure the response of priority threatened species to fox control at these sites.

Table 8 Threatened species protected in the Hawkesbury–Nepean region by fox control

Threatened species	Population numbers at fox control sites
southern brown bandicoot	increasing

The net result for the threatened species is a decrease in the impact of foxes at priority sites.

Freshwater pests

Data on freshwater pests is being collected by I&I. The freshwater sampling provides data for an indicator measuring the impact of alien fish (non-native fish) on native fish. The indicator is measured as the percentage of alien fish counted as part of the total catch at a particular site. The average of all site indicators in the Hawkesbury–Nepean region is 36.62 per cent.



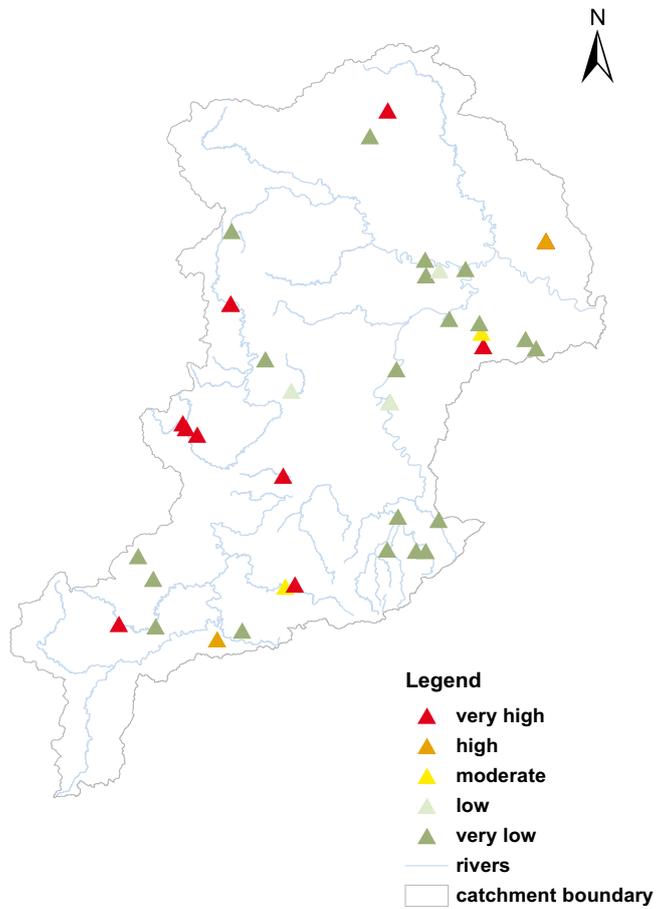


Figure 3 Alien fish percentage in the Hawkesbury–Nepean region

The indicator classes are:

Very high	81% to 100%
High	61% to 80%
Moderate	41% to 60%
Low	21% to 40%
Very low	0% to 20%

Wild dog stock losses

In the Hawkesbury–Nepean region, 2934 stock losses attributed to wild dogs were reported to I&I during the period 2004–2007.



Figure 4 Wild dog stock losses in the Hawkesbury–Nepean region

The indicator classes are:

Very high	>1000
High	301–1000
Moderate	151–300
Low	51–150
Very low	1–50

Management activity

State level

The invasive species target is being addressed at the state level by the implementation of the NSW Invasive Species Plan. The plan aims to prevent the introduction of new invasive species, eradicate or contain new incursions that have established and to implement control programs to reduce the impacts of widespread species at priority sites.

Some of the state level initiatives include:

- protection and control, including:
 - protecting environmental assets from widespread weeds; prioritising environmental assets at risk from widespread weeds and sites for control in the Hawkesbury–Nepean region. A draft plan for the Hawkesbury–Nepean region is being developed to guide investment until 2015
 - participating in a national effort to control *Salvinia molesta*, one of the 20 weeds of national significance. I&I is hosting the Salvinia National Coordinator and staff are rearing the weevil that acts as a biological control (bio-control) agent
 - bio-control of Patterson’s curse
 - a lantana rust bio-control project
 - a serrated tussock coordination project
 - Bitou TAP
 - implementing strategic fencing in national parks to manage feral goats
 - Fox TAP
- best management practice for:
 - alligator weed
 - cabomba
 - dryland cropping systems (weeds)
 - regional fox control
 - *Phytophthora cinnamomi*
- education and capacity building, including:
 - ‘Weed Warriors’ schools project
 - ‘What does your garden grow?’ community capacity project
 - I&I courses on topics such as vertebrate pest management and planning for pest management. For more information go to www.dpi.nsw.gov.au/agriculture/profarm/courses
- research, including:
 - an early detection program for aquatic weeds
 - vine weed research project (cats claw creeper and madeira vine)
 - determining regional weed management priorities for the conservation of biodiversity
 - conducting a survey of *Phytophthora cinnamomi*, the causal agent of Phytophthora dieback in native flora, throughout the region

- investigating the susceptibility of 28 species of NSW flora to *Phytophthora cinnamomi*
- assessing the risks of wild deer in NSW
- causes in variation of the rabbit haemorrhagic disease virus in wild rabbit populations
- commercial use of pest animals (production and conservation values)
- a scoping study for the release of sterility agents for foxes and rabbits
- improving the management of Australia's pest birds
- South East NSW and Australian Capital Territory wild dog project
- pest animal regional strategies (pest plan)
- monitoring, evaluation and reporting (MER), including:
 - state of the catchments (SOC) reports – invasive species data collection
 - SOC MER data collected as support to the DECCW's state of the environment report
 - Fox TAP; the monitoring of biodiversity and foxes in response to fox control at priority sites. Priority sites in the Hawkesbury–Nepean region include conservation reserves and private lands in the following areas: Jenolan Caves, St Albans, Taralga, Wolgan River, Wollondilly, and Ku-ring-gai Chase. The biodiversity response is being analysed as part of the review of the Fox TAP
 - estimating feral goat numbers
 - Bitou TAP; the monitoring of biodiversity, bitou bush and other weeds in response to control at priority sites, of which there are five across all land tenures in the Hawkesbury–Nepean region
 - lantana control; the monitoring of biodiversity, lantana and other weeds in response to control at priority sites identified in a draft lantana plan. There are two priority sites in the Hawkesbury–Nepean region.

Further reading

- McNaught I, Thackway R, Brown L & Parsons M 2006, *A field manual for surveying and mapping nationally significant weeds*, Bureau of Rural Sciences, Canberra [www.weeds.org.au/docs/Weeds_Manual.pdf].
- Murray–Darling Basin Commission 2003, *Fish theme pilot audit technical report – sustainable rivers audit*, [www.mdbc.gov.au/__data/page/64/Web_Summary_Fish_Theme.pdf].
- National Land and Water Resources Audit 2007, *Vertebrate pests – ecologically significant invasive species*, [www.nlwra.gov.au/national-land-and-water-resources-audit/vertebrate-pests].
- National Land and Water Resources Audit 2007, *Weeds – ecologically significant invasive species*, [www.nlwra.gov.au/national-land-and-water-resources-audit/weeds].
- Natural Resources Commission 2005, *Recommendations, state-wide standards and targets*, [www.nrc.nsw.gov.au/content/documents/Recommendations%20-%20State-wide%20standard%20and%20targets%20May%202005.pdf].

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