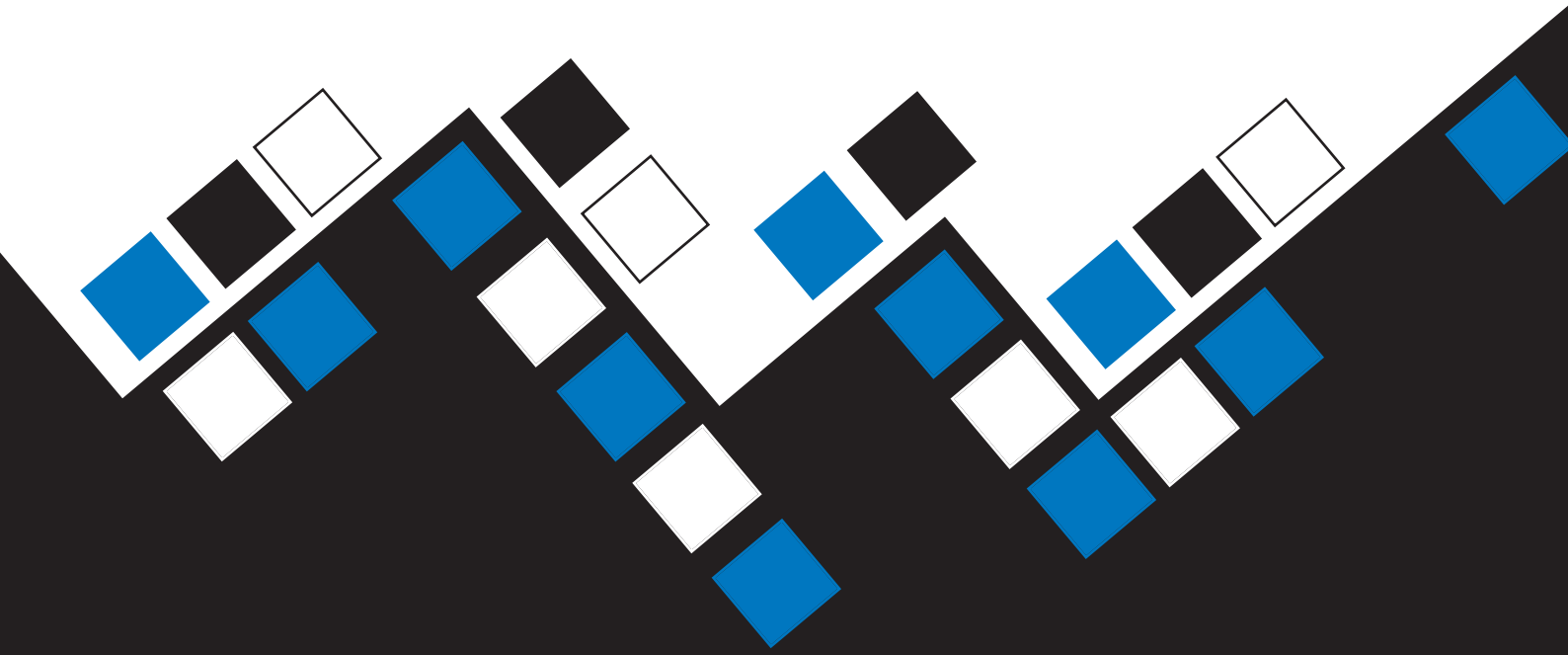
Engaging schools in pest management education



WEEDBUSTERS

PEST PATROL RANGER

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Natural Heritage Trust
Helping Communities Helping Australia
An Australian Government Initiative

Queensland Government
Natural Resources and Water

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Copies of the guide may be obtained from the authors:

Kirby Doak
Regional Pest Management Officer
FNQ ROC
Phone: (07) 4044 3518
Mobile: 0427 147 939
k.doak@cairns.qld.gov.au

Moni Carlisle
Education Resource Officer
FNQ NRM Ltd.
Mobile: 0429 613 662
Email: monic@fnqnrm.com.au

Jo Kelly
Project Officer Weed and Pest Education
Land Protection, Natural Resources and Water
Phone: (07) 3224 7704
Fax: (07) 3405 5551
Email: Joanne.Kelly@nrm.qld.gov.au

Foreword

As part of the environment, people are also inherently part of the management solution to environmental problems.

When equipped with the right information and support, we are all capable of contributing to solutions. However, to achieve real improvements in the condition of our natural landscape, these contributions must be made collectively, at the community-scale. An empowered community is one that is able to genuinely participate in shaping or adapting to the inevitable changes occurring in our environment.

Weeds and pest animals impact on our society, economy and environment, degrading our natural resources. Pest management is an integral part of the holistic and integrated approach to managing the Queensland's natural resources. The responsibility for raising community awareness and encouraging responsible behaviour towards potentially threatening plants and animals belongs to our whole community. Our success depends on our ability to equip both current and future land managers to make informed and balanced decisions about the environment and their relationship to it.

The Far North Queensland community recognises the role of knowledge and awareness in shaping change and building resilience. The challenge for environmental practitioners is to find better ways of connecting people with their landscape, instilling community ownership, and encouraging participation in caring for the environment. Education is therefore fundamentally linked to the sustainable management of our natural landscape and its associated resources.

Educators can provide students and communities with opportunities to discuss the environment and how it shapes all aspects of our lives. Through schools, we can work today with tomorrow's land managers, positioning them to consider balanced options and actions aimed at creating more sustainable lifestyles.

Engaging schools in pest management education embodies this philosophy, recognising the value of education in achieving healthy landscapes. Developed through a partnership between the Far North Queensland Regional Organisation of Councils, Far North Queensland Natural Resource Management Limited (FNQ NRM Ltd) and the Land Protection business unit from the Department of Natural Resources and Water (NRW), it provides the natural resource practitioner with practical suggestions, critical information and a number of tools to effectively engage schools in pest management.

Rachel Wicks
Manager, Community Engagement
FNQ NRM Ltd

About this guide

Engaging schools in pest management education was developed to assist those responsible for pest animal and weed management in Far North Queensland to engage schools in pest animal and weed education. We offer the guide to our colleagues working across Queensland in pest animal and weed management as a tool to further their ongoing work with schools.

The guide is by no means prescriptive and the authors and contributors recognise the excellent programs those with pest animal and weed management responsibilities are already implementing. Our aim here is to provide a way of sharing pest management education information, which may help you in your educational and awareness activities.

We hope that you find *Engaging schools in pest management education* useful and welcome any contributions to future editions.

Note
Since this guide was compiled, the Department of Natural Resources, Mines and Water (NRMW) has become the Department of Natural Resources and Water (NRW) through a machinery-of-government change.

Contents

Overview

Schools are busy places and teachers' workloads are ever-increasing. It is a good idea to keep this in mind when planning your visit to a school. Here are some tips for preparing to work with schools. These are explained in further detail throughout the guide.

- Ensure that those participating in your education program meet the requirements of the *Commission for Children and Young People and Child Guardian Act 2000* (Qld) by holding a Blue Card or being Blue Card exempt.
- Choose which schools would be best to approach.
- Plan to approach schools at the appropriate times.
- Organise a meeting with the school principal/subject coordinator and/or classroom teacher (this may be supported with a formal letter stating your intentions—see Appendix C).
- Explain where in the curriculum pest animal and weed education can fit (the more you understand about the curriculum and where pest animals and weed awareness fit, the better).
- Explain why it is important for young people to learn about pest animals and weeds.
- Explain what resources are available to the school, including activity books, local experts and the time you are willing to offer.

1. Make sure you have a Blue Card

Under the *Commission for Children and Young People and Child Guardian Act 2000* (Qld), people who work with children under 18 in particular categories of businesses, paid or voluntary employment must be screened. This is known as the Working with Children Check.

The information below was taken from the website of the Commission for Children and Young People and Child Guardian and is provided as a guide only. Information is subject to change, so for the latest advice, please visit the website at:

http://www.childcomm.qld.gov.au/employment/bluecard/categories.html

Who needs a blue card?

A person will need a blue card if they propose to work, in a paid or voluntary capacity, or to carry on a business, in a child-related area regulated by the Commission's Act.

What child-related activities are regulated?

Both paid employees and volunteers may need a blue card if they fall under one of the following categories:

- residential facilities
- school boarding houses
- *schools—employees other than teachers and parents
- *child care
- Churches, clubs and associations involving children
- child counselling and support services
- private teaching, coaching or tutoring
- *education programs conducted outside of schools
- child accommodation services, including homestays
- *religious representatives
- sport and active recreation
- *emergency services cadet programs
- *school crossing supervisors
- *care of children under the *Child Protection Act 1999*

Note: The categories marked with * are retrospectively screened.

Volunteers

A volunteer, unless exempt, must have a blue card **before** they start volunteering in one of the above categories, regardless of how often they come into contact with children and young people.

Paid employees

Paid employees must apply for a blue card if they work, or are likely to work, in one of the above categories over 12 months, for at least:

- eight consecutive days
- once a week, each week, over four weeks
- once a fortnight, each fortnight, over eight weeks
- once a month, each month, over six months.

Note: A paid employee can commence work pending the outcome of their blue card application.

2. Get to know your school

The schools directory provides contact details for all state, independent and Catholic schools, including email and website addresses if available. The following link allows you to search the directory:

http://education.qld.gov.au/schools/directory/

Choose a school from the directory and you'll find information such as the number of students, school address and principal's email address. This is a great place to start if you look after an area with a number of schools—independent (including Catholic and Anglican schools) and state.

Once you've chosen the schools you would like to approach, go to their websites and learn as much as you can about their current initiatives, student numbers and the curriculum they provide. This will ensure you are well versed on the interests of students/teachers/parents prior to meeting with school staff.

Approach schools at an appropriate time

Each school is different, and has its own routine of planning. School calendars vary depending on the type of school. For example, term dates differ for state and independent schools.

The Education Queensland website is a great place to start to ensure your planned activities are based outside of key school dates such as student free days and school holidays.

The following link may be useful:

http://education.qld.gov.au/public_media/calendar/holidays.html

Meet with key staff

Meet with the principals and or vice-principals of schools to explain how being involved in pest management education will benefit the entire school community.

Like us, teachers need to prioritise workloads. When writing a letter and/or making a phone call to the school principal or teacher you wish to meet, quickly state why you wish to meet. This should include a summary of the following three questions:

- Where does pest animal and weed awareness fit within the curriculum? (See Section 3)
- Why is it important that students learn about pest animals and weeds? (See Section 5)
- What resources are available? (See Appendix A)

Appendix C provides an example of an introductory letter that summarises these three questions.

Teacher workloads

Generally, teachers are autonomous in the way they develop their classroom materials and deliver the curriculum. They welcome new ideas, resources and approaches and can make decisions to incorporate these in their teaching programs.

However, a school year is hectic and there are never enough hours in a school day. A teacher's workload includes:

- development of lesson plans
- teaching classes face-to-face
- marking/correcting work (usually done in their own time)
- setting and marking assessment
- attending staff meetings and curriculum meetings
- attending school assemblies
- supervising the playground
- attending to administrative and organisational duties.

Other factors that affect the workload of teachers include: class size; curriculum mix; behaviour management issues; range of ability and age of students; resources and facilities available. Furthermore, teachers make voluntary/discretionary efforts, including school camps, concerts, excursions and after-school sport.

This workload demonstrates that you need to be aware of the pressures on teachers. Anything you can do to make it easier for them to participate in your education program will increase uptake. Even helping with things such as photocopying can make a difference.

It also underlines how important it is to approach the school at an appropriate time. Turn up in the first week of the school semester or half way through an examination period and you are likely to be turned away.

3. Get to know the Queensland curriculum and links with pest management education

If your eyes start to glaze over when the words syllabus, curriculum and pedagogy are thrown about, you are not alone! However, it is useful for you to know some things about curriculum in Queensland to help you communicate with teachers. Here's a quick summary of what it all means and the implications for pest management education.

What is the syllabus and who writes it?

The Queensland syllabus provides the rationale of key learning areas (KLAs). There are eight nationally accepted key learning areas which form the common curriculum for Queensland schools; English, Health and Physical Education, Languages Other Than English, Maths, Science, Studies of Society and Environment (SOSE), Technology and Art. (Pest management education is most relevant to Science and SOSE). There are two syllabuses for each of the KLAs—one which applies to years 1–10, and one which applies to years 11–12 (senior syllabus).

The Queensland Studies Authority (QSA) is responsible for syllabus development, assessment, and the transition to tertiary education and post-school destinations for Queensland students from preschool to year 12. The QSA membership comprises representatives from teacher, parent, union, higher-education groups as well as the state, Catholic and independent schooling sectors.

What is the difference between the syllabus and curriculum?

The syllabus is a statement of the course of teaching and is developed by the Queensland Studies Authority while the curriculum is the course of study the school offers based on the syllabus for the key learning area. You may also hear the term pedagogy, which refers to the art or profession of teaching.

What is the core curriculum?

The core curriculum (literacy, numeracy, life skills and future perspectives) consists of essential learnings, which are included within all the key learning areas and are defined by core learning outcomes.

What are outcome levels?

Outcome levels are statements of what students should be able to do as a result of the education program. Outcome levels are not to be confused with year levels. For example, students in a year five class in primary school are most likely to be working at level 3. Some students in a year five class may be working at a higher level due to their strong academic abilities; some may be working at a lower level as school work may be a challenge for them.

Much of the pest management education material in existence can be adapted for any outcome level or year level.

Using available resources

Determine the age of the students for whom you are developing your pest management program and the corresponding year level and outcome level. Review the syllabus document for the key learning areas you believe would be the most suitable for your program. These will probably be Science or SOSE, but there is the potential for including pest management education activities across all key learning areas. For example, see the Gould Leagues's *Weedbusters Activities, Information and Curriculum Links* available to purchase by ordering at:

http://www.gould.edu.au/shop/

You can find syllabus documents relevant to your program on the Queensland Studies Authority website at http://www.qsa.qld.edu.au.

Choose the syllabus documents that apply to the year level with which you are working (either 1–10 or 11–12).

Below is an example of how you can link pest management education to the SOSE syllabus.

Example

Here is an example of how you can link the SOSE syllabus (Years 1–10) with an existing pest management program.

You will need to print out the SOSE Yrs 1–10 syllabus document, which can be found at the Queensland Studies Authority website: http://www.qsa.qld.edu.au/

Find the Time, Continuity and Change Strand. We're looking at level 3 outcomes.

(Direct link if you had trouble navigating the site: http://www.qsa.qld.edu.au/yrs1to10/kla/sose/docs/syllabus/syllabus.pdf)

- Studies of Society and Environment (SOSE): core learning outcomes
- Strand: Time, Continuity and Change (TCC)
- Relevant activities for level 3 outcomes

Level statement

Students understand the contributions, causes and effects, and differing perspectives about particular developments in Australia's history and can use a range of evidence. They also understand how to organise information about these developments and can make predictions about Australia's environmental and social futures.

TCC 3.5 Students describe various perspectives based on the experiences of past and present Australians of diverse cultural backgrounds.

Linking TCC 3.5 to pest management education

Students could investigate the animals and plants brought into Australia by different cultural groups, their reasons for bringing them in, and the impact on Australia's environment and other Australians. For example, they could investigate:

- Aboriginal Australians and the introduction of the dingo
- European Australians and the introduction of a host of pest plants and animals
- new Australians bringing in plants as foods specific to their cultures e.g. alligator weed
- The impact of the introduction of pigs by European Australians on the culture of Aboriginal Australians

Pest education resources to help investigate this example would include:

- Pest Patrol
- *Reclaiming lost provinces: A century of weed biological control in Queensland*
- Audio visual materials
- Relevant web resources (e.g. organise a 'Web quest' on the subject)
- Weed Warriors activities 1,4,5,6,10 (See more about Weed Warriors in resource section and Appendix A)
- Cultural heritage pest management unit (to be developed)

When meeting with teachers, present these resources and ideas for their use with their classes.

4. Appeal to your target audience

No matter what the project is, it is always best to have a firm idea of who your target audience is and keep their needs in mind when developing materials/programs.

Target audiences in school settings include:

- pre-schoolers—students turning five
- lower primary—students in years 1–4, aged 6–9 years
- upper primary—students in years 5–7, aged 10–12 years
- middle school—students in years 5–9, aged 10–14 years (this varies)
- junior high school—students in years 8–10, aged 13–15
- seniors—students in years 11–12, aged 16–18

General hints

- Speak to the teachers at the school where you intend to run the program to find out more about the strengths/challenges of your target audience.
- Keep in mind the age of the students and pitch the language appropriately. Don't be frightened to introduce new words or concepts; just make sure you provide definitions and explanations that are easy to understand, and offer examples to support students and teachers in the learning process.
- Ensure your program provides equal opportunity for participation across gender and ability. Try to include tasks that enable students to participate in your program at their own level of ability. Remember that students learn differently. Some learn best from seeing, others from hearing, and others from doing.
- Provide teachers with a couple of short activities/games to help orientate students or keep them on track in lessons.

Students with disabilities

Working with students with disabilities can be a fantastic experience. Such students vary in age and ability and they may find employment in a number of areas including horticultural industries. So, weed-related programs can be a very useful grounding for them.

5. Explain why it is important for students to learn about pest animals and weeds

Pest animals and weeds have social, economic and environmental impacts. They degrade our natural resources and our community bears the cost. And what a cost! Whether it is a resource such as a water body no longer available for recreational use due to the incursion of water weeds, the loss of habitat and subsequently the loss of our Australian native species from an area, or the loss of production and costs of control hitting our back pocket, the impacts of pest animals and weeds reverberate through our communities, ultimately degrading our quality of life.

A conservative estimate of the costs associated with the impact of exotic species on Australia is:

- Weeds—over $4 billion annually[1]
- Pest Animals—$720 million annually[2]

Unfortunately weed and pest animal problems in Australia are growing, and will continue to grow. Behind habitat loss, weeds and pest animals are considered the biggest threat to Australia's biodiversity[3].

Our children, the land managers of tomorrow, will inherit the problems caused by weeds and pest animals. It is vital to educate the students of today who will become the decision makers of tomorrow, about the problems caused by weeds and pest animals, and what actions can be taken at the individual, community, local, regional, state and federal levels to address weed and pest animal issues.

Through education we can help students understand the issues and help them gain the knowledge and skills needed to empower them to make changes towards sustainable land management—a valid goal in this, the United Nations Decade of Education for Sustainable Development (2005–2014).

Useful facts about pest animals

[This information comes from *Queensland Pest Animal Strategy 2002–2006*, Department of Natural Resources and Mines, 12 July 2002]

Economic impacts

Pest animals reduce the viability of primary industries, which account for a significant proportion of Queensland's export income. The impacts of some animals are well documented; however, the true cost of pest animals to Queensland's economy is unknown and difficult to quantify. Feral pigs alone have been estimated to reduce grain production by $12 million every year. Wild dogs cost $33 million every year in livestock losses, diseases spread and

1 Sinden, J (et al) (2004) *The Economic Impact of Weeds to Australia – Report to the CRC for Australian Weed Management* CRC for Australian Weed Management Technical Series No. 8, March 2004.
2 McLeod, R. (2004) *Counting the Cost: Impact of Invasive Animals in Australia 2004*. Cooperative Research Centre for Pest Animal Control. Canberra.
3 DEST (1996) *State of the Environment Australia*. Department of Environment, Sport and Territories.

control. The cost of each mouse plague is estimated at $10–$20 million in lost agricultural production and $1.5 million in landowner and government control. Negative economic impacts of pest animals include:

- direct control and management costs
- predation of livestock by wild dogs, foxes and feral pigs
- competition for resources
- destruction of natural resources through soil disturbance and removal of vegetation
- destruction of pastures and crops
- creation of general nuisance in urban and rural residential areas and associated management
- reduction of nature-based tourism due to destruction of natural resources.

Many pest animals are susceptible to, and could act as carriers for, a range of exotic diseases including foot-and-mouth, African swine fever and rabies. If these diseases were to enter Australia they would affect livestock and humans, and the cost of control and management would be considerable.

Environmental impacts

Introduced pest animals place considerable pressure on native plants and animals. While some impacts have been well documented, the true impact of pest animals on Queensland's environment is unknown and difficult to quantify.

Negative environmental impacts include:

- direct predation on native fauna: foxes and feral cats have been implicated in the decline or extinction of at least 17 native species
- destruction of habitats and natural resources including reduction in water quality, increased soil erosion and land degradation, and destruction of native plants that provide food and shelter to native species
- competition with native animals for food and shelter
- poisoning of native animals and spreading of disease: the decline of native predators has been attributed to poisoning from cane toads.

Some pest animals impact on specific habitats or species; others are more general and affect many species, ecosystems and ecological and physical processes.

These impacts can lead to reduced populations of native species, a decline in the quality and quantity of their habitats, and ultimately the extinction of some native species.

Social impacts

The social impacts of pest animals are many and varied and can cost individuals and the government considerable sums of money. Pest animals can create a general nuisance and interfere with the liveability of an area, particularly in urban and rural residential areas. Negative social impacts include:

- potential and actual disease transmission
- predation of, and attacks on, domestic poultry and small pets
- creation of dangerous driving conditions: pest animals often wander onto roads, and locust swarms reduce visibility
- reduction of the community's enjoyment of natural areas
- general nuisance and disturbance in urban areas.

Useful facts about weeds

[This information is adapted from the draft *Australian Weeds Strategy: a national strategy for weed management in Australia*, Natural Resource Management Ministerial Council, developed by the Australian Weeds Committee, 31 August 2006.]

Weeds impact on Australia's economy and environment, as well as human health and amenity. Directly or indirectly, all Australians are affected by weeds. For example, landholders and other land and water managers incur material and labour costs to control weeds and these costs may be passed on to the Australian public through higher prices for produce. Weed control also imposes great demands on government resources for public land and water management. Weeds may also harbour organisms that are harmful to native and/or economically important plants.

Economic impacts

Weeds reduce the quantity and quality of Australia's agricultural, horticultural and forestry products, which affects both industry and consumers. It is estimated that the cost to the Australian economy from the agricultural impacts of weeds is in the vicinity of $4 billion per annum[1]. This estimate includes the direct costs of weed control and the losses from reduction in yield and contamination of agricultural products by weeds. The economic impact of weeds on nature conservation, tourism and landscape amenity, although not quantified, is thought to be of a similar magnitude. For example, it is estimated that at least $19.6 million is spent on weed control in conservation areas annually[2].

Weeds also have indirect economic costs, such as when they cause allergic reactions and poison animals, reduce fisheries as a result of in-stream invasions, and harbour feral animals and other pests that compete with domestic animals.

Environmental impacts

Weeds can displace native plant species, harbour pests and diseases and create fuel loads for fire. Weeds therefore affect the structure and function of land-based and aquatic ecosystems, and impact negatively on fauna and flora. Weeds pose a threat to the integrity of nationally and globally significant sites, such as listed Ramsar wetlands, cultural heritage sites and declared World Heritage areas. National parks and nature reserves, multi-use forest lands, and agricultural and grazing land also require ongoing weed control and monitoring. Paradoxically, some economically important plants, particularly some rangeland pasture species, are also serious environmental weeds.

Social impacts

Many weeds affect human and animal health causing allergies, dermatitis, asthma and other respiratory problems, and poisoning.

Weeds are detrimental to the community's enjoyment and amenity in many ways. For example, weeds can clog waterways, which prevents boating and water sports, increases the risk of drowning and destroys fishing spots. Weeds form impenetrable thickets that hamper cultural activities including food collection, recreational vehicle use and enjoyment of the bush. Weeds also lower the aesthetic value of the Australian landscape.

Weeds create high fuel loads that cause greater bushfire intensity resulting in increased losses of homes, rural infrastructure and biodiversity.

6. Provide resources for schools, teachers and students

Teachers always enjoy a new face in the classroom. So if you can afford the time, offer your services. As little as 30 minutes can go a long way to persuading a teacher to incorporate pest animals and weed awareness.

Currently, there are a range of resources available to support your pest management education activities. See Appendix A for further information.

Useful resources available now include the Weedbuster Activity Booklet and Pest Patrol Activity Booklet, which can be downloaded from the Department of Natural Resources and Water's website at ‹www.nrm.qld.gov.au›, or can be ordered (subject to availability) through your land protection officer or land protection extension officer.

Weed Warriors unites local government officers, regional natural resource management bodies, Landcare and other weed specialists and local schools to learn about weeds relevant to the area, using biological control agents as a catalyst to capture the imagination of students. Email the Queensland Weed Warriors Coordinator, Jo Kelly, to register your interest at: ‹Joanne.Kelly@nrm.qld.gov.au› and visit the Weed Warriors internet site for further information about the project: ‹http://www.weedwarriors.net.au/›.

Other pest animal publications and resources available from the NRW website include:

- an A–Z listing of pest animals—information about specific animals, including control information
- impacts of pest animals
- prohibited pets
- pest animal publications—including fact sheets, posters, brochures, books and maps.

See Appendix A for further information.

Appendix A

Support for local government involved in education activities with schools

The following materials are useful for both Science and Studies of Society and Environment:

Weedbuster

http://www.nrm.qld.gov.au/pests/weeds/weedbuster/

Weedbuster is a national program of weed awareness and action with activities culminating in a week of weedbusting from **October 8 to 15**. Weedbuster gives your local government, regional management group and landcare/ catchment groups a chance to join with schools to teach students about local weed problems and issues throughout the year. It also encompasses some local on-ground weedbusting and site rehabilitation in October. Contact the **Weedbuster Coordinator via email** ‹weedbuster@nrm.qld.gov.au› or (07) 3224 7742; F: (07) 3224 2153

Weed Warriors

http://www.weedwarriors.net.au/

Weed Warriors provides an opportunity for those with weed management responsibilities to help educate their local community on local weed issues and problems. Contact the Queensland Weed Warriors Coordinator, Jo Kelly on (07) 322 47704. Email: Joanne.Kelly@nrm.qld.gov.au.

Lantana—a Weed of National Significance

A lantana education booklet is being prepared under the Lantana Weeds of National Significance project. The guide will include activities and ideas for teachers that are both classroom and field-based, as well as including fun activities that can be completed by students. Materials will be made available from the website at ‹www.nrm.qld.gov.au/pests›. Email Andrew.Clark@nrm.qld.gov.au or call on 07 3224 8383.

Weed and pest animals

http://www.nrm.qld.gov.au/pests/index.html

For background information on weeds and pest animals, this is the place to start. All the latest developments will be found here, and the site acts as a gateway to your area of interest, from the legislation underpinning weed and pest animal management in Queensland, through to strategies for individual weed and pest species.

http://www.nrm.qld.gov.au/pests/education/educational_resources.html

You'll find:

- **Weedbuster activity booklets** containing colouring-in sheet; link to the national Weedbuster website; posters; links to weed publications; and further information on the impacts of weeds, identification and seed spread
- **Pest Patrol** containing posters; brochures; links to pest animal publications; further information on the impacts of pests

Further information

- http://education.qld.gov.au/schools/environment/outdoor/ (Outdoor Environmental Education Centres)
- http://www.weeds.crc.org.au/for_schools/index.html (Gateway to CRC for Australian Weed Management includes educational materials such as Lord of the Weeds/ Ghastly Guests/ Weed Warriors)
- http://www.invasiveanimals.com/index.php (CRC for invasive animals—useful for fact finding)
- http://www.weeds.org.au/index.html (Weeds Australia including Weeds of National Significance (WONS)
- http://www.anbg.gov.au/weeds/weeds.html (Australian National Botanic Gardens; environmental weeds)
- http://farrer.riv.csu.edu.au/ASGAP/weeds.html (Environmental weeds)
- http://www.csiro.au/csiro/channel/ich1c,,.html (Pest management research, biocontrol, quarantine)
- http://www.deh.gov.au/biodiversity/invasive/ferals/ (Commonwealth Department of Environment and Heritage)
- http://www.feral.org.au/ (Information on vertebrate pests).
- http://www.deh.gov.au/education/ (Environmental education issues and information.)
- http://www.nrm.gov.au/ (Natural Resource Management education including pest issues)
- http://wwf.org.au/#resources (Weeds and pests including list of plants naturalised in Australia)
- http://www2.dpi.qld.gov.au/extra/aquaticinvaders/default.html (Aquatic Pest Fish)
- http://www.regionalnrm.qld.gov.au/ (Regional NRM groups)
- http://www.hawaii.edu/ant/docs/ID/behaviorKey.html (Useful key for identification of ants through behaviour)

NRW educational resources

- www.nrm.qld.gov.au/education

For further information contact Rod Goldsworthy, Community & Landscape Sciences ph: 07 3896 9332 Email: rod.goldsworthy@nrm.qld.gov.au

- **Catchment management resource (Level 5 Science)** The catchment management resource provides opportunities for students to learn about and investigate various aspects of water catchments.
- http://www.nrm.qld.gov.au/education/teachers/catchment/index.html
- **Land management resource (Level 6 Science)** The land management resource provides opportunities for students to learn about and investigate the consequences of agricultural practice on a number of different environmental aspects including soil health, biodiversity, and the water quality within catchments.
- http://www.nrm.qld.gov.au/education/teachers/land/index.html
- Water cycles and catchments resource (Level 3 Science and SOSE). Students have the opportunity to investigate and understand water catchments through the water cycles and catchments resource.
- http://www.nrm.qld.gov.au/education/teachers/water/index.html
- **Dungbusters resource (Levels 2, 3, 4, 5 SOSE and Science)** The dungbusters resource introduces students to the important functions that dung beetles perform by rapidly returning animal manure to the soil including recycling nutrients, promoting pasture growth, improving the quality of run-off from pastures and reducing fly breeding habitat.
- http://www.nrm.qld.gov.au/mines/publications/education_awareness.html
- **River Journeys (Level 4 Science, The Arts, English and SOSE)** River Journeys is designed to stimulate upper primary and lower secondary classroom discussion about waterways, rivers and whole-of-catchment health through using art, dance, history and culture and science investigations http://www.qld.waterwatch.org.au/resources/river_journeys_resource.htm
- **Waterwatch Queensland (community waterway monitoring)** http://www.qld.waterwatch.org.au Information and resources for individuals and groups wanting to become more involved in monitoring their local waterways can be found at Waterwatch Queensland. Resources include Fish Snapshot, Macro Invertebrates sampling guides, River Journeys, Saltwatch and the Creek Rescue game.

Appendix B:

Weed Warriors—information for key contacts

What is Weed Warriors?

Weed Warriors is an innovative national community engagement and empowerment program developed by the Cooperative Resource Centre for Weed Management, which fosters increased community awareness of, and involvement in, local weed issues.

The Weed Warriors program recognises children as the land managers of the near future and seeks to empower and engage them in weed issues through an ongoing program of classroom and field-based activities. The activities are designed to take the program participants beyond knowledge to action and help to encourage a sense of connection to, and responsibility for, their natural environment. The program also focuses on linking stakeholders involved in weed management with the community.

What does the program involve?

As weed warriors, students become actively involved in the management of a local weed problem when they join with land managers and community groups to implement a biological control program for a target weed (biological control is the management of a weed using natural enemies from the weed's country of origin). The weed species targeted reflect weed problems that occur in the local area.

Through the program, students are given the unique opportunity to undertake real-life weed research at school. The students take on the role of weed scientists and their classroom becomes a mini research institute as they breed biological control agents to help control the target weed.

The breeding phase of the Weed Warriors program generally lasts four to six weeks. Throughout this time students are taught the skills needed to breed the biological control agents through the provision of resource material and through active participation in the process.

Students, in collaboration with local land managers and community groups, then release their biological control agents at a weed infestation local to the school, playing an active role in bringing about a solution to a weed problem in the local community.

An important aspect of the Weed Warriors program is the establishment of mentor-student relationships; linking schools with key people that play a role in weed management, conservation or natural resource management in their local area.

The role of the mentors in the Weed Warriors program is to help increase the quality of the learning experience and to develop in the students a sense of connection to, and responsibility for, weed issues in their local area. Their involvement in the program helps to create a real-world experience for the students and assists them in developing a thirst for environmental knowledge.

Who does the program target?

The Weed Warriors program is adaptive to all levels of education. However, the program is most often targeted at years 3 to 7 in primary schools and years 8 to 10 in secondary schools.

What are the benefits of participating in the program?

- **Empower and engage the community in weed management**
  Increase student and community ownership of, and capacity for action to address, local and regional weed management issues through active participation in ongoing integrated weed control programs.
- **Foster a community partnership approach to weed management**
  Facilitate the development of sustainable partnerships between the community, public and private land managers, government agencies, local government and industry. Foster the on-going coordinated management of weeds in a region.
- **Promote best practice weed management**
  Enhance current integrated weed management efforts through the establishment of biological control agents against widespread priority weeds through coordinated community participation. Help to decrease the impact of established weeds on natural and productive resources.
- **Educate the land managers of the future and create a more weed-aware society**
  Help create a more weed-aware and capable community by giving participants a greater understanding of the impact of weeds and empower them with the skills needed to implement practical solutions to the problem.

Further information

For further information visit the website at ‹www.weedwarriors.net.au› and email the Queensland Weed Warriors Coordinator: Joanne Kelly at: ‹Joanne.Kelly@nrm.qld.gov.au›.

Joanne works part time and is in the office on Wednesday until 12.15, and Thursday and Friday all day. Call her on (07) 3224 7704 on those days.

Appendix C:

An example of an introductory letter to school and accompanying fact sheet

‹School›

‹Postal address›

‹Town_Postcode›

‹Date›

Dear ‹teacher's name›

Weed and pest animal management education

‹Your organisation› wishes to invite your school to participate in a weed and pest animal management education and awareness program during ‹school term› term of ‹year›.

Why are we interested in weed and pest animal management education? Well, the impact of exotic species on Australia can be difficult to quantify, but the figures we do have, which are conservative, are frightening in themselves:

- Weeds: over $4 billion annually[1]
- Pest animals: $720 million annually[2]

Unfortunately weed and pest animal problems in Australia are increasing, and will probably continue to grow. Behind habitat loss, weeds and pest animals are considered the biggest threat to Australia's biodiversity.[3]

Our children, the land managers of tomorrow, will inherit the problems caused by weeds and pest animals. It is vital to educate the students of today who will become the decision makers of tomorrow, about the problems caused by weeds and pest animals, and what actions can be taken at the individual, community, local, regional, state and federal levels to address weed and pest animal issues.

Through education we can help students understand the issues and gain the relevant knowledge and skills needed to empower them to make changes towards sustainable land management—a valid goal in this the United Nations Decade of Education for Sustainable Development (2005–2014).

While weed and pest animal education can be taught across the curriculum, it fits nicely within both the Science and SOSE syllabuses.

If your school chooses to participate in the program, your students will enjoy the opportunity of looking at real weed and pest animal issues in their local community, being addressed by local specialists, and learning about what they can do to help protect the environment.

Please see the attached fact sheet, which summarises the proposed program, links to the curriculum, resources we can provide to support the program and proposed timeframes.

If you are interested in participating in the program, please don't hesitate to contact me on ‹phone› or ‹email›.

Yours sincerely,

‹Name›

‹Position›

1 Sinden, J (et al) (2004) *The Economic Impact of Weeds to Australia – Report to the CRC for Australian Weed Management* CRC for Australian Weed Management Technical Series No. 8, March 2004.
2 McLeod, R. (2004) *Counting the Cost: Impact of Invasive Animals in Australia 2004*. Cooperative Research Centre for Pest Animal Control. Canberra.
3 DEST (1996) *State of the Environment Australia*. Department of Environment Sport and Territories.

Fact sheet tailored to suit your program

Here are some topics you may choose to include:

- the aim of your program
- a content summary
- curriculum links (see the table below)
- timing
- resources
- costs
- details of the presenter including blue card status.
- contact details

Strand	**Level 3 core learning outcomes**
Science and Society	3.2 Students recognise the need for quantitative data when describing natural phenomena. 3.3 Students make predictions about the immediate impact of some applications of science on their community and environment and consider possible pollution and public health effects.
Life and Living	3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live. 3.2 Students present information which illustrates stages in different types of life cycles (including metamorphosis) of familiar living things. 3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.

Appendix D:
An example of 40-minute lesson plan
Pest animals—years 5 and 6

Introductory activities

This activity creates a comfortable and fun rapport with the students.

- Ask each student to choose a number between 0 and the number of students in the class (each student will end up with an individual number).
- Ask students to sit themselves in numerical order from one side of the classroom to the other.
- Make two teams by dividing the classroom in half.
- Allocate a name to the two teams.

Prior experience

This activity is presented to the students to allow you to identify their prior understandings. You will then be in a position to adjust the remaining activities appropriately.

- Tell the students you will award points to each team if your question can be answered correctly.
- Remind the students they must raise their hand before answering the questions.
- Ask the class random questions that will allow every student to be engaged (e.g. What is your my name?).
- Now ask the students more pest animal related questions (e.g. From what county is the feral rabbit? What did the heaviest wild pig caught in Queensland weigh?—270kg).

Presentation

- What are pest animals? (See page 2 of Pest Control Activity)
- How did they get here?
- Why are pest animals a problem? (See page 25 of Pest Control Activity)

This activity will assist students to understand why pest animals are a problem (See page 23).

Concepts

- Some animals are feral.
- Feral animals can be a problem.
- Why do we have feral animals?

Review and reflect (concluding activities)

This activity allows you to evaluate student understanding

Ask the students questions similar to those you used to commence the lesson. Do they answer the questions better?

Additional activities

Refer to Pest Control Activity Book

Unit resources

Scats, stuffed animals, moulded footprints, websites

Students skills

- Make simple observations during activities
- Simple problem solving during activities
- Report on their explorations, using drawings and simple statements
- Communicate ideas through drawings and simple verbal or written statements
- Access information from computer resources such as simple picture dictionaries, encyclopaedias and information sites

Learning outcomes and indicators

SCSC0101	Student is able to describe, using appropriate language, his or her scientific explorations of the chemical, and physical and natural world.
	use appropriate words in describing scientific phenomena
	recount what happened in an experiment he or she undertook
	use simple statements or drawings to describe his or her observations
	identify scientific ideas learned from his or her scientific exploration

Appendix E

Links between the syllabuses and existing pest management education programs

Initially targeting middle phase of schooling: age groups 10–14; year levels 5–9, outcome levels 3–5; Weed Buster, Weed Warriors and Pest Patrol can be linked to the syllabus documents of the Key Learning Areas (KLA's) Science and SOSE.

Key learning area: Studies of Society and Environment

Strands:	Foundation core learning outcomes:
Time, Continuity and Change	Students are developing an understanding of changes and continuities in people's lives and can communicate about these in a particular communication mode. Students are beginning to respond to information about their environment and can make decisions accordingly. Students are developing an understanding about changes and continuities in their environments and can communicate about these in a particular communication mode.
Place and Space	Students are developing an understanding that there are different environments and can indicate which environment they are in. Students demonstrate a preference for a particular place or places. Students are developing an understanding that each environment can be used in a variety of ways and can present information about their use of an environment.
Systems, Resources and Power	Students participate in a variety of contexts and are developing an understanding of the need to cooperate in these contexts. Students are developing an understanding that resources can be obtained from various sources and can be used to meet their needs and wants. Students are developing an understanding that individuals are different. Activities: Students may be involved in developing a native nursery on school grounds, raising and tending plants to be used for site rehabilitation of once weedy areas.

Strands:	Level 3 core learning outcomes:
Time, Continuity and Change	TCC 3.1 Students use evidence about innovations in media and technology to investigate how these have changed society. TCC 3.2 Students create sequences and timelines about specific Australian changes and continuities. TCC 3.3 Students use knowledge of people's contributions in Australia's past to cooperatively develop visions of preferred futures. TCC 3.4 Students organize information about the causes and effects of specific historical events. TCC 3.5 Students describe various perspectives based on the experiences of past and present Australians of diverse cultural backgrounds.
Place and Space	PS 3.1 Students compare how diverse groups have used and managed natural resources in different environments. PS 3.2 Students create and undertake plans that aim to influence decisions about an element of a place PS 3.3 Students cooperatively collect and analyse data obtained through field study instruments and surveys to influence the care of a local place PS 3.4 Students use and make maps to identify coastal and land features, countries, continents and climate zones. PS 3.5 Students describe the values underlying personal and other people's actions regarding familiar places.
Systems, Resources and Power	SRP 3.1 Students make inferences about interactions between people and natural cycles including the water cycle. SRP 3.2 Students apply the principles of democratic decision making in cooperative projects.

Strands:	Level 4 core learning outcomes:
Time, Continuity and Change	TCC 4.1 Students use primary sources to investigate situations before and after a change in Australian or global settings. TCC 4.4 Students critique information sources to show the positive and negative effects of a change or continuity on different groups. TCC 4.5 Students review and interpret heritages from diverse perspectives to create a preferred future scenario about a global issue.
Place and Space	PS 4.2 Students predict the impact of changes on environments by comparing evidence. PS 4.3 Students participate in a field study to recommend the most effective ways to care for a place. PS 4.4 Students use latitude, longitude, compass and scale references and thematic maps to make inferences about global patterns. PS 4.5 Students explain whether personal, family and school decisions about resource use and management balance local and global considerations.
Systems, Resources and Power	SRP 4.3 Students enact democratic processes in familiar settings using knowledge of representative government.

Strands:	Level 5 core learning outcomes:
Time, Continuity and Change	TCC 5.2 Students represent situations before and after a period of rapid change. TCC 5.3 Students collaborate to locate and systematically record information about the contributions of people in diverse past settings.
Place and Space	PS 5.2 Students design strategies for evaluating environmental impacts of a proposed project, highlighting relationships within and between natural systems. PS 5.3 Students participate in geographical inquiries to evaluate impacts on ecosystems in different global locations. PS 5.5 Students evaluate ideas concerning sustainability to identify that may benefit and who may be disadvantaged from changes to a Queensland industry.
Systems, Resources and Power	SRP 5.1 Students evaluate the relationship between an ecological system and a government and/or an economic system. SRP 5.2 Students use a structured decision-making process to suggest participatory action regarding a significant current environmental, business, political or legal issue.

Key learning area: Science

Strand	Foundation core learning outcomes
Science and Society	Students are developing an understanding of the ways that science affects aspects of their lives. They are developing an intuitive understanding of some common natural phenomena.
Life and Living	Students are developing an understanding that some things are living and some things are non-living, and can use observable features to communicate the difference.

Strand	Level 3 core learning outcomes
Science and Society	3.2 Students recognize the need for quantitative data when describing natural phenomena. 3.3 Students make predictions about the immediate impact of some applications of science on their community and environment and consider possible pollution and public health effects.
Life and Living	3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live. 3.2 Students present information which illustrates stages in different types of life cycles (including metamorphosis) of familiar living things. 3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.

Strand	Level 4 core learning outcomes
Science and Society	4.2 Students use the elements of a fair test when considering the design of their investigations. 4.3 Students present analyses of the short-and long-term effects of some of the ways in which science is used.
Life and Living	4.1 Students examine the internal and external structure of living things (including animal respiratory systems and plant systems) and account for observed similarities and differences in terms of adaptation. 4.2 Students identify and analyse similarities and differences in the ways that different living things reproduce. 4.3 Students make generalizations about the types of interaction which take place between the living and non-living parts of the environment.

Strand	Level 5 core learning outcomes
Science and Society	5.1 Students consider how and why scientific ideas have changed over time. 5.2 Students refine investigations after evaluating variations and inconsistencies in experimental findings. 5.3 Students analyse the relationship between social attitudes and decisions about the applications of science.
Life and Living	5.1 Students collect information about the structure (including cell structure) and function of living things and relate structure and function to survival. 5.2 Students evaluate different processes and strategies of reproduction (including asexual reproduction and care of young) in terms of their relative efficiency in ensuring survival of offspring. 5.3 Students evaluate the consequences of interactions between the living and non-living parts of environments.

1 Sinden, J, Jones, R, Hester, S, Odom, D, Kalisch, C, James, R and Cacho, O (2005, The economic impact of weeds in Australia, CRC for Australian Weed Management, Technical Series No. 8, Adelaide, p. 39.
2 Ibid.