A HISTORY OF THE WEED MANAGEMENT BRANCH IN THE NORTHERN TERRITORY

Introduction

Weeds have detrimental impacts on land and water in the Northern Territory, affecting primary industries, conservation, amenity values and lifestyles. Although native plants can become weeds, most of the weeds we deal with were introduced intentionally or unintentionally from overseas.

This article summarises information on a selection of early weed introductions in the Northern Territory from the 1800s, and reviews development of the Noxious Weeds Control Unit from its inception in 1965. Knowledge of the history of weed introductions, and early control, can put the present-day issue of weed management into perspective, in terms of the need for a continuous long-term commitment.

Documentation of early activity on weeds in the Northern Territory is piece-meal and mention of weeds may occur in other publications or herbaria that have yet to be thoroughly examined. Therefore, this article is certainly not the complete history of Northern Territory weeds but it does provide a starting point for development of a more detailed record.

Early weed introductions and control

Records of weeds in the Northern Territory date back to the early 19th century. Hyptis (*Hyptis suaveolens*) was first recorded in the Territory by the explorer Leichhardt in about 1845. Later, a government resident's report of 1887 named bellyache bush (*Jatropha gossypifolia*), amongst a list useful plants grown in the Darwin Botanic Gardens. In 1892, the curator, Maurice Holtze, published a list of plants that had become numerous, some of which had already become troublesome pests in the Darwin area. The list included chinee apple (*Ziziphus jujuba*), mimosa (*Mimosa pigra/M.rubricaulis*), common sensitive plant (*Mimosa pudica*), candle bush (*Cassia alata*), stinking passion flower (*Passiflora foetida*), thornapples (*Datura* spp.), lion's tail (*Leonotis nepetaefolia*), snakeweeds (*Stachytarpheta* spp.) and castor oil plant (*Ricinus communis*). All of these weeds still occur in the Territory today.

Early introductions to Central Australia included Bathurst burr (*Xanthium spinosum*) and Noogoora burr (*Xanthium occidentale*). They probably arrived on livestock or in hay from interstate. Castor oil plant occurred in 1939 and Athel pine (*Tamarix aphylla*) was planted in central Australia as a shade and ornamental tree in the 1950s. Spiny emex (*Emex australis*) is another early introduction, while Paterson's curse (*Echium plantagineum*) was recorded in Alice Springs in 1956.

If the existence of legislation is any indication, there was certainly a consciousness of weeds in the Territory going back to the 1800s. The South Australian *Thistle and Burr Act* of 1862 applied to the Northern Territory until 1916 when a Northern Territory *Noxious Weeds Ordinance* was notified in the Commonwealth Gazette. A list of noxious weeds under this ordinance was gazetted on 1 September 1939. In 1959 the ordinance was amended and became known as the *Noxious Weeds Ordinance 1916-1959*. It was again amended to the *Noxious Weeds Ordinance 1962*, which is essentially the same piece of legislation that became the *Noxious Weeds Act* after self-government in 1978.

The full extent of action to control weeds in the Northern Territory in the early days is unknown. However, reports indicate that weed control was a major activity in the Darwin Botanic Gardens in 1913 on lantana (*Lantana camara*), mimosa, hyptis and other noxious weeds. There are records of further recommendations being made for weed control in the gardens in 1926 and a gardener working in the Botanic Gardens in 1947 was directed to pull out mimosa.



Clearing up lantana, Botanic Gardens, Darwin. Report of the Administrator for the Year 1914-15, Commonwealth of Australia.

Between 1940 and the late 50s, three grasses that are now regarded as weeds were introduced to Australia for testing as pastures: gamba grass (*Andropogon gayanus*), annual pennisetum (*Pennisetum pedicellatum*) and mission grass (*Pennisetum polystachion*). CSIRO conducted trials with two lines of gamba grass in Katherine from 1946. Material from Katherine was later planted by officers of the Commonwealth's Northern Territory Administration in pasture evaluation trials at Berrimah Experiment Farm in 1954. It was also planted at other sites in the Top End between 1961 and 1980. The cultivar, "Kent" gamba grass, was derived from these two lines, and released by the NT Herbage Plant Liaison Committee in 1978 and registered as an Australian Herbage Plant Cultivar in 1986. While it does have a pastoral use, gamba grass is now regarded as an environmental weed.

Pennisetum sp., C.P.I. 8608, was chosen for field testing after observation in nursery rows at Katherine in the 1950s. It was subsequently determined as *P. pedicellatum* and, in the 1950s and 60s, it spread to become a weed of crops and pastures in the Top End. The weed was given the common names of Curteis' curse or Berrimah buffel.

The origin of *Pennisetum polystachion* (mission grass) in the Northern Territory is a mystery. It became a weed in the Darwin area from the 1970s and although introductions named as *P. polystachion* were tested at Katherine Research Station in the 1950s, there was no field record of it in Katherine, even as late as 1997. It is therefore unlikely that *P. polystachion* was ever selected for field evaluation in Katherine, or it may never have been grown in nursery rows. There was some uncertainty about the taxonomy of *P. pedicellatum* and *P. polystachion* in the early days and, at one stage, *P. pedicellatum* (Berrimah buffel) was known as *P*.

polystachion. Later introductions of *P. polystachion* (1970 and 1973) were made into Queensland for testing as a pasture grass, but there is no record of these lines ever being deliberately introduced or tested as pastures anywhere in the Northern Territory.

The first field record of *P. polystachion* in the Northern Territory was beside the Holmes Jungle Road in Darwin in 1974, although there are memories of it being in the McMillans Road area in 1970. It quickly became an aggressive weed of disturbed areas in the Darwin and Litchfield areas. Its origin is unknown, but it may have been introduced as a contaminant from Asia where it also occurs.

In 1952, an Agricultural Section was formed within the Lands and Survey Branch of the Northern Territory Administration. From the mid 1950s and early 60s, weeds of cultivation and noxious weeds are mentioned in Annual Reports of the Animal Industry Branch and the Agriculture Branch which became a Branch in its own right. In particular Mossman River grass (*Cenchrus echinatus*) was known as a serious weed of cultivation.

In the early 1960s, khaki weed (*Alternathera repens*), rubber bush (*Calotropis procera*), Devils' claw (*Martynia annua*) and hyptis were regarded as serious problems in the higher rainfall areas, while in the Alice Springs district Bathurst burr was regarded as the most serious weed. The control of Bathurst burr in the Alice Springs district and control of weeds in the Katherine farming area are mentioned as activities of the Agriculture Branch in the early 1960s, as was work on revising the list of noxious weeds in cooperation with the Animal Industry Branch. There was no indication that a specific weeds unit existed at that time, but in 1963 there were plans to appoint field officers in the Agriculture, Animal Industry and Lands and Survey Branches as weeds inspectors under the *Noxious Weeds Ordinance 1962*.

Development of the Weed Management Branch

Government reports, files and other literature provide information on growth of the Weeds Management Branch and achievements. Over the years, many people have made valuable contributions to protecting the Territory from the impact of weeds and to developing the Branch, but there are too many to name them all here. Today's Weed Management Branch has evolved over nearly 40 years through various name changes, through gradual improvements in resources, and through advances or changes in operational capability.

The first mention of a government "Noxious Weeds Control Unit" appeared in the Agriculture Branch's 1964-65 Annual Report. A Technical Assistant, Lofty Pickering, was recruited to take charge of the unit, commencing duties on 17 February 1965. The unit consisted of one person and one of Lofty's first jobs was spraying 2,4,5-T in the upper catchment of the Adelaide River to control mimosa. At that time, mimosa consisted of a relatively small infestation so a catchment approach was adopted.

Lofty was successful in controlling the infestation along 35 kilometres of river from its uppermost point above Adelaide River Township downstream to Tortilla flats by spraying all known populations of the weed. There was no mimosa on the floodplain, but Lofty could foresee that it would become a major weed so he asked for help. He always kept a diary and one of them contains a statement that, in hindsight, can only be regarded as a classic in the world of weed management. Lofty's diary states that on Wednesday 18th August 1966 he asked the Agriculture Branch's Senior Agronomist

for an extra agricultural labourer to help with the mimosa work. Lofty was told he was glorifying the job!



Lofty Pickering, the Territory's first weeds officer, celebrating the Branch's 25th birthday in 1990.

In 1966, the Animal Industry and Agriculture Branches amalgamated and from 1966/67 the unit became known as the "Noxious Weeds Section". Nigel Hall was the first agricultural graduate to work in the section from 1966 to 1967. Nigel's major contribution was the writing of the first extension bulletins on weeds in the NT: hyptis and rubber bush. From that time, and into the early 70s, there were two people in the Noxious Weeds Section: a research officer and Lofty, occasionally with an assistant.



The Noxious Weeds Section in 1966: Lofty Pickering (L) and Nigel Hall (R), preparing to photograph a weed at East Point near Darwin.

John Holmes was Weeds Agronomist from February 1968 to January 1976. Mimosa control continued and the section was in a position to stop seed set. However, the Commonwealth Government's removal of funds compounded a realisation that eradication was impractical. This illustrates that the classical approach to catchment management of a weed is not feasible unless resources are available to maintain follow-up control in the long-term. Therefore, attempts at full-scale eradication ceased in 1971. This was followed by a limited control program on key infestations of mimosa which has continued until today, and initiation of biological control research from 1978.



John Holmes (1969) as author of an article on hyptis in the magazine *Turnoff*, 1(2), 94-95.



Lofty Pickering removing an isolated infestation of mimosa with a mattock beside the Adelaide River, near the Arnhem Highway, on 2 December 1976.

Between 1969 and 1974, research was carried out on the control of hyptis and zamia palm, and control of weeds in sorghum at Tipperary Station. The first time the section used aircraft for spraying weeds was in 1970 to control hyptis on Beatrice Hill and later for the control of parthenium (*Parthenium hysterophorus*) weed on Elsey Creek in 1978. In these cases a fixed wing aircraft was used. From January 1983 helicopters were used to apply herbicides to mimosa and this is now the favoured method for aerial survey and application.



Lofty Pickering refuelling an aircraft for aerial spraying of hyptis at Beatrice Hill, 1970.

In the 1970s, the Noxious Weeds Section not only operated in the Darwin region. Herbicide trials were carried out on parkinsonia (*Parkinsonia aculeata*) at Goondooloo, east of Katherine, and on rubber bush. Work in 1970 also included inspecting a herd of 1,000 goats that were being walked from Queensland to the Northern Territory, to prevent the entry of Noogoora burr.

A major change in Commonwealth Government resources for weeds in the Territory occurred from 1975. The three Territory District Agronomists in the Animal Industry and Agriculture Branch, Ian Miller (Darwin), Maged Aboutaleb (Katherine) and Ken Shaw (Alice Springs) were given responsibility for noxious weed survey and control in their districts, as well as their existing responsibilities for agricultural extension and horticultural research. This enabled development of targeted control activities in the regions such as control of salvinia (*Salvinia molesta*), water hyacinth (*Eichhornia crassipes*) and parthenium weed. The weed research function remained with the one weeds agronomist, Laurie Nemestothy.

With self-government on 1 July 1978, weed research and control came under the umbrella of the first Northern Territory Government Department that dealt with primary industry – the Department of Industrial Development. From 1979, the weeds function was placed in a succession of departments that handled primary industry. In recognition of the potential scale of weed problems in the Territory, and the need to deal with them, resources devoted to weeds were gradually increased. In 1979/80, the term "Weeds Section" was first used for the group of five people carrying out weed control, either full-time or part-time, in the northern region. Then, in 1988, the "Weeds Section" became the "Weeds Branch" within the Department of Primary Industry and Fisheries.

By 1982 there were 10 officers: seven in Darwin and three in Katherine. At that time, weed control operations and extension in the Alice Springs district and Barkly Tablelands were handled by the Pastures and Horticulture Sections in Alice Springs. In 1987, full-time weeds officers were recruited to Alice Springs and Tennant Creek. District offices were subsequently established in Jabiru (1991), Timber Creek (1998) and Borroloola (1999). By 1995 there were 23 staff and, at its maximum in the year

2000, there were a total of 27 weeds officers located in Darwin, Jabiru, Katherine, Timber Creek, Borroloola, Tennant Creek and Alice Springs.

This increase in resources enabled development of an integrated weed management team to service landholders across the Territory. It also created a work environment where staff could gain experience outside of their regions.

On 13 November 2001, the Northern Territory Government amalgamated several departments into larger departments. Primary Industry and Fisheries was placed in the new Department of Business, Industry and Resource Development (DBIRD). The Department of Infrastructure, Planning and Environment (DIPE) was created from the former Department of Transport and Works, the Department of Lands, Planning and Environment, and the Parks and Wildlife Commission.

From 1 July 2002, the Weeds Branch was transferred from DBIRD to DIPE where it became the "Weed Management Branch". The rationale for this transfer was that DIPE covers land management activities including pastoral land management, Landcare, the Bushfires Council, feral animal control, natural resource survey, soil conservation, water resource management, management of national parks and road corridors. It was reasoned that Weeds Branch would be best located in a department that supports landholders in all aspects of conservation land management.

Some notable projects

NT Weeds Management Strategy and legislation

The Northern Territory's first weeds strategy was developed in 1982 as "Weeds in the Northern Territory: Current Situation and Future Directions". This document guided weed management over a period of more than 10 years. In June 1996, the Minister for Primary Industry and Fisheries released a new strategy "The Northern Territory Weeds Management Strategy 1996-2005". It has objectives of preventing the introduction and spread of weeds, integrated weed management, research, public awareness and education, and the need for new legislation. The strategy is available on the Internet at http://www.ipe.nt.gov.au/divisions/weeds/manage_strategy.html.

During administration of the *Noxious Weeds Act 1962*, deficiencies became evident. A new Act was needed which reflected current and developing approaches to weed management. Therefore, from 1995, a process of public and inter-departmental consultation was undertaken, interstate legislation was studied and a new *Weeds Management Act* commenced on 1 July 2001 (http://www.nt.gov.au/lant/hansard/hansard.shtml).

Chemical, physical and ecological control

<u>Aquatic weeds</u>. The aquatic weed, water hyacinth was first recorded in the Territory in 1974 and salvinia was recorded in 1976. Major successes for the Weeds Branch in the mid 70s through to the late 80s were the eradication of six field infestations of water hyacinth and five infestations of salvinia, using chemical and physical means. The essence of success was early detection of infestations brought about by public awareness, swift action, regular follow-up and a long-term commitment. The fact that these infestations have gone, and no one these days knows it, bears witness to the saying that was coined in the NT: "successful weed control is not what you can see, but what you can't see."



Lofty Pickering (L) and Laurie Nemestothy (R) spraying salvinia on the Adelaide River, 12 January 1977.

<u>Parthenium weed</u>. In August 1977, parthenium weed was found growing beside the Roper Highway at Elsey Creek, east of Mataranka. This was the first of only a few infestations that have been found in the Territory. Aerial spraying was carried out in 1978, followed by regular survey and ground control for 10 years, and less frequent surveys in recent years. By 2004, parthenium weed had not been detected for five years and it may have been eradicated. This 27-year, long-term success story resulted from staff in Katherine and Darwin putting in many years of difficult work.



Dick Cowen and Maged Aboutaleb searching for parthenium weed at Elsey Creek, 21 October 1980.

<u>Prickly acacia.</u> Another major success has been control of prickly acacia (*Acacia nilotica*) on the Barkly Tableland. This is a serious weed in Queensland and has the potential to become a major problem in the NT so constant public awareness is

required. Isolated outbreaks have been recorded in the Territory, but vigilance and prompt action by the Weeds Branch has prevented it having a major impact.



Prickly acacia on the Barkly Tableland, 28 October 1987 - treated with tebuthiuron.

<u>Mimosa control and research</u>. Obviously the lack of resources and cessation of a catchment approach to mimosa control on the Adelaide River in 1971 led to a major expansion of the weed. It spread mainly on floodwaters within the Adelaide River catchment, and to other river systems by man and animals.

The rapid spread of mimosa prompted initiation of a major research project on the biology and control of mimosa from 1981 to 1992. This incorporated the work on biological control (referred to elsewhere) in order to adopt an integrated approach that included research on the biology of the plant, herbicides, fire and ecological control. From 1983 it included a project on the control of mimosa in Thailand supported by the Australian Centre for International Research, Thai institutions, CSIRO Division of Entomology and the Weeds Branch. This work laid the foundation for control methods still used today to contain the spread of mimosa, and to reclaim floodplains.

Control has been successful in certain areas, but unsuccessful where follow-up control has not been sustained. Since 1972, only areas with strategic, environmental or pastoral value have been controlled with herbicides, and a large proportion of the infested area has never been treated. For example, most of the large infestation on the Adelaide River has never been treated with herbicides. This is in line with a policy adopted in 1978 to not control large infestations pending biological control. This policy was later varied to allow for control of certain high-priority infestations away from the Adelaide River.



A 'helitorch', containing gelled gasoline, igniting a mimosa burning trial on the Adelaide River floodplain, 27 September 1988.



John Pitt demonstrating mimosa control at a Training Workshop near Bangkok, Thailand, 3 November 1989.

The most controversial project carried out by the Weeds Branch was the chemical and mechanical control of an 8,000-hectare infestation of mimosa on the East Alligator River floodplain near Oenpelli in Arnhem Land. An inter-agency meeting in Canberra in May 1990, involving the Commonwealth and Northern Territory, resolved to develop a program that aimed to prevent the spread of mimosa westwards into Kakadu National Park and eastwards into Arnhem Land. Management of the program came under an inter-agency Steering Committee.

Aborigines from Gunbalanya carried out ground control during the 1991 dry season, while aerial application of the herbicide tebuthiuron commenced on 15 November 1991. From the outset, it was predicted that follow-up control would be required and the program continues to this day.



The ground survey team for control of isolated mimosa plants at Oenpelli, November 1991



Robert Knight (L), Neil Kerrigan and Graham Schultz (R) refuelling a helicopter and calibrating tebuthiuron pellets for aerial application to mimosa at Oenpelli, 4 November 1993.

There are differing views on the success of the program or otherwise, depending on whether the observer saw the extent of the infestation in the early 1990s, on expectations, on previous experiences with woody weed control and on the method of evaluation. In 1997, a Sessional Committee on the Environment Inquiry into mimosa reported that the methodology employed at Oenpelli was appropriate at the time, that it had been successful and it produced benefits to the community by allowing the floodplain to once more become a resource for the Oenpelli community.

<u>Athel pine</u>. The appointment of two weeds officers in Alice Springs enabled a control program to begin in 1989 on the control of Athel pine, a major weed along several hundred kilometres of the Finke River system. With the use of herbicides and bulldozers, and cooperative funding, progress is being achieved. The Branch in Alice Springs was also involved in management of mesquite (*Prosopis limensis*), Mexican poppy (*Argemone ochroleuca*), Paterson's curse (*Echium plantagineum*), Bathurst burr and Noogoora burr.



Blade ploughing Athel pine on the Finke River, April 1994.

<u>Lion's tail and bellyache bush</u>. From 1998 Weeds Officers in Timber Creek provided a weed control and extension service in the Victoria River District. This included control of lion's tail at Yarralin and the strategic control of bellyache bush in the Victoria River catchment.



Lion's tail at Yarralin in 1992.

Biological control

In the late 1970s, biological control was recognised as being an ideal method of weed control in the Northern Territory. The pastoral industry makes relatively low returns per unit area of land, there are vast areas of a natural environment to protect, while conventional chemical and mechanical weed control methods are expensive. As a consequence, the Weeds Branch has maintained a continuing interest in developments in biological control within Australia and overseas. Several weeds have become targets for biological control.

<u>Noogoora burr</u>. On 22 May 1977, a rust fungus, *Puccinia xanthii*, was recorded on Noogoora burr at Calvert Hills, inland from the Gulf of Carpentaria. The rust was introduced accidentally to Australia and spread naturally from Queensland. The Weeds Section transferred the rust to other infestations throughout the Territory. The rust reduced the vigour of plants on the Calvert and Robinson Rivers, and although the rust occurs in the Daly River catchment it has had little impact. A stem-boring beetle, *Nupserha antennata*, was also introduced for Noogoora burr, but it did not establish. A stem-galling moth, *Epiblema strenuana*, was released and became locally abundant, but patchy in its distribution.



Collecting leaves of Noogoora burr infected with *Puccinia xanthii* on the Daly River, 20 January 1981. The infected leaves were transferred to other infestations.

<u>Mimosa</u>. The impracticality of full-scale eradication of mimosa on the Adelaide River stimulated moves by the Weeds Section to initiate a joint biological control research program with CSIRO Division of Entomology and a recommendation for integrated control. Background work for biological control started in 1978, and NT government approval for the project was obtained on 19 December 1979.



The CSIRO Biological Control Unit in Curitiba Brazil, 14 March 1980. This was the base for early fieldwork on the joint CSIRO/NT biological control project.

In 1980, exploration for natural enemies of mimosa began in Brazil from an established CSIRO base at Curitiba. Subsequently, exploration for natural enemies was extended into Venezuela and Mexico, a field station being established in Mexico in 1984. Recognising the potential for biological control in the Territory, and the predicted increase in the work-load related to the rearing and release of biological control agents, the Weeds Section sought appointment of its first Biological Control Officer. John Gillett commenced work on 12 October 1981.

The first releases of biological control agents for mimosa in the NT were made on 13-14 April 1983. Seed feeding beetles (*Acanthoscelides* spp.) were released in the Marrakai and coastal plains areas. A total of thirteen biological control agents that feed on different parts of mimosa have now been released. In undertaking biological control, it is important to acknowledge the long-term nature of the task and to be persistent in pursuing an outcome. Research and associated administrative actions for the biological control of mimosa have been in progress continuously for 26 years. Biological control is now having a measurable impact on mimosa.

<u>Salvinia</u>. On 17 December 1981, John Gillett released a weevil (*Cyrtobagous salviniae*) that had been made available by CSIRO Division of Entomology for the biological control of salvinia at Nhulunbuy. It has since been released at other sites in the Top End. The effect of this insect has proven to be cyclical in nature but, in the long-term, it is successful in controlling certain infestations.



John Gillett searching for Cyrtobagous salviniae in Nhulunbuy Town Lagoon, 16 December 1982.

<u>Parkinsonia</u>. On 23 March 1982, the Department agreed to the Weeds Section collaborating with the Queensland Department of Lands and the Western Australian Department of Agriculture in a program on the biological control of parkinsonia. Overseas exploration was conducted from 1983 in southern USA, Mexico and Central America. In 1989 a leaf sucking bug, *Rhinacloa callicrates*, was released, followed by two seed-feeding bruchids, *Mimosestes ulkei* and *Penthobruchus germaini*. The latter is the most successful.



Rob Moloney collecting parkinsonia seeds in the Roper River area, to determine the impact of *Penthobruchus germaini*.

<u>Sida</u>. In 1984, *Sida* spp. were included in the joint project with CSIRO Division of Entomology. The project resulted in discovery of a number of potential agents one of which, a leaf-feeding beetle, *Calligrapha pantherina*, has provided substantial control of spinyhead sida (*Sida acuta*) in most situations near the coast.



Damage to spinyhead sida at a property near Noonamah, caused by the leaf-feeding beetle, *Calligrapha pantherina* in 1990.

<u>Other targets</u>. From 1998/99, research was initiated for the biological control of mesquite, bellyache bush and Mexican poppy. By the year 2000, a leaf-tying moth

(*Evippe* sp.), introduced from South America, had become established on mesquite on the Barkly Tableland and was causing defoliation. A Venezuelan jewel beetle (*Agonosoma trilineatum*), a fruit sucking insect that destroys seeds, was released on bellyache bush at Willeroo Station on 18 March 2003 and at Acacia Gap in the Darwin Region on 3 June 2003. After some preliminary work, the Mexican poppy project was cancelled.

Education

Extension and public awareness have always been an important part of the Branch's activities through responding to public enquiries, property visits, publications, show exhibits, field days and the media.

The first weed pamphlets were produced in 1967, the first TV advertisement on water hyacinth and salvinia was televised in 1977, and the first Agnote was released in 1977. Since then a series of Agnotes have been produced on every declared weed and weeds of quarantine importance.

(http://www.nt.gov.au/dbird/dpif/pubcat/agnotes/weeds.shtml).



Weeds exhibit at Darwin Show in 1976.



Ken Shaw addresses landholders at a parkinsonia field day at Banka Banka Station on 27 March 1981.

In August 1994, a Weeds Education and Awareness Officer was appointed. This enabled Weeds Officers to have access to a person who not only carried out extension for the Branch, but who was capable of raising the quality of publications, pamphlets, posters, public presentations and displays on weeds. Working with school children and environmental groups became an important area. This enabled the introduction of knowledge about the detrimental impact of weeds at an early age, and creation of an attitude that weeds can be controlled.

A selection of other projects

In the 24 years from 1978 through to 2002, the Weeds Branch introduced new practices, schemes and projects, some in collaboration with the Commonwealth and States. These include:

- Roadside weed control. Roadsides are points of entry for new weeds and serve as a source of spread to pastoral and conservation areas. As a consequence, the Branch carried out roadside weed control on an opportunistic basis from the early 1970s. The Department of Transport and Works provided funding assistance from 1988/89 in the Katherine Region. This was extended to the Darwin and Southern regions in 1991/92. Roadside weed control was taken over by a Transport and Works contractor from 1998.
- Physic nut (*Jatropha curcas*) was controlled in the Mt Wells area in the late 1970s and eradicated in the 1980s.
- In 1982, a Herbicide Subsidy Scheme was introduced to encourage and assist control of noxious weeds, particularly in pastures. This became the Herbicide Reimbursement Scheme in 2000/2001.
- A Mimosa Aerial Spraying Assistance Scheme was introduced in 1985/86 to encourage a targeted approach to mimosa control where the weed was having a major economic impact. From 1997/98 it was termed the "Weed Management

Assistance Scheme" to allow applicability to other weeds, and from 2001 it was called the "Weed Management Reimbursement Scheme".

- A Spray Unit Loan Scheme commenced in 1982/83. It resulted in a substantial increase in the level of weed control, particularly in the Katherine Region.
- The Branch carried out paddock inspections on request under a voluntary certification scheme for hay that was introduced by the Katherine District Farmers Association in 1983.
- The Branch cooperated in development of complementary Commonwealth/State/Territory legislation for the biological control of pests, resulting in the Northern Territory *Biological Control Act 1986*.
- A Noxious Weeds Recording System was developed in 1985. From 1995, work commenced to develop an improved GIS based weed mapping and management system.
- In 1988, funding was approved for a research project carried out by the University of Queensland to map mimosa using satellite imagery.
- In collaboration with the Queensland Department of Lands in 1994, a 100kilometre buffer zone was established east of the Northern Territory border, aimed at preventing the entry of rubber vine.
- From 1991, the Branch collaborated with the Commonwealth and States to develop a National Weeds Strategy, published in 1997.
- From 1998, contributions were made to the Environmental Management Plan for the Alice Springs to Darwin Railway.
- In 1998, the Branch participated in a Tropical Weeds Panel as part of the process to determine Weeds of National Significance. From 1999 the Branch became the lead agency for development of Strategic Plans on mimosa and Athel pine, and assisted the States with other relevant Strategic Plans.

The future

Weed management in the Northern Territory presents a special challenge. The NT covers a large geographic area, intrinsic factors in the environment allow for rapid growth and spread of weeds, land management over much of the area is not intensive and the human population density is low - meaning there are few people to watch for and control weeds.

The transfer of the Weeds Branch to DIPE in 2002, and creation of a Weed Management Branch, marked the end of the Branch's long-term placement within a primary industry agency. This provides a new opportunity to adopt and promote weed management as a conservation function for all land and water uses.

The Weed Management Branch now has an opportunity to build on previous experiences to provide practical, innovative and realistic responses to the impact of weeds in the Northern Territory. Educating the public about their detrimental impacts, developing methods to manage them, and instilling landholder responsibility for weed management will continue to be fundamental for achieving the goal of the NT Weed Management Strategy.

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