



Feral Animal Control Program

2017 - 2020

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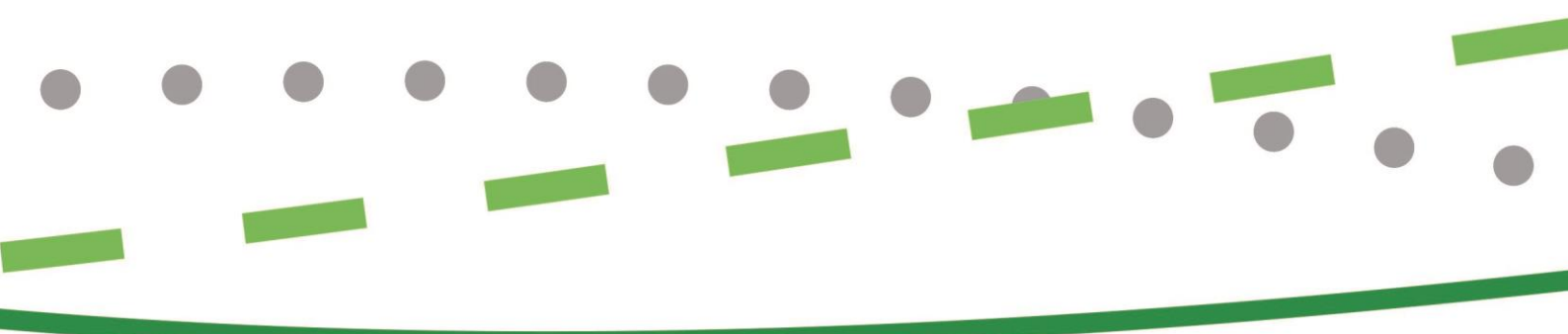


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1. Introduction

Feral animals including pigs, dogs and cats impact on agricultural production and the environment. The Whitsunday Regional Council have estimated that the population of feral pigs and dog are causing approximately \$18 million worth of damage each year to the agricultural industry. Feral pigs and dogs directly predate on young calves and affect watering points. Feral animals are also a vector for transmitting disease to cattle and native animals.

The Council has estimated that feral animals cause \$28 million in impacts to the environment each year. The impacts include damage to watercourses and water quality, ground vegetation, native animals and aquatic ecosystems. Damage to creek banks and wetlands increase sedimentation which can reduce the habitat value of downstream ecosystems and reduce the habitat for native fish.

The Whitsunday Regional Council is directed under the *Queensland Biosecurity Act 2014* to coordinate the control and reduction of restricted and prohibited pests (declared pests). Feral animals such as pigs, dogs and cats are classed as category 4 pest animals. The Council has limited resources so, careful planning is needed to make sure financial and human resources are allocated where they result in the best outcomes.

The purpose of this report is to define the Whitsunday Regional Council pest animal program for 2017-2020. The three-year program will use conventional and more innovative methods to reduce the feral animal populations in the region. The objectives of this 2017-2020 feral animal control program report are:

- To describe the feral animal control program tasks.
- To describe the budget needed to implement the proposed program.
- To set program targets.



Figure 1. Location of the Whitsunday Shire

2. Background

2.1 Legislation and Policy

The main legislation which guides pest management in the Whitsunday region is the *Queensland Biosecurity Act (2014)* and the Whitsunday Regional Council Local law 3 (Community and Environment). The Queensland government has introduced the *Queensland Biosecurity Act 2014* to guide the management of invasive plants and animals.

The *Biosecurity Act 2014* introduces the concept of the general biosecurity obligation (GBO), which is an overarching obligation that requires all persons who deal with biosecurity matter to take all reasonable and practical measures to prevent or minimise the risk posed by the biosecurity matter. The GBO encourages all relevant parties to take a proactive role in preventing, managing and addressing biosecurity risks that relate to them.

The *Biosecurity Act* also introduces prohibited and restricted biosecurity matter. Prohibited matter is not currently present in Queensland and is prohibited because there are reasonable grounds to believe it could have significant adverse effects if introduced to the state. Restricted matter is found in Queensland and may have an adverse effect if restrictions are not imposed. Restricted matter is assigned category numbers from 1-7 based on its characteristics and the risk it poses. Pest plants and animals can be attributed to more than one pest category.

The Whitsunday Regional Council Local Law 3 (Community and Environment) enables the council to identify pest plants. Under Local Law 3, a person must not;

- introduce, propagate or breed a declared local pest; or
- provide harbour to a declared local pest.

The Local Law 3 subordinate local law contains a list of locally declared pest plants which are not identified as pest plants by the State government but are recognised locally as invasive and worthy of control and eradication.

The list of the restricted categories under the Biosecurity Act and a brief explanation from the State government is listed in table 1. The category of declared pest animals is found in table 2.

Table 1. Biosecurity Act categories descriptions.

Category	Description
1	Includes insects such as red imported fire ants, electric ants and Asian honey bees, and certain animal and plant diseases, aquatic diseases and pathogens. This restricted matter must be reported to Biosecurity Queensland within 24 hours of you becoming aware of its presence.
2	Includes certain noxious fish, weeds and pest animals such as spotted gar, Miconia weed and redeared slider turtle. This restricted matter must also be reported to an authorised person within 24 hours of you becoming aware of its presence.
3	Includes certain noxious fish, weeds, pest animals and insects. Examples of this category of restricted matter are gambusia, parthenium weed and foxes. You must not supply to another person or release into the environment this category of restricted matter.
4	Includes specific noxious fish, weeds and pest animals such as the giant cichlid, bitou bush and feral pig. You must not move this restricted matter to ensure that it does not spread into other areas of the state.
5	Restricted matter includes certain noxious fish, weeds, pest animals such as carp, Mexican feather grass and rabbits. You must not possess or keep this restricted matter under your control. These pests have a high risk of negatively impacting on the environment.
6	Includes certain invasive animals such as feral deer, foxes, rabbits and wild dogs and noxious fish such as carp, gambusia and tilapia. You must not feed this category of restricted matter. With the exception of the fish species, feeding for the purpose of preparing for or undertaking a control program is exempted.
7	Restricted matter includes the noxious fish carp, weatherloach, climbing perch, gambusia and tilapia. If you have these noxious fish in your possession you must kill the restricted matter and dispose of it by burying the whole carcass (no parts removed) in the ground above the high tide water mark or placing it in a waste disposal receptacle.

Table 2. Biosecurity status of feral animals found in the Whitsunday Region.

Pest Animal	Biosecurity Category
Pig	3,4,6
Dog	3,4,6
Dingo	3,4,5,6
Cat	3,4,6
Deer	3,4,6
Rabbit	3,4,5,6
Fox	3,4,5,6

2.2 Whitsunday Biosecurity Plan

The Whitsunday Regional Council has developed a Biosecurity Plan as required under the *Queensland Biosecurity Act 2014*. The purpose of the Whitsunday Regional Council Biosecurity Plan (2016-2020) is to guide pest management within the Whitsunday local government area. This Biosecurity Plan applies to all land within the jurisdiction of Whitsunday Regional Council. The Whitsunday Biosecurity Plan seeks the following outcomes:

- Describe how the extent of pest plants and animals in the region will be mapped and monitored.
- Inform the community of their pest management obligations.
- Describe how the regional pests are prioritised.
- Describe how pests will be managed across the region.
- Document the roles and responsibilities for pest management stakeholders.

The Council has developed this Biosecurity Plan in consultation with regional land management stakeholders. The Council's pest management program aims to reduce pest plant and animals across the region.

There are a number of current Natural Resource Management regional plans that guide the management of invasive plants and animals. The regional plans which have a focus on pest management or include pest management are:

- Burdekin Dry Topics NRM region – Pest Management Plan – 2014-2019 (NQDT, 2014)
- Mackay Whitsunday Isaac Natural Resource Management Plan (2014 – 2024)
- Burdekin Dry Topics Natural Resource Management Plan -2016-2026
- Regional Pest Management Strategy – Isaac Mackay Whitsunday 2011-2014.

The Whitsunday Biosecurity Plan (2016-2020) aims to reflect the regional pest management priorities. The Biosecurity Plan will also reflect the objectives and desired outcomes of the Queensland Weed and Pest Animal Strategy 2016-2020 (DAFF, 2016).

The Whitsunday Regional Council Feral Animal Control Program is written as a sub-ordinate plan under the Whitsunday Biosecurity Plan. The feral animal control program will deliver the feral animal outcomes described within the Whitsunday Biosecurity Plan.

2.3 Current feral animal population and impacts

Council officers have estimated feral animal densities and population for the main landscapes in the Whitsunday Region. The feral animal densities are based on landholder advice, trapping, aerial observations and road fatalities. The estimated feral animal populations in the Whitsunday region are shown in table 3.

Table 3. Showing the estimated feral animal populations in the Whitsunday Regional Council area.

Feral Animal	Coastal National Parks		Coastal Lowlands (North)		Coastal Lowlands (South)		Coastal Wetlands		Inland		Total Population
	Density	Population	Density	Population	Density	Population	Density	Population	Density	Population	
Pigs	Low: 1 per 30ha	1,500	Low: 1 per 50ha	2,200	Low: 1 per 50ha	2,200	1 per 30ha	850	Low: 1 per 200ha	9,500	16,250
Dogs	Low: 1 per 30ha	1,500	Low: 1 per 50ha	1,100	Low: 1 per 50ha	2,200	1 per 50ha	500	Low: 1 per 200ha	9,500	15,950
Cats	Low: 1 per 30ha	1,500	Low: 1 per 100ha	220	Low: 1 per 100ha	1,100	1 per 100ha	500	Low: 1 per 200ha	9,500	13,950
Deer	Nil Observed	0	Low: 1 per 500ha	600	Low: 1 per 500ha	220	Low: 1 per 1000ha	25	Low: 1 per 500ha	3,800	4,265
Fox	Low: 1 per 100ha	500	Low 1 per 200ha		Low: 1 per 200ha	600	1 per 500ha	200	Low 1 per 1000ha	1,900	3,800
Area (Ha)	50,000		110,000		110,000		25,000		1,900,00		
Total		5,500		6,500		6,500		2,300		36,100	54,215

It is difficult to determine an accurate population for feral animals. The feral animal population is likely to fluctuate year-to-year based on climate and feral animal control activities.

Some observations from the feral animal population table:

- The main feral animal is the feral pig. The feral pig can be found in all landscapes. The feral pig population densities range from 1 per 30ha to 1 per 200ha which are similar densities reported by QDAFF (2008). The largest population of feral pigs could be in the large inland landscape area.
- Feral deer are starting to move eastwards into the coastal lowland areas. There have been anecdotal sightings of small groups of deer around the Clarke Range and Kelsey Creek in the southern lowland landscape.
- The fox has a relatively low population in coastal and inland areas.
- The population of feral cats is possibly least known. Feral cats are likely to have growing populations around urban areas and rural residential areas.

2.4 Current feral animal activities and their application

2.4.1 Aerial baiting

The aerial baiting program delivers injected 1080 baits from a helicopter. The Council collected information on the aerial baiting program in 2014 and 2015. The cost of the baiting program and the area serviced from 2014 and 2015 are shown in table 4.

Table 4. The aerial baiting program and the costs and benefits of the program.

Flight Date	Landscape Unit	Flight Control Area (ha)	Baits	Pigs Destroyed	Dog Destroyed	Total Feral Animals Destroyed	Cost Per Flight	Funding Source	Cost Per Bait	Cost Per Head/Pig	Cost Per Head/Pig and Dog
2014	Coastal Lowlands – South	149,000	1500	298	75	373	\$24,500	Reef Catchments/ QPWS and Landholder	\$16.30	\$82.21	\$65.70
2015	Coastal Lowlands – South	175,000	2000	350	90	440	\$21,250	Reef Catchments/ QPWS and Landholder	\$10.62	\$60.71	\$48.29

• *Note- assumptions:*

o *Estimated number of destroyed feral pigs = area bated x population density (use 1 per 100ha) x 20% of population.*

o *Estimated number of destroyed feral dogs = area bated x population density (use 1 per 100ha) x 5% of population.*

The Council has estimated that possibly 20% of the feral pig and 5% of the dog population may be reduced from the program. If the estimation of the impact of the aerial bating is close to the actual uptake, then the cost per destroyed animal could be between \$50-\$83/animal.

2.4.2 Aerial shooting

The Whitsunday Regional Council has collated the costs and outcomes of the aerial shooting program since 2012. The costs and outcomes of the aerial shooting program are shown in table 5.

Table 5. Showing the aerial shooting costs and benefits for 2012 to 2016.

Flight Date	Location	Landscape Unit	Flight Path Distance	Pigs Destroyed	Dogs Destroyed	Deer Destroyed	Flight Hours	Cost per Flight	Funding Source	Cost Per Head
Jul-12	East Euri – Kali Wetlands	Coastal Lowlands – North		146			17	\$11,972		\$82
18-19/12/12	East Euri – Klai Wetlands	Coastal Lowlands - South		165			16	\$6,360	NQDT	\$38
18/09/14	Kaili – Abbot Pt wetlands	Wetlands		61			2	\$1,860	EEG	\$30.49
5/11/14	Goorganga	Wetlands		106			4	\$3,740	EEG	\$35.09
30/11/14	Birrilee	Inland	144	59			2	\$1,860	EEG	\$31.52
3/12/14	Kaili Valley	Wetlands		35			2	\$1,860	EEG	\$53.14
4/12/14	Splitters – Wangaratta Ck	Coastal Lowlands (North)		27			2	\$1,860	EEG	\$68.89
27/02/14	Goorganga	Wetlands		18			2	\$1,860	EEG	\$103
29/07/15	Goorganga	Wetlands	141	38			3	\$3,348	EEG	\$88.10
30/07/15	Abbot Pt	Wetlands	332	57			5	\$4,743	EEG	\$83.21
11/08/15	Birrilee	Inland	328	203			6	\$6,138	EEG	\$30.23
1/12/15	Birrilee	Inland	176	63			6	\$5,580	EEG	\$91.47
2/12/15	Bogie River	Inland	380	199	6		6	\$5,580	EEG	\$27.21
3/12/15	Abbot Pt	Wetlands	295	24	3		6	\$5,580	EEG	\$206.66
4/12/15	Goorganga	Wetlands	137	14	2		6	\$5,580	EEG	\$398.57
16/05/16	Birrilee	Inland	340	175	2		7.5	\$6,975	EEG	\$39.40
17/05/16	Bogie	Inland	325	85	2		5	\$4,650	NQDT	\$53.44
18/05/16	Rocky Ponds	Coastal lowlands -north	182	24			5.5	\$5,115	NQDT	\$204.60
19/05/16	Rocky ponds	Coastal lowlands -north	177	41	2		2.5	\$2,325	NQDT	\$54.06
21/09/16	Goorganga	wetlands	291	34			4	\$3,720	EEG	\$109.41
26/09/16	Birrilee	Inland	389	119	2		9	\$8,370	EEG	\$65.90
27/09/16	Bogie In	Inland	311	45	12		5	\$4,650	NQDT	\$81.57
28/09/16	Rocky ponds	Coastal lowlands -north	298	60			5	\$4,650	EEG	\$93
24/11/16	Goorganga	wetlands	105	57	3		6	\$5,580	EEG	\$93
25/11/16	Abbot Pt	wetlands	186	104	1		5	\$4,650	EEG	\$44.28
28/11/16	Birrilee	Inland	134	89	5		6.5	\$6,045	EEG	\$57.02
29/11/16	Bogie	Inland	229	56			5	\$4,650	NQDT	\$83.03
30/11/16	Rocky ponds	Coastal lowlands -north	236	74	4		5	\$4,650	NQDT	\$59.61
				2178	44	17	156	\$133,951		\$62

- **Notes:**
 - *Cost per hour of flight time is:*
 - *Helicopter= \$850*
 - *Council staff = \$60*
 - *Consumables = \$20*
 - *Total = \$930/hr*
 - *Funding:*
 - *NQDT – North Queensland Dry Tropics*
 - *EEG – Everyone’s Environment Grant (Commonwealth)*
 - *Total cost for aerial shooting activity for council is \$14,400/yr*

A benefit of the aerial shooting program is that the actual number of destroyed animals can be measured accurately. Over the course of the five years, the Council aerial shooting program has reduced the feral pig population by 2178 and a total of 2239 feral animals. The cost of the program over the five-year period is \$134,000 in grants plus Council time in organising and coordinating the aerial shooting at a cost of \$57,600 provides a total of \$191,600 over the five years or \$87 per destroyed animal.

2.4.3 Calculation of financial benefits

The various ground and aerial feral animal control activities have been evaluated against cost per destroyed animal and land use. The financial evaluation of the various methods for 2015-16 are shown in table 6. The evaluation shows that aerial shooting is quite cost effective for the grazing areas and it is a suitable activity. The most suitable feral animal control activity for urban areas is the use of traps.

Table 6. The evaluation of the effectiveness of the feral animal programs for 2015-16 financial year only.

Method	Animals Destroyed (15-16)	Cost for Serve 15-16 (\$)	Area Serviced (ha)	Cost per Head	Value of activity on grazing	Value of activity on sugarcane	Value on urban land use
Trapping – cage	200	\$7,200	1000	\$36	Low	Low – Medium	Medium
Trapping – foot hold	10	\$7,200	500	\$72	Low	Low	Medium
Ground baiting (syndicates)	500	\$36,000	1,200,000	\$72	Medium	Low	Low
Ground baiting (casual)	25	\$1500	1400	\$60	Low	Low	Low
Aerial baiting	350	\$21,250	175,000	\$60.72	Medium	Low - Medium	Low
Aerial shooting	598	\$24,400 (grants) + \$14,400 + \$38,800	1,000,0000	\$64.88	Medium - High	Medium	Low
Total	1683	\$111,950	2,378,000	\$66.52			

- **Note-assumptions:**
 - *Animals destroyed for ground baiting and aerial baiting based on assumptions from estimated population and expected impacts.*
 - *Cage trapping results based on landholder responses and anecdotal evidence from WRC staff.*
 - *Aerial shooting service area – based on flight paths with 100m swath.*

Table 7. Total number of feral animals destroyed over the five-year period.

Activity	2012 – 13	2103 – 14	2014 – 15	2015 – 16	2016 – 17	Total
Trapping – Cage	200	200	200	200	200	800
Trapping – Foot Hold	10	10	10	10	10	40
Ground Baiting (Syndicates)	500	500	500	500	500	2000
Ground Biting (Casual)	25	25	25	25	25	100
Aerial Baiting	350	350	350	350	350	1400
Aerial Shooting	311	0	329	598	1013	2251
Total	1396	1085	1414	1683	2098	6591

The total cost of the feral animal program over the five-year period is shown in table 8.

Table 8. The total cost of the feral animal control program over the five-year review period.

Activity	2012 – 13	2013 – 14	2014 – 15	2015 – 16	2016 – 17	Total
WRC	\$87,000	\$87,000	\$87,000	\$87,000	\$87,000	\$435,000
EEG		\$20,000	\$25,000		\$25,000	\$70,000
NQDT	\$22,829		\$24, 400	\$12,000	\$12,000	\$34,829
Reef Catchment			\$5000	\$9,000	\$17,000	\$31,000
Other						
Total	\$109,829	\$107,000	\$117,000	\$96,000	\$141,000	\$570,829

The Whitsunday Regional Council feral animal control program has reduced the feral animal population by approximately 5,578. The overall cost of the feral animal program has cost \$570,829. The overall cost per destroyed animal over-all program activities over the five-year period is \$102.33 including administration costs.

3. Program

3.1 Goals and Objectives

The goals and objectives of the feral animal program are listed in table 9.

Table 9. Feral animal program goals and objectives.

Goal	Objective
G1. To determine and monitor feral animal populations	O1. To develop a process which can be used to determine the number of feral animals in the shire to a reasonably accurate level.
	O2. To develop a process which can be used to determine whether feral animal populations are increasing or decreasing.
G2. To undertake activities which reduce feral animal numbers	O3. To identify feral animal activities best suited to each land use to reduce feral animal numbers.
	O4. To implement feral animal control activities in a way which will have the largest impact on feral animal numbers and their impacts.
	O5. To collect data on feral animal control activities which can be used to measure their effectiveness in reducing population numbers and impacts.
G3. To reduce feral animal impacts on agricultural production	O6. To develop a process to measure the impacts of feral animals on agricultural production by land use.
G4. To reduce feral animal impacts on the environment	O7. To develop a process to measure the impacts of feral animals on the environment.
G5. To monitor the Shire for new feral animal incursions	O8. To develop a system to monitor for new pest incursions into the Shire.
G6. To provide an effective and cost-efficient feral animal coordination service to landholders and rate payers	O9. To develop a process to record the outcomes of the feral animal program and report on the outcomes.

3.2 Activities and applications

There are a range of possible methods available to council to reduce feral animals. Council reviewed the use and application of the numerous types of actions and have determined the suitability of their application against land use. The proposed list of feral animal control methods and their application are summarised in table 10. The Shire will be divided up into Feral Animal Management Areas (FAMA) for baiting and aerial shooting. The Feral Animal Management Area for each method can be different because of the proposed target for each activity. The FAMA for aerial baiting and aerial shooting will be different. The use of aerial baiting will only occur in inaccessible upland areas, however aerial shooting will not occur in upland forested areas.

Table 10. The feral animal control methods and their application.

Method	Value of Activity on Grazing	Value of Activity on Sugarcane	Value on Urban Land Use	Target Land Use	Comments
Trapping – Cage	Low	Low – Medium	Medium	Rural Residential	Cage traps will be used around urban and rural residential area. Cage traps will be provided to graziers if they show an interest.
Trapping – Foothold	Low	Low	Medium	Rural Residential	Useful for trapping wild dogs around urban and rural residential areas.
Ground Baiting (Syndicates)	Medium	Low	Low	Rural	Coordinated baiting is a reasonably useful method of destroying feral pigs and dogs over a large area. The usefulness of this method is difficult to measure.
Ground Baiting (Casual)	Low	Low	Low	Rural	The provision of individual commercial baits to graziers will be provided between ground syndicate baiting rounds if requested in rural areas.
Aerial Baiting	Medium	Low – Medium	Low	Rural Upland Forested Areas	The use of aerial baiting is good for hilly forested areas where access is poor.
Aerial Shooting	Medium - High	Medium	Low	Rural	This method provides a good accountable way to reduce feral pig and dog numbers.

3.3 Schedule of tasks

The feral animal activities will occur at various times in the year.

Table 11. Ground baiting syndicates and baiting times.

Syndicate and FMA	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Days/year
						1 st Round				2 nd Round			
Kelsey Creek													2
Goorganga													2
Longford Creek													2
Mt Dangar													2
Strathmore													2
Mt Coolan													2
Abbot Point													2
Gumlu													2
Total													16

Table 12. Aerial baiting feral animal management area (FAMA) timeframes.

FMA	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Days/year	Cost \$
Clarke Range														
Conway														
Mt Dryander														
Mt Hector														
Mt Aberdeen														
Total													3	\$19,000

• **Note:**

- WRC - \$5,000. Reef Catchments = \$5,000, QPWS = \$5,000, Industry = \$2,000, Individual landholders = \$2,000. Total = \$19,000.
- The timing will depend on funding and weather.

Table 13. Schedule of aerial shooting for feral animal management areas (FAMA).

FMA	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Hours/year	Cost \$
Goorganga				4						4			8	\$6,800
Peter Faust Dam				2						2			4	\$3,400
Abbot Point/ Caley Wetlands				6						6			13	\$11,050
Rocky Ponds				6						6			13	\$11,050
Mt Dangar				6						6			10	\$8,500
Bogie River				5						5			14	\$11,050
Strathmore				7						7			14	\$11,050
Suttor – Mt Coolon											6 x 3		18	\$15,300
Total				36						36	18		94	\$79,900

Note: Target budget : NQDT = \$20,000, Reef Catchments = \$20,000, DNRM = \$2,000, NQBP = \$2,000., Industry = \$7,000, individuals = \$5,000, WRC = \$25,000.

3.4 Budget

The budget required to implement the feral animal control program is listed in table 14.

Table 14. Budget for the feral animal control program – annual salary (not including oncosts).

Feral Animal Program	Task	% of Staff Time	Approximate Number of Days/ years	Approximate Expenditure of Council Funds/ year (Salary and Transport)
Ground Sub-Program	Ground baiting – syndicates (project planning and activity)	25	50	\$20,000
	Supplementary landholder baiting	1	2	\$1,000
	Cage Traps – Pigs	5	10	\$3,500
	Leg Traps – Dogs	5	10	\$3,500
	Traps – Cats	2	4	\$1,000
	Rabbits	2	4	\$1,000
	Aerial Sub-Program	Aerial baiting (project planning and activity)	10	20
	Aerial shooting (project planning and activity)	10	20	\$7,000
Other	Administration	10	20	\$7,000
	Complaints and landholder enquiries	15	30	\$10,000
	Pest plant	15	30	\$10,000
	Ute (\$15,000/ year)	-	-	\$15,000
	Fuel (\$5,000/ year)	-	-	\$5,000
Total		100	204	\$90,000

• Note: 1 Officer salary based on \$70,000/yr.

Table 15. Annual operating funds required for activities.

Feral Animal Program	Task	Approximate Expenditure of Council and External Funds Per Year (Operating)							
		2017-18		2018-19		2019-20		2020-21	
		WRC	External	WRC	External	WRC	External	WRC	External
Ground Sub-Program	Ground baiting – syndicates (project planning and activity)	\$20,000		\$20,000		\$20,000		\$20,000	
	Supplementary landholder baiting	\$1,000		\$1,000		\$1,000		\$1,000	
	Cage Traps – Pigs	\$3,500		\$3,500		\$3,500		\$3,500	
	Leg Traps – Dogs	\$3,500		\$3,500		\$3,500		\$3,500	
	Traps – Cats	\$1,000		\$1,000		\$1,000		\$1,000	
	Rabbits	\$1,000		\$1,000		\$1,000		\$1,000	
Sub-total		\$30,000	\$0	\$30,000	\$0	\$30,000	\$0	\$30,000	\$0
Aerial Sub-Program	Aerial baiting (project planning and activity)	\$7,000	\$19,000	\$7,000	\$19,000	\$7,000	\$19,000	\$7,000	\$19,000
	Aerial shooting (project planning and activity)	\$25,000	\$56,000	\$25,000	\$56,000	\$25,000	\$56,000	\$25,000	\$56,000
Sub-total		\$32,000	\$75,000	\$32,000	\$75,000	\$32,000	\$75,000	\$32,000	\$75,000
Other	Administration	\$7,000		\$7,000		\$7,000		\$7,000	

	Complaints and landholder enquiries	\$10,000		\$10,000		\$10,000		\$10,000	
	Pest plant	\$10,000		\$10,000		\$10,000		\$10,000	
Sub-total		\$27,000	\$0	\$27,000	\$0	\$27,000	\$0	\$27,000	\$0
	Ute and Fuel	(\$20,000)		(\$20,000)		(\$20,000)		(\$20,000)	
Total		\$109,000	\$75,000	\$109,000	\$75,000	\$109,000	\$75,000	\$109,000	\$75,000

4. Conclusion

The Whitsunday Regional Council feral animal control program has an estimated annual cost of \$90,000 for the council contribution for salary and transport, \$25,000 operational budget and \$75,000 from external sources, with a total cost of \$190,000/yr. The program will rely on the availability of \$75,000/yr from external sources such as Natural Resource Management groups, industry and landholders. The feral animal control program will vary year to year depending on the availability of funds. The proposed Council feral animal control program in this report represents Council's preferred range of feral animal control tasks

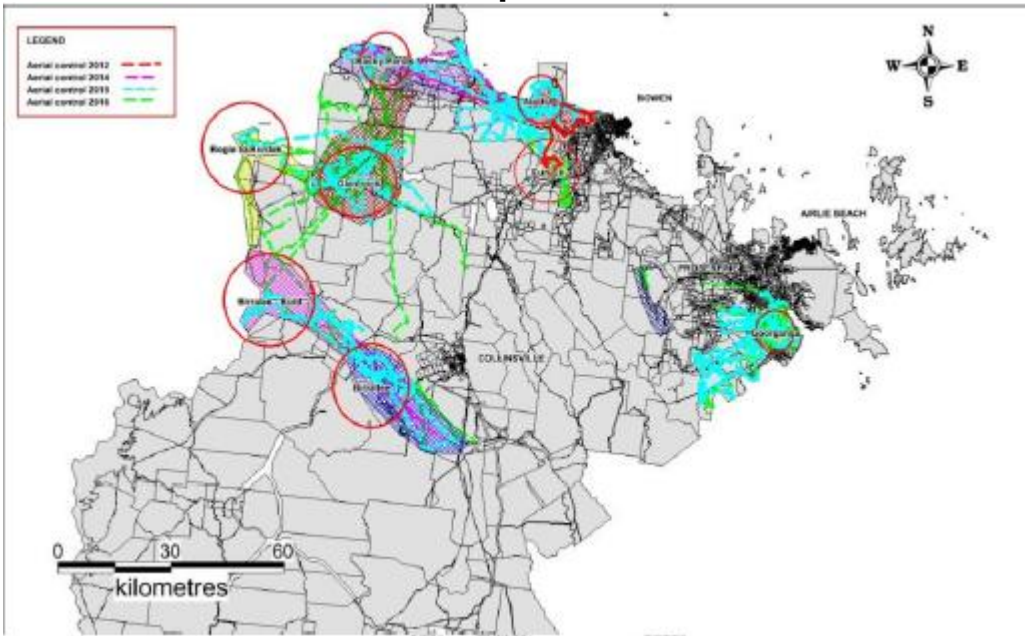
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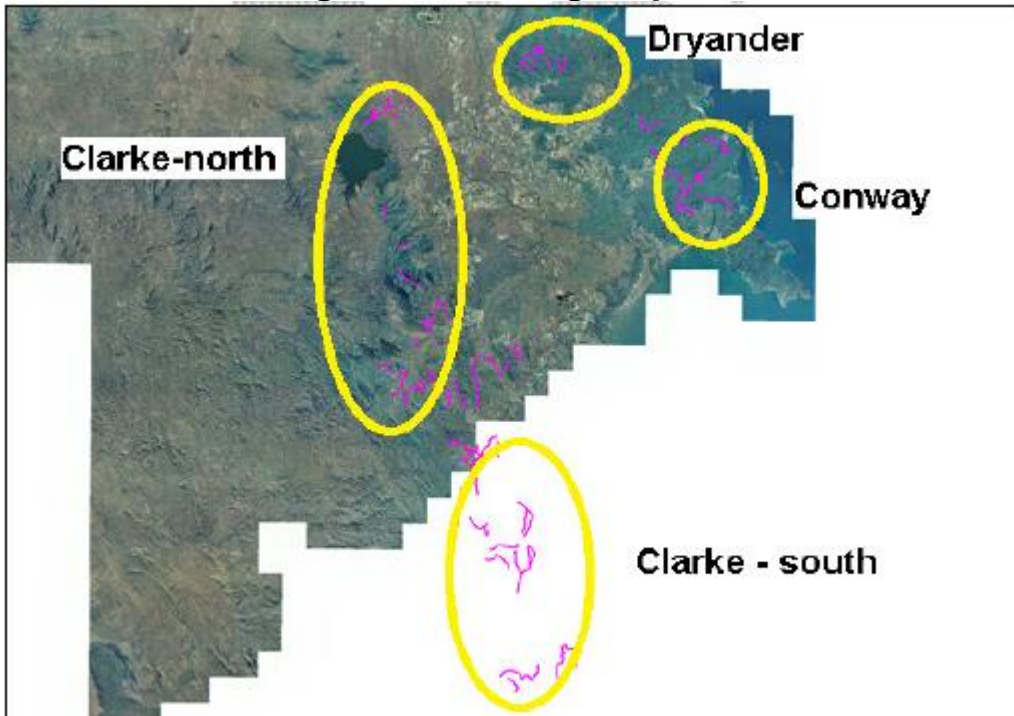
REMPAN, 2016. Latest REMPLAN data incorporating Australian Bureau of Statistics' (ABS) April 2016 Gross State Product, 2012 / 2013 National Input Output Tables and 2011 Census Place of Work Employment Data.

6. Appendix

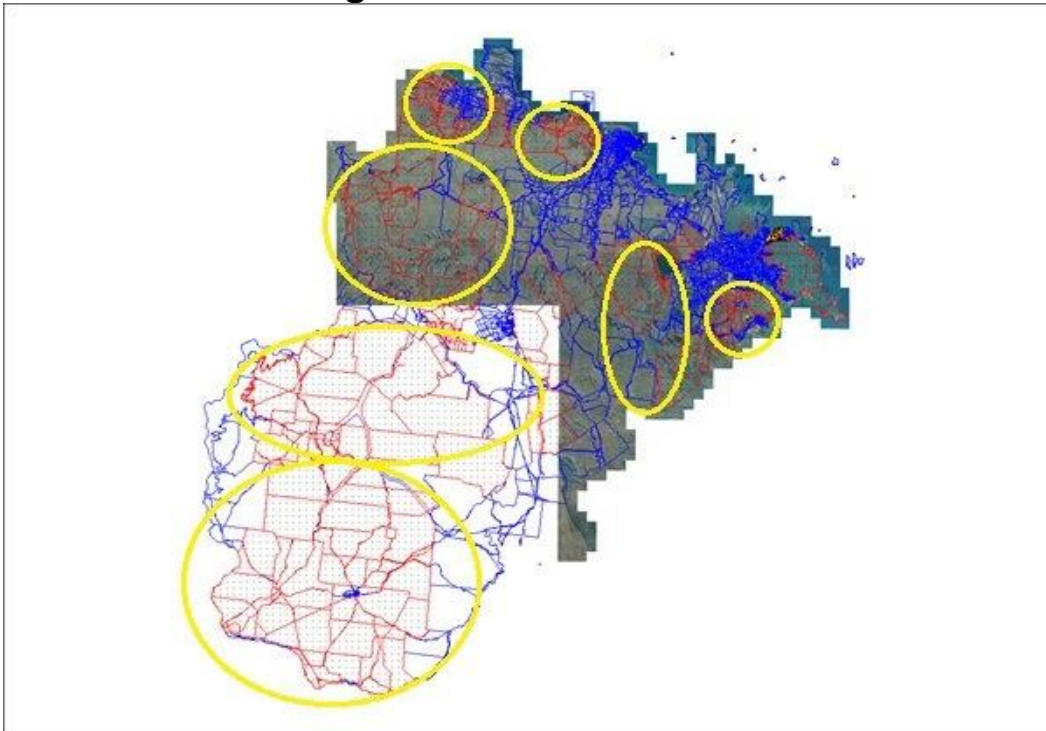
6.1 Aerial shoot FAMA map



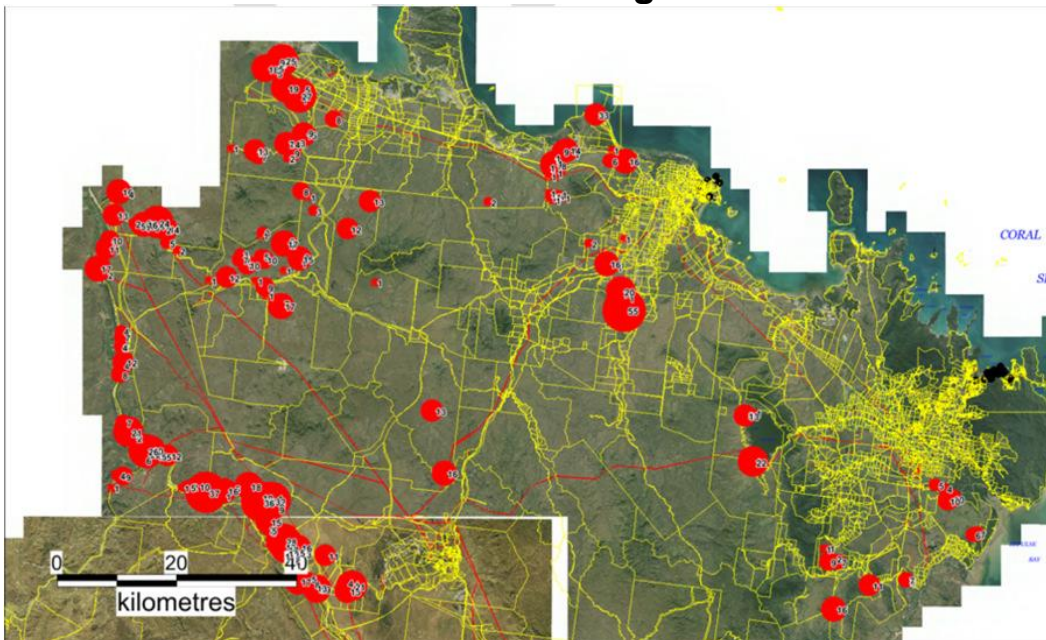
6.2 Aerial baiting FAMA baiting map



6.3 Ground baiting FAMA



6.4 Historical feral animal shooting areas.



6.5 Possible aerial shooting budget – worksheet

Location/ Syndicate	Date	Properties	Ha	River km	Helicopter Hours Estimated @ \$850/hr	Helicopter Cos	Ammunition @ \$1.50/round @ 2.47 rounds/ animal = \$66.66/hr	Total Required
Goorganga, PFD, Andromache	August/ September	16	69255	233	6	\$5,100	\$400	\$5,500
Abbott Point, Eurie Creek, Upstart	August/ September	13	52606	131	6	\$5,100	\$400	\$5,500
Bowen, Birrallee, Burdekin Rivers	August/ September	12	174571	261	6	\$5,100	\$400	\$5,500
Bogie, Burdekin Rivers	August/ September	9	48379	170	6	\$5,100	\$400	\$5,500
Rocky Ponds, Molongle Creek	August/ September	13	419934	79	6	\$5,100	\$400	\$5,500
Suttor, Eaglefield	August/ September	5	152200	295	6	\$5,100	\$400	\$5,500
Rosetta, Police	August/ September	5	80570	124	6	\$5,100	\$400	\$5,500
Sellheim	August/ September	5	46136	65	6	\$5,100	\$400	\$5,500
Verbena	August/ September	5	69255	53	6	\$5,100	\$400	\$5,500
Goorganga, PFD, Andromache	November/ December	16	52606	233	6	\$5,100	\$400	\$5,500
Abbot Point, Eurie creek, Ups tart	November/ December	13	182344	131	6	\$5,100	\$400	\$5,500
Bowen, Birrallee, Burdekin Rivers	November/ December	12	571	261	6	\$5,100	\$400	\$5,500
Bogie, Burdekin Rivers	November/ December	9	174	170	6	\$5,100	\$400	\$5,500
Rocky Ponds, Molongle Creek	November/ December	13	48379	79	6	\$5,100	\$400	\$5,500
Suttor, Eaglefield	November/ December	5	419934	295	6	\$5,100	\$400	\$5,500
Rosetta, Police	November/ December	5	152200	124	6	\$5,100	\$400	\$5,500
Sellheim	November/ December	5	80570	65	6	\$5,100	\$400	\$5,500
Verbena	November/ December	5	46136	53	6	\$5,100	\$400	\$5,500
Totals		83	1225995	1411	108	\$91,800	\$7,199	\$98,999

3. Biology

Common Mynas mate for life. During the breeding season, there is usually considerable competition for nesting sites. Favoured locations are in the walls and ceilings of buildings, making these birds a nuisance to humans. Nests are also placed in tree hollows, which are used by native birds. Nests are quite messy and consist of a variety of materials. Leaves, grasses, feathers and assorted items of rubbish are common materials.

<https://fennerg-school-associated.anu.edu.au/myna/problem.html>

4. Reason for listing as a pest species (impacts)

The Indian Myna's success is mostly a result of its opportunistic behaviour and aggressiveness towards other species, bullying them around food sources and out competing them for nesting sites. Mynas reduce biodiversity by fighting for hollows with native birds like Rosellas, destroying their eggs and chicks and stopping them from breeding. Indian Mynas are capable of evicting even large birds such as Kookaburras and Dollar Birds from their nests. They also evict small mammals, like Sugar Gliders from hollows.

5. Distribution of the pest (Australia)

The Common Myna is found along the east and south-east coasts of Australia. Introduced at Melbourne from south-east Asia between 1862 and 1872, it established quickly, with several other introductions occurring until the 1950's. The distribution of the Indian myna bird up until 1980 is shown in figure 2.

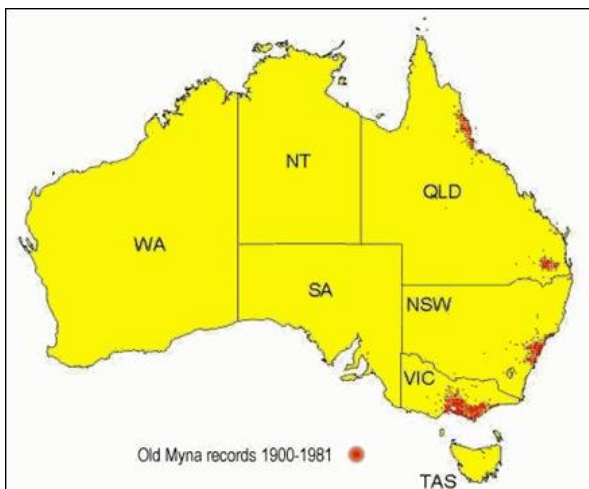


Figure 2. The distribution of the Indian Myna bird in 1980

6. Distribution of pest (Whitsunday's)

The Indian Myna bird was first identified in the Whitsunday region in 2015. The population of Myna birds is estimated to be less than 100. Myna birds have been seen just north and south of Proserpine.

7. Pest reduction strategy

The pest reduction strategies are limited. It is possible to use cage traps to capture the birds then euthanise them.

8. Pest reduction actions

The Council has purchased three Indian Myna cage traps. The cage traps can be set and managed by council or set on private property.

9. Pest monitoring and reporting

The Council will keep a spreadsheet of Indian Myna bird sightings and number of birds trapped.

10. Budget (annual)

The Indian Myna bird population is small and the birds are difficult to catch. The Council will allocate up to 10 days/yr to catching the Indian Myna bird.

11. Further reading

- <http://www.birdsinbackyards.net/species/Sturnus-tristis>
- <https://fennerschool-associated.anu.edu.au/myna/problem.html>
- <https://mynabirdtraps.com.au/indian-myna-bird-facts/>

6.6.2 Feral animal – species response plan: Cane toad

The Cane toad (*Rhinella marina*)

1. Introduction

Cane toads are large, robust amphibians which are native to Central and South America. The cane toad was introduced to Australia as a means of controlling pest beetles in the sugar cane industry in 1935.



Figure 1. The cane toad.

2. Biosecurity Act classification

Not listed. The Commonwealth government developed a Cane Toad Policy in 2009.

3. Biology

Cane toads have an impressive array of highly toxic chemical defences available to them at almost all stages of their lives. The toxins occur in their skin and organs and can be secreted by large glands at the back of the animal's head when it is threatened. As a result, toads will poison many predators that attempt to eat them.

4. Reason for listing as a pest species (impacts)

The impacts of the cane toad are listed as a key threatening process under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This means that cane toads are identified as threatening or potentially threatening the survival, abundance or evolutionary development of native species or ecological communities.

5. Distribution of the pest (Australia)

The current and potential distribution of cane toads is shown in figure 2.

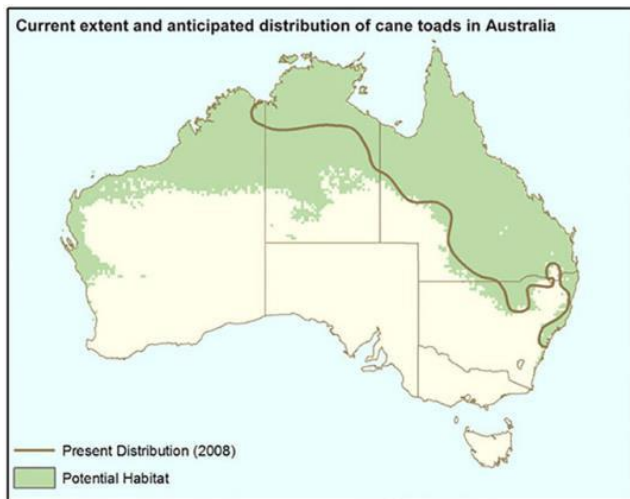


Figure 2. The current and potential distribution of cane toads.

Source: Kearney, M, Phillips, BL, Tracy, CR, Christian, KA, Betts, G & Porter, WP 2008, 'Modelling species distributions without using species distributions: the cane toad in Australia under current and future climates', *Ecography*, vol. 31, pp. 423–434.

6. Distribution of pest (Whitsunday's)

The cane toad is found throughout the Whitsunday Regional Council area. The cane toad has a preference for the wetter coastal areas. There are millions of cane toads in the Whitsunday region.

7. Pest reduction strategy

Due to the vast scale of the cane toad infestation and the absence of a broad-scale biological solution, eradication (except locally) is not practicable. Focussing on positive biodiversity outcomes through decreasing the impact of toads and containing their spread offers the best strategy for the future.

In the Whitsunday region, a small number of environmentally sensitive sites will be selected to control and reduce cane toad tadpoles.

8. Pest reduction actions

It is impossible to control and reduce the cane toad population. The climate has an impact on the cane toad population. Drought years will reduce cane toad breeding and the population.

The environmentally sensitive areas where cane toad tadpoles will be treated will include:

- Cedar Creek falls (adjacent to Dryander national park)
- Dryander Creek, Patuallo Road (adjacent to Dryander National Park)

Research has confirmed that cane toad tadpoles are attracted to the toxin produced by adults and spawn. Cane Toad tadpoles are shiny black on top and have a plain dark belly and a short thin tail. Nets will be used to capture the tadpoles.



Figure 3. Cane toad tadpoles.

9. Pest monitoring and reporting

The Whitsunday Regional Council will keep a list of treated sites and the date of treatment. The sites will be treated during the wet season when breeding occurs and tadpoles are observed.

10. Budget (annual)

The Whitsunday Regional Council will allocate up to 4 days a year to trap cane toad tadpoles.

11. Further reading

- <https://www.environment.gov.au/system/files/pages/3167d7df-9a89-4aae-9e39-b36d8fc21e68/files/cane-toad-policy.pdf>
- http://www.frogsafe.org.au/cane_toads/cane_frog.shtml
- https://en.wikipedia.org/wiki/Cane_toads_in_Australia
- <https://australianmuseum.net.au/cane-toad>

6.6.3 Feral animal – species response plan: Tilapia

1. Introduction

The black mangrove cichlid or 'spotted tilapia' (*Tilapia mariae*) and the Mozambique tilapia (*Oreochromis mossambicus*) were illegally introduced into Australian waterways during the 1970s.

At first they were probably released as unwanted aquarium fish, and Mozambique tilapia are now established in catchments in tropical and subtropical Australia while black mangrove cichlids are mostly restricted to northeast Queensland. Both tilapia species are declared invasive pests in most Australian states.



Figure 1. Tilapia

3. Biology

Tilapia vary in colour from dark olive to silver-grey, depending on their age and their environment. They are generally deep-bodied fish with thin profiles, long snouts and pronounced lips/jaws.



Figure 2. Showing Tilapia.

4. Reason for listing as a pest species (impacts)

Both species of tilapia introduced to Australia are highly aggressive when breeding and actively defend their territories and young from potential predators. Aggressive behaviour towards Australian native fish has been well documented, with tank trials showing the mere presence of Mozambique tilapia significantly disrupts the breeding success of the Australian eastern rainbow fish.

Tilapia can cause changes and damage to aquatic habitats. Black mangrove cichlids and Mozambique tilapia both dig out hollows or 'nests' in the river bed during breeding. The introduction of tilapia can decrease water quality in warm-water lakes and reservoirs.

5. Distribution of the pest (Australia)

Black mangrove tilapia was introduced to Australia in the 1970s for the aquarium trade, and is now established in about three catchments in the Cairns and Cooktown region. Mozambique tilapia was also introduced to Australia in the 1970s for the aquarium industry. However, the current widespread distribution of this species in approximately 20 of the 76 catchments in Queensland, several catchments in the Pilbara region of Western Australia and in the Northern Rivers region of NSW has been substantially aided by recreational fishers, although tolerance of high salinity has also likely aided range expansion among nearby coastal drainages in some instances.

6. Distribution of pest (Whitsunday's)

Tilapia have been found in the following areas:

- Muller's lagoon in Bowen
- Collinsville;
 - Bowen River
 - Bogie River

7. Pest reduction strategy

Once a feral population of tilapia has become established, control and impact mitigation options include:

- Physical removal, such as electrofishing and netting. While heavy fishing pressure can substantially reduce the census population size, the few remaining individuals enable rapid population recovery after fishing interventions cease. Trials have shown electrofishing to be more effective at capturing adults, and fyke nets at capturing juveniles. Warm water 'traps', or use of water quality meters to find the warmest places of a waterbody, may improve the effectiveness of physical removal of tilapia, as tilapia seek out the warmest part of a waterbody, especially in winter.
- Chemical methods, such as the use of rotenone in conjunction with temporary dams and physical barriers. The use of piscicides is one of the most effective ways to eradicate pest fish from small, discrete waterbodies, although it is not an option for some waterbodies, such as those used for water supply, and is less effective in large waterbodies.
- Biological control. There are currently no known traditional biological control options (i.e. pathogens or predators) for tilapia, although an emerging option involves the release of genetically modified tilapia. These sterile or 'daughterless' individuals only produce male offspring, thereby potentially reducing the reproductive output by future generations of feral tilapia at key infestation sites.
- Habitat manipulations, such as flow management and ecological restoration of aquatic ecosystems. While habitat manipulations may not lead to eradication of pest fish, they can increase the resilience of native fish to predatory or competitive interactions with pest fish, and thus may mitigate the impact of pest fish on native fish.

The Whitsunday Regional Council will try the use of physical removal in Muller's lagoon when the water level is lowest. The Council is not in a position to physically remove Tilapia in the Bowen and Bogie river systems. The Council will continue to map the location of the Tilapia and focus on removing fish in small infestations when council are notified.

8. Pest reduction actions

The Whitsunday Regional Council will undertake the following tasks:

- Try the physical removal of Tilapia from Muller's lagoon
- Continue to map the location of Tilapia infestations.

9. Pest monitoring and reporting

The Council will continue to map Tilapia infestations.

10. Budget (annual)

The Council will allocate up to 4 days a year to the mapping and treatment of Tilapia infestations.

11. Further reading

- http://www.pestsmart.org.au/wp-content/uploads/2012/02/TILFS4_web.pdf
- <http://www.finterest.com.au/natives-and-introduced/actions-to-exclude-tilapia-in-themdb/>
- <http://frcenv.com.au/the-invasion-of-australias-aquatic-ecosystems-by-tilapiaconsequences-of-the-free-ride/>