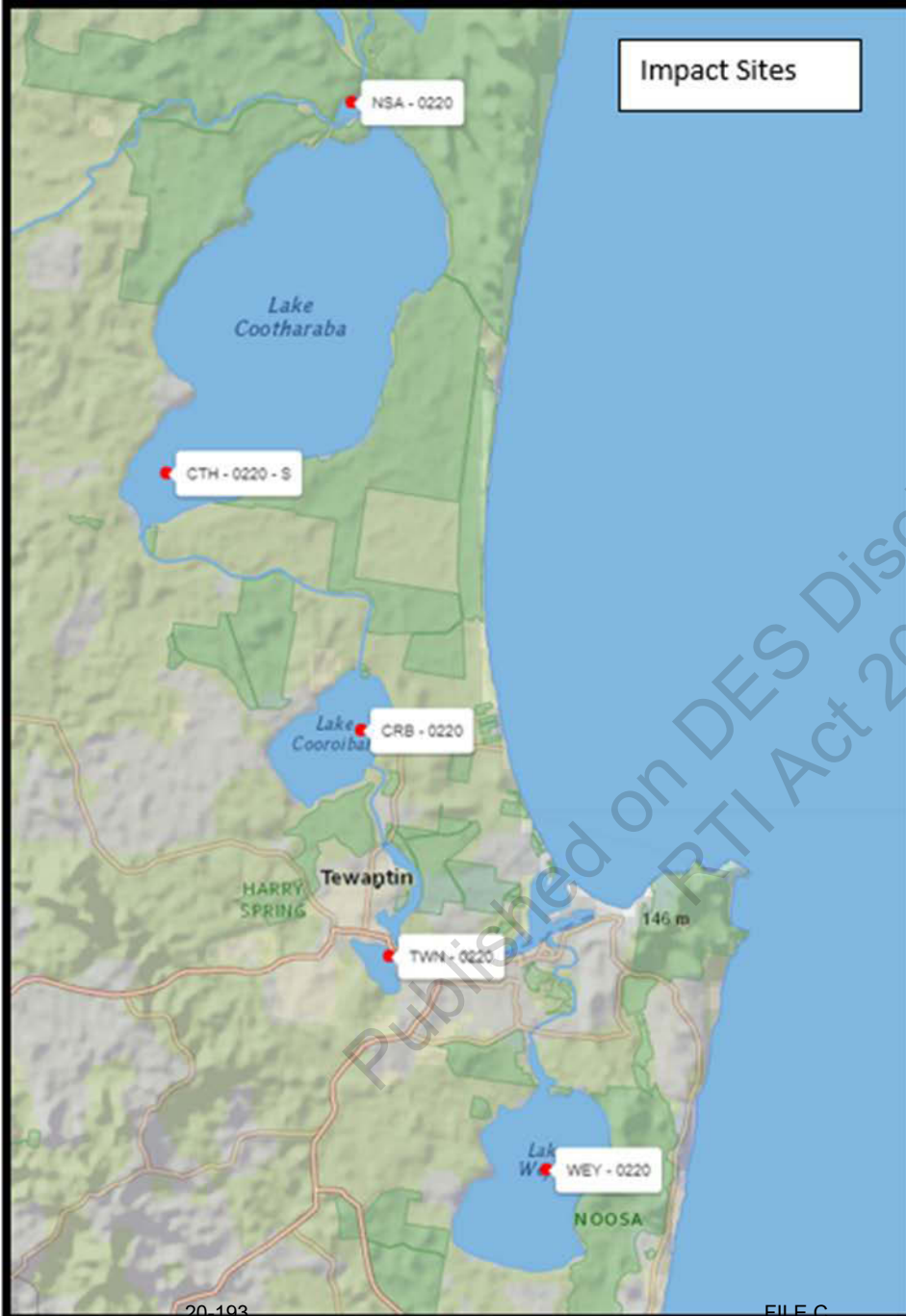
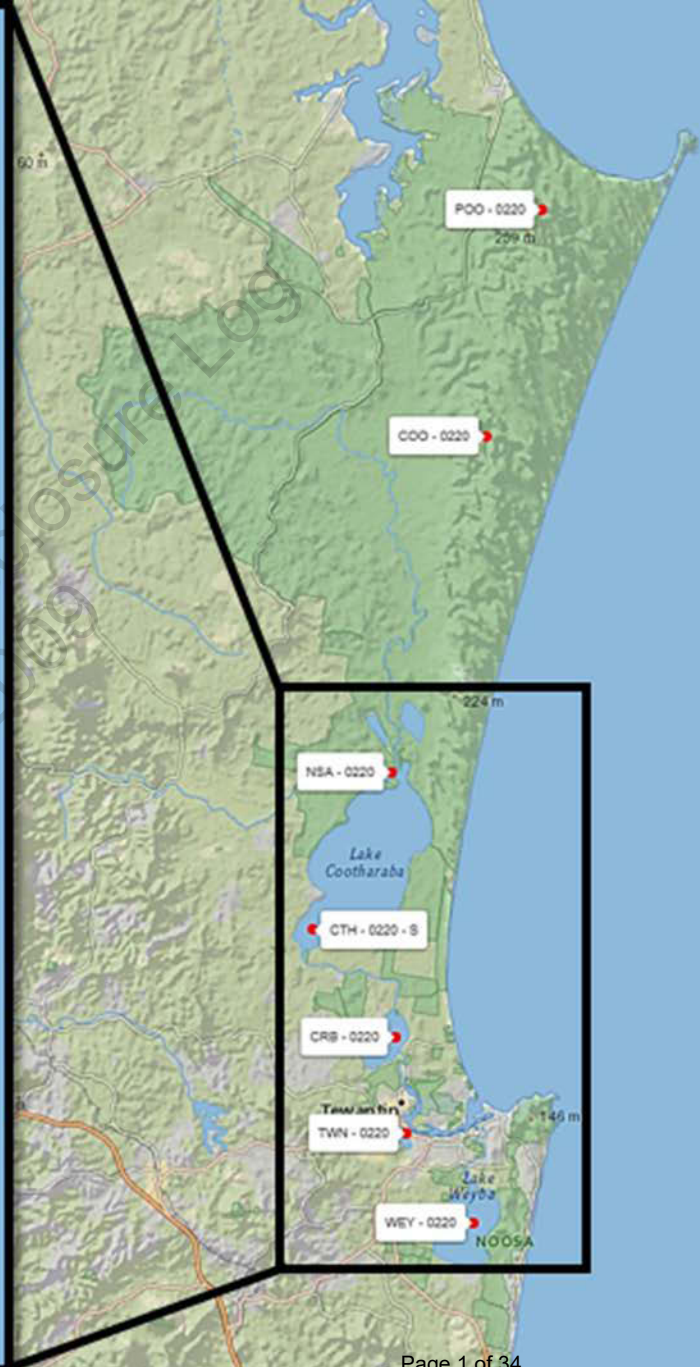


Impact Sites



Dioxin Survey Noosa River

Phase Two – Biota Sampling

Human Health Assessment

Site and sample type	Fat (%)	TEQ (pg/g)	Sample
Weyba mullet	4.1	1.7	Composite Sample (5 fillets)
Cootharaba mullet	8.6	1.3	Composite Sample (4 fillets)
Cooroiba Oysters	ND	1.7	Composite Sample (7 fillets)
Weyba Oysters	ND	3.2	Composite Sample (9 fillets)
Cootharaba Mud Crab	0.6	0.36	Composite Sample (flesh of two crabs)

ND – Not determined as not enough sample to do lipid extraction

TEQ (pg/g) stands for toxic equivalents (to normalise for different toxicities associated with different dioxins/furans).

Dioxins in biota compared to previous results from Moreton Bay

	n	TCDD (pg/g lipid) median (range)	Total dioxins (pg/g lipid) median (range)
Pacific Oyster	1	1200	3800
Pearl Oyster	1	2600	4300
Pipi	4	6300 (6000-12000)	37000 ^a
Cooroiba Oysters ^b	1	3913	57739
Weyba Oysters ^b	1	3008	44513
Mullet	4	88 (14-150)	170 (99-240)
Weyba Mullet	1	134	439
Cootharaba Mullet	1	221	342
Mudcrab	2	7200 (3700-11000)	12000 ^a
Cootharaba Mudcrab	1	65	1363

^a Only one sample was analysed for Total Dioxins

^b Lipid weight used was average of pacific oyster and pearl oyster

Matthews, V., Pöpke, O. and Gaus, C. (2008) 'PCDD/Fs and PCBs in seafood species from Moreton Bay, Queensland, Australia', Marine Pollution Bulletin, 57(6–12), pp. 392–402.

Calculations

- NHMRC (2002) established Tolerable Monthly Intake (TMI) guideline value (GV) for dioxins of 70 pg TEQ/month.
- By taking in account background exposures, FSANZ estimated limit for dioxins and fish and seafood for human consumption was 6 pg TEQ/g (FSANZ 2007), based on a single serve of fish from the contaminated area per week.

National Health and Medical Research Council (2002) 'Dioxins : Recommendation for Tolerable Monthly Intake for Australians', (October). Available at:

https://www.nhmrc.gov.au/files/nhmrc/publications/attachments/eh26_dioxins_recommendation_tolerable_monthly_intake_131223.pdf.

FSANZ. (2007). *Dioxins in Seafood from Sydney Harbour A Revised Assessment of the Public Health and Safety Risk. Technical Series Report No: 32. Food Standards Australia and New Zealand. Canberra*

Equations

$$\text{Intake (dioxin)} = \frac{\text{Conc} \times (\text{portion size} * \text{frequency})}{\text{Body weight}} \quad \text{Equation 1}$$

Where

Intake is intake of dioxin in pg TEQ/kg

Conc is the concentration of dioxin in fish

Portion size is the weight in g of fish consumed in a meal

Frequency is the number of meals consumed per month

Body weight is the default body weight for a child or adult in kg.

$$HQ = \frac{\text{Intake}}{\text{Guideline}} \quad \text{Equation 2}$$

Where

HQ is the hazard quotient

Intake is the intake of dioxin from Equation 1

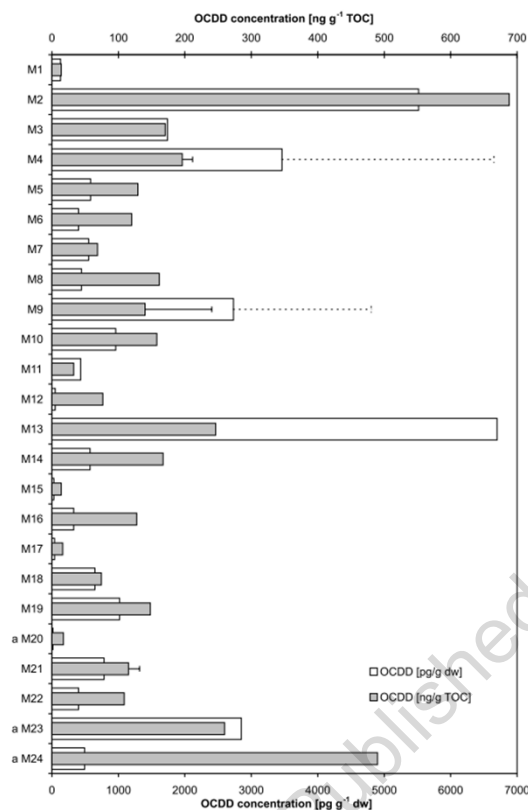
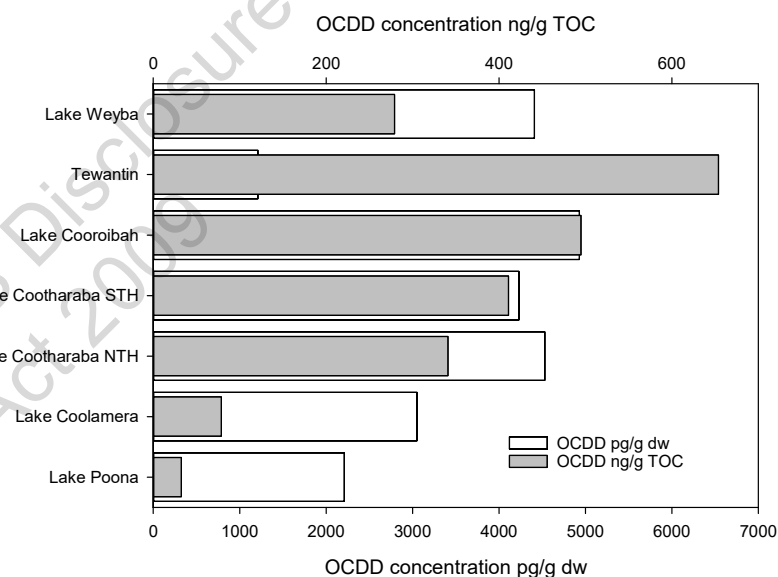
Results

Parameter	Units	1 meal per week	2 meals per week	3 meals per week	Oysters (all)	Oysters (Weyba)
Concentration	pg/g	1.70	1.70	1.70	2.50	3.20
Portion size (fish)	g/meal	150.00	150.00	150.00	100.00	200.00
Frequency	meals/month	4.00	8.00	12.00	4.00	4.00
Ingestion Rate (fish)	g/week	600.00	1200.00	1800.00	400.00	800.00
body weight	kg	70	70	70	70	70
Intake (dioxin)	pg/kg bw month	1.46E+01	2.91E+01	4.37E+01	1.43E+01	3.66E+01
GV (NHMRC)	pg/g bw month	70	70	70	70	70
HQ		0.21	0.42	0.62	0.20	0.52

QH advice for mercury in fish – would be protective to dioxins

People should be advised to follow the recommendation to limit the consumption of fish 2 to 3 serves per week of 75 g of most fish for children up to 6 years, and 2 to 3 serves of 150 g for the rest of the population..... It should be noted that this advice includes all fish consumed, including wild caught, store bought, farmed and tinned fish..... In general, consumers should source seafood from multiple locations.

Comparison of sediment results to previous studies

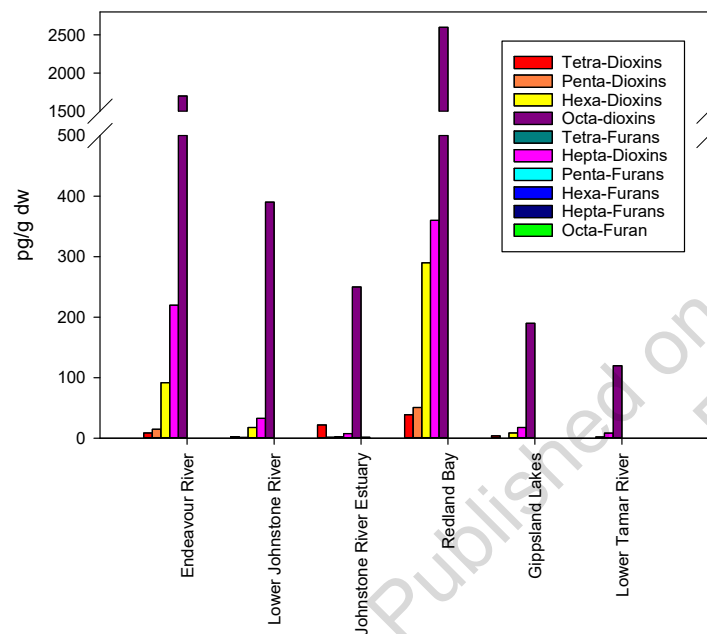


Marine sediments in QLD

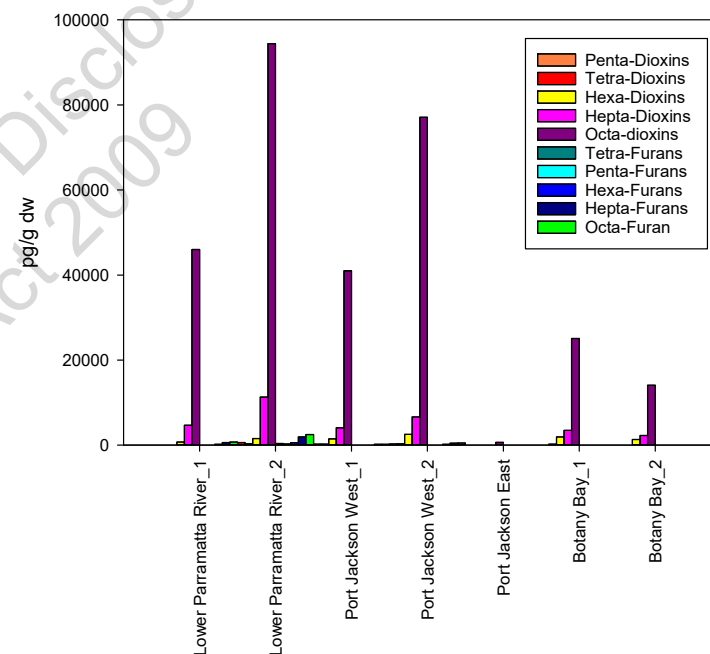
Gaus et al. / Chemosphere 43 (2001) 549-558

Dioxin signature in QLD and Australia

Urban/rural



Industrial



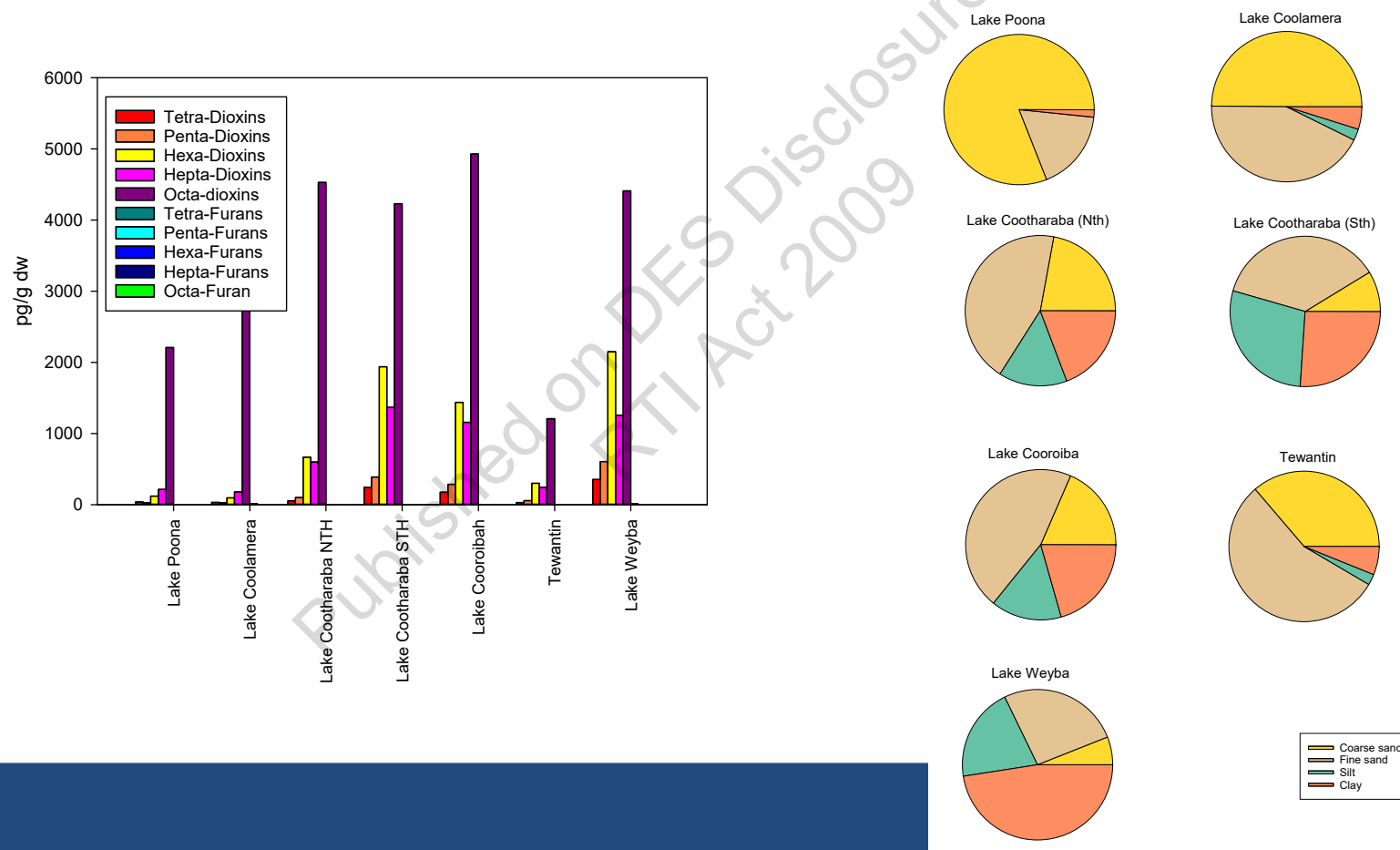
Theories on sources

- Secondary kaolinitic clays have a particular signature (US, Germany, UK).
- Described as 'a natural formation pattern'
- HxCDD-congeners the 1,2,3,7,8,9-HxCDD dominated, followed by the 1,2,3,6,7,8- HxCDD.

Hexa congeners	Units	Lake Poona	Lake Coolamerra	Lake Cootharaba NTH	Lake Cootharaba STH	Lake Cooroibah	Tewantin	Lake Weyba
123478-HxCDD	pg/g	<2.4	<2.4	<2.5	7.2	5.6	<2.5	20.4
123678-HxCDD	pg/g	<2.4	<2.4	4.4	13.4	11.4	2.6	29
123789-HxCDD	pg/g	2.5	4.7	11.7	34.2	27.6	5.5	66.9

Schmitz et al. (2011) Environ. Sci. Technol. 45, 461–467

- OCDD was dominant, followed by HpCDD and HxCDD. The PeCDD and TCDD had the lowest concentrations.
- PCDF contents were low to undetectable.



Other theories

- Pentachlorophenol and other pesticides cause the contamination pattern in QLD (precursors to dioxin formation).
- Recent forest fires do not cause this dominant pattern

Meyer et al. 2005. Dioxin Emissions from Broad Scale Biomass Burning in Australia. Available from:

http://www.cmar.csiro.au/e-print/open/meyer_2005a.pdf

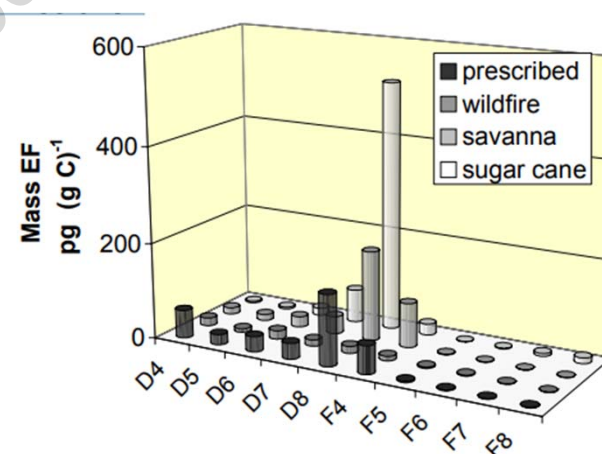


Figure 1. Mass emission factors (EF) for PCDD/PCDF homologue groups for each class of fire. D4=TCDD; D5=PeCDD; D6= HxCDD; D7=HpCDD; D8= OCDD; F4= TCDF; F5=PeCDF; F6= HxCDF; F7=HpCDF; F8= OCDF.

Proposal for Stage Two Dioxin Survey in Noosa Area - Biota

Water Quality and Investigations

Introduction

This document outlines the Stage Two Proposal for sampling dioxins in the Noosa River area. There have been concerns raised by members of the Noosa community that historical usage of the pesticide 2,4-D and 2,4,5-T in the forestry industry in the Noosa catchment has contaminated the river with TCDD. There is some evidence that TCDD is a contaminant in 2,4-D and is a known contaminant in 2,4,5-T. TCDD cannot be analysed on its own, and so a standard suite of dioxins and furans will be analysed.

Dioxins and furans are persistent organic pollutants (POPs) and are ubiquitous. They are formed by combustion process (e.g. bushfires, sugar cane burns and motor vehicle emissions) as well as being bi-products of manufacturing (such as the production of pesticides). Dioxins are insoluble in water, and so will be found in sediments and biota in the aquatic environment.

In February 2020, a sediment sampling program was undertaken in the Noosa River area in order to investigate the community concerns about TCDD. As there are no guidelines for TCDD in sediments, sediments were collected in the same manner as outlined in the National Dioxin Program's *Dioxins in Aquatic Environments in Australia* (Mueller et al. 2004). This allowed results to be compared to those found throughout Australia during that survey.

TCDD was not detected at five of the sites surveyed, but was found around the limit of reporting at Lake Cootharaba - North (duplicates were <0.05 and 0.7 pg/g) and at higher concentrations in Lake Weyba (2.7 and 4.4 pg/g) (Figure One). The Toxic Equivalents^Y at Lake Weyba were 38.77 and 77.01 pg TEQ/g. Initial results indicate that TCDD and the TEQ measured at Lake Weyba are equivalent to those found in Port Jackson and Botany Bay (Vardy in prep.). These results indicate that further biota sampling should be undertaken. Oysters and fish were both collected in the National Dioxin Program, and we recommend that they are collected for this program also. In addition, mud crabs are caught commercially in the area and as they burrow into the mud during the day are potentially exposed to the dioxins.

As Lake Weyba is not in an area that has historical forestry or industry, it is believed that the elevated dioxins in this area may be due to recent fires. However, further investigation is needed.

Sampling Strategy

Sampling will follow that outlined in the *Dioxins in Aquatic Environments in Australia* (Mueller et al. 2004) technical report. Approximately 30 individuals or a minimum of 200 g of oyster flesh will be collected and pooled to make one composite sample for chemical analysis. Flesh from five adult fish and five mud crabs caught at each location will also be collected and composited. Where available, flathead (*Platycephalus* spp.) will be targeted as this species does not move around as much as some other commercial species (Peter Kind DAF) and are bottom dwelling species. Because there are current travel restriction related to COVID 19, commercial fishers will be approached to collect samples for this study. It is suggested that samples are collected from Lake Weyba, Lake Cootharaba and Lake Cooroiba as these areas are where commercial fisheries occur.

Budget

The total budget for the analysis is approximately \$ 16,731 (inc. GST) (Table One).

^Y Toxic Equivalents (TEQs) report the toxicity-weighted masses of mixtures of dioxins and furans. The reported value provides toxicity information about the mixture of chemicals. TEQs reported here are based on WHO methods and include half the limit of reporting.

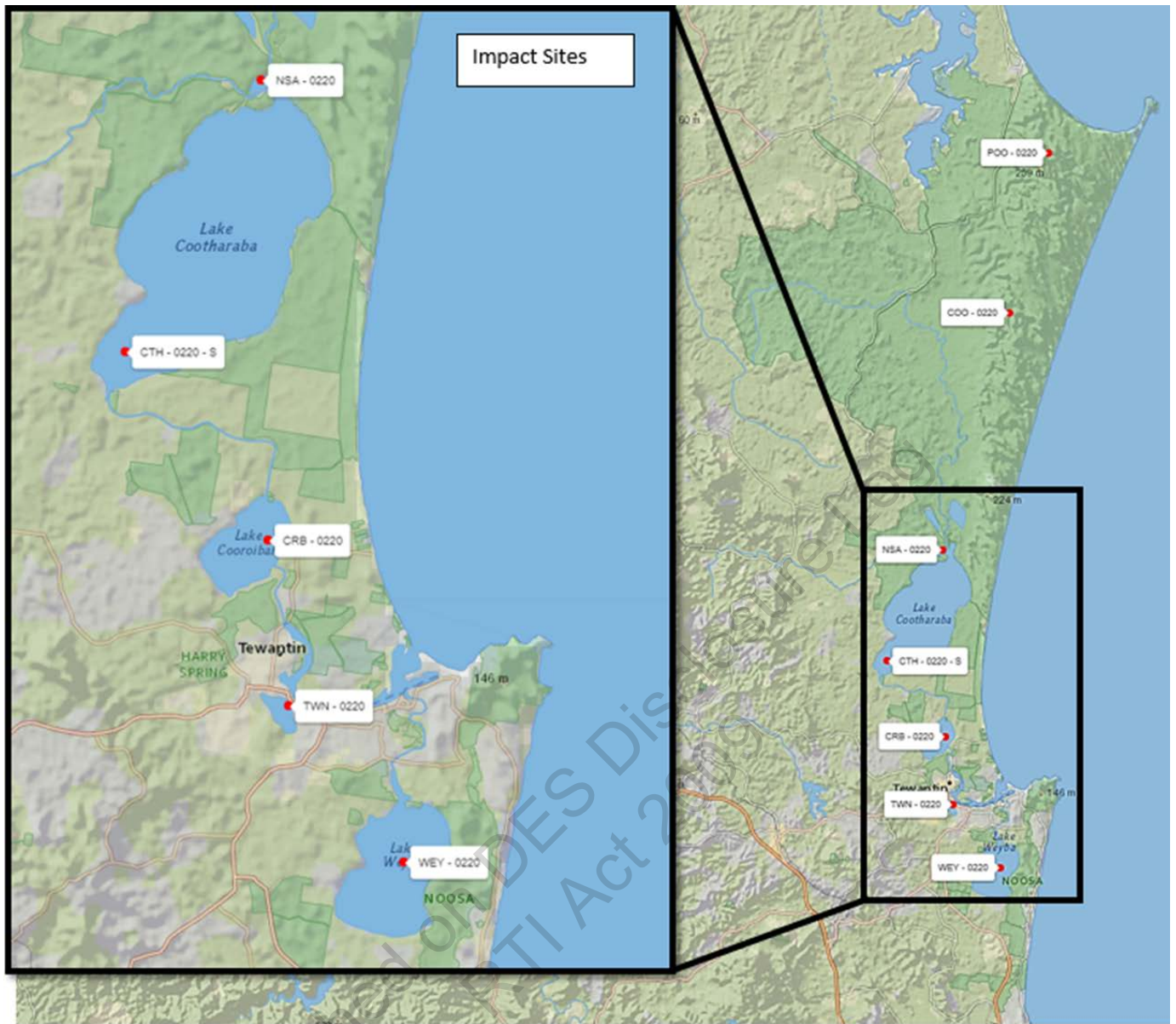


Figure One: Potentially impacted sites sampled in February 2020: Lake Weyba (WEY), Tewantin (TWN), Lake Cooroiba (CRB), Lake Cootharaba - South (CTH-S), Lake Cootharaba - north (NSA),

Table One: Budget summary

	No. Samples	Cost per sample	Total cost
Dioxin Analysis Oysters (three sites)	3	\$ 1, 690	\$ 5,070
Dioxin Analysis Flathead (three sites)	3	\$ 1, 690	\$ 5,070
Dioxin Analysis Mud Crab (three sites)	3	\$ 1, 690	\$ 5,070
Grand total (excluding GST)			\$ 15,210
Grand total (including GST)			\$ 16,731

References

Mueller J, Muller R, Goudkamp K, Shaw M, Mortimer M, Haynes D, Paxman C, Hyne R, McTaggart A, Burniston D, Symons R & Moore M 2004, *Dioxins in Aquatic Environments in Australia*, National Dioxins Program Technical Report No. 6, Australian Government Department of the Environment and Heritage, Canberra.

Agreement

Title	Position	Signature	Date
Liz Young	Director, Sustainable Environment		
Christian Witte	Director, EMAS		

Published on DES Disclosure Log
RTI Act 2009

Proposal for Stage Two Dioxin Survey in Noosa Area - Biota

Water Quality and Investigations

Introduction

This document outlines the Stage Two Proposal for sampling dioxins in the Noosa River area. There have been concerns raised by members of the Noosa community that historical usage of the pesticide 2,4-D and 2,4,5-T in the forestry industry in the Noosa catchment has contaminated the river with TCDD. There is some evidence that TCDD is a contaminant in 2,4-D and is a known contaminant in 2,4,5-T. TCDD cannot be analysed on its own, and so a standard suite of dioxins and furans will be analysed.

Dioxins and furans are persistent organic pollutants (POPs) and are ubiquitous. They are formed by combustion process (e.g. bushfires, sugar cane burns and motor vehicle emissions) as well as being bi-products of manufacturing (such as the production of pesticides). Dioxins are insoluble in water, and so will be found in sediments and biota in the aquatic environment.

In February 2020, a sediment sampling program was undertaken in the Noosa River area in order to investigate the community concerns about TCDD. As there are no guidelines for TCDD in sediments, sediments were collected in the same manner as outlined in the National Dioxin Program's *Dioxins in Aquatic Environments in Australia* (Mueller et al. 2004). This allowed results to be compared to those found throughout Australia during that survey.

TCDD was not detected at five of the sites surveyed, but was found around the limit of reporting at Lake Cootharaba - North (duplicates were <0.05 and 0.7 pg/g) and at higher concentrations in Lake Weyba (2.7 and 4.4 pg/g). The Toxic Equivalents^Y at Lake Weyba were 38.77 and 77.01 pg TEQ/g. Initial results indicate that TCDD and the TEQ measured at Lake Weyba are equivalent to those found in Port Jackson and Botany Bay (Vardy in prep.). These results indicate that further biota sampling should be undertaken. Oysters and fish were both collected in the National Dioxin Program, and we recommend that they are collected for this program also. In addition, mud crabs are caught commercially in the area and as they burrow into the mud during the day are potentially exposed to the dioxins.

As Lake Weyba is not in an area that has historical forestry or industry, it is believed that the elevated dioxins in this area may be due to recent fires (Figure 2). However, further investigation is needed.

Sampling Strategy

Sampling will follow that outlined in the *Dioxins in Aquatic Environments in Australia* (Mueller et al. 2004) technical report. Approximately 30 individuals or a minimum of 200 g of oyster flesh will be collected and pooled to make one composite sample for chemical analysis. Flesh from five adult fish and five mud crabs caught at each location will also be collected and composited. Where available, flathead (*Platycephalus* spp.) will be targeted as this species does not move around as much as some other commercial species (Peter Kind DAF) and are bottom dwelling species. Because there are current travel restriction related to COVID 19, commercial fishers will be approached to collect samples for this study. It is suggested that samples are collected from Lake Weyba, Lake Cootharaba and Lake Coroiba as these areas are where commercial fisheries occur.

Budget

The total budget for the analysis is approximately \$ 16,731 (inc. GST) (Table One).

^Y Toxic Equivalents (TEQs) report the toxicity-weighted masses of mixtures of dioxins and furans. The reported value provides toxicity information about the mixture of chemicals. TEQs reported here are based on WHO methods and include half the limit of reporting.



Figure One: Sites surveyed in the March 2020 Dioxin Survey in the Noosa River Area. Control sites: Lake Lake Weyba (WEY), Tewantin (TWN), Lake Cooroiba (CRB), Lake Cootharaba - South (CTH-S), Lake Cootharaba -north (NSA), Lake Poona (POO), Lake Coolamera (COO).

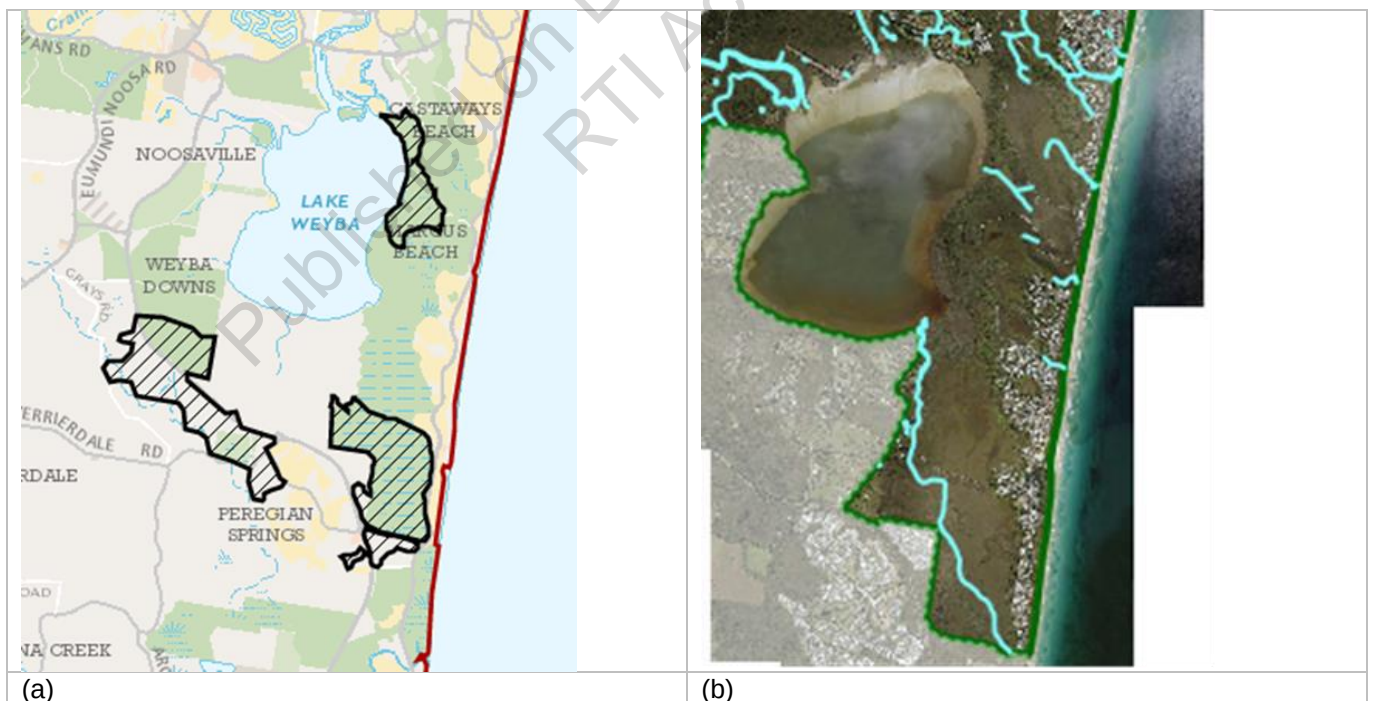


Figure Two: (a) Areas known to have burnt in late 2019 around Lake Weyba and (b) a drainage line from the first Peregrine Fire area flowing to Murdering Creek then Lake Weyba.

Table One: Budget summary

	No. Samples	Cost per sample	Total cost
Analysis			
Dioxin Analysis Oysters (three sites)	3	\$ 1, 690	\$ 5,070
Dioxin Analysis Flathead (three sites)	3	\$ 1, 690	\$ 5,070
Dioxin Analysis Mud Crab (three sites)	3	\$ 1, 690	\$ 5,070
Grand total (excluding GST)			\$ 15,210
Grand total (including GST)			\$ 16,731

References

Mueller J, Muller R, Goudkamp K, Shaw M, Mortimer M, Haynes D, Paxman C, Hyne R, McTaggart A, Burniston D, Symons R & Moore M 2004, *Dioxins in Aquatic Environments in Australia*, National Dioxins Program Technical Report No. 6, Australian Government Department of the Environment and Heritage, Canberra.

Agreement

Title	Position	Signature	Date
Liz Young	Director, Sustainable Environment		
Christian Witte	Director, EMAS		

Proposal for Stage Two Dioxin Survey in Noosa Area

Water Quality and Investigations

Introduction

This document outlines the Stage Two Proposal for sampling the dioxins in the Noosa River area. There have been concerns raised by members of the Noosa community that historical usage of the pesticide 2,4-D and 2,4,5-T in the forestry industry in the Noosa catchment has contaminated the river with TCDD. There is some evidence that TCDD is a contaminant in 2,4-D and is a known contaminant in 2,4,5-T. TCDD cannot be analysed on its own, and so a standard suite of dioxins and furans will be analysed.

Dioxins and furans are persistent organic pollutants (POPs) and are ubiquitous. They are formed by combustion process (e.g. bushfires, sugar cane burns and motor vehicle emissions) as well as being bi-products of manufacturing (such as the production of pesticides). Dioxins are insoluble in water, and so will be found in sediments and biota in the aquatic environment. The National Dioxin Survey found the presence of dioxins in every sediment sample that was tested (Mueller et al. 2004).

In February 2020, a sediment sampling program was undertaken in the Noosa River area in order to investigate the community concerns about TCDD. As there are no guidelines for TCDD in sediments, sediments were collected in the same manner as outlined in the National Dioxin Program's *Dioxins in Aquatic Environments in Australia* (Mueller et al. 2004). This allowed results to be compared to those found throughout Australia during that survey.

TCDD was not detected at five of the sites surveyed, but was found around the limit of reporting at Lake Cootharaba - North (duplicates were <0.05 and 0.7 pg/g) and at higher concentrations in Lake Weyba (2.7 and 4.4 pg/g). The Toxic Equivalents^Y at Lake Weyba were 38.77 and 77.01 pg TEQ/g. Initial results indicate that TCDD and the TEQ measured at Lake Weyba are equivalent to those found in Port Jackson and Botany Bay (Vardy in prep.). Although a preliminary assessment, these results indicate that further biota sampling should be undertaken. Oysters and fish were both collected in the National Dioxin Program, and we recommend that they are collected for this program also. Depending upon results, further sampling may be required.

As Lake Weyba is not in an area that has historical forestry or industry, it is believed that the elevated dioxins in this area may be due to recent fires (Figure 2). However, further investigation is needed.

Sampling Strategy

Sampling will follow that outlined in the *Dioxins in Aquatic Environments in Australia* (Mueller et al. 2004) technical report. It is suggested oysters and fish be sampled. Approximately 30 individuals or a minimum of 200 g of oyster flesh will be collected and pooled to make one composite sample for chemical analysis. Evaluation of dioxin-like chemicals in commercially available fish samples should also be sampled. Flesh from five adult fish caught in the same location will be collected. Where available, flathead (*Platycephalus* spp.) should be targeted, along with another one locally caught species. Because there are current travel restriction related to COVID 19, commercial fishers will be approached to collect samples for this study.

Sample sites will be confirmed in consultation with Noosa Shire Council (in regards to oysters) and with Peter Kind, DAF (in regards to fish). It is suggested Lake Weyba, Lake Cootharaba and Tewantan are sampled.

Budget

The total budget for the analysis is approximately \$ 10,140.00 (exc. GST) (Table One).

^Y Toxic Equivalents (TEQs) report the toxicity-weighted masses of mixtures of dioxins and furans. The reported value provides toxicity information about the mixture of chemicals. TEQs reported here are based on WHO methods and include half the limit of reporting.



Figure One: Sites surveyed in the March 2020 Dioxin Survey in the Noosa River Area. Control sites: Lake Lake Weyba (WEY), Tewantin (TWN), Lake Cooroiba (CRB), Lake Cootharaba - South (CTH-S), Lake Cootharaba -north (NSA), Lake Poona (POO), Lake Coolamera (COO).

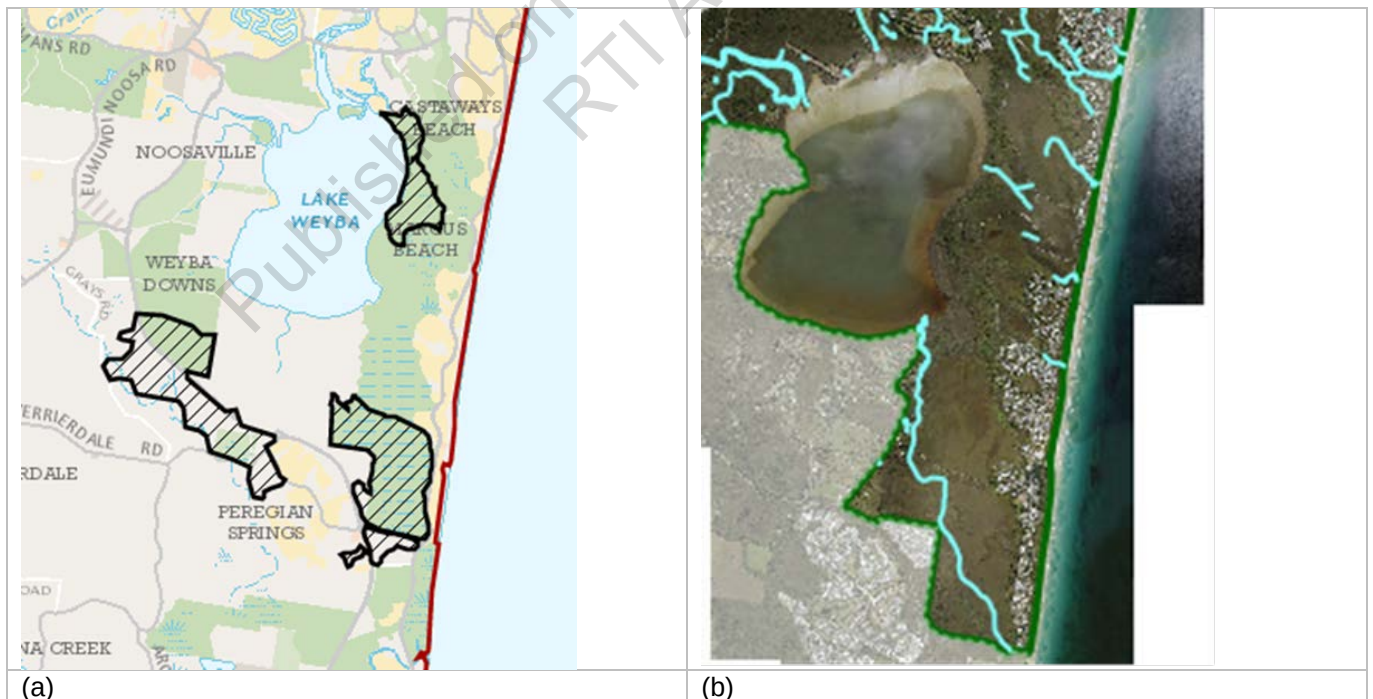


Figure Two: (a) Areas known to have burnt in late 2019 around Lake Weyba and (b) a drainage line from the first Peregian Fire area flowing to Murdering Creek then Lake Weyba.

Table One: Budget summary

	No. Samples	Cost per sample	Total cost
Analysis			
Dioxin Analysis Oysters (three sites)	3	1690	5070
Dioxin Analysis Fish One (three sites)	3	1690	5070
Grand total (excluding GST)			\$ 10,140.00
Grand total (including GST)			\$ 11,154.00

References

Mueller J, Muller R, Goudkamp K, Shaw M, Mortimer M, Haynes D, Paxman C, Hyne R, McTaggart A, Burniston D, Symons R & Moore M 2004, *Dioxins in Aquatic Environments in Australia*, National Dioxins Program Technical Report No. 6, Australian Government Department of the Environment and Heritage, Canberra.

Agreement

Title	Position	Signature	Date
Liz Young	Director, Sustainable Environment		
Christian Witte	Director, EMAS		

Proposal for Stage One Dioxin Survey in Noosa Area

Water Quality and Investigations

Introduction

This document outlines the Stage One proposal for sampling the dioxin TCDD in the Noosa River. There have been concerns raised by members of the Noosa community that historical usage of the pesticide 2,4-D and 2,4,5-T in the forestry industry in the Noosa catchment has contaminated the river with TCDD. There is some evidence that TCDD is a contaminant in 2,4-D and is a known contaminant in 2,4,5-T. TCDD cannot be analysed on its own, and so a standard suite of dioxins and furans will be analysed.

Dioxins and furans are persistent organic pollutants (POPs) and are ubiquitous. They are formed by combustion process (e.g. bushfires, sugar cane burns and motor vehicle emissions) as well as being a bi-products of manufacturing (such as the production of pesticides). Dioxins are insoluble in water, and so will be found in sediments and biota in the aquatic environment. The National Dioxin Survey found the presence of dioxins in every sediment sample that was tested (Müller et al. 2004).

As there are no guidelines for TCDD in sediments, the best way to assess the results from this survey is to compare the dioxin results to those reported in the National Dioxin Program's *Dioxins in Aquatic Environments in Australia* (Müller et al. 2004). Therefore, the sampling design and methodology outlined in Müller et al. (2004) will be followed.

Sampling Sites

Five sites downstream of historic forestry in the Noosa River were chosen (Figure One) for sediment sampling. Two additional control sites in the Cooloola National Park (Figure Two) were also selected. Lakes were chosen as these are likely to be sinks for contaminated sediments.

Sampling Strategy

Sampling will follow that outlined in the *Dioxins in Aquatic Environments in Australia* (Müller et al. 2004) technical report. Ten samples will be collected at each site using a standardised coring device, comprising aluminium tubes (15 cm length, 2.8 cm diameter) attached to a sediment coring device. This methods ensures the collection of sediment from a shallow profile (10 cm depth) of surface sediment. These samples will be composited prior to sending them to the laboratory. The ten samples will be collected in a triangular formation and will be approximately 25 m apart. At three sites samples will be split and sent as blind duplicates to the main analytical laboratory and to a second laboratory. As well as dioxins, particle size distribution and total organic carbon analysis will be undertaken on each sample.

Budget

The total budget for the sampling and analysis is \$15, 633 (exc. GST) (Table One).

References

Müller J, Muller R, Goudkamp K, Shaw M, Mortimer M, Haynes D, Paxman C, Hyne R, McTaggart A, Burniston D, Symons R & Moore M 2004, *Dioxins in Aquatic Environments in Australia*, National Dioxins Program Technical Report No. 6, Australian Government Department of the Environment and Heritage, Canberra.



Figure One: Sites in the Noosa River Catchment downstream of historical forestry.



Figure Two: Control sites in the Cooloola National Park

Table One: Budget summary

	No. Samples	Cost per sample	Total cost
Dioxin Analysis Laboratory One	10	850	8500
Dioxin Analysis Laboratory Two	3	1521	4563
PSD Analysis	10	36	360
TOC Analysis	10	21	210
Accommodation (2 nights, three people)			
Travel allowance			800
Hotels			1200
Grand total			\$15, 633

Proposal for Stage One Dioxin Survey in Noosa Area

Water Quality and Investigations

February 2020

Introduction

This document outlines the Stage One proposal for sampling the dioxin TCDD in the Noosa River. There have been concerns raised by members of the Noosa community that historical usage of the pesticide 2,4-D and 2,4,5-T in the forestry industry in the Noosa catchment has contaminated the river with TCDD. There is some evidence that TCDD is a contaminant in 2,4-D and is a known contaminant in 2,4,5-T. TCDD cannot be analysed on its own, and so a standard suite of dioxins and furans will be analysed.

Dioxins and furans are persistent organic pollutants (POPs) and are ubiquitous. They are formed by combustion process (e.g. bushfires, sugar cane burns and motor vehicle emissions) as well as being bi-products of manufacturing (such as the production of pesticides). Dioxins are insoluble in water, and so will be found in sediments and biota in the aquatic environment. The National Dioxin Survey found the presence of dioxins in every sediment sample that was tested (Müller et al. 2004).

As there are no guidelines for TCDD in sediments, the best way to assess the results from this survey is to compare the dioxin results to those reported in the National Dioxin Program's *Dioxins in Aquatic Environments in Australia* (Müller et al. 2004). Therefore, the sampling design and methodology outlined in Müller et al. (2004) will be followed.

Noosa council have been using methoprene for many years to control mosquitos, and the use of this chemical is also potentially of concern. Methoprene breaks down rapidly, is only sparingly soluble in water and is likely to bind to sediments. Therefore, the analysis of methoprene in sediments is also going to be undertaken during this survey.

Sampling Sites

Five sites downstream of historic forestry in the Noosa River were chosen (Figure One) for sediment sampling. Two additional control sites in the Coolool National Park (Figure Two) were also selected. Lakes were chosen as these are likely to be sinks for contaminated sediments.

Sampling Strategy

Sampling will follow that outlined in the *Dioxins in Aquatic Environments in Australia* (Müller et al. 2004) technical report. Ten samples will be collected at each site using a standardised coring device, comprising aluminium tubes (15 cm length, 2.8 cm diameter) attached to a sediment coring device. This methods ensures the collection of sediment from a shallow profile (10 cm depth) of surface sediment. These samples will be composited prior to sending them to the laboratory. The ten samples will be collected in a triangular formation and will be approximately 25 m apart. At three sites samples will be split and sent as blind duplicates to the main analytical laboratory and to a second laboratory. As well as dioxins, particle size distribution and total organic carbon analysis will be undertaken on each sample.

Budget

The total budget for the sampling and analysis is approximately \$16, 233 (exc. GST) (Table One).

References

Müller J, Muller R, Goudkamp K, Shaw M, Mortimer M, Haynes D, Paxman C, Hyne R, McTaggart A, Burniston D, Symons R & Moore M 2004, *Dioxins in Aquatic Environments in Australia*, National Dioxins Program Technical Report No. 6, Australian Government Department of the Environment and Heritage, Canberra.



Figure One: Sites in the Noosa River Catchment downstream of historical forestry.

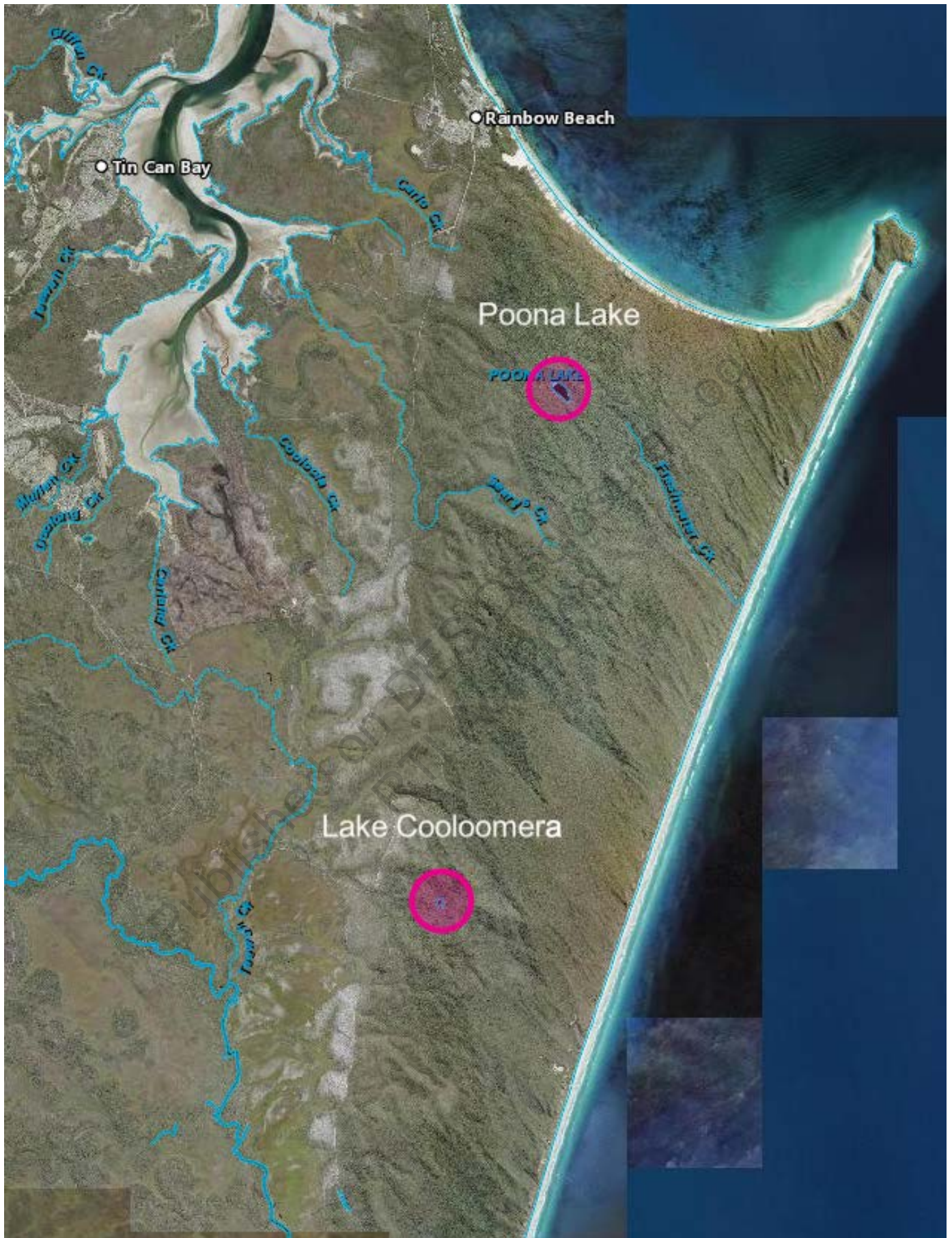


Figure Two: Control sites in the Coolool National Park

Table One: Budget summary

	No. Samples	Cost per sample	Total cost
Analysis			
Dioxin Analysis Laboratory One	10	850	8500
Dioxin Analysis Laboratory Two	3	1521	4563
PSD Analysis	10	36	360
TOC Analysis	10	21	210
s-methoprene Laboratory One	10	40	400
s-methoprene Laboratory Two	1	200	200
Accommodation (three nights, two people)			
Travel allowance			800
Hotels			1200
Grand total			\$16, 233

Stage Two

Biota (oyster) sampling and dioxin analysis will be undertaken when the results of Stage One are available.

Agreement

Title	Position	Signature	Date
Liz Young	Director, Sustainable Environment Environmental Policy and Planning Department of Environment and Science		
Christian Witte	Director, Environmental Monitoring and Assessment Sciences Science Delivery and Knowledge Department of Environment and Science		

Proposal for Stage One Dioxin Survey in Noosa Area

Water Quality and Investigations

February 2020

Introduction

This document outlines the Stage One proposal for sampling the dioxin TCDD in the Noosa River. There have been concerns raised by members of the Noosa community that historical usage of the pesticide 2,4-D and 2,4,5-T in the forestry industry in the Noosa catchment has contaminated the river with TCDD. There is some evidence that TCDD is a contaminant in 2,4-D and is a known contaminant in 2,4,5-T. TCDD cannot be analysed on its own, and so a standard suite of dioxins and furans will be analysed.

Dioxins and furans are persistent organic pollutants (POPs) and are ubiquitous. They are formed by combustion process (e.g. bushfires, sugar cane burns and motor vehicle emissions) as well as being bi-products of manufacturing (such as the production of pesticides). Dioxins are insoluble in water, and so will be found in sediments and biota in the aquatic environment. The National Dioxin Survey found the presence of dioxins in every sediment sample that was tested (Müller et al. 2004).

As there are no guidelines for TCDD in sediments, the best way to assess the results from this survey is to compare the dioxin results to those reported in the National Dioxin Program's *Dioxins in Aquatic Environments in Australia* (Müller et al. 2004). Therefore, the sampling design and methodology outlined in Müller et al. (2004) will be followed.

Noosa council have been using methoprene for many years to control mosquitos, and the use of this chemical is also potentially of concern. Methoprene breaks down rapidly, is only sparingly soluble in water and is likely to bind to sediments. Therefore, the analysis of methoprene in sediments is also going to be undertaken during this survey.

Sampling Sites

Five sites downstream of historic forestry in the Noosa River were chosen (Figure One) for sediment sampling. Two additional control sites in the Coolool National Park (Figure Two) were also selected. Lakes were chosen as these are likely to be sinks for contaminated sediments.

Sampling Strategy

Sampling will follow that outlined in the *Dioxins in Aquatic Environments in Australia* (Müller et al. 2004) technical report. Ten samples will be collected at each site using a standardised coring device, comprising aluminium tubes (15 cm length, 2.8 cm diameter) attached to a sediment coring device. This methods ensures the collection of sediment from a shallow profile (10 cm depth) of surface sediment. These samples will be composited prior to sending them to the laboratory. The ten samples will be collected in a triangular formation and will be approximately 25 m apart. At three sites samples will be split and sent as blind duplicates to the main analytical laboratory and to a second laboratory. As well as dioxins, particle size distribution and total organic carbon analysis will be undertaken on each sample.

Budget

The total budget for the sampling and analysis is approximately \$16, 233 (exc. GST) (Table One).

References

Müller J, Muller R, Goudkamp K, Shaw M, Mortimer M, Haynes D, Paxman C, Hyne R, McTaggart A, Burniston D, Symons R & Moore M 2004, *Dioxins in Aquatic Environments in Australia*, National Dioxins Program Technical Report No. 6, Australian Government Department of the Environment and Heritage, Canberra.

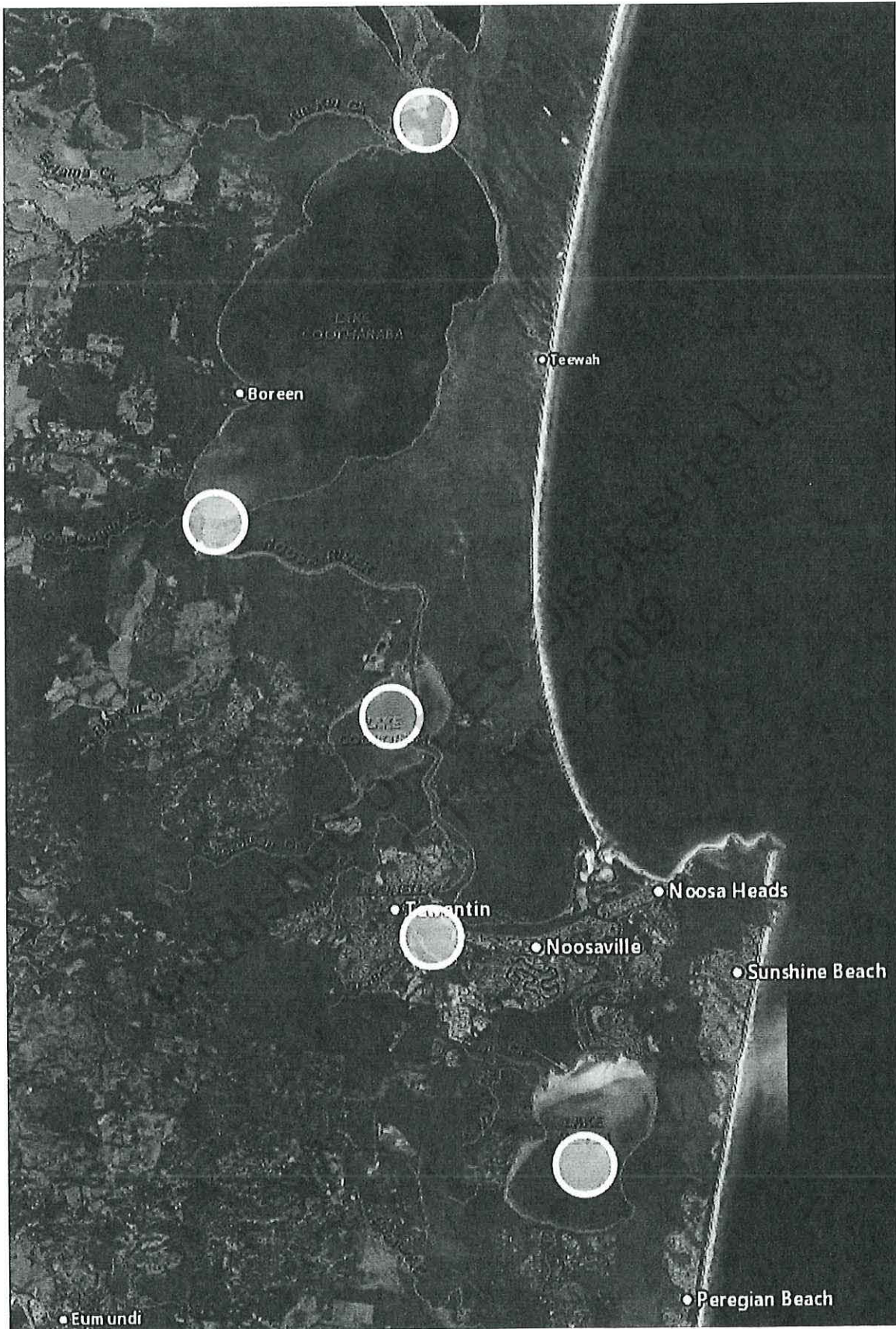


Figure One: Sites in the Noosa River Catchment downstream of historical forestry.

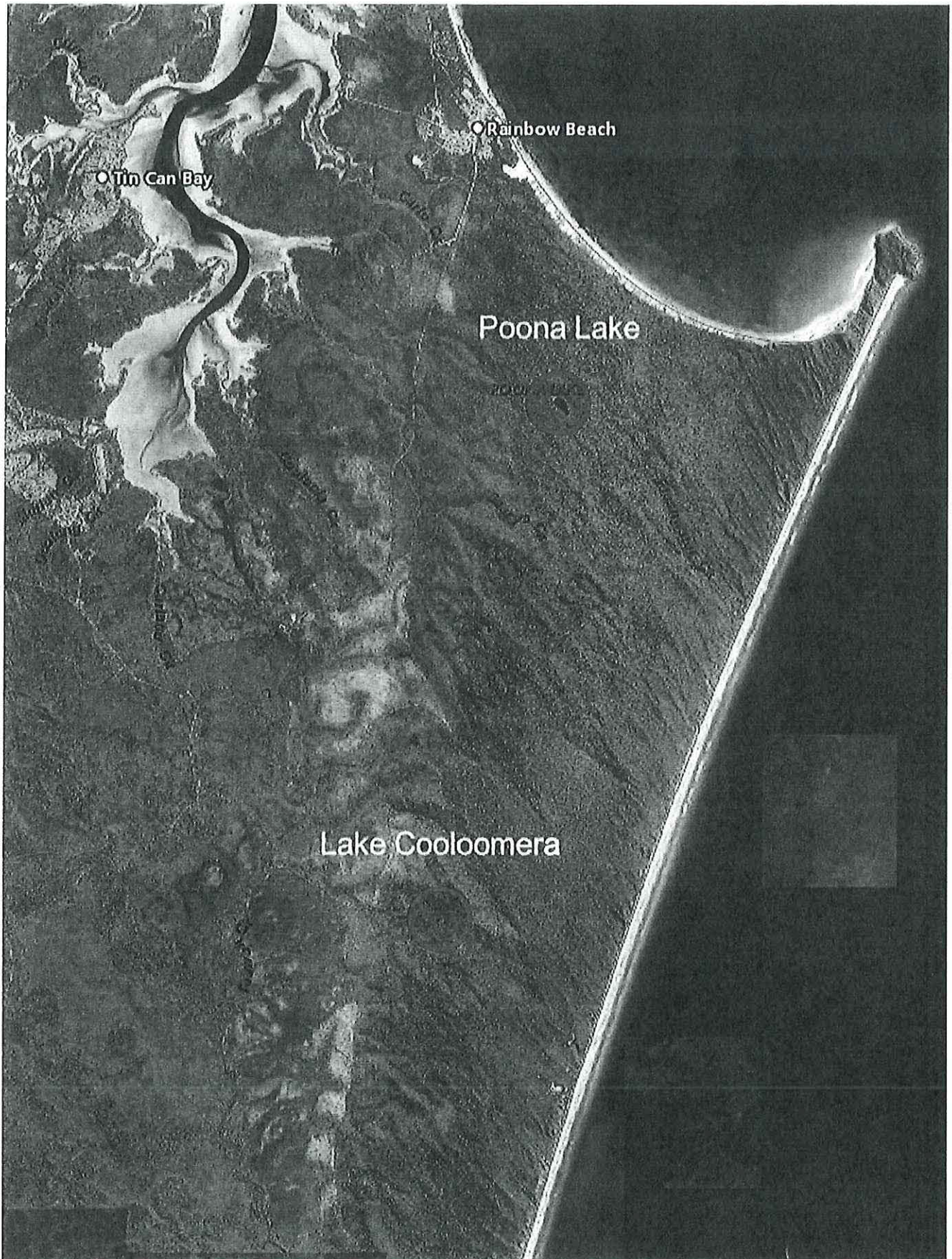


Figure Two: Control sites in the Cooloolia National Park

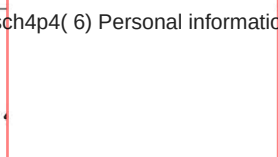
Table One: Budget summary

	No. Samples	Cost per sample	Total cost
Analysis			
Dioxin Analysis Laboratory One	10	850	8500
Dioxin Analysis Laboratory Two	3	1521	4563
PSD Analysis	10	36	360
TOC Analysis	10	21	210
s-methoprene Laboratory One	10	40	400
s-methoprene Laboratory Two	1	200	200
Accommodation (three nights, two people)			
Travel allowance			800
Hotels			1200
Grand total			\$16, 233

Stage Two

Biota (oyster) sampling and dioxin analysis will be undertaken when the results of Stage One are available.

Agreement

Title	Position	Signature	Date
Liz Young	Director, Sustainable Environment Environmental Policy and Planning Department of Environment and Science		19/2/2020
Christian Witte	Director, Environmental Monitoring and Assessment Sciences Science Delivery and Knowledge Department of Environment and Science	 sch4p4(6) Personal information	19/2/2020