Australian Government
Department of Defence

RAAF Base Richmond –Ecological Risk Assessment Findings

PFAS Investigation & Management Program

Investigation Background

In May 2017, Defence commenced a detailed environmental investigation to identify the nature and extent of per- and poly-fluoroalkyl substances (PFAS) on, and in the vicinity of RAAF Base Richmond (the Base), as a result of the historical use of legacy firefighting foams.

The purpose of the investigation is to identify whether the use of these foams has resulted in PFAS exposure to people, animals and/or the environment and develop strategies to minimise exposure, if required.

Preliminary Site Investigation (PSI)
Completed August 2017

Community Water Use Survey
Distributed August 2017

Sampling Plan
Completed September 2017

Community Information Session
September 2017

Detailed Site Investigation (DSI)
Completed June 2018

Community Information Session
June 2018

Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA)
Completed October 2018

Community Information Session
November 2018

WE ARE HERE

PFAS Management Area Plan (PMAP) and Ongoing Monitoring Plan (OMP)
*First Quarter 2019**

Community Information Session
*Second Quarter 2019**

*Dates subject to change

The Ecological Risk Assessment

As part of the environmental investigation, an Ecological Risk Assessment (ERA) has been completed to better understand the potential risks of PFAS exposure to the environment within the 'Study Area'.

Study Area

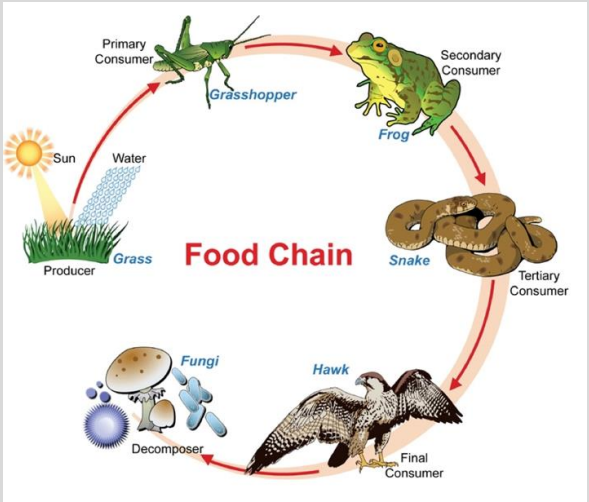
The ERA Study Area includes:

- The Base and Defence-owned land, north-east of the Base, known as Rickabys Drop Zone;
- Bakers Lagoon;
- Hawkesbury River; and
- All remaining locations within the Study Area.

Scope of the ERA

Within the Study Area, the ERA assessed the potential for:

- Exposure risks to 'ecological receptors' (land and water-based animals and plants) from direct exposure to PFAS (e.g. PFAS in soil, sediment and surface water); and
- Indirect exposure risks, through the food chain, to 'higher order animals' (e.g. fish-eating birds, land-based animals and birds of prey), from PFAS bioaccumulation in land and water-based animals.



Domestic animals (e.g. pets and livestock) were not assessed in the ERA as they are not exposed to PFAS in the same way as wild animals (i.e. domestic animals are often fed food sourced from other areas or drink rain or tap water instead of creek and river water).

ERA Methodology

PFAS exposure risks for ecological receptors were assessed by comparing PFAS concentrations in soil, surface water and biota samples against Australian and international screening benchmarks.

Indirect exposure risks from bioaccumulation in the food chain can occur when an animal absorbs PFAS at a rate faster than PFAS leaving the animal. The potential for risks to ecological receptors was assessed by estimating the dietary intakes of PFAS and comparing them against relevant toxicity reference values.

Food web modelling was also carried out to understand the extent to which animals may cumulatively be exposed to PFAS, including through ingesting PFAS in soil, sediment, surface water, plants and animals, as part of the food chain.

The amount of PFAS likely to be ingested by the animal was then compared with the exposure concentrations considered to be acceptable, in order to determine the exposure risk to that animal group.

Indicator Species

As it is not possible to assess the exposure risks to all ecological receptors in the Study Area, the ERA has identified and assessed a range of 'indicator species'. Indicator species (e.g. the brown falcon, the Australian hobby or the Australian kingfisher) are used to represent a larger group of animals, with similar food and habitat requirements.

Sampling

The ERA involved collecting and analysing 'biota' (plant and animal) samples as well as analysing sampling results from the Preliminary Site Investigation, Detailed Site Investigation and the Human Health Risk Assessment.

Table 1 Samples collected to inform the ERA

SAMPLE TYPE	SAMPLES COLLECTED
Surface water	93
Soil	60
Sediment	70
Groundwater	6
Biota	57
Total samples collected	**286**

Exposure Pathways

The ERA has identified the following main exposure pathways for indicator species living in the Study Area:

- Direct exposure to PFAS in soil (for plants and animals such as insects, worms and spiders);
- Direct exposure to PFAS in water (for plants, fish and animal such as insects, water bugs and prawns that live in water);
- Direct exposure through incidental ingestion of PFAS in soil and sediment (for birds, reptiles and mammals);
- Direct exposure through ingestion of dissolved PFAS in water (for birds, reptiles and mammals); and
- Indirect exposure to PFAS bioaccumulated in food sources (for birds, reptiles and mammals).

Exposure pathways for different indicator species may vary depending on the food they eat, the habitat they live in and the way they interact with the environment.

An assessment of relevant exposure pathways for each indicator species was used to estimate the cumulative amount of PFAS entering the animal.

Exposure Assessment

The ERA used the following terms to assess exposure risks:

- **Potentially elevated risk** is used when exposure risks are above an adopted risk benchmark; and
- **Minimal or low and acceptable risk** is used when an estimated exposure risk is below the acceptable risk benchmark.

An exposure risk can only exist if all of the following are present: a PFAS source, a pathway for the PFAS to move along, and a plant or animal on that pathway.

Key Findings of the ERA

The ERA indicates that there is potential for elevated risks to plants and animals within the Study Area. This is because of:

- Discharge of PFAS impacted surface water from the Base's airfield foam cannon testing area and Sewage Treatment Plant (STP);
- Discharge of PFAS impacted surface water from the Base and Rickabys Drop Zone to Rickabys Creek;
- Discharge of PFAS impacted surface water from the STP on the Base and Rickabys Drop Zone, through an underground pipe to Bakers Lagoon; and
- The bioaccumulation of PFAS in water and land-based animals.

Exposure Risks to Animal Groups

Table 2 Potential Elevated Risks per Animal Group

Animal Group	Potential for Elevated Exposure Risks			
	The Base and Rickabys Drop Zone	Bakers Lagoon	Hawkesbury River	Remaining Locations in the Study Area
Terrestrial invertebrates (Land-based animals e.g. worms and insects)	!	!	*N/A*	!
Terrestrial plants (Land-based plants)	!	!	*N/A*	✓
Aquatic invertebrates (Water-based animals e.g. insects and worms that live in the water)	!	!	!	!
Fish	!	!	!	!
Herbivorous terrestrial mammals (Land-based mammals that eat plants)	!	!	*N/A*	✓
Herbivorous terrestrial birds (Land-based birds that eat plants)	!	✓	*N/A*	✓
Invertivorous / omnivorous mammals (Mammals that eat plants and animals)	!	✓	*N/A*	✓
Invertivorous / omnivorous birds (Birds that eat plants and animals)	!	!	*N/A*	!
Predatory terrestrial mammals (Land-based predatory mammals)	!	!	*N/A*	✓
Predatory terrestrial reptiles (Land-based predatory reptiles)	!	✓	*N/A*	✓
Predatory terrestrial birds (Land-based predatory birds)	!	!	*N/A*	✓
Invertivorous / omnivorous aquatic birds (Water-based birds that eat plants and animals)	!	!	✓	✓
Invertivorous / omnivorous aquatic reptiles (Water-based reptiles that eat plants and animals)	!	✓	✓	✓
Piscivorous aquatic birds (Water-based fish eating birds)	!	!	✓	!

✓ = minimal or low and acceptable risk

! = potential elevated risk

N/A = Not applicable

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Next Steps

A PFAS Management Area Plan (PMAP) will now be developed and is expected to be completed in early 2019. The PMAP will outline activities that Defence will undertake to manage and reduce the risks of PFAS exposure, where required, within the Study Area.

Developing the PMAP involves reviewing the sources of the contamination and the key ways it is migrating into the Study Area. It will also include a comparison and evaluation of a range of available PFAS management activities to identify possible options for the Base.

As part of the PMAP, an Ongoing Monitoring Plan (OMP) is also being prepared which will outline the sampling program that will be carried out by Defence to monitor and track PFAS contamination over the coming years.

Keeping the Community Informed

Defence is committed to regularly updating the community about the ongoing monitoring. As new information becomes available, updates will be provided through the project website, community information sessions, newsletters and information sheets.

Contact

Phone: 1800 789 291 freecall (business hours)

Web: www.defence.gov.au/environment/pfas/ Richmond/

Email: richmond.defence@aecom.com

Media enquiries should be directed to Defence Media Operations on (02) 6127 1999 or media@defence.gov.au.

Government Agencies

Defence is cooperating in the investigation and management of PFAS contamination with a number of Commonwealth and NSW Government Agencies. These agencies include:

- Commonwealth Department of Health:

  1800 941 180
- NSW Health: 1300 066 055
- NSW Environment Protection Authority: 131 555
- NSW Department of Primary Industries:
  - Fisheries: 1300 550 474
  - Agriculture: 1800 808 095
- NSW Food Authority Helpline: 1300 552 406