



PENDOLEY
ENVIRONMENTAL

MARINE CONSERVATION
ENVIRONMENTAL SERVICES

Capability Statement



Company Profile

Welcome to Pendoley Environmental

We are a specialist Marine Conservation Environmental Consultancy helping government and resource companies manage the impact of their industrial activities on marine turtles and coastal habitat. Drawing on 30 years of extensive experience, our team of dedicated specialists undertake rigorous scientific research that unlocks the data you need to meet compliance obligations, sending a powerful message to regulators and industry partners about your environmental commitment and eco credibility.

Our vision is to be a highly respected champion for marine conservation worldwide. Through developing and nurturing long-term client relationships of mutual respect and trust, we're achieving better outcomes for all. Every solution we innovate is tailored to your operations, ensuring we manage your environmental impact with minimal disruption to you. And with over 50 satisfied clients (and growing), we've proven we're in it for the long haul. We look forward to partnering with you as your environmental consultancy of choice.



Meet Kellie Pendoley
Owner & Principal Scientist

Kellie has over three decades of experience in the environmental management of large-scale oil and gas developments in Australia and overseas. With her extensive knowledge of marine turtle biology and ecology, Kellie has designed and implemented an array of research and monitoring programs, with a special interest in artificial light pollution.



History in the Making

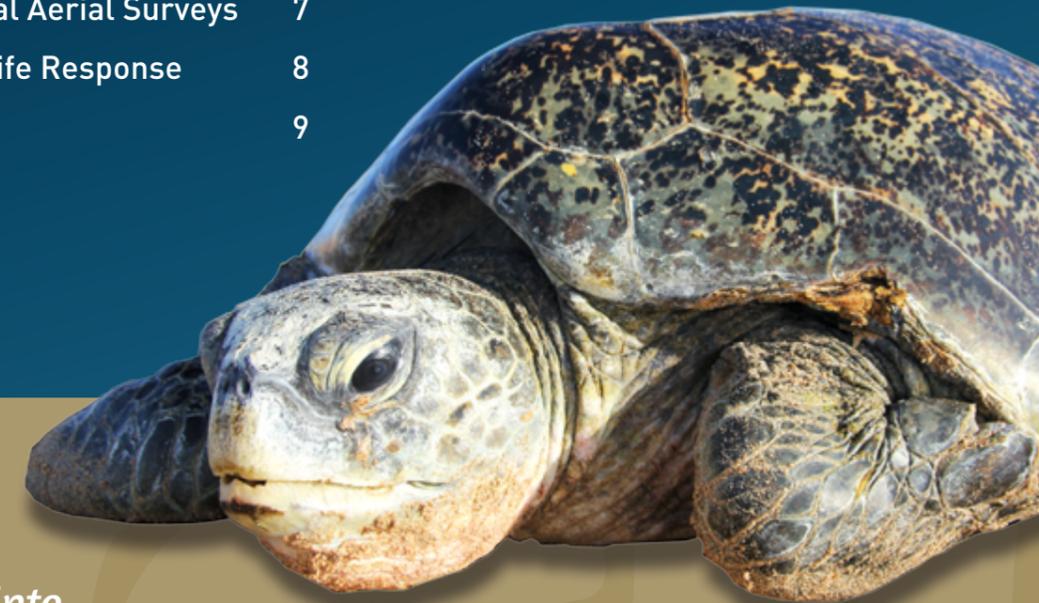
Pendoley Environmental was established in 1997 by Dr Kellie Pendoley. From humble beginnings we've grown into a leading biology consultancy, with specialists operating out of Perth and Sydney offices working on coastal and offshore projects across Australia and beyond.

Over the years, we've formed an invaluable collaborative network with local, national and international specialists at the forefront of global

marine biology conservation. Together with our accomplished team of marine scientists, turtle biologists, marine fauna observers and oil spill response specialists, we're now providing multi-national resource companies with the most up-to-date environmental solutions.

Contents

Company Profile	2
History in the Making	3
Leading Advice (Our Services)	4
Marine Turtle Monitoring	4
Artificial Lighting Assessments	6
Marine and Coastal Aerial Surveys	7
Oil Spill and Wildlife Response	8
Our Clients	9



Our vision is to be a highly respected partner for marine conservation worldwide. We're passionate about the habitats we conserve, to the long-term relationships we foster.

We've grown into a leading biology consultancy, with specialists operating out of Perth and Sydney offices working on coastal and offshore projects across Australia and beyond.

Leading advice Exceptional solutions

At Pendoley Environmental, research and innovation are in our DNA. With a multi-disciplinary team of subject matter experts, trusted network of global conservation experts, and in-house Digital Horizon Imaging technology division, we're continuously pushing new frontiers of environmental compliance.

Pendoley Environmental offers four key areas of expertise:

1. **Marine Turtle Monitoring**
2. **Artificial Light Assessment**
3. **Marine and Coastal Aerial Surveys**
4. **Oiled Wildlife Response**

Marine Turtle Monitoring

Led by a team of qualified, highly experienced marine turtle biologists and ecologists, Pendoley Environmental offers the complete suite of on and offshore marine turtle monitoring and management services.

Track Census

Demonstrate that your activities have not caused changes to marine turtle nesting behaviour or distribution with a track census. Our ground and aerial surveys can rapidly detect these changes, both over time and over large geographic areas, providing data essential to effective management planning and response.

Tagging

As a long lived species, the marine turtle life cycle is complex. Tagging provides information to understand the long-term impacts of your project on a turtle population. Suitable for populations of any size and for any duration, our capture-mark-recapture technique delivers the highest quality data, meeting compliance conditions in both remote and urban environments.

Nest Success

Monitoring the early stages of a marine turtle's lifecycle is critical to understanding long-term effects of impacts to the overall population. We can provide early detection of potential impacts occurring below the sand surface (such as poor hatching and emergence rates) so you can take early action.

Satellite Tracking

Marine turtles spend 99% of their lives at sea. Through advanced mapping and spatial analysis techniques, we can track movements and identify turtle behaviour offshore to pinpoint the impact of industry marine operations such as dredging, construction and vessel movements.

Hatchling Orientation

Artificial light emissions can impair a marine turtle hatchling's ability to locate the ocean when emerging from the nest at night.

We offer cost-effective, regulator approved assessments to identify problematic light sources and quantify impacts on hatchlings, supported by practical solutions to aid hatchling survival and ensure compliance.

Hatchling Dispersal

We use the latest movement tracking technology to monitor hatchling dispersal and survivorship. This allows us to quantify the level of influence your offshore operations are having on hatchlings (such as artificial light emissions and physical barriers) after leaving the nesting beach.



Our capture-mark-recapture technique delivers the highest quality data, meeting compliance conditions in both remote and urban environments.

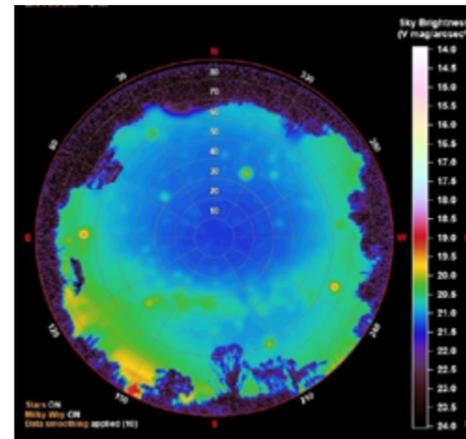
Artificial Lighting Assessment

As the world realises the harmful environmental and ecological impacts of artificial light pollution, development projects are taking action. However, quantifying light levels in a meaningful way is challenging. Recognising this, Pendoley Environmental has developed cutting edge Sky42™ technology in-house at our Digital Horizon Imaging division.

Now recognised globally as a leading tool in artificial light measurement and management, Sky42™ offers a cost-effective way to capture and record biologically relevant light emissions. Pendoley Environmental can audit your facility, assess lighting output and confirm that emitted wavelengths match manufacturer specifications.

Following your assessment, we can then propose detailed recommendations to:

- Reduce your lighting output to meet compliance obligations (without compromising HES standards)
- Decrease output in specific wavelengths to manage impacts to sensitive fauna
- Alleviate public concern
- Resolve nuisance lighting disputes at commercial and residential properties
- Reduce your power bills.



Marine and Coastal Aerial Surveys

Pendoley Environmental's aerial surveys provide rapid coverage of remote, inaccessible areas, capturing the location of marine turtle nesting activity or marine mega-fauna. Equipped with aircraft, drones and an in-house pilot, we have the capacity to deliver the complete service at any time, from survey design to data acquisition and post-analysis.

Option 1: Fixed wing aircraft

From our Digital Horizon Imaging division comes Wing42 – custom-built camera technology mounted to a fast and manoeuvrable fixed-wing aircraft that rapidly accumulates high-resolution imagery. Teamed with purpose built in-flight hardware and custom-acquisition software, we can record observations at the touch of a button, from species, to location, time and more.

Option 2: Unmanned Aerial Vehicles (drones)

Operated by highly experienced CASA certified pilots and supported by certified UAV controllers, our state-of-the-art drones are equipped with technology that captures ultra-high resolution images with survey grade geo-positional accuracy. We can manage all aspects of your drone survey, from flight planning to control and permissions.

All captured data is georeferenced and images ortho-mosaicked before analysis by our qualified GIS analysts using purpose built software designed in-house.



Recognised globally, Sky42™ is a leading tool used to record biologically relevant light emissions, offering a cost-effective solution to your light pollution.



We have the capacity to deliver the complete service at any time, from survey design to data acquisition and post-analysis.

Oil Spill and Wildlife Response

Oil spill events that threaten wildlife are subject to intense media and public scrutiny. Planning in advance is critical, not only for your company's reputation – it's also a regulatory requirement. At Pendoley Environmental, we offer a range of oil spill planning and response services proven to meet regulations, wholly integrated into your corporate health and safety system.

Planning

- Develop standard operating procedures for oiled wildlife handling and management
- Develop an Incident Action Plan and framework for zones of potential impact.

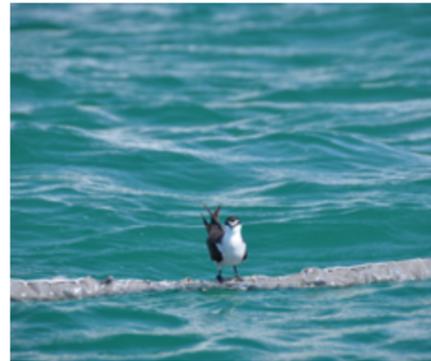
Responding

24-72 hours

Immediate Response Mobilisation Model comprising a training matrix and availability register for our network of 30 experienced first strike responders.

72 hours+

Deploy an Ongoing Response Mobilisation Model comprising an extended network of responders. They will assist throughout the spill event and beyond with wildlife management and rehabilitation, including veterinary care, associated paperwork and government agency liaison.



Planning your response in the event of an oil spill is critical, not only for your company's reputation - it's also a regulatory requirement.

Our Clients

Chevron Australia

Location: Gorgon Gas Development - Barrow Island + Mundabullangana, WA

Service: Marine Turtle Monitoring + Artificial Light Surveys

The Challenge

Design and implement a long-term monitoring program to detect and manage potential project-related impacts on marine turtle populations. As a high profile project located in an A-class nature reserve, with both on and offshore operations, executing a program consistent with global research standards and practical within an industry setting posed a significant challenge.

The Solution

Our experts implemented a suite of monitoring solutions designed to deliver a complete understanding of the marine turtle population:

1. Track census
2. Turtle tagging
3. Incubation success
4. Satellite tracking
5. Hatchling orientation
6. Offshore hatchling dispersal
7. Artificial lighting
8. Beach temperatures
9. Control chart statistical modelling

To achieve this, we established an annual monitoring program that notably includes 72 volunteers each season. We also invested in the research and development of new Sky42™ technology to detect artificial light *as it is perceived by turtles* and used a control chart approach to detect changes and trends for a number of demographic parameters across multiple monitoring seasons.

The Outcome

The Gorgon solution became the first long-term assessment of a flatback turtle population in Western Australia. The tagging program is considered the most comprehensive of its kind globally, with over 85% of nesting flatback turtles tagged, while the combination of our Sky42™ technology and hatchling orientation assessment technique is now considered best practice in monitoring artificial light impacts on turtles.

Since the start of the program in 2005, we have successfully implemented all required monitoring components each season, addressing knowledge gaps that allow government and industry bodies to implement sound management practices. The solution has led to the publication of multiple research papers in peer-reviewed scientific literature.

The combination of our Sky42™ technology and hatchling orientation assessment technique is now considered best practice in monitoring artificial light impacts on turtles.

Rio Tinto

Location: Amrun - Cape York, Queensland

Service: Marine Turtle Monitoring

The Challenge

Monitor marine turtle nesting patterns in alignment with a feral pig population management program and detect long-term trends in nest predation rates. Working along the expansive, remote coastline of a heritage area with low-density nesting posed a significant challenge.

The Solution

We monitored each beach within a 60km radius of the project site using ATVs, deployed infrared camera traps for 24-hour monitoring of feral pig predation and implemented a Traditional Owner training program in data collection techniques.

The Outcome

Our solutions enabled us to measure feral pig predation levels and describe nesting turtle density. By teaching Traditional Owners field survey techniques and monitoring skills, we have initiated a process to enable the local Traditional Owners to take ownership of future management of a long-term monitoring program.

Queensland Gas Company

Location: Queensland Curtis LNG - Curtis Island, Gladstone, Queensland

Service: Digital Horizon Imaging: Sky42™ Artificial Light Surveys

The Challenge

Measure the impact of the project's artificial light emissions on the sea-finding ability of marine turtle hatchlings at nearby beaches.

The Solution

Pendoley Environmental conducted a comprehensive audit of each lighting fixture and fitting throughout the LNG facility. We then captured images using Sky42™ technology at three major rookeries up to 60km away over multiple seasons while simultaneously measuring hatchling orientation. From there, advanced techniques developed in-house were used to link hatchling sea-finding orientation to specific emission sources and quantify the impact.

The Outcome

Our solution integrated the cumulative light emissions of the LNG facility with data from the Sky42™ images. This allowed us to pinpoint problematic light sources and provide practical recommendations for managing and minimising the impact of artificial light emissions on local turtle nesting beaches.

Department of Parks and Wildlife

Location: Eighty Mile Beach

Service: Digital Horizon Imaging: Wing42 Aerial Surveys

The Challenge

Provide an overview of marine turtle habitat use and nesting activity within the vast and remote Eighty Mile Beach Marine Park.

The Solution

We combined aerial surveys using track census methodology with our custom built Wing42 imaging technology. This collected high-resolution digital images with a 30% overlap along the flight path, resulting in seamless georeferenced ortho-mosaicked images.

The Outcome

Using images collected in the 2012 and 2014 nesting seasons, we were able to map the distribution and density of turtle species that nest along the 230km of Eighty Mile Beach and determine their proximity to heritage areas. This focused current monitoring and management of the marine park.

Hess Exploration Australia Pty Ltd / Permit Area WA-474-P

Location: Northwest Shelf

Service: Oil Spill Response/Oiled Wildlife Response

The Challenge

Provide oil spill stand-by services for the duration of the WA-474-P drilling campaign.

The Solution

We developed a staged Oiled Wildlife Response (OWR) Plan. This included the provision of personnel experienced in handling wildlife, as well as the equipment kits needed to capture and care for oiled wildlife during the first two days of an oil spill. Our first strike responders were on stand-by for the duration of the drilling program.

The Outcome

Hess met their regulatory requirements by successfully implementing an OWR Plan and completed their drilling program without incident. While our standby services were (thankfully) not activated, Hess enjoyed complete peace of mind knowing that our team would take swift action in the event of a spill in order to minimise environmental impact and media scrutiny.



PENDOLEY
ENVIRONMENTAL

12A PITT WAY, BOORAGOON,
WESTERN AUSTRALIA, 6154.

+61 8 9330 6200

penv.com.au