

43RD ANNUAL ECC CONFERENCE

engineering and construction contracting association



JOURNEY INTO UNCHARTED TERRITORIES

September 7-10, 2011

JW Marriott Desert Ridge, Phoenix, AZ

How are owners, contractors and suppliers adapting to successfully execute projects and reposition their businesses in the ever evolving project environment?



REPOSITIONING THE PROJECTS BUSINESS IN A WORLD WITH CHANGING BOUNDARIES

Gorgon LNG Project – The New Paradigm

Johann van der Merwe

Quarantine Manager - Gorgon



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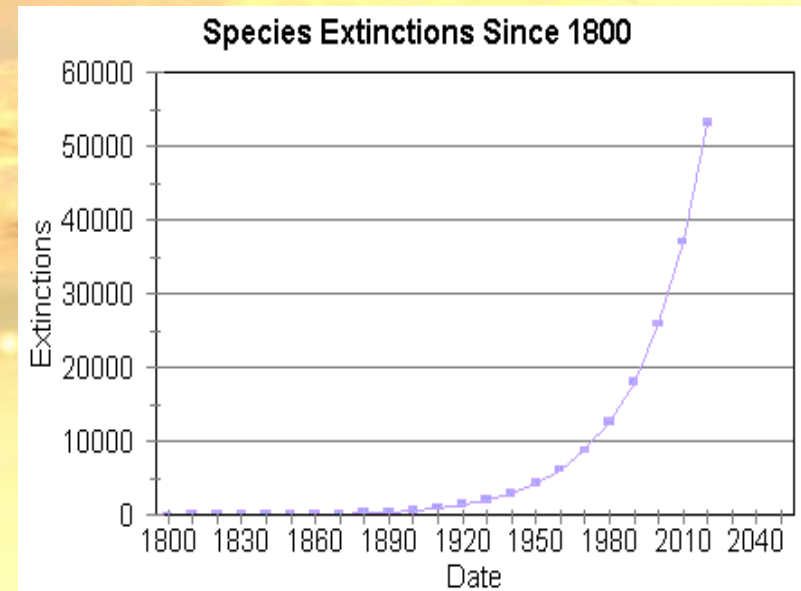
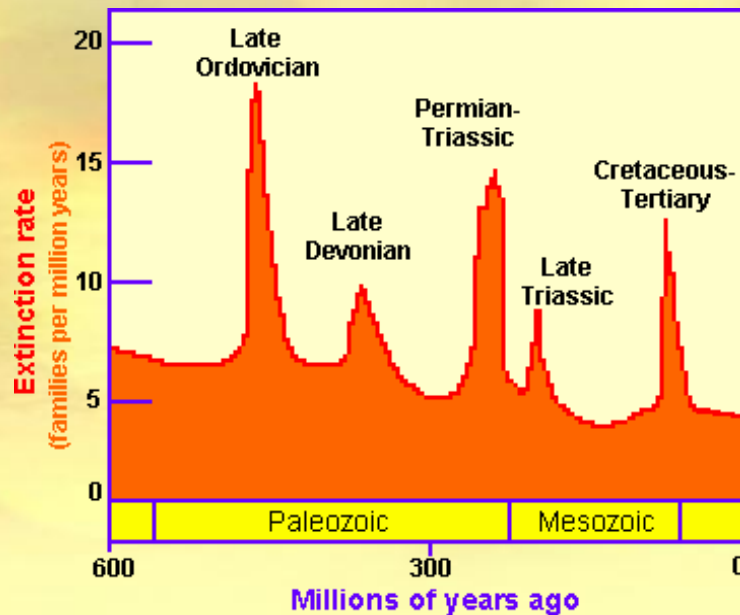
GENERAL SESSION



REPOSITIONING THE PROJECTS BUSINESS IN A WORLD WITH CHANGING BOUNDARIES

Extinction: The challenge of our time

- 5 historical extinctions and we are witnessing the 6th
- Estimated 27,000 species lost per year
- At this rate, 20% of all known species will be extinct by 2022
- An estimated 7000x the background rate



Australia's threatened species



Threatened Species:

- 1,324 species (2nd to the US)
- 38 reptiles (1st in the world)
- 35 amphibians (1st in the world)
- 74 fish (3rd to Mexico and China)
- 20% of all mammals



Rare species:

- 612 plants
- 47 birds
- 39 mammals
- 16 frogs
- 16 reptiles
- 19 fish



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Barrow Island – Class A Nature Reserve



- 2nd largest Island off West Australia
- Separated for 8000 years
- Proclaimed in 1910 as a Class A Nature Reserve
- Oil discovered in 1964
 - 475 producing wells today
 - 313 million barrel's of oil to date



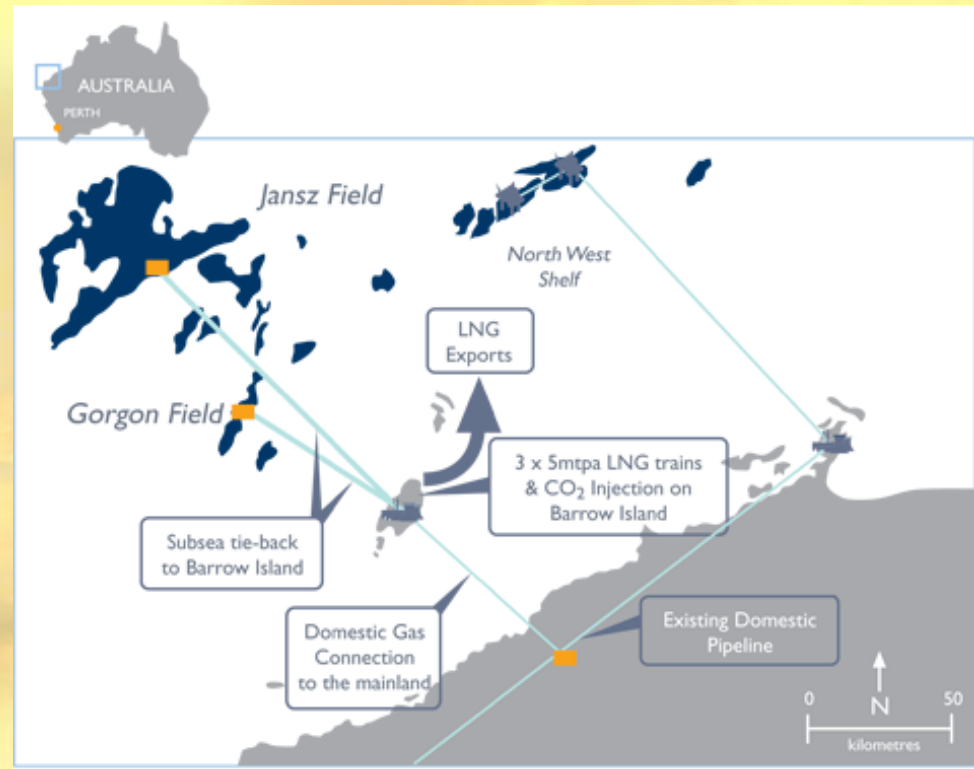
Gorgon Project Overview

Joint Venture Participants

- Chevron (~47%)
- ExxonMobil (25%)
- Shell (25%)
- Osaka Gas (1.25%)
- Tokyo Gas (1%)
- Chubu Electric Power (0.417%)

Project Development Plan

- 3 x 5 MTPA LNG trains
- A domestic gas plant with capacity of 300 terajoules per day
- LNG shipping facilities to transport products to international markets
- Challenging environmental approval process
- World's largest CO₂ injection project



Gorgon Project Facts

FID / Total Investment	Sept 2009 , \$A43bn
First Gas	2014
Employment	>20,000 people
Total Freight Tonnage	>3.5 Million freight tonnes
Total number of vessels	>180 barges, tugs, supports
Modularised steel tonnage	>260,000 tonnes
Rock for pipe line stabilisation	1.5 million tonnes
Dredging total	~6 million cubic metres
Fuel	>300 million liters of diesel
Passengers	~275 000 (FID to first gas)
Meals	~15 million meals (FID to first gas)
Contribute to Australian GDP	A\$60bn

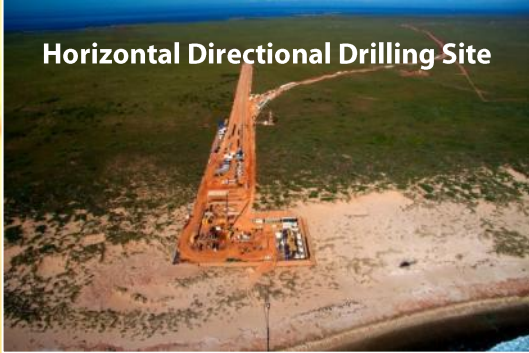


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Gorgon – Progress to Date

Horizontal Directional Drilling Site



Gorgon LNG Plant Site



Temp Facilities and Utilities



Construction Accommodation ~
4,000 people



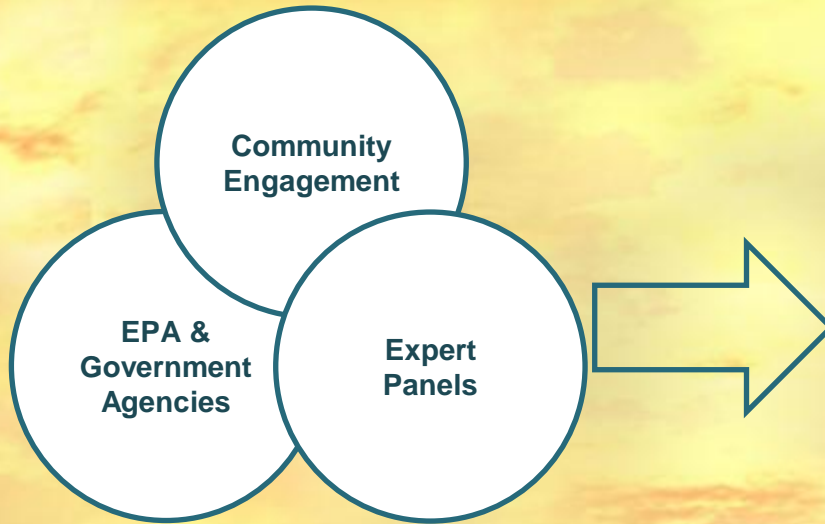
Marine Offloading Facility



Challenging Regulatory Approval

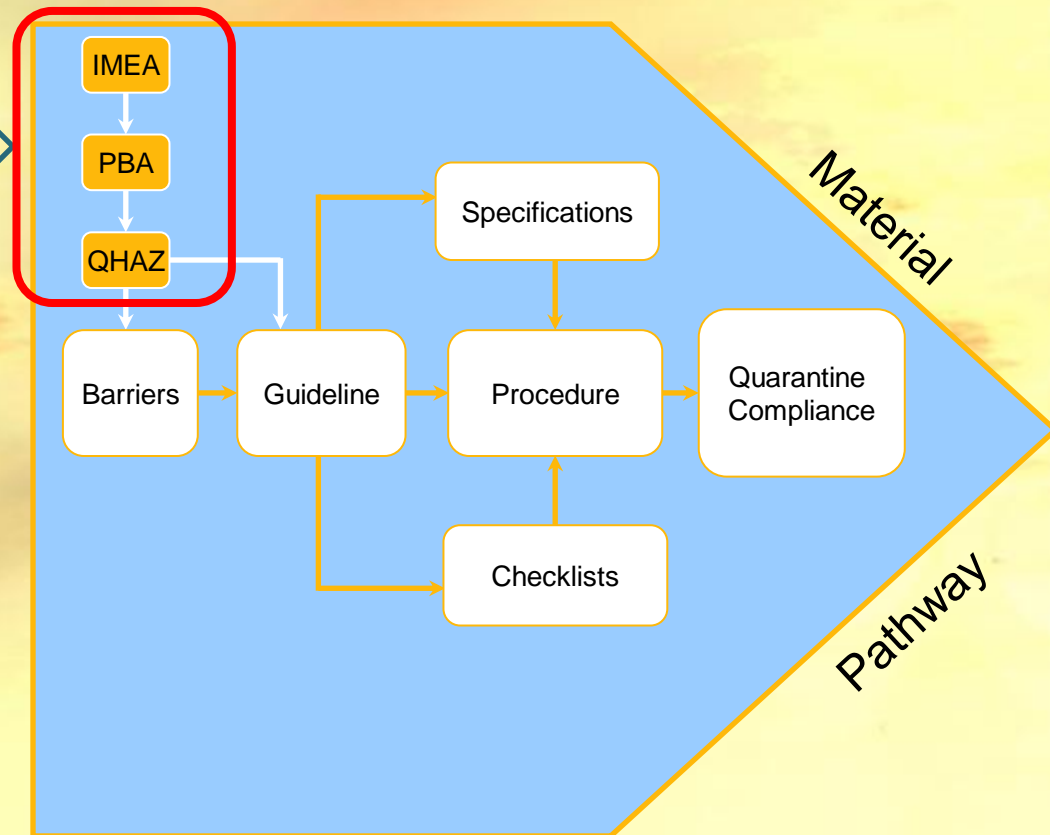
- EPA Report 1101 (2003) advised that if Gorgon was approved:
 - *Develop Set of standards for acceptable risks*
 - *Involve independent technical experts*
 - *Include a high level of community input*
 - *Set new benchmarks and go 'beyond best practice'*
- EPA Report 1323 (Sept 2009) stated:
 - '... likely to be world's best practice and therefore it is unlikely to be possible to recommend additional practical controls beyond that system.'

Quarantine Management System (QMS)

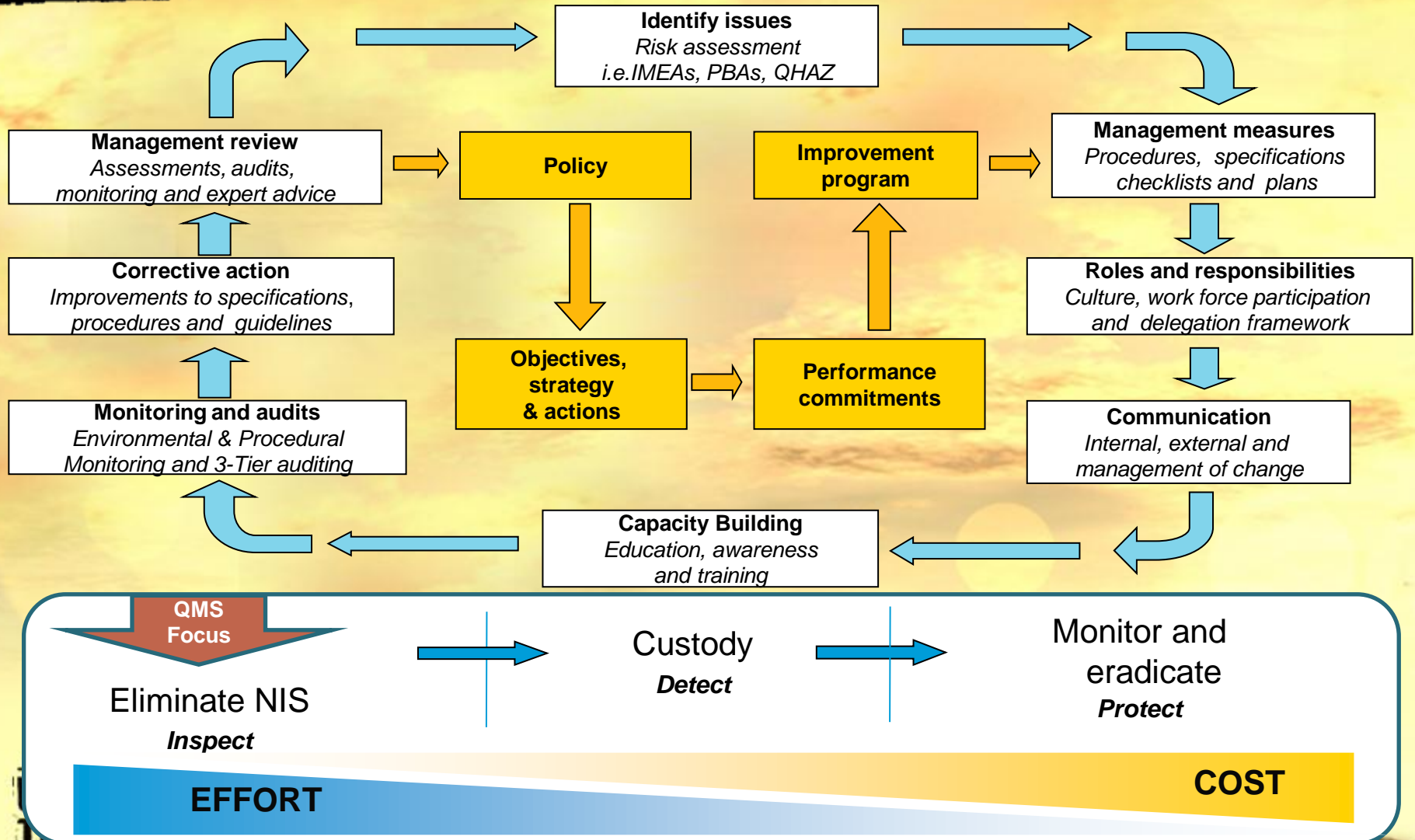


- Infection Modes & Effect Analysis (IMEA)
- Preliminary Barrier Analysis (PBA)
- HAZID Process (QHAZ)

- No tools existed to undertake a risk assessment in conservation values
- Risk assessment process for QMS was derived from engineering “tools”



Structure of the QMS



Quarantine Continuum

Quarantine is addressed as a continuum of activities occurring:

- Pre-border (before goods and personnel reach the island)
- Border (on arrival at Barrow Island) and
- Post-border (outside of the development)



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Quarantine Design and Treatment Solutions

- Facilities Design, e.g.
 - Kitchen
 - Supply base
 - Wash-bays
 - Airport departure lounge
 - BWI Clearance facility
- Wrapping
- Fumigation
- Residual insecticides
- Herbicides
- Anti-fouling



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Quarantine and Logistics Assurance

- Quarantine Management Plans
- Quarantine Advice Report
- Quarantine Inspection Protocol
- Quarantine Compliance Verification
- Quarantine Non-conformance Report
- Quarantine Audit Report
- Quarantine Corrective Action
- Opportunity for Improvement
- Competency Training
- Quarantine Awareness



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Quarantine Science

- Substantial field collection
- Most comprehensive baselines
- Remote diagnostic capacity
- New benchmark in surveillance
- Species action plans
- Incursion response protocol

Quarantine Marine Pest Alert
Asian green mussels

Classification: THREAT

Marine pests are species with the potential to become a threat to the natural marine environment, fisheries production or human health. They can breed rapidly and prolifically, and generally pose a significant threat to local marine populations by competing for space and food. They can displace native marine populations and may contribute significantly to the degradation of marine ecosystems.

Asian green mussel (*Perna viridis*) has potential ecological, economic and human health impacts. While it is a significant marine pest that outcompetes native species, the mussel is considered a valuable aquaculture species in China, India, Thailand, Singapore, Indonesia, the Philippines and many other countries.

Distribution

The Asian green mussel originates from the northwest Indian Ocean and western Pacific Ocean. It is found from the Persian Gulf to the Philippines and from the East China Sea in the north to Indonesia in the south. It has been accidentally introduced to a number of locations, including the Caribbean, North and South America, Japan and Australia.

Ecology

The Asian green mussel prefers warm waters; however it can survive for short periods in cooler temperatures. They occur at depths of less than 10 m and its capacity to tolerate a variety of conditions - such as pollution, temperature, salinity - has ensured its success as an invasive species.

Asian green mussels are transported in ships' ballast water, on vessel hulls, in areas such as internal seawater systems and on aquaculture equipment. They firmly attach themselves to hard surfaces, forming carpets 60 cm thick and reaching densities of more than 35,000 mussels per square metre.

Biology

Asian green mussels are between 8 and 16 cm long at full maturity. Juveniles have a bright green shell that darkens to brown with green edges as they mature. The exterior is smooth with growth rings.

The Asian green mussel can live for around three years, feeding on tiny plants and animals filtered from water that they draw in through a siphon. They can breed throughout the year and may be prompted to spawn when there are changes in salinity or if they detect the sperm or eggs of other Asian green mussels. Larvae attach to hard surfaces such as rocks, pylons and hulls and grow up to 1 cm per

Cluster of Asian green mussels
Image: Reef Quarantine Marine Services Pty Ltd

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Gorgon Project

Quarantine Marine Pest Alert
Barnacles

Classification: THREAT

Marine pests are species with the potential to become a threat to the natural marine environment, fisheries production or human health. They can breed rapidly and prolifically, and generally pose a significant threat to local marine populations by competing for space and food. They can displace native marine populations and may contribute significantly to the degradation of marine ecosystems.

Barnacles are a type of crustacean that generally attach themselves to rock or other hard surfaces. Worldwide, there are around 1000 different species of barnacles.

There are two major groups of barnacles, acorn barnacles (which cement themselves directly to hard surfaces) and goose-neck barnacles (which use a rubbery stalk to attach themselves to a surface). Goose-neck barnacles are not considered to be marine pests.

Two barnacle species of concern to Gorgon Quarantine are the bay barnacle (*Balanus improvisus*) and the ivory barnacle (*B. eburneus*).

Distribution

The bay barnacle is native to North America, and has also been recorded in temperate and tropical seas of South America, Asia and the Middle East.

The ivory barnacle is also native to the Atlantic coast of North America, but prefers warmer, more tropical waters. It has been found in waters off the east coast of South America, the West Indies, east coast of the United States, the Atlantic coast of Europe and Japan.

Ecology

Both the bay barnacle and the ivory barnacle thrive in intertidal and shallow subtidal habitats where they live on hard surfaces such as rocks, artificial surfaces (including vessel hulls and marine infrastructure), wood and shells. They are capable of tolerating a wide range of temperatures and salinities.

Biology

The bay barnacle is usually around 1 cm but can grow up to nearly 2 cm in diameter. It has a smooth-surfaced shell that is white or greyish white. It is usually fairly flat, growing to a maximum height of about 6 mm.

The ivory barnacle has a conical white shell and grows up to 2 cm in diameter and height.

Bay barnacle
Image: Dr A Hople

Ivory barnacle
Image: Dr A Hople

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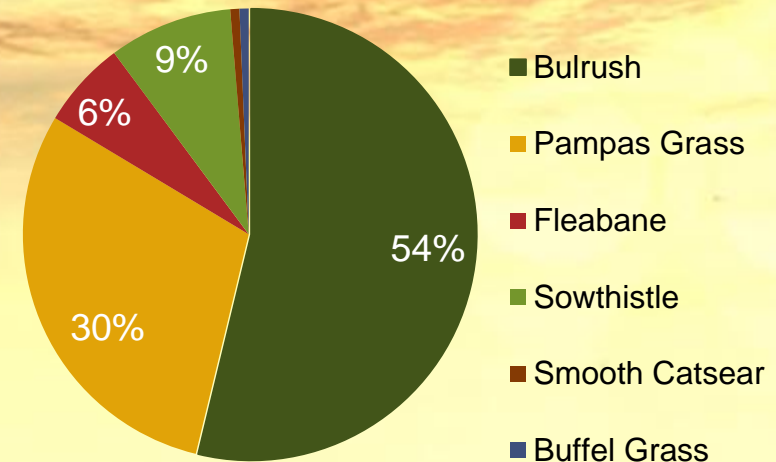
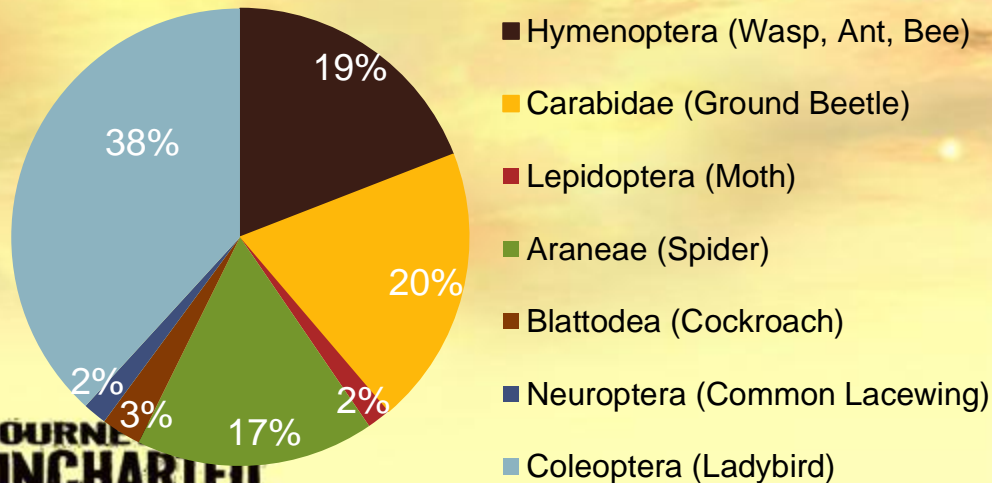
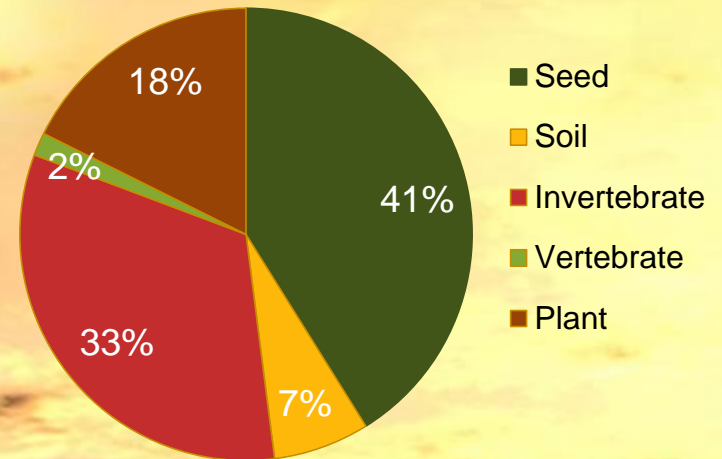
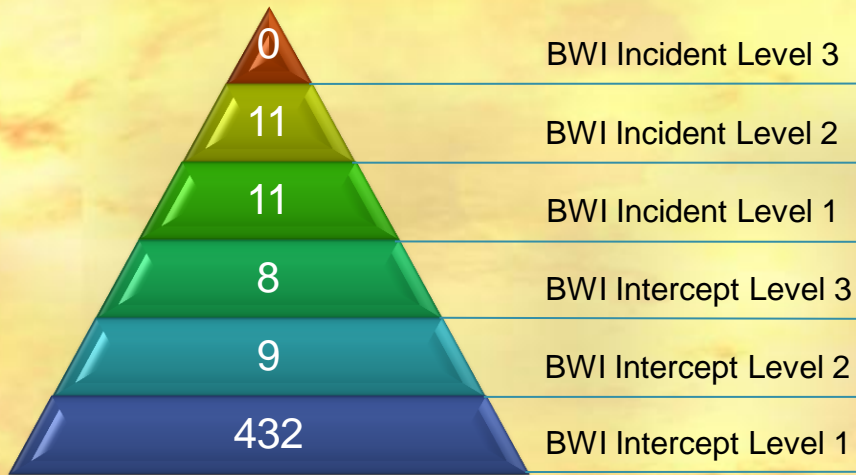
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Quarantine Statistics



Quarantine Performance

Awards:

- APPEA Environment Award 2010
- CRC Excellence in Innovation Award 2011

Statistics:

- More than 500,000 tonnes shipped to Barrow Island [this includes all rock shipped]
- Served more than 1.7 million quarantine compliant meals
- More than 99,000 passengers screened at airports in Perth and Karratha
- 148 fully compliant vessels have been mobilised
- 87 audits completed
- Delivered almost 19,000 Quarantine training sessions to more than 12,500 contractors

All this activity without a single introduction of a non-indigenous species

Repositioning Our Business

Gorgon and Australia Benefits:

- Positive impacts in construction
- Disciplined quarantine bestowed unforeseen benefits in execution
- Built a strong conservation culture – “Sense of pride”
- Benefit to the greater Australian Community

Industry benefits:

- Exploration and execution of projects in sensitive remote areas
- Greater global awareness around environmental and conservation issues, putting greater demands on projects
- Competitive advantage
- The “New Paradigm”

Questions



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