



Murdoch
UNIVERSITY

MURDOCH RESEARCH REPOSITORY

<http://researchrepository.murdoch.edu.au/6674/>

Stephens, N., Holyoake, C.S., Finn, H. and Bejder, L. (2011) *An unusually severe presentation of dolphin poxvirus in bottlenose dolphins (*Tursiops aduncus*) within the Swan-Canning Estuary.* In: 48th Annual Conference of the Australian Marine Science Association, 3 - 7 July, Fremantle, Western Australia.

Presentation

It is posted here for your personal use. No further distribution is permitted.



Murdoch
UNIVERSITY

**An unusually severe
presentation of dolphin
poxvirus in bottlenose
dolphins (*Tursiops aduncus*)
within the Swan-Canning
Estuary**



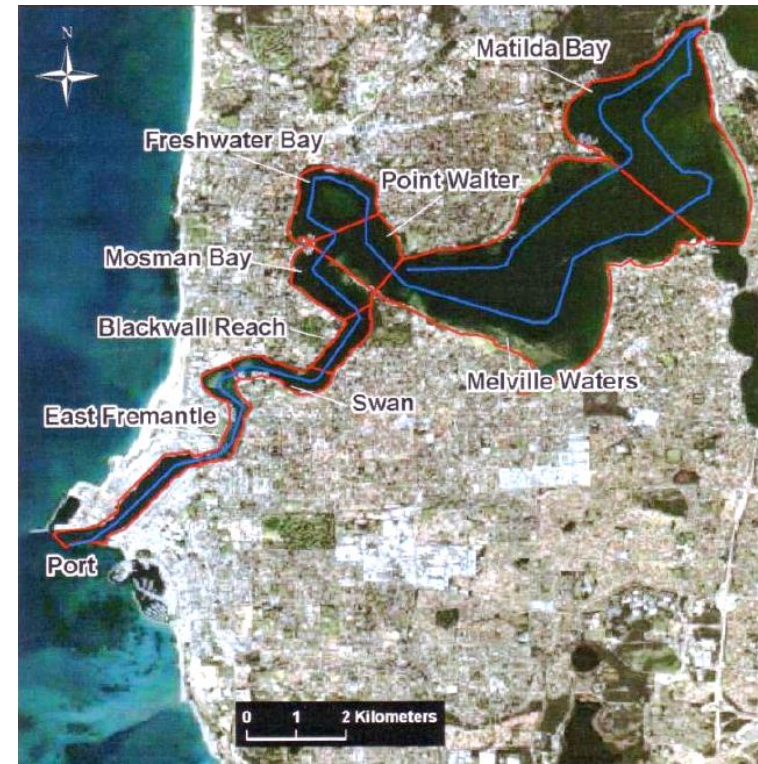
Murdoch
UNIVERSITY

**First report of fatal cetacean
morbillivirus infection in WA
and an accompanying unusually
severe presentation of dolphin
poxvirus infection**

Nahiid Stephens, Carly Holyoake, Hugh
Finn & Lars Bejder

Unusual mortality event 2009

- 6 bottlenose dolphin deaths within 5 months in the Swan Canning estuary
- Represent a marked \uparrow in dolphin mortalities based on previous stranding data



Dolphins in the estuary

- 2001-2003: 20-25 bottlenose dolphins were consistently found in the estuary

Mortalities:

DATE	SIGNALMENT	COMMENT
5 June	Male, calf	Too decomposed
8 June	Male, juvenile	
21 June	Female, adult	
17 Sept	Female, adult	
9 Oct	Male, adult	Too decomposed
25 Oct	Female, adult	

June 8: Male juvenile

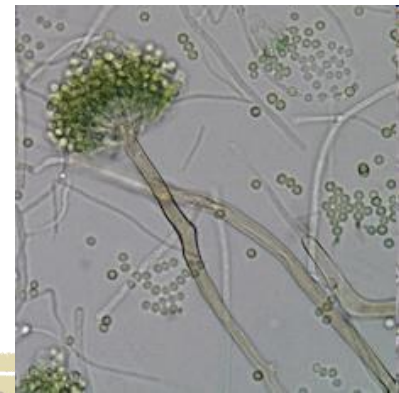
Most significant findings:

- Fungal meningoencephalitis with intralesional fungal organisms consistent with *Aspergillus* spp. (fungal infection of the brain)
- Lymphoid depletion noted histologically (reduction in immune cells in lymph nodes & spleen)



Aspergillus

- Ubiquitous in the environment
- Usually exposure does not result in infection as the immune system is able to ward off infection in healthy animals
- Infection with *Aspergillus* suggests that the immune system of this dolphin was compromised



June 21: Female adult

Most significant findings:

- severe chronic fishing line entanglement of the right fluke
- Lung fungal & bacterial infection
- Kidney bacterial infection
- Lymphoid depletion noted histologically
- Septicaemia likely



Murdoch
UNIVERSITY



DISCOVERERS WELCOME

September 17: adult female

Most significant findings:

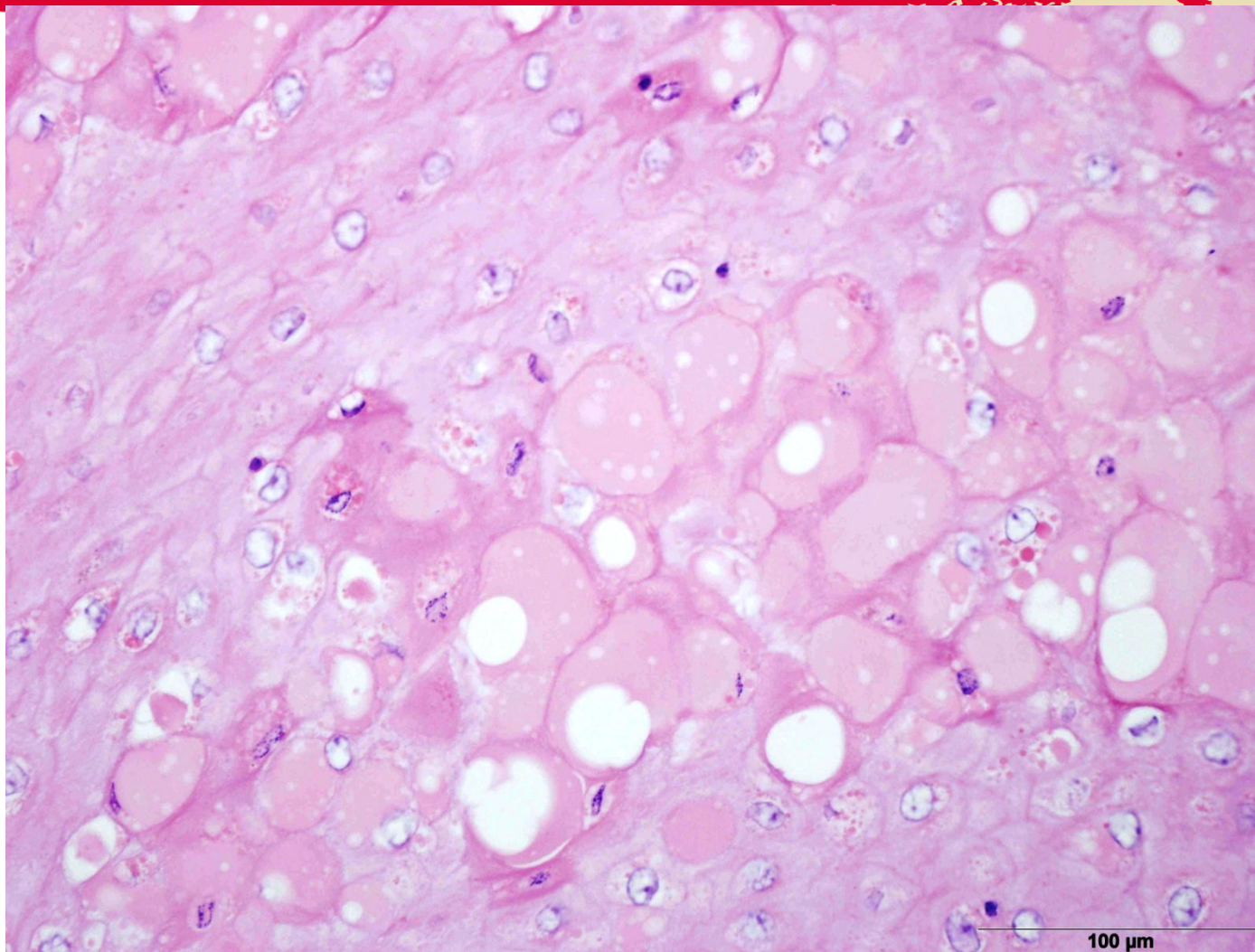
- Numerous, extensive ulcerative skin lesions with intralesional opportunistic bacterial & fungal organisms
- Intracytoplasmic viral inclusion bodies detected in keratinocytes, indicative of poxvirus infection



Poxvirus inclusion bodies



Murdoch
UNIVERSITY



100 μm

DISCOVERERS WELCOME

October 25: female, adult

Most significant findings:

- Numerous, extensive ulcerative skin lesions with intralesional opportunistic bacterial & fungal organisms
- Intracytoplasmic viral inclusion bodies in keratinocytes (poxvirus infection)
- Acute (recent) human induced injury – fish-hook lodged in oesophagus, minor entanglement with minimal tissue laceration of the right pectoral fin



Poxvirus/Tattoo Skin Disease

- Poxvirus infection - most often reported in juveniles (adults tend to develop protective immunity following infection as a juvenile)
- Considered to be only weakly pathogenic. Infection usually self-limiting
- Does not usually result in large deeply ulcerative lesions
- Usually not associated with death



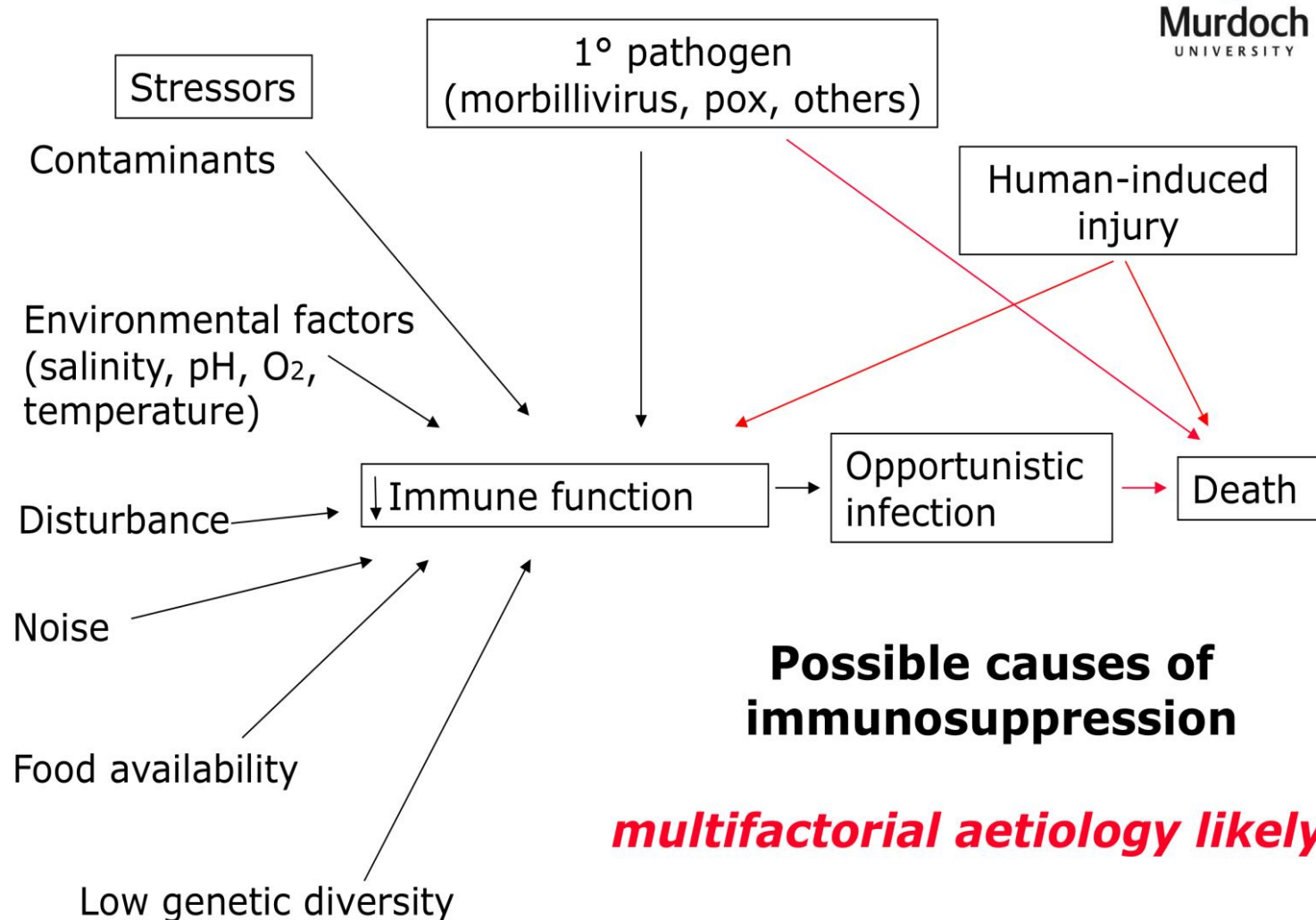


General post-mortem findings

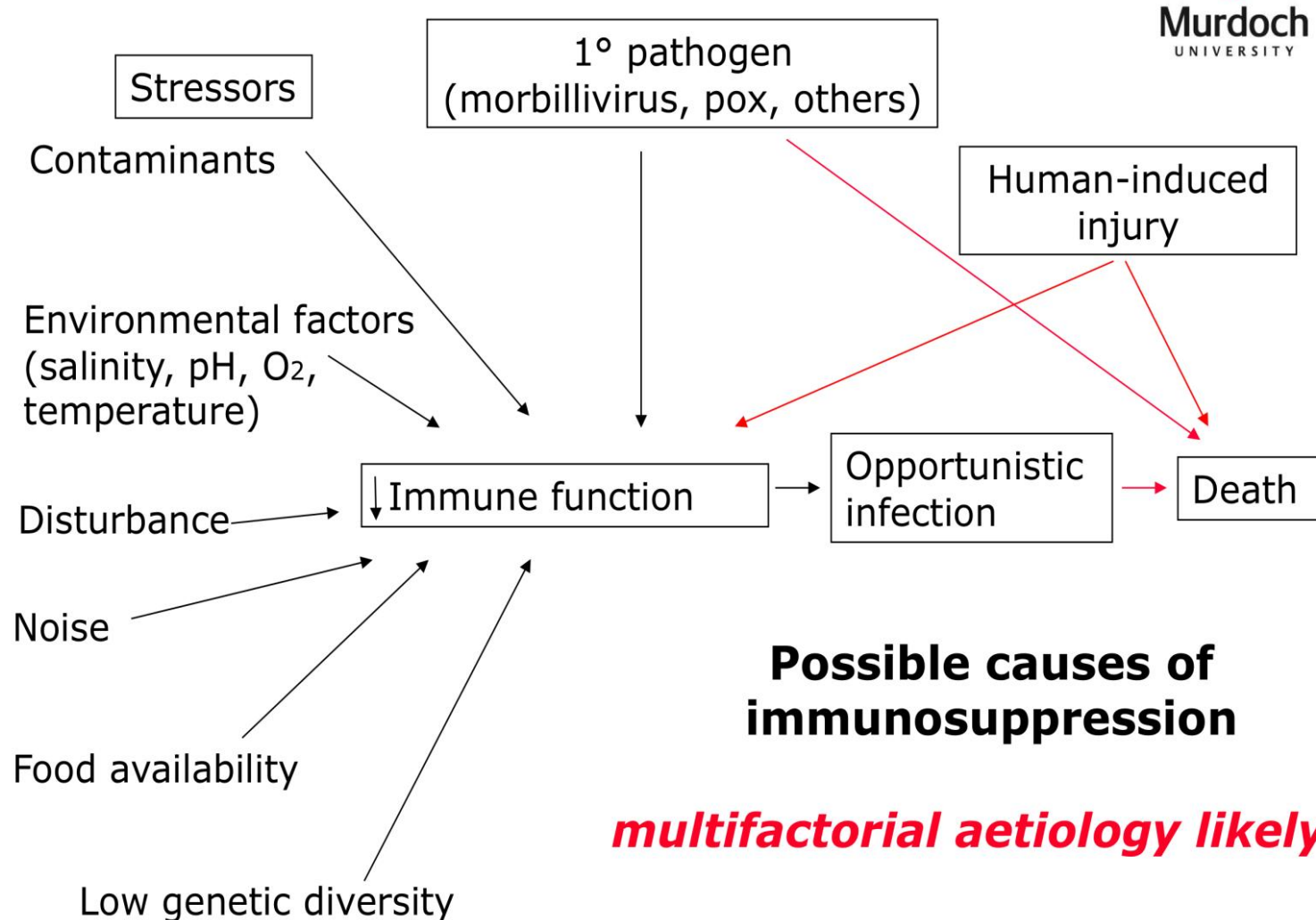
- Secondary infections (bacteria &/or fungi)
- Lymphoid depletion (reduction in immune cells in lymph nodes & spleen)
- Severe skin lesions in 2 dolphins

= Clinical findings suggestive of compromised immune function → underlying cause????

Possible causes of impaired immune function



What was different about 2009?



Cetacean morbillivirus

- Most pathogenic virus known to cetaceans
- Causes severe lymphoid depletion



Secondary infections (pneumonia, encephalitis, parasites)

Cetacean morbillivirus

- Implicated in mass mortalities in US & Europe
- Little surveillance for disease in Australian cetaceans
- 1st confirmed case in Australia in a dolphin calf from QLD in 2010

Morbillivirus testing

- Immunohistochemistry (IHC) for the detection of morbillivirus antigen

DATE	SIGNALMENT	IHC
5 June	Male, calf	Not tested
8 June	Male, juvenile	Positive
21 June	Female, adult	Positive
17 Sept	Female, adult	Not tested
9 Oct	Male, adult	Not tested
25 Oct	Female, adult	Negative

Significance of morbillivirus for WA

- First time in WA
- Second in Australia
- First Indian Ocean
- Highly pathogenic

Transmission of morbillivirus

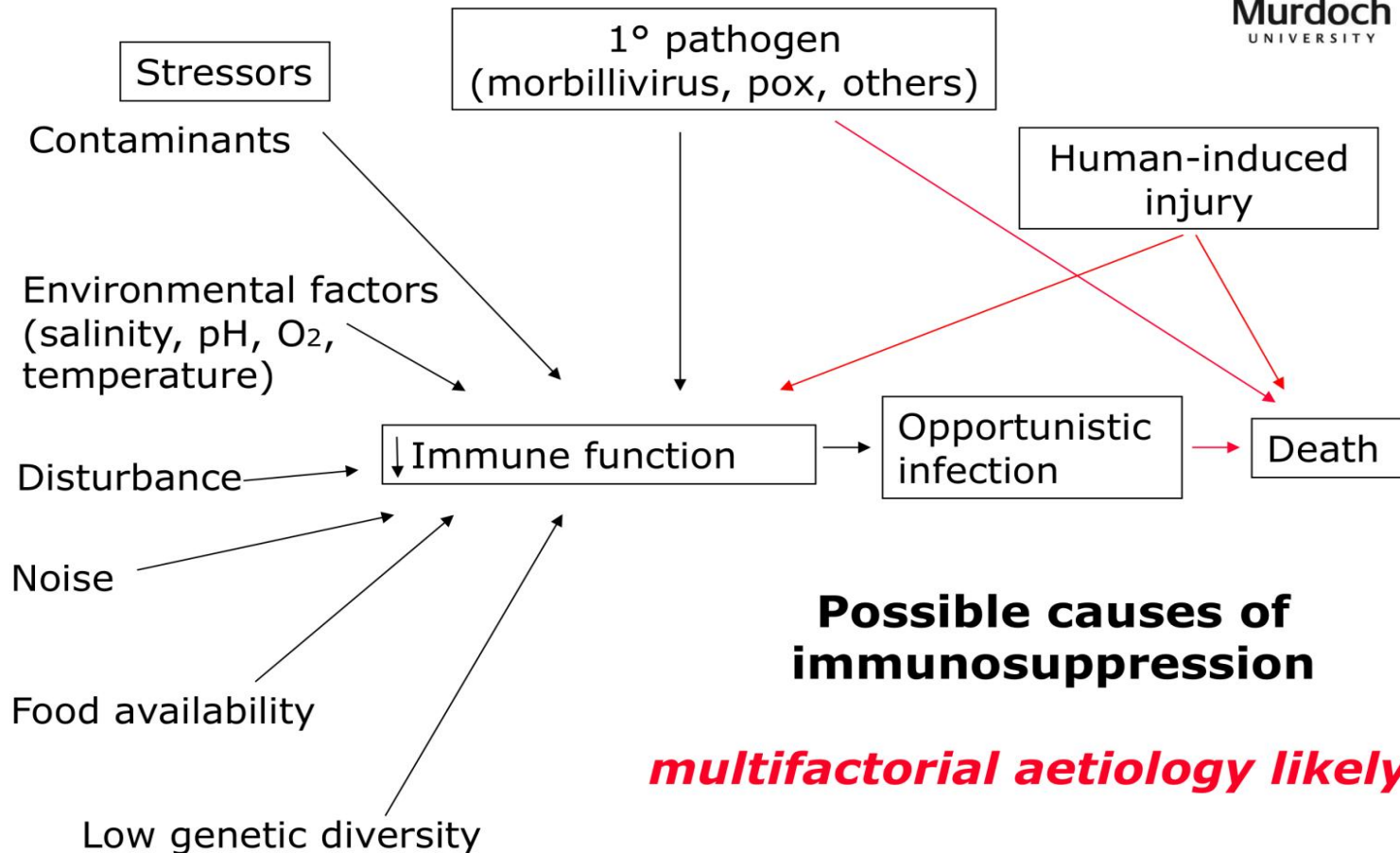
- Virus needs a very large population to persist
- Herd immunity not maintained in small dolphin communities
- No carrier or latent state
- Infected dolphins that survive remain immune
- Pilot whales thought to be reservoir hosts

The 2009 mortalities are best explained as the outcome of multiple contributing factors



Murdoch
UNIVERSITY

Murdoch
UNIVERSITY



Acknowledgements

- Swan River Trust for providing funding which enabled this project
- Swan River Trust and Department of Environment and Conservation personnel responsible for the retrieval of the dolphin carcasses



Murdoch
UNIVERSITY

Questions?