



Illuminating Biodiversity of the Ningaloo Canyons

30-day Post Cruise Report

Ship name: Falkor

Cruise Dates - Day Departed: 03/08/2020 **Day Returned:** 4/8/2020

Cruise Number: FK200308

Departure Port: Fremantle, Australia **Arrival Port:** Broome, Australia

Mid-Cruise Port Call (if any): Exmouth, Australia

Participating Organizations, Institutions, Foundations, Government Agencies, etc. Western Australian Museum, Curtin University, Geoscience Australia, Scripps Institution of Oceanography, Geraldton Senior High School, Macquarie University, Foundation for the WA Museum

Funding Sources: IWA Museum, Foundation for the WA Museum: Diving deep- support for marine biodiversity exploration off Exmouth, WA

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Cruise Objectives:

To understand and inventory the marine biodiversity in two two canyons, the science team carried out 1) ROV-based biological surveys, 2) complementary eDNA surveys, 3) quantitative video transects, 4) fish and crab trap deployments and 5) mapping activities.

Impact of the Research:

- Specimen collections include the deepest fish records for Western Australia (4470m), first giant hydroids collected in Australia, significant communities of glass sponges discovered in Cape Range Canyon
- probably the longest animal (siphonophore) in the world sighted
- Along with new distribution and depth records of known species, this research also led to the discovery of up to 30 new species of marine animals.
- The deployment of 5 autonomous reef monitoring structures (ARMS) in Cape Range canyon was noteworthy because it is the first time ARMS have been deployed at abyssal depths.
- 11,318 km² of multibeam bathymetry data collected
- The first utilisation of a common household brush to attempt non-invasive genetic sampling (dubbed the Kitchen Brush of Science, KBOS) resulted in one successful sampling event
- The capture of fish using nets held by the ROV arm was unprecedented and resulted in ten significant specimens.

Summary of Operations and Data Collection: The deep-sea expedition was focused on discovering the biodiversity in two marine canyons in Gascoyne Marine Park off the mid-coast of Western Australia, in the eastern Indian Ocean (8 Mar – 8 Apr 2020). The main aim of the work was to better understand the biodiversity in the Cape Range and Cloates canyons, which required specimen collection. To this end, the team completed 20 ROV dives (19 on station) and investigated a total of 16 stations over 32 days at sea. Twelve stations were visited in Cape Range Canyon and four at the adjacent Cloates Canyon, with the deepest overall dive to 4439m. To broaden specimen capture (aside from ROV dives), fish traps were deployed using an acoustic release and additional fish traps and lobster traps were deployed via a lander. Five ROV dives were shortened by either weather (n=3) or ship/ROV issues (n=2). There were also three complete days where diving was not possible due to weather, and another two complete days lost to diving due to ship/ROV issues. Often other operations such as CTDs, plankton tows, trap/lander deployments or mapping were still possible during those days.

In total, over 1000 specimens were captured and curated during the expedition and these samples were registered into the Western Australia Museum databases, which include data on locality, imagery (both in situ and in vivo), and preservation, including tissue sub-sampling for genetic analysis. Highlights of these collections include the deepest fish records for Western Australia (4470m), first giant hydroids collected in Australia, significant communities of glass sponges discovered in Cape Range Canyon, and probably the longest animal (siphonophore) in the world sighted. This latter discovery led to a media storm but the final measurements still need to be completed. Along with new distribution and depth records of known species, this research also led to the discovery of up to 30 new species of marine animals. The deployment of five autonomous reef monitoring structures (ARMS) in Cape Range canyon at five sites was noteworthy because it is the first time ARMS have been deployed at abyssal depths. They will

yield future quantifiable biodiversity returns when they are retrieved, and extend the Museum's research through sampling of small, cryptic fauna not captured by other means.

Another aim of the expedition was to screen water for eDNA to extend reach of the biodiversity sampling using traditional methods. To this end, ten CTDs were completed with 150 Niskins fired, and 57 ROV Niskins were also fired enabling filtration of 2070 litres of water (1500L CTD and 570L ROV) by Georgia Nester, a Curtin University PhD student supported by Schmidt Ocean Institute's Student Opportunity program. Dr. Rachel Przeslawski from Geoscience Australia led video transect surveys and sediment sampling during the cruise. This initiative resulted in 20 pushcores sampled for grain size and some infauna. Twelve video transects were completed in Cape Range Canyon, which will serve as an important trial for monitoring marine parks in Australia. R/V *Falkor* crew members, led by Deb Smith, contributed to enhanced mapping of the area with 11,318 km² of multibeam bathymetry data collected, providing new data for Gascoyne Marine Park.

Including student experiences and training was another goal of the expedition and three PhD and one high school student were able to participate and contribute to the success of the expedition. The inclusion of an indigenous high school student (from the Follow the Dream program) from a nearby regional community was significant as a high school student has not participated on a *Falkor* cruise before.

The skill and ingenuity of the ROV team coupled with scientific need for new tools led to several other noteworthy occurrences and these deserve mention. The first was the utilisation of a common household brush to attempt non-invasive genetic sampling (dubbed the Kitchen Brush of Science, KBOS). Secondly, the capture of fish using nets held by the ROV arm was unprecedented and resulted in ten significant specimens.

The onset of the global coronavirus pandemic set off unusual challenges to planning and carrying out the expedition. Many planned outreach activities (ship tours, school ship-to-shores) were cancelled or modified, and there were high levels of uncertainty around the continuity of personnel (both ship and science party). However, the high level of professionalism displayed by all personnel resulted in an almost normal continuation of science objectives and activity, despite a slightly diminished number of personnel onboard for leg 2 (including multimedia loss).

Did you collect Measurements or Samples, including biological specimens? Yes

Is there any suspected or confirmed new species discovered during the cruise? Yes, up to 30 new species

Did you deploy and/or recover any Moorings, Bottom Mounted Gear, or Drifting Systems? Yes
Equipment Used:

Total number of CTD casts completed during the cruise: 10

Total number of AUV dives completed during the cruise: 0

Total number of ROV dives completed during the cruise: 20

Total number of ROV samples collected during the cruise: 1018

Total number of Unmanned Aerial Vehicle (UAV) or other vehicle deployments during the cruise: 0

Other notable facts about the cruise: The capture of fish using nets held by the ROV arm was unprecedented and resulted in 10 significant specimens. The deployment of 5 autonomous reef monitoring structures (ARMS) in Cape Range canyon at 5 sites was noteworthy because it is the first time ARMS have been deployed at abyssal depths. The discovery of the (likely) largest animal in the ocean, a siphonophore *Apolemia* sp., garnered much media attention.