

New reflections on old data: living populations of *Nautilus* and *Allonautilus*

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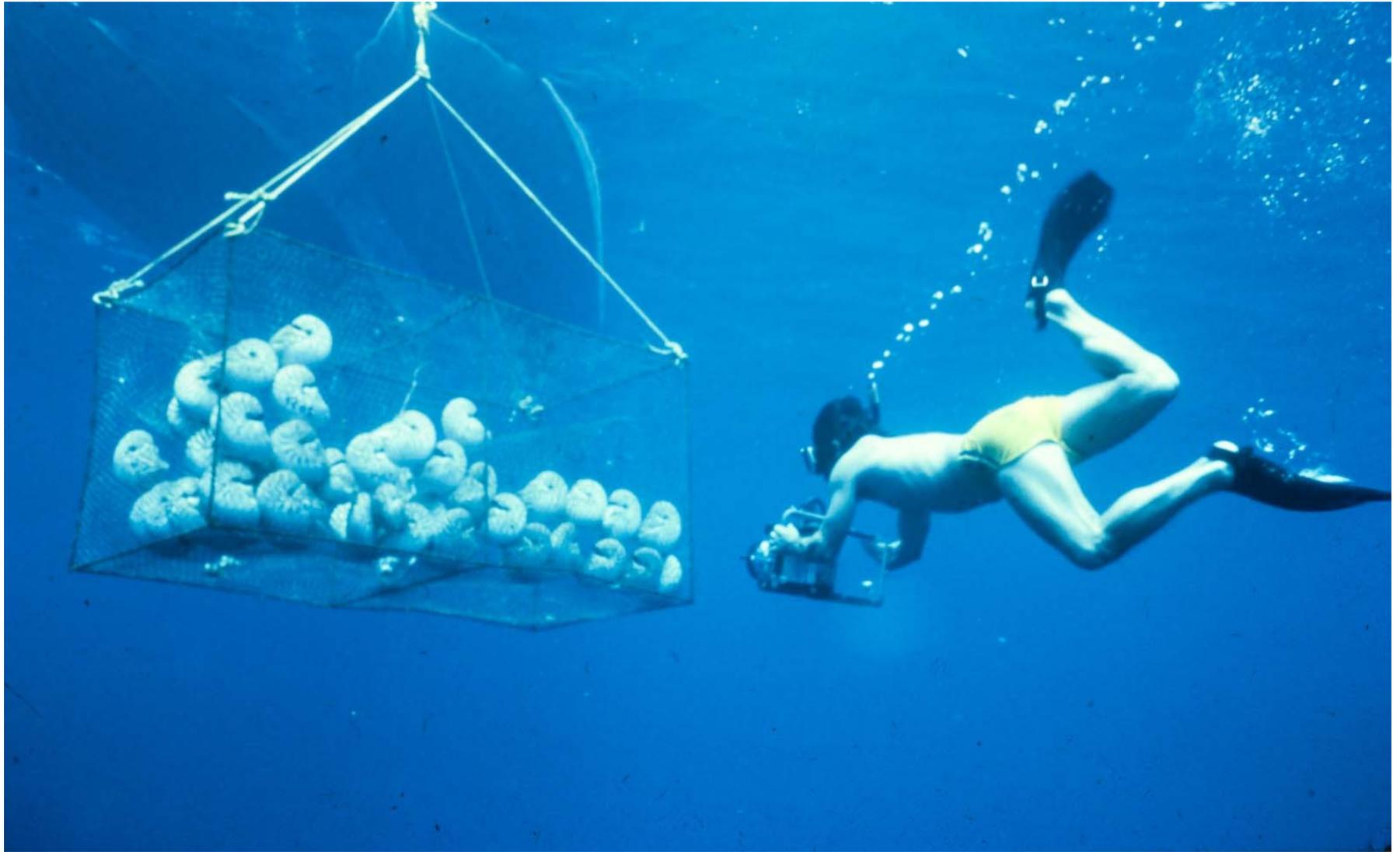
From the NY Times, Oct 25, 2011



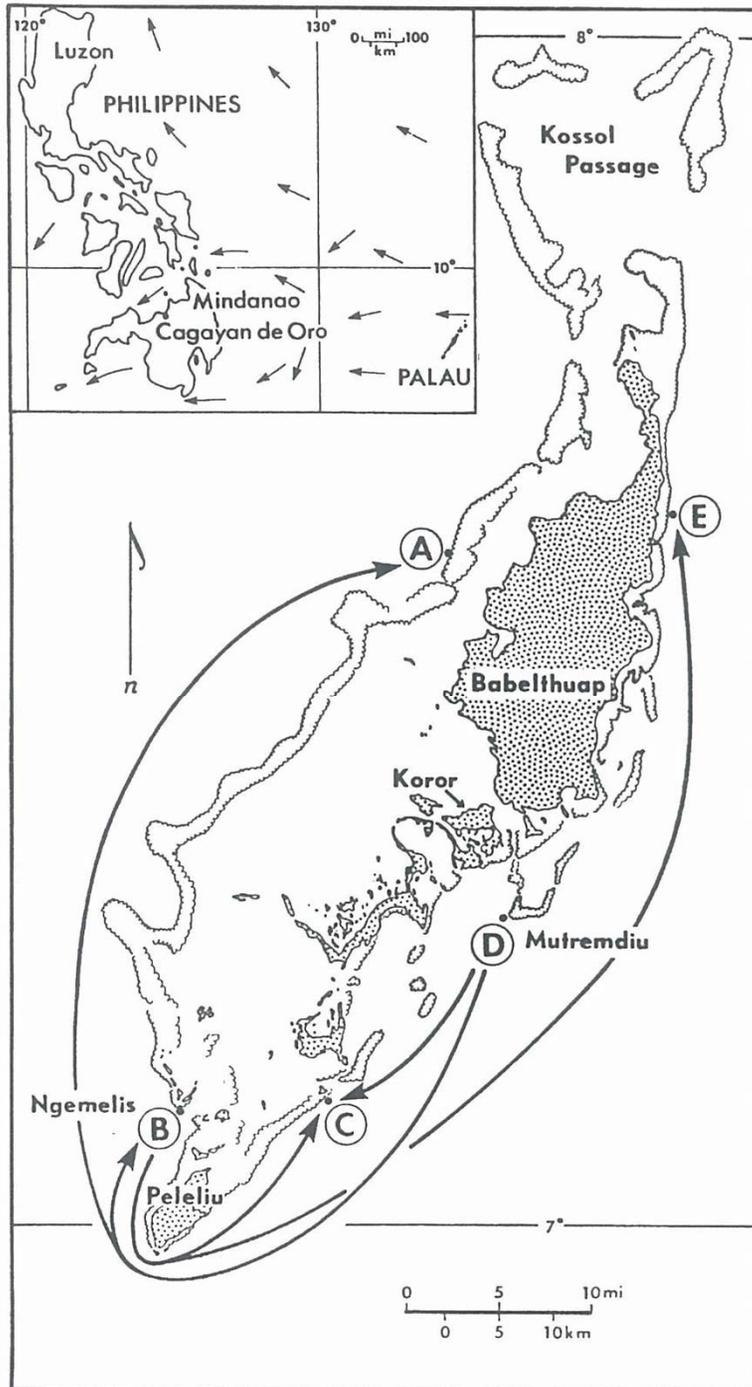
Shells of the species of *Allonautilus/Nautilus*



Ngemelis Is., Palau. Typical Indo-Pacific *Nautilus-Allonautilus* habitat, with animals scavenging foreef slopes at depths of ~100-500 m, moving into shallower water during darkness.



Trap with *N. belauensis* being retrieved from *ca.* 300m in 1984. ~30% of the animals had been previously tagged & released (some were recaptured five times).

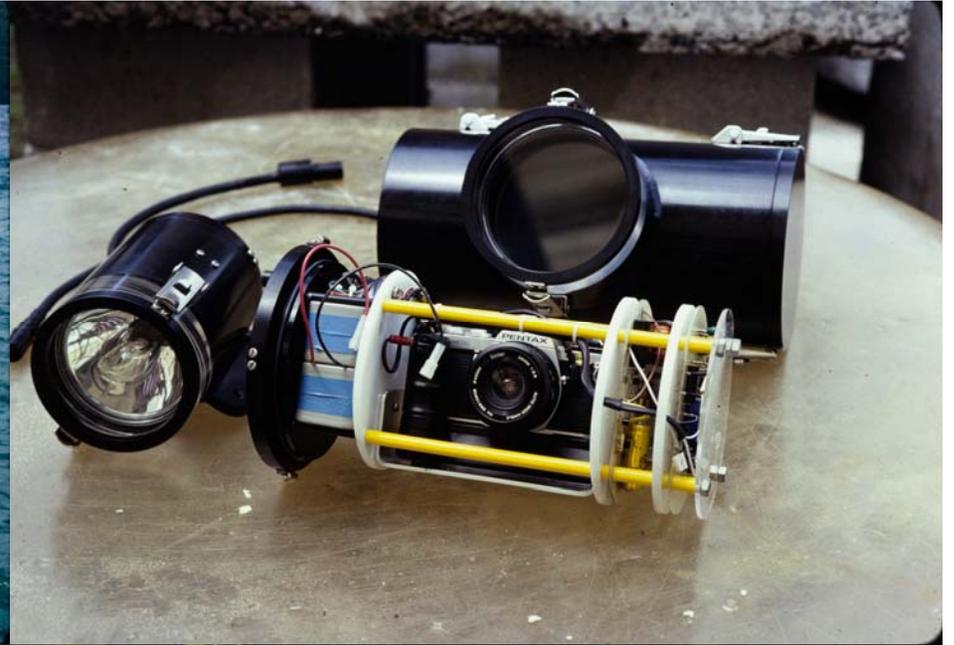


Republic of Palau (Belau), W. Caroline Is.

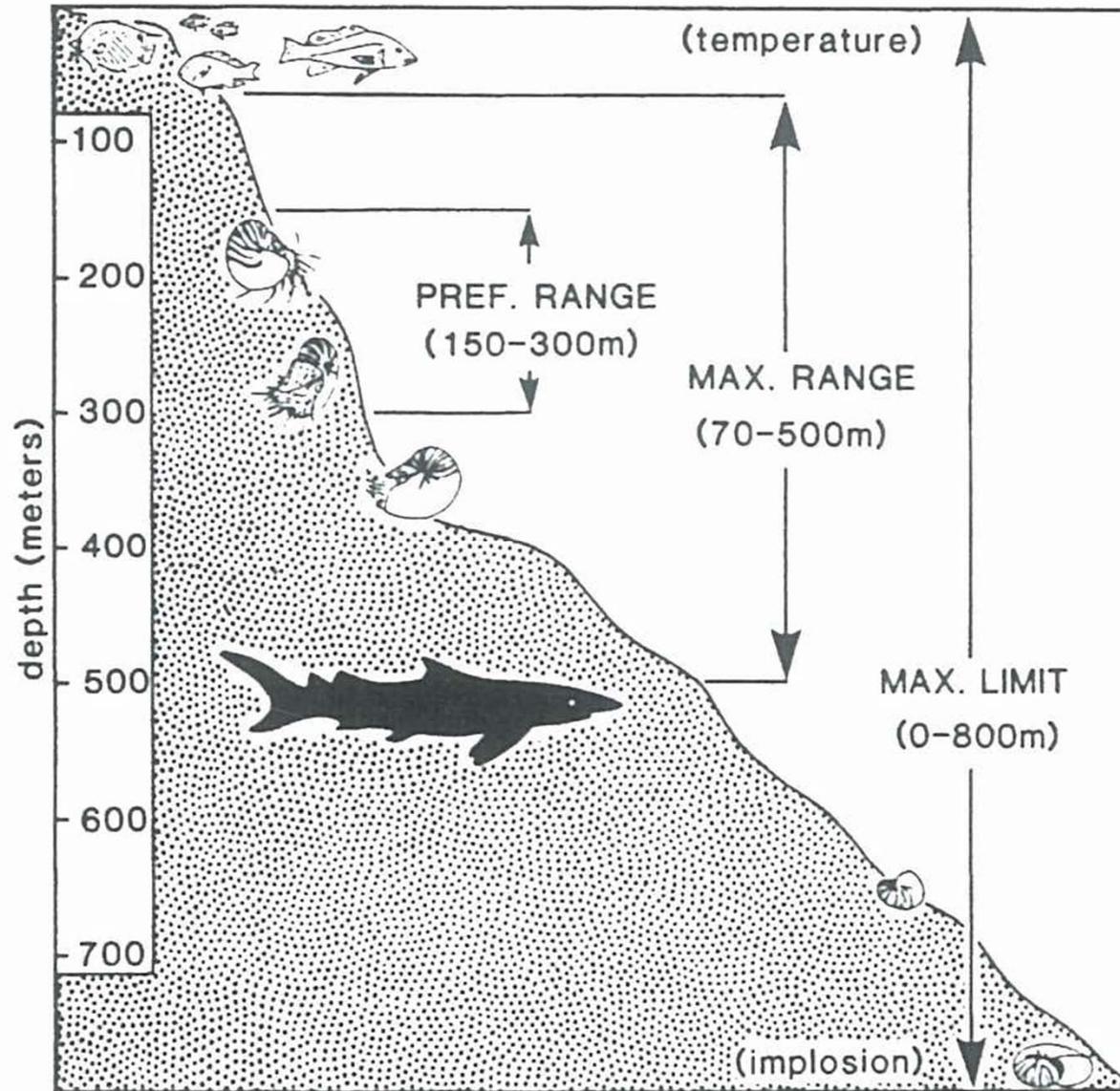
Locs. B & D were primary trapping sites for *N. belauensis* during 1977-1985, when ~ 2,500 animals were trapped, tagged and released.

Four animals were recaptured after 10-12mos, 40-150 km away (~0.5km/day).

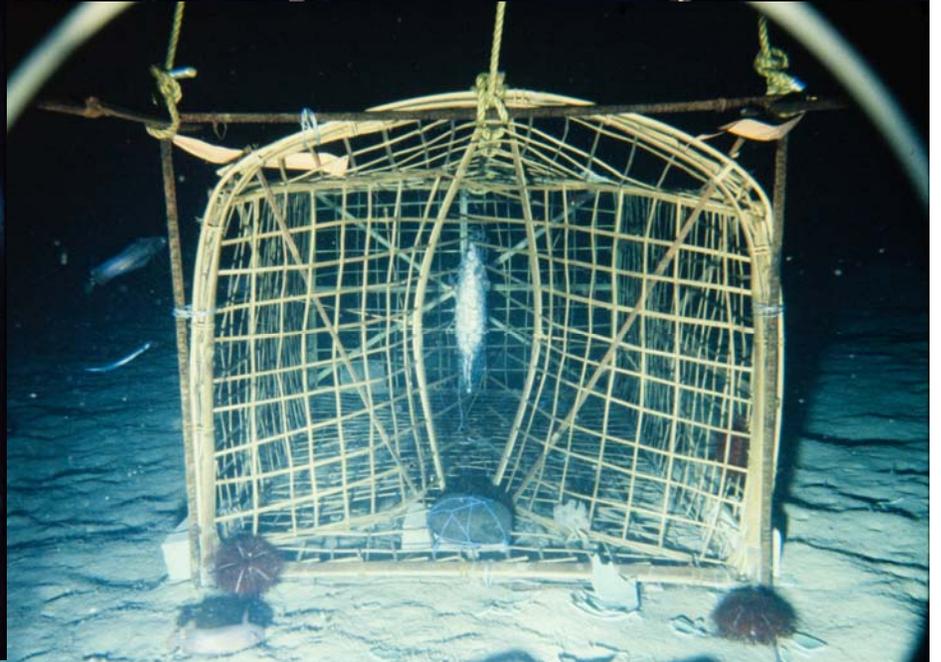
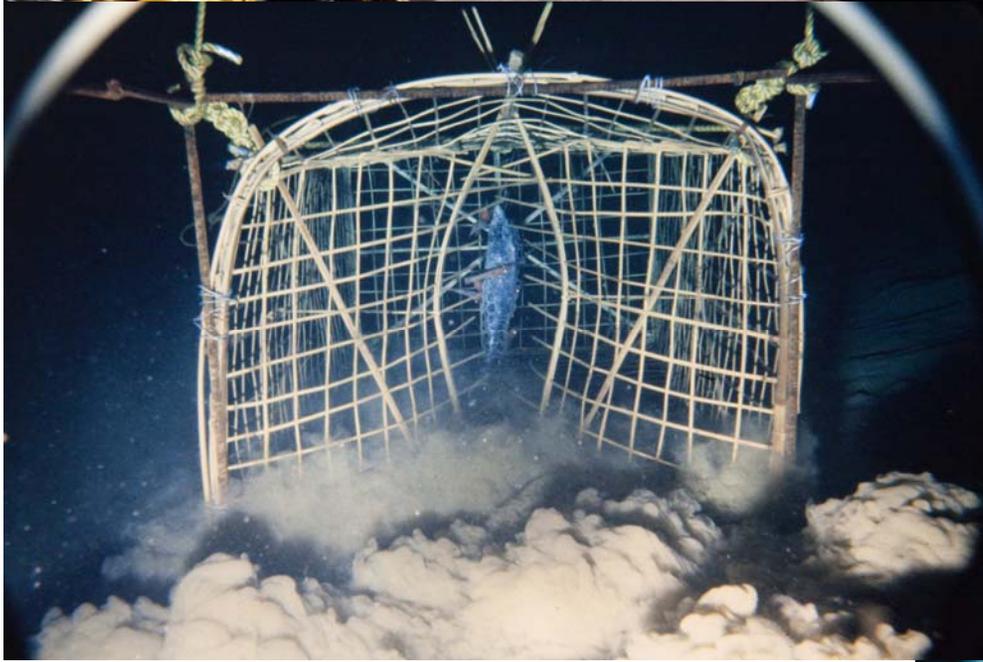
An empty *N. belauensis* shell was recovered in Mindanao, Philippines, 138 days after being tagged (~7 km/day).



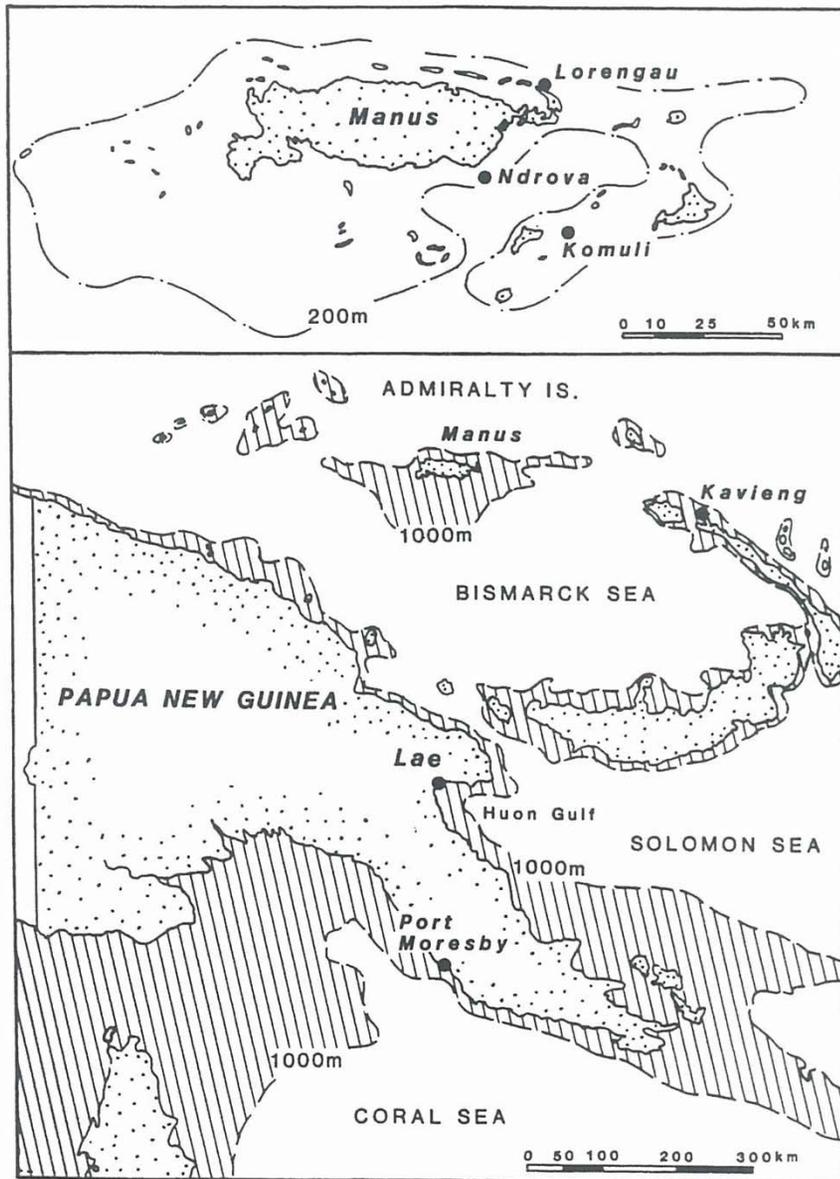
Deep-water remote camera setup, used to $\sim 500\text{m}$ depth. In Palau, Philippines & Papua New Guinea. **Bottom**, scenes from Palau, 273m (left) and 500m (right).



Summary composite of depth-limiting factors, based on deep-water photosequence and trapping data in Palau, but representative of *Nautilus/Allonautilus* generally.



RV Alpha Helix *Nautilus* research expedition to the Philippines, 1979. Typical *Nautilus* fishery efforts, off Negros Is., and deep-water camera photos, ca. 220m depth.



Nautilus/Allonautilus trapping in PNG. **Left**, sites where living populations were found, showing 1000m depth contour; **top right**, Ndrova Is., Manus, where first *Allonautilus* were trapped in 1986; **bottom**, first trap containing *N. pompilius* and *A. scrobiculatus*.



Closeups of *Nautilus/Allonautilus* at Ndrova Is., Manus, PNG. **Lower right**, deep-water remote photograph of both genera in trap with deep-water snapper (*Etelis carbunculus*)



Lizard Is., GBR; first living *N. stenomphalus* (lower left) and sympatric *N. pompilius* (right).



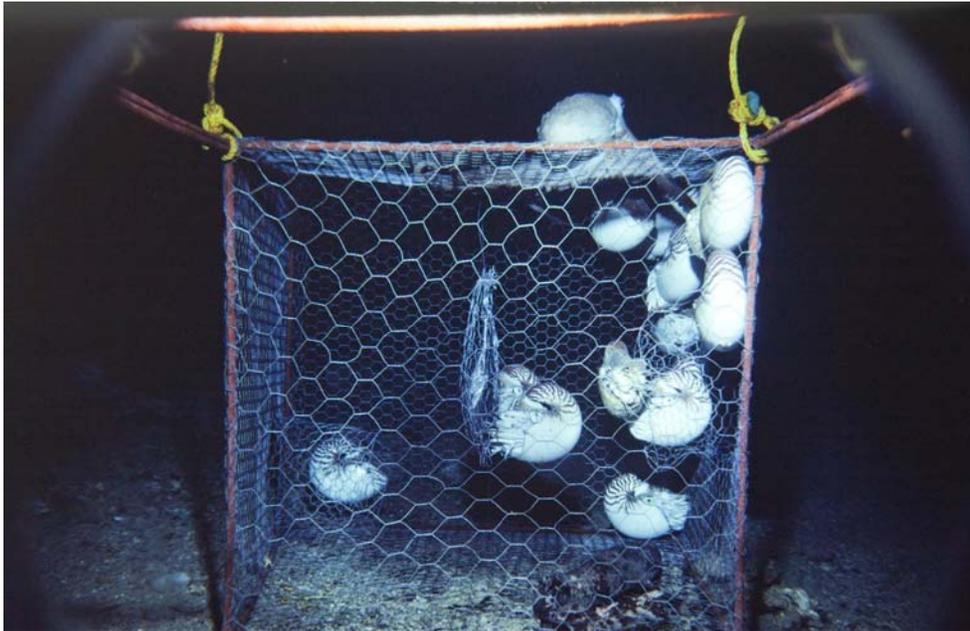
Top: Ambon, Indonesia, type locality of *N. p. pompilius s. s.* described by Rumphius (1705) and cited by Linnaeus (1758). **Bottom:** first *N. pompilius* trapped off Pago Pago, American Samoa (**left**), and empty traps being retrieved in W. Samoa (also, Tonga, Kosrae, Yap, Pohnpei.....)

Should *Nautilus/Allonautilus* be protected?

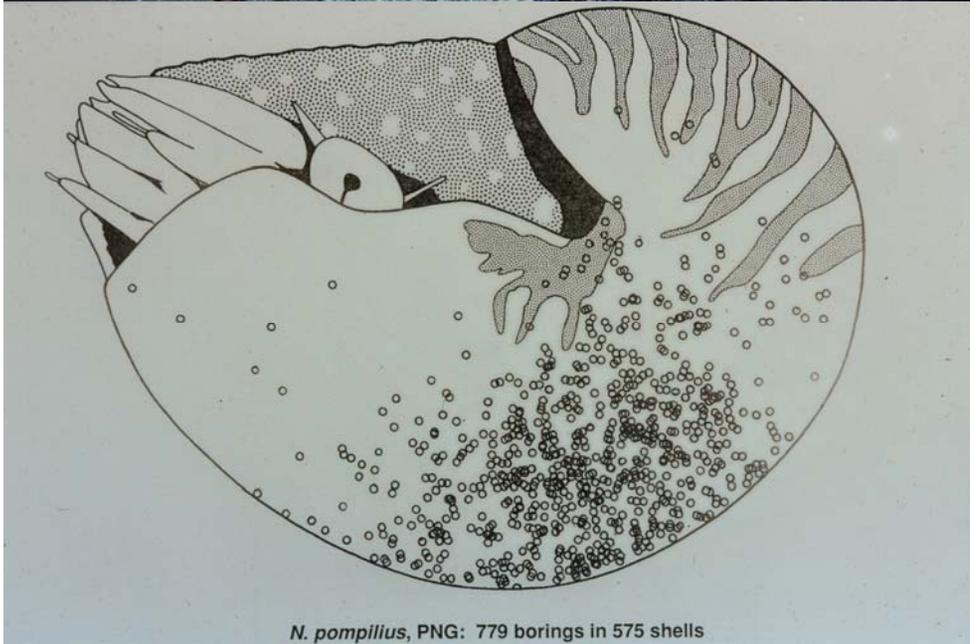
Intense fishing has depleted *N. pompilius* populations at some Philippine localities. Population replenishment will occur, if left alone.

- There are thousands of un-touched *N. pompilius* populations in the Indo-Pacific.
- Sustainability via mariculture is probably not feasible. Drifted shells, (e.g., killed by *Octopus*) could provide “green” material to the shell trade, at no cost to the parent population.
- My personal greatest concern is for the **endemic species**, which also happen to be the most profitable. These species (*N. stenomphalus*, *N. belauensis*, *N. p. suluensis*, *N. repertus?*, *A. scrobiculatus*, and *A. perforatus?*) **are** vulnerable, and should be protected. For now, *N. pompilius s.l.*, as presently understood, probably does not need protection (?).





RETURN TO:
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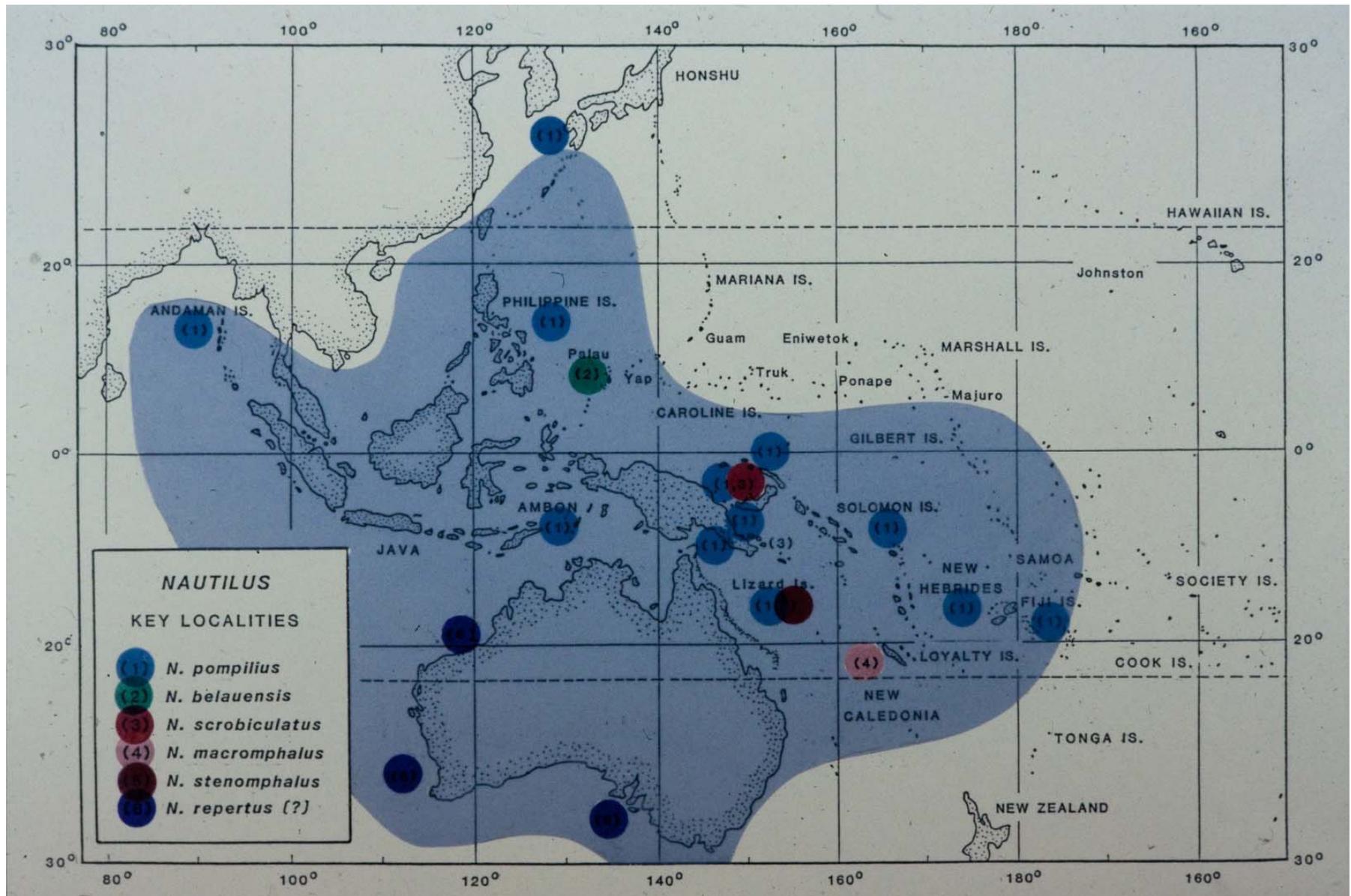
Octopus predation on *Nautilus*. Deep-water photograph of *Octopus* sp. on *Nautilus* trap, and shell borings. **Lower left**, composite location of borings in 50% of 1,532 empty shells of *N. pompilius*.

***Nautilus/Allonautilus* Populations & Abundance: Relevant Factors**

- Geographic & hydrographic isolation (implosion >800m)
- Water temperature (< ~21C)
- Growth rate (~5-10yr to maturity)
- Reproductive rate (iteroparity; 1-2 eggs; ~ 1yr to hatching)
- Life span (~10-20yr?)
- Mature:immature ~4:1; male:female ~3.5:1
- Trapping susceptibility (~30% recatch rate)
- Habitat availability (no problem)
- Mariculture dubious (growth rate; clean, cold water)
- Sustainability (dead, *Octopus*-drilled shells)

Should *Nautilus/Allonautilus* be protected?

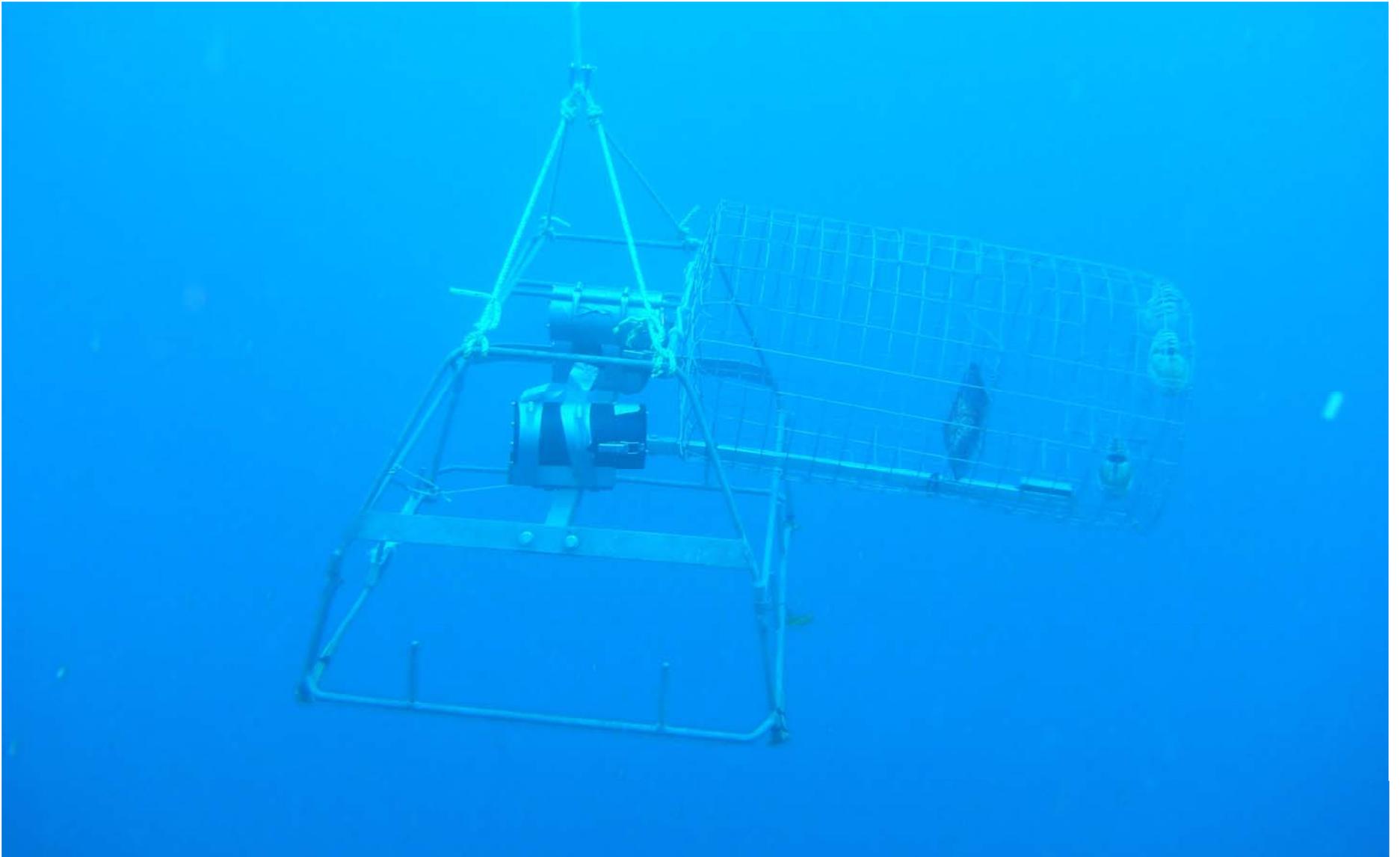
- It was recently proposed that *Nautilus/Allonautilus* (N/A) should be approved for CITES protection (Convention on International Trade in Endangered Species).
- This was bolstered, in part, by a USF & W report that 579,000 *Nautilus* shells had been imported into the U. S. (2005-2008) (?).
- The CITES proposal was considered & tabled, pending additional information on population sizes and fisheries pressure.
- There is definitely greater awareness that there are several species of “chambered nautilus.” Some bring higher prices, particularly larger shells. So-called *Nautilus* “pearls” are even being marketed.



Distribution of known living populations of *Nautilus/Allonautilus*, and constituent species



BRUV being deployed, GBR



“BRUV” apparatus (Baited Underwater Remote Vehicle) on GBR



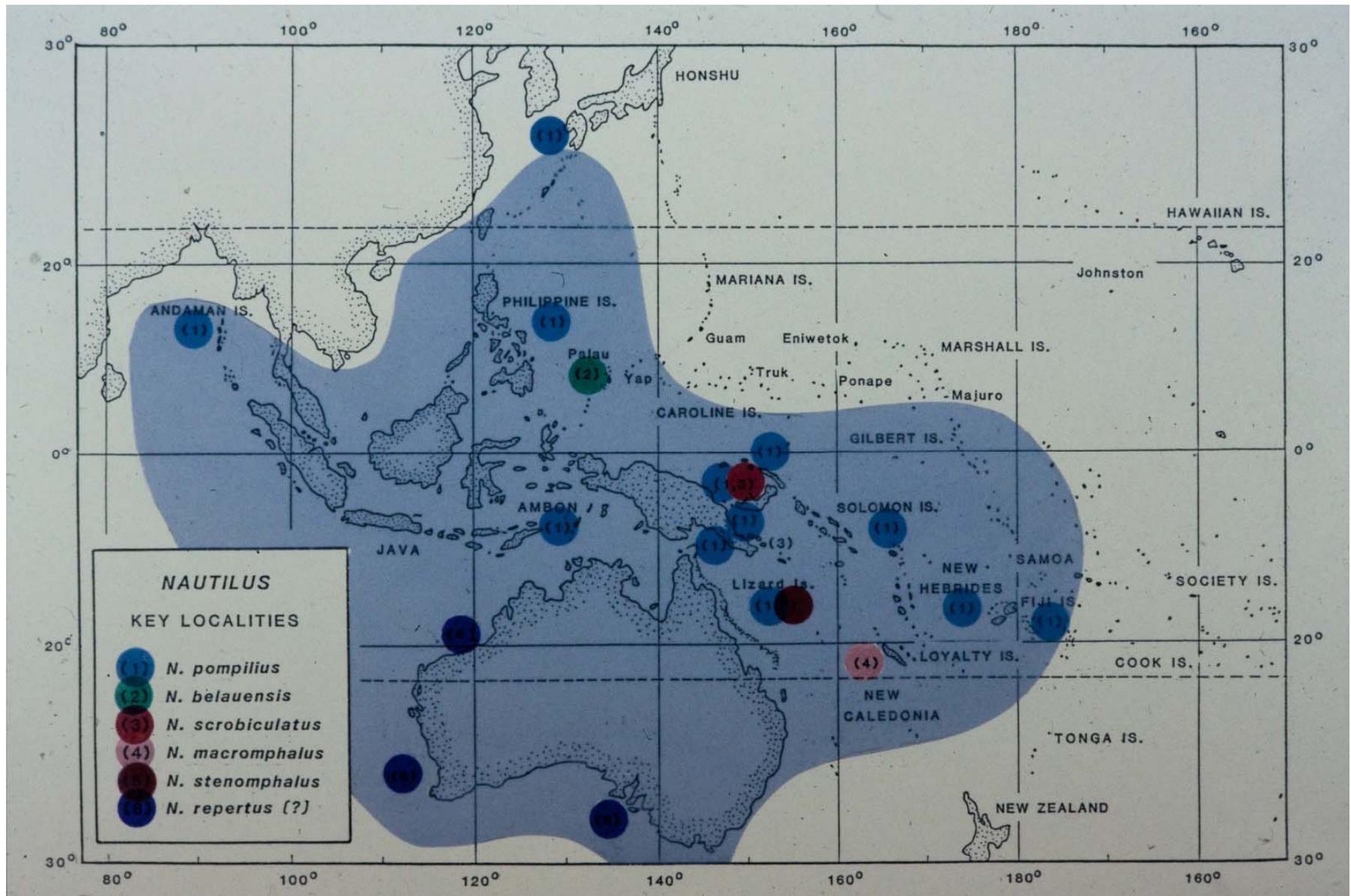
“BRUV” apparatus (Baited Underwater Remote Vehicle) on GBR

The New York Times

Loving the Chambered Nautilus to Death

October 25, 2011

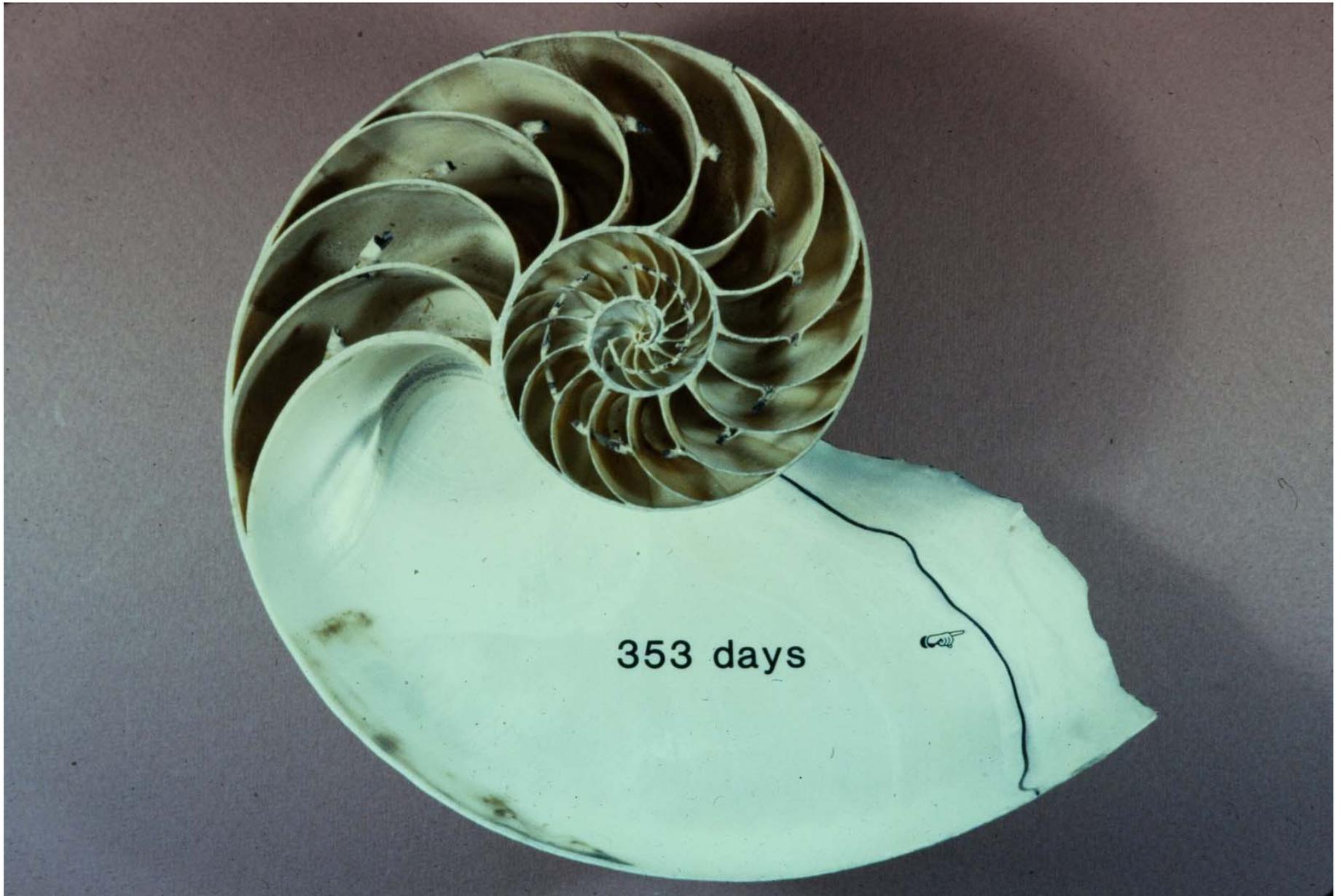




Distribution of known living populations of *Nautilus/Allonautilus*, and constituent species



Recaptured *N. belauensis* ; this animal had been fully mature when released four years earlier.



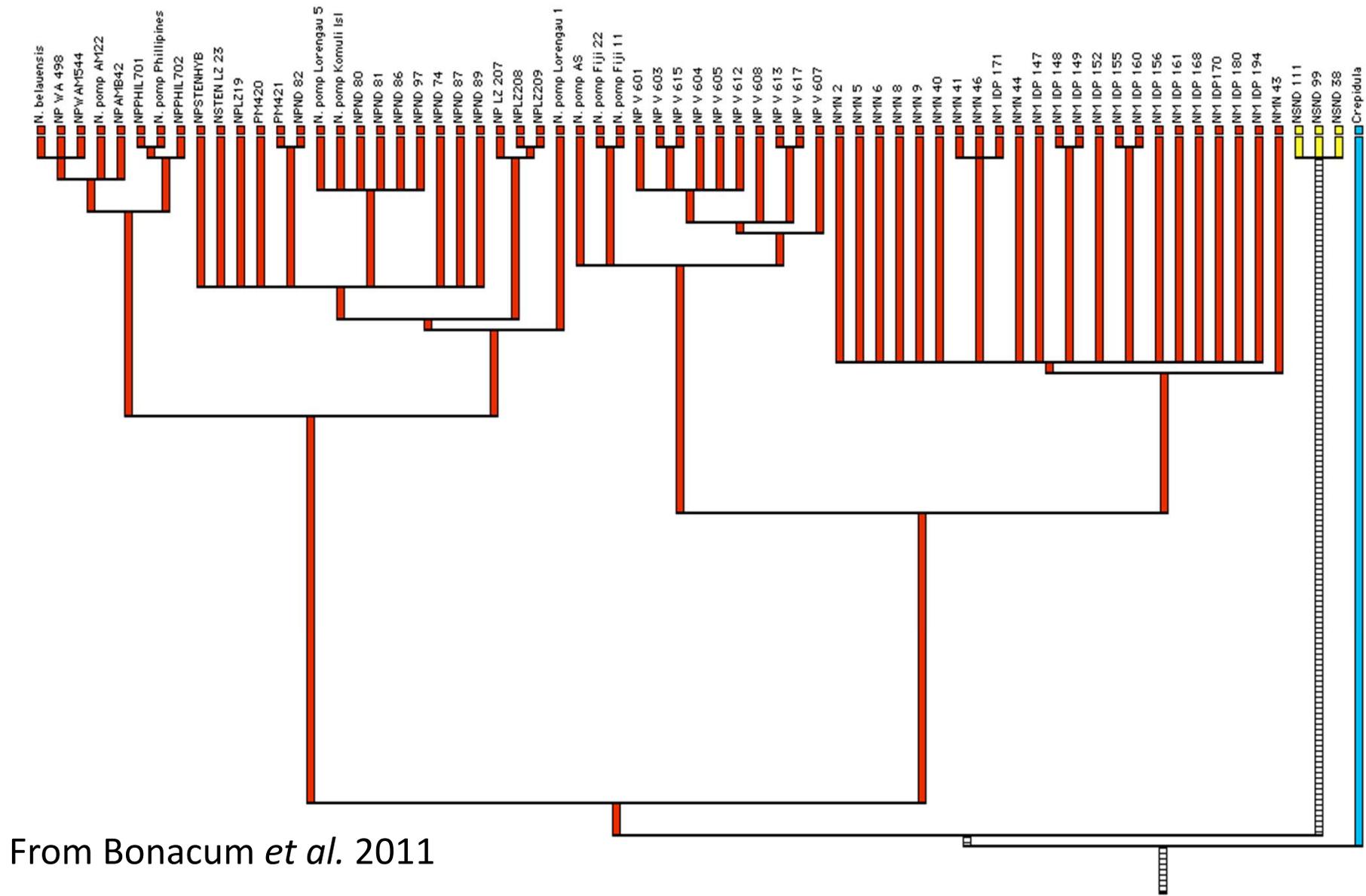
Recaptured submature *N. belauensis* showing one years' shell growth.



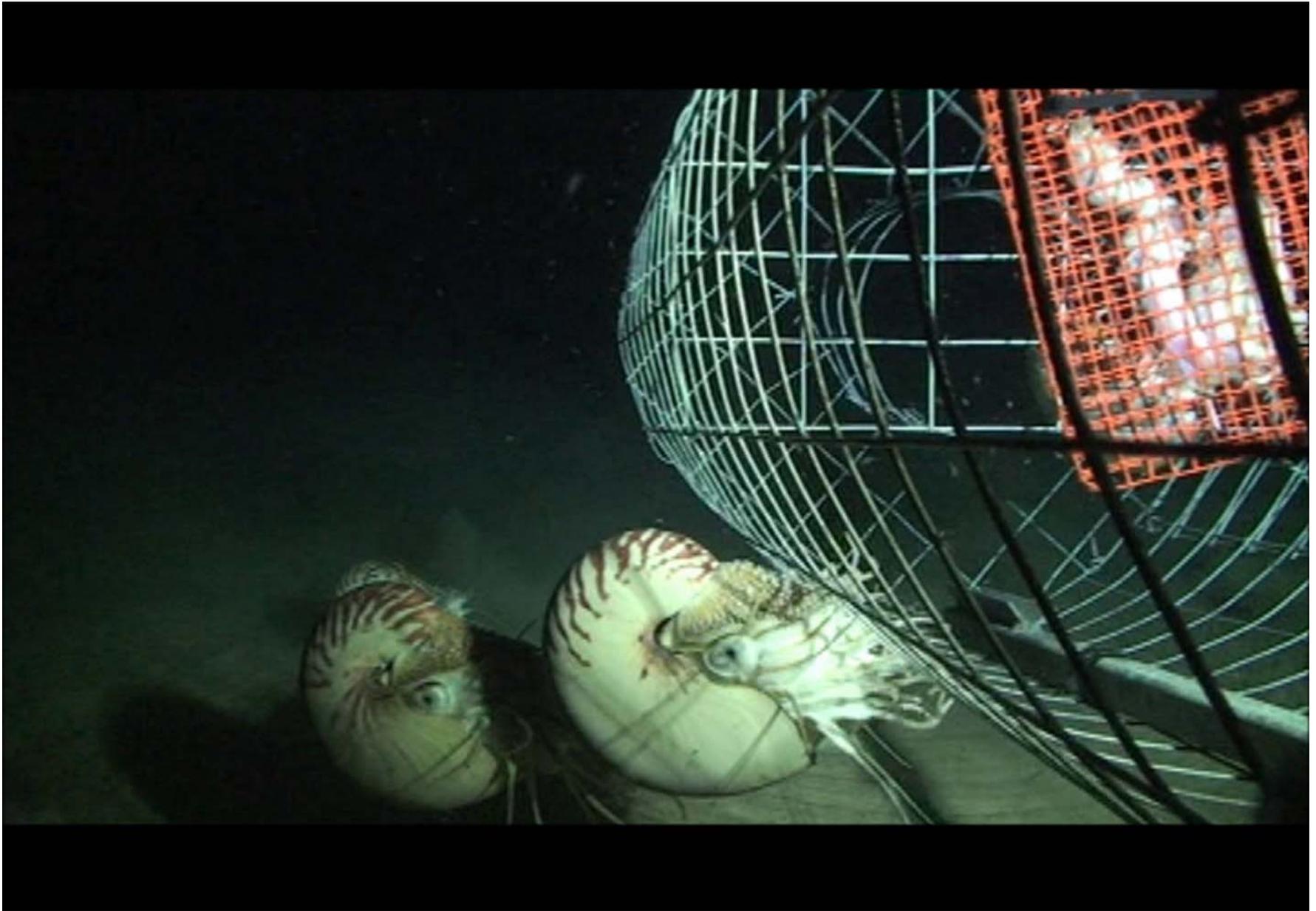
Tagged *N. belauensis* after release at Ngemelis, Palau, being attacked by triggerfish (*Balistoides*).



Same *N. belauensis* as in previous slide, after repeated triggerfish attacks. Note that animal had been recaptured three times.



From Bonacum *et al.* 2011



BRUV image off Lizard Is., GBR (ca. 200m)



BRUV image off Lizard Is., GBR (ca. 200m)