Sandfish production and sea ranching trial in Fiji

Cathy Hair

James Cook University, Townsville

Fiji sandfish fishery

- Sandfish (*Holothuria scabra*) or *Dairo* are part of the Fijian traditional diet
- Sandfish are restricted by legislation to domestic consumption, but Fisheries laws are ambiguous
- After the 1987 coup, export-driven over-fishing of sandfish has occurred

T. Pickering

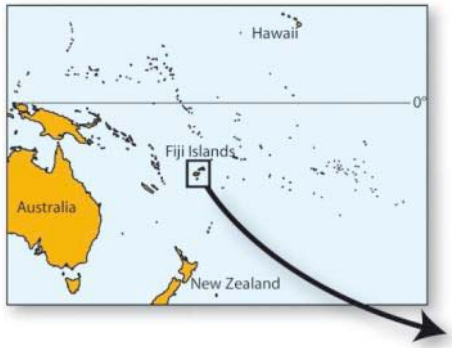
dairo vaka tini bulamakau

Project objectives

1. Transfer hatchery and juvenile grow-out technology
   - Government and private sectors
   - Improve capacity of project staff in sea cucumber production techniques, release and monitoring skills
2. Trial sandfish sea ranching in a Fijian *qoliqoli*
   - Monitor juveniles growth and survival
   - Determine social, technical and economic feasibility
   - Scope out management options for sea ranching as a village livelihood

1.
Technology transfer

Project location



Savusavu (Hatchery 1)

J Hunter blacklip pearl oyster hatchery

Savusavu resources

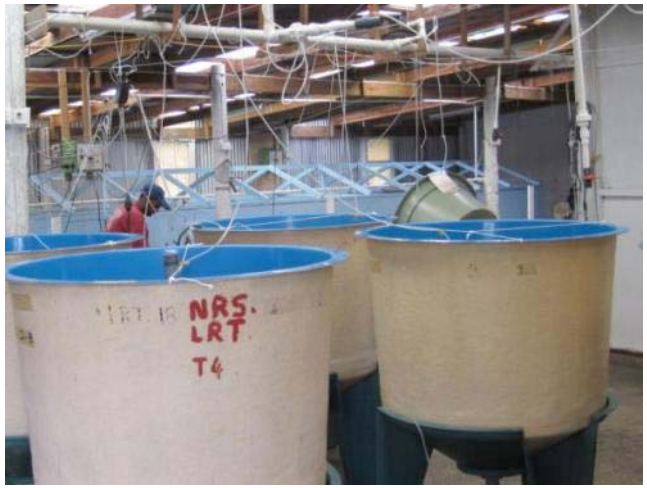
- Spawning tank
- Microalgae production
- 1,600 L larval tanks
- Temporary raceways
- Reliable broodstock source
- Marine pond (rocky, well flushed, non-secure)

Galoa (Hatchery 2)

Fiji Fisheries Department shrimp hatchery

Galoa resources

- Spawning tank
- No microalgae unit (supply from USP)
- 1,000/300 L larval tanks
- Concrete raceways
- Unknown broodstock source
- Marine ponds (ex-shrimp)



Training and production

- **Five** hatchery runs at Savusavu, **one** run at Galoa
- Successful spawning & larval production **every time**
- Settlement on **three** occasions
- Juvenile production on **two** occasions
- **One** juvenile release

Technology transfer outcomes

- Successfully trained private and government staff in sea cucumber production techniques
- Demonstrated the relative ease of producing sea cucumber in non-sea cucumber hatcheries
- Successfully reared larvae and early juveniles with Reed's Instant Algae (shellfish mix)
- Increased awareness and raised interest in the technology

2.
Sea ranching trial

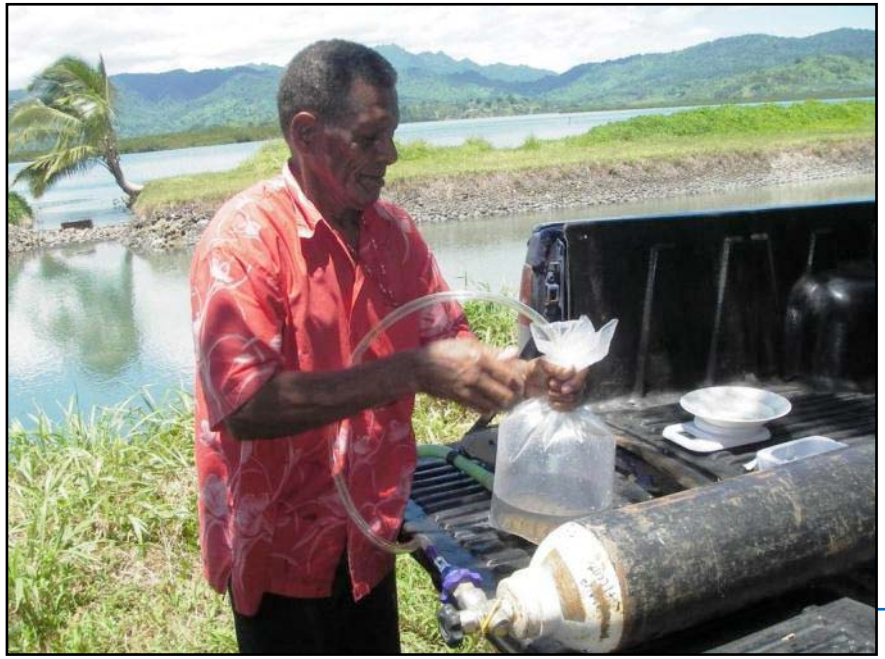
Release site selection

- A *qoliqoli* is a traditionally managed fishing area
- Criteria for the juvenile release site:
  - Optimum physical microhabitat
  - Community interest / security for sandfish
  - Proximity to hatchery
- Negotiate with *qoliqoli* owners on use of release site
- Determine an interim management framework to suit all stakeholders
- Final decision: Natuvu (Wailevu, Vanua Levu),

Project location

Broodstock

- Sourced from Natuvu (i.e. released juveniles are same genetic stock)
- Transported in plastic bags with sea water and oxygen



- Collected and held in pond for spawning initially
- Later, collected from wild and then returned to sea

Release site microhabitat

- Used WorldFish criteria developed by Steve Purcell
- Water depth 0.2 to 2.5 m at low tide
- 40-70% seagrass cover
- Primarily *Syringodium* with some *Halodula*
- Many invertebrates, including sandfish and other sea cucumbers
- Minimal freshwater input (but some flood risk)
- Muddy sandy sediments of moderate softness

Release protocol

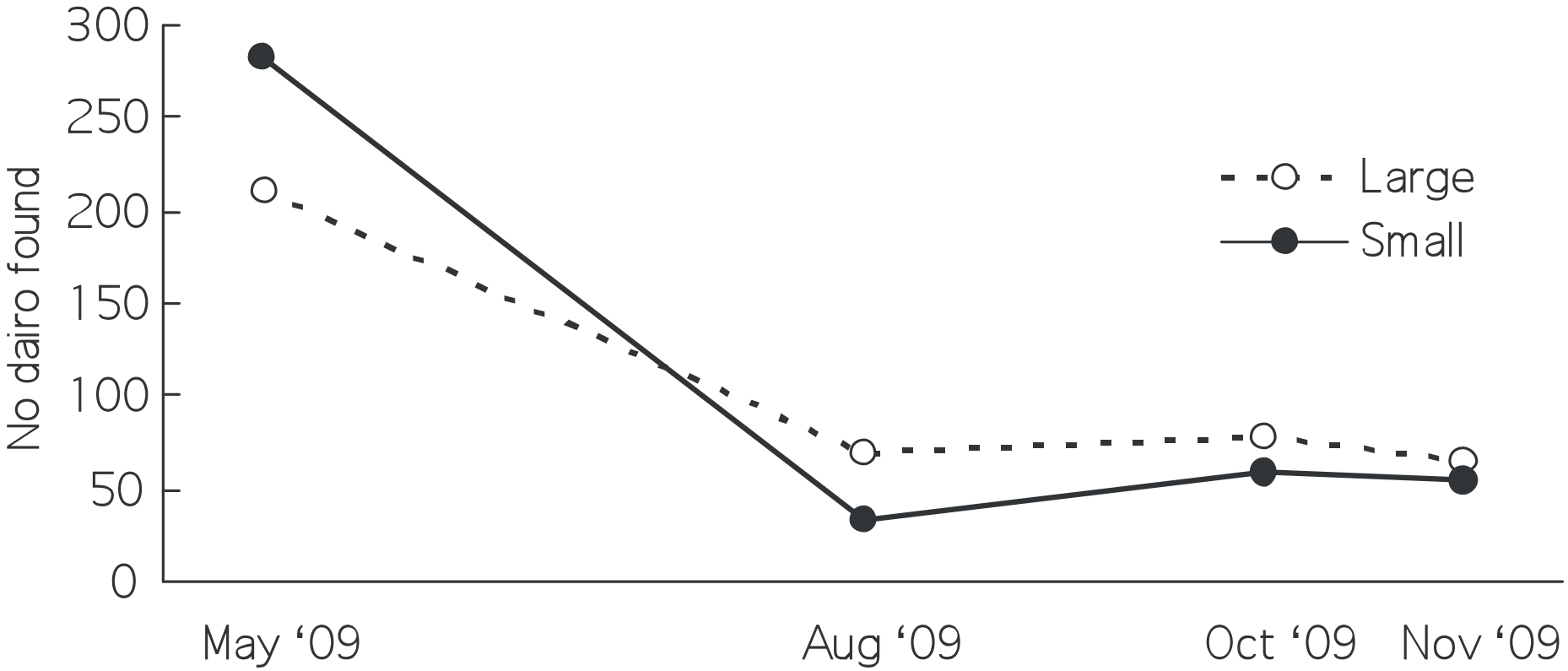
- Followed WorldFish protocol
- Tag juveniles with fluorochrome dyes, one week recovery and conditioning sand
- Health check before release
- Four 100 m^2 pens constructed at site
- Transport to site (plastic bag with water and oxygen)
- Overnight conditioning at release site (in enclosed nets)
- Juveniles individually ‘planted’ within pens by community
- A sample marked with pegs and checked at regular intervals afterwards to observe behaviour

Experimental release

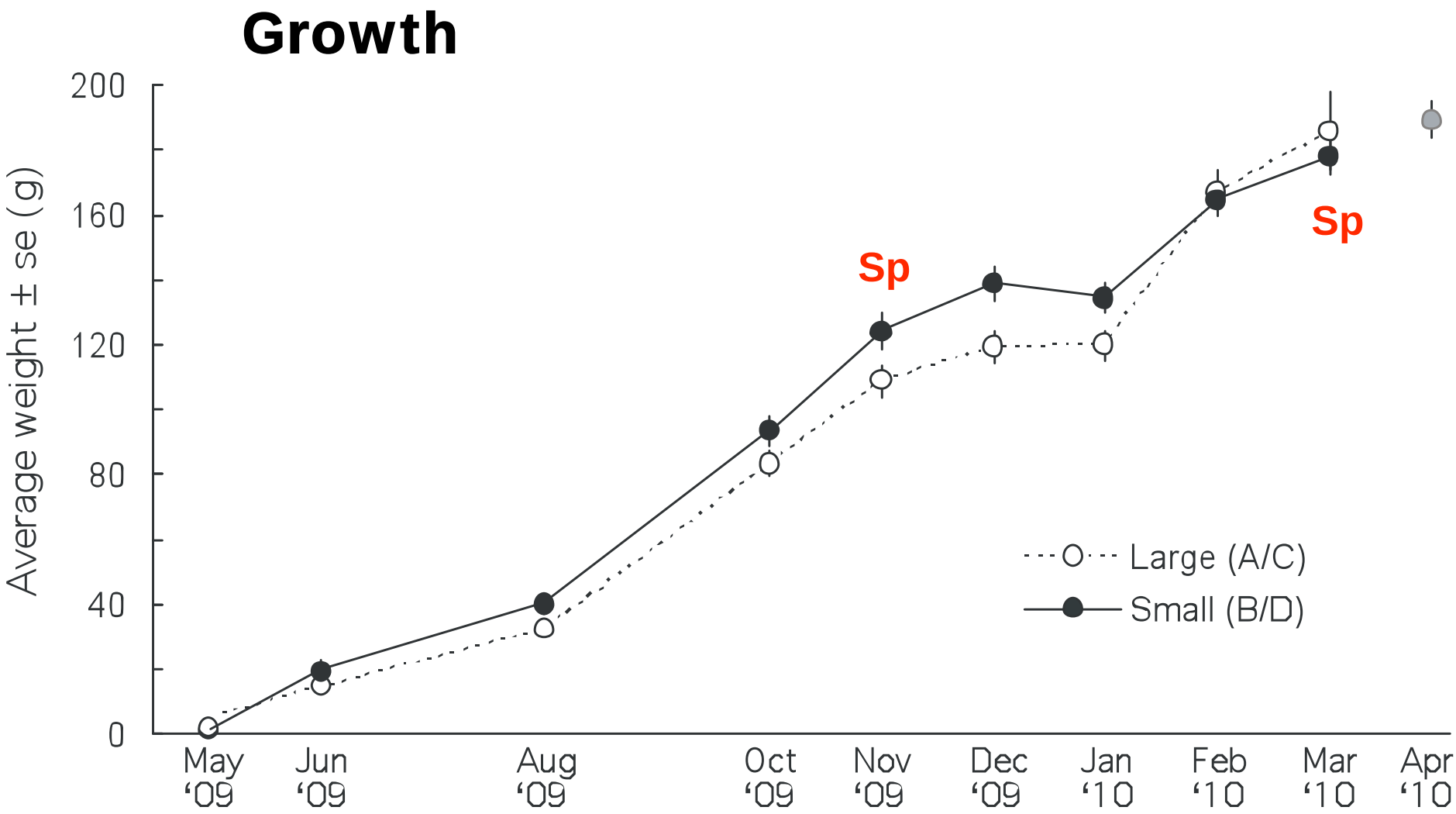
- Into Natuvu *qoliqoli* (May 2009)
- Pilot scale release of 500 juveniles
- 4 pens of 100 m^2 (1/m^2)
- Two size classes:
  - Small (1-3 g)
  - Large (>3 – 10 g)
- Local wardens assigned to protect juveniles and maintain pens
- Monthly monitoring by student, Fisheries officers and wardens

Monitoring results

Survival (28% overall, 33% large, 23% small)



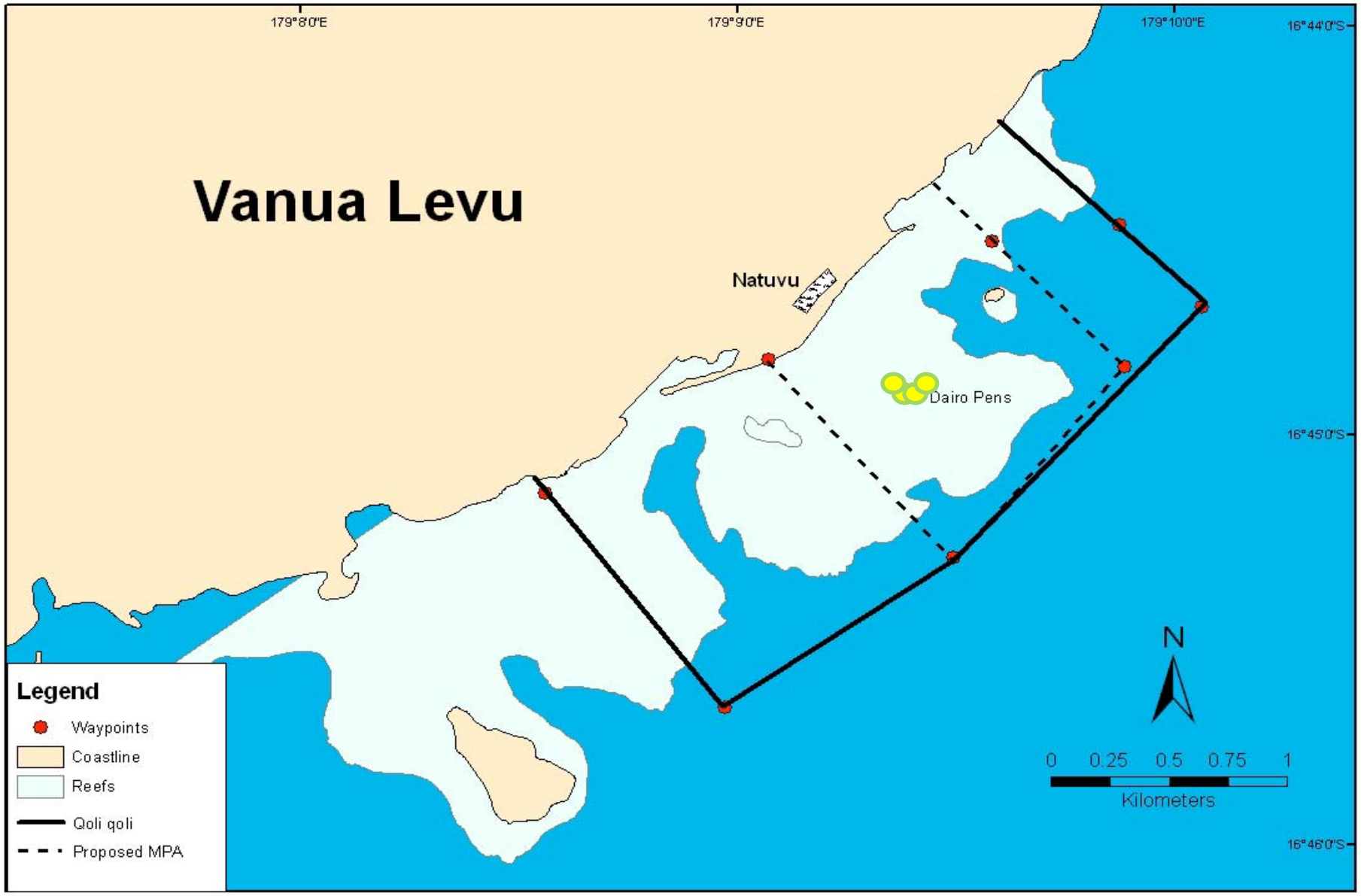
Monitoring results



Community engagement

- Imposed a ban on sandfish collection prior to project
- Declared a marine protected area during project
- Community assisted with all project work in village
- Chief assigned “dairo” wardens to check pens, assist with monitoring, maintenance, etc

Marine Protected Area



Community management

- Community enforced ban on sandfish collection within entire *qoliqoli*
- Harvested other species in consultation with Dept Fisheries (e.g curry fish)
- Community noted increase in other marine species

Cyclone damage

JAMES COOK UNIVERSITY AUSTRALIA

Dec

Mar line

Sea ranching outcomes

- High survival of large and small juvenile sandfish
- Spawning of released sandfish in November 2009 and April 2010 (6 and 11 months post release)
- High level of community cooperation
- Project led to application of local management measures
- Keen interest to continue the project

Priority challenges (Fiji…Pacific?)

- Production of microalgae for feeding
- Collection, maintenance and security of broodstock
- Low scale of hatchery production to juveniles (>3 g)
- Management of environmental “hiccups”
- Accurate post-release monitoring/data collection
- Equitable management of ranched sandfish

JAMES COOK UNIVERSITY
AUSTRALIA

merci!