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## HYDRO - THE LRSS WAY: HYDROGRAPHIC SURVEYING IN THE AUSTRALIAN ARMY



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*Hydrographic surveying within the Australian Defence Force (ADF) has primarily been seen as the Royal Australian Navy's (RAN) domain and for almost all chart related work, this is certainly the case. The Littoral and Riverine Survey Squadron (LRSS) is the Australian Army's sole hydrographic survey unit and works closely with the RAN when assisting with inshore surveys and other chart related activities.*

*Increases in capability through the acquisition of new equipment and improved procedures have recently seen the squadron deploy in support of, Army Aboriginal Community Assistance Program (AACAP) activities in Western Australia, ADF exercises in Papua New Guinea, and with wreck detection in Jervis Bay.*

*This paper summarises the squadron's role and position within the ADF hydrographic community and the methods used to achieve this, and outlines a series of recent activities undertaken by the squadron.*

### INTRODUCTION

The Littoral and Riverine Survey Squadron (LRSS) is the Australian Army's hydrographic survey unit and conducts surveys and provides engineer advice in the littoral and riverine environment to support point of entry (POE) and logistics over the shore (LOTS) operations. This is achieved by gathering, analysing and interpreting geospatial data related to the coastal and riverine environment and producing detailed plans, maps / charts and reports in the field.

This ability enables LRSS to provide a specialist deployable Hydrographic survey capability in order to support the Australian Defence Force (ADF) on operations.

### ADF HYDROGRAPHIC COMMUNITY

The hydrographic community within the ADF consists of two quite distinct parts. The first is a very large part consisting of the Australian Hydrographic Office (AHO) in Wollongong and the RAN assets based in Cairns. The AHO task these assets according to Hydroscheme, the chart maintenance program. At present these assets consist of the Laser Airborne Depth Sounder (LADS) aircraft, two hydrographic survey (HS) ships and four survey motor launches (SML). Full time staff within this part totals approximately 350.

LRSS completes the community with two 7.5m Inshore Survey Vessels (ISV) (see figure 1) and 30 part time staff (Army Reserve).



**Figure 1:** Inshore Survey Vessel

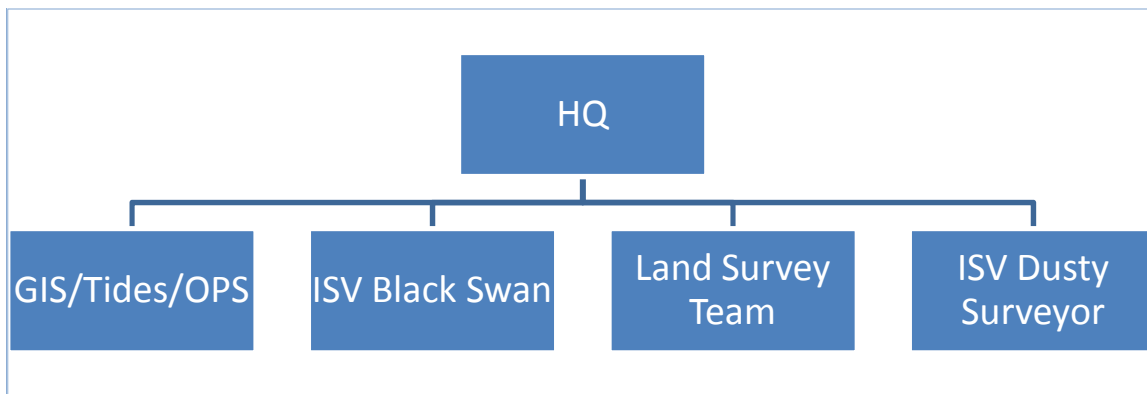
## **THE SQUADRON**

### **Squadron Origins**

LRSS owes its origins to the 45<sup>th</sup> Port Maintenance Squadron which was raised as a Supplementary Reserve unit in 1955. The squadron was reorganised into a series of port construction and repair teams (5, 6, 7 & 8) in 1961 with these teams operating for almost 10 years when they were amalgamated into the 1<sup>st</sup> Port Construction & Repair Group in 1971. In 1994 the group was integrated into the 19<sup>th</sup> Chief Engineer Works at Randwick as a Works Section which undertook planning and a Hydrographic Survey Detachment. December 2006 saw the members transferred to the 21<sup>st</sup> Construction Regiment (Royal Australian Engineers) at Holsworthy to man the newly created Littoral and Riverine Survey Squadron (LRSS). The Australian Army's Survey Corps was amalgamated with the Corps of Engineers in 1989.

### **Present Structure**

The majority of the squadron's key professional technical personnel are employed by government departments or corporations with only a small number in private practice. A task / location based structure (see figure 2) is used within the squadron with team selection based on the individual skills and experience contributed by each member. These attributes and personal qualities need not be gained through employment with the ADF.



**Figure 2: LRSS Organisation Chart**

Squadron members hold qualifications ranging from certificate to masters level in a wide variety of fields including engineering, environmental science, surveying, GIS, and maritime operations. The squadron's relationship with the RAN was strengthened with 2008 seeing the first army member successfully complete the H2 course at the RAN School of Hydrographic Surveying.

### Equipment

The key equipment (see table 1) utilised by the squadron allows each survey team to operate independently when required. Data collection is undertaken in the field by each team according to their task specifications and analysed and post processed at the conclusion of each phase. Final report production and product generation are finalised on site with output available to colour A3.

**Table 1: Equipment Summary**

Category	Item
Vessels	Inshore Survey Vessels (ISV's), Inflatable water craft (Zodiacs)
RTK Positioning	Trimble R8 base station with repeater R8 rovers
Single Beam E/S	ODOM MKIII Echo Sounders
Side Scan Sonar	C-Max Side Scan Sonar (loan from RAN)
Tide Gauges	RBR TGR1050P tide gauges
Sound Velocity Probes	Digibar Pro 1200's Probes
Total Station	Trimble S6
Software	Hypack TGO ARCGIS

## RECENT SQUADRON ACTIVITIES

### LRSS in the Kimberleys: AACAP 2008

The Australian Army has assisted aboriginal communities for many years through the Army Aboriginal Community Assistance Program (AACAP) and in 2008 the squadron was asked to participate by conducting a survey within Napier Broome Bay in Western Australia. The purpose of the survey was to determine the suitability of a series of alternate landing sites in the vicinity of Kalumburu in the East Kimberley.

For the AACAP project to be completed, 1200 tonnes of construction stores had to be off-loaded from HMAS Manoora utilising a combination of landing barges (LCH and LCM8). As a result of the tidal windows and steaming times, two separate beach landing sites were required with each needing an approach 400 metres wide and 4.5 km long.

150 km of depth soundings were acquired by the three survey teams who worked in searing heat for up to 12 hours per day continuously for 12 days.



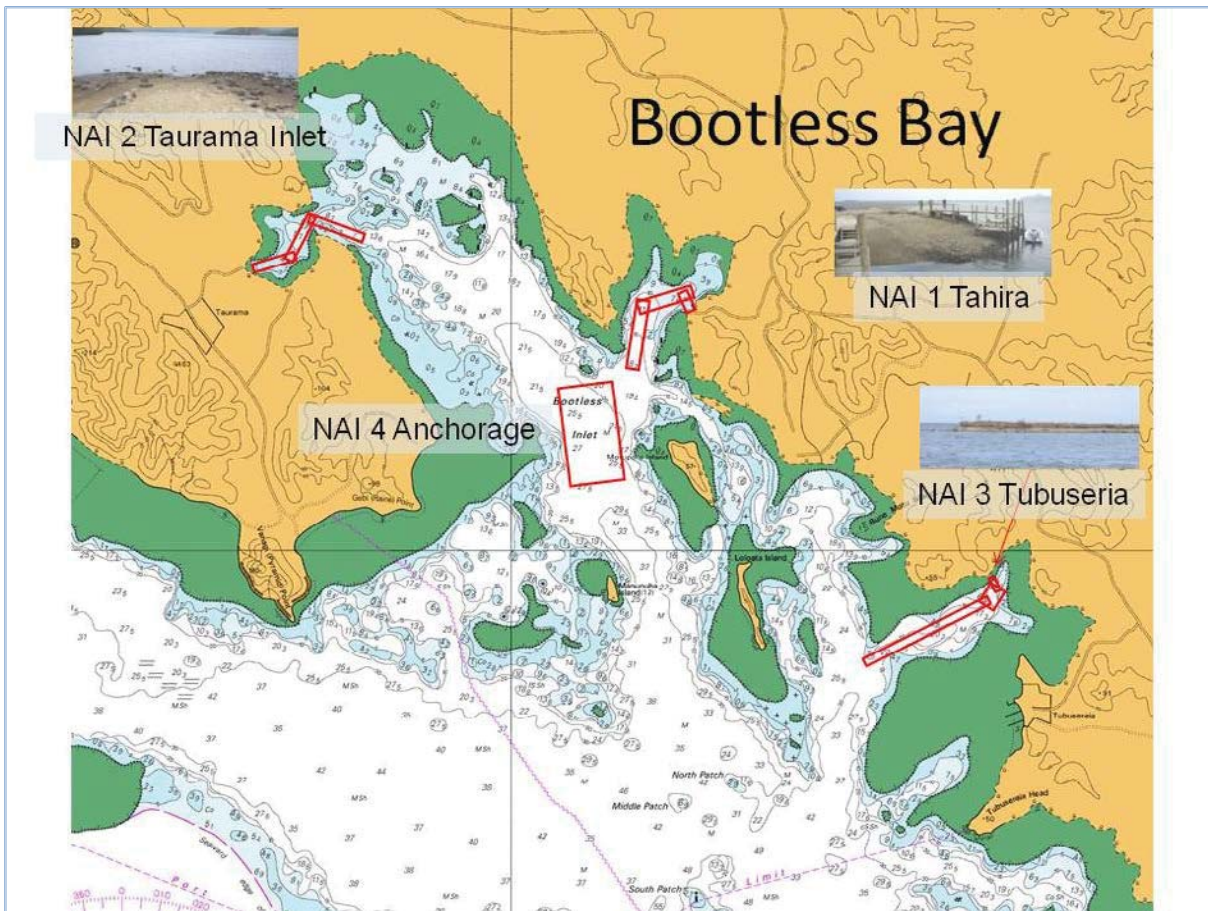
**Figure 3:** LRSS – Napier Broome Bay

Final products included

- Charts of landing sites,
- Beach surveys,
- Road survey from landing site to main supply routes, and
- Engineer report to assist in future construction tasks.

### Exercise Olgetta Warrior: PNG 2009

In 2009 the ADF conducted a joint exercise with the PNGDF in the vicinity of Bootless Bay which is about 25km east of Port Moresby. LRSS was tasked with producing a series of planning products over Bootless Bay in support of the exercise's amphibious operations. The survey teams conducted initial surveys (see figure 4) to determine the most suitable landing site for the purposes of the exercise.



**Figure 4:** Survey Areas in Bootless Bay

A more detailed survey was conducted after the final landing site was chosen.

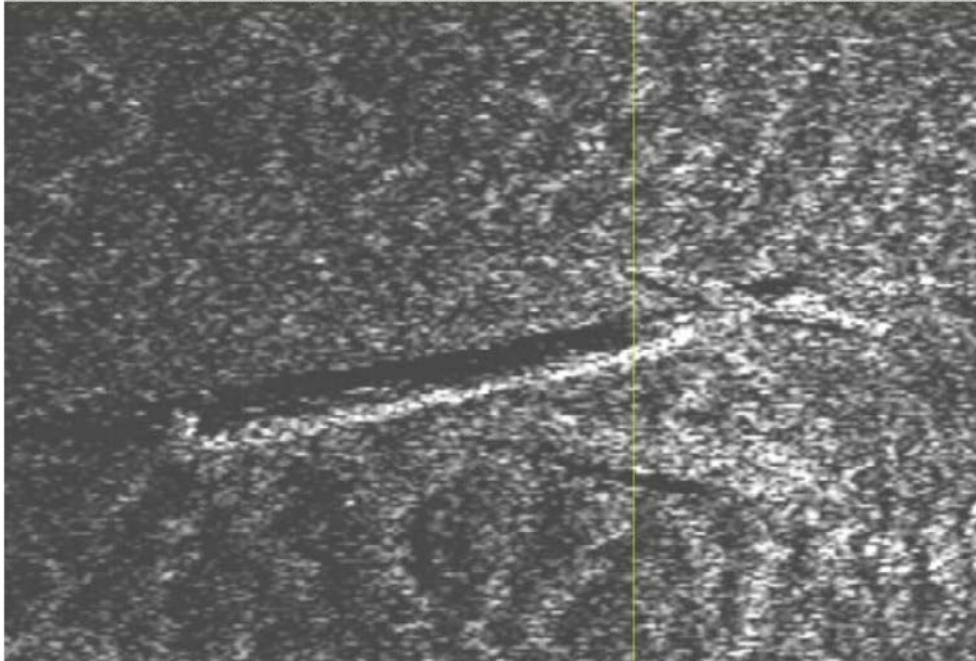
### Wreck Hunting in Jervis Bay

In late 2010, LRSS was contacted by the AHO and asked to confirm the position of a wreck in the northern section of Jervis Bay. Investigations revealed that the wreck was actually an aircraft, the RAN Fairey Firefly VX381 (a similar aircraft is shown in figure 5).



**Figure 5:** RAN Fairey Firefly

The plane was on a routine training flight in November 1956 with several other aircraft when a mid air collision resulted in the loss of two aircraft. VX381 crashed into the middle of Hare Bay and now sits on a sandy bottom in about 12 metres of water. The aircraft's position has been long known to the local dive community after being originally discovered in the early 1980's.

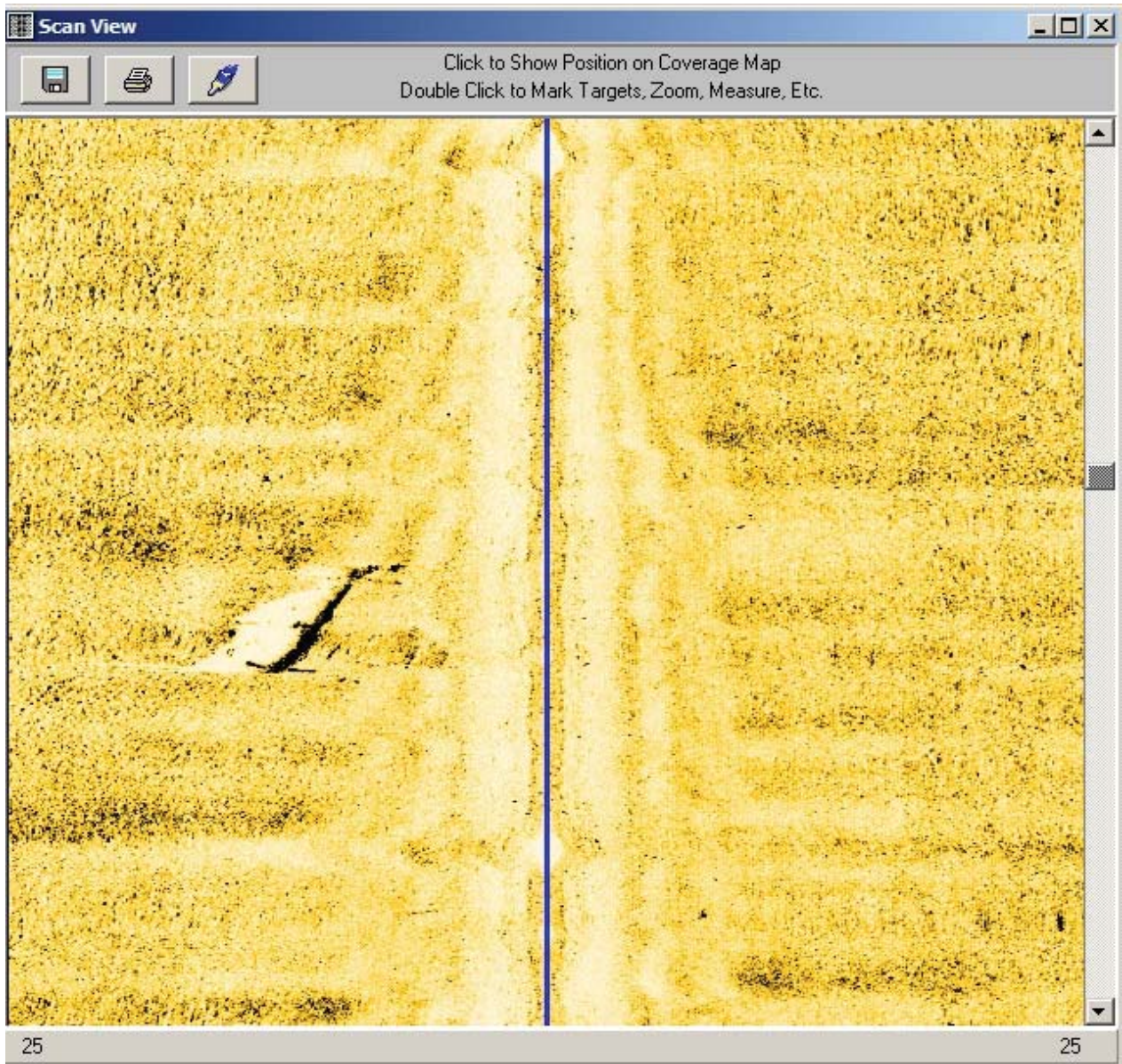


**Figure 6:** Side Looking Sonar Image of VX381

The aircraft's position was confirmed in November 2010 using the following key processes:

- RTK base station and repeater established at HMAS Creswell,
- Search grid established in the vicinity of the aircraft,
- Depth profile determined using single beam echo sounder,
- Imagery obtained using side-looking sonar.

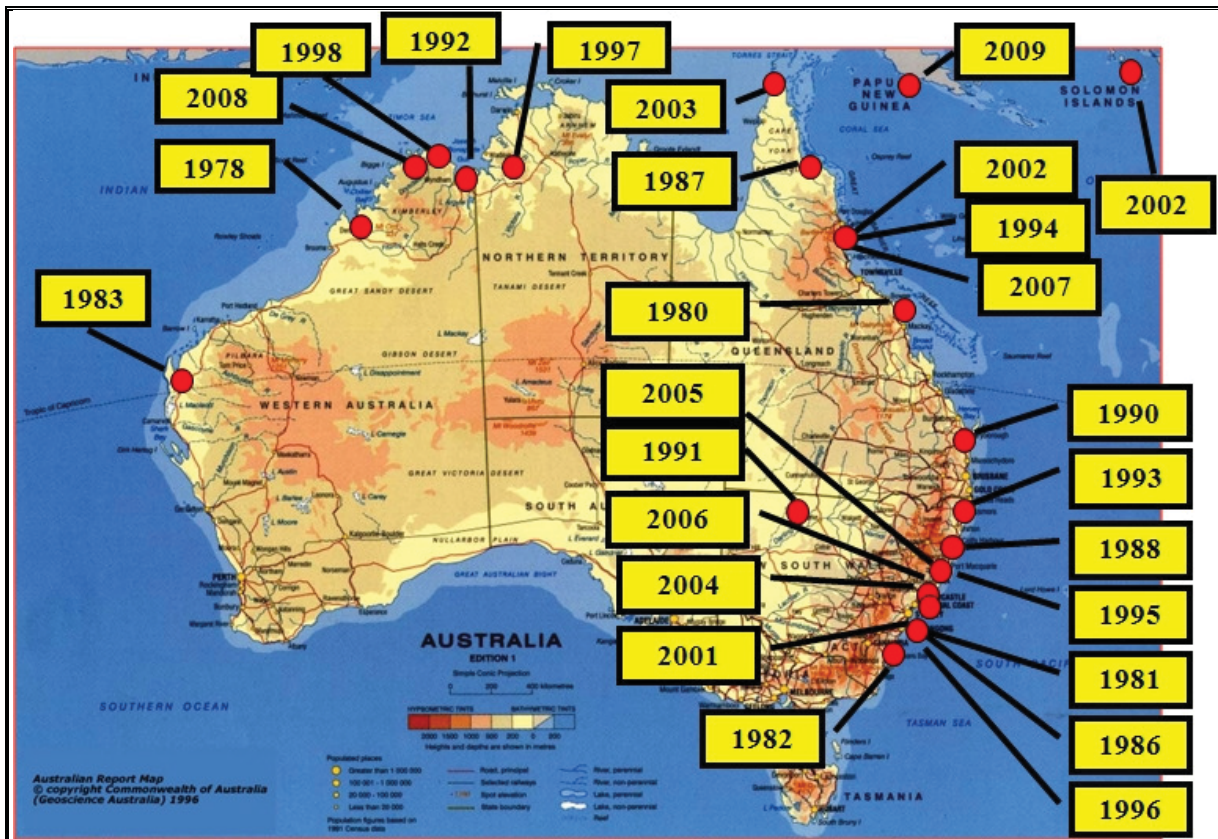
Additional information regarding the aircraft's location and orientation (see figure 7) was obtained in March 2011 using a c-max side scan sonar loaned from the RAN.



**Figure 7:** Cmax side scan sonar image of VX381

### **CONCLUDING COMMENTS**

In the thirty years to 2009, the squadron had undertaken surveys in East Timor, Tonga and Samoa, conducted riverine surveys in NSW, QLD, WA and the NT, supported ADF exercises in Australia and in PNG, and taken the lead survey role on four AACAP exercises (see figure 8).



**Figure 8: LRSS Survey Operations 1978 - 2009**

This experience coupled with the appropriate range of skill sets enables LRSS to be uniquely placed within the ADF whilst continuing to fulfil it's primarily role of providing a specialist deployable Hydrographic survey capability.

### Enquiries

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