

Non-intrusive conservation focussed monitoring of underwater cultural heritage by the public - Gathering Information via Recreational and Technical (GIRT) Scientific Divers

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ABSTRACT

The no-impact maritime archaeological conservation-focused citizen science program Gathering Information via Recreational and Technical (GIRT) Scientific Divers formally started in January 2019, after an approximately six-month pilot project in South Australia. GIRT Scientific Divers was designed and developed to encourage interested people, businesses, and groups to have an active and positive underwater archaeology role. Launching in New Zealand and across Australia, GIRT has expanded to include members in ten countries. From a 2020/21 survey of member motivations and characteristics, GIRT has been demonstrated to be a gateway into maritime archaeology for previously non-engaged individuals. However, GIRT is very much still an evolving citizen science program, and this paper discusses some of the key learning outcomes the author has gained from developing and training members of the public in GIRT over the last five and half years. The paper candidly looks at challenges experienced by GIRT to maintain an engaged and active membership specifically addressing the key issues of time and funding, IT, the andragogical methodology used, and survey structure and complexity. Lastly, drawing from recent training activities in late 2022-2023, the paper highlights changes to the teaching program and survey structure that occurred in early 2022, with the introduction of a scaffolded learning approach and a rapid GIRT survey option to enable members to develop confidence and build from success.

Keywords: Citizen science, site monitoring, conservation, underwater cultural heritage management

List of figures

Figure 1 Greenpeace MV *Rainbow Warrior I* (1987), Cavalli Islands, North Island, New Zealand.

Figure 2 Screenshots of the GIRT Scientific Divers website and the GIRT Scientific Divers Sketchfab pages.

Figure 3 Post processing collected data from fieldwork on the *Othello* at Kaipipi Shipyard

Figure 4 Screenshot of photogrammetry of the *Othello* wreck generated by two trainees on their first effort

1. INTRODUCTION

Gathering Information via Recreational and Technical (GIRT) Scientific Divers is a conservation focused no-impact citizen-science project. It aims to train members to systematically document observable physical and natural features of historic shipwrecks, submerged aircraft and other submerged underwater cultural heritage (hereafter referred to as UCH) to facilitate the site's ongoing protection and management. The focus of the GIRT citizen science project is to both encourage interested people to have an active and positive public archaeology role and to enable better understanding of the condition of UCH and the factors driving its preservation or deterioration (Viduka 2021a, 1-2; 2021b, 2; 2021c, 44).

Through the public's voluntary participation in GIRT, they can assist others, especially non-divers, to see the condition or threats to UCH from natural or human activity more easily (Figure 1). GIRT members (individuals, groups and businesses) 'adopt-a-site' that is of interest to them and agree to monitor the site periodically using the GIRT survey methodology, outlined in more detail below. By surveying the same site systematically and periodically, members can, at a minimum, directly compare photos of up to 10 survey points for change, as well as site sketches for new or changed detail. Undertaking the full survey, members can also compare qualitative and quantitative site environmental data, video transects, photogrammetry, and marine life survey data.

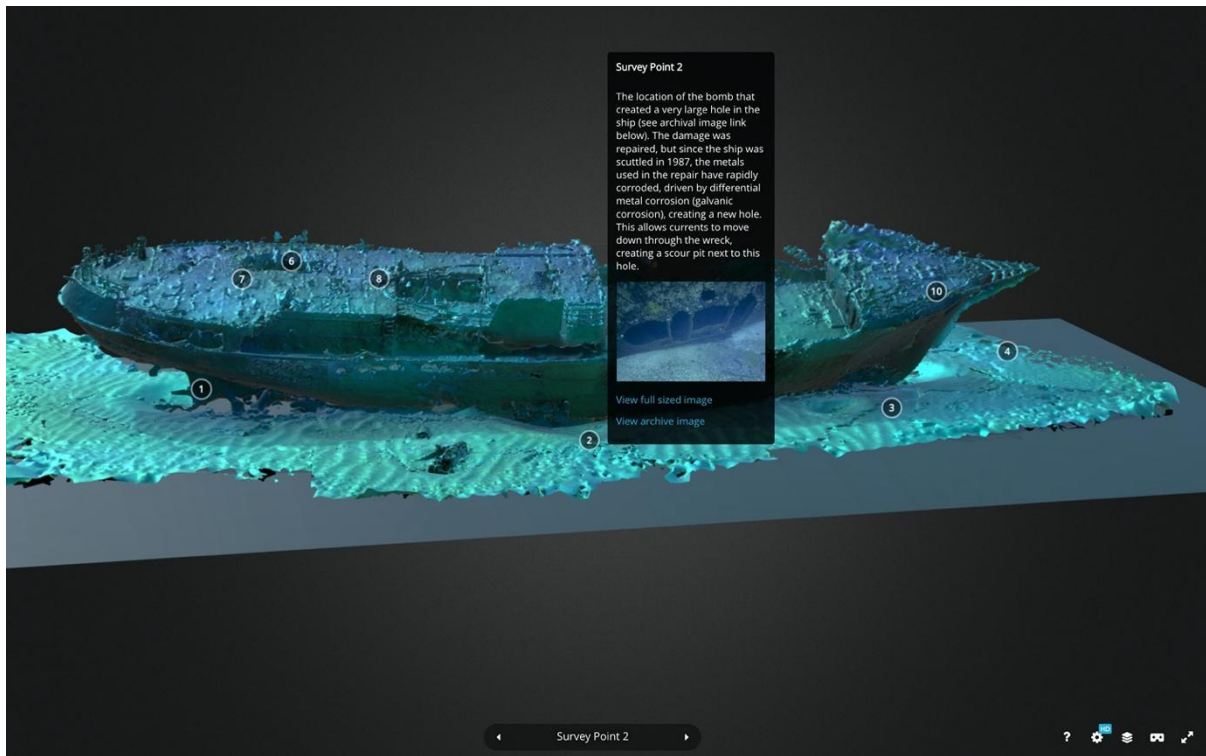


Figure 1 Greenpeace MV *Rainbow Warrior I* (1987), Cavalli Islands, North Island, New Zealand, surveyed 2019 and 3D model produced in 2020. This 3D model was the first GIRT photogrammetry model to include site condition photos to assist in site condition interpretation (Viduka, Sutton and Hutchison 2021, 10).

An important element of GIRT is to encourage communication and information sharing between GIRT members and persons responsible for managing such heritage in the relevant jurisdictional waters. As GIRT members are able to download a PDF version of their submitted data into the GIRT relational database, each GIRT member can choose to share their data with the relevant site manager for the purpose of the information becoming a part of the site's formal condition record (**Figure 2**). This can contribute directly to science-based decision making by UCH management agencies and potentially the prioritisation of activities by these relevant authorities to protect or undertake rescue archaeology of submerged sites.

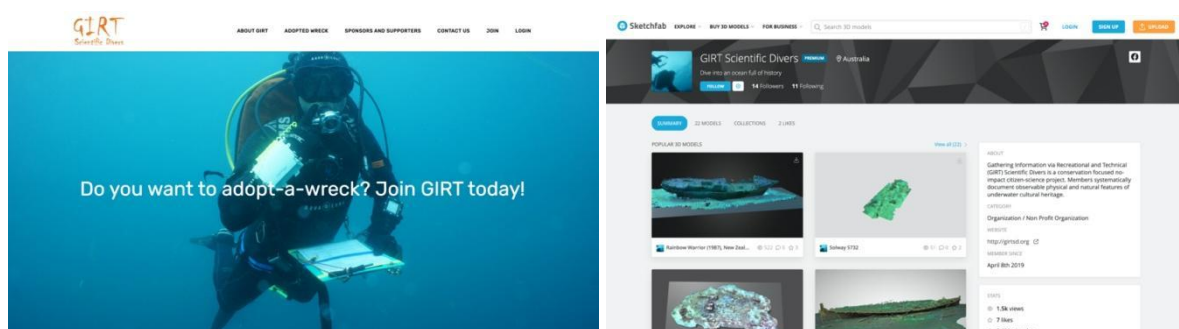


Figure 2 Screenshots of the GIRT Scientific Divers website and the GIRT Scientific Divers Sketchfab pages.

Starting in the first year of observations, GIRT members are asked to also identify potential or known threats to their site, and to estimate the likelihood and consequence of those threats. Based on member's subjective data, and sometimes following moderation discussions with a GIRT instructor, members allocate a 'traffic light' indication of threat to their adopted site's preservation (Green, Yellow, Orange, Red). GIRT member's indications of threat are shown on the publicly viewable adopted sites map as their site's location icon. This can be viewed at <https://www.girtsd.org/wrecks>.

All survey records entered by members through the Survey Reporting tab in the internal members pages of the GIRT website are linked to the names of the members who undertook the survey and their adopted site.

Once data has been collected, GIRT members are encouraged to compare their results with other members, lead the analysis of aspects of research (i.e. site formation, marine life, correlation of storm data with observed sediment movements, modelling observed change to other proximal sites.....) or simply conduct further archival research on their adopted site, and present the results of their surveys or broader analysis of data to dive clubs or at conferences.

Separate to their initial training, GIRT members are ongoingly supported through three options. The first option is a regularly updated version of a guidance document which can be downloaded, with current survey sheets, at the register to JOIN page on the GIRT website (<https://www.girtsd.org/register>). The second option is through content added in the members internal TRAINING pages. The third option is by being able to contact local GIRT instructors through the members BLOG pages, via email or via phone.

2. RESOURCES

In order to collect data on a site, besides standard dive gear, members need:

- access to a camera with an underwater housing;
- 30m fibreglass tape;
- at least three photogrammetry scales;
- one photography scale;
- slate and pencil; and
- relevant GIRT monitoring templates printed on waterproof paper.

In addition, members need access to a computer and the internet.

3. FRAMEWORK - KEY LEARNING OUTCOMES

The GIRT citizen science program has now been taught for five and half years. In that time, the author has gained a better understanding of issues faced by the public to be an engaged and active citizen science member and of in-built barriers in the initial design, architecture and teaching of GIRT to their active and fulfilling participation. Below, I highlight some of the key issues encountered.

Time and Funding

The two biggest issues which crosscut and exacerbate all other problems are the classic, time and money. GIRT remains a very small citizen science program predominantly led solely by the author. Time constraints are real issues to building the program. While efforts are underway to bring in GIRT instructors (see below), issues around insurance and work-place health and safety make it necessary for any potential GIRT instructors to deliver the training under their existing workplace arrangements. Equally, as a full-time employee in a busy role, GIRT is very much managed around the margins of daily life with an occasionally focussed training activity.

Money is always the main problem in small projects. Currently, funding for GIRT is mainly covered by myself and my wife (please don't tell her!). Periodically, GIRT is partially compensated to deliver training in a particular country or jurisdiction. This funding typically does not cover the cost of delivery, or the time of the instructor to prepare, travel and deliver the training. In business terms, a fairly non-sustainable product.

IT

The website and relational database in GIRT are key to the programs objectives of recognising the public's input, connecting members with each other, and making collected data saved, searchable, comparable, and openly accessible to all (Viduka, Illukkumbura and Abeygunawardena 2020, 7-8). Another facet of the impact of the lack of money and time is delayed development of the IT infrastructure. This has been perhaps the most problematic aspect of running the project in the terms of making the project fulfilling for members, and an issue that is not fully resolved to date. Members who have undertaken surveys and who have their data, have struggled to enter the data into the SURVEY REPORTING tool because of IT issues. This has resulted in frustration for all and certainly impacted enthusiastic ongoing member participation.

Maintaining the website, and developing and refining the survey reporting tool and associated relational database, so it aligns with the latest version of the survey sheets, takes development time. As a non-IT developer, I am currently totally reliant on working with free or very cheap third parties to deliver changes, including updating features of the website that annually need refreshing.

The andragogical methodology

GIRT was developed as an adult based learning programme. This is because GIRT is targeted at individuals over 18 years of age who have more than 50 logged dives. Adult learning (androgogy), as different to children focussed learn (pedagogy), recognises that adult learners bring their varied experience and are more self-directed and self-motivated. Adult learning also has a focus on hands-on learning (learn through play).

Since 2018, GIRT has been taught in several ways to meet community interest to dive with a purpose and monitor underwater cultural heritage sites. Initially GIRT was only taught as a one-day face-to-face program. The GIRT one-day training sought to explain why members should participate, what would be the value of their contribution, and then how to apply the methodology. The choice of one-day teaching was initially driven by financial expediency and available time.

The one-day training program quickly evolved into a two-day training program, with the second day focused on using the GIRT method as a team. This was in recognition of the need to reinforce class-based learning with hands-on activities.

In all training options, GIRT is taught as an activity broadly comprised of three parts:

1. planning and preparing for a survey activity;
2. doing the survey activity, and saving and labelling the data on the day; and
3. post-processing the collected data and entering it as a report.

The reason it was taught in this way was to emphasize the importance of each stage and to assist members to recognise that the survey is not finished until a survey report is submitted.

During COVID, GIRT training was delivered online, with an adaptation of the original one-day workshop delivered during two blocks of three hours over two days. It was recognised at the time that this was not the ideal for teaching GIRT however it was seen as an opportunity to offer

something to the community during COVID, an opportunity to promote GIRT, raise broader awareness of the threats to underwater cultural heritage, and to identify people who wished to participate who could receive further support in the future. Retrospectively, both the one day intensive and online teaching versions were found to be simply too much information for participants with very little ongoing activity by individuals who took part in this type of training.

In addition, several factors, which in hindsight are key to adult participation, were not sufficiently initially highlighted in the teaching of the program. These include: the need to focus on promoting working with a group (make it a friends based activity); being inclusive of people with a marine science focus (broadening the groups knowledge base and ensuring site and environment are equally considered); the rule of three parts to a survey (recognising that planning, doing and post fieldwork data processing all require time); and highlighting the need to plan a diving day to leave sufficient time to save, label data and backup results.

Survey structure and complexity

The GIRT survey requirements were initially based on what a non-impact maritime archaeological conservation survey of a site would endeavour to do to obtain a baseline of data for longitudinal site monitoring. Early on in the process of delivering GIRT, and with good advice from other people who deliver citizen science programs, it became evident that the initial structure of the GIRT survey methodology in totality, was too much for most new members who had little scientific diving background.

4. RESULTS - CHANGES TO THE TEACHING PROGRAM AND SURVEY STRUCTURE

While no change has occurred to the issues of IT, or time and money, since 2022 GIRT Scientific Divers has operated within a Pty Ltd company structure, with a constitution that only allows the company to pursue charitable purposes. The GIRT Director is now supported by three other Board members who separately specialise in law, IT, and public archaeology.

The andragogical methodology updated

In 2022, significant adjustments were made to the training presentations and a restructuring of the survey activity, reflecting a response to the issues outlined above. To support members, the GIRT guidelines were also updated to the currently available version 3. The new guidelines outline the updated GIRT teaching program approach, which will hopefully go some way to remedy the issues of the identified critical need to immediately reinforce learning activities through doing, and making the initial learning outcomes more achievable so that people can build from success.

To better understand who is interested to participate in GIRT, why, and what it is they seek to get out of their participation, a survey was sent out to the first 119 people who undertook training. Prior to the survey's close on 30 June 2020, 100 people responded providing information about the demographics of participants, their background in heritage and protection, diving, science and conservation, and volunteering. Survey results show that GIRT is acting as a gateway into maritime archaeology for previously non-engaged individuals (Viduka and Edney 2021a, 14). This further emphasises the need to re-scale initial expectations of a citizen scientist to a more achievable level for a group largely previously not engaged by other public archaeology programs.

The new teaching approach recognises that many people trained to be GIRT members to date, have not yet completed a survey report. Putting IT issues aside, which are anecdotally the most explained reason, this still leaves the majority of members not having completed a survey and or not attempting to input the data.

While a number of people outside Australia continue to request the online training option, the updated GIRT teaching program solely incorporates the two-day GIRT training model and re-structures the curriculum, so it is more achievable for members. A key facet of the two-day program is post-processing collected data to finalise a clean site sketch, save Figures, video and data and label everything properly immediately after diving (Figure 3). Since its implementation, the two-day training program has been trialled in Norfolk Island, Australia (20-21 August 2022), Adelaide, South Australia (17-18 September 2022), and Rakiura/Stewart Island, New Zealand (25-26 February 2023) (Figure 4) with increasing success demonstrated by participants at Stewart Island completing the training having done the rapid survey elements and all four additional survey activities.

Another significant recent development is endeavouring to have regionally located GIRT instructors to drive training and engagement with divers locally and to amplify opportunities for interested people to be trained. The first dedicated GIRT Instructor training occurred on 18 February 2023 in Auckland, New Zealand with Dr Kurt Bennett. GIRT is still in discussions with Kurt's employer to ascertain if he can deliver GIRT training as a workplace activity so as to get around the current GIRT insurance/workplace health and safety/funding Gordian knot.



Figure 3 Post processing collected data from fieldwork on the *Othello* at Kaipipi Shipyard, Raikura/Stewart Island, New Zealand, February 2023 and an early screen shot of the developing 3D model from images collected by participants in the training event.

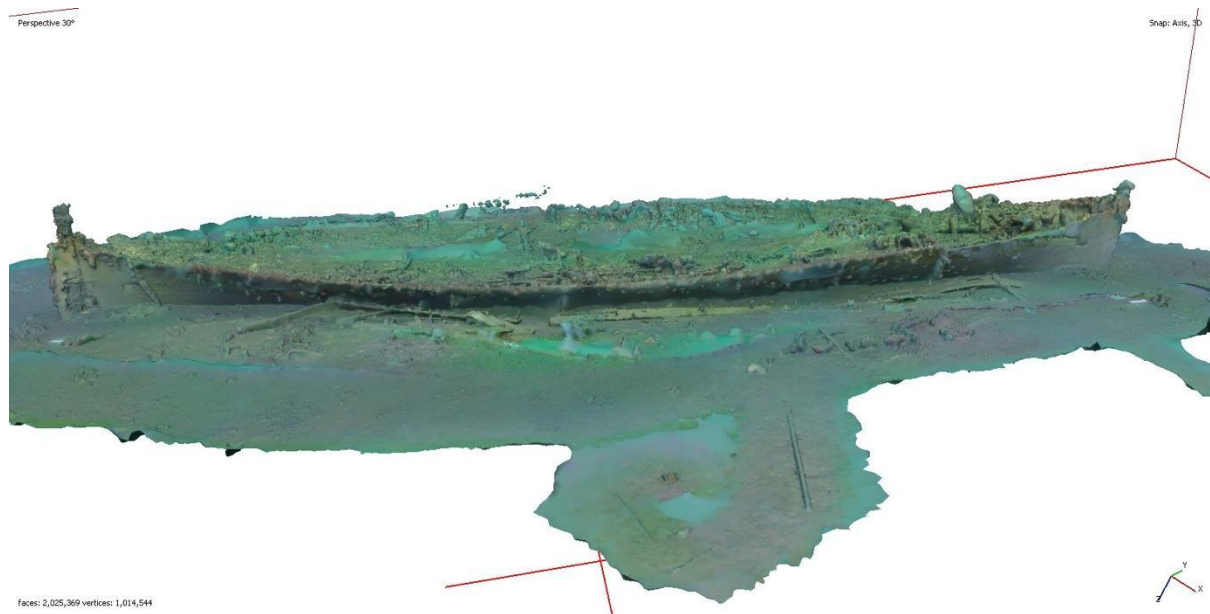


Figure 4 Screenshot of photogrammetry of the *Othello* wreck generated by two trainees on their first effort and processed by Dr Andrew Hutchison.

GIRT Rapid Survey

In the updated guidelines a scaffolded learning approach is outlined for the survey activity. This approach aims to systematically build on a members' experiences and knowledge so they can learn new skills more comfortably. The scaffolded learning program uses the original GIRT survey components however it breaks the learning down to a small core survey component (GIRT rapid survey), that can be more easily done underwater and followed with simple and quicker post processing of data requirements before successfully submitting a survey report. Up to four additional survey activities are then outlined. These additional survey activities can be undertaken to any scale and in any combination, subject to a members' knowledge level, comfort, interest, the environmental conditions, diving safety parameters and commitment.

The GIRT rapid survey is designed to be completed in one or two dives by a buddy pair and is less complex and time consuming both underwater and during data post-processing for members. This rapid survey comprises completing a site identification sheet, a site sketch sheet, and a photo condition sheet. Members joining GIRT, and who do not bring experience in collecting data, should first use the GIRT rapid survey method until they are comfortable with the in-water survey process, post-diving data management, post-survey data processing and submission of their survey report.

Once a member is comfortable with undertaking a GIRT rapid survey and can complete all aspects, members are then encouraged to choose to undertake one, some, or all of the four additional survey activities: a video-transect survey; photogrammetry of features/site; collecting additional site and conservation data; and or undertaking a marine-life survey. Survey sheets for the video-transect survey; photogrammetry survey and site and conservation data survey are available to be downloaded from the GIRT website at <https://www.girtsd.org/register>. Any data collected by a member for a marine-life survey simply needs to be saved as a PDF to be included in the final site SURVEY REPORT.

To undertake a complete GIRT survey, even in shallow water on a relatively small site, more than two dives by a dive buddy pair will be required. It is important to note that, while it is ideal to collect as much data as possible in each survey activity, for any and all activities, the survey method is scalable. Only complete as much of each survey sheet as possible within the limitations of your safe diving and conditions. When entering data into the Survey Reporting tab in the GIRT website, the

reporting tool only requires a few mandatory data fields from the Surface Sheet. All other data fields need only be populated as data is available.

The GIRT method includes a video transect survey of the site environment, on the site and off the site, which acts as a minimum of environmental data being recorded. However, members are encouraged to also collect data for another established marine citizen science program on their site (undertaking a marine-life survey). More broadly, and to emphasise the importance of understanding the marine environment associated with a site, members are encouraged to include a GIRT diver who is primarily interested in the marine environment in their survey team.

CONCLUDING REMARKS

While GIRT Scientific Divers has been operating for five and half years, some critical milestones for success are yet to be met. The most significant of these is a fully functioning website and associated relational database that aligns with the rapid and additional survey reporting sheets. Secondly, while GIRT has expanded to include members in ten countries, the ability to train and have GIRT regionally based instructors is a significant limiting factor to GIRT's broader uptake. Thirdly, the most ideal training model, two-days, is also the costliest. While developing a funding stream can resolve this, the author is determined to try and develop GIRT so that it can operate without charging people so there is no barrier to participation in site monitoring to the interested public.

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