Abstract

Many threats face the freshwater turtle, Chelodina colliei, also known as the oblong turtle. A community education project, Turtle Watch, focused on this target species and enabled effective conservation action to be implemented. Turtle Watch was conducted in the Perth Metropolitan Area of Western Australia, as the oblong turtle inhabits the wetlands of Perth. Predation, habitat loss, road deaths and climate change are key threats to this species. Nest predation issues arose during stage 1 of Turtle Watch (2005–2008), so Turtle Watch 2 (2010–2012) aimed to identify predators and foster community partnerships, including citizen science, to promote awareness and conservation of turtles. Turtle Watch 2 focused on four eco education centres and involved collaboration between government and community groups concerned about turtles. Camera surveillance was undertaken to determine predators. Various strategies were also adopted to promote community education and participation, such as, public talks, fair stalls, media publicity, and the ‘Turtle Hotline’ and ClimateWatch website for recording turtle sightings. Project results included camera surveillance evidence of fox predation. In addition, numerous partnerships, ranging from research organizations, educational institutions, and input from community citizen scientists made valuable contributions to the project by working collaboratively on turtle conservation issues. Following completion of Turtle Watch 2 (2013), it was agreed by project stakeholders that the initiative would continue given considerable community momentum to support an ongoing Turtle Watch commitment. This strong community and school engagement continues to contribute to improved knowledge, skills and action in relation to oblong turtle conservation.

Keywords: science education, community education, outdoors education, elementary education

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Introduction

Promotion of science understandings amongst the general public is a critical strategy for developing a scientifically literate society (Department of Innovation, Industry, Science and Research, 2010). Equally, engaging students in authentic science settings and real-life contexts is viewed as one effective method of ‘re-imagining science education’ in Australia (Tytler, 2007). Turtle Watch is an example of such promotion and re-imagining.

Turtle Watch began ten years ago, in 2005, and involved community and student participation in an ongoing science education and conservation project being conducted in the Perth metropolitan area of Western Australia. The target species of this project was the freshwater turtle, *Chelodina colliei*, commonly known as the oblong turtle (Georges & Thomson, 2010), which inhabits the wetlands and rivers of the southwest of Western Australia.

The aim of this article is to provide an exploration of the relationship between local species conservation efforts and community/student engagement in authentic real-life science through the Turtle Watch project. First, the biology and ecology of the oblong turtle is summarized. Then a synopsis of the Turtle Watch project is provided, how it began, an examination of the three phases in the implementation of Turtle Watch, and outcomes achieved. The article concludes with a discussion of facilitators and barriers to the project in order to provide insight for future community engagement directions.

Biology and Ecology of the Oblong Turtle

The oblong turtle is the only native freshwater turtle species found in metropolitan and suburban Perth and is considered to be the top predator in the aquatic food chain. It is an opportunistic carnivore, feeding upon an array of aquatic invertebrates, small fish and birds, as well as carrion (Burbidge, 1967; Giles, 2001; Tysoe, 2005).

The distinctive features of the oblong turtle include its long neck, which is approximately 90% of its carapace length, and the carapace which widens slightly at the back giving its oblong shape and common name (Cann, 1998). The length of the carapace of a mature oblong turtle ranges from 30 to 40 cm (Cann, 1998; Giles, 2001). Carapace length is used as an indicator of sexual maturity. Males are sexually mature when they reach 13–14 cm carapace length, while females require 16–17 cm carapace length (Kuchling, 1989).

Breeding usually occurs during winter and spring (Cann, 1998), with female oblong turtles leaving the water to nest in open soft sandy soil during Spring (September–November) and Summer (December–January) (Clay, 1981). They lay, on average, eight eggs in spring and four eggs in summer (Clay, 1981). Females take an hour or more to find a suitable nesting site and then up to 45 minutes to dig the nest, lay eggs and compact the soil (Burbidge, 1967; Clay, 1981). Incubation time ranges from 200 to 230 days (Burbidge, 1967).

Oblong turtles have an important role to play in wetland and river health; however they are under threat from habitat loss, road deaths, predation when they leave the water and climate change (Bartholomaeus, 2012, 2013; Giles, 2001, 2012; Sinclair, 2010; Tate, 2009). These threats have contributed to the upgrading of the conservation status of the
oblong turtle to ‘Near Threatened’ (Perth Zoo, 2015). Research evidence also indicates a
decline in oblong turtle populations, particularly mature female turtles (Bartholomaeus,
2013; Dawson, 2012; Giles, 2012) leading to increased risk of local extinction.
However, there have been relatively few studies conducted on the oblong turtle of the
Perth region, so the present research sought to contribute to the limited documented
knowledge.

**Background and Implementation of Turtle Watch**

The history of Turtle Watch may be divided into three phases: 2005–2009, 2010–2012 and
2013 ongoing. The first phase of Turtle Watch arose directly from community concern.
During 2005 residents and students near Herdsman Lake (Perth) expressed concern to
a local school teacher (author) about the oblong turtle population, especially in relation
to road deaths and water pollution. Following stakeholder consultation a Community
Conservation Grant (Western Australian Department of Environment and Conservation,
under Grant 2006/2007) was obtained to investigate this issue. The resultant project was
conducted between 2006 and 2008, with planning for the follow-up project undertaken
during 2009 (Lewis, Baudains, & Mansfield, 2008a, 2008b, 2009; Lewis, Mansfield, &
Baudains, 2008, 2010). Since Turtle Watch 1 has been previously reported, only brief
mention of the research will be presented here, followed by a more detailed report of
Turtle Watch 2 and the current ongoing Turtle Watch phase.

*Turtle Watch 1*

The aim of the initial phase of Turtle Watch was to conduct a trial that involved the pro-
vision of a suitable, safe nesting site for oblong turtles in the Herdsman Lake Regional
Park. Aspects of this aim included: promotion of student and community engagement
in science; collection of turtle nesting and hatching data; and promotion of connectivity
to nature in the local neighbourhood. Another important aspect involved collaboration
between the school and other community stakeholders.

Key stakeholders included local officers from the Herdsman Lake Wildlife Centre
(HLWC) and the Department of Environment and Conservation (DEC). These officers
expressed interest in turtle conservation and provided a range of support services to the
project, including advice, site selection and opportunities for community engagement.
Such assistance provided impetus which has contributed to the sustainability of the
project.

The project created a nesting site for oblong turtles at Herdsman Lake that did not
require turtles to cross the road. The site was a 50 m × 25 m rectangular, weed-free,
sandy area about 30 m from the water. Students, interested community members and
school staff visited the site weekly to observe and record developments. Turtles nested
in the identified area during the following nesting season. However, results demonstrated
the site was not safe due to predation. Thirty-one predated turtle nests were found at the
trial nesting site (Figure 1), with no live hatchlings observed (Lewis, Baudains, & Mans-
field, 2008a, 2008b, 2009).
Turtle Watch 2

BACKGROUND

Following the completion of the initial phase of Turtle Watch, students and community members continued to lobby for action to be taken, based on the results of that trial. These findings led to a follow-up project which ran from 2010 to 2012. This second phase of Turtle Watch, conducted by the Australian Association for Environmental Education Western Australian Chapter (AAEE-WA) and funded by another conservation grant (Lotterywest, Western Australia, under Grant 11561/20110821), involved research at three Perth sites – Canning River, Bibra Lake and Herdsman Lake. Eco education centres were linked to each of these sites: South East Regional Centre for Urban Landcare (SERCUL) and Canning River Eco Education Centre (CREEC) to the Canning River; Cockburn Wetlands Education Centre (CWEC) and City of Cockburn (CoC) to Bibra Lake; and HLWC to Herdsman Lake. These eco centres were critical stakeholders in this phase of the project, providing support both at the Turtle Watch committee level and the community engagement level.

AIMS AND METHODOLOGY

The aims of Turtle Watch 2 were to identify predators involved in the destruction of oblong turtle nests at the three nominated sites; and foster partnerships between the community, research organizations, educational institutions and industry to promote conservation action for oblong turtles.

Participation of community members in the project was undertaken in the context of citizen science (Bonney, Ballard et al., 2009; Shirk et al., 2012). Since ‘Citizen science projects have been remarkably successful in advancing scientific knowledge, and contributions from citizen scientists now provide a vast quantity of data about species occurrence and distribution around the world’ (Bonney, Cooper et al., 2009), it was
anticipated that the involvement of members of the general public could contribute to the present research. The degree of participation was predominantly ‘collaborative’ (Shirk et al., 2012). This meant the project was designed by researchers and members of the public primarily contributed data, but they also helped to refine the project design and disseminate findings.

This research project involved a case study of four eco education centres in the Perth metropolitan area, which were involved in turtle conservation. The design used mixed methods data collection (Cresswell & Plano Clark, 2007; Mertens, 2010). Quantitative and qualitative data was collected in relation to fox predation and partnerships. Camera surveillance footage, turtle population studies, community participation tallies, anecdotal evidence and student assessment data was collected.

There are a number of limitations to this research: surveillance evidence of fox predation of turtle nests; generalizability of the findings; and methodological exclusions. Locating suitable turtle nest sites to safely attach the surveillance cameras was an ongoing issue at the nominated lakes. Consequently, artificial nest sites were also employed. Although the research examined eco centre responses to the plight of the oblong turtle, the results of the study cannot be generalized beyond the target population studied. The research does not, therefore, attempt to extrapolate from the context of the identified lakes to any other environmental contexts, although some parallels may be found. There are methodological exclusions to this study, for example, it was beyond the bounds of this study to interview community partners and students. Despite these limitations, this research provided new and original knowledge in a previously neglected field.

IMPLEMENTATION

Project implementation included camera surveillance of nesting sites identified by community members and eco centre staff. Turtle Hotline phone numbers were advertised to enable students and community members to inform eco centres of oblong turtle sightings. Also the ClimateWatch website was promoted so that community members could record turtle sightings: http://www.climatewatch.org.au/. Further project promotion was achieved through print media and online: http://www.aaeewa.org.au/turtlewatch.html.

Meetings with stakeholder groups, such as the Oblong Turtle Collaborative Research Group based at Murdoch University, were conducted. Community education forums at the eco centres were facilitated to promote awareness of the plight of oblong turtles and regular e-bulletins were distributed to interested stakeholders. A Turtle Education Kit was also developed for use by eco centre staff and schools. Finally, this phase involved the enhancement of existing community partnerships and establishment of new partnerships to expand conservation efforts. All these aspects of Turtle Watch were reviewed throughout the project and recommendations made to improve turtle conservation.

Results

Key outcomes from Turtle Watch 2 related to fox predation and partnerships (see Table 1). Locating suitable sites to safely and securely attach surveillance cameras focused on oblong turtle nest sites was an ongoing issue. Typically, turtles nested in
Table 1: Summary of Turtle Watch 2 results

| Aim                                      | Methods                        | Key findings                                                                                      | References                        |
|------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------|
| Provide evidence for fox predation       | Camera surveillance            | - Camera traps – (i) Bibra and Herdsman Lakes – artificial nest sites predated only by foxes. (ii) Bindoon Lakes (adjacent area) – 43% of artificial nests were predated and only foxes were detected predating these nests. | Lewis (2013)                      |
|                                          |                                | - Turtle population surveys                                                                      | Bartholomaeus (2013)              |
|                                          |                                | - Bibra Lake turtle population in decline due to impact of roads, fox predation, water quality issues and drying climate. Spring 2011, 87 turtles captured in study (29 adult females, 56 adult males, one juvenile, one sub-adult female). | Dawson (2012)                     |
|                                          |                                | - Turtle population in decline due to fox predation.                                             |                                   |
|                                          |                                | - Sex skewing towards males in Shenton Park and Booragoon Lake (Perth metro area) populations due to deaths of females trying to nest; leads to lack of sexually mature females which can cause a decrease in offspring. | Bartholomaeus (2013)              |
| Develop new and enhance existing partnerships | Quantitative – tallies     | - Existing partnerships: 4                                                                      | Lewis et al. (2013)               |
|                                           | Qualitative – anecdotal feedback | - New partnerships: 14                                                                          | Lewis (2013)                      |
|                                           |                                | - Community partners maintained contact and requested new initiatives e.g. Native ARC wanted turtle rescue kits; CoC wanted school accreditation. |                                   |
| Provide opportunities for citizen science | Quantitative – tallies        | - Hotline contacts: 30 in 2012                                                                    | Lewis, Mansfield & Baudains (2010) |
|                                           | Qualitative – anecdotal feedback; student assessments | - ClimateWatch loggings: 85 in 2012                                                              | Lewis (2013)                      |
|                                           |                                | - Attendance at six community education forums: over 50 people per session                       |                                   |
|                                           |                                | - Community members (i) conducted numerous Turtle Watch stalls at public events each year; (ii) made spontaneous contact with the Turtle Watch committee re-success and concerns; (iii) spontaneously made donations to Turtle Watch e.g. $400 from a school and $50 from a family. | Lewis et al. (2013)               |
|                                           |                                | - School student science assessments – concept maps and reports – demonstrated enhanced understandings. | Lewis et al. (2012)               |

Lewis and Hartill (2012)
sites unsuitable for camera traps; usually the sites were exposed with limited places to camouflage cameras. Consequently, evidence from artificial turtle nests was predominantly employed, although some video footage documenting fox predation of actual turtle nests was obtained. Research evidence of fox predation was also reported by Bartholomaeus (2013), Giles (2012) and Dawson (2012). Table 1 summarizes these findings. Lewis (2013) documented evidence from camera surveillance at Herdsman and Bibra Lakes (http://youtu.be/syxWgssIKL0 and www.wildlifesurveillance.wordpress.com), as shown in Figure 2.

Existing partnerships for the conservation of the oblong turtle were enhanced, for example, with HLWC and DEC. New partnerships were established, for example, with AAEE-WA, ClimateWatch, schools, Murdoch University, University of Western Australia, Native ARC, Turtle Oblonga Rescue and Rehabilitation Network, CREEC and CWEC volunteer groups, as well as other local Friends groups. Clearly, numerous cooperative relationships were established and enhanced as an outcome of Turtle Watch.

Another aspect of the partnerships aim involved community members’ participation in Turtle Watch as citizen scientists. High attendance numbers were recorded at six community turtle education forums, which were held at three eco centres during 2011. Numerous school based sessions were conducted too. These events, along with other initiatives to promote awareness of the plight of oblong turtles were implemented. Posters were displayed at eco centres and at environmental conferences (Lewis et al., 2013); journal articles published (Lewis, Nielsen, Pearson, & Baudains, 2012); a Turtle Education Kit compiled (http://www.aeeewa.org.au/turtlewatch.html); student displays at eco centres; Turtle Watch bookmarks distributed; professional newsletter articles published (Glitsos, 2011; Lewis & Hartill, 2012); websites uploaded http://www.aeeewa.org.au/turtlewatch.html; http://www.climatewatch.org.au) and newspaper articles printed (MT, 2011). Based on

![Figure 2: Camera surveillance evidence of fox predation](image-url)
these promotional activities, community members and students utilized the new Turtle Hotline to report turtle nesting behaviour and accessed the new oblong turtle links on the ClimateWatch website to log sightings. A final component of the partnerships aim related to school students. Turtle Watch 2 was innovative because it was a school education programme as well as a citizen science endeavour. Students were, and continue to be an integral part of the community participating in this authentic science issue in a real-life context. Key aspects of student involvement included: learning about turtle biology through inquiry-based learning; participation in excursions to turtle wetland sites; incursions involving visiting turtle experts; and actions to enhance wider community awareness through presentations and displays. Furthermore, students from Foundation level to Year 7 studied turtles within the context of the new Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2014a, 2014b, 2014c):

1. Science: Biological Sciences sub-strand (Science Understanding) and Use and Influence of Science (Science as a Human Endeavour). Students examined key biological concepts of structure and function, life cycle, adaptations that support survival, classification, habitats, endangered species, biodiversity and conservation (Figure 3).

Figure 3: Year 7 project on display in the community
2. Cross curriculum priorities of Sustainability, Aboriginal and Torres Strait Islander Histories and Cultures, and Asia and Australia’s Engagement with Asia.

3. General Capabilities of Literacy and Critical and Creative Thinking (employing concept maps as diagnostic and formative assessment tools).

In brief, Turtle Watch 2 project findings indicated both wider community partnerships and school science engagement in Turtle Watch was effective. Students, for example, moved from very limited to improved knowledge about oblong turtles, as reflected in their project reports and concept maps. Likewise, some adults who attended community education forums were subsequently confident to conduct Turtle Watch stalls at public events.

Table 2: Indicators of the sustainability of Turtle Watch

| Indicators                        | Evidence                                                                                                                                                                                                 | Comments                                                                                                                                                                                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Meetings                          | Regular planning meetings continue to be conducted by the Turtle Watch organizing committee.                                                                                                              | Quarterly Turtle Watch committee meetings and additional as required for urgent action/s.                                                                                                                 |
| Promotion                        | Preparation and distribution of ‘Living with Turtles’ fact sheet and Turtle Watch bookmarks through the eco centres and at education events. http://www.aaeewa.org.au/documents/TurtleWatchFactSheet.pdf | Fact sheet and bookmarks funded by eco centres after grant funding acquitted.                                                                                                                               |
| Education events                 | Regular community education events continue to be scheduled and implemented by the four participating eco centres, as well as new centres not previously involved.                                            | Eco centres have annual schedules for Turtle Watch events e.g. Cockburn Wetlands Education Centre ‘Get Wild About Wetlands’ event: Turtle Creations.                                                                 |
| Camera surveillance              | The camera surveillance consultant committed to providing AAEE-WA access to future video footage showing turtle predation over the next five years (2013–2017).                                              | Turtle Watch committee members in regular contact with consultant.                                                                                                                                            |
| Website information and access   | The AAEE-WA website provides ongoing updated access to Turtle Watch information and resources: http://www.aaeewa.org.au/turtlewatch.html                                                                 | Annual data records show oblong turtle sightings continue to be logged.                                                                                                                                       |
| Partnerships and stakeholder collaboration | Existing and new Turtle Watch partnerships are maintained and nurtured.                                                                                                                                   | Lewis, 2013; Lewis & Hartill, 2012. Turtle Watch committee in discussion re new partnership with University of Western Sydney re potential collaboration in TurtleSAT.                                               |
| Turtle Watch School Accreditation | Schools may apply to become an accredited Turtle Watch School (AAEE-WA, 2015a). http://www.aaeewa.org.au/documents/TurtleWatchSchoolAccreditationForm.pdf | This initiative achieved without external funding. First accredited school, Nov 2014, http://www.aaeewa.org.au/documents/TurtleWatchAccreditationFORM_CoolbiniaPS2014.pdf |
Turtle Watch Ongoing

In early 2013, after the acquittal of the Turtle Watch 2 grant, it was agreed by project stakeholders that the initiative would continue, given considerable community momentum to support an ongoing Turtle Watch commitment. Under the auspices of the AAEE-WA, Turtle Watch continues to be a collaborative network of community partners and individuals who work together to enable the conservation of the oblong turtle through education and informed actions. Indicators of the long-term sustainability of Turtle Watch are presented in Table 2.

The aim of the ongoing Turtle Watch initiative is the provision of information about the oblong turtle, including targeted educational materials, to enhance awareness of the biology of this species, together with action in relation to its needs. This aim aligns with Australia’s national ‘Inspiring Australia’ and ‘Powering Ideas’ objectives, which emphasize the critical need to build a strong relationship between science and society, supported by effective communication about science and its benefits (Department of Innovation, Industry, Science and Research, 2010).

Clearly, Turtle Watch has shown strong community and school engagement, and continues to facilitate an inspirational education programme and active involvement in conservation behaviours (Figure 4).

Figure 4: Live turtle hatchling entering Herdsman Lake
| Elements                          | Facilitators                                                                                                                                                                                                                                                                                                                                 | Barriers                                                                                                                                                                                                                                                                                                                                 | Comments                                                                                                                                                                                                                     |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Volunteers                       | Enthusiasm and support from volunteers and ongoing commitment for project by AAEE-WA, as the auspicing body. Volunteers drawn from across the community e.g. schools, families, interested individuals.                                                                                   | Volunteers may not always be available when needed.                                                                                                                                                                                                                                                                                      | Volunteers provided 50–200 hours annually on Turtle Watch activities.                                                                                                                                                                                                                          |
| Citizen science                  | Eco centre hotline promotion and supports. Links with other citizen science opportunities e.g. Climate Watch. Provided opportunities for active engagement of wider community resulting in increased recording of oblong turtle data.                                                                       | Time and resources to train community members.                                                                                                                                                                                                                                                                                        | Rare instances of volunteers being unavailable.                                                                                                                                                                                                                                           |
| Attitudes towards oblong turtles | Favourable attitudes across all community sectors. ‘Near threatened’ status. Safe, secure camera surveillance of artificial turtle nests. Some post-graduate research being conducted on oblong turtles.                                                                                                  | Oblong turtle not classified as ‘endangered’ so conservation action not urgent. Difficulties locating suitable sites to safely and securely attach surveillance cameras. Limited data available on populations and analysis of threats.                                                                                                  | Current new opportunity to link with University of Western Sydney to enhance depth and breadth of citizen science engagement.                                                                                                                                                      |
| Research                         | Mostly enthusiastic cooperation with annual Turtle Watch education programmes conducted.                                                                                                                                                                                                                                                | Added work demands on eco centre staff.                                                                                                                                                                                                                                                                                              | Positive attitudes contribute to interest and willingness to engage in project. Lewis (2013) Bartholomaeus (2013) Dawson (2012) Giles (2012)                                                                                          |
| Partnerships with eco            | Typically high levels of cooperation e.g. with Climate Watch and Native ARC.                                                                                                                                                                                                                                                             | Limited input by a minority of NGOs who expressed interest in participation.                                                                                                                                                                                                  | Limited input by a minority of NGOs who expressed interest in participation.                                                                                                                                                      |
| education centres                | Willingness to participate and new stakeholders joining project. Grants (2) enabled significant developments to be achieved in the project e.g. community education forums conducted and education resources created.                                                                                                           | Change in departmental personnel and associated lack of awareness about project. Dependence on grants limits rate of project progress, funding for promotion and types of education activities that may be implemented. Time and expertise to apply for grants.                                                                                     | Limited input by a minority of NGOs who expressed interest in participation.                                                                                                                                                      |
| Partnerships with other non-governmental organizations (NGOs) |                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                  | Limited input by a minority of NGOs who expressed interest in participation.                                                                                                                                                      |
| External government department stakeholders |                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                  | Limited input by a minority of NGOs who expressed interest in participation.                                                                                                                                                      |
| Funding                          | High attendance numbers at community education events on the oblong turtle. Increased media publicity about oblong turtle needs. Increased community awareness about oblong turtles and commitment to their conservation.                                                                                   | Need for funds to cover cost of expert presenters and hall hire/catering expenses.                                                                                                                                                                                                | Lewis, Mansfield and Baudains (2010) Lewis (2013), Lewis et al. (2013) Lewis et al. (2012) Lewis and Hartill (2012) MT (2011) Bartholomaeus (2012).                                                                 |
| Wider community impacts          |                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                  | No current external funding although grant applications in process.                                                                                                                                                                                                                      |
Discussion

Overall, Turtle Watch has been shown to be a successful community education, conservation and citizen science project. Facilitators and barriers of the Turtle Watch project are presented in Table 3, highlighting elements that have enabled success and those that have slowed progress. Furthermore, Table 3 suggests issues that may be broadly applicable to other community based education and conservation programmes. They may provide guidelines to support the success of other such initiatives.

Research produced evidence of fox predation and Turtle Watch 2 developed new and enhanced partnerships focused on the conservation of oblong turtles. These advances in the project were stimulated by external funding. This suggests that to attain further major advances in Turtle Watch, close collaboration with all stakeholders needs to be maintained and grant applications tailored to Turtle Watch and external funding body priorities to ensure ongoing conservation initiatives in relation to oblong turtles.

The citizen science aspect of Turtle Watch appeared to contribute to increased awareness, knowledge and science understandings of participants. As found in the report by Bonney, Ballard, et al. (2009) on citizen science projects, the present project enabled participants to increase their engagement in scientific activities. Furthermore, some participants returned year after year to contribute to Turtle Watch endeavours, such as presenting turtle education sessions at annual science expos and Earth Day events at CREEC (AAEE-WA, 2015b).

Conclusion

Turtle Watch demonstrated the development of a strong relationship between science and society on an issue of concern, with students, wider community members and institutions collaborating effectively. It provided opportunities for the general public and students to engage in authentic science in a real-life context, truly ‘re-imagining science education’. Turtle Watch in schools showcased the implementation of the Australian Science Curriculum, with students enthusiastically participating in science learning activities related to turtles. Student work samples illustrated the depth of learning. Furthermore, the high level of community education and engagement in Turtle Watch appears to ensure an ongoing commitment to the initiative. However, further research is warranted to address methodological exclusions, such as conducting interviews with partners and citizen scientists to measure educational outcomes in more depth, or enhancing the degree and quality of the participation of the citizen scientists. In addition, it is vital to conduct long-term monitoring of the health and threats to oblong turtle populations now that some baseline information has been documented. Such research will contribute to the conservation of this engaging species.

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