Assessing the effectiveness of training community 'citizen scientist' participants in shorebird monitoring and recovery

Coastal Birds Program, BirdLife Australia, National Office

Compiled by Bronwen Baird and Grainne Maguire, June 2019

Background

For nearly a decade, the Adelaide and Mount Lofty Ranges (AMLR) Natural Resource Management (NRM) Board has invested heavily in community engagement in migratory and beach-nesting shorebird conservation. This has been multi-faceted, involving training of participants to increase engagement and collection of citizen science data to inform national monitoring/conservation action programs led by BirdLife Australia (e.g. BirdLife Australia's Shorebirds 2020 and Beach-nesting Birds Programs). Education events to impassion communities around the plight of these birds are used to generate awareness, interest and behavioural change.

Success has been tangible through improved breeding success outcomes for beach-nesting birds, increased participation in monitoring and on-ground conservation actions, demonstrated changes in land manager practices, and even changes to coastal policy to protect key habitats and minimise threats. However, assessing the impact of training (content and delivery mechanisms) and the resultant outcome on quality of participation, degree of capacity building and behaviour change, is less evident.

Shorebird conservation action is built upon the foundations of citizen science monitoring and the collection of scientifically rigorous, standardised data, building active networks of land managers and volunteers to deliver on-ground recovery actions, and assessing, evaluating and adapting delivery of coordinated and effective recovery actions.

Evaluating success is critical to ensuring we are delivering training and education in the best way possible to maximise participation, to build resilient frameworks for continued participation and to ensure participants have the skills and knowledge to positively influence conservation outcomes. This study was aimed at surveying individuals who have participated in the various training opportunities led by BirdLife Australia and funded by AMLR NRM over the past 10 years. Results will be used to guide future investment and ensure the training content and delivery mechanisms maximise training results to achieve our conservation goals.

Methods

We aimed to carry out a series of targeted surveys of current and past participants in shorebird (beach-nesting and migratory) conservation and monitoring programs within the AMLR and Gulf St

Vincent area. We were particularly interested in exploring the components of training offered to potential future volunteers and how effective these were at upskilling participants and improving confidence and participation. Our current training workshops and materials include:

- Training citizen scientists to collect migratory shorebird data via Birds n' Bickies training courses
- Training citizen scientists to collect beach-nesting bird breeding data and threat data
- Specialised training opportunities e.g. communications with beach users training, nest protection/on-ground management training, and exposure to 'big picture' goals and higher level research through national conferences
- Online inductions for new volunteers
- Field visits aimed at mentoring new volunteers

Survey content was developed to explore the effectiveness of mechanisms of delivery (e.g. indoor workshop, outdoor training session, online induction etc), content of training (discovering which elements have increased capacity, motivation, participation, etc), behaviour change post-training, and exploration of citizen capacity, skill sets, values, knowledge and role extension following training.

All historical sign in sheets and contact details of both active and inactive volunteers (e.g. retired volunteers) were utilised to compile a distribution list of 224 people for Beach-nesting Bird workshop participation and 38 people for Birds n Bickies (Migratory Shorebirds training).

Survey content was split in to two distinct surveys:

1. Birds n' Bickies (with a Migratory Shorebirds focus) totalling 67 questions (see Appendix 1)
2. Beach-nesting Birds (BNB) totalling 89 questions (see Appendix 2)

Surveys were set up in SurveyMonkey and a link was sent to potential participants. Birds n Bickies surveys were carried out in early October 2018 with 3 weeks to complete, and Beach-nesting Birds surveys in February 2018 with 3 weeks to complete the survey and a follow up reminder 10 days before the survey closing date.

In total we had 24 participants (65% uptake) attempt the Birds n' Bickies survey and 43 (19% uptake) attempt the BNB survey.

Results

Results for each type of Shorebird program (Birds n' Bickies and Beach-nesting Birds) are presented separately to reflect the differences in the surveys, as well as the uniqueness of each of the content and activities within these programs.

BIRDS N' BICKIES

Demographics of survey participants

Gender: 58% of survey participants were female and 42% male.

Age: 50% of survey participants were aged between 65-74, 17% between 55-64, 21% between 45-54 while 12% are 35-44 with no participants either over 74 or under 35.

Employment status: 46% of survey participants were retired, 17% in part time or casual employment, 37% employed full time. None of the survey participants were students or unemployed.

Education: All survey participants have completed some level of tertiary education. 41.6% hold Bachelor level Degrees, 33.3% postgraduate qualifications while 25% have completed Graduate Diploma or Certificate level education.

Exposure to the sciences: 57.1% of respondents have studied or worked in Biological Sciences, 38.1% in other sciences, while 23.8% have studied or worked in Threatened species management or conservation. 33.3% of respondents studied or worked in Education and 14.4% in Mathematics and Statistics. Overall this indicates that most of the respondents had a foundational knowledge of science prior to the training with a majority having background in biological or conservation studies.

Participation in the Projects

In total, 41.6% (n=10) of survey participants indicated that they were involved in shorebird monitoring prior to attending a birds n' bickies session, several (n=7) for more than 5 years with one respondent having been involved for 48 years!

The same number (n=10) indicated that their involvement was as participants of BirdLife Australia's Beach-nesting Birds program which includes Friends of the Hooded Plover Fleurieu Peninsula volunteers, as well as Red-capped Plover and Oystercatcher volunteers.

Q9 What activities do you participate in as part of the Beach-nesting Birds project?

From the 10 respondents invited to "tick as many as apply" the results show participation in a number of areas:

Activity type	% attending
Monitoring birds	90
Biennial count	70
Chatting to the public (sharing knowledge) on the beach	70
Monitoring threats at breeding sites	60
Data entry	60
Helping at events	50
Setting up or helping maintain nest site protection	50
Other (please specify)	10

Other activities specified included
- Monitoring threats but not necessarily at breeding sites, mainly at foraging and roosting sites for oystercatchers

Of these 10 respondents, 4 have been involved with the Beach-nesting Birds project for between 8-12 years, the others being more recent participants.

Responses to Q10 asking about involvement with the BirdLife Australia Shorebirds 2020 project indicate that 32% (n=8) had some involvement. Further detail of this involvement is provided by *Q11 What do you participate in as part of the Shorebirds 2020 project? Tick as many as apply.*

Results show participation in a number of areas:

Activity type	% attending
Monitoring/counting/surveys	100
Helping at events e.g. Shorebirds festival, Oz Asia Moon Lantern Parade	57.14
Data entry	42.86
Chatting to the public/sharing knowledge	42.86
Mentoring new volunteers with shorebird ID	42.86
On-ground activities like weeding, replanting, repairing fences, rubbish clean ups, etc	28.57
Other - St Kilda Bioblitz	14.29

Q12 What first motivated you to attend a training session? (Only 7 people answered this question. 18 skipped)

Motivation	% responses
General interest in the coast and coastal issues	85.7
To have an opportunity to see shorebirds in their natural habitat	85.7
To learn directly from experts who work with these birds	71.4
To learn how to contribute to conservation	71.4
General interest in birds	57.1
General interest in science/the environment	57.1
To meet/connect with others in the community	42.8
It was recommended to me by someone I know	0
Read about these birds in the media	0
Other (please specify)	0

Q13 How many training sessions have you attended in total?

6 respondents indicated that they have attended more than one training session with one attending an impressive 12 sessions.

Q14 – Q18 How do people identify themselves? (1 indicates "I don't identify with this" and 5 indicates "I strongly identify with this")

Most identified themselves as volunteers making a difference to bird conservation and also quite high was being a bird watcher assisting with monitoring or a volunteer assisting with a project in their community.

How do people identify themselves?	# responses	Average response
I am a volunteer making a difference to conservation of threatened birds	22	3.89
I am a bird watcher contributing to a monitoring project	22	3.83
I am a volunteer contributing to a community project	21	3.82
I am a volunteer helping educate others about birds and conservation	22	3.72
I am a citizen scientist collecting important information	21	3.59

Q19 to Q31 Respondents were asked to score 13 types of training on a scale from 1 meaning *Least effective* to 5 meaning *Most effective*. The below table summarises the average scores provided. The results indicate that attendees value opportunities to experience and to see, or hear about, situations in real life and that information presented with a visual or hands on component were rated more highly.

Type of training	# responses	Average response
Field visit as part of workshop	19	4.72
Opportunity to observe birds through a scope	19	4.63
Multiple shorebird field ID sessions run over several weeks i.e. Bird n Bickies	19	4.44
Mentor accompanying me in field (e.g. BirdLife staff or a Regional Coordinator)	18	4.44
Presenters sharing real life case studies	19	4.29
Opportunities to ask questions at the workshop	19	4.17
Opportunities to follow up with questions via email/phone	18	4.07
Referencing scientific studies or including research findings	19	4.06
Quality and range of photographs showing the birds and their behaviours	19	3.94
Reading training resources (handouts, guide booklets, website info)	19	3.94
Videos included in the presentation	19	3.88
Indoor workshop with PowerPoint presentations	19	3.88
Online inductions (e.g. beach-nesting bird monitoring induction)	18	3.33

Q32 Respondents were asked to rank each of the following types of training in order of importance In this question 1 indicates MOST important with 5 being LESS important

65% of respondents ranked a *Field visit as part of workshop* as the most valuable form of training, while 22% rated a S*ite visit with mentor* as most valuable. 0% rated *Reading materials* as most important and 45% ranked *Online Induction* as least important. Again, emphasising that trainees appreciate an in-the-field/hands-on experience.

Type of training	#responses	Average ranking
Field visit as part of workshop	17	4.35
Site visit with a mentor	18	3.78
Indoor workshop	19	3.05
Online induction	20	2.15
Reading materials	20	1.90

Q33 What are the 3 things you have learnt during a training session that have been most important to your participation in shorebird volunteering?

Overwhelmingly respondents felt that Shorebird identification skills gained during training were most important to their ability to volunteer in the program. A better understanding of threats to migratory birds and the importance of accurate data collection and recording were considered important as indicated by statements such as:

- "The importance of monitoring and use of collected data to advise on shorebird management"
- "That data matters"
- "The continual need for protecting Migratory Shorebird sites"

Respondents also felt strongly that learning about the resources, advice, support and mentoring services available to them was very important to their continued involvement. Feedback includes:
- "That a network of supportive others exists"
- "Any level of participation is welcome and valued"
- "How great the experts are at enthusing the plebs like me"

Q*34 Did training help you understand the role you could play in helping shorebirds?*

100% of respondents answered "Yes" to this question. When asked "Why?" respondents indicated an increased confidence in their ability to influence the future of shorebirds. Responses included:

- "Shorebirds are under increasing pressure for various reasons so we need all the information we can get to help protect them"
- "Practical and positive suggestions for monitoring and interacting with the public"
- "I discovered how best I could use my knowledge and expertise in assisting in the conservation of resident shorebirds"
- "Provided a better understanding of the issues and resolutions"
- "Finding out about the national programs that collect data and people who act to help protect shorebirds was very encouraging"

Q35 - Q48 Respondents to these questions were asked to rank 19 types of skill in terms of level of improvement resulting from training. The ranking scale used was: 1 equals *No improvement* and 5 equals *Greatly improved.*

Encouragingly most respondents felt that their skill levels improved in all areas in which training was provided. Interestingly respondents felt they had experienced most improvement in their understanding of the current situation and threats to shorebirds both globally and locally as well as their ability to identify shorebirds. The improvement in ability to count large or multi-species flocks were ranked less highly perhaps indicating less opportunity to practice those skills.

Type of skill	# responses	Average response
Knowledge of threats the birds face internationally	18	4.28
Knowledge of threats the birds face locally	18	4.11
Migratory Shorebird Identification	18	4.06
Mitigating my potential impact as an observer	18	4.00
Shorebird ecology	18	3.94
Understanding my potential impact as an observer	18	3.89
Resident shorebird identification	18	3.67
Spotting difficult to see birds	18	3.53
Collecting data for a scientific purpose	18	3.44
Using Birdata	18	3.38
Reading and recording leg bands or flags	18	3.33
Age class (chick/juvenile/adult) identification	18	3.12
Counts of large flocks	18	2.94
Counts of multi-species flocks	18	2.82

Q49 *If there was no opportunity for training beyond reading materials and email support, how likely would you have been to participate?* (1 indicates highly UNLIKELY and 5 indicates highly LIKELY)

39% of survey respondents felt that they would be unlikely to participate if there was no opportunity for training beyond reading materials and emails. Only 5.6% felt that it was highly likely they would still participate. The average weighted response was 2.75.

Q50 *As a whole, training was a positive experience for me.*

58.8%, of respondents strongly agreed and 35.3% agreed that the training experience was a positive one. No respondents felt it was a negative experience while 1 respondent was ambivalent.

Q51-Q66 For each of the 16 following statements, respondents (n=17) were asked to indicate their level of agreement with how much the training assisted in achieving the outcomes (1 being strongly disagree to 5 being strongly agree).

Outcome	# responses	Average response
Fostered a sense of making a difference to threatened birds	17	4.59
Presented me with an opportunity to volunteer	17	4.24
Increased my satisfaction in birding	17	4.24
Increased the frequency of my participation	17	4.00
Increased my confidence in what I was observing	17	4.12
Improved my connection with community	17	3.94
Led to me sharing my knowledge with others	17	3.94
Diversified the range of activities in which I would have participated	17	3.81
Fostered a broader interest in science, natural history and/or conservation	17	3.81
Presented me with science in an accessible format	17	3.80
Increased my confidence in data collection	17	3.63
Improved my well-being, health and/or fitness	17	3.59
Increased the number of data reports I submit	17	3.54
Increased my confidence/capacity in leadership	17	3.07
Increased my awareness of Health & Safety when monitoring shorebirds	17	3.06
Improved my career opportunities/prospects	17	2.21

Q67 If you have any further comment to make about the importance of training, please add your comments here:

Comments from respondents varied greatly. All were supportive and many included suggestions as to further training that could be provided in the future. Some examples are provided below:

- "Perhaps provide this type of training to the younger generation such as schools. If they grow up with this knowledge, then they are more likely to care and participate as they mature"
- "Well done Birdlife. I think there needs to be another stage of Shorebird education beyond the initial workshops in order for newly informed volunteers to become actively engaged in future events. Such continual appreciation fosters a greater chance of enjoying shorebirding, perhaps one of the most difficult group of coastal birds to identify"

- "Would like to see more workshops on oystercatchers ID, monitoring and ecological research"
- "I filled out this as a relative newcomer to birding and contributor to bird welfare and habitat. Lots more practice needed at identification, counting, monitoring etc. BirdLife workshops and their highly skilled employees have greatly enhanced my knowledge and enthusiasm for involvement with bird needs and their habitats."

BEACH-NESTING BIRDS TRAINING

Demographics of survey participants

Gender: 67.4% of survey participants were female and 32.6% male.

Age: 69.7% of survey participants were aged between 55-74, 11.6% between 45-54, 9.3% were aged 35-44 and 7% were 75-84 and 2.3% aged 18-24.

Employment status: 60.5% of survey participants were retired, 20.9% in part time or casual employment, 13.9% employed fulltime with both students and unemployed participants making up 2.3%.

Education: 37.2% of survey participants hold Bachelor level Degrees, 27.9% postgraduate qualifications, 18.6% have completed Graduate Diploma or Certificate level education, 13.9% senior secondary school and 2.3% other (still completing studies).

Exposure to the sciences: 46.5% of respondents have studied or worked in Education, 42.9% in Biological sciences, 39.2% in other sciences, 32.1% have studied or worked in Threatened species management or conservation and 14.4% in Mathematics and Statistics. Overall this indicates that most of the respondents had a foundational knowledge of science prior to the training.

Attendance at training workshops

81.4% of respondents had attended a Hooded Plover workshop, 34.9% a Red-capped Plover workshop, 32.6% an Oystercatcher workshop and 44.2% the National BNB conference. Many respondents branched out to attend a mix of training workshops offered, to include both Hooded Plover focused workshops as well as Red-capped Plover or Oystercatcher workshops, and even National conference attendance. Most respondents had attended on average 3.4 workshops, with the maximum attendance being 14 workshops/conferences!

Participation in the Projects

In total, 81.4% (n=35) of survey participants indicated they are active volunteers in the Beach-nesting Birds program. Only 7% of survey participants were involved in shorebird or beach-nesting bird monitoring prior to the establishment of the BirdLife Australia training events in 2007. However, at the time of this survey, 55.8% were volunteers with Friends of the Hooded Plover Fleurieu Peninsula, 18.6% were primarily involved with Red-capped plovers, 7% with Oystercatchers, while 18.6% were not participants of BirdLife Australia's Beach-nesting Birds program.

Q10 What activities do you participate in as part of the Beach-nesting Birds project?

From 35 respondents invited to "tick as many as apply" the results show participation in a number of areas:

Activity type	% attending
Monitoring birds	91.4
Chatting to the public (sharing knowledge) on the beach	77.1
Biennial count	71.4
Monitoring threats at breeding sites	62.9
Data entry	52.3
Setting up or helping maintain nest site protection	37.1
Helping at events	34.3
Other (please specify)	11.4

Other activities specified included:
- "I write a hoodie report for the local neighbourhood community newsletter so that local residents know how the hoodies are faring and to encourage behaviours favourable to the hoodies"
- "Training and mentoring volunteers, media appearances, grant applications, organising displays"

Q11 What year did you first attend a BirdLife Australia training session?

Most respondents initially attended a BirdLife Australia training session several years ago, although the percentage of first attendees in 2018 indicates many of the people who have attended a session most recently have participated in this survey.
Between 2009-2011 - 12%, Between 2012-2014 - 33%, Between 2015-2017 - 38%, In 2018 -17%

Q12 What first motivated you to attend a training session?

 "Seeing a handwritten sign advising the current status of the nesting birds is what made me phone up. I thought, 'wow, real live human beings are looking out for the birds' - it was that personal touch that attracted me."

Motivation	% responses	# responses
General interest in birds	85.7	36
To learn directly from experts who work with these birds	73.8	31
General interest in the coast and coastal issues	73.8	31
To learn how to contribute to conservation	71.4	30
General interest in science/the environment	64.3	27
To have an opportunity to see shorebirds in their natural habitat	45.2	19
To meet/connect with others in the community	23.8	10
It was recommended to me by someone I know	21.4	9
Read about these birds in the media	11.9	5
Other (please specify)	9.5	4

Q14 – Q18 How do people identify themselves? (1 indicates "I don't identify with this" and 5 indicates "I strongly identify with this")

This question was designed to explore the type of participant, and how participants identify themselves. The Beach-nesting Birds Project is fundamentally a citizen science project where volunteers help the birds and their actions make a direct positive impact on conservation of these

birds. Most participants recognise themselves as volunteers helping save the birds, but very interestingly, did not strongly identify as citizen scientists.

How do people identify themselves?	# responses	Average response
I am a volunteer making a difference to conservation of threatened birds	42	4.40
I am a volunteer helping educate others about birds and conservation	42	3.93
I am a bird watcher contributing to a monitoring project	42	3.90
I am a volunteer contributing to a community project	42	3.83
I am a citizen scientist collecting important information	42	3.81

To identify possible relationships between survey responses, response data from each section were reduced by conducting a Principal Component Analysis (PCA). The first three of the five generated principle components explained substantial amounts of variation in survey responses (87.7%; see table i). These principal components describe aspects of participants survey responses. The three selected components (Table i) that explained greater than 0.75 of variation in the data can be described as: (1) participants perceiving themselves as a citizen scientist, (2) participants who do not identify as a bird watcher but strongly identify as a volunteer helping to educate others about birds and conservation, and (3) individuals who do not identify as a volunteer but strongly identify as being a citizen scientist (Table ii). How participants identify themselves may in future help guide what roles (from the volunteer role descriptions) may best suit them, their skills and their interests.

Table i. Principal Components Analysis results where cumulative proportion of variance up to 0.75 is used to select components for further interpretation. Those components selected for further interpretation are highlighted.

Attribute	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5
Standard deviation	2.148	1.002	0.954	0.791	0.539
Proportion of variance	0.620	0.135	0.122	0.084	0.039
Cumulative proportion of variance	0.620	0.755	0.877	0.961	1.000

Table ii. Questions 14 – 18. Question loadings; highlighted values indicate component scores of a magnitude ≥ 050, which were used to interpret the principal components.

Question	Comp 1	Comp 2	Comp 3
I am a citizen scientist collecting important information about birds	0.540	0.177	0.533
I am a bird watcher contributing to a monitoring project	0.476	-0.784	-0.374
I am a volunteer making a difference to conservation of threatened birds	0.304	0.218	-0.223
I am a volunteer contributing to a community project	0.473	-	0.420
I am volunteer helping to educate others about birds and conservation	0.406	0.553	-0.592

Q19 to Q31 Respondents were asked to score 13 types of training on a scale from 1 meaning *Least effective* to 5 meaning *Most effective*. The below table summarises the average scores provided. The results indicate that attendees value opportunities to experience and to see, or hear about, situations in real life and that information presented with a visual or hands on component were rated higher.

Type of training	# responses	Average response
Field visit as part of workshop	38	4.68
Presenters sharing real life case studies	38	4.61
Opportunities to ask questions at the workshop	38	4.55
Quality and range of photographs showing the birds and their behaviours	38	4.50
Opportunity to observe birds through a scope	38	4.50
Videos included in the presentation	38	4.37
Conference (e.g. Beach-nesting Birds conference with a range of speakers	38	4.33
Mentor accompanying me in field (e.g. BirdLife staff or a Regional Coordinator)	38	4.31
Referencing scientific studies or including research findings	38	4.26
Indoor workshop with PowerPoint presentations	38	4.16
Opportunities to follow up with questions via email/phone	38	4.03
Reading training resources (handouts, guide booklets, website info)	38	3.97
Online inductions (e.g. beach-nesting bird monitoring induction)	38	3.83

For questions 19 – 31, principal component analysis produced 13 principal components. The first four of these components explained 75.8% of the variation in survey responses and were selected for further interpretation. The four selected components (Table iii) can be described as: (1) participants responding positively to the conference, (2) participants who respond positively to online inductions, (3) individuals responded negatively to viewing birds through a scope, and (4) participants who respond negatively to online inductions (Table iv).

Table iii. Principal components were generated, but only the five explaining the greatest variation in data are shown here. Components cumulatively explaining 0.75 of the data are selected for further interpretation and are highlighted.

Attribute	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5
Standard deviation	2.227	1.626	1.393	1.181	1.082
Proportion of variance	0.344	0.183	0.135	0.097	0.081
Cumulative proportion of variance	0.344	0.527	0.662	0.758	0.840

Table iv. Questions 19 – 31. Question loadings; highlighted values indicate component scores of a magnitude ≥ 050, which were used to interpret the principal components.

Question	Comp 1	Comp 2	Comp 3	Comp 4
Indoor workshop with PowerPoint presentations	0.152	0.270	-	0.232
Videos included in the presentations	0.123	0.279	-	0.182
Quality and range of photographs showing the birds and their behaviours	-	0.194	0.159	0.135
Presenters sharing real life case studies	-	0.166	0.136	0.184
Referencing scientific studies or including research findings	-	0.141	-	0.369
Opportunities to ask questions at the workshop	0.103	0.144	-	0.245
Opportunities to follow up with questions via e-mail or phone	-	0.193	0.273	0.277
Field visits as part of workshop	-	0.115	-	0.119
Opportunities to view birds through a scope	0.175	-	-0.859	0.328
Online inductions. E.g. Beach-nesting Birds online induction	0.146	0.608	-0.241	-0.660
Reading training resources (handouts, guide booklets, website)	-	0.286	0.224	0.102
Mentor accompanying me in field. e.g. BirdLife staff or a Regional Coordinator	0.390	0.279	-	-
Conference. e.g. Beach-nesting Birds conference with a range of speakers	0.853	-0.401	0.160	-0.136

Q32 Respondents were asked to rank each of the following types of training in order of importance In this question 1 indicates MOST important with 5 being LESS important.

45% of respondents ranked an *Outdoor workshop/field visit as part of workshop* as most valuable form of training, while 23.7% rated a S*ite visit with mentor* as most valuable. 0% rated O*nline induction* as most important whereas 47.4% ranked it as least important. Again emphasising that trainees appreciate a hands on approach.

Type of training	#responses	Average ranking
Outdoor workshop/field visit as part of workshop	38	3.82
Indoor workshop	38	3.55
Site visit with a mentor	38	3.45
Reading materials	38	2.34
Online induction	38	1.84

Q33 *What are the 3 things you have learnt during a training session that have been most important to your participation in beach-nesting bird volunteering?*

Responses to this question fell mainly into 6 categories which are illustrated below by quotes from survey participants:

1. Understanding the current situation in relation to beach nesting birds
- "Understanding level of threats impacting on birds"
- "The plight of the chicks - how difficult their survival is for first 28 days"
- "How management at high threat sites can significantly change (improve) breeding outcomes"
- "The interventions are working, and constantly being reviewed and assessed"

2. The need for community awareness
- "That more people need to get on board ie council and community"
- "That Volunteering is a very useful method of collecting data on birds"
- "Importance of helping others be aware of beach birds"

3. Techniques for communicating
- "How to communicate with public about vulnerability of nesting birds"
- "Communicating effectively with the public"
- "Be prepared to meet people who do not share the same passion as you about the birds"
- "How to approach dog walkers when the situation calls for it"

4. Bird behaviour and what it means
- "Identifying bird behaviours that indicate breeding and how to monitor ethically to ensure the birds"
- "During site visit with mentor: what the birds' behaviours indicate"
- "Learning about the behaviour of our beach nesting birds"

5. Methods used in monitoring beach nesting birds
- "Opportunities to witness scientific sampling, banding etc"
- "How to record the data collected"
- "Best place to walk on the beach"
- "Finding nests"

6. Discovering the interest amongst the community
- "Experience the enthusiasm from fellow volunteers"
- "The passion of the volunteers"

Q34 Did training help you understand the role you could play in helping beach-nesting birds?

100% of respondents answered "Yes" to this question. When asked "Why?" the responses included:

- "The presentation made it very clear, what the mission is, how it is being undertaken, what is working and why. I could clearly see how my participation fit into the project."
- "Training was illuminating because it made me realise how little I knew about hoodies and their vulnerability. As someone interested in nature and birds, my own knowledge gaps enabled me to understand how other beach-goers might know even less - so it made me have more empathy and understanding and thus (I think) a better communicator with other beach-goers."
- "I would not have been able to report effectively on the portal without the training."

Q35-Q53 Have you seen an improvement in the following areas related to training provided?

Respondents to this question were asked to rank 19 types of skill in terms of level of improvement resulting from training. The ranking scale used was: 1 equals *No improvement* and 5 equals *Greatly improved.* Encouragingly most respondents felt that their skill levels improved in all areas in which training was provided. The results also show that areas where respondents feel their skills most improved mirror the emphasis placed on particular fields in the training. Basic understanding of the issues and impacts of the management program and bird species involved showed most

improvement while more advanced skills of predator track and weed identification showed least improvement.

Type of skill	# responses	Average response
Knowledge of threats the birds face	37	4.68
Identifying and interpreting breeding behaviours of beach-nesters	37	4.57
Identification of beach-nesting species	37	4.46
Understanding my potential impact as an observer	37	4.46
Mitigating my potential impact as an observer	37	4.46
Understanding how the different ways dogs can be a threat to nesting shorebirds	37	4.43
Knowledge of the range of methods used to protect beach-nesting birds	37	4.41
Age class (chick/juvenile/adult) identification	37	4.35
Observing chicks	37	4.31
Monitoring nests	37	4.29
Understanding what disturbance is	37	4.27
Collecting data for a scientific purpose	37	4.23
Spotting difficult to see birds	37	4.19
Finding nests	37	4.11
Using the My Beach Bird portal	37	4.08
Understanding the pros and cons of each method to protect beach-nesting birds	37	4.00
Reading and recording leg bands or flags	37	3.91
Identifying tracks and prints (e.g. fox prints)	37	3.78
Identifying weeds that are a threat to shorebirds	37	2.86

For questions 35 – 53, principal component analysis produced 19 principal components. The first five explained 76.6% of the variation in survey responses and were selected for further interpretation. The five selected components (Table v) can be described as: (1) participants who responded (although weakly) overall positively to all questions, (2) participants who were not confident to read leg bands or flags, (3) individuals confident in collecting data for a scientific purpose, (4) participants who were confident to read leg bands and flags, and (5) individuals who were confident in understanding what causes of disturbance were (Table vi). Interestingly, although outside our cumulative 0.75 cut off a sixth principal component weakly described participant who were not confident at identifying age class (i.e. chick vs juvenile), were unsure of their own potential impact as an observer and unsure how to mitigate their impact as an observer. The identification of age class was also an issue that was revealed via quizzes occurring pre- and post-training. This is therefore a topic identified as one that new participants, in particular, struggle with.

Table v. Questions 35 – 53. 19 principal components were generated, but only the five explaining the greatest variation in data are shown here. Components cumulatively explaining 0.75 of the data (all five below) are selected for further interpretation and are highlighted.

Attribute	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5
Standard deviation	2.58	1.85	1.43	1.31	1.22
Proportion of variance	0.33	0.17	0.10	0.09	0.07
Cumulative proportion of variance	0.33	0.50	0.61	0.69	0.77

Table vi. Questions 35 – 53. Question loadings; highlighted values indicate component scores of a magnitude ≥ 050, which were used to interpret the principal components.

Question	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5
Identification of beach-nesting species	0.187	0.436	0.119	0.142	0.344
Age class identification (chick, juvenile)	0.167	-0.132	0.146	-0.184	0.217
Reading or recording leg bands or flags	0.205	-0.573	-0.311	0.556	0.204
Spotting difficult to see birds	0.293	0.134	0.266	0.186	-
Understanding my potential impact as an observer	-	-	-	-	-
Mitigating my potential impact as an observer	0.174	-	-	-0.134	0.134
Collecting data for a scientific purpose	0.121	-0.213	0.752	0.359	-0.215
Knowledge of threats the birds face	-	-	-	-	0.131
Identifying and detecting breeding behaviour	0.156	-	-	-	-0.124
Finding nests	0.342	0.263	-	-	-0.123
Monitoring nests	0.408	0.157	-0.266	0.135	-0.181
Observing chicks	0.382	-	-0.277	0.195	-0.119
Identifying tracks and prints i.e. fox prints	0.387	0.124	-	-0.199	-
Identifying weeds that are a threat to shorebirds	0.258	-0.330	-	-0.361	-0.440
Using the 'My beach bird' portal	0.115	-0.281	0.201	-	0.129
Understanding the different ways dogs can be a threat to shorebirds	0.106	-	-	-0.101	0.304
Understanding what disturbance is	0.158	-0.139	-	-0.175	0.553
Knowledge of range of methods used to protect beach-nesting birds	-	-	0.102	-0.260	0.122
Understanding the pros and cons of each method of protecting beach-nesting birds	0.157	-0.244	-	-0.322	-

Q54 Have you attended a specialised 'nest protection' training session, either as a Powerpoint session or on-the-beach demonstration of setting up a fenced area?

35% of respondents had attended a nest protection training session. These sessions provide more advanced training in the techniques used for installing and monitoring signage and rope fencing.

Q55-Q61 For the subset who had attended a nest protection training session (n=13), respondents were asked how the training improved their understanding of 7 aspects of nest protection (Ranking 1 being no improvement to 5 being greatly improved). Skill levels in almost all areas were rated as improved, most by a substantial level, however a perception of lower levels of improvement was shown in the use of chick shelters.

Type of skill	# responses	Average response
Appropriate conditions for installing signs and fencing	13	4.54
Work Health and Safety	13	4.45
Impacts of predators watching you	13	4.31
Adapting the set up to the beach layout	13	4.31
Best practice protocols for fencing and signing nests	13	4.15
Time limits for installing signs and fencing	13	4.08
Use of chick shelters	13	3.27

Q62 Have you attended a specialised 'communicating with the public about beach-nesting birds' training session?

29.73% of respondents have attended a 'communicating with the public about BNB' session. *Q63-Q68* For the subset who have attended a 'communicating with the public about BNB' session (n=11). Respondents were asked if the training improved their capacity around various techniques which can be used when communicating (1 being no improvement to 5 being greatly improved). As can be seen by the table below respondents in general felt that all skill types were significantly improved.

Type of skill	# responses	Average response
Approaching members of the public	11	4.45
Best way to deliver information	11	4.45
Improving my understanding of the concept of promoting coexistence between beach users and the birds	11	4.45
Personal safety	11	4.36
Aim of your interaction	11	4.27
Code of conduct	10	4.20

Q69 *If there was no opportunity for training beyond reading materials and email support, how likely would you have been to participate?*

35% of survey respondents felt that they would be unlikely to participate if there was no opportunity for training beyond reading materials and emails. 46% felt that it was likely they would still participate and 19% were ambivalent. Average weighted response 3.24.

Q70 *As a whole, training was a positive experience for me.*

A large percentage, 72.97%, of respondents **strongly agreed** and 22% agreed that the training experience was a positive experience. No respondents felt it was a negative experience.

Q71 What else would you like to have training on? 17 answers

The majority of respondents were happy with the training that was offered. Several suggested that further training on communicating with the public would be useful.

- "Dealing with the owners of uncontrollable dogs"
- "I think that learning about how to approach people and talk to them about their impact on the birds is an important aspect that was not covered greatly"
- "I would like to attend a workshop on interaction with other beach users, particularly dog owners, and will perhaps try to do this next season"
- "Any new forms of disturbance, e.g. drones, kite surfers and how to discuss the implications on beach nesting birds with their users"

Others suggested more in-depth training about chick development, banding and predator print identification would be useful. This highlights the thirst for new knowledge and upskilling by participants.

Q72 Do you have any suggestions for improving training sessions? 19 answers

Most responses to this question suggested further training rather than alterations to current training with one commenting that "there is a lot to take in" and another suggesting that they found it worth attending the session more than once. Suggestions for further training included:

- "More hands-on training and ongoing mentoring including by more experienced volunteers"
- Communication skills including "More information shared of potential dangers of communicating to public on shorebirds and case studies referenced of incidents of what went wrong and advice on conflict resolution"

Q73-Q88 For each of the 16 following statements, respondents (n=37) were asked to indicate their level of agreement with how much the training assisted in achieving the outcomes. (1 being strongly disagree to 5 being strongly agree)

Outcome	# responses	Average response
Increased my confidence in what I was observing	37	4.59
Presented me with an opportunity to volunteer	37	4.53
Fostered a sense of making a difference to threatened birds	37	4.49
Increased my confidence in data collection	37	4.44
Increased my satisfaction in birding	37	4.28
Led to me sharing my knowledge with others	37	4.19
Fostered a sense of shaping positive beach use behaviours	37	4.08
Presented me with science in an accessible format	37	4.05
Increased the frequency of my participation	37	3.94
Increased the number of data reports I submit	37	3.88
Fostered a broader interest in science, natural history and/or conservation	35	3.88
Diversified the range of activities I would have participated in	36	3.74
Improved my connection with community	36	3.61
Increased my confidence/capacity in leadership	37	3.60
Improved my well-being, health and/or fitness	37	3.44
Improved my career opportunities/prospects	37	2.42

Principal Component Analysis for questions 73 – 88 produced 11 principal components. The first four explained 77.0% of the variation in survey responses and were selected for further interpretation. The selected components (Table vii) can be described as: (1) participants who responded (although weakly) overall positively to all questions, (2) participants who did not think the training improved their career prospects, (3) participants who felt the training did not foster a broader interest in science, natural history and/or conservation, and (4) participants who felt the training did not increase their satisfaction in birding (Table viii).

Table vii. Questions 73 – 88. 11 principal components were generated; but only the four explaining the greatest variation in data are shown here. Components cumulatively explaining 0.75 of the data are selected for further interpretation and are highlighted.

Attribute	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5
Standard deviation	2.19	1.61	1.49	1.24	0.99
Proportion of variance	0.33	0.18	0.15	0.11	0.07
Cumulative proportion of variance	0.33	0.51	0.66	0.77	0.84

Table viii. Questions 73 – 88. Question loadings; highlighted values indicate component scores of a magnitude ≥ 050, which were used to interpret the principal components.

Question	Comp 1	Comp 2	Comp 3	Comp 4
Increased my confidence and capacity in leadership	0.474	0.192	0.120	0.397
Diversified the range of activities I would have participated in	0.486	-	-	0.160
Fostered a broader interest in science, natural history and/or conservation	0.418	-0.258	-0.743	-0.172
Improved my wellbeing, health and/or fitness	0.410	0.130	-	-0.328
Improved my connection with community	0.253	-	0.190	0.194
Led to me sharing my knowledge with others	0.194	0.185	0.182	0.179
Fostered a sense of making a difference to threatened birds	0.151	-	0.251	-0.195
Fostered a sense of shaping positive beach use behaviour	0.120	-	0.203	-0.116
Improved my career opportunities and prospects	0.181	-0.886	0.378	-
Increased my satisfaction in birding	0.103	0.162	0.212	-0.730
Presented me with science in an accessible format	0.117	0.153	0.251	-0.158

Q89 If you have any further comment to make about the importance of training, please add your comments here:

All responses from survey participants about the importance of training were enthusiastic and included:

- "Training is extremely important!"
- "I think the face-to-face and other training offered by BirdLife Australia is vital. It has provided me with knowledge, skills and a capacity to observe shorebirds (resident & migratory - different training programs) that I wouldn't have otherwise developed. It has enabled me to remain connected to and involved in science and species conservation in retirement, which I might otherwise not had. I feel I can contribute to something really worthwhile and am connected to a group of interesting, like-minded people. Training sessions are a chance to catch up with others spread across the region/state/country. Win-win-win! Works for me, and hopefully works for BirdLife and the birds too!"
- "Connecting our scientists and experienced bird watchers with the community is not only valuable for the individual trainee but for the community in general"
- "Unifies the strategies in protecting BNB"

Key findings and Recommendations

Overwhelmingly, respondents gave high and positive scores for training provided and unanimously indicated that it helped them understand the role they could play to help shorebirds and was a positive experience. Training increased people's confidence in what they were observing, gave them an opportunity and avenue for volunteering, and fostered a sense of making a difference to helping threatened birds.

Birds n Bickies participants were attracted to the training opportunities for different reasons to BNB participants. They generally had a stronger interest in the coast, birds in the wild, learning from experts and learning how to make a contribution to conservation, while BNB participants primarily had a general interest in birds, then followed by wanting to learn from experts and an interest in the coast, as well as contributing to conservation. While Birds n' Bickies hadn't been recruited by friends or media, this was not the case for a number of BNB participants.

Both sets of Shorebird program participants identified most strongly as volunteers making a difference to conservation of threatened birds and only weakly identified as citizen scientists who collect important information. The latter may relate to more diverse roles that these volunteers play, where often they participated in additional activities beyond data collection.

Similarly, both sets of Shorebird program participants valued field visits most highly, more so for Birds n' Bickies participants. Differences in responses to types of training were mainly that BNB participants valued more highly the opportunity for asking questions and the range of photographs used to show the birds and their behaviours, as well as videos, conferences and scientific references. This indicates that perhaps the skills that Birds n' Bickies volunteers require for monitoring migratory shorebirds rest more heavily on having sharpened identification and counting skills, while BNB monitoring relies heavily on interpretation of behaviours, recognising subtle cues and adaption of conservation efforts has been shaped in real time by new research, so that the volunteers can see the value in exposure to new research findings.

Principal Components Analysis of BNB respondents rankings of the different delivery mechanisms of training revealed that elements such as the inductions had polarised reactions, with one group positively responding to this while another proportion negatively responded; a strong positive response to the BNB conference (which is in line with feedback from attendees), and interestingly some individuals who didn't feel that scope viewing was beneficial.

The training content that people felt increased their knowledge/skills the most was primarily around the threats the birds faced for both programs, then for Birds n' Bickies it was more around identification of species and shorebird ecology, while for BNB it was identification of behaviours and the way threats operate, and both improved their understanding and mitigation of impacts as observers.

The Principal Components Analysis for BNB data for training content revealed most participants responded positively to all types of content, while there were also distinct groups of individuals who were and who were not confident in reading leg bands/flags, individuals confident in collecting data for a scientific purpose, individuals confident in understanding what causes of disturbance were and to a lesser extent participants who were not confident at identifying age class (i.e. chick vs juvenile), their own potential impact as an observer and how to mitigate their impact as an observer. The identification of age class was also an issue that was revealed via quizzes occurring pre- and post-training. This is therefore a topic identified as one that new participants, in particular, struggle with. The lack of confidence in knowing and mitigating impact as an observer is something we tackle heavily in ongoing mentoring, highlighting that in order to sufficiently train individuals, it is critical that there are multiple training opportunities.

Potential participation rates in the absence of one-to-one training were rated as low for both programs, but far lower for the Birds n' Bickies participants, indicating that training greatly improves capacity to participate in monitoring migratory shorebirds.

When comparing the two sets of shorebird training participants, it was evident that BNB participants strongly increased their confidence in interpreting their observations and collecting data, enjoyed access to science in an accessible format, and these also resulted in sharing knowledge with others. This was distinct from the Birds n' Bickies participants. Both groups felt that training presented them with an opportunity to volunteer (over 80% of BNB participants went on to volunteer for example) and fostered a sense of making a difference to threatened birds.

Training was rated as lower value for career prospects and opportunities, although this is likely to relate to the demographic of mostly retirees who participated in the survey, particularly for Birds n' Bickies participants who were all either employed or retired.

Identifying environmental factors such as weeds and predator prints were still areas participants feel they have not improved on after training, while all aspects of understanding the birds, monitoring, how threats operate and data collection were strongly understood after training.

Respondents have a thirst for new knowledge, and many have indicated they would like to extend their skills further and be exposed to training on identifying predator prints, understanding chick development and age classes, and tips on communication when seeking to change behaviours of coastal users. This will guide future development of upskilling workshops for existing participants.

Acknowledgements

Components Analyses on a subset of the data. Thanks to Danielle de Wit with assisting with setting up the questions in Survey Monkey.

Special thanks to all those who took the time to complete the survey. We asked many questions of you but we learnt so much and thank you for taking the time to do this.