Aquatic Weeds Training and Awareness:

Survey Results from the
New South Wales (NSW) Murray Region

March 2015

Table of Contents

1. Introduction

As part of a larger project to reduce the spread of aquatic weeds in the Murray Darling Basin (MDB; MDB Aquatic Weeds Project) (Cherry & Bosse 2014), five '*Recognising Water Weeds (RWW)'* courses (Industry & Investment NSW 2009) were held in the New South Wales (NSW) Riverina region in spring 2014. These courses aimed to provide weed professionals or people working in Natural Resource Management (NRM) with basic knowledge and skills to identify aquatic weeds, including Weeds of National Significance (WoNS), to better understand and minimise the impact of aquatic weeds to Australia's waterways.

The MDB Aquatic Weeds Project aimed to improve awareness and aquatic weed management skills among NRM professionals who manage water for production and environmental purposes, as well as determine knowledge gaps to improve future training and resource development. The *'RWW'* courses provided a means to engage with NRM professionals, and to conduct a survey to collect information on their knowledge gaps and future needs. The courses were advertised widely to weeds officers, irrigation managers, Department of Primary Industry (DPI) staff, Local Land Services (LLS) staff, National Parks and Wildlife Service (NPWS) staff, and other land and water managers in the Riverina region. As an incentive to encourage participation the cost of the course, normally $300 per person, was fully covered by the MDB Aquatic Weed Project and participants could obtain accreditation if desired.

The five courses held in Yanco, Albury and Deniliquin, attracted eighty-one participants in total. Participants were provided with a basic introduction to aquatic weeds including, state and territory legislation, impacts on the environment, aquatic plant recognition techniques (including 'hands-on' plant samples), correct disposal of aquatic materials and early detection survey guidelines. The courses also included a focus on invasive water plants that pose a serious threat to the MDB such as, sagittaria (*Sagittaria platyphylla*), water hyacinth (*Eichornia crassipes*), cabomba (*Cabomba caroliniana*), alligator weed (*Alternanthera philoxeroides*) and Mexican water lily (*Nymphaea mexicana*).

2. Survey Objectives and Methodology

The MDB aquatic weeds project officer conducted surveys before and after each of the five courses delivered, using a two-part questionnaire. The 'Before' questionnaire (Appendix A) was given to the participants on the day of the course, prior to the start, using a written paper format. The 'After' questionnaire (Appendix B) was emailed to the same participants using a Survey Monkey format six weeks after the course took place. A reminder email was sent one week after the initial email request, and participants were given a total of twenty-one days to fill out the Survey Monkey form before it was closed.

Of the eighty-one participants who attended the courses, forty people attended one of three one-day courses delivered in Yanco on 17, 18 and 19 September, 2014; twenty attended the course in Albury on October 28, 2014; and twenty-one attended the course in Deniliquin on October 30, 2014. Overall, 62% of participants completed both 'Before' and 'After' questionnaires.

In the questionnaires (Appendix A and B), participants self-rated their level of knowledge and interest in aquatic weeds and their ability to notice and/or identify potential aquatic weeds by responding to single-answer multiple choice questions with response choices being: None, A little, Reasonable, Moderate and Extensive. The questionnaires also contained a second section consisting of multiple-answer, multiple choice questions and open-ended text questions that allowed the respondents to provide opinions and/or suggestions regarding weed identification and training resources and processes.

The objectives of the survey were to:

- Assess changes in the level of knowledge and interest in aquatic weeds, including the ability to detect and identify them before and after the course.
- Assess how aquatic weed incursions were being reported and where participants seek assistance with aquatic weeds identification and/or control.
- Gather opinions from participants about the '*RWW*' course content.
- Seek suggestions on tools or resources that can be provided in future to help maintain or improve aquatic weed management skills.

3. Survey limitations

The '*RWW*' course has been delivered nationally since 2009. This survey only covered five courses in NSW, thus only representing a small snapshot of opinions related to the '*RWW*' course. Only nominal data were collected from the survey using open-ended text and multiple choice questions, limiting statistical analyses. Data analysis was limited to frequency distribution tables and tally sheets to obtain percentages and modes. Paper-based questionnaires were given to participants before undertaking the course, while web-based questionnaires (Survey Monkey) were emailed to the same participants after attending the course. The surveyor was present to administer paper-based questionnaires and encouraged participants to complete them. However, this was not the case in the web-based questionnaire, where only an email remainder was sent. Thus, the web-based questionnaire gathered fewer responses, which in turn, decreased the sample size. Furthermore, the survey was not anonymous. The respondent may not have felt comfortable providing answers that might present them in an unfavourable manner.

4. Results

4.1 Question 1:

How would you rate your level of (a) Knowledge and (b) interest in aquatic weeds?

As Figure 1 demonstrates, participants' self-rated level of knowledge of aquatic weeds increased overall following the course. 'Reasonable' responses tripled (12% to 34%), while 'Moderate' responses doubled (22% to 40%) after undertaking the course. 'None' responses decreased to 0% and 'A little' responses decreased by more than half (48% to 18%). Lastly, 'Extensive' responses slightly increased from 2% to 8%.

The level of interest in aquatic weeds among participants did not greatly change after undertaking the course, with 'Reasonable' and 'Extensive' responses slightly increasing (66% to 70% and 10 to 18% respectively), while 'Moderate' and 'A little' responses decreased by half (20% to 10% and 4% to 2% respectively). 'None' responses were absent in both 'Before' and 'After' questionnaires.
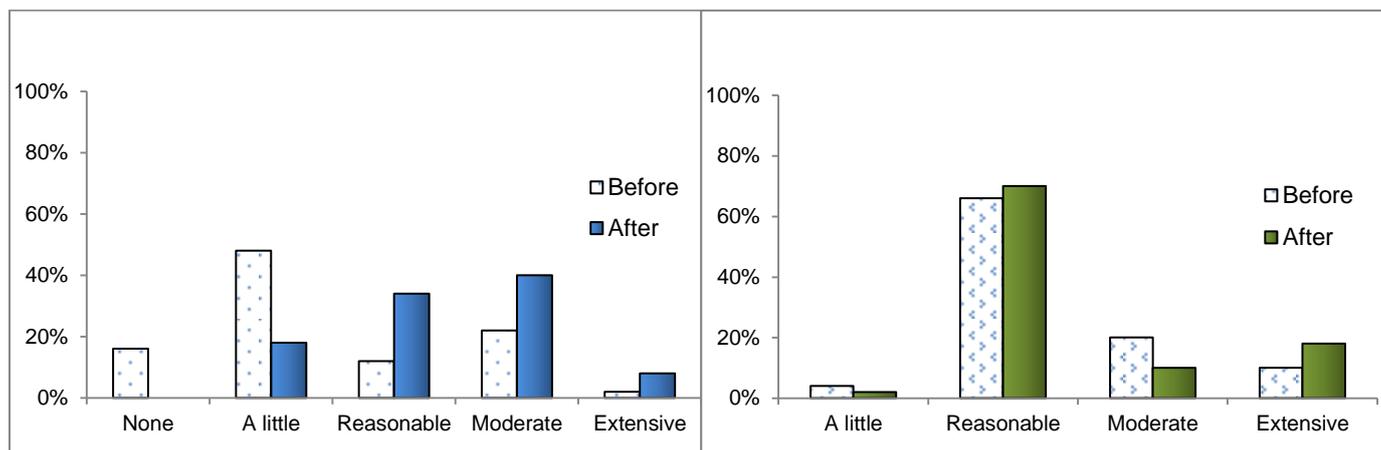
Figure 1. Self-assessment of (n=50) respondents rating their (a) level of knowledge and (b) level of interest in aquatic weeds before and after undertaking '*RWW*' course in Riverina region, NSW.

4.2 Question 2 and 3:

How would you rate your ability to (a) notice/find an aquatic weed and (b) positively identify an aquatic weed?

Participants felt their ability to notice and/or positively identify an aquatic weed improved after undertaking the '*RWW*' course (Figure 2). 'Reasonable' and 'Moderate' responses increased (30% to 44% and 30% to 42% respectively) when participants self-rated their ability to notice an aquatic plant that that might be a weed following the course. There was also an increase in 'extensive' responses (2% to 12%), while 'None' and 'A little' responses greatly decreased from 8% to 0% and 30% to 2% respectively.

A similar trend occurred when participants self-rated their ability to positively identify an aquatic weed after attending the course, with 'Reasonable' and 'Moderate' responses increasing from 14% to 46% and 32% to 42% respectively. 'Extensive' responses also increased (2% to 8%), while 'None' responses decreased 100% and 'A little' responses greatly decreased by more than half (40% to 14%).
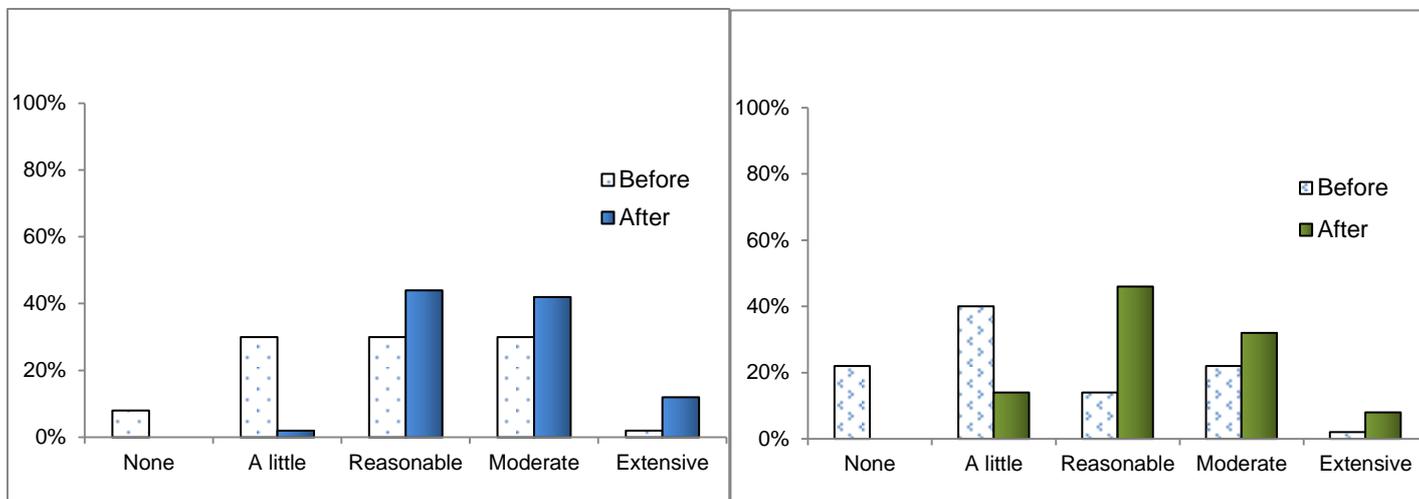

Figure 2. Self-assessment of (n=50) respondents rating their (a) ability to notice and/or find an aquatic weed and (b) ability to positively identify an aquatic weed after attending '*RWW*' course in Riverina region, NSW.

4.3 Question 4:

Have you found/noticed any aquatic weeds since undertaking the course? If yes, please describe what you found, who you notified, and what action was taken.

Respondents were asked a dichotomous question to find out if they have found and/or noticed any aquatic weeds since undertaking the course. 22% of participants responded yes (Table 1). Seven respondents reported what aquatic weed was found: some covered in the course such as *Sagittaria platyphylla,* azolla (*Azolla spp.*)*,* smart weed (*Persicaria decipiens*) and elodea (*Elodea canadensis*), and other noxious weeds including, ribbon weed (*Vallisneria Americana*, cumbungi (*Typha spp.*) and phragmites (*Phragmites australis*).

Out of seven positive respondents, two provided more detail on what action was taken when the weed was found and identified (a control request was added to their system and the weed infestation was added to scheduled maintenance during growing season). No respondents identified who they contacted when notifying the aquatic weed. Deniliquin and Yanco showed similar results, with 29% and 28% (respectively) participants finding aquatic weeds since undertaking the course, while Albury has only 1 participant with a positive response (7%).

Table 1. Percent of participants (n=50) from Riverina region, NSW who noticed and/or found aquatic weeds six weeks after attending 'RWW' course.

	Albury	Deniliquin	Yanco	Total
No	13 (93%)	5 (71%)	21 (72%)	39 (78%)
Yes	1 (7%)	2 (29%)	8 (28%)	11 (22%)
No. of Respondents	14	7	29	**50**

4.4 Question 5 and 6:

<u>Before</u>: *if you discovered a possible aquatic weed, do you know who to contact to assist with identification and/or control? If yes, who would you talk to?*

<u>After</u>: *In future, who will you contact if you find a declared and non-declared aquatic weed?*

In the second part of the 'Before' questionnaire, participants were asked a dichotomous question followed by an open-ended text question to determine what agencies or people they would contact to assist with identification and/or control of an aquatic weed. In the 'After' questionnaire, they were asked multi-choice questions (multiple answers were permitted) to determine who they would contact if they found a (a) declared or (b) non-declared aquatic weed.

Before undertaking the course, 70% of the sample size (N=50) indicated they knew who to contact to assist with identification and/or control (*i.e.* responded 'yes') of an aquatic weed, while the remaining 15 participants responded 'no'. those who replied 'yes', provided 'write-in' responses indicating, as depicted in Figure 3, that they would contact Local Government Weeds Officers (the most common response at 49%), the DPI Invasive Plants Hotline (40%), supervisors and/or colleagues (23%) and Local Land Services Representative (6%).
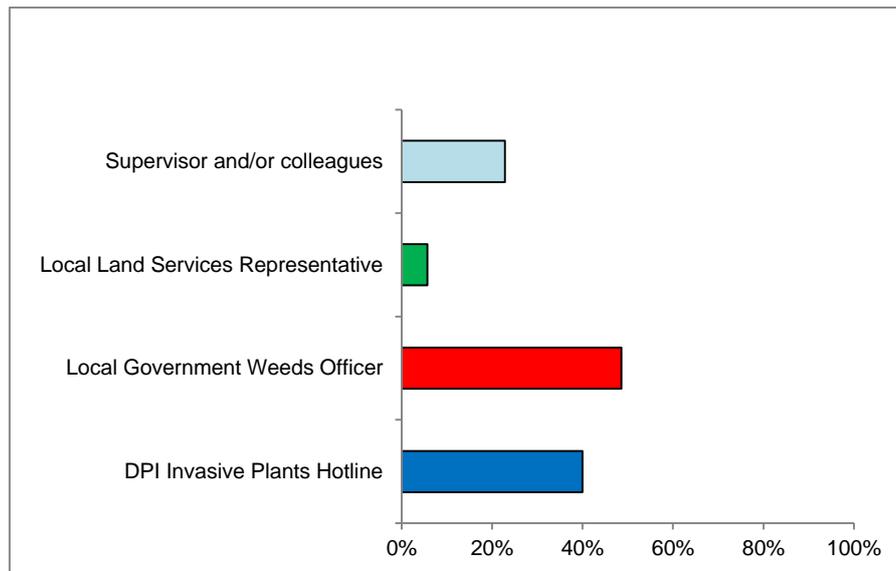
Figure 3. Preferred agencies or people to contact by respondents (n=35) to assist with ID and/or control of a possible aquatic weed before undertaking the 'RWW' course in Riverina region, NSW. Multiple answers were permitted

After attending the course, participants were asked who they would contact if they found an aquatic weed and to choose from: DPI Invasive Plants Hotline, Landowner/manager, Local Government Weeds Officer, Local Land Services Representative, Regional Weed Group and other. They were asked this question separately for (a) declared and (b) non-declared weeds (Figure 4).

If a declared aquatic weed was found, respondents would contact the DPI Invasive Plants Hotline (80%) as a first choice followed by the Local Government Weeds Officer (68%), Landowner/manager (62%) and Regional Weed Group and Local Land Services representative (34% and 32% respectively). 8% of respondents selected 'other' and provided a 'write-in' response, indicating that they would also contact the contracted client to discuss the next step, NPWS, immediate supervisor and local clubs or groups using the waterway where the declared weed was found (e.g. local land care group, local fishing club, wetlands committees, etc.).

In contrast, if a non-declared aquatic weed was found, respondents would prefer to contact the Local Government Weeds Officer (62%), Landowner/manager (58%) and DPI Invasive Plants Hotline (38%). Local Land Services Representative and Regional Weed Group are the least preferred agencies to contact, with 22% and 20% (respectively). 4% of respondents selected 'other', indicating they would contact the contracted client and would notify users of the waterway where the non-declared weed was found.

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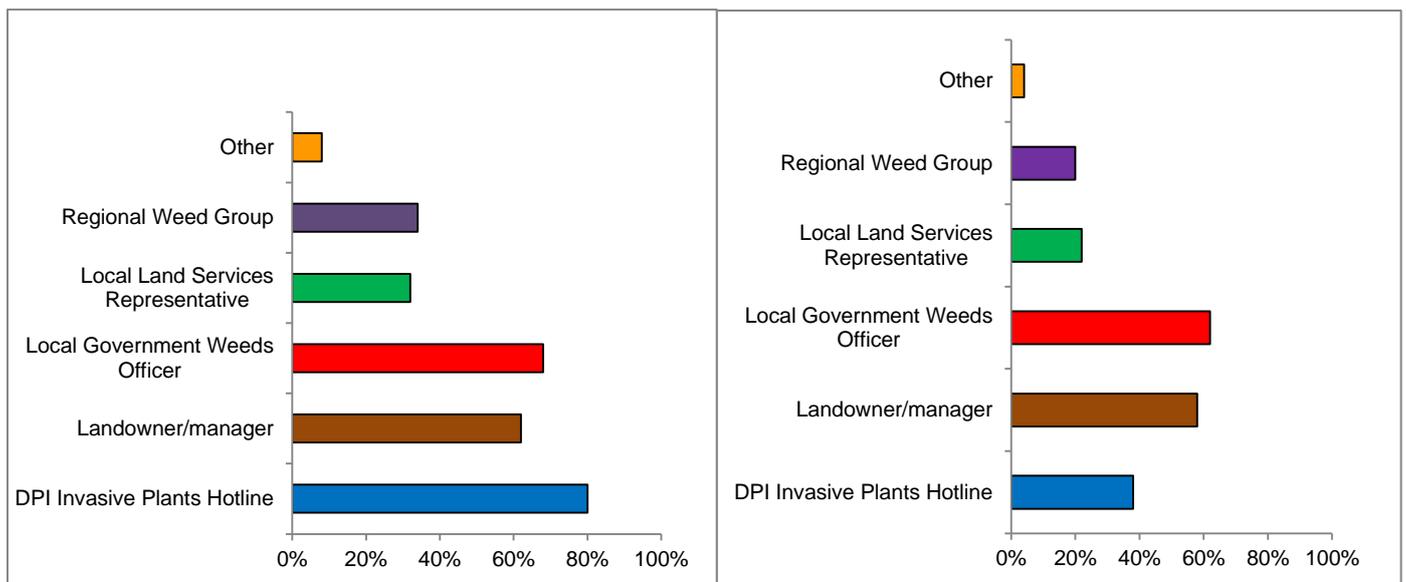
Figure 4. Preferred agencies or people to contact by respondents (n=50) to assist with ID and/or control (a) if you found a DECLARED noxious aquatic weed and (b) if you found a NON-declared aquatic weed after undertaking 'RWW' course. Multiple answers were permitted.

Course content: Participants feedback

4.5 Question 7:

Other than identifying aquatic weeds, what things did you learn from the course that you can use in your work?

Fifty-nine participants responded to this open-ended text question, which allowed respondents to give multiple answers in their own words. Respondents mentioned that other than identifying aquatic weeds, they learned basic information about aquatic weeds, inspection and collection techniques, and how to preserve samples for reporting purposes or keep them as reference specimens. The '*RWW*' course allowed the participants to network (e.g. exchange contact information among regional and state level staff) as well as share knowledge and experiences in regards to weed management. Participants also pointed out the importance of learning about what agencies or people are available able to assist them with identification and management of aquatic weeds.

Before: What is/are the most important thing/s you would like to learn about aquatic weeds?

After: What was missing from the course? (e.g. issues not covered)

Fifty-nine participants answered the 'Before' open-ended text question. Although the respondents were aware that the course mainly focused on aquatic weed identification skills, 54% of respondents expected to learn about control measures, 19% wanted to know more about impacts of aquatic weeds on the environment, and 14% wanted to learn more information on who to contact if aquatic weeds were found or noticed.

Fifty participants responded to the 'After' open-ended text question. After undertaking the course, most respondents pointed out they would have liked more detailed information on control measures and/or aquatic weed management. One participant felt that there was not much information given about how native aquatic plants can also become weeds. Overall, most participants were happy with the content and duration of the course, highlighting that the course was comprehensive and well delivered.

Aquatic weed identification and training resources: Participants feedback

4.7 Question 9(a):

What networking, communication or training opportunities can be provided in future to help weed professionals maintain or improve your aquatic weed management skills (e.g. identification, control, planning or other management) How often should the activity take place?

Thirty-one participants answered this open-ended text question. Responses included annual training sessions covering identification techniques and control measures and annual field training and/or workshops to learn or refresh aquatic weeds identification skills and knowledge.

Several participants indicated that the development of an online tool (website, e-news or newsletter) to be updated or delivered every six months would be useful to assist them in managing aquatic weeds. The online tool could contain: possible dates for training sessions; news about changes in legislation, newly declared weeds and hotspots in NSW; and a space for people to share questions, knowledge and experiences. Lastly, some respondents would like to have a list of contact information of the people who attended the training session.

What tools or resources can be provided in future to help weed professionals maintain or improve their aquatic weed management skills (e.g. weed ID, control, planning or other management)? If applicable, who would be the best to deliver and/or develop the resources (e.g. Regional Weed Groups, LLS, DPI, OEH, etc.)?

This open-ended text question was answered by twenty-five participants. The majority of the respondents indicated that a website or app that includes (i) aquatic weed descriptions, (ii) distribution maps, (iii) identification keys or guides, (iv) e-news, and/or (v) a regional directory, would be a useful tool for weed management. When asked who would be best to deliver and/or develop the resources, 84% of respondents chose DPI, followed by Local Land Services (36%), OEH and Regional Weed Group (20% respectively). Multiple answers were permitted.

5. Conclusions

The comparisons between 'Before' and 'After' questionnaires indicated that the *Recognising Water Weeds* course was successful at improving knowledge in identification and reporting of aquatic weeds, fundamental skills for effective aquatic weed management at local and state level. Participants were not expected to become experts at identifying aquatic weeds after undertaking the course, but rather become confident in their ability to notice and identify possible aquatic weeds. Despite an increase in 'Reasonable', "Moderate' and 'Extensive' responses when participants self-assessed their level of knowledge after undertaking the course, 22% of the fifty respondents subsequently found or noticed an aquatic weed. This limited number could be attributed to the short period of six weeks between the courses and responding the 'After' survey, which might have not allowed sufficient time for the participants to use their newly developed skills.

Respondents were correctly able to identify numerous key agencies and/or people to contact when reporting declared or non-declared aquatic weed incursions. However, Regional Weed Action Groups and Local Land Services Representatives were notably underrepresented, suggesting that respondents may not be aware of the role played by these agencies in the management of aquatic weeds.

Overall, most participants were happy with the content and duration of the *Recognising Water Weeds* course, highlighting that the course was comprehensive, well delivered and provided an important opportunity to network. However, some respondents indicated that information on aquatic weed impacts on the environment and control measures and/or management would be beneficial, despite this being outside the scope of the course. A key suggestion to help maintain or improve aquatic weed management skills

among most participants was the establishment of annual training sessions. Such training sessions should cover identification techniques and control measures, as well as annual field training/workshops to learn or refresh aquatic weed identification skills. Lastly, the development of a website or app that includes aquatic weed descriptions, distribution maps and identification keys or guides; e-news; and regional directory, was proposed by many as a great tool for aquatic weed management.

Analysis of the data gathered in this survey provided baseline information that will help to develop a more complete aquatic weeds identification and training resource, and allow weed and natural resource management professionals to effectively address the risk of aquatic weeds.

6. Acknowledgements

7. References

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State of New South Wales Industry & Investment 2009, *Recognising water weeds: aquatic weeds early detection project*, Industry & Investment NSW, Grafton, accessed 27 January 2015, <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications#Weed-identification>.

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NEW SOUTH WALES
WEEDS ACTION PROGRAM

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Aquatic Weeds – Questionnaire 'Before'

1. Have you participated in an aquatic weed training course before? ☐ Yes ☐ No
   If yes, approximately how long ago was the course?

2. How would you rate your level of i) knowledge and ii) interest in aquatic weeds?
   ☐ Extensive ☐ Reasonable ☐ Moderate ☐ A little ☐ None

3. How would you rate your ability to notice/find an aquatic plant that might be a weed? *e.g.* spotting an aquatic plant that looks unusual (out of place) when doing other field work.
   ☐ Extensive ☐ Reasonable ☐ Moderate ☐ A little ☐ None

4. How would you rate your ability to <u>positively identify</u> an aquatic weed? *e.g.* someone pointing out an aquatic plant to you and you being able to identify it.
   ☐ Extensive ☐ Reasonable ☐ Moderate ☐ A little ☐ None

5. If you discovered a possible aquatic weed, do you know who to contact to assist with identification and/or control? ☐ Yes ☐ No
   If yes, who would you talk to (*i.e.* job title or agency/location – no names necessary)?

6. What is/are the most important thing/s you would like to learn about aquatic weeds?

7. Where will you apply the skills/knowledge from this course in your work? (*e.g.* with what other actions, when? Where? With what other groups? In planning?).

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Aquatic Weeds – Questionnaire 'After'

1. How would you rate your level of i) knowledge and ii) interest in aquatic weeds?
   ☐ Extensive ☐ Reasonable ☐ Moderate ☐ A little ☐ None

2. How would you rate your ability to notice/find an aquatic plant that might be a weed? *e.g.* spotting an aquatic plant that looks unusual (out of place) when doing other field work.
   ☐ Extensive ☐ Reasonable ☐ Moderate ☐ A little ☐ None

3. How would you rate your ability to positively identify an aquatic weed? *e.g.* someone pointing out an aquatic plant to you and you being able to identify it.
   ☐ Extensive ☐ Reasonable ☐ Moderate ☐ A little ☐ None

4. Have you found/noticed any aquatic weeds since undertaking the course? ☐ Yes ☐ No
   If yes, please describe what you found, who you notified, and what action was taken

5. In future, who will you contact if you find a declared noxious aquatic weed?
   i. DPI Invasive Plants Hotline (1800 680 244 or email weeds@dpi.nsw.gov.au)
   ii. Landowner/manager
   iii. Local government weeds officer
   iv. Local Land Services representative
   v. Regional weed group
   vi. Other _____

6. In future, who will you contact if you find a non-declared aquatic weed?
   i. DPI Invasive Plants Hotline (1800 680 244 or email weeds@dpi.nsw.gov.au)
   ii. Landowner/manager
   iii. Local government weeds officer
   iv. Local Land Services representative
   v. Regional weed group
   vi. Other _____

7. Other than identifying aquatic weeds, what things did you learn from the course that you can use in your work?

8. What was missing from the course? (*e.g.* issues not covered)

9. Please tell us what networking, communication or training opportunities and what tools or resources can be provided in future to help you maintain or improve your aquatic weed management skills (*e.g.* identification, control, planning or other management).
   a) Networking, communication or training needs?
      i. How often should the activity take place?
   b) Tools and resources?
      i. Who would be best to develop/distribute these? (*e.g.* internally in your agency, regional weed groups, LLS, DPI, OEH, etc.)