Findings are presented from the baseline survey completed by UPP Down Under students in 2013, 2014, and 2015 and interviews conducted with research abroad participants.

Undergraduate PIRE Program (UPP) Down Under: Baseline Survey Results


- 3 cohorts
- 36 students
- 3 universities
- 13 departments
- Total students each year: 12
- Departments from which students came each year:
  - 2013: 6
  - 2014: 6
  - 2015: 9
- Total of 13 unique departments over three years with 39% from Environmental Engineering.

Reasons for Joining PIRE Project in 2015

Most students joined PIRE to explore research and future academic and career paths. All themes and the percentage of students who mentioned them are shown below.

- Learn about water sustainability: 25%
- Interesting opportunity/new experience: 33%
- Explore research and future academic and career paths: 42%

Strengths and Contributions

When asked what contributions they could make to the PIRE program, several students in 2013 and 2014 talked about teamwork, but only 1 student in 2015 mentioned teamwork as a contribution. The 2015 responses are below:

- Lab/research experience: 33%
- Academic background: 33%
- Personal strengths: 33%

Career Goals and Workforce Development

Students’ participation in seminars and knowledge of career opportunities and contacts declined from 2014, but 54% of 2015 students know where to look and who to contact to pursue a career in the field of urban water sustainability.

Baseline Knowledge

Students’ baseline knowledge has grown since 2013.

- Climate change predictions for Southwest US
  - Ratings of familiarity on knowledge items: 3.33
- Filtration
  - Ratings of familiarity on knowledge items: 3.25
- Sedimentation
  - Ratings of familiarity on knowledge items: 3.25
- Contaminants in sewage
  - Ratings of familiarity on knowledge items: 3.17
- Nitrification/de-nitrification
  - Ratings of familiarity on knowledge items: 4

At baseline, students were not at all familiar with the following items, indicating focus areas for instruction.

- Value, equity considerations and regional planning and governance associated with low-energy options
- Economic approaches for identifying optimal water supply options at the watershed scale
- Photochemical oxidation
- Energy and greenhouse gas savings associated with biofilter relative to conventional water supplies
- Climate change predictions for SE Australia
- Hyporheic exchange
Interviews with Research Abroad Experience (RAE) Participants

Findings are presented from 15-minute Skype interviews with 10 out of 15 participants who worked with Australian partners, including three postdocs, three recent PhD graduates, two PhD candidates, and two PhD students.

### Research Experiences

Participants worked with Australian/US partners in the three ways shown below:

- 6 US participants traveled to Australia
- 2 US participants worked with Australian partners remotely
- # trips abroad: 1-6
- Length of time abroad: 2 wks-6 mos (most spent 1 month)

### Partnerships

Although not all students could identify a mentor, working with Australian partners was helpful for all participants.

The research abroad enabled students to:

- Develop new relationships
- Have mutually beneficial relationships with Australian partners as they provided assistance to participants as well as reached out to them
- Strengthen partnerships with each trip
- Hope to continue relationships and collaborative work through:
  - Email
  - Proposals
  - Papers
  - Presentations

### Academic and Career Path

Participants say these research experiences:

- Shifted their research focus
- Impacted their career path
- Introduced them to new people and ideas
- Enabled them to work in new disciplines
- Improved their job options

*This experience broadened my options that I’m looking into. There are so many problems we can tackle, I’m just one cog in the wheel...I’ve been learning more and more stuff and this didn’t change the track of my research, but improved it.* —RAE Participant

Working with UPP helped because I had to teach what I learned, and I understood it a lot better. I had to teach it to other people. I loved being a mentor in the program. —RAE Participant

### Knowledge and Skills Gained

All participants’ knowledge and skills increased as a result of their research and mentoring through their RAE. Knowledge and skills they gained can be found below:

<table>
<thead>
<tr>
<th>Through research</th>
<th>Through mentoring lab and UPP students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporating other disciplines into research</td>
<td>More confidence</td>
</tr>
<tr>
<td>Application of Australian water practices in US</td>
<td>Organizational skills</td>
</tr>
<tr>
<td>Collaboration and networking skills</td>
<td>Management skills</td>
</tr>
<tr>
<td>Skills used for PhD research</td>
<td>Confirmed knowledge</td>
</tr>
<tr>
<td>Collaboration skills</td>
<td></td>
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</tbody>
</table>

### UPP Down Under

- Ask questions on the UPP Down Under applications about teamwork to ensure students are willing to work in a collaborative and team-oriented environment.
- Increase instruction on all baseline knowledge items with which students had no familiarity during lectures and activities to continue to build student knowledge.
- Ensure the program includes information about graduate school and careers in urban water sustainability.
- Disseminate information to undergraduate students about research seminars and career-related presentations to build knowledge before UPP Down Under.
- Help students make connections with domestic and international researchers so they can be part of future grant opportunities.

### Research Abroad Experience

- Provide more students the opportunity to go to Australia more than once, which will not only enhance research, but foster partnerships.
- If students are unable to travel abroad, help them foster relationships with Australian partners through Skype calls and educational seminars.
- Continue to include US and Australian graduate students and postdocs in the teaching/mentoring of UPP Down Under students to build teaching/mentoring skills.
- Help foster connections with Australian partners and provide opportunities for continued collaboration such as papers, presentations and proposals.
- Ensure all graduate students can identify a mentor and know how to collaborate with him/her.