Individual Development Plans (IDPs): An underutilized advising tool in the geosciences
Supplemental Data

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In this supplemental data file, we include additional program information and implementation details, advisor/mentor survey results, and a copy of the basic IDP template used in the ‘Ike Wai project.

About the program

The ‘Ike Wai project requires IDPs for all Graduate Scholars and Postdoc Scholars as part of a broader professional development program that also includes cohorted training in a variety of professional skills. Graduate Scholars can devote up to 20% of their graduate assistantship on career development activities. The project has included 19 Graduate Scholars to date, each matched with a research advisor and professional development (PD) mentor. While some research advisors have more than one advisee, all PD mentors have only one mentee. Due to the small population size, we did not collect demographic data as part of this survey in order to help preserve anonymity. However, based on the most recent project demographics, the 2019 Graduate Scholars were ~57% women and 43% underrepresented minorities, including 21% Native Hawaiian or Pacific Islander.

Survey of Advisors/Mentors

In addition to the graduate student survey, we conducted an anonymous survey of research advisors and PD mentors in our program, asking them to report on the perceived effectiveness of IDPs (Fig. S1) and the typical time spent with students in a given term (Fig. S2). Results suggest that IDPs are overwhelmingly popular among advisors and PD mentors, with 81% saying they would recommend IDPs to other advisors/mentors, and are regarded as effective tools while requiring relatively little time from advisors and PD mentors.

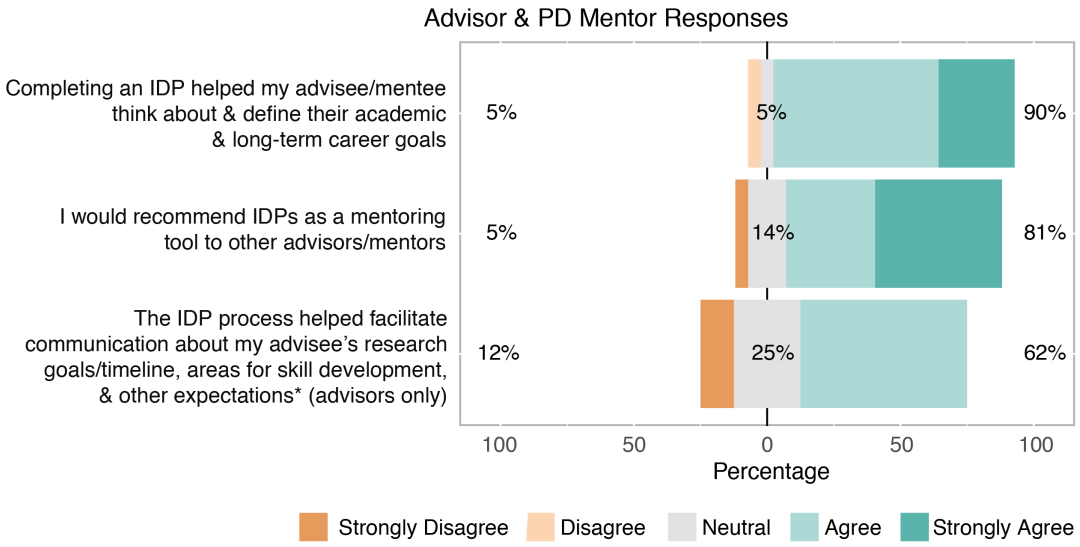
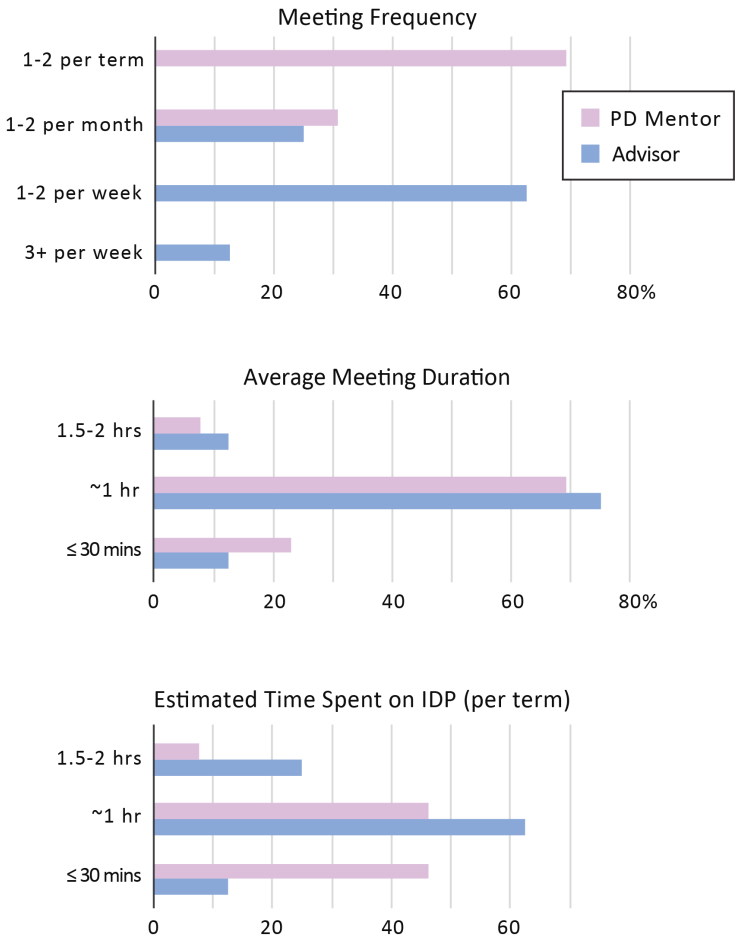


Figure S1: Results from anonymous survey of research advisors and PD mentors (n = 21). Percentages shown correspond to the total responses for disagree or strongly disagree (left), neutral (center), and agree or strongly agree (right).

Figure S2: Average meeting frequency, duration, and time spent specifically on IDPs, as report by research advisors and PD mentors (anonymous survey, n = 21).



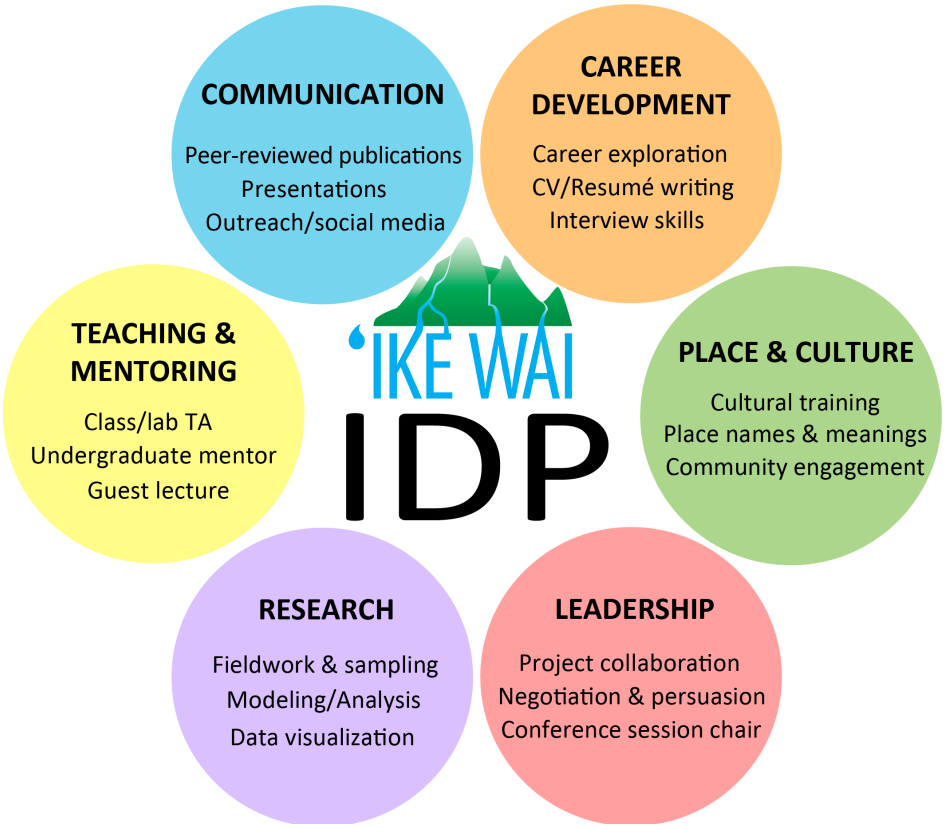


Figure S3. The six core competencies (bold) in 'Ike Wai's Individual Development Plan (IDP), with a few examples listed for each area. Students complete a self-assessment in each area and develop an action plan based on their individual priorities.

Figure S4. The IDP template used on the project (attached), including instructions, self-assessment (Form 1), the action plan (or IDP) (Form 2), and signature form (Form 3). *Additional notes on implementation:* In practice, we have adopted more flexibility with the meeting order to help keep the process moving along (especially when faculty may be unavailable due to field work or other travel constraints). In addition, our IDP Coordinator almost always meets with students one-on-one (vs. with their advisors/mentors present), which greatly simplifies scheduling and seems to be universally preferred by the students.

Individual Development Plan: Guidelines for 'Ike Wai Graduate Students & Post-Docs

Summary of forms:

- Form 1 (Self-Assessment)
- Form 2 (Individual Development Plan)
- Form 3 (Cover Sheet)

Rationale

Our overarching goal is for graduate students and post-docs to emerge from their 'Ike Wai training period competitive (via an intentional professional development program), committed to interdisciplinary research ('Ike Wai projects will transcend disciplinary boundaries), inclusive (comfortable with diversity and culturally adept), and integral (comprehensively networked with stakeholders and career development opportunities). 'Ike Wai graduate students and post-docs are expected to spend up to 20% of their time on educational and training activities. Within 60 days of their appointment, they will each develop an Individual Development Plan (IDP) of research and professional development (PD) milestones.

Establishing such a formal structure has been shown to support success, productivity and satisfaction (Davis 2005). Benefits of an IDP include:

- Empowering the student/post-doc to take ownership of his or her training
- Providing an open, direct dialogue about research and career goals
- Outlining concrete steps with timelines toward achieving those goals
- Helping to prepare for a career, both by developing core competencies and competencies specific to one's individual career goals
- Clarifying responsibilities and expectations for the mentee, research advisor and PD mentor

Concept

The IDP is a personal action plan, jointly agreed to by the mentee, research advisor, PD mentor, and IDP coordinator. It will include six core competencies: Research, Teaching & Mentoring, Leadership, Oral & Written Communication, Place & Culture, and Career Development. For each competency, the IDP identifies milestones, as well as the training and experiences needed to achieve these milestones within a mutually agreed time frame. Each IDP is uniquely tailored to the needs of the individual. It is an evolving document that will be revisited throughout the appointment.

Setting milestones will help individuals to be more deliberate about their education and training experiences, and keep them on track. The best milestones are SMART

- Specific (Is the milestone focused and unambiguous?)
- Measurable (Can you measure whether you have achieved the milestone?)

- Actionable (Is there an action required on your part?)
- Realistic (Considering difficulty and timeline, is the milestone achievable?)
- Timely (By when will you complete the milestone?)

Preparing an IDP

The graduate student or post-doc (mentee) will initiate this process with full participation by the research advisor and PD mentor. This involves a series of steps:

	For graduate student/post-doc	For research advisor & PD mentor
Step 1 *(within 10 days)*	• Complete a written self-assessment (Form 1)	• Review mentee's self-assessment and provide feedback
Step 2 *(within 20 days)*	• Learn about research, PD and career opportunities, and discuss among mentee, research advisor and PD mentor	
Step 3 *(within 30 days)*	• Draft an IDP (Form 2) and share draft with advisor and mentor	• Review draft IDP and suggest revisions
Step 4 *(within 40 days)*	• Submit draft IDP (Form 2) to IDP coordinator; schedule appointment to review	• Participate in review meeting with mentee and IDP coordinator (optional)
Step 5 *(within 60 days)*	• Finalize and submit IDP (Form 2) and cover sheet (Form 3) to IDP coordinator. Begin implementation	• Sign off on cover sheet (Form 3)
Step 6 *Review IDP once per semester* ***MAR 30, OCT 30***	• Schedule a meeting with research advisor, PD mentor and IDP coordinator to review progress and outline future activities. Revise IDP (Form 2) and resubmit to IDP coordinator.	
Step 7 *Self-assess annually* ***MAR 30 or OCT 30***	• Re-do written self-assessment (Form 1)	• Review mentee's self-assessment and provide feedback

IDP coordinator email: epscor.ed@gmail.com

Getting Started: A 'how to guide' to create your IDP

STEP 1 – Complete a written self-assessment

- Conducting a self-assessment (Form 1) is the first step in developing your IDP. The self-assessment will allow you to craft a vision for your personal growth over the course of your graduate or post-doctoral career. You will re-take this self-assessment each April, so that you, your research advisor and PD mentor can reflect on the past year and revise your IDP as needed.
- Use the self-assessment as a tool to survey your current skills and abilities. Try to be realistic when identifying your strengths and defining the areas that need development. Ask your colleagues, family and friends what they see as your strengths, and areas where you may need to improve.
- This self-assessment focuses on six core competencies. For each competency, review the questions and respond in the space provided. Then, for each skill set listed on the bottom of the page, rate yourself on the scale provided. After you have completed the written self-assessment, share it with your research advisor and PD mentor and ask for their honest feedback.

STEP 2 – Survey research, PD and career opportunities and discuss with research advisor and PD mentor

- Within each core competency, identify and outline opportunities that interest you.
- Identify the skill sets you will need to develop, if any, to pursue these opportunities. How will you develop these skill sets?
- Set up a meeting with your research advisor and PD mentor to discuss the opportunities that you have identified, as well as opportunities that your advisor and PD mentor may have identified as being useful to you.

STEPS 3 & 4 – Draft your IDP (Form 2) and share with your advisor, PD mentor and IDP Coordinator

A couple of important things to remember when starting to write your IDP:

- Your IDP is an <u>evolving document</u> that will be updated as often as needed.
- Start by identifying your personal long-term career goal
    - *Example 1: Become a tenure-track economics professor at a research intensive*

university

- *Example 2: Conduct engineering research in a government lab that directly impacts the quality of water in Hawaii*
- *Example 3: Work for an environmental consulting firm on the US Mainland*

- Identify **S**pecific, **M**easurable, **A**ctionable, **R**ealistic, and **T**imely (SMART) milestones that will help you achieve your long-term career goal. Record these on Form 2 **(column 1**).
- Think about what skills, strengths and experiences are needed to accomplish your milestones. Define approaches and strategies of how you will obtain and/or develop certain skills, strengths and experiences (**column 2**), and a timeframe (**column 3**).
- Include an output/outcome statement that can easily be measured, so you know whether you have met your goal (**column 4**). Think about what you will see, do or be when you accomplish this milestone. If it is difficult to state, then reframe the milestone to be more concrete, specific and actionable.
- Share your IDP draft with your research advisor and PD mentor, and receive constructive and honest feedback.
- Revise and submit your IDP to 'Ike Wai IDP coordinator.
- Set up a review meeting with the IDP coordinator to discuss your IDP revised draft. (Optional: Invite your research advisor and/or PD mentor to the meeting. Although their presence isn't required, it might be useful.)
- Finalize and obtain required signatures (Form 3)

STEP 5 – Submit your finalized IDP to IDP coordinator and begin implementation

- Email your final IDP (Form 2) and the cover sheet (Form 3) to the IDP coordinator, with copies to your advisor and PD mentor.

- Start implementing your IDP.

STEP 6 – Regular Review of Progress

- Meet with your research advisor, PD mentor and IDP coordinator regularly. We require a meeting each semester, and encourage more frequent meetings.
- Revise and modify your IDP as necessary based on evolving goals and your discussions with your research advisor and PD mentor. Don't hesitate to ask for help if you feel you are not making the progress that you wish.
- Each April, electronically submit your revised IDP and revised self-assessment to the IDP coordinator, flagging any significant updates. Be sure to get the appropriate signatures before submitting.

STEP 7 – Annual self-assessment

- Re-do the written self-assessment each year. This will help you see where you have significantly progressed and where there is still room to grow.

Resources

Self-assessment and planning your IDP

- ✓ Science Careers: http://myidp.sciencecareers.org/
- ✓ Fiske, P.S. (2001) Put Your Science to Work: The Take-Charge Career Guide for Scientists. American Geophysical Union

Teaching & Mentoring

- ✓ Advisor, Teacher, Role Model, Friend (1997) On being a Mentor to Students in Science and Engineering. National Academy Press
- ✓ Carl Wieman Science Education Initiative: http://www.cwsei.ubc.ca/
- ✓ Science Education Resource Center: http://serc.carleton.edu/index.html

Leadership

- ✓ Linsky, M, Heifetz, R.E. (2002) Leadership on the Line: Staying Alive Through the Dangers of Leading. Harvard Business Review Press
- ✓ Sapienza, A.M. (2004) Managing Scientists: Leadership Strategies in Scientific Research. Wiley-IEEE, Inc.
- ✓ Myers, B. (2011) Take the Lead. Atria Paperback. Simon & Shuster, Inc.

Oral & Written Communication

- ✓ Day, R. and Gastel, B. (2011) How to Write and Publish a Scientific Paper. Greenwood
- ✓ Browning, B. (2008) Perfect Phrases for Writing Grant Proposals. Madison, Wisconsin: CWL Publishing Enterprises
- ✓ Olson, R. (2009) Don't Be Such A Scientist. Island Press

Place & Culture

- ✓ Clark, J.R.K., Hawai'i Place Names (2002). University of Hawai'i Press
- ✓ Morgan, J.R., Hawai'i: A Unique Geography (1996). Bess Press
- ✓ Pukui, M.K., Elbert, S.H. (1986) Hawaiian Dictionary. University of Hawai'i Press
- ✓ Sterling, E.P, Summers, C.C. (1978). Sites of O'ahu. Bernice Pauahi Bishop Museum

Career Development

- ✓ Bolles, R.N. (2002) What Color is you Parachute? A Practical manual for Job-Hunters and Career-Changers. Ten Speed Press
- ✓ Robbins-Roth, C. (2006) Alternative Careers in Science – Leaving the Ivory Tower. Elsevier
- ✓ Careers in Science and Engineering (1996) A Student Planning Guide to Grad School and Beyond. National Academy Press

Start by reading the questions at the top of the page. Don't feel obligated to answer them all; just answer the ones that seem relevant. Record your immediate thoughts; do not over think your answers. Later in the process, you will have the opportunity to revise your responses. Underline or highlight the questions that you responded to. Then, at the bottom of this page, rank your skills on a scale of 1 to 5.

Core Competency 1: Research

- What are your research goals?
- What research-related skills have you acquired to date?
- Which research-related skills would you like to improve?
- What new skills do you need to acquire?
- What feedback have you received on your research project?

Response:

Please self-assess your skills and abilities in the area of research. Use a scale of 1 (not at all proficient) to 5 (highly proficient). If something is not applicable, select N/A

Knowledge of concepts/theories related to your project	1	2	3	4	5	N/A
Knowledge of past and current literature related to your project	1	2	3	4	5	N/A
Creativity in designing experiments and new research directions	1	2	3	4	5	N/A
Laboratory skills	1	2	3	4	5	N/A
Computer skills	1	2	3	4	5	N/A
Fieldwork skills	1	2	3	4	5	N/A
Data management	1	2	3	4	5	N/A
Data analysis including statistics	1	2	3	4	5	N/A
Critical evaluation of data	1	2	3	4	5	N/A
Problem solving/troubleshooting	1	2	3	4	5	N/A
Seeking research help/feedback when needed	1	2	3	4	5	N/A

Core Competency 2: Teaching & Mentoring

- Have you ever taught, guest-lectured or served as a TA?
- What feedback have you received on your course content, syllabi, or teaching?
- Do you plan to teach, guest-lecture or TA during the next 12 months?
- How will you improve your teaching? What resources are available?
- How will you find new teaching opportunities?
- Have you ever formally served as a mentor?
- What qualities/skills do you associate with good mentoring?
- Have you received mentoring training?

Response:

Please self-assess your skills and abilities in the area of teaching and mentoring. Use a scale of 1 (not at all proficient) to 5 (highly proficient). If something is not applicable, select N/A

Familiarity with place-based learning	1	2	3	4	5	N/A
Familiarity with inquiry-based learning	1	2	3	4	5	N/A
Use of active learning strategies	1	2	3	4	5	N/A
Encouraging student participation	1	2	3	4	5	N/A
Use of instructional technologies	1	2	3	4	5	N/A
Providing constructive feedback	1	2	3	4	5	N/A
Careful listening	1	2	3	4	5	N/A
Respecting diversity	1	2	3	4	5	N/A
Helping your mentee build a network	1	2	3	4	5	N/A
Providing career guidance	1	2	3	4	5	N/A
Serving as a role model	1	2	3	4	5	N/A
Seeking teaching/mentoring help when needed	1	2	3	4	5	N/A

Core Competency 3: Leadership

- What leadership experiences have you had (e.g., led a field research campaign, organized a workshop, chaired a meeting)?
- What leadership experiences would you like to have?
- What collaborations have you established in the past?
- What collaborations would benefit your research? How can you pursue them?
- What experience do you have with negotiation and conflict resolution?

Response:

Please self-assess your skills and abilities in the area of leadership. Use a scale of 1 (not at all proficient) to 5 (highly proficient). If something is not applicable, select N/A

Establishing effective collaborations	1	2	3	4	5	N/A
Ability to work in a team	1	2	3	4	5	N/A
Ability to lead and motivate a team	1	2	3	4	5	N/A
Respecting contributions and ideas of others	1	2	3	4	5	N/A
Leading a field campaign, research project, etc.	1	2	3	4	5	N/A
Chairing a meeting	1	2	3	4	5	N/A
Dealing with and resolving conflict	1	2	3	4	5	N/A
Negotiating with a peer	1	2	3	4	5	N/A
Negotiating with a more senior person (e.g., advisor)	1	2	3	4	5	N/A
Managing projects	1	2	3	4	5	N/A
Managing people	1	2	3	4	5	N/A

Core Competency 4: Oral & Written Communication

- What writing or presentation skills would you like to improve? What resources are available?
- What research papers, proposals, or fellowship applications would you like to write within the next 12 months? Where will you submit them?
- Where could you present your research to peers within the next 12 months (e.g., at a lab meeting, seminar, conference)?
- Where could you present your research to a general audience within the next 12 months (e.g., outreach event, media interview)?

Response:

Please self-assess your skills and abilities in the area of communication. Use a scale of 1 (not at all proficient) to 5 (highly proficient). If something is not applicable, select N/A

Communicating effectively in everyday conversation	1	2	3	4	5	N/A
Ability to actively listen to what others are saying	1	2	3	4	5	N/A
Presenting research to peers (e.g., seminar)	1	2	3	4	5	N/A
Sharing research with a general (non-specialist) audience	1	2	3	4	5	N/A
Giving a 30-second elevator pitch on your research	1	2	3	4	5	N/A
Writing a clear one-page summary of your research	1	2	3	4	5	N/A
Effectively writing under time constraints	1	2	3	4	5	N/A
Writing a peer-reviewed publication on your research	1	2	3	4	5	N/A
Writing a grant proposal or fellowship application	1	2	3	4	5	N/A
Using research search engines (e.g., web of science)	1	2	3	4	5	N/A
Social media communication & etiquette	1	2	3	4	5	N/A
Giving peer feedback on communication	1	2	3	4	5	N/A
Receiving peer feedback on communication	1	2	3	4	5	N/A
Seeking communication help/feedback when needed	1	2	3	4	5	N/A

Core Competency 5: Place & Culture

- How does place and/or culture influence your identity?
- How has place and/or culture influenced your research to date?
- What would you like to learn about Hawaiian language, places or culture? What resources are available?
- What opportunities or resources would help you to integrate place and/or culture into your 'Ike Wai research?

Response:

Please self-assess your skills and abilities in the area of cultural competence. Use a scale of 1 (not at all proficient) to 5 (highly proficient). If something is not applicable, select N/A

Communicating effectively and respectfully with people of different cultures	1	2	3	4	5	N/A
Awareness of one's own cultural worldview	1	2	3	4	5	N/A
Knowledge of other cultural worldviews	1	2	3	4	5	N/A
Respect/Openness toward other cultural worldviews	1	2	3	4	5	N/A
Awareness of Hawaiian cultural protocols (e.g., when conducting field research)	1	2	3	4	5	N/A
Pronunciation of Hawaiian words and place names	1	2	3	4	5	N/A
Respect for Traditional Knowledge	1	2	3	4	5	N/A
Integration of Traditional Knowledge into your research	1	2	3	4	5	N/A
Knowledge of historic water use/distribution in Hawai'i	1	2	3	4	5	N/A
Knowledge of water use and values among Hawaiian cultural practitioners today	1	2	3	4	5	N/A
Seeking culturally related help/guidance when needed	1	2	3	4	5	N/A

Core Competency 6: Career Development

- What is your long-term career goal (e.g., college professor, environmental consultant, researcher in a government lab)? Why?
- What personal & professional traits do you have that will help you attain your career goal?
- What skills/experiences do you need to attain your career goal? Which of these can you get while still a graduate student or post-doc ?
- Are your CV and professional webpage up to date?
- Are you prepared for a job interview? If not, what should you prepare?

Response:

Please self-assess your skills and abilities in the area of career development. Use a scale of 1 (not at all proficient) to 5 (highly proficient). If something is not applicable, select N/A

CV/Resume writing	1	2	3	4	5	N/A
Establishing career goals	1	2	3	4	5	N/A
Awareness of career opportunities in your field	1	2	3	4	5	N/A
Networking inside your academic environment	1	2	3	4	5	N/A
Networking outside your academic environment	1	2	3	4	5	N/A
Carving out time for career development	1	2	3	4	5	N/A
Conducting an Informational Interview	1	2	3	4	5	N/A
Interviewing for a job	1	2	3	4	5	N/A
Negotiating a job offer	1	2	3	4	5	N/A
Seeking career-related help/guidance when needed	1	2	3	4	5	N/A

1. **Research (e.g., fieldwork, modeling, data visualization, translation)**

Milestones	Approaches/Strategies	Deadline	Outputs/Outcomes
Example: Answer the question "How does water quality vary seasonally/temporally"	Resample the same 5 DWS wells in Hualalai in Mar, Aug & Dec 2018	Dec 2018 (fieldwork) Feb 2019 (analysis)	GIS maps showing how water quality varies at DWS wells between these 3 time stamps

2. **Teaching & Mentoring (e.g., teach or TA a class, mentor an undergraduate student)**

Milestones	Approaches/Strategies	Deadline	Outputs/Outcomes
Example: Teach a 3 credit class at a Community College (CC)	Contact Department Chairs at 3 CCs & ask about teaching opportunities	Spring 2019	Taught entry level class in xx at Leeward CC during Spring 2019

3. **Leadership (e.g., negotiation, strategic persuasion, collaboration)**

Milestones	Approaches/Strategies	Deadline	Outputs/Outcomes
Example: Attend a workshop focusing on strategies to be a better negotiator	Survey workshop opportunities on developing negotiation skills	Fall 2018/Spring 2019	Attended a workshop on negotiation

4. Oral & Written Communication (e.g., peer-reviewed publications, grant proposals, blogs, presentations, media interviews)

Milestones	Approaches/Strategies	Deadline	Outputs/Outcomes
Example: Submit NSF Graduate Research Fellowship Program (GRFP) proposal	Get examples of previous successful applications from other students	October 23, 2018	Submitted proposal. Decision expected spring 2019

5. Place & Culture

Milestones	Approaches/Strategies	Deadline	Outputs/Outcomes
Example: Learn to pronounce and spell all Hawaiian words and place names in 'Ike Wai proposal and core values document.	Read proposal & core values. List words/place names. Ask Hawaiian language grad students for training	December 2018	Correct pronunciation and spelling

6. Career Development (e.g., career exploration, networking, interview skills, CV writing, website development)

Milestones	Approaches/Strategies	Deadline	Outputs/Outcomes
Example: Conduct 5 informational interviews re: tenure-track economics faculty positions (my career goal)	Contact tenure-track economics faculty at various institutions and request interviews	Jan-May 2019 (1 per month)	List of skill sets that I need to develop to be competitive for this job. Better understanding of job

IDP Cover Sheet for 'Ike Wai Graduate Students

Name of graduate student: _____

Degree(s) you currently hold (e.g., BA – Economics): _____

Start date of graduate school at UH Manoa (e.g., Aug 2017): _____

Start date of 'Ike Wai graduate appointment (e.g., Feb 2018): _____

Current academic department (e.g., Hawaiian Language): _____

Current degree program: (if more than one, check the one you will get first)

___MA __MS __PhD

___ Other/Notes: _____

Expected date of completing this degree (e.g., Dec 2020): _____

IDP approved by:

_____ _____
Graduate student (sign) Date

_____ _____ _____
Research advisor (printed name) Date Research advisor (sign)

_____ _____ _____
PD Mentor (printed name) Date PD Mentor (sign)

_____ _____ _____
IDP Coordinator (printed name) Date IDP Coordinator (sign)

Email Forms 2 & 3 to epscor.ed@gmail.com