Characteristics of Graduate Programs in Ocean Sciences

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Broad Outline

• Examples from Recent Surveys (10-11, 11-12)
• A Flow Model for Graduate Programs (Four Years of Data, 06-11)
• Interesting Trends (03-12)
• Concluding Comments
The Survey

• Applications, Offers and First Year Enrollment by Discipline, Gender, Citizenship, Ethnicity
• Characteristics of Student Body by Discipline, Gender, Citizenship, Ethnicity, Support
• Characteristics of MS and PhD Graduates by Discipline, Gender, Citizenship, Ethnicity, Next Position, Time in Program
Survey Returns

- 29 responding institutions 2010-11
- 34 responding institutions 2011-12
- Δ: 1 out and 6 new, net +5
- 28 responding both years
- 14 responding each of the past five years
Data Fidelity and Consistency

• Changing mix of responding institutions
• Internal consistency of data
• Some examples
  – Check sum: number of applications not consistent with sum of total number of applications from US citizens and foreign nationals (4/34)
  – Check sum: number of applications from US citizens not consistent with sum of ethnicity of US citizens (15/34)
  – Data not collected or recorded: ethnicity of US citizens (6/34)
  – Continuity of record
Specific Example of Data Fidelity

- ~3300 Applications among 34 Institutions
- Filtering for Valid Checksums, Have High Degree of Confidence in Data From 19: ~2000 Applications (60% of Pool)
- This Subset is Similar To Overall Data (But Differences Exist)

- General Approach: Use the Largest Subset
The Admission Sequence

• ~2000 Applicants, 51% Female

• To These Applicants, ~570 Offers, 28% of Pool
• Success of Women 32%, Success of Men 24%

• Enroll ~375 Students, 19% of Applicants of Each Gender
Bioscience Sequence

![Graph showing the number of males and females applying, admitting, and enrolling in Biological Oceanography/Marine Biology.](image)
Ethnicity Sequence

The graph shows the number of applications, offers, and enrollments for different ethnic groups. The X-axis represents the stages of application, offer, and enrollment. The Y-axis represents the number of applicants.

- Caucasian
- Asian American
- Hispanic
- African American
- Native American

The graph indicates a decreasing trend in the number of applications, offers, and enrollments for all groups from applied to enrolled stages.
Program Characteristics 2011-2012

• 2749 Graduate Students in Residence
• ~1/3 Biological Oceanography or Marine Biology, ~1/3 Chemical, Physical, Geological
• 79% US Citizens
• Among US Citizens: 88% Caucasian
• Degrees Granted: 358 MS, 219 PhD
• 67% supported by RA/Fellowship/Traineeship, 15% as TA, 18% Unsupported
Degrees Granted: Gender

The graph shows the relationship between the fraction of Ph.D. degrees received by women and the fraction of M.S. degrees received by women across different fields. The x-axis represents the fraction of M.S. degrees received by women, while the y-axis represents the fraction of Ph.D. degrees received by women. Points are scattered across the graph, with labels for specific fields such as AES and Chem. The diagonal line indicates where the fraction of Ph.D. degrees would be equal to the fraction of M.S. degrees received by women.
Degrees Granted: Ethnicity

The graph shows the relationship between the fraction of Ph.D. degrees received and the fraction of M.S. degrees received for Caucasian and Non-Caucasian students. The graph indicates a linear relationship with both data points lying on the same line, suggesting that the proportion of Ph.D. degrees received increases as the proportion of M.S. degrees received increases.
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A Flow Model

Assessing the State of Graduate Programs in the Ocean Sciences

OVERVIEW OF SURVEY DATA

Only 33% of terminal degree recipients become academic!

10 students graduate with a MS for every 11 students graduating with a PhD!

FUTURE WORK

WHAT QUESTIONS DO WE EXPLORE?

CHALLENGES

- Recruitment
- Retention

FLOW MODEL: MORPHOLOGY

- On students' degree
- Degree & discipline
- Employment history
- Graduate student equity

Methodology

• Composite Data from Subset of 14 Institutions Responding to Four Years of Surveys in 07-08, 08-09, 09-10, 10-11

• Quasi Steady State Model (N is adjusted for dN/dt Δt), Blue Derived from Survey Data, Red Inferred

• Separately Tracks Gender (Except for Post Degree Outcomes)
New Enrollments

Students in Residence, N
Annual Increase dN/dt
Time to MS
Time to PhD

Terminal MS
PhD
No Advanced Degree
Results

Note: Terminal MS
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Disciplinary Expertise:
New Enrollment
Ethnicity:
New Enrollment

![Graph showing the fraction of first year new enrollment over years 2004 to 2010. The fraction increases from 2004 to 2006, then remains roughly constant until 2008, after which it increases steadily to 2010.](image-url)
Entering in 2011

• ~1/3 of institutions: no new students from underrepresented groups
• ~1/3: one or more up to 15%
• ~1/3: more than 15% (no obvious geographic pattern)
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Connecting Observation and Issues

• Less Than 40% of Incoming Students Continue Into Academia (And Further Attrition after Postdoc Not Measured): Do Curricula Reflect This? Are Faculty Supportive Mentors? Are We Meeting Expectations of Funders?

• Attrition Among Women. See in Offer -> Enrollment, See in MS vs PhD

• (Uncertain, but ~25% of Incoming Non-Caucasian Students Receive No Degree)
Wrapping Up

• My Personal Transition
• Preserving Legacy Data: Boundaries Between Confidentiality and Meaningful Access
• Survey Design and Future