

Demographics of Ocean Science Graduate Programs Some Long Term Perspectives

Russell McDuff

Board Chair, OceanGate Foundation
Professor Emeritus, UW School of Oceanography

37 Years of Data

- * First Data Gathering In 1978 Dating to 1975
- * Over The Years Many Thanks to Charley Hollister, Arthur Nowell, Jake Pierson, John Farrington, Mel Briscoe; Henry Hope, Sue Cook, Allison Miller, Amanda Holloway
- * JOI -> 1994, CORE 1995-2007, COL 2007-
- * Alas: Preservations, Scope and Format Inconsistent

A Promise

- * No pie charts, no bar charts
- * And I'll restrain myself from using ternary diagrams and log-linear plots
- * A few tables though

Some Perspectives

- * Existing Data (Long Term and Decadal)
- * Moving Forward

The Last Synthesis

Nowell and Hollister (1988)

Covering 1975-1985 for JOI Institutions

- * Applications Down ~33%
- * Enrollment and Graduation Rate Steady, 90 PhD/y
- * Women Enrollment from 20% to 29%
- * GRE Scores Very Stratified (Three Institutions with Medians Above 90th Percentile)
- * 80% of Students Supported, 66% From Federal Research Grants

Recent Surveys (Past Decade)

- * 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
- * 34 responding institutions in 2011-2012

Data Fidelity and Consistency

Some (and Perhaps Substantial) Limitations

- * Changing mix of responding institutions from year to year
- * Internal consistency of data provided
- * Continuity of record as survey instrument changes
- * Heterogeneous set of institutions
- * Ever changing institutional representatives

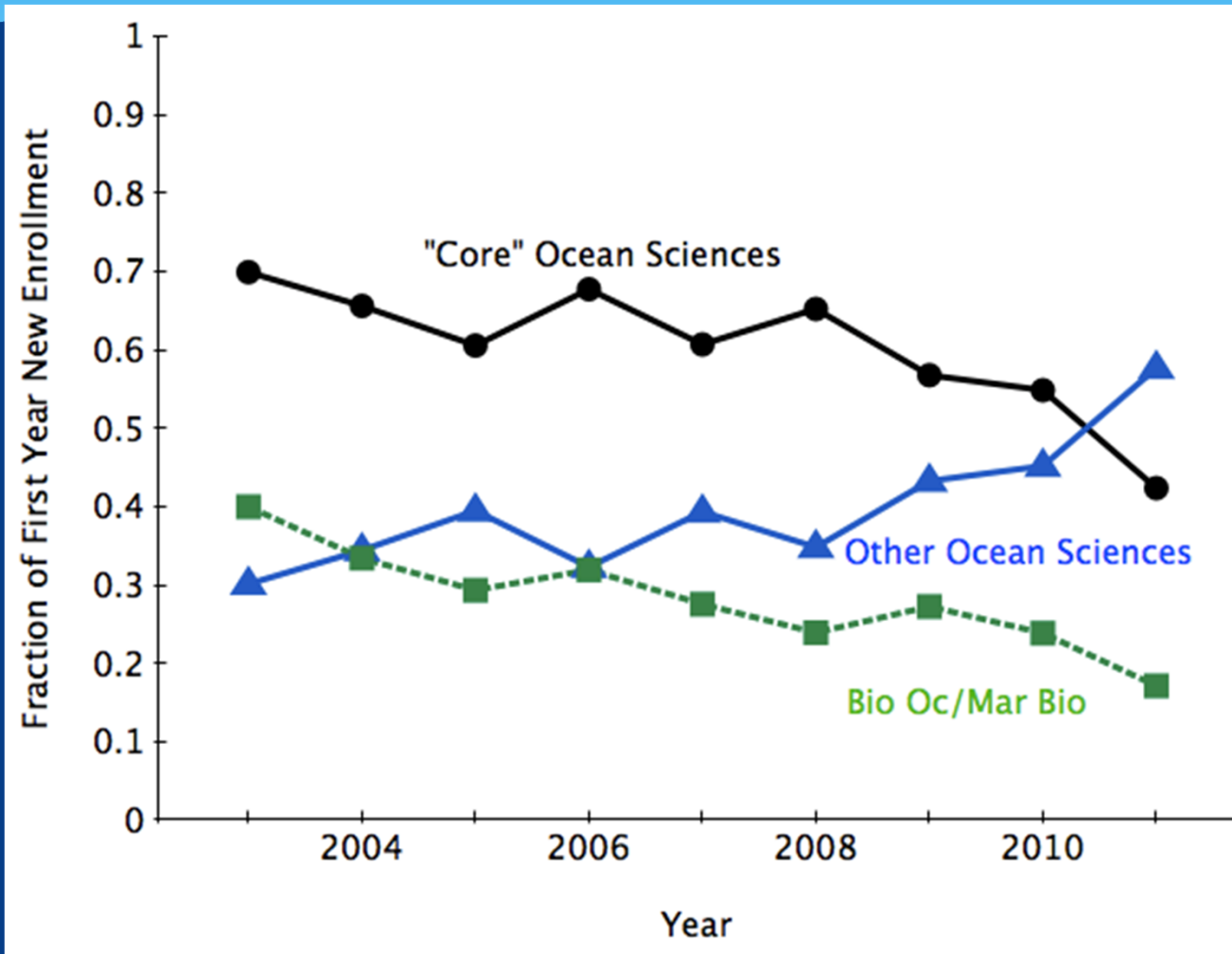
Program Characteristics 2011-2012

- * 375 New Enrollees
- * 2749 Graduate Students in Residence
- * ~1/3 Biological Oceanography or Marine Biology, ~1/3 Chemical, Physical, Geological, ~1/3 Other Ocean Science
- * 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

Admissions Sequence

- * ~2000 Applicants (51% Women, 49% Men)
- * Offers To ~570 of These Applicants, 28% of Applicant Pool (Women 32%, Men 24%)
- * Enroll ~375 Of These Applicants, 19% of Applicant Pool (Women 19%, Men 19%)
- * Multiple Offers? Non-Ocean Science Trajectory? (Pre-FERPA Suggests Few Multiple Applications 1984-1985)

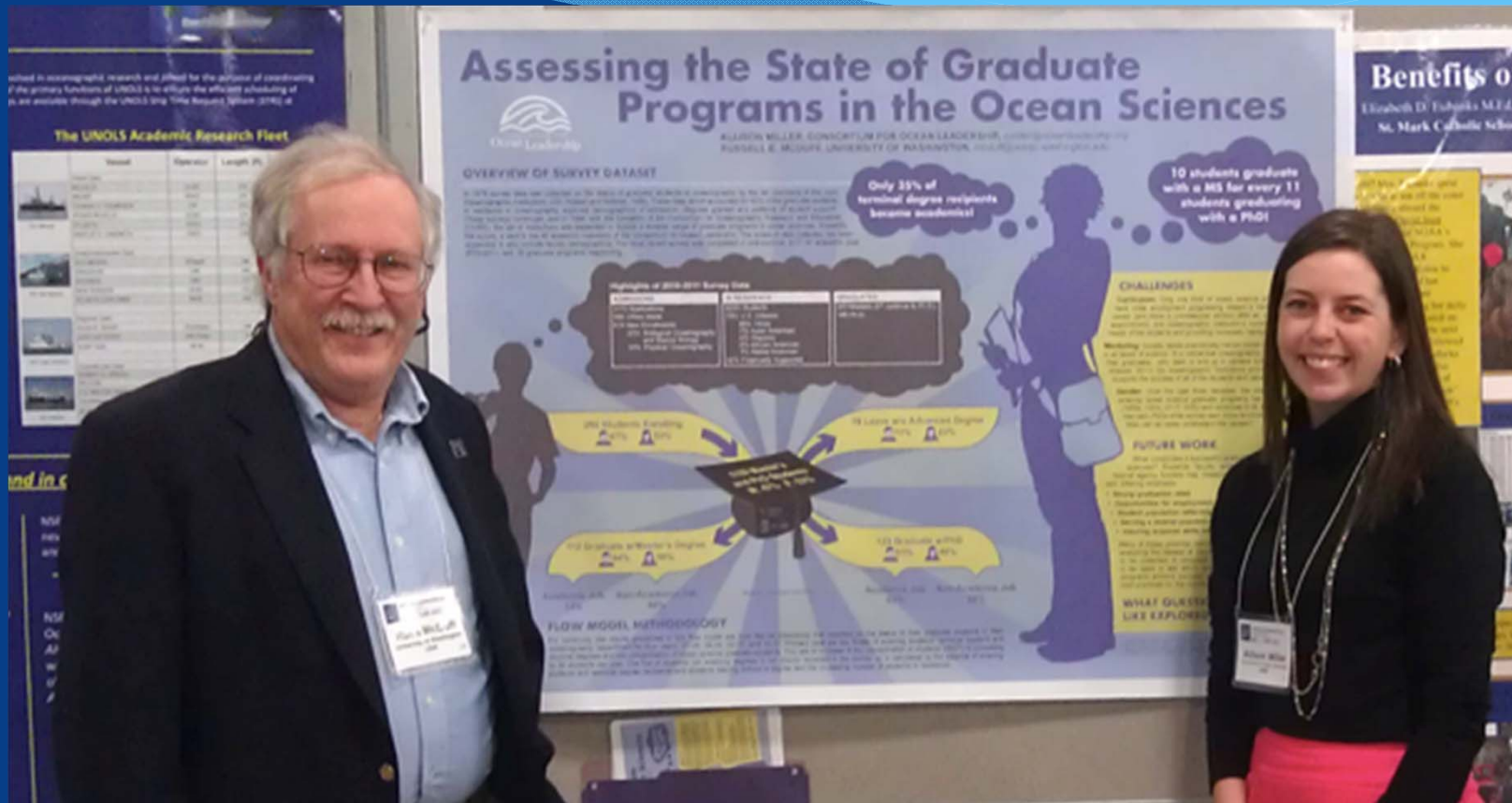
Disciplinary Expertise: New Enrollment



“Core Ocean Sciences”

Discipline	84-85 Apps	11-12 Apps	Ratio Then/Now	11-12 Enrolls	Ratio Enroll/Ap p
Bio	39%	48%	1.2	40%	0.8
Chem	10	16	1.6	16	1.0
Phys	16	20	1.3	25	1.3
GG	35	16	0.5	18	1.1

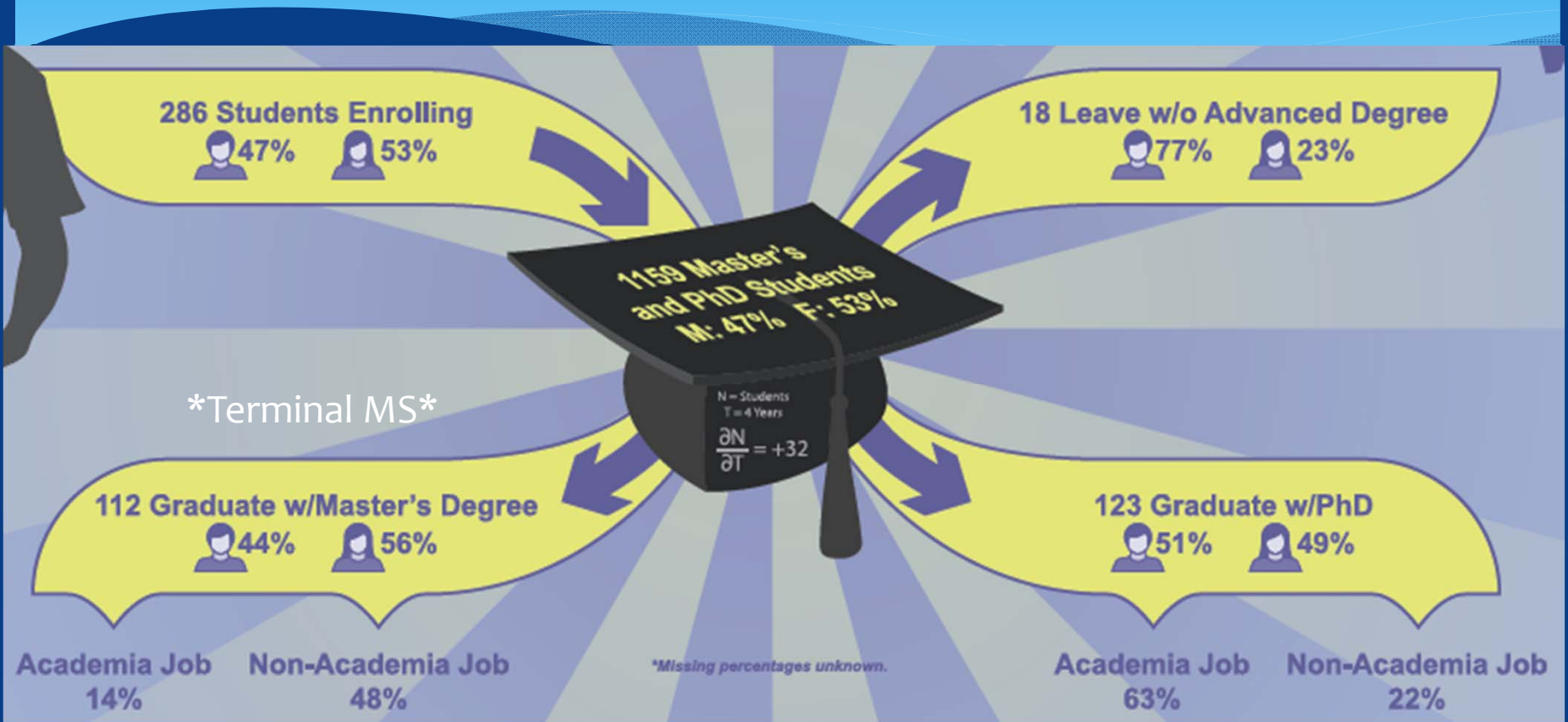
A Flow Model (OSM 2012)



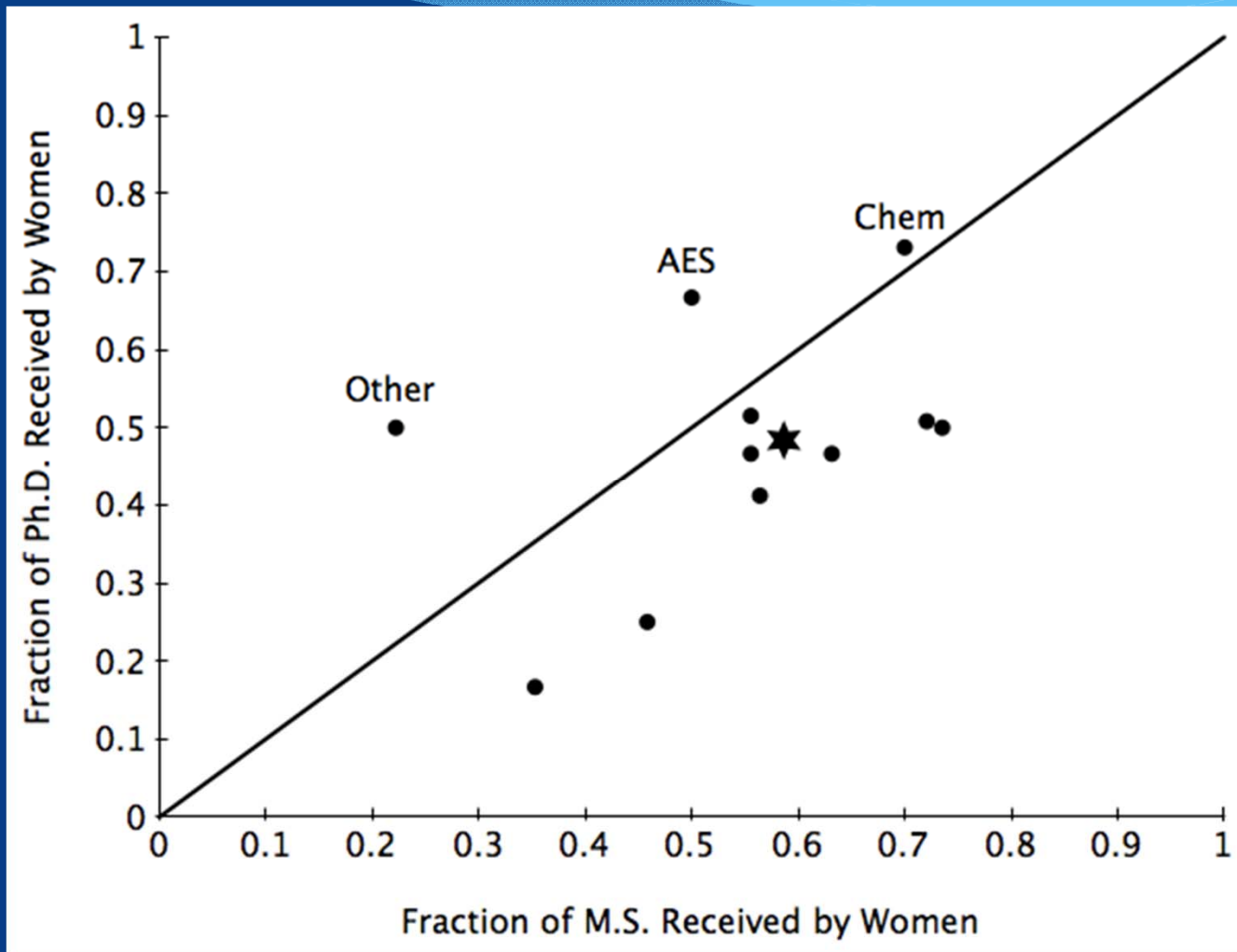
Methodology

- * 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 $dN/dt \Delta t$), Only Inferred Variable is “No Advanced Degree”
- * Separately Tracks Gender (Except for Post Degree Outcomes)

Degree Pathways



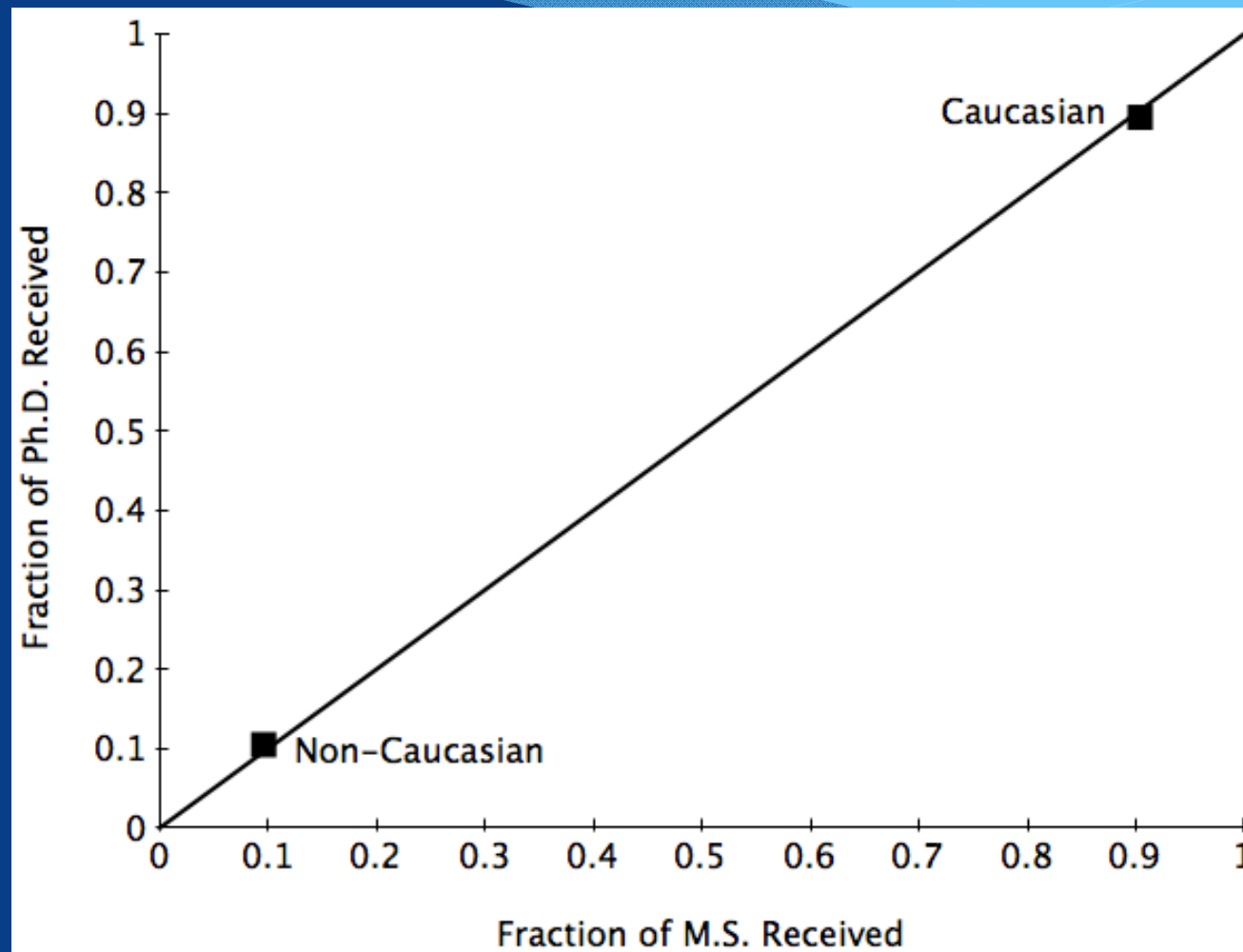
Degrees Granted: Women-Men



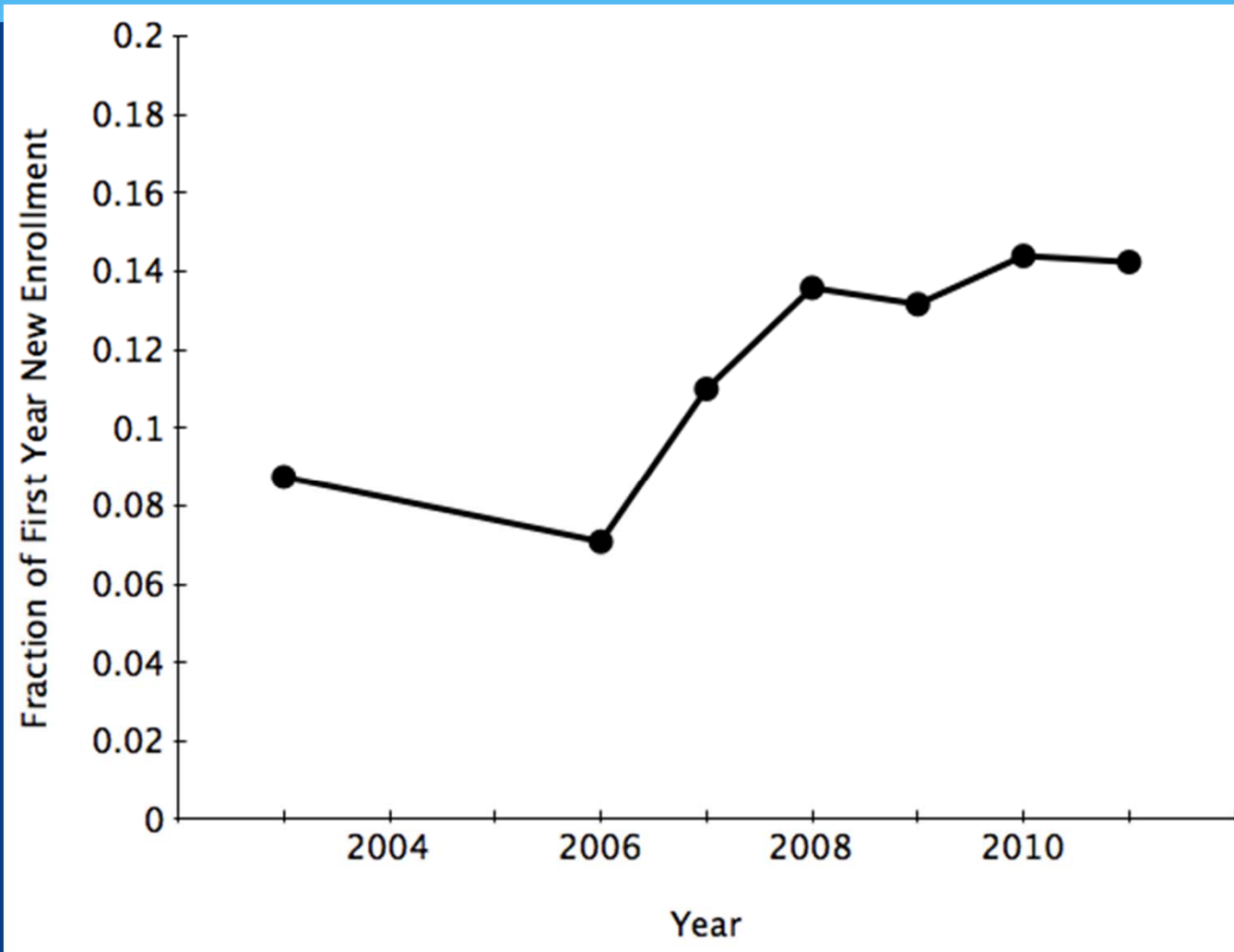
Program Population: Ethnicity

Ethnicity	Fraction of Graduate Students
Caucasian	88
Hispanic	4
Asian American	5
Native American	1
African American	2

Degrees Granted: Ethnicity



Ethnicity: New Enrollment



Ethnicity: Institutional Success

- * ~1/3 of institutions: no new students from underrepresented groups
- * ~1/3: one or more up to 15% of new students
- * ~1/3: more than 15% of new students
- * (no obvious geographic pattern)

(My) Worries

- * About 43% of Incoming Students Continue Into Academia: Do Curricula Reflect This? Are Faculty Supportive Mentors? Are We Meeting Expectations of Funders?
- * Attrition Among Women
- * Weak Asian American Participation

The Future

- * Existing Data (Long Term and Decadal)
- * Making Data Available
 - * Preserving and Providing Meaningful Access: Challenges and Pathways
 - * My Personal Transition

The Data

- * (Good thing): I religiously back up data
- * (Bad Thing) Data in Excel... sheets very, very wide
- * (Okay?) One-off analysis, no consistent workflow
- * (How do?) More analysis welcomed, as aggregated data and for individual institutions to compare to aggregated data, but data are inaccessible

Work to Date

- * ~2/5 of data from 2003 onward ingested
- * Particular tool used is SQLShare, developed by the UW e-Science Institute for “big data”
- * SQLShare meant as a scientific tool, e.g. UW genomics/proteomics research groups are power users
- * An important attribute: these are durable, shareable workflows (a key characteristic of reproducibility)

And Coming

- * Amazon Web Services Willing to Host Data Gratis
- * And AWS Will Provide An Accessible Virtual Machine on AWS Running SQLShare Linked to These Data
- * Initially Locking Data for Individual Institutions vs Aggregated Data
- * As Community, Must Find a Data Sharing Model:
Otherwise I Am Not Empowered to Unlock

