

# An Examination of the Demand for & Supply of WA State Occupations Requiring a Bachelors Degree

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WASHINGTON UNIVERSITY

start something **big**

# Goals of the analysis

- Examine the Washington state *projected* labor market demand for Bachelor's degrees and the *current* supply of Bachelor's degrees
- This is an extension of the December, 2020 presentation to the EWU BOT, where I considered the top 25 occupations currently in demand and the projected annual demand for the top 40 occupations that require at least a Bachelor's degree over the 2020s
- Desired outcome: a quantitative, if imperfect, tabulation of the match of degrees from WA 4-yr institutions of higher education & projected labor market needs.

# Two key assumptions

- The degree holder plans on finding an occupation in the field in which he/she has graduated.
  - Realize that some degree holders will find work in other fields
    - Some might be “adjacent,” such as economics or statistics majors working in business or psychology majors intending to work in school counseling.
    - Yet, some matches of degree might not be too related
  - For the analysis, there is little choice in assessing adequacy of higher ed offerings but to pursue matching degree and “closest” occupation
- Demand projections are accurate
  - Generally, the further into the future one projects, the larger the error
  - The Covid-19 pandemic may have altered the structure of jobs in certain industries, so that the past has less predictive power than before

# An overview of the approach to demand

- An expanded view of occupational demand from the presentation given to the BOT in December, 2020; now covering *all* occupations
  - Importantly, occupational demand defined here through the lens of 27 undergraduate *majors* or *groups of majors*
- Time frame: 2023-2028
  - Economists at WA Employment Security employ a technique developed by the U.S. Bureau of Labor Statistics to make projections
  - For WA, about 560 different, specific (at 6-digit level of detail) jobs
  - Source: WA ESD

# More about demand

- Since the supply of graduates is described by degree area, must convert occupational demand to degree demand
- Importantly, I exclude: 1) occupations that require a post-graduate degree, and 2) business managers. Why?
  - Difficult to know what share of Bachelor's grads plan to go to grad school
  - Further, WA demand for occupations requiring a degree beyond a Bachelors can be met by out-of-state degree holders & often are.
  - Assume that management jobs require a few years of experience
- Interpretation of demand used here: *annual estimated needs of those occupations that require only a Bachelors degree <-> "modified demand"*

# Reference for making the assignment between occupation and degree major: BLS Handbook

- Updated continuously

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OCCUPATIONAL OUTLOOK HANDBOOK

Home

NEW! Visit the new [Field of Degree](#) pages for data and information on a variety of academic fields.

OCCUPATION GROUPS

- Architecture and Engineering
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- Business and Financial
- Community and Social Service
- Computer and Information Technology
- Construction and Extraction
- Education, Training, and Library
- Entertainment and Sports
- Farming, Fishing, and Forestry
- Food Preparation and Serving
- Healthcare
- Installation, Maintenance, and Repair
- Legal
- Life, Physical, and Social Science
- Management
- Math
- Media and Communication
- Military
- Office and Administrative Support
- Personal Care and Service
- Production
- Protective Service
- Sales
- Transportation and Material Moving

SELECT OCCUPATIONS BY

2019 Median Pay Entry-Level Education On-the-job Training

Number of New Jobs (Projected) Growth Rate (Projected) GO

FEATURED OCCUPATION

**Dancers and Choreographers**

Dancers and choreographers use dance performances to express ideas and stories.

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A-Z INDEX

ABCDEFGHIJKLMNOPQRSTUVWXYZ

BROWSE OCCUPATIONS

- Highest Paying
- Fastest Growing (Projected)
- Most New Jobs (Projected)
- Field of Degree

- An example for statisticians

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OCCUPATIONAL OUTLOOK HANDBOOK

Mathematicians and Statisticians

Summary

Quick Facts: Mathematicians and Statisticians

2019 Median Pay	\$92,030 per year \$44.25 per hour
Typical Entry-Level Education	Master's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2019	45,700
Job Outlook, 2019-29	33% (Much faster than average)
Employment Change, 2019-29	14,900

**What Mathematicians and Statisticians Do**

Mathematicians and statisticians analyze data and apply mathematical and statistical techniques to help solve problems.

**Work Environment**

Many mathematicians and statisticians work in the federal government and in private science and engineering research companies. They may work on teams with engineers, scientists, and other professionals.

**How to Become a Mathematician or Statistician**

Mathematicians and statisticians typically need at least a master's degree in mathematics or statistics. However, some positions are available to those with a bachelor's degree.

**Pay**

The median annual wage for mathematicians was \$105,030 in May 2019.

The median annual wage for statisticians was \$91,160 in May 2019.

**Job Outlook**

Overall employment of mathematicians and statisticians is projected to grow 33 percent from 2019 to 2029, much faster than the average for all occupations. Businesses will need these workers to analyze the increasing volume of digital and electronic data.

# Degree issuance (supply): 2 streams

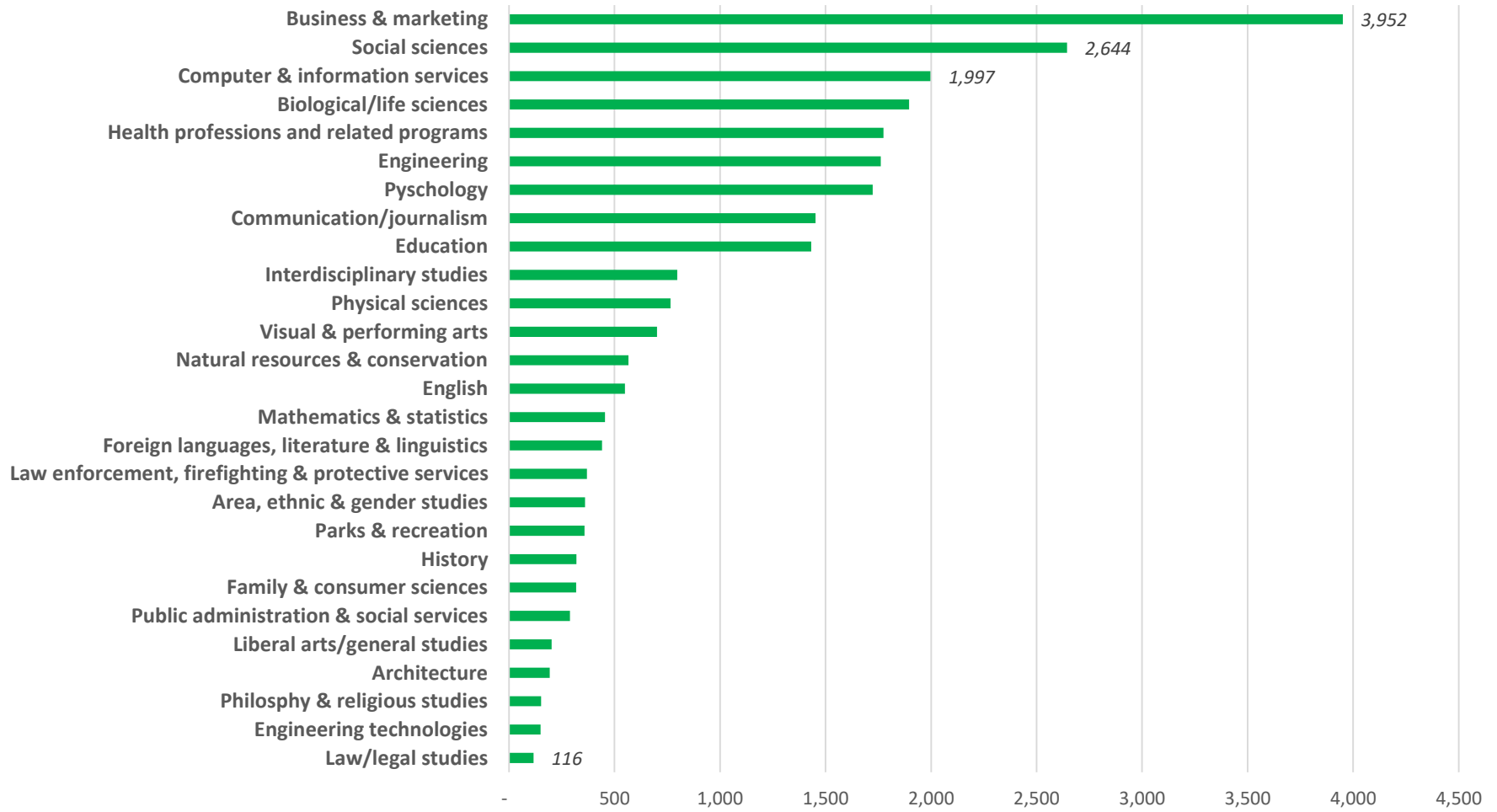
- First, from the 5 WA public 4-year institutions
  - Evergreen State omitted because its graduates do not identify majors
  - Data source: Common Data Sets (CDS) of each institution
  - Data from the branch campuses folded into one university
- Second stream: the 10 private colleges & universities in WA
  - Not capturing for-profit, private universities
  - Nor public institutions with large online presence (SNHU, ASU, WGU)
  - Data source: Integrated Post-Secondary Education Data System ([IPEDS](#))
- Also not considering any applied bachelor degrees from WA's community colleges.

# More on supply of Bachelor's degrees

- The analysis uses 27 degree categories
  - Both the CDS & IPEDS degree issuance data contain several more
  - Not relevant, however, for EWU, are all degrees that are “technologies” except for engineering technology
  - Not relevant also are degrees that are highly specialized to one or two institutions, such as agriculture and theology
  - All these exclusions represent small amounts in overall degrees issuance
- Data are the most recent: from 2018-19 academic year
- Will “drill down” into EWU degree issuance to consider where Eagle bachelors are concentrated relative to WA public higher ed

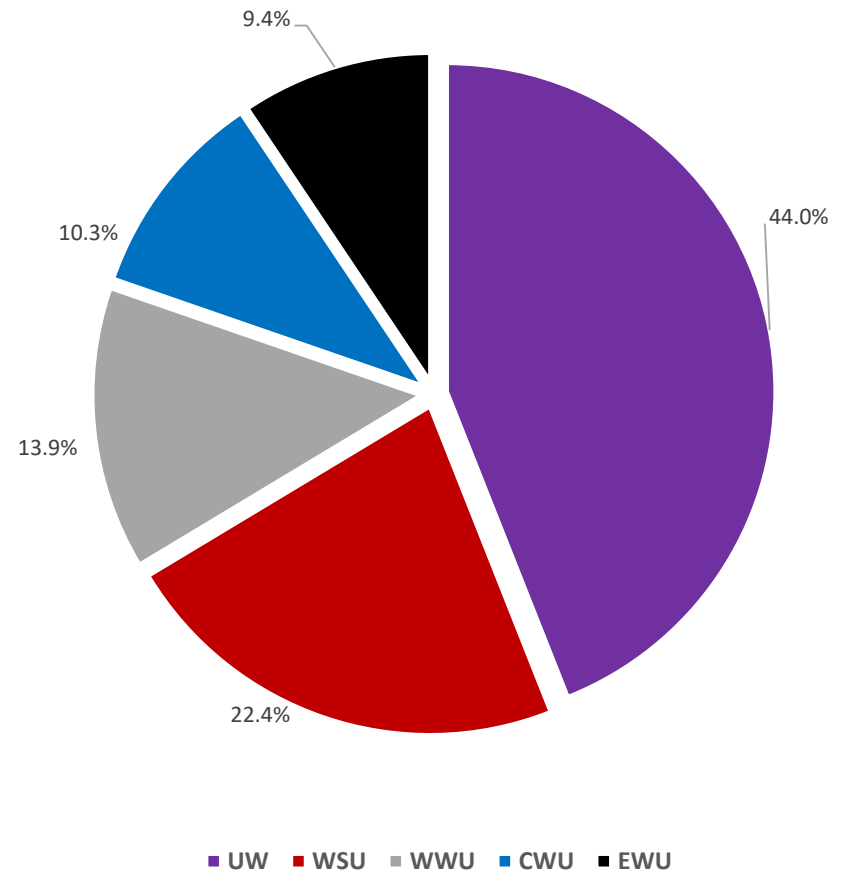


# Distribution of degrees from 5 WA 4-yr public higher ed institutions in 2018-19



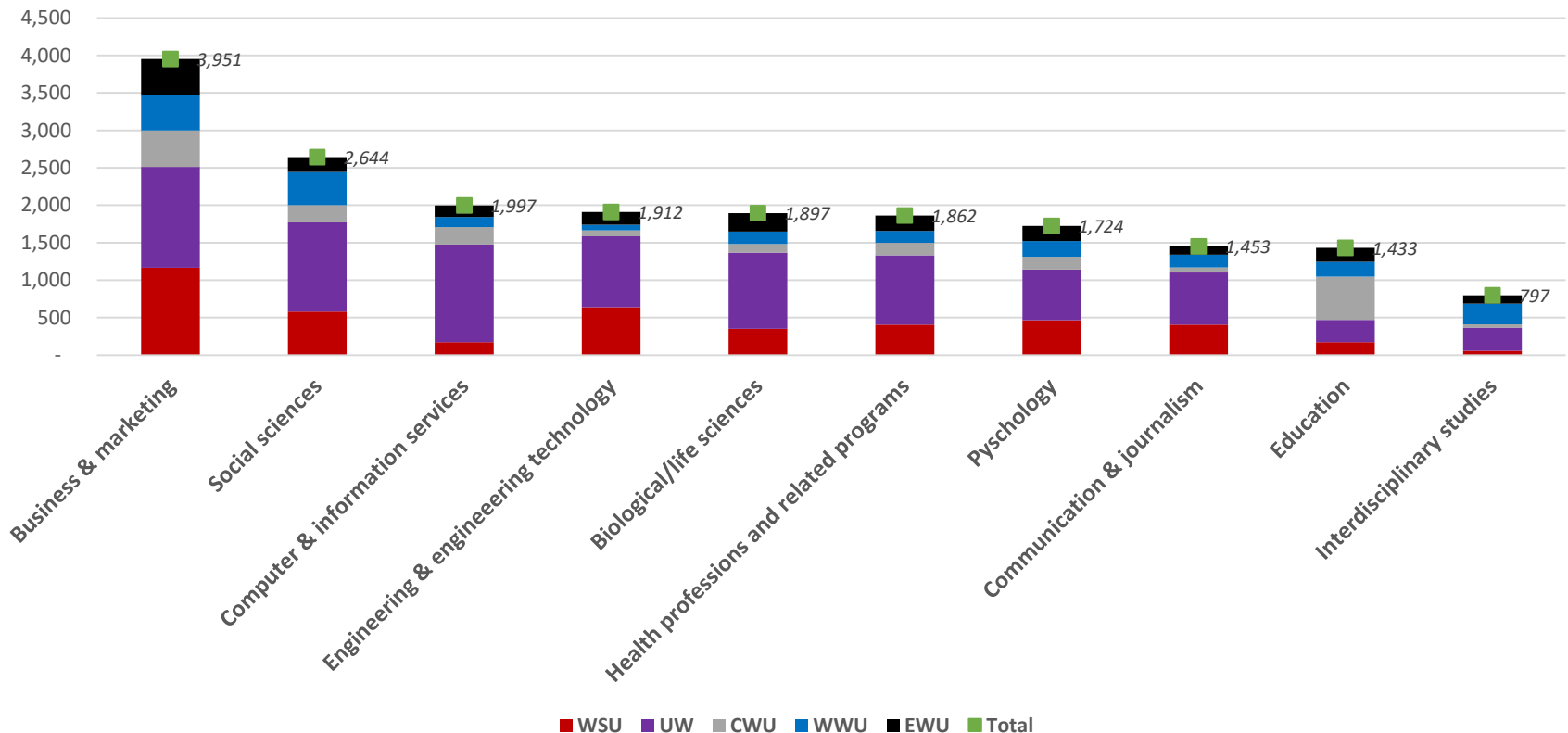
# Distribution of Bachelor's degrees from the 5 WA 4-yr. public universities in 2018-19

- Total ~ 25,735
  - Evergreen: 881 Bachelors
- 2/3 of degree production of WA stems from UW & WSU
- Contribution to total of some majors varies greatly by institution



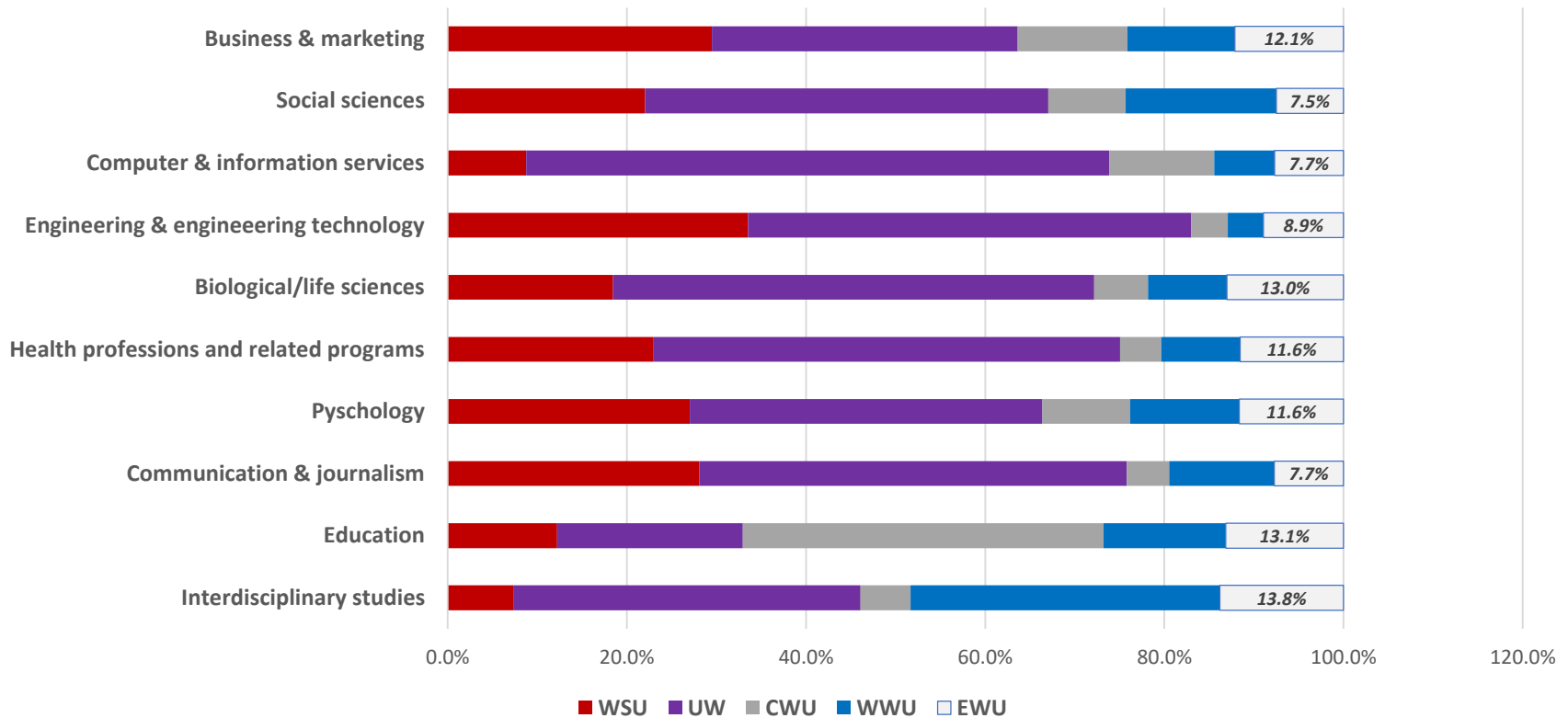
# Distribution of the 10 largest degree categories – total & by the 5 public institutions

2018-2019

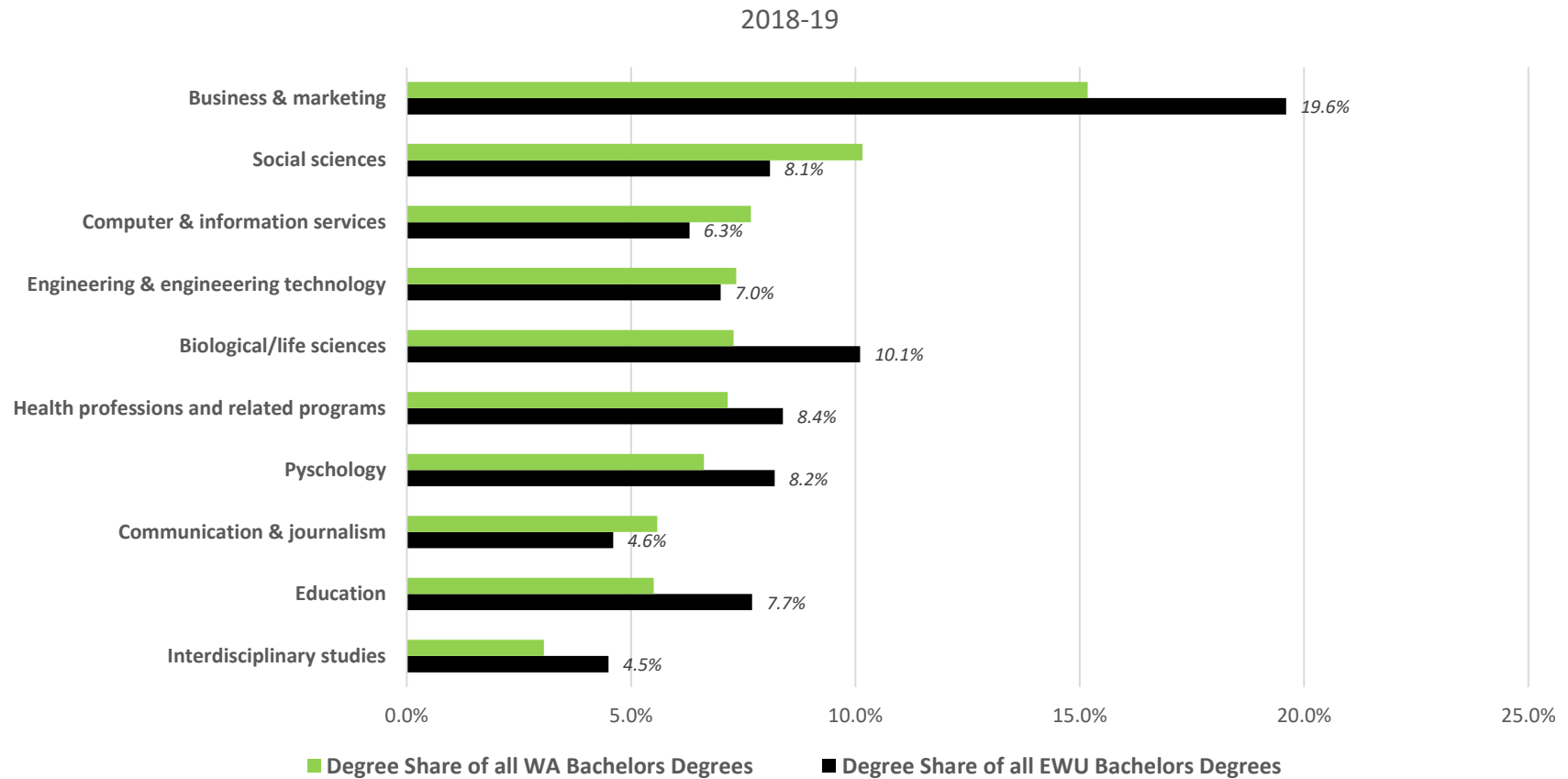


# Distribution of 10 largest degrees categories (75% of total) by share of each university of all WA public universities

2018-19

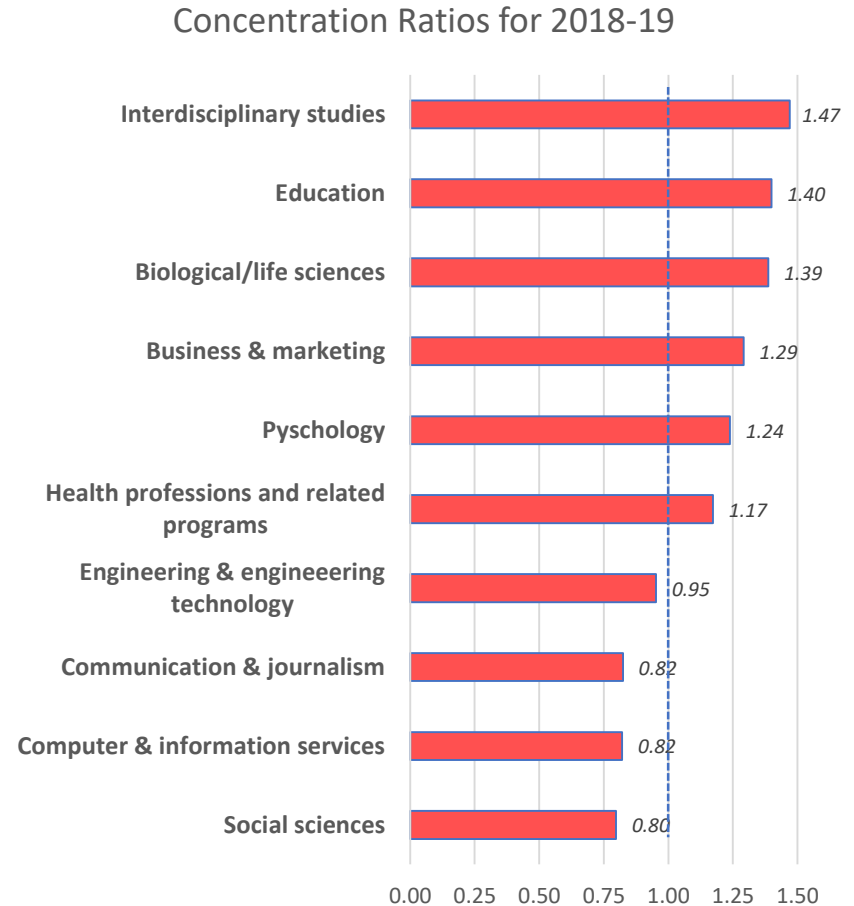


# Degree distribution (shares) by EWU and the 5 public 4-year institutions



# An alternative display: EWU's degree concentration ratios for top 10 degrees, relative to all WA public universities

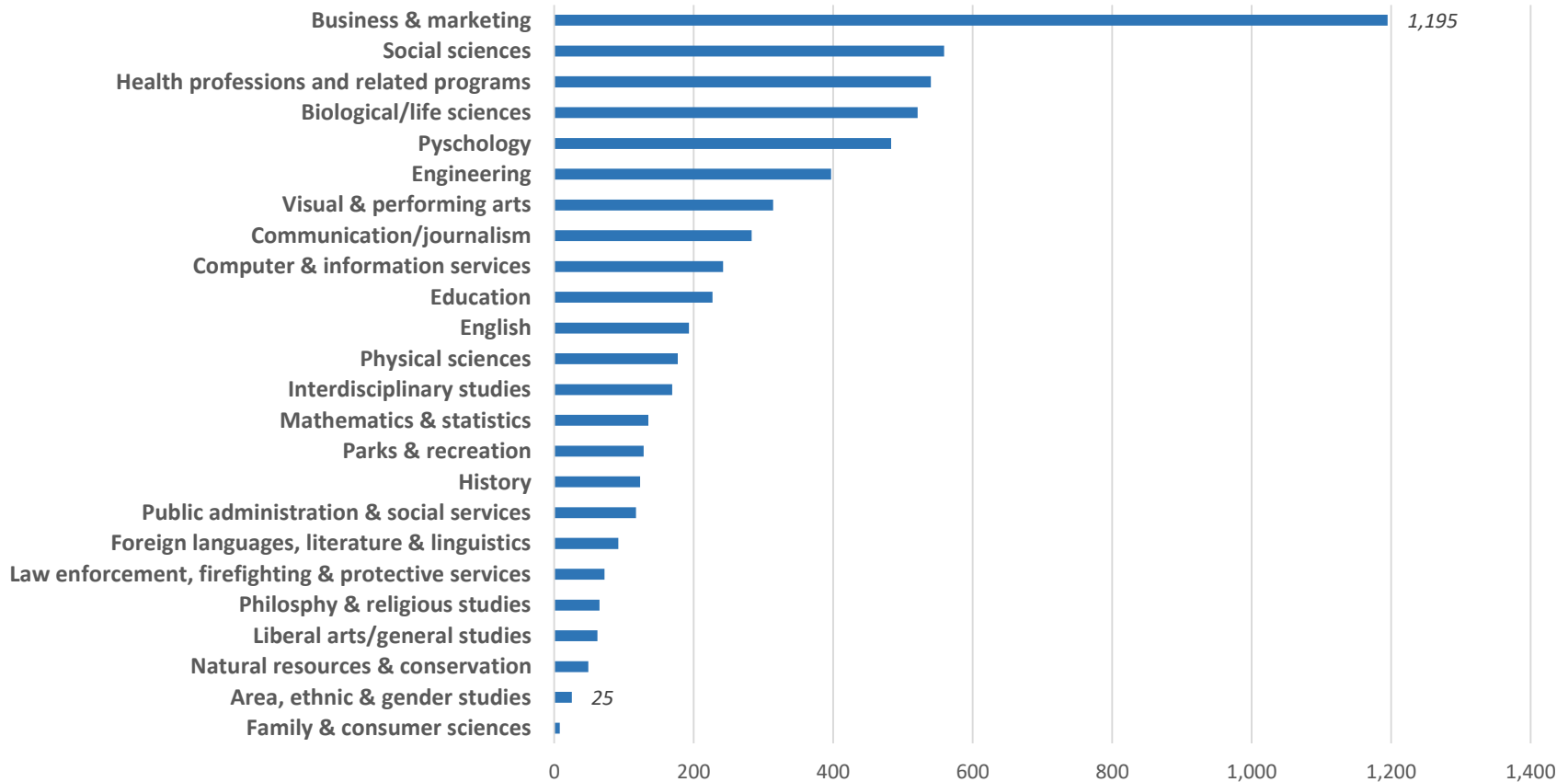
- A ratio of two ratios, with values from degree distribution shares
- Borrows from economic development literature, looking at concentrations or “clusters”
- Interpretation: value  $> 1.0$  implies that EWU is more concentrated in that degree than all publics are
- Does this confer an advantage?



# Interpretation of concentration ratios

- Several of EWU's degree programs are relatively larger than their counterparts at the other public universities.
- Note that this ranking does not take *size* of the degree pool from EWU into account
  - As prior slide showed, interdisciplinary studies is a smaller program than all others in the top 10 at EWU, but its *relative* presence compared to the footprint of the program at other universities is larger
- In the economic development literature, high concentrations are taken to imply a competitive advantage. Does this apply here?

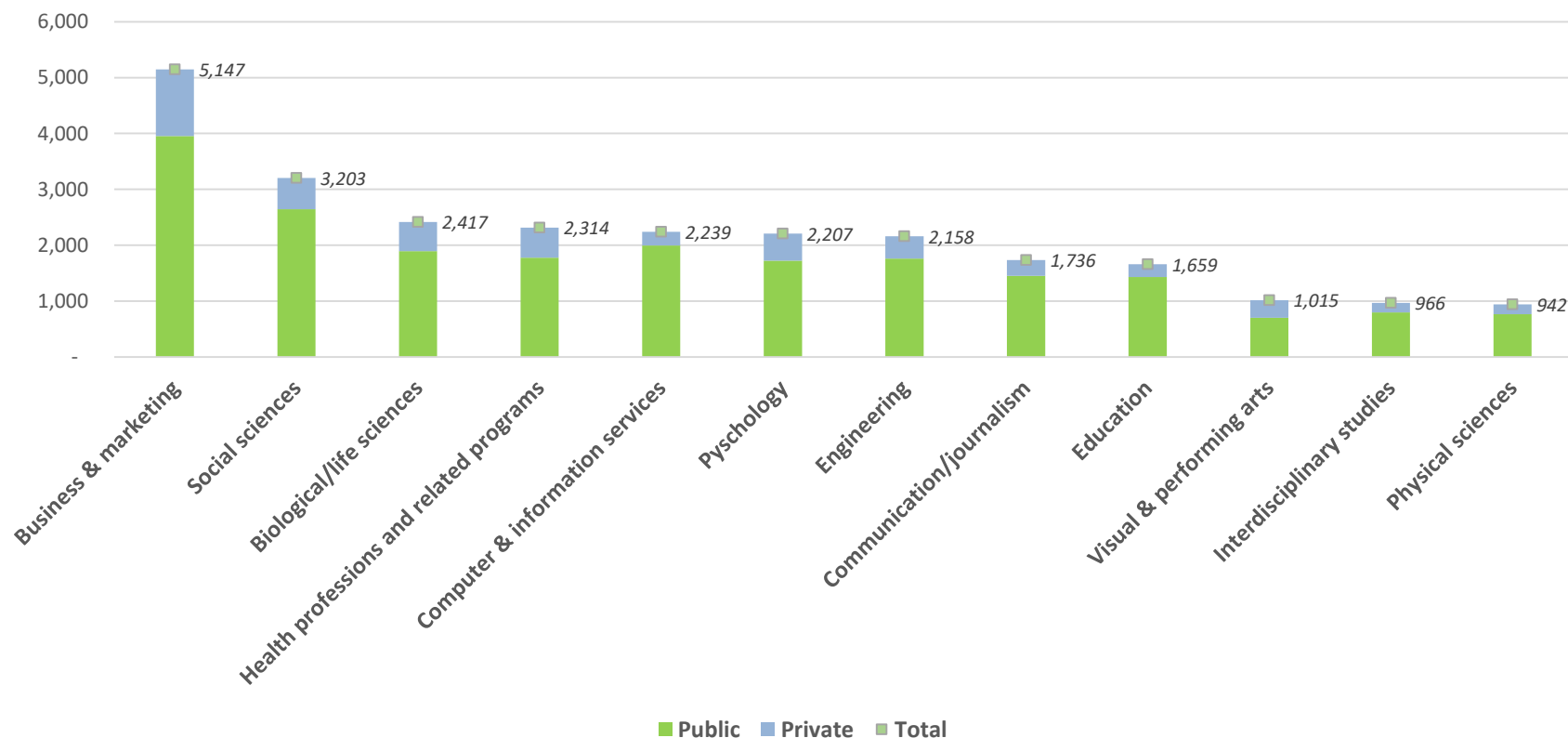
**Now consider the totals from the 10 WA *private* colleges & universities: similar to publics but the distribution a bit different; 2018-2019** *(total ~6,175)*



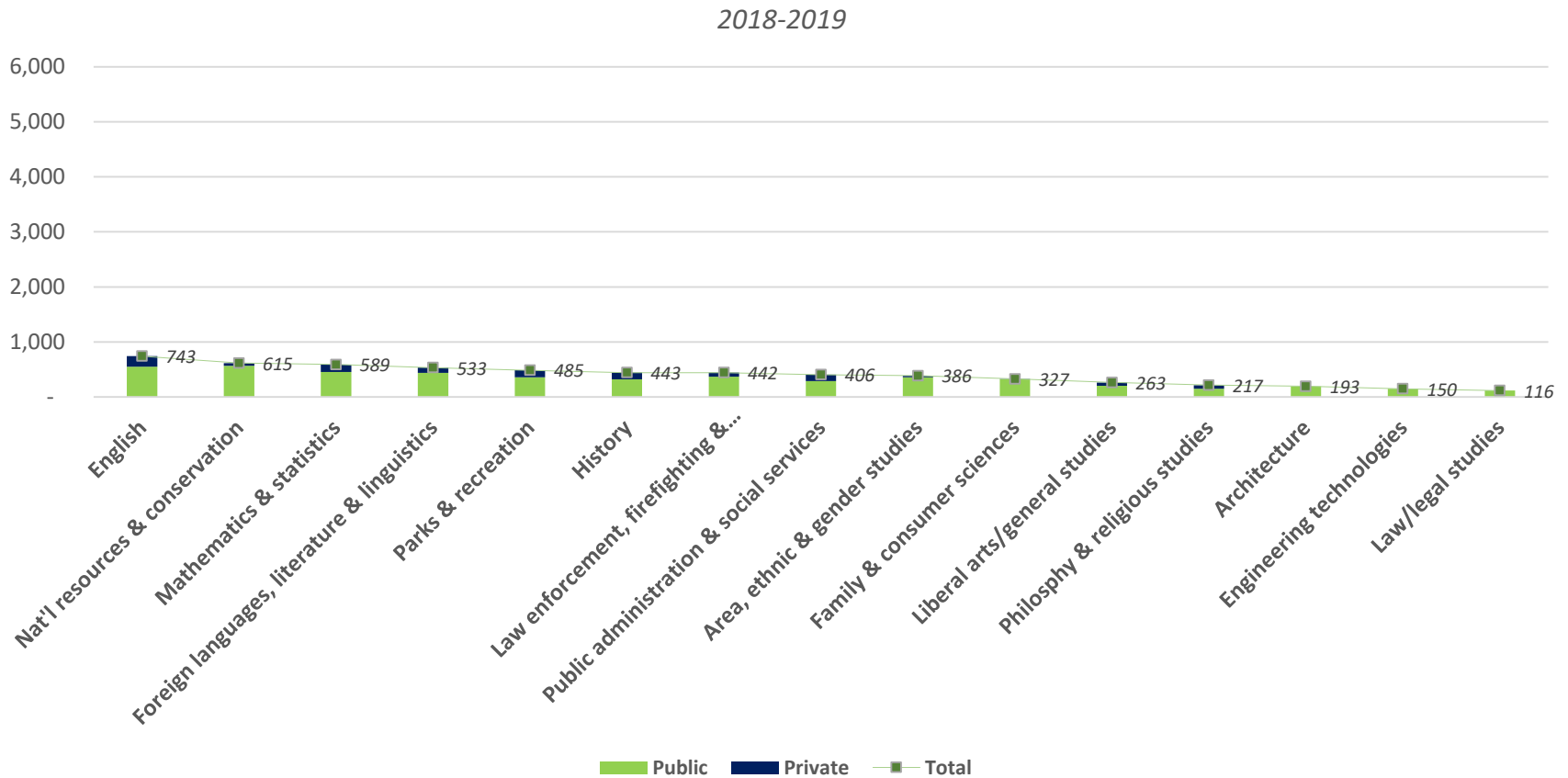


# Putting the public and private degree issuance together and ranking by totals: top dozen

2018-2019

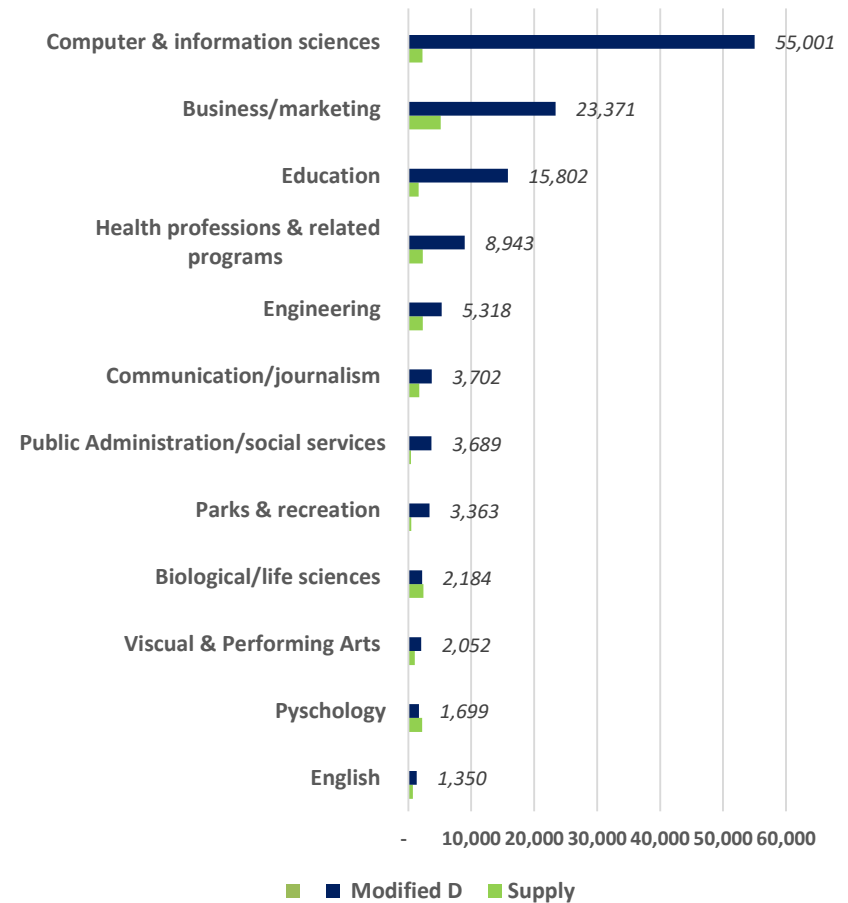


# Putting the public & private degree issuance together: remaining majors



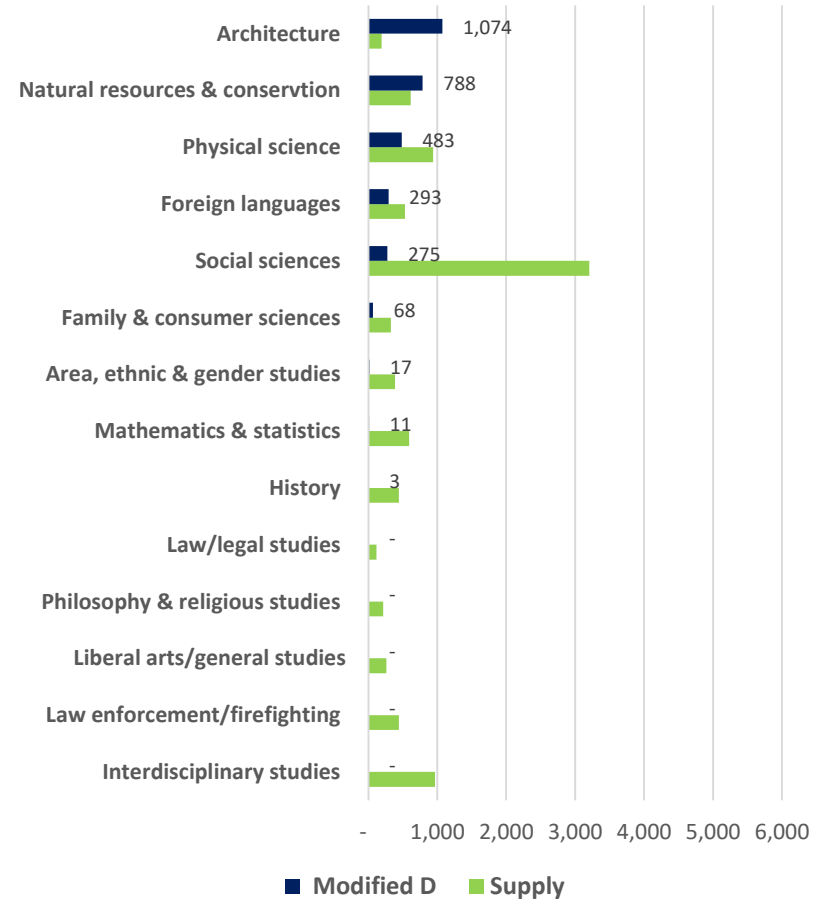
# Combining WA annual supply & projected annual demand, by demand of top 12 degrees

- Undersupply of degrees
  - Computer & info sciences
  - Business & marketing
  - Education
  - Health professions
  - Engineering
  - Communication & journalism
  - PA & social services
  - Parks & recreation (coaches)
  - Visual & performing arts
  - English
- Oversupply of degrees
  - Biological & life sciences
  - Psychology



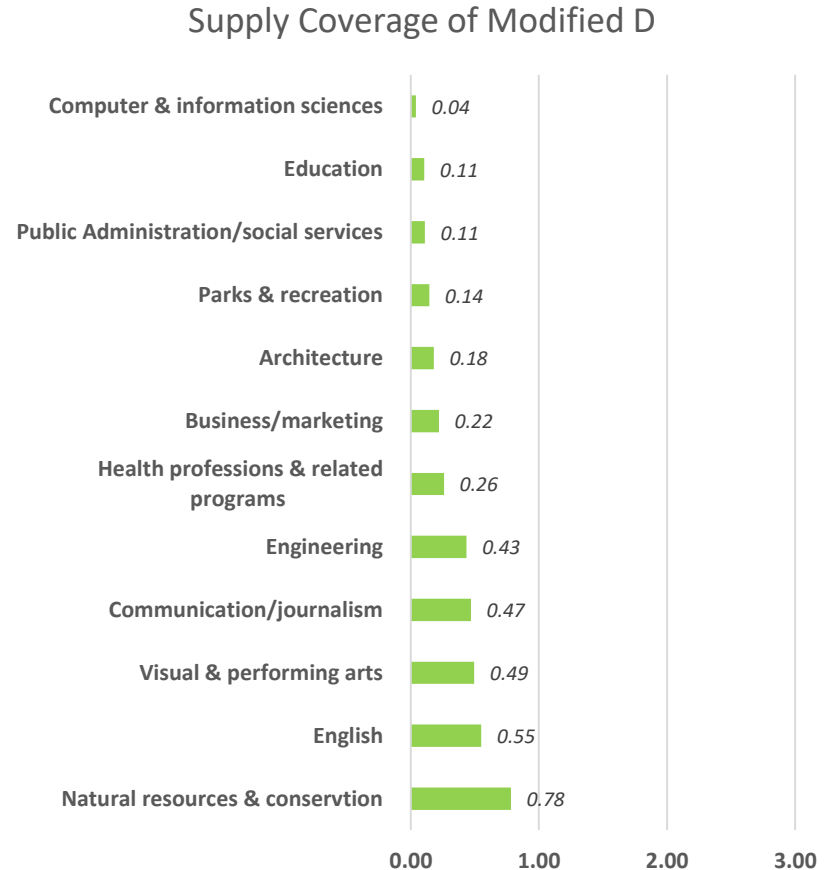
# Combining annual WA supply & demand, cont'd

- Note the scale change: these majors carry numbers that are an order of magnitude smaller than previous slide
- Undersupplied majors
  - Architecture
  - Natural resources & conservation
- Oversupplied majors – all the rest



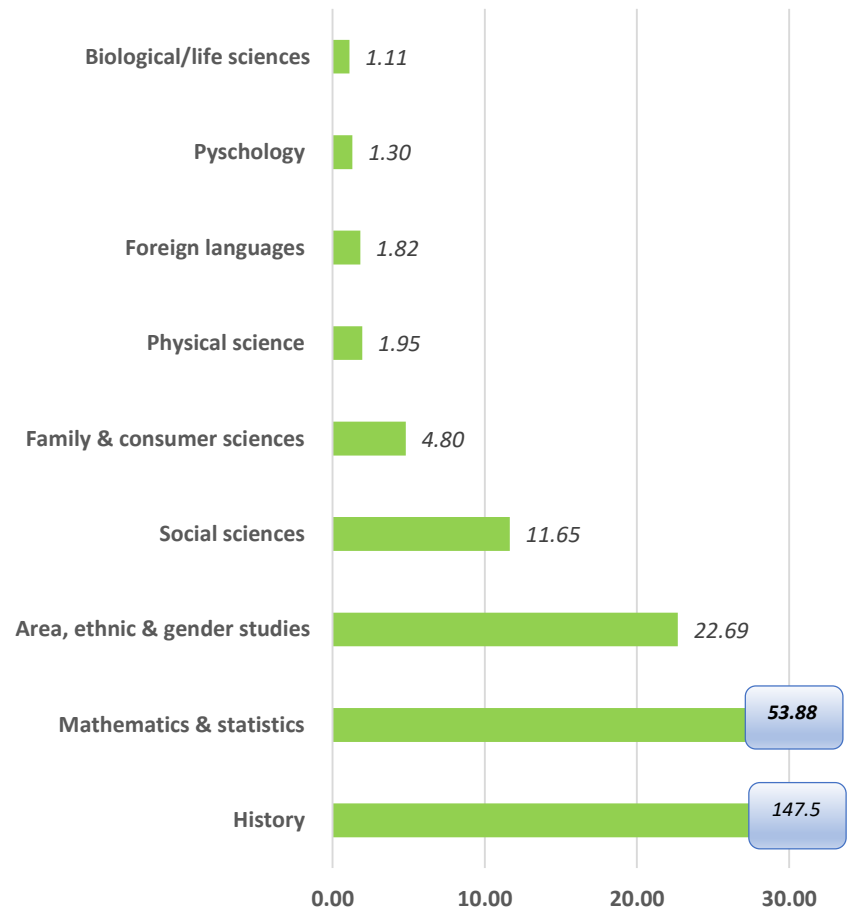
# An alternative way of depicting the WA supply-demand balance: “coverage ratio,” or how many WA annual degrees exist for one WA job in demand

- Note the very wide range
- What is the optimal ratio? For sure,  $< 1$ , because we do not want to annually produce more graduates than jobs in a particular field
- But how much  $< 1$ ?
  - Some jobs could be filled by in-migrants to WA; indeed, that has been true for the tech industry
  - Some jobs could be filled by those currently unemployed
  - My best guess: between 0.5 and 0.6



# Remainder of the coverage ratios

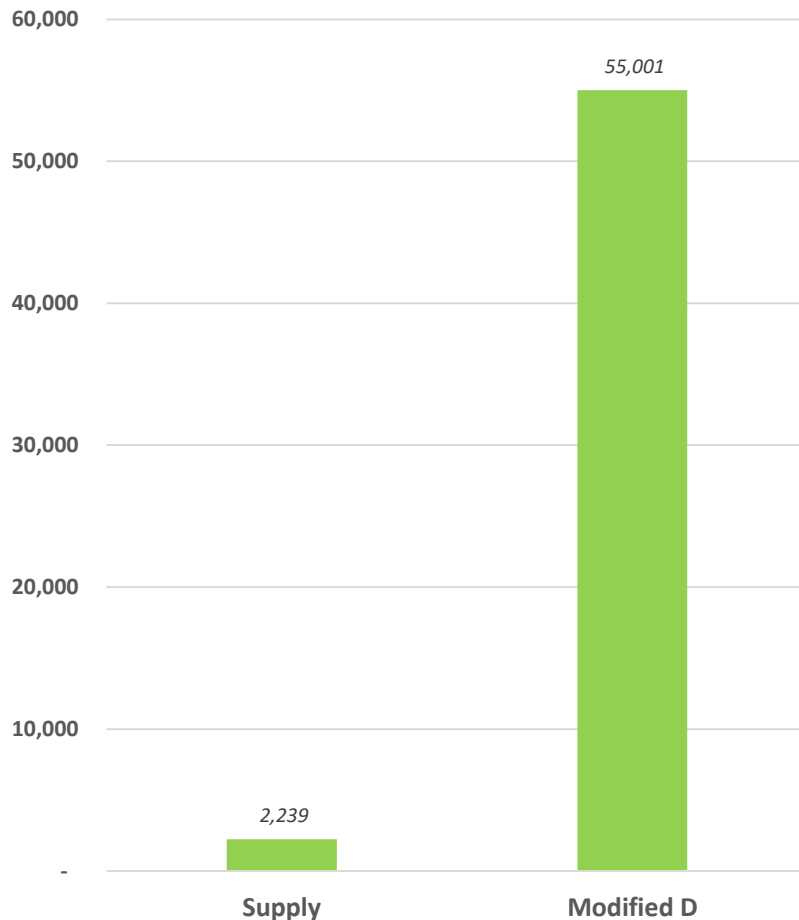
- Note scale change: one order of magnitude larger than prior slide
- Every one of these majors is, state-wide, in overproduction
- Caveats
  - Some disciplines will send a certain share of their BA/BS grads to graduate school
  - If some graduates have dual majors, say, in education & a specialty, the education coverage ratio is understated and overstated in the specialty major.



## Next, a detailed examination of current supply & projected demand of top majors in demand

- Will not map those degree categories where the supply/demand coverage ratios are in the double digits
- For one omitted category, math/statistics, BLS posits that most jobs require a degree beyond a Bachelors
  - Caveat: Some of math/stat Bachelor's degree holders might find jobs in the Business category
- Another omitted category, social sciences, shows large “degree production” but little direct demand
  - Caveat: Economics degrees can be treated as part of Business demand

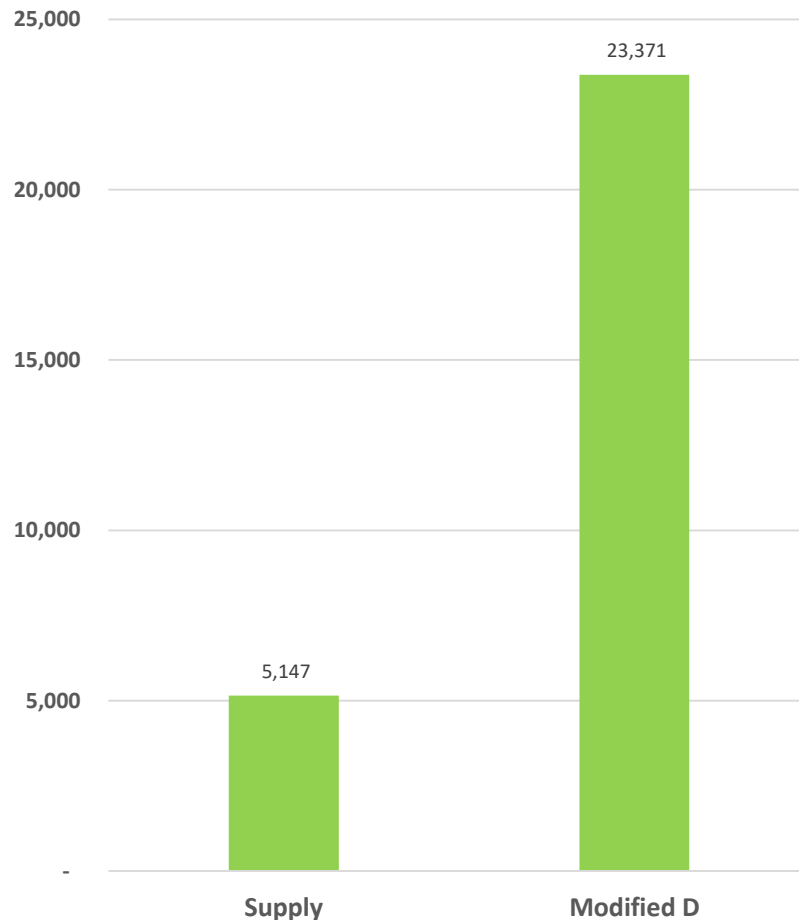
# Modified demand-supply annual balance for Computer & Information Sciences



Components of Occupation Group: Computer & Information Science	
Occupation	Annual Demand
Software Developers	46,119
Computer Occupations, All Other	2,668
Computer Systems Analysts	1,992
Web Developers	1,972
Network and Computer Systems Administrators	990
Information Security Analysts	467
Computer Network Architects	420
Computer Programmers	373
Note: Little reduction in demand due to small number of management & higher ed teaching positions	

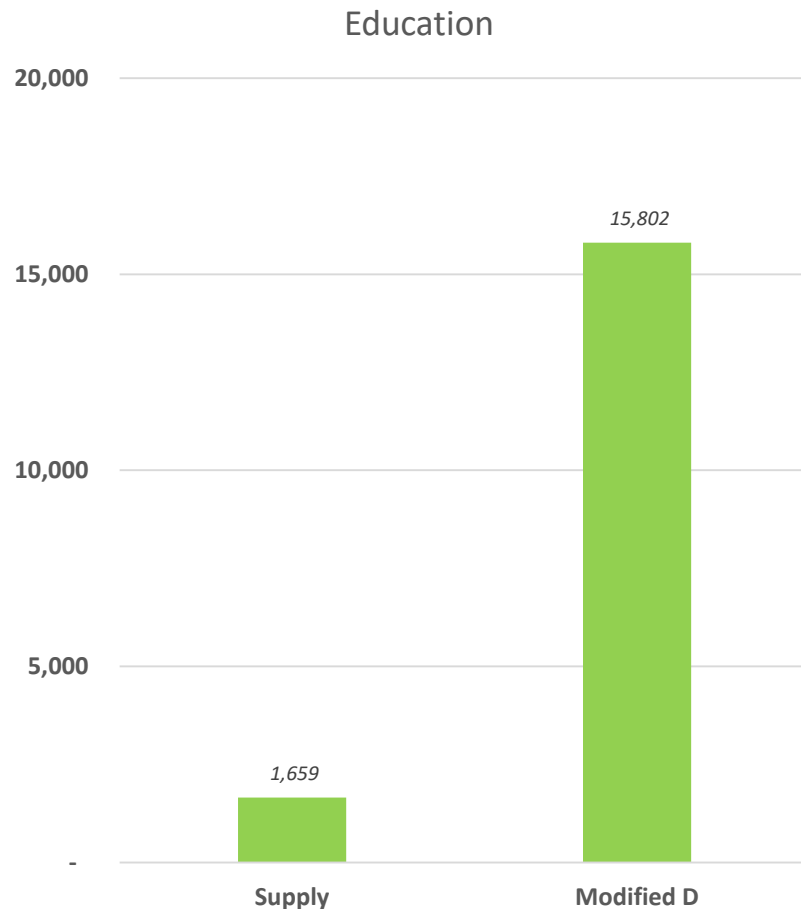


# Modified demand-supply annual balance for Business/marketing



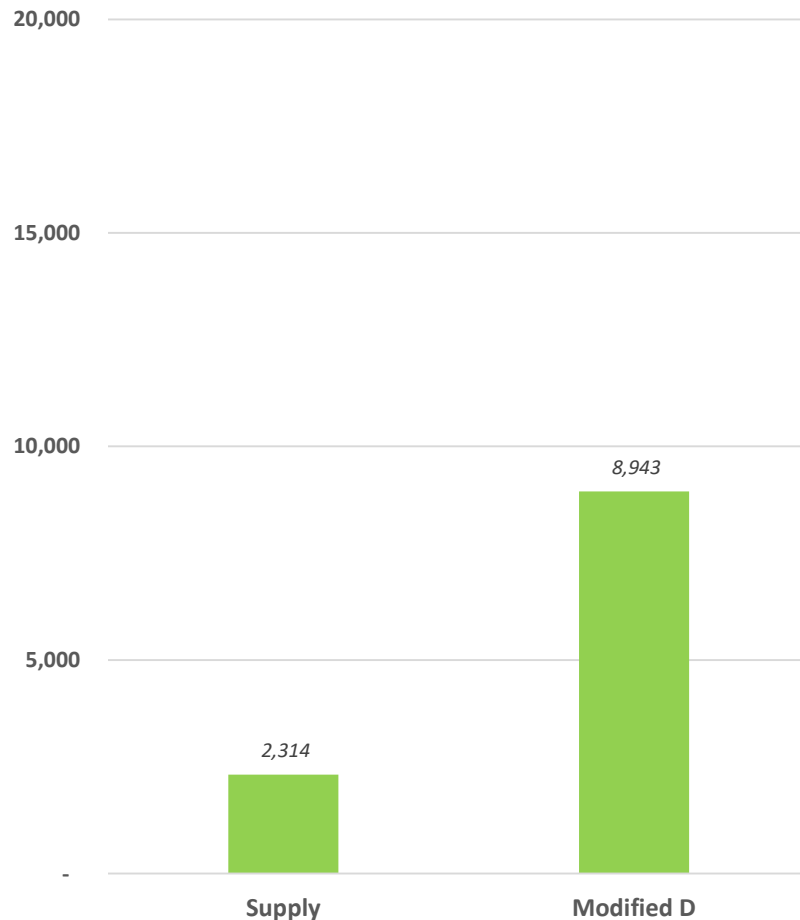
Components of Occupation Group: Business & Marketing	
Occupation	Annual Demand
Accountants and Auditors	4,994
Market Research Analysts and Marketing Specialists	4,491
Human Resources Specialists	2,848
Buyers and Purchasing Agents	2,157
Financial Specialists, All Other	1,442
Insurance Sales Agents	1,363
Sales Representatives, Wholesale & Mfg, Technical & Scientific Products	913
Securities, Commodities, and Financial Services Sales Agents	874
Logisticians	794
Personal Financial Advisors	733
Cost Estimators	679
Loan Officers	661
Operations Research Analysts	373
Labor Relations Specialists	300
Compensation, Benefits, and Job Analysis Specialists	237
Credit Analysts	189
Insurance Underwriters	144
Budget Analysts	93
Tax Examiners and Collectors, and Revenue Agents	86
<i>Note: Significant reduction in demand due to the high number of managers in overall forecast</i>	

# Modified demand-supply annual balance for Education



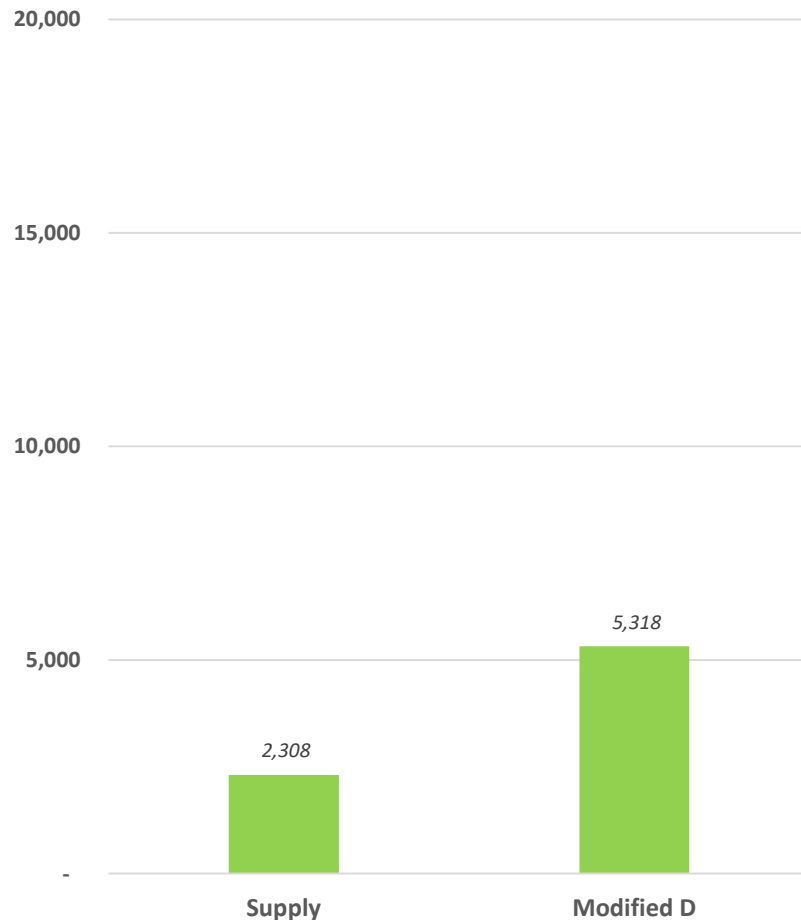
Components of Occupation Group Education	
Occupation	Annual Demand
Elementary School Teachers, Except Special Education	4,026
Teachers and Instructors, All Other	2,854
Self-Enrichment Education Teachers	2,413
Secondary School Teachers, Except Special and Career/Technical Education	1,860
Middle School Teachers, Except Special and Career/Technical Education	1,238
Educational, Guidance, School, and Vocational Counselors	963
Kindergarten Teachers, Except Special Education	885
Special Education Teachers, All Other	606
Adult Basic and Secondary Education and Literacy Teachers and Instructors	318
Special Education Teachers, Secondary School	301
Special Education Teachers, Middle School	176
Special Education Teachers, Preschool	102
Career/Technical Education Teachers, Middle School	60
Career/Technical Education Teachers, Middle School	60
Note: small reduction in demand, as the categories holds relatively few number of administrators & higher ed education instructors	

# Modified demand-supply annual balance for Health Professions & related programs



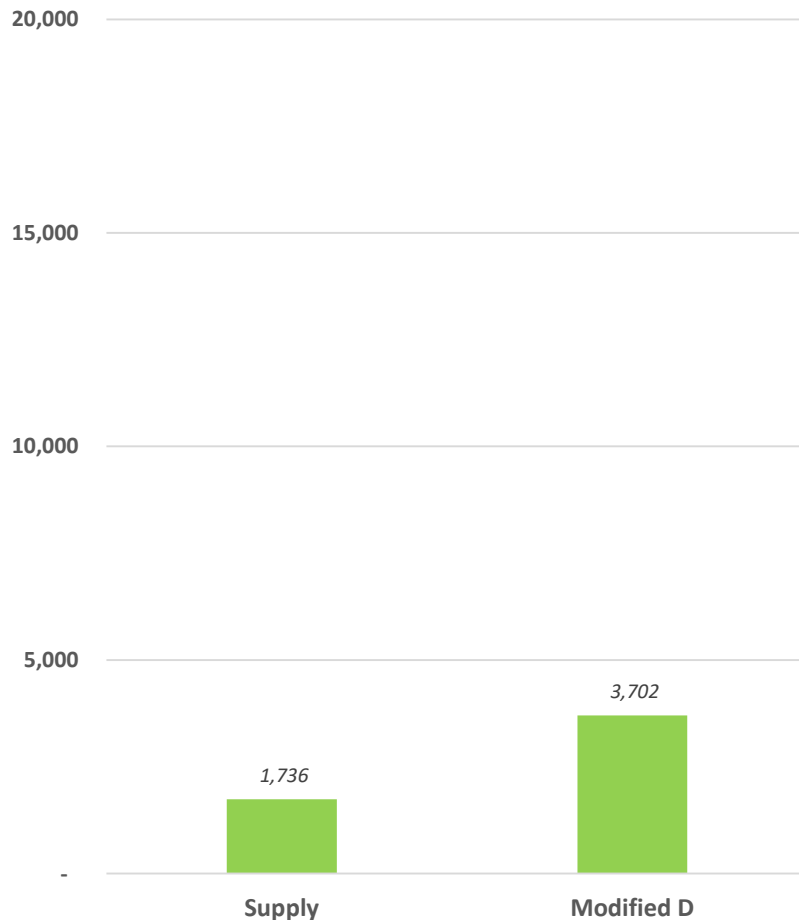
Components of Occupation Group: Health	
Occupation	Annual Demand
Registered Nurses	5,947
Medical and Health Services Managers	1,098
Dental Hygienists	807
Occupational Health and Safety Specialists	334
Health Educators	228
Dietitians and Nutritionists	190
Healthcare Practitioners and Technical Workers, All Other	139
Athletic Trainers	78
Health & Safety Engineers, Except Mining Safety Engineers & Inspctrs	70
Therapists, All Other	31
Recreational Therapists	21
Note: the category has a significant reduction in overall demand, due to post-graduate degrees required for many occupations	

# Modified demand-supply annual balance for Engineering



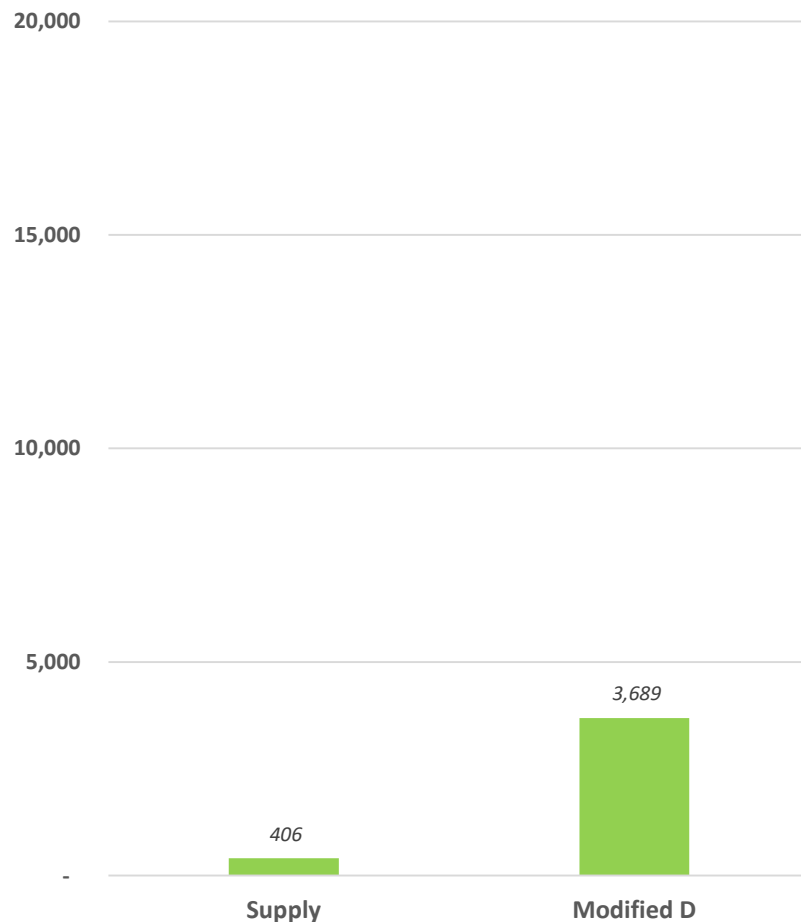
Components of Occupation Group: Engineering	
Occupation	Annual Demand
Civil Engineers	1,261
Industrial Engineers	836
Mechanical Engineers	764
Electrical Engineers	546
Aerospace Engineers	523
Engineers, All Other	281
Electronics Engineers, Except Computer	263
Environmental Engineers	222
Computer Hardware Engineers	168
Nuclear Engineers	111
Sales Engineers	95
Materials Engineers	82
Biomedical Engineers	61
Chemical Engineers	50
Marine Engineers and Naval Architects	44
Petroleum Engineers	7
Mining and Geological Engineers, Including Mining Safety Engineers	4
<i>Note: the category show almost no change from overall demand</i>	

# Modified demand-supply annual balance for Communications & journalism



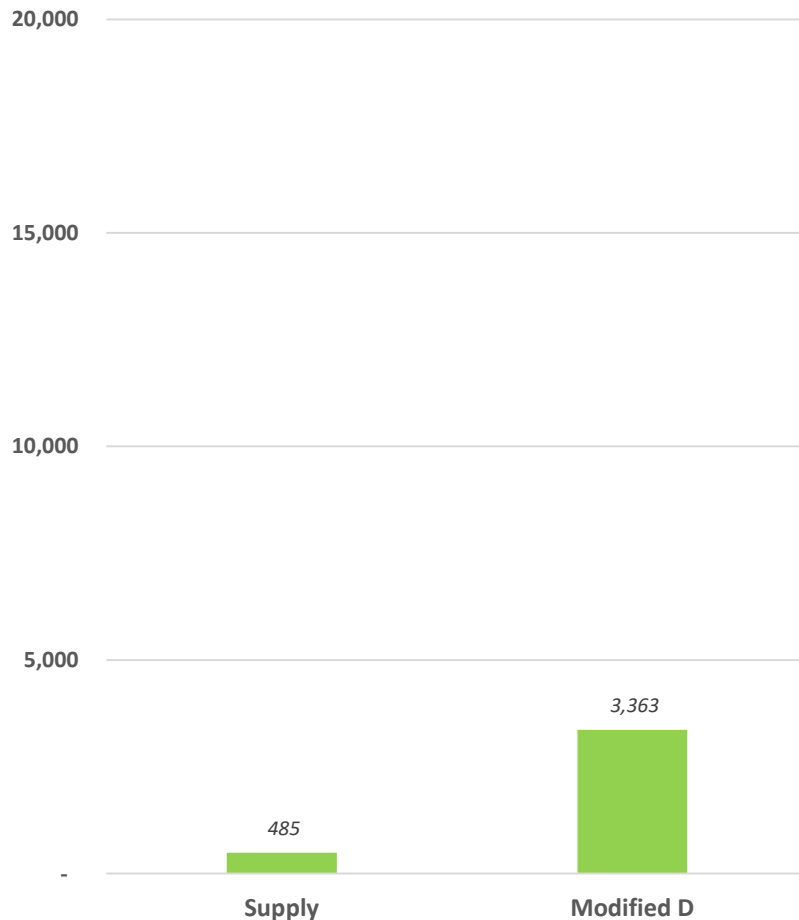
Components of Occupation Group: Communication/Journalism	
Occupation	Annual Demand
Training and Development Specialists	1,229
Public Relations Specialists	1,096
Meeting, Convention, and Event Planners	712
Fundraisers	486
Media and Communication Workers, All Other	98
Reporters and Correspondents	74
Broadcast News Analysts	7
Note: category has little decline from overall demand	

# Modified demand-supply annual balance for Public Administration & Social Services



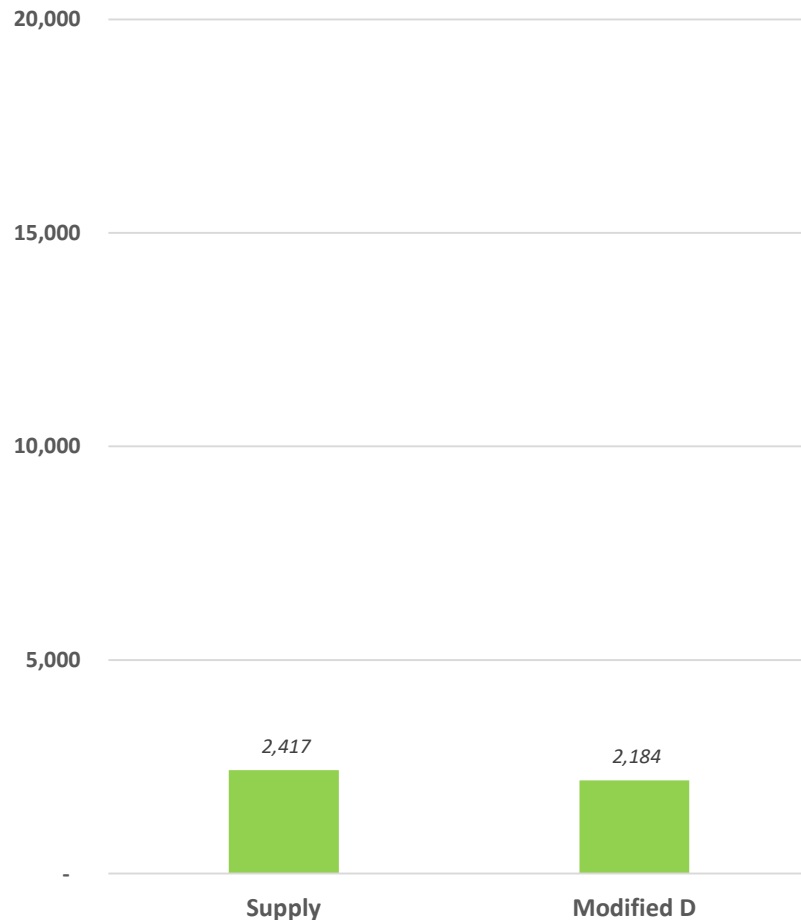
Components of Occupation Group: Public Administration	
Occupation	Annual Demand
Compliance Officers	1,071
Child, Family, and School Social Workers	978
Healthcare Social Workers	531
Community and Social Service Specialists, All Other	396
Mental Health and Substance Abuse Social Workers	332
Urban and Regional Planners	293
Social Workers, All Other	88
Note: category shows a significant decline (~50%) from overall demand due to large numbers of managers in overall demand	

# Modified demand-supply annual balance for Parks & Recreation



Components of Occupation Group: Parks & Recreation	
Occupation	Annual Demand
Coaches and Scouts	3,350
Exercise Physiologists	13
Note: almost no change from overall demand	

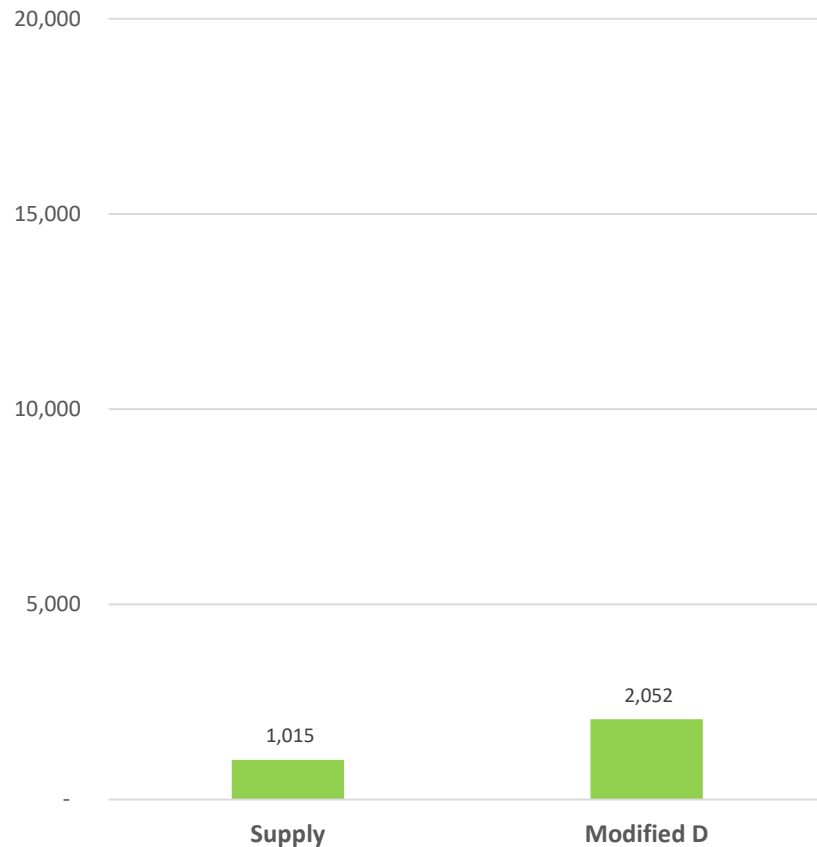
# Modified demand-supply annual balance for Biological & Life Sciences



Components of Occupation Group: Biological/Life Sciences	
Occupation	Annual Demand
Clinical Laboratory Technologists and Technicians	637
Health Technologists and Technicians, All Other	591
Biological Technicians	464
Zoologists and Wildlife Biologists	296
Biological Scientists, All Other	153
Life Scientists, All Other	22
Food Scientists and Technologists	21
Note: large (~60%) reduction in overall demand, due the presence of many occupations that require post-graduate study -- MDs/Dos, dentists, scientists	

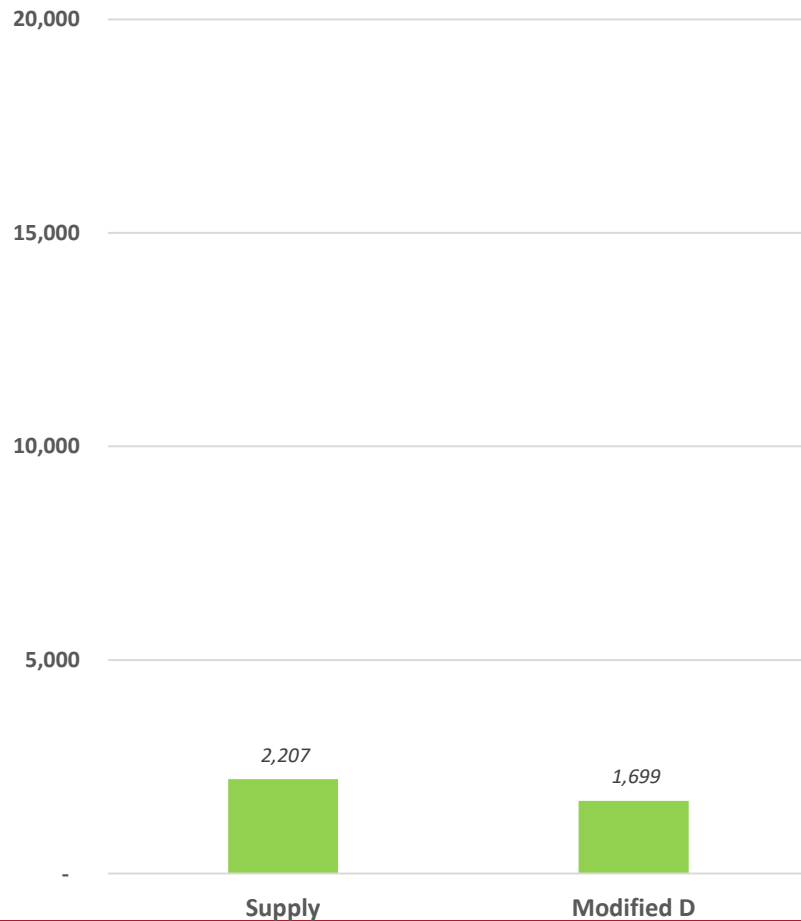


# Modified demand-supply annual balance for Visual & Performing Arts



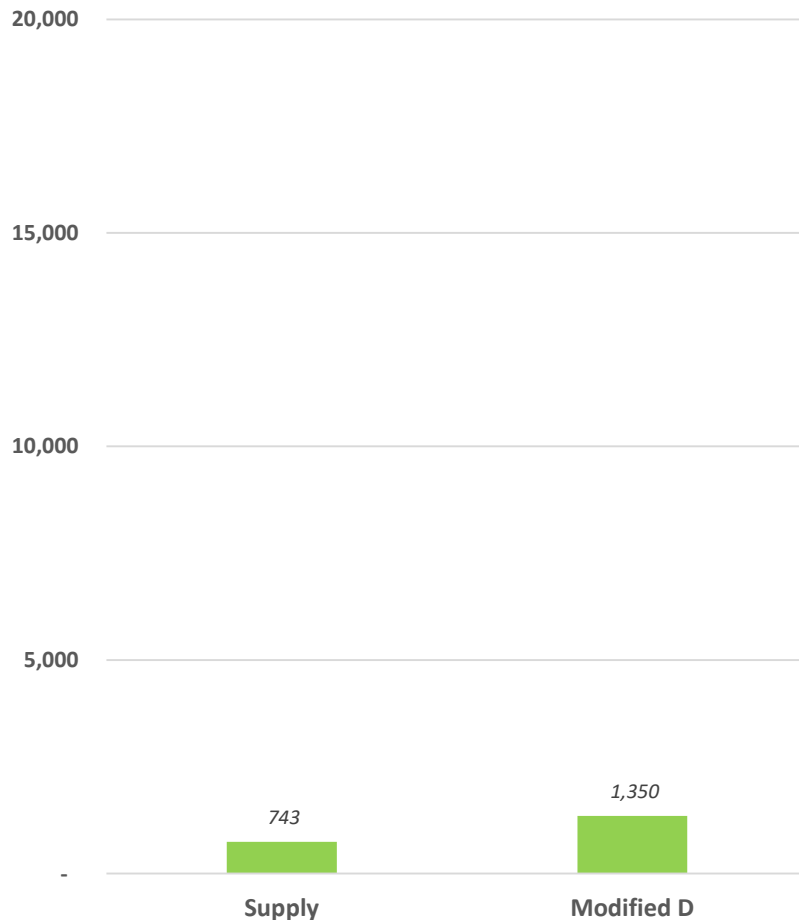
Components of Occupation Group: Visual & Performing Arts	
Occupation	Annual Demand
Multimedia Artists and Animators	635
Producers and Directors	450
Music Directors and Composers	322
Art Directors	301
Fine Artists, Including Painters, Sculptors, and Illustrators	118
Actors	91
Film and Video Editors	72
Museum Technicians and Conservators	48
Artists and Related Workers, All Other	15
<i>Note: some decline (~25%) from overall demand due to need for post-graduate degrees in certain occupations</i>	

# Modified demand-supply annual balance for Psychology



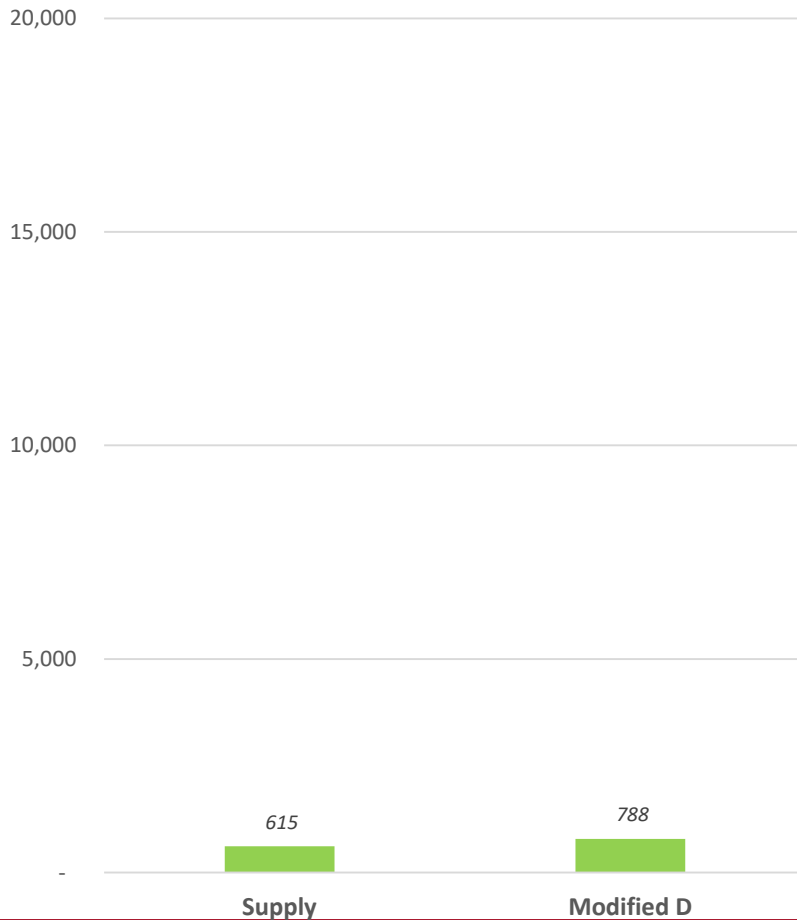
Components of Occupation Group: Psychology	
Occupation	Annual Demand
Counselors, All Other	1,699
Note: significant (~40%) decline from overall demand due to need for post=graduate degrees in many occupations	

# Modified demand-supply annual balance for English



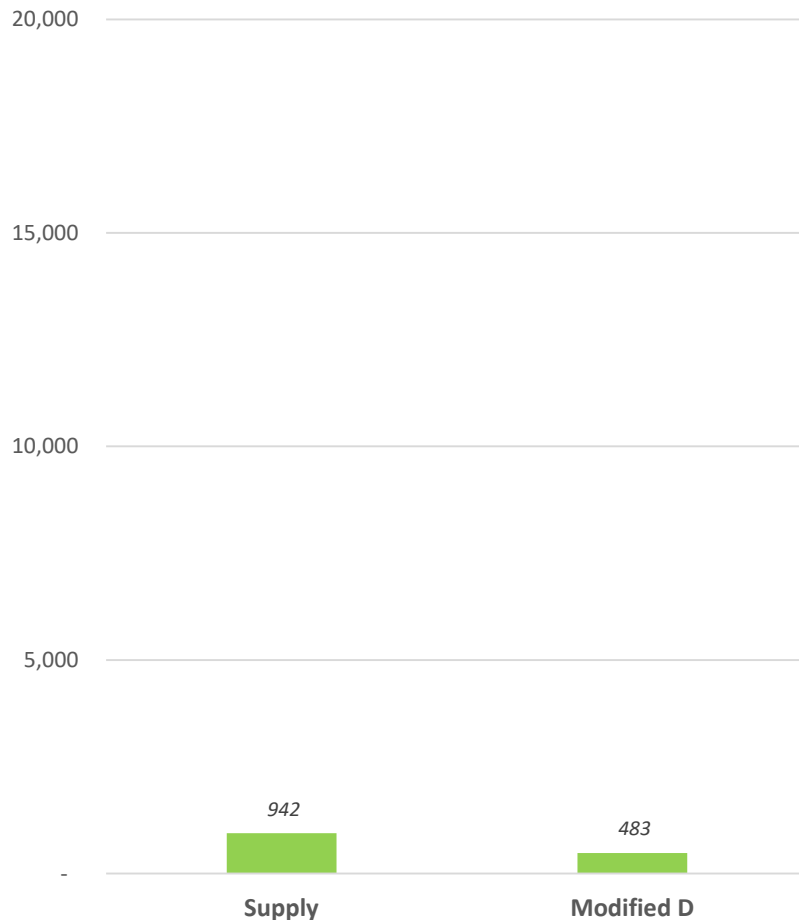
Components of Occupation Group: English	
Occupation	Annual Demand
Writers and Authors	662
Editors	444
Technical Writers	244
Note: only a modest decline (13%) from overall demand due to a need for post-graduate degrees in many occupations	

# Modified demand-supply annual balance for Natural Resources & Conservation



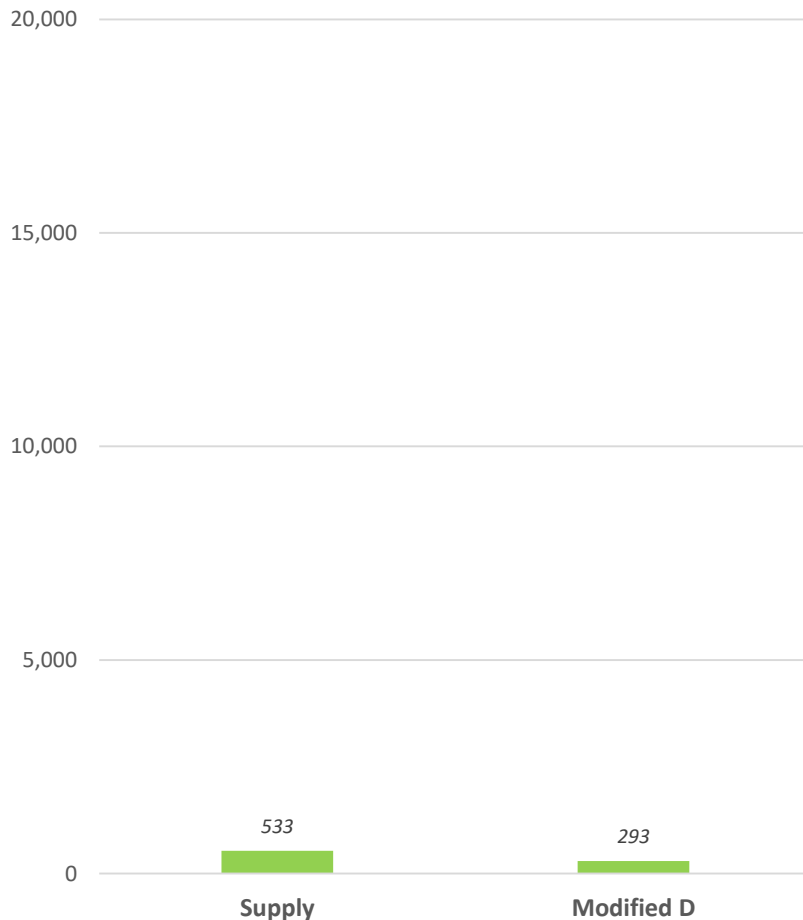
Components of Occupation Group: Natural Resources & Conservation	
Occupation	Annual Demand
Environmental Scientists and Specialists, Including Health	551
Conservation Scientists	138
Foresters	99
Note: only a modest decline (14%) from overall demand due to a need for post-graduate degrees in many occupations	

# Modified demand-supply annual balance for Physical Sciences



Components of Occupation Group: Physical Sciences	
Occupation	Annual Demand
Chemists	203
Geoscientists, Except Hydrologists and Geographers	192
Physicists	94
Biochemists and Biophysicists	50
Hydrologists	47
Materials Scientists	40
Physical Scientists, All Other	30
Atmospheric and Space Scientists	24
Astronomers	6
Note: significant decline (~51%) from overall demand due to presence of managers & higher ed instructors; still, many of included occupations may need a degree higher than a Bachelors	

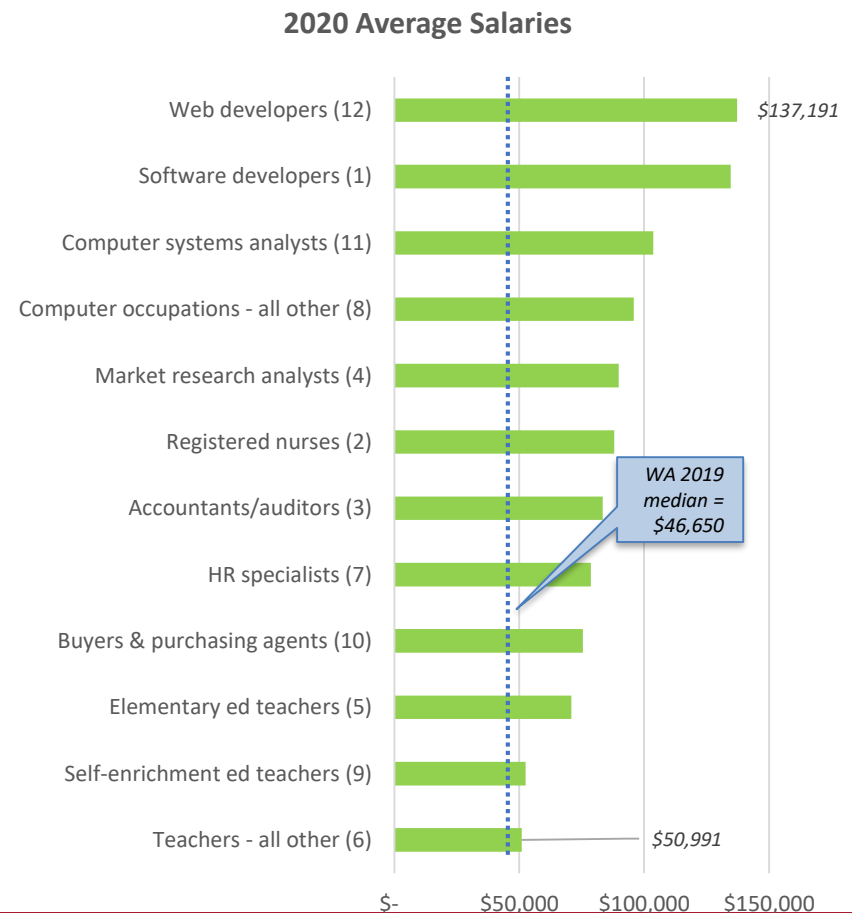
# Modified demand-supply annual balance for Foreign Languages



Components of Occupation Group: Foreign Languages	
Occupation	Annual Demand
Interpreters and Translators	293
Note: some decline (~21%) from overall demand, due the presence of higher ed instructors	

# Salaries of the top 12 occupations in demand, 2023-28, requiring a Bachelor's degree

- Computer science degrees claim the highest salaries in the group
- Education claim the lowest salaries in the group
- Business degrees and nursing in the middle
- (Number in parentheses) indicates rank among the top 12 by total projected jobs.



# Final caveats

- How important is the pool of the unemployed? It can be important in certain degree areas & needs further investigation
  - Still, most of the unemployed do not have a BA or higher, based on national surveys
- More precise degree issuance data would help analysis
  - E.g., we “know” annual projected demand for accountants. But CDSs & IPEDS don't contain data on accounting degrees issued in WA every year.
- Need a better sense of the proportion of undergraduates statewide who go on to further study to make degree demand estimates more precise.



# Still, opportunities for Bachelors degree expansion seem apparent

- In the aggregate, a distinct imbalance between supply and demand for Bachelor's degrees in Washington State
  - Supply (2018-2019): nearly 31,000 (or ~32,000 with Evergreen's grads)
  - Annual Demand (2023-2028): ~129,500 (~171,000 without modifications)
- Degree areas that show promise for expansion
  - Computers & information science (software developers, systems analysts, web developers)
  - Business (accounting, market analysts, financial specialists)
  - Education (elementary ed, secondary ed, middle ed, enrichment)
  - Health (nursing, medical managers, dental hygiene)
  - Engineering (civil, industrial)
  - Other areas exist but have smaller opportunities

# THANK YOU

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