

# Geoscience COVID-19 Impacts Study

Impacts of COVID-19 on the Geoscience Enterprise:  
How Permanent Will Academic Program and Workforce Changes Be?

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American Geosciences Institute

23 March 2021

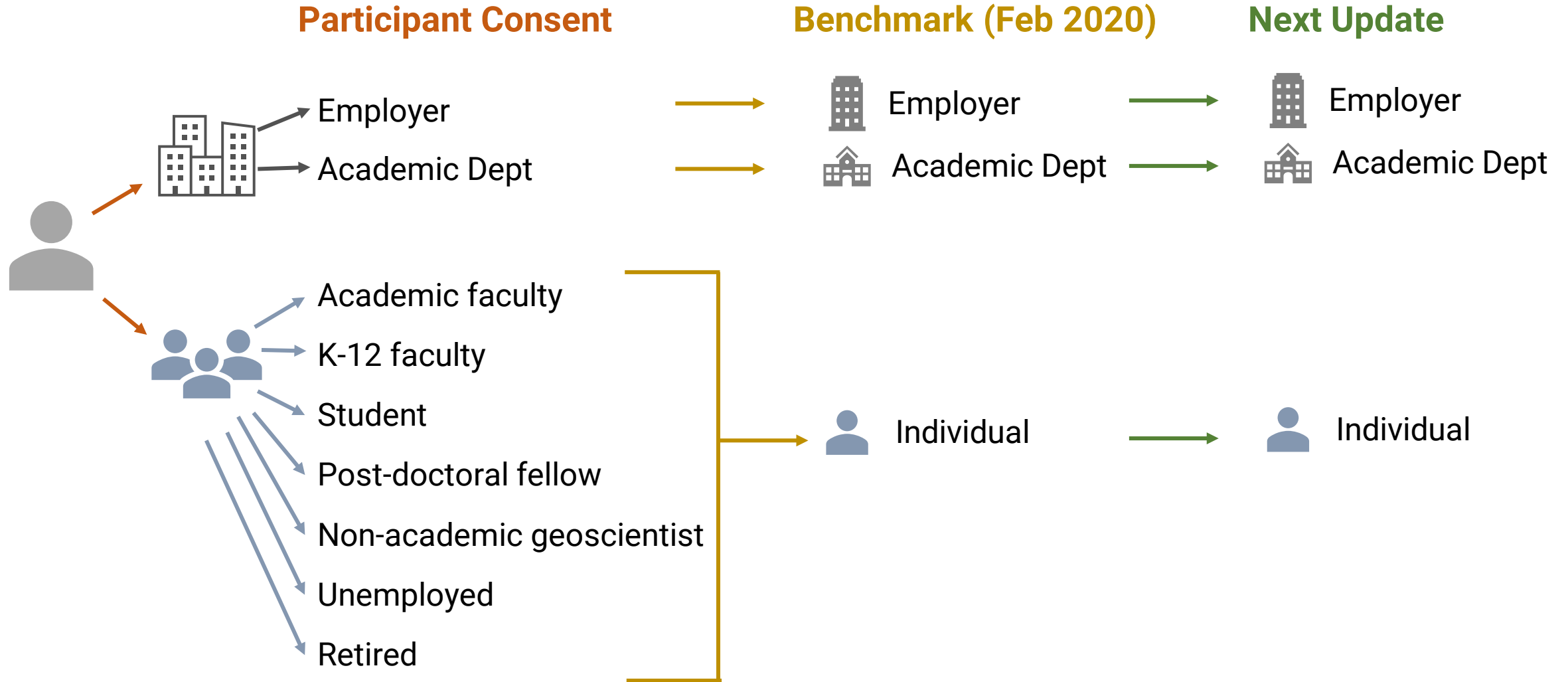
This material is based upon work supported by the National Science Foundation under Grant Number ICER-2029570.

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# Rationale

- COVID-19 pandemic - unique event that required rapid structural changes to the geosciences
- Assess short-term and long-term impacts of pandemic
- Establish a baseline of pre- and post-COVID-19 workplace and instructional environments
- Assess the magnitude and permanency of changes to workplace and instructional environments
- Inform response and recovery planning for future disasters and disruptions to work and instructional environments

# Survey Cohorts & Pathways



Data Type	Consent	Benchmark	Next Update
Participant Type	I	I	I
Employment / Enrollment Status	I	I	I
Organizational Affiliation	I A E	I	I
Educational Background	I	I	I
Job-seeking Activities	I	I	I
Retiree Activities	I	I	I
Work / Learning Environment		I A E	I A E
Academic Activities		I A	I A
Work & Research Activities		I A E	I A E
Professional Development		I	I
Outlook & Concerns		I A E	I A E
Contact Info	I A E		
Demographic Info	I		
Business Operations		A E	A E

# Survey Design

Multi-cohort longitudinal survey

Continuous onboarding  
May 2020 – Jan 2022



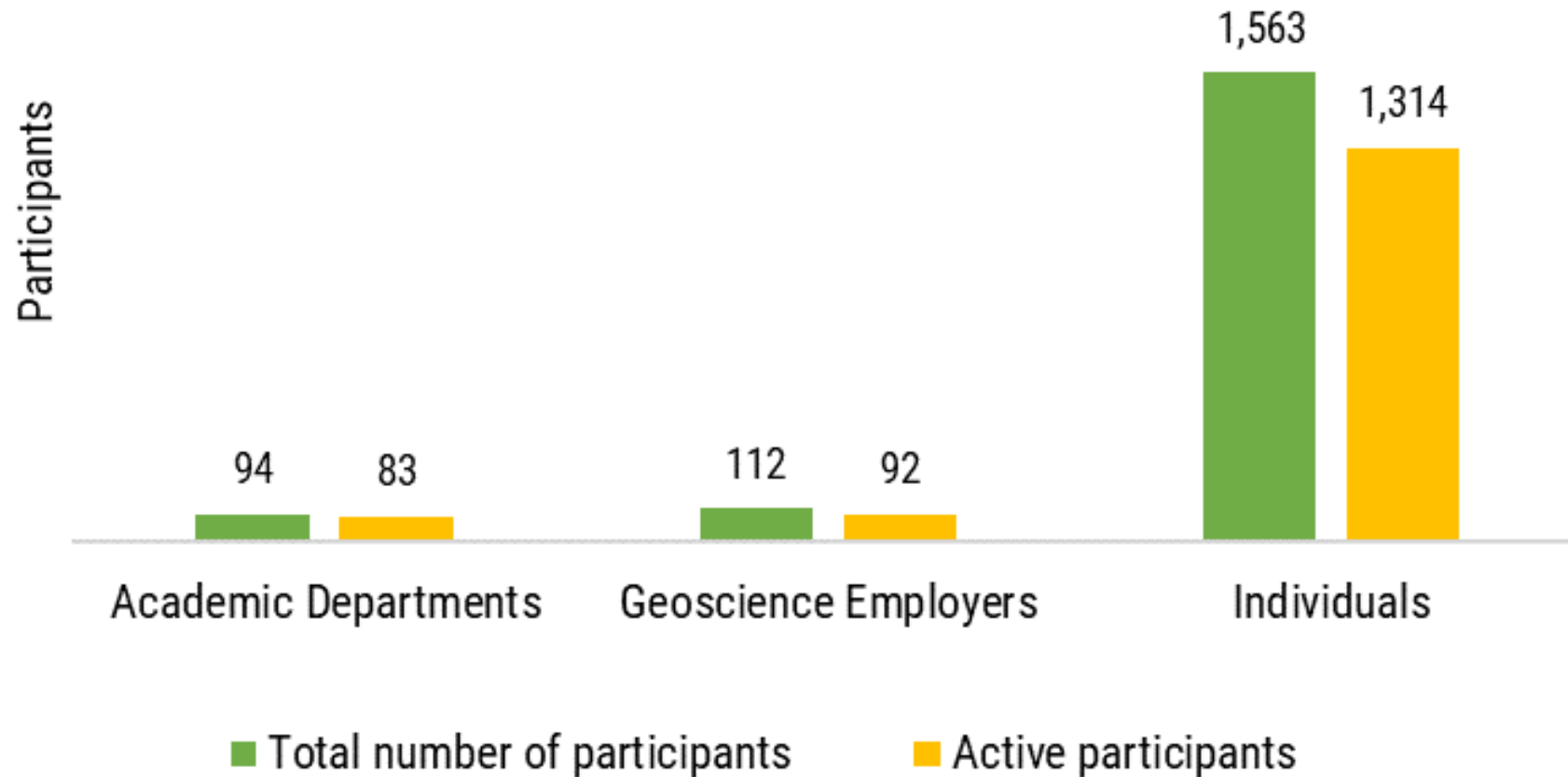
Participants are not required  
to answer every survey



Survey sent every 2 weeks

# Survey participation by major cohort

Participants by major cohort



# Response rates

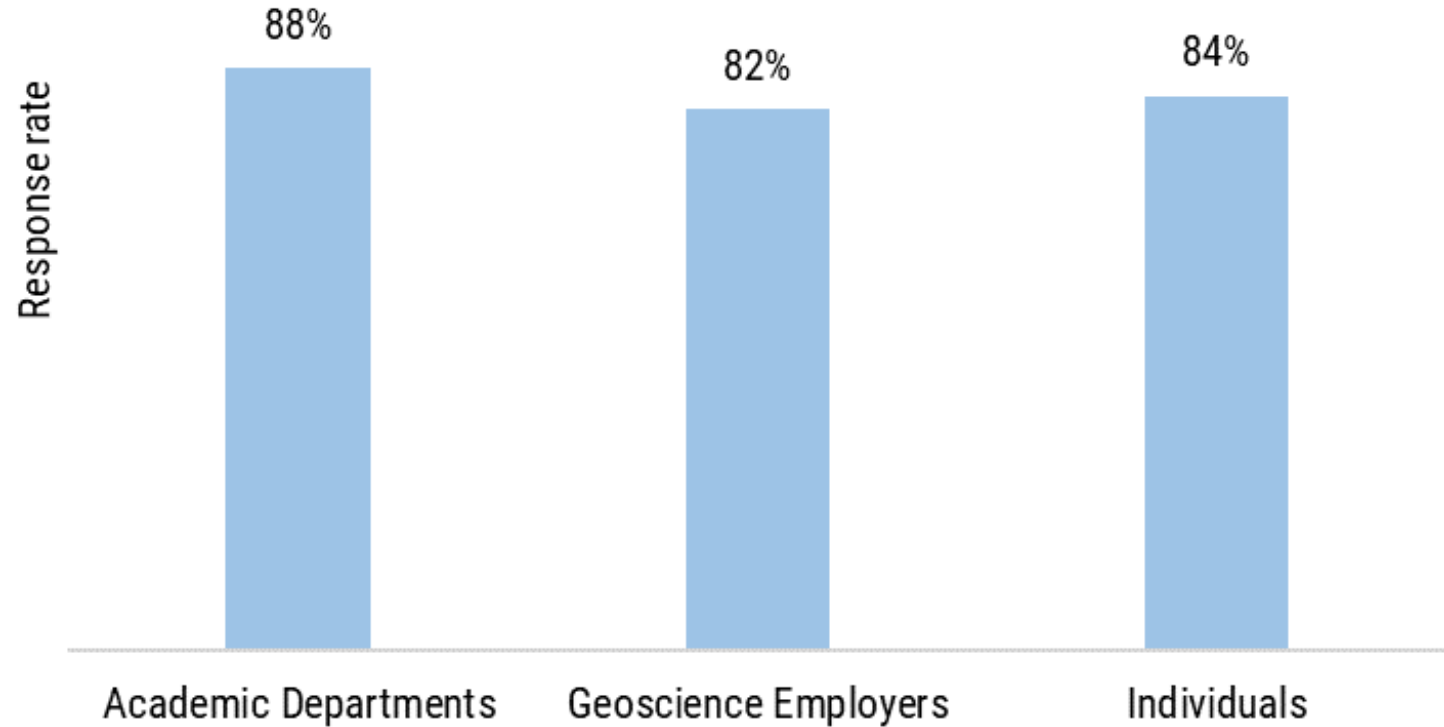
Chained response rate (CRR)

$$\text{CRR} = \text{AP} / \text{C}$$

**AP:** Number of active participants

**C:** Total number of consent surveys

Chained response rates per major cohort





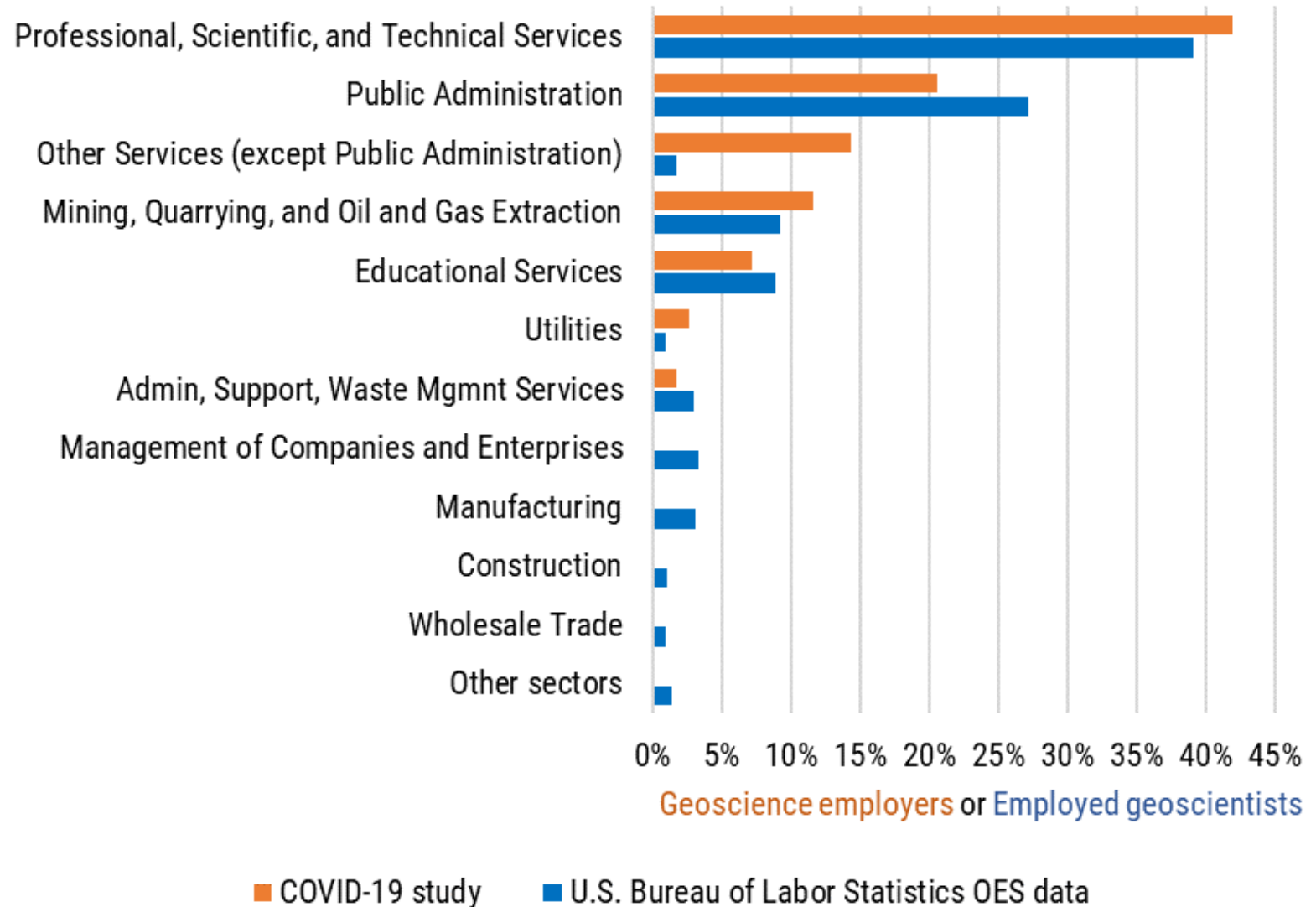
# Employers

Representation similar to federal data on major geoscience employment sectors

Over-representation in non-profit sector (i.e., other services except public administration).

AGI promoted the study to its member societies, all of which are non-profits, so the over-representation is not unexpected.

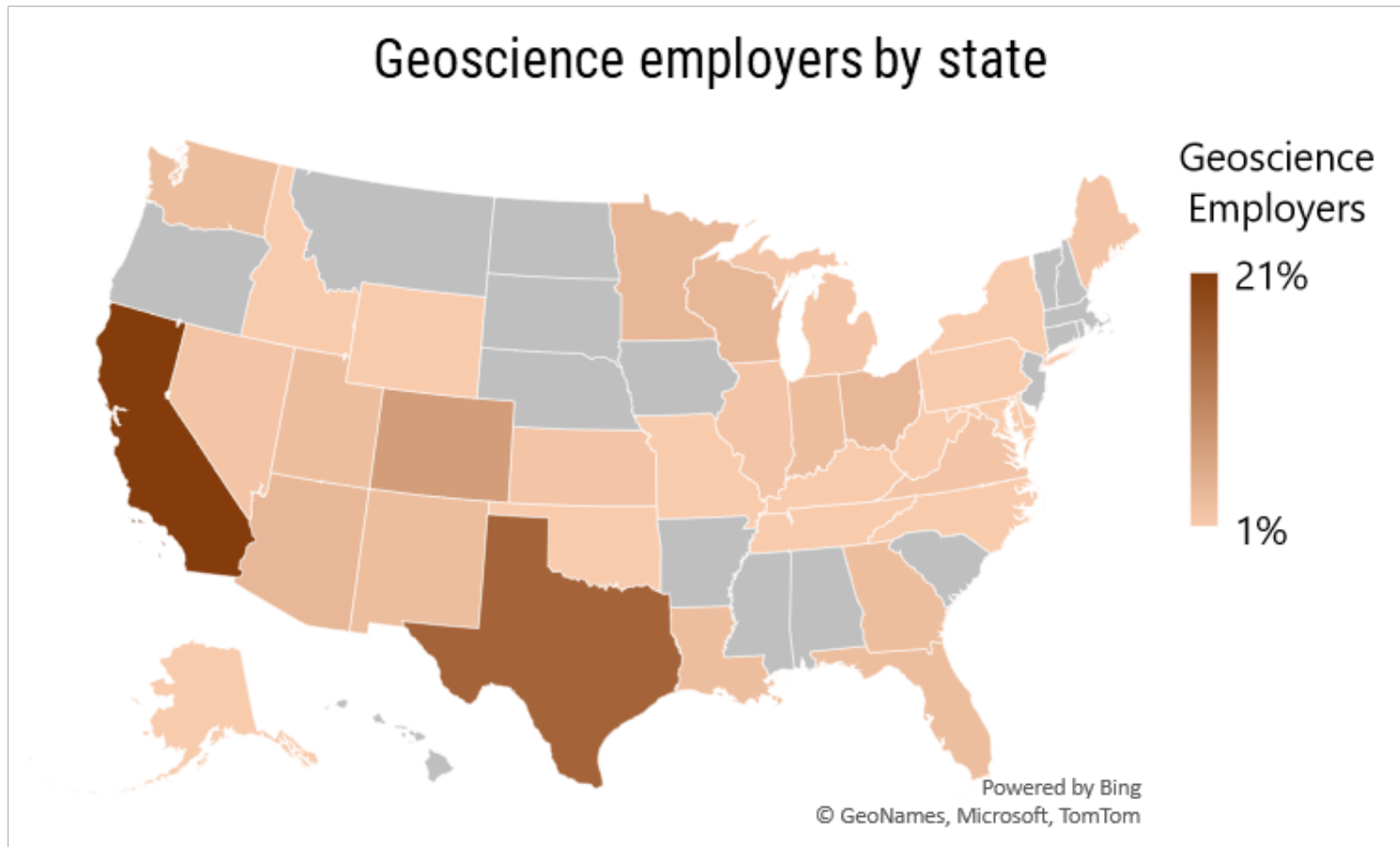
Employment sectors of geoscience employers in COVID-19 survey and of employed geoscientists from federal data



# Employers

Geographic coverage includes 34 states and Puerto Rico (not shown on map).

Still collecting data on employer size (i.e., number of employees). Currently only 19% of employers have provided data.

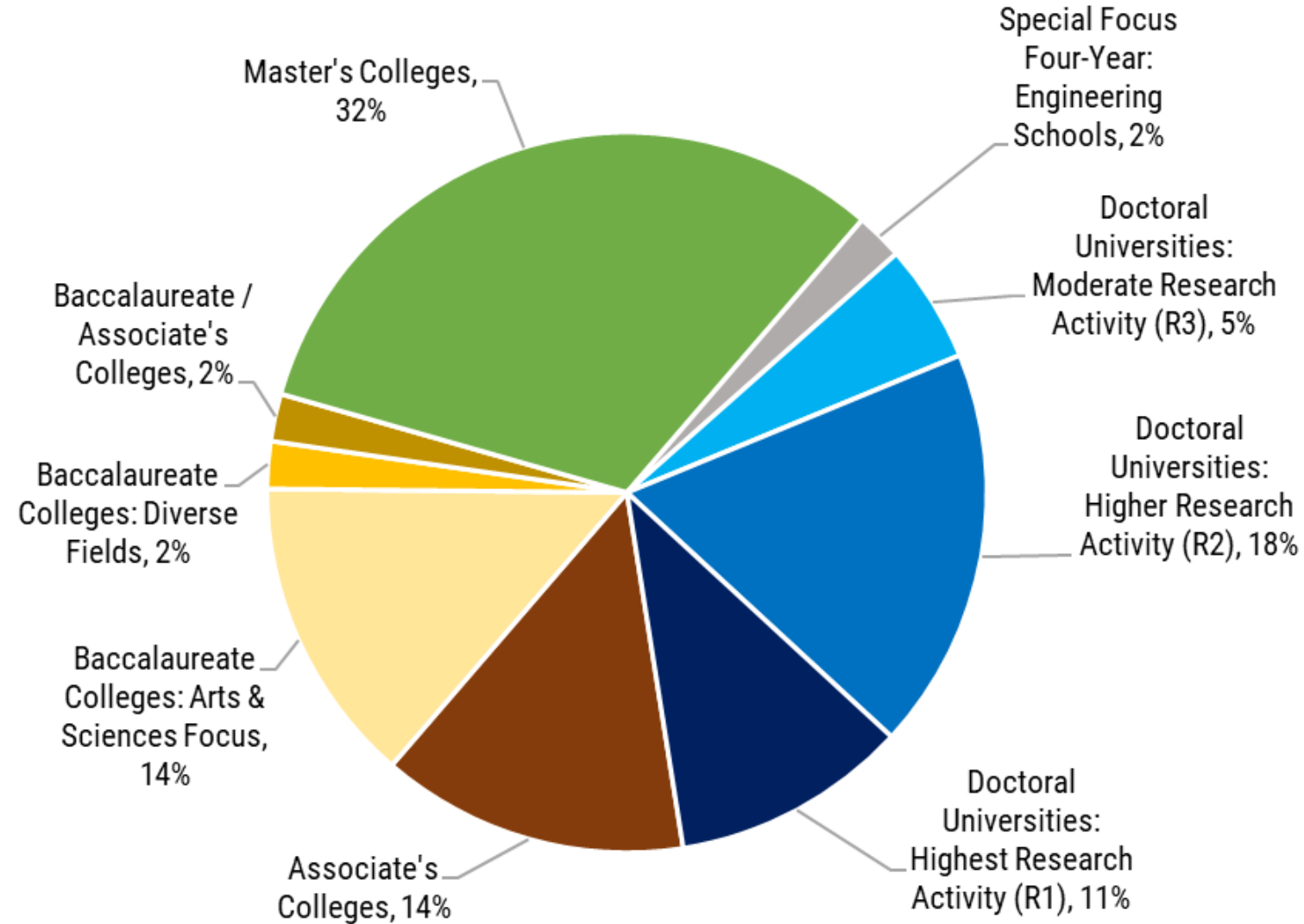


# Departments

Approximately 1/3 in each major classification category.

Baccalaureate / Associates: 34%  
Master's Colleges: 32%  
Doctoral Universities: 34%

## Academic Departments by Institutional Carnegie Classification



# Departments

## Similar representation

HSI (Hispanic Serving Institutions)

## Under-representation

HBCU (Historically Black Colleges & Universities)

AANAPISI (Asian American Native American Pacific Islander-Serving Institutions)

NASNTI (Native American-Serving Non-Tribal Institutions)

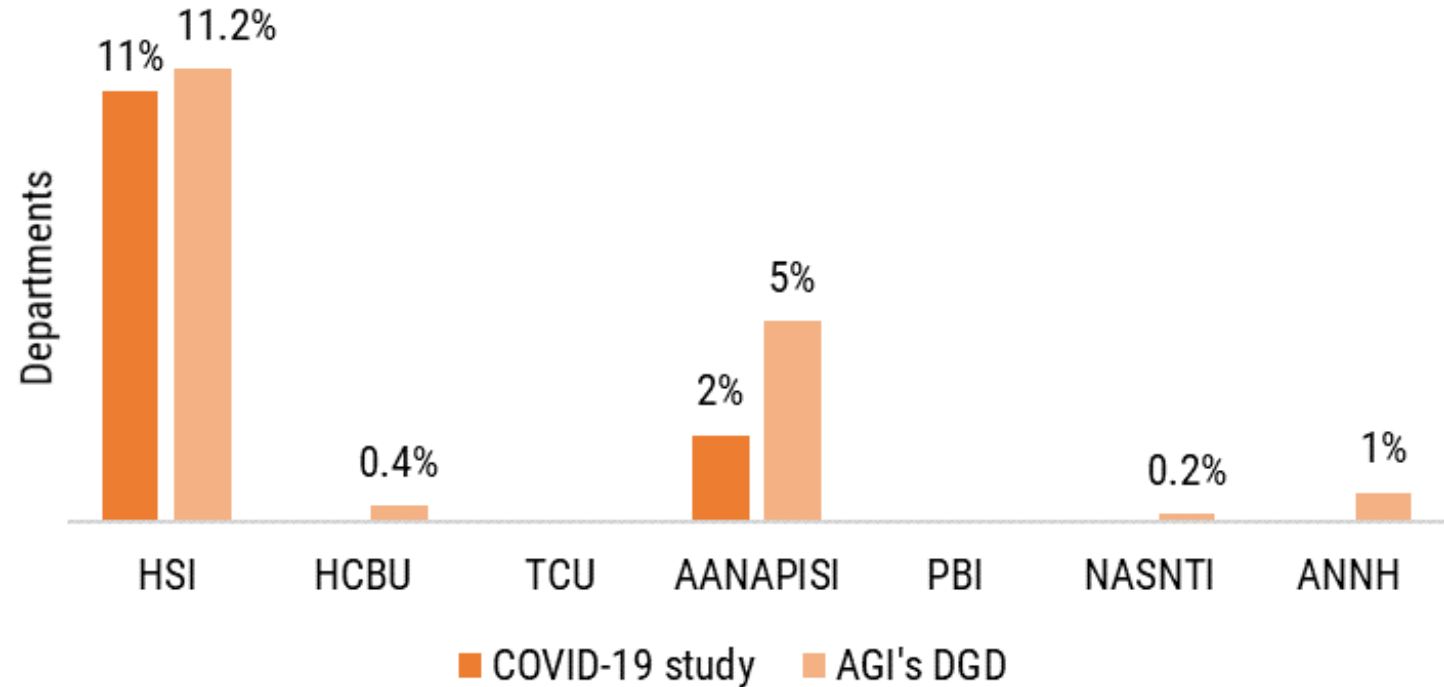
ANNH (Alaska Native / Native Hawaiian Serving Institutions)

## No representation (Study and DGD)

TCU (Tribal Colleges and Universities)

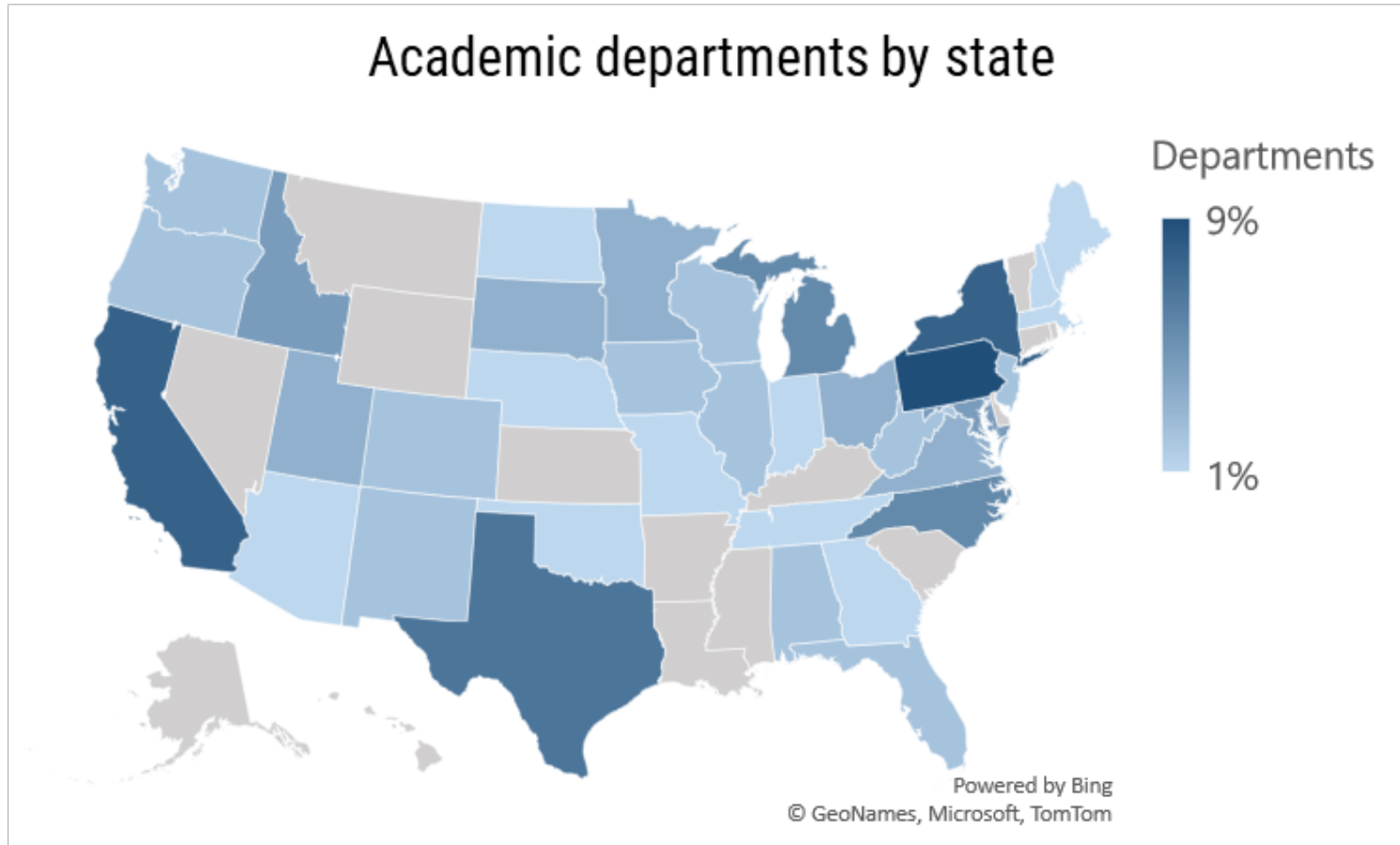
PBI (Predominantly Black Institutions)

Percentage of geoscience departments in minority-serving institutions



# Departments

Geographic coverage includes 35 states.

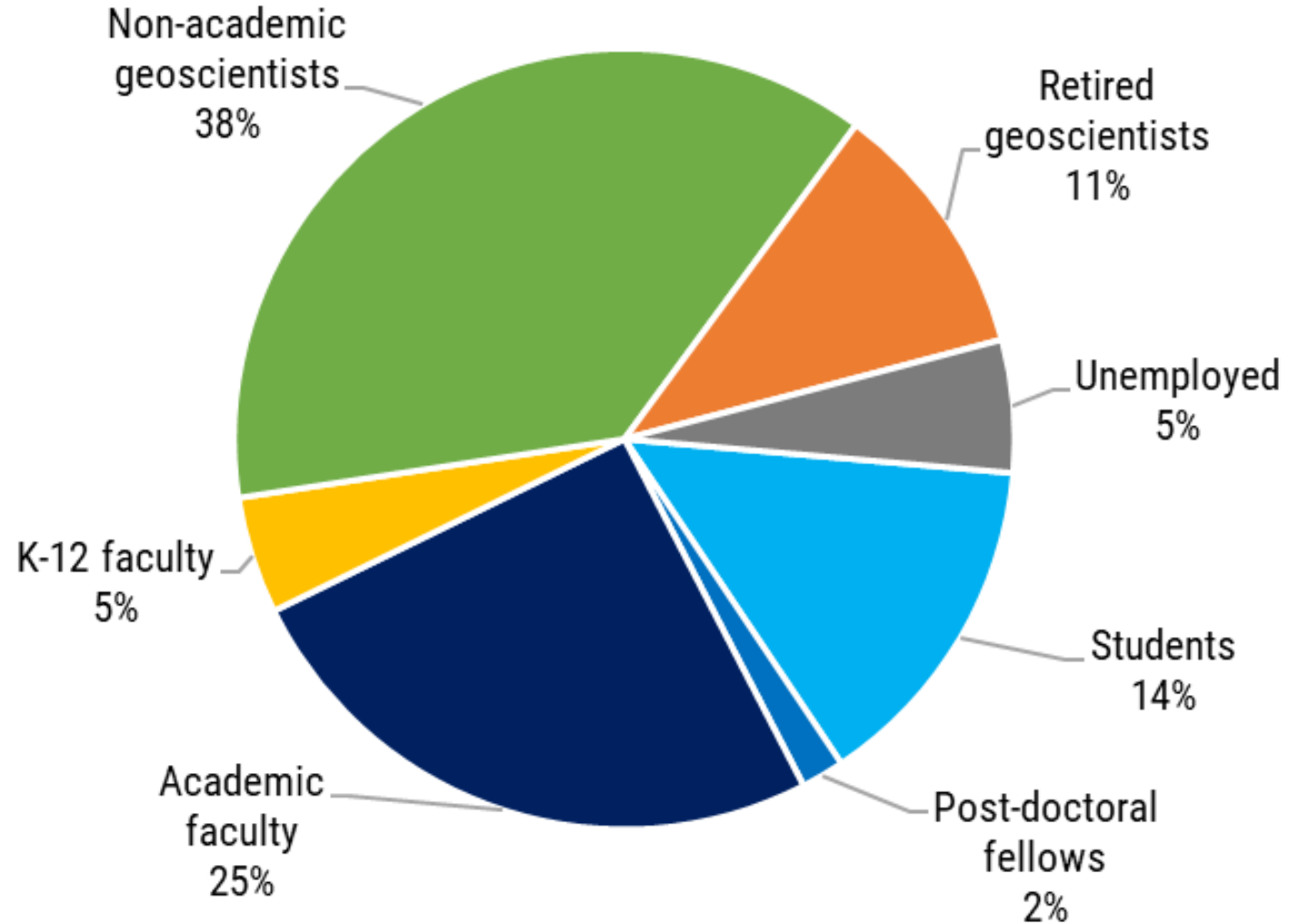


# Individuals

Good representation among non-academic geoscientists and university / college faculty.

Low participation from post-doc cohort.

Participants by occupational category at time of survey consent



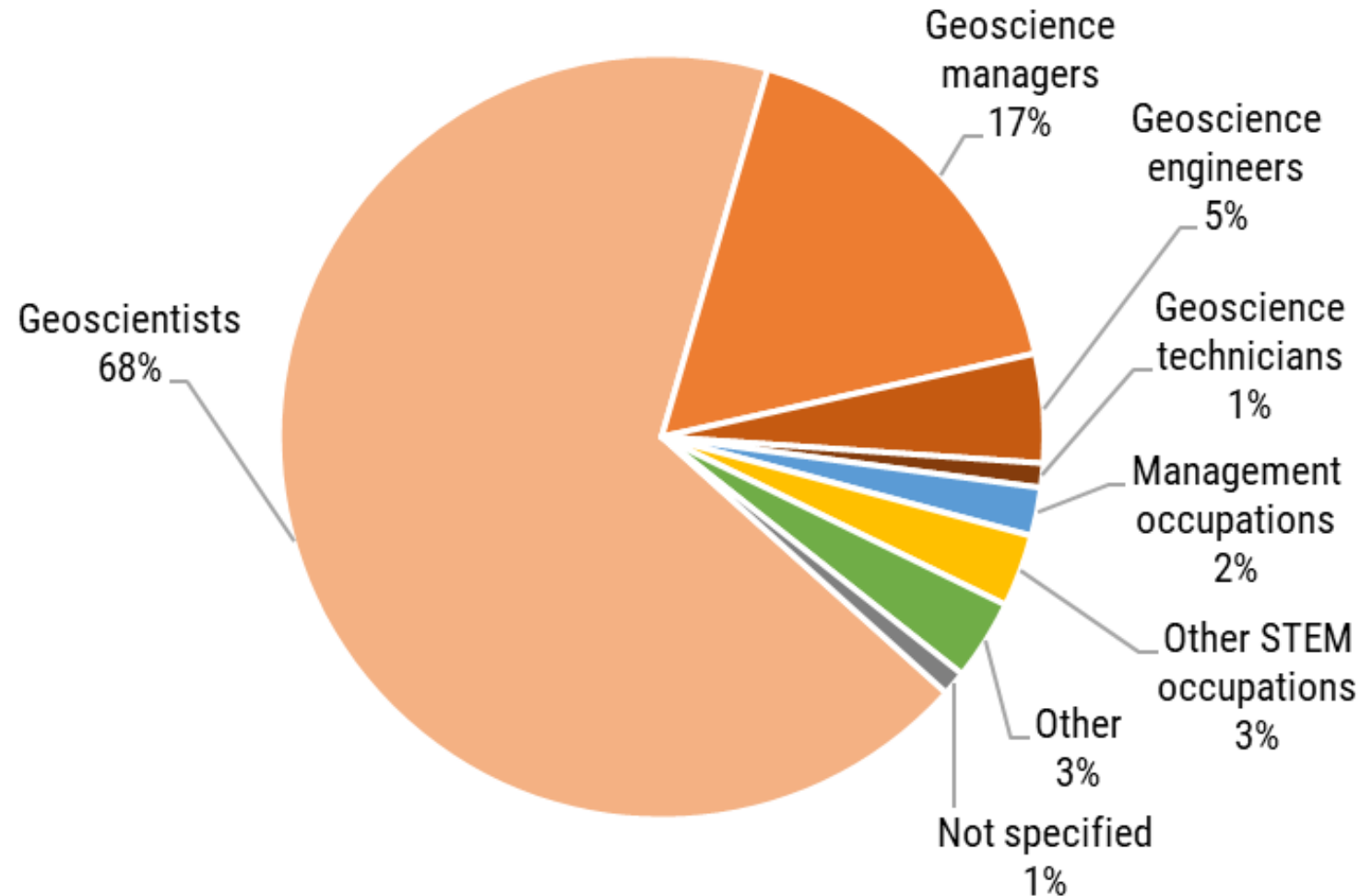
# Individuals

Most non-academic geoscientists working in core geoscience occupations (91%).

Those in non-core occupations:

1. Are usually using their geoscience knowledge and skills in the job
2. Are working within the profession in a non-core occupation.

Occupations of Non-Academic Geoscientists at survey consent



# Individuals

## Representation across employment sectors of non-academic geoscientists

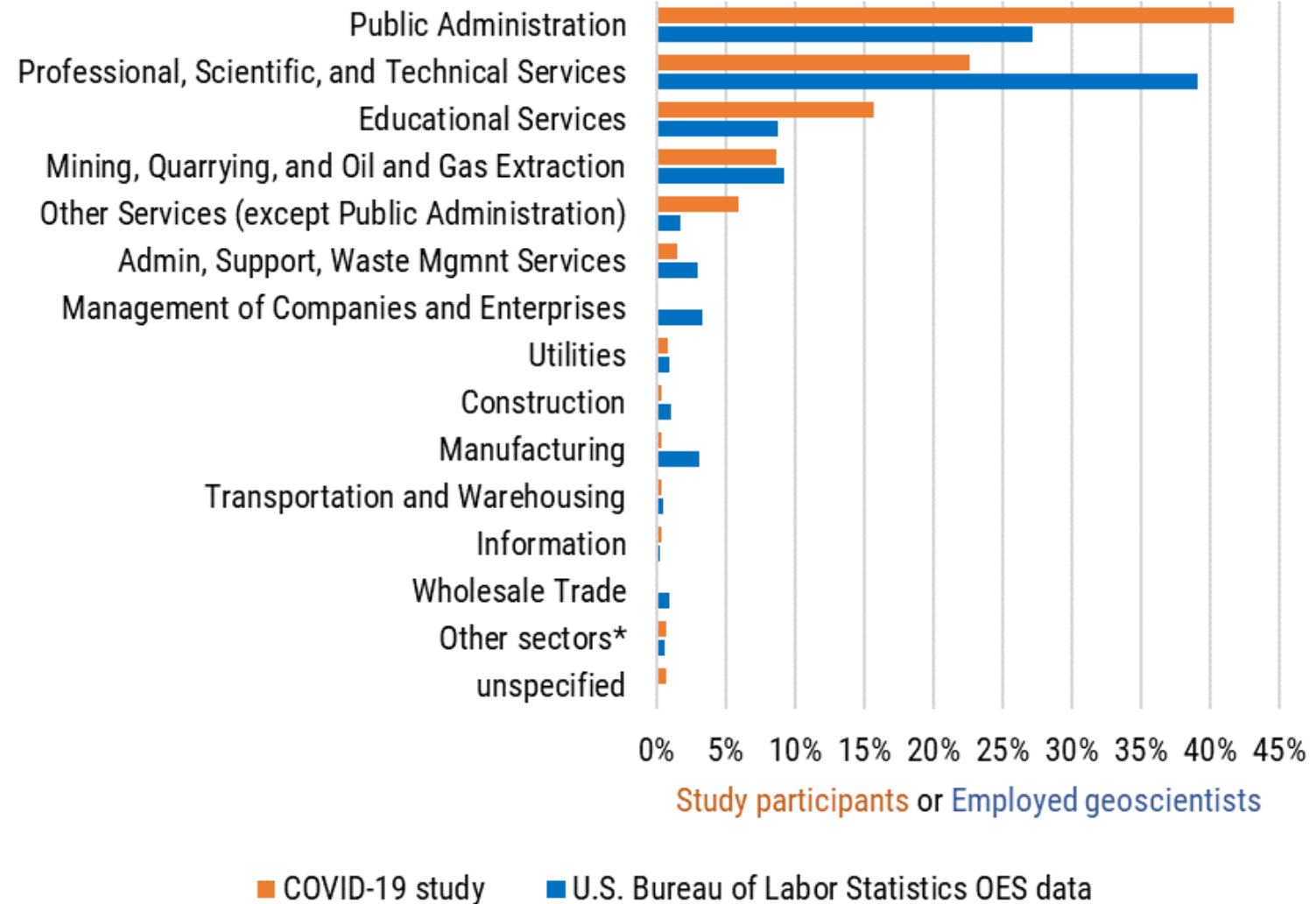
### Over-representation

*Public Administration (state government)*  
*Educational services (post-secondary staff)*  
*Other services (non-profits)*

### Under-representation

*Professional, scientific, technical services*  
*Admin, support, and waste management*  
*Management of companies and enterprises*  
*Manufacturing*

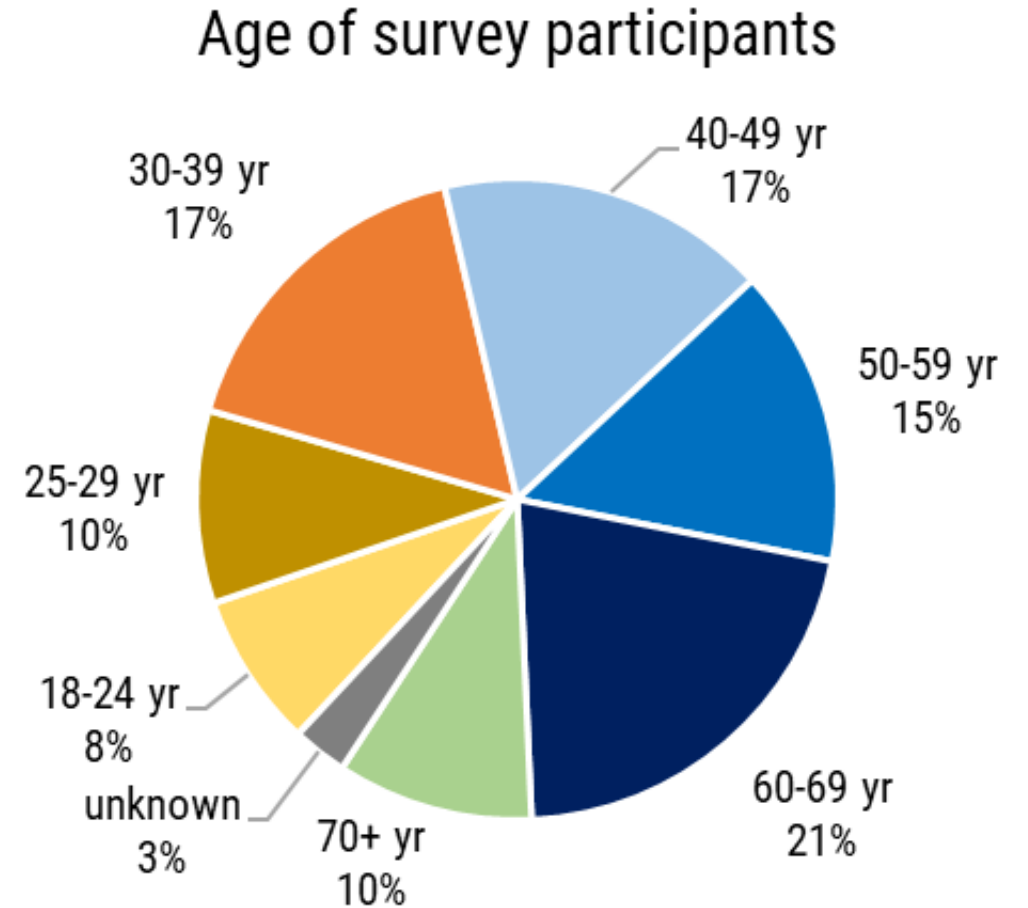
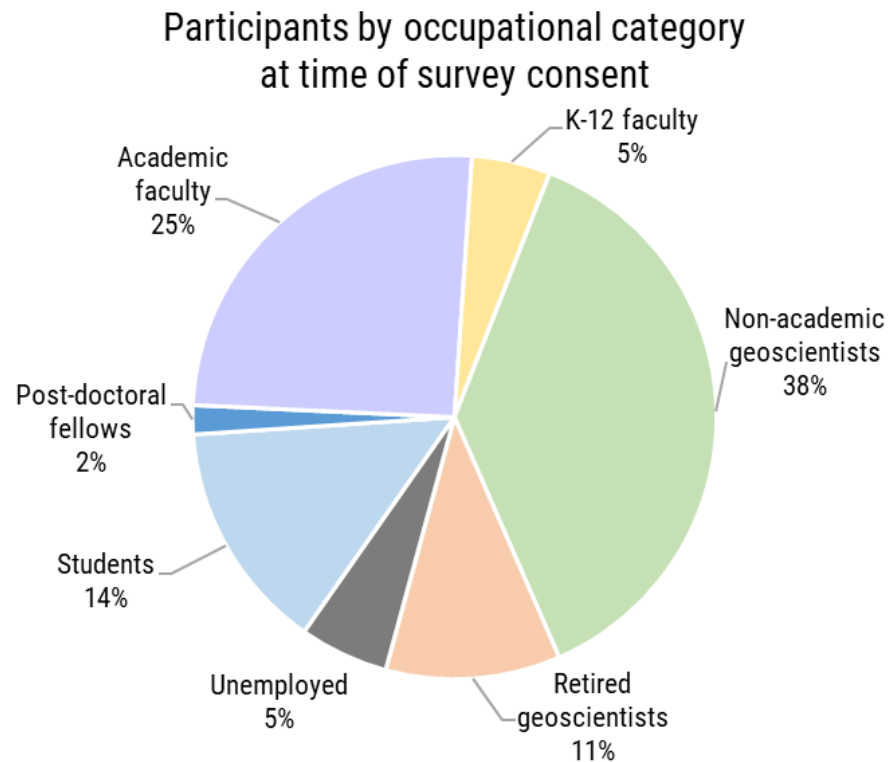
Employment sectors of non-academic geoscientists in study and of employed geoscientists from federal data





# Individuals

Relatively even distribution across age groups that tracks occupational categories.



# Individuals

## National data on participation of women

### 2019 geoscience enrollments (AGI):

46% undergraduate, 44% graduate

### 2019 geoscience degrees conferred (AGI):

46% Bachelor's and Master's, 40% Doctorates

### 2019 occupational data (U.S. Bureau of Labor Statistics):

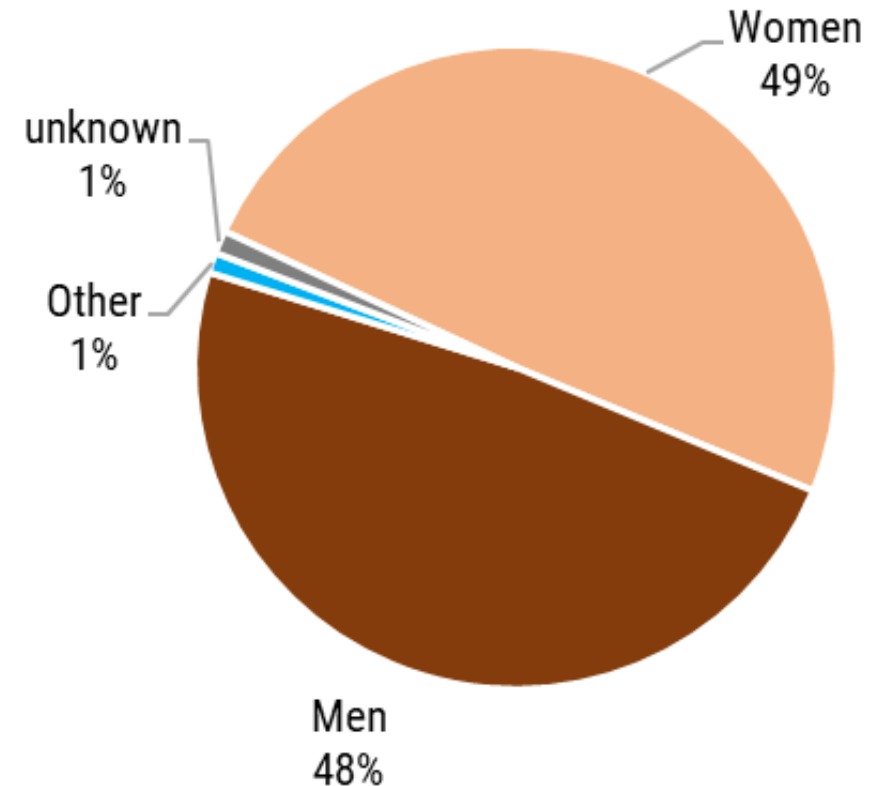
33% Environmental scientists and geoscientists

- *rate of increase in participation in occupation is outpacing other broad S&E categories.*

### 2019 population data (U.S. Census Bureau):

50% working population (18 – 64 yr)

Gender of survey participants



# Individuals

## National data on underrepresented minority participation

### 2019 geoscience degrees (IPEDS)

Bachelors: 12% Hispanic, 3% Black / African American

Masters: 7% Hispanic, 3% Black / African American

Doctorate: 5% Hispanic, 2% Black / African American

### 2019 occupational data (U.S. Bureau of Labor Statistics)

*Environmental scientists and geoscientists*

12% Hispanic, 5% Black / African American

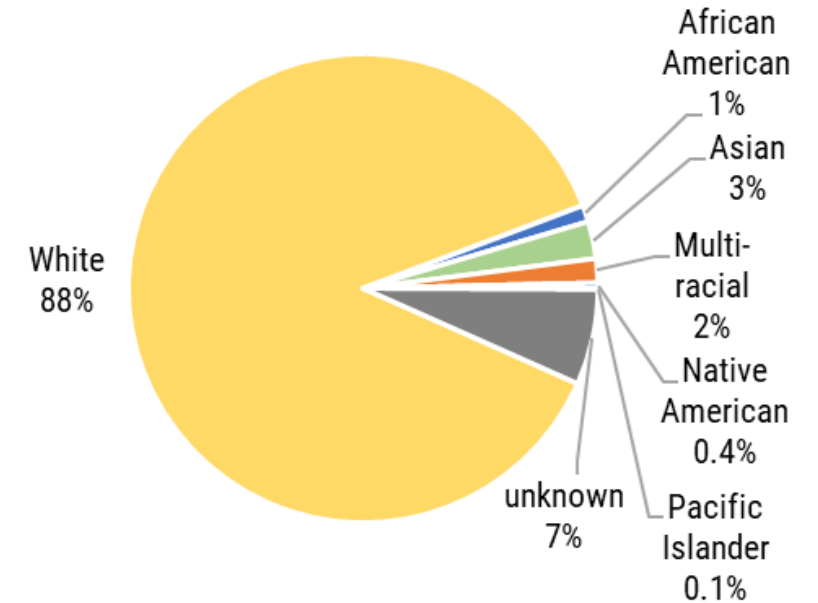
### 2019 population data (U.S. Census Bureau)

*Working population (18 – 64 yr)*

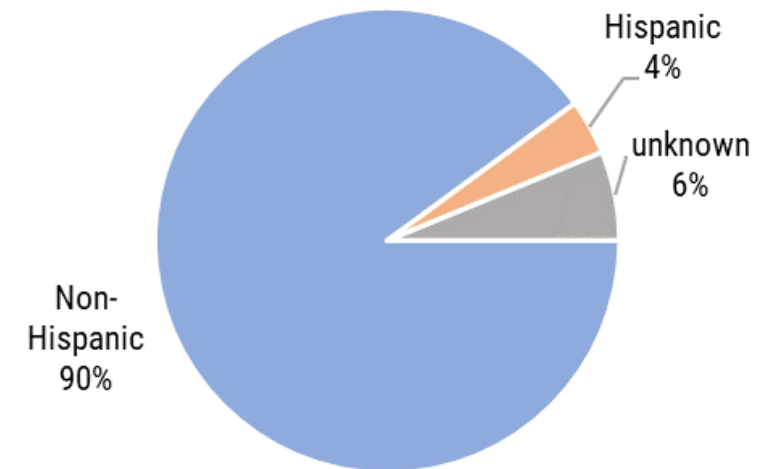
19% Hispanic, 14% Black or African American

Native American and Pacific Islander comprise < 1% of degrees and occupational representation

### Race of survey participants



### Ethnicity of survey participants

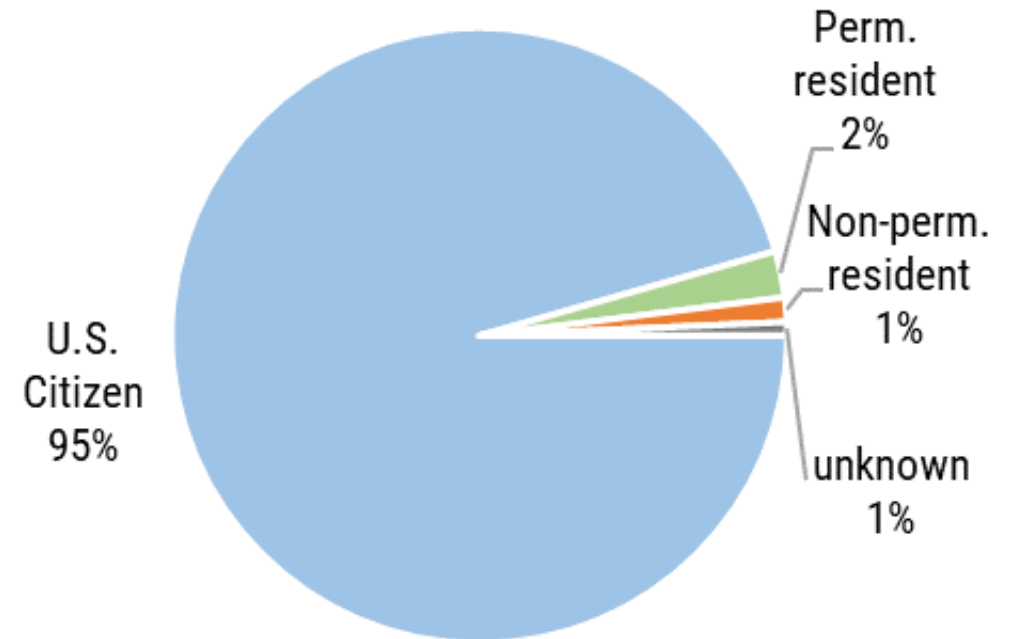


# Individuals

Survey analysis is only performed on data from U.S. citizens, permanent residents, or non-permanent residents.

Unknown category is those participants whose status for inclusion in the survey is still under determination, but cannot be definitively excluded from the analyses.

## Citizenship of survey participants



# What we've learned so far...

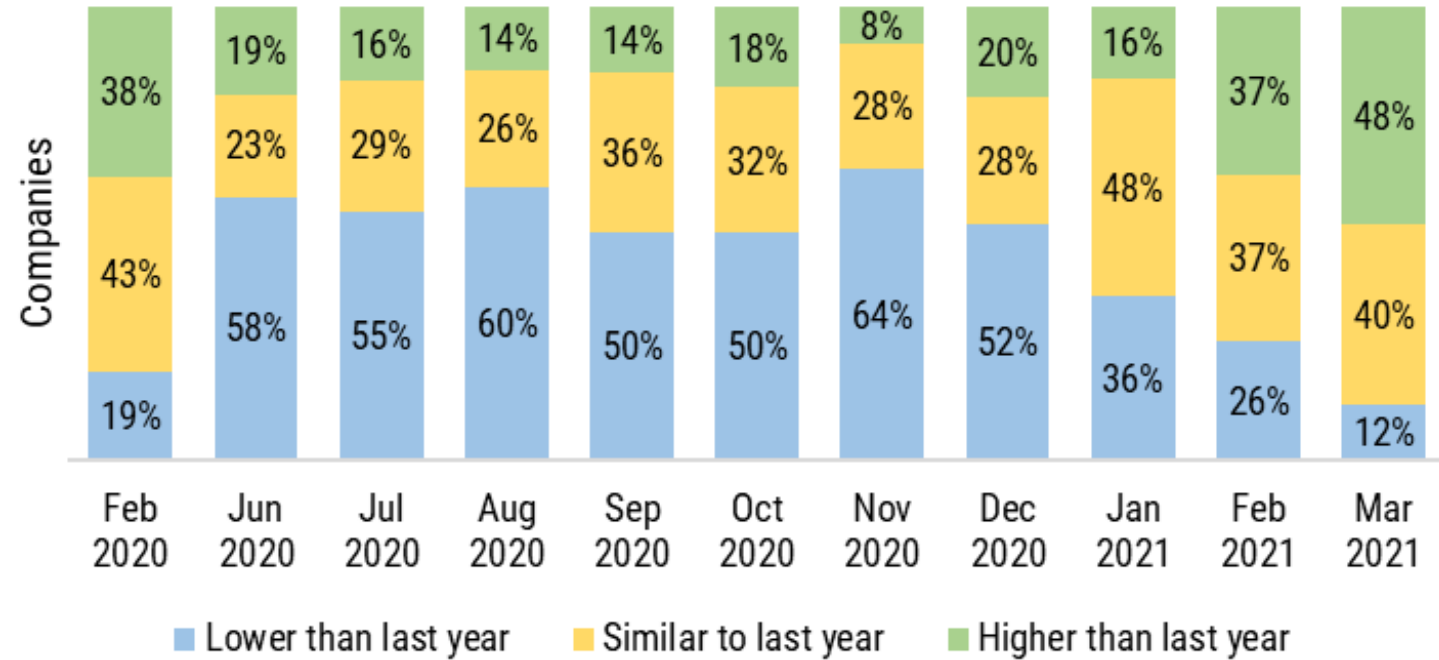
- How have business and department operations changed?
- How have workplace / instructional modes changed?
- Where are we now relative to last year?
- What are the top concerns going forward?

# Employers: Operations

Since November, financial performance is recovering.

Just over 1/3 of employers reported receiving financial assistance between June and August 2020, primarily from federal aid (i.e., PPP, EIDL, SBALF, etc.).

Expectations for financial performance: current calendar year relative to last year



# Employers: Operations

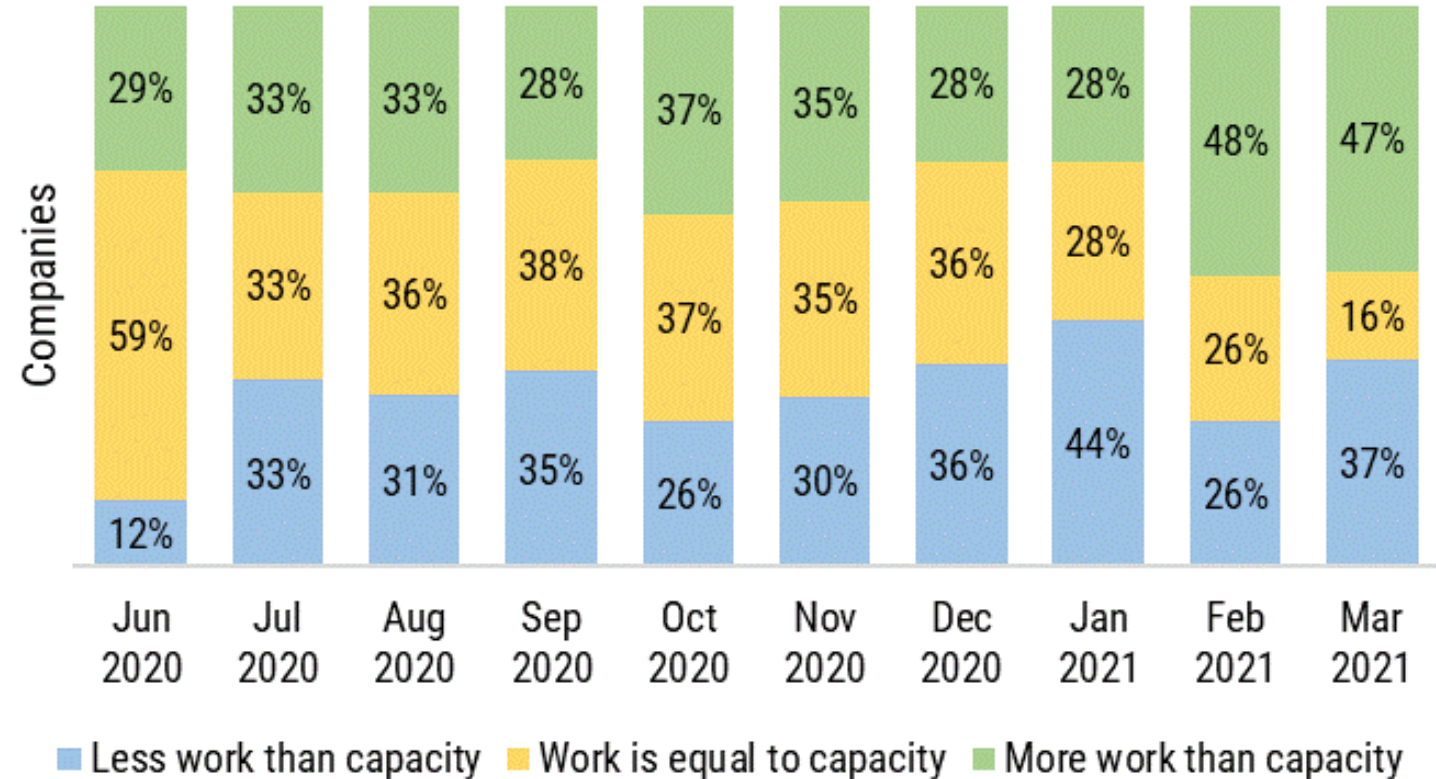
Equal to higher work-to-capacity ratio reported by ~60-75% of companies.

Overall, ~1/3 of companies reporting less work than capacity throughout pandemic period.

## Related influences

PPP job protection restrictions end in 2020

### Level of work relative to capacity

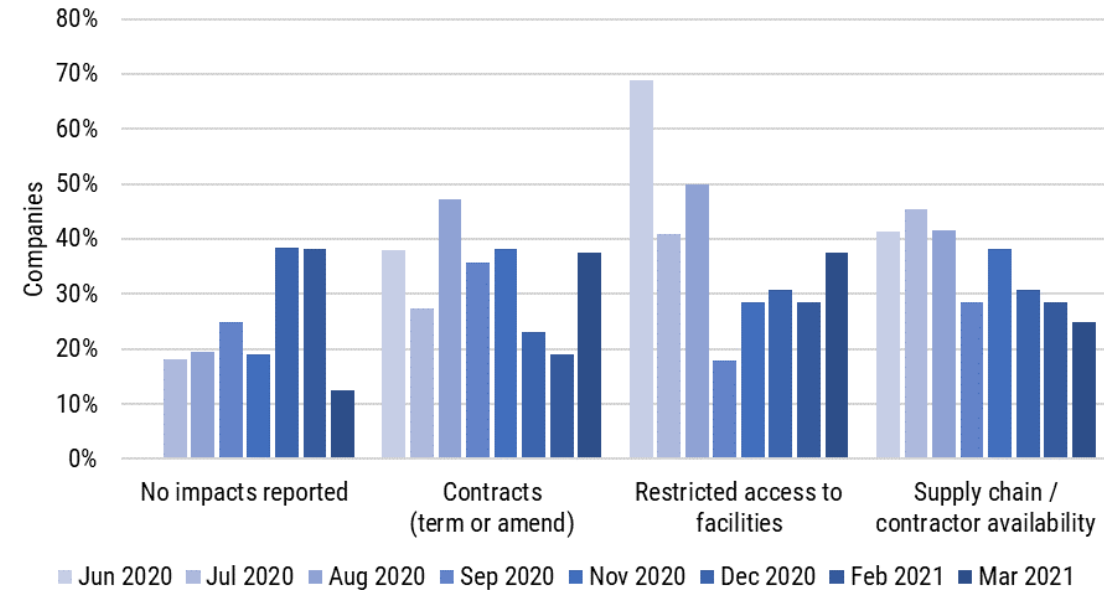


# Employers: Operations

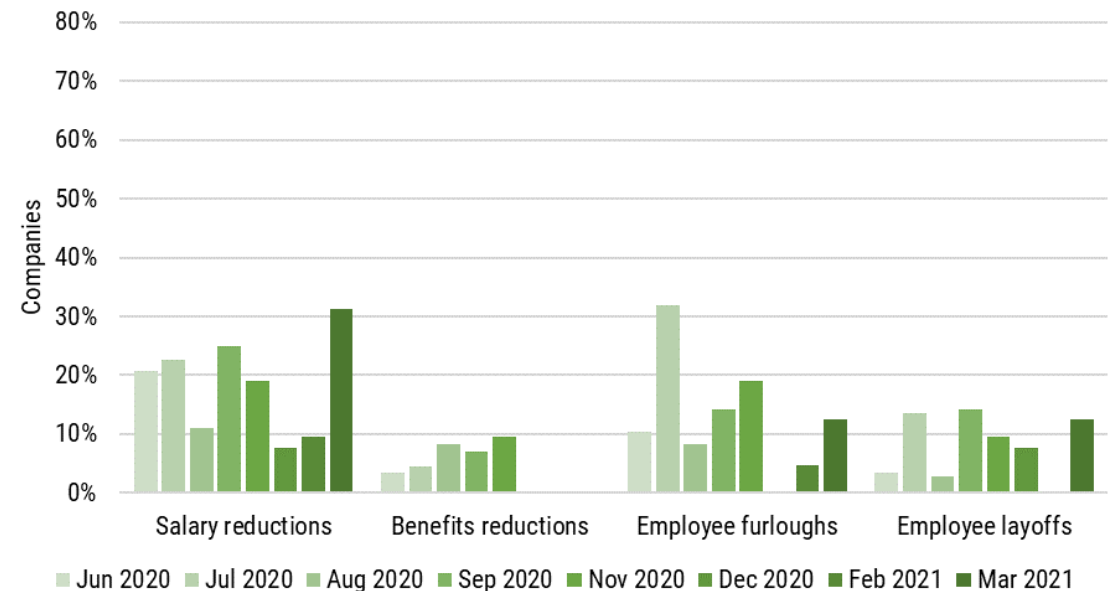
## General trends point to recovery in progress.

- Termination / amendment of contracts generally down from Summer 2020.
- Supply chain disruptions and contractor availability issues improving.
- Facility access restrictions easing, with increasing trend since Sept 2020.
- Reporting of no impacts up since June 2020 (except March 2021).
- Furloughs down, but layoffs reported by ~10% of employers.

COVID-19 impacts to business operations



COVID-19 impacts to business operations



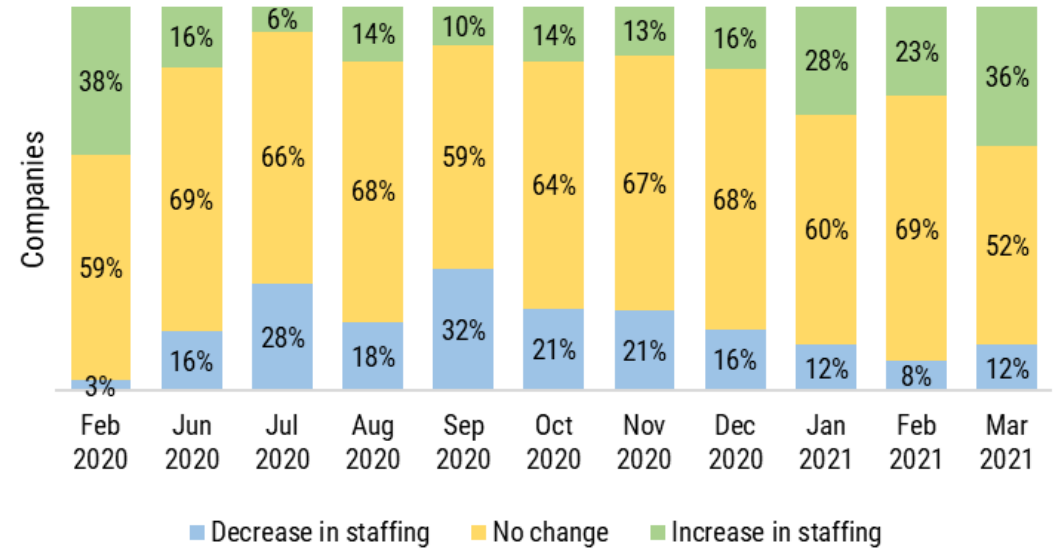


# Employers: Staffing

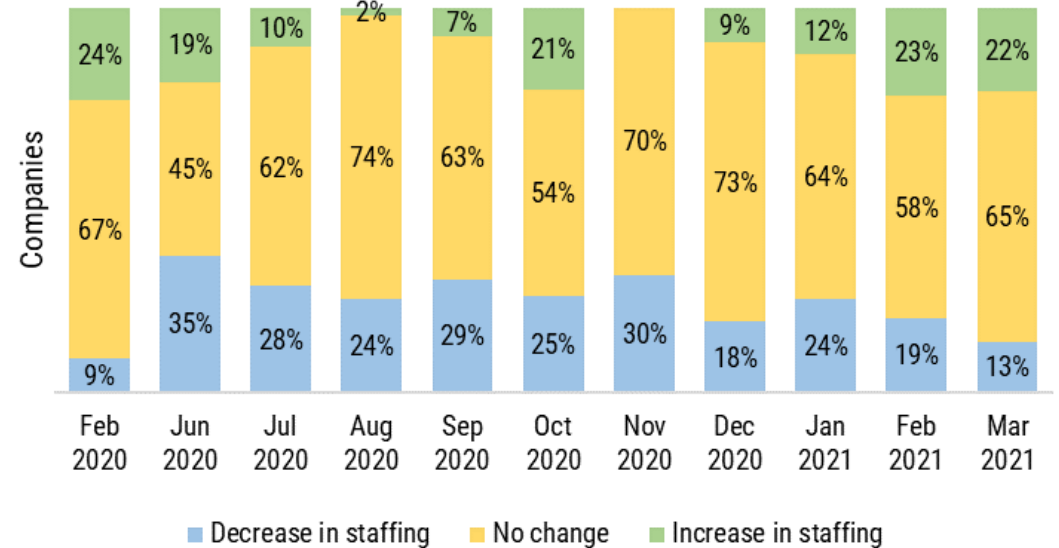
Expectations for permanent and temporary / contract staffing nearing pre-pandemic levels.

Lingering expectations for decreased staffing which are higher than pre-pandemic levels (more so for permanent staffing than temporary / contract staffing).

Expectation for current year permanent staffing



Expectation for current year temporary and contract staffing



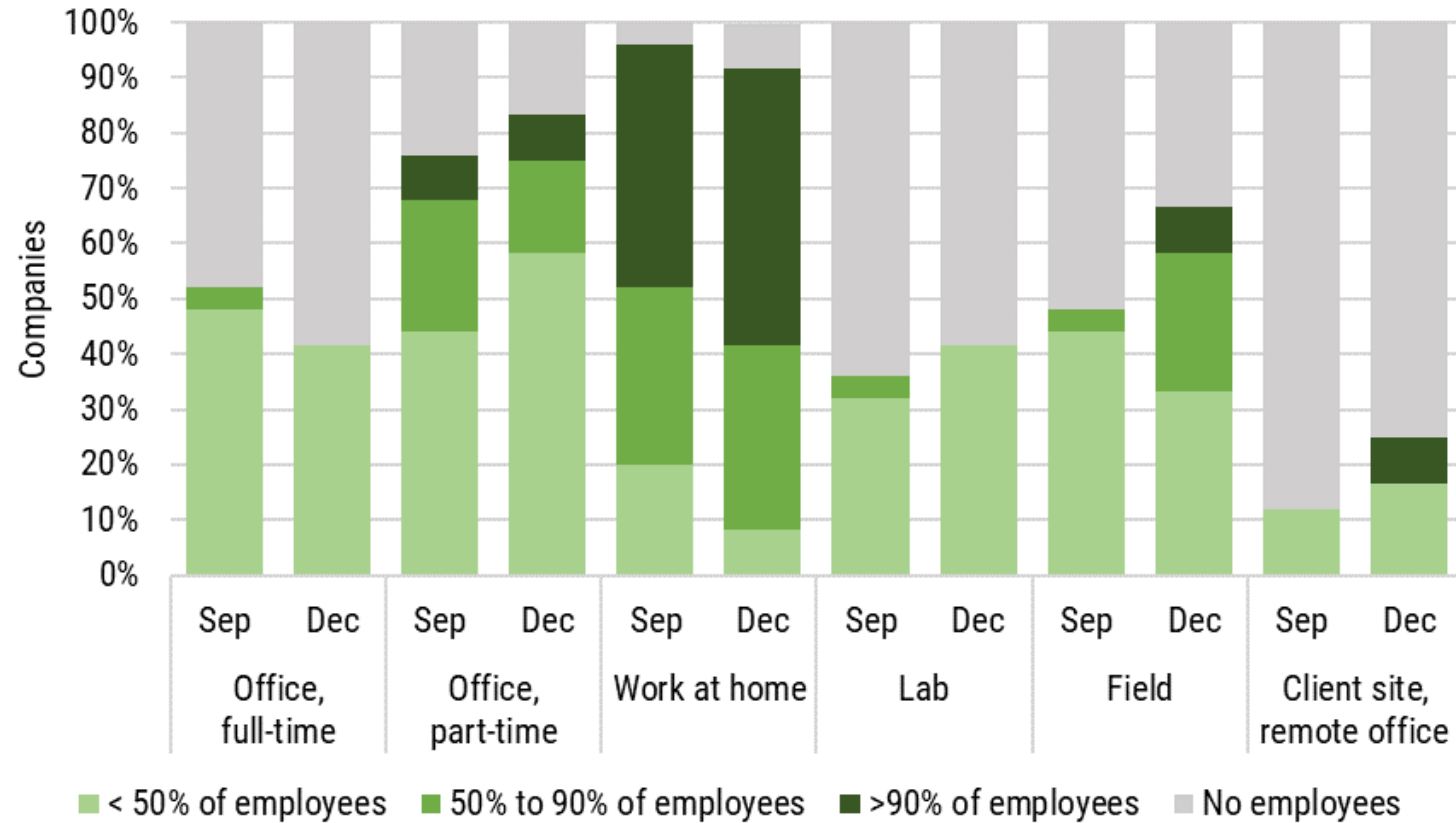
# Employers

Shift to increase in telework and part-time in-office work.

Declines in full-time office attendance.

Increased lab, field, and client sites/remote office attendance.

Employee distribution by workplace environment  
September and December 2020



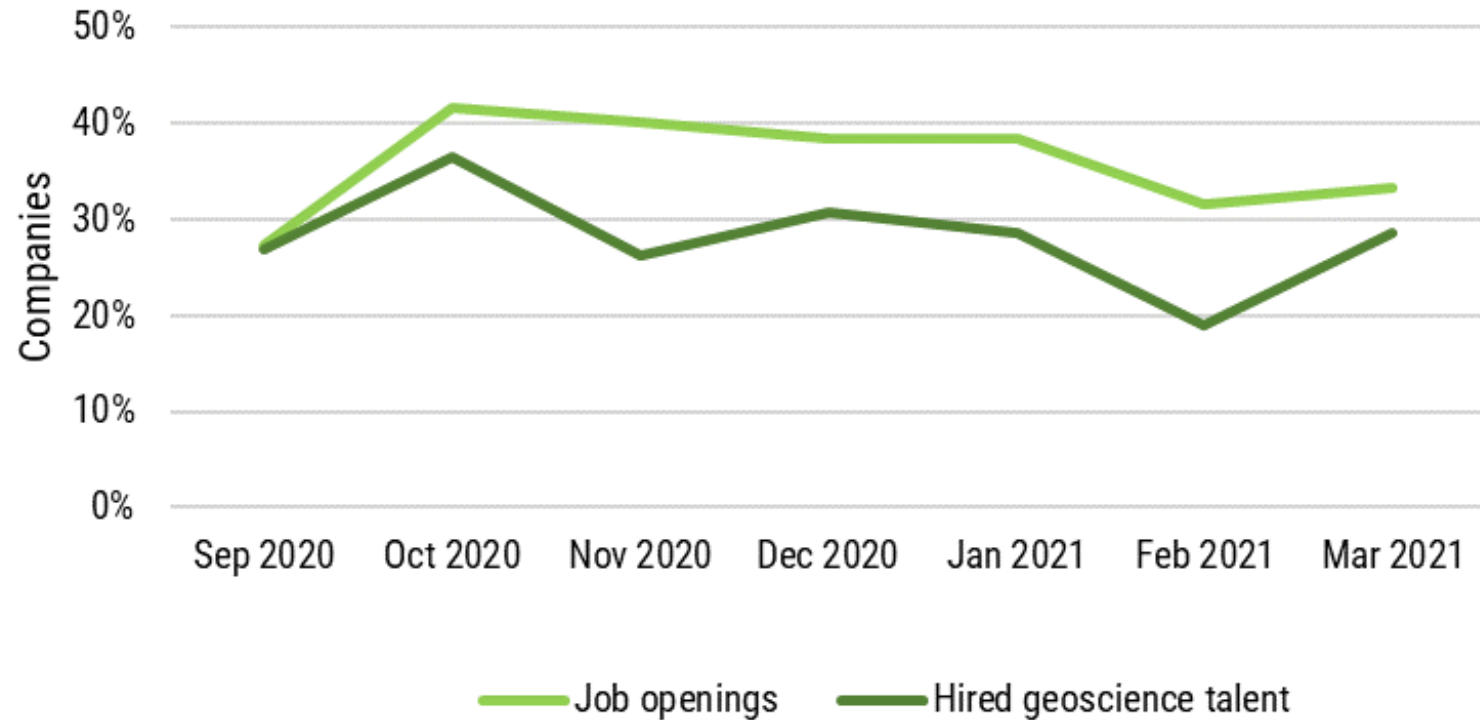
# Employers

October hiring echoes trends in recent geoscience graduates gaining employment at the same time.

30%-40% of employers are seeking geoscience talent.

20%-30% of employers have hired geoscience talent.

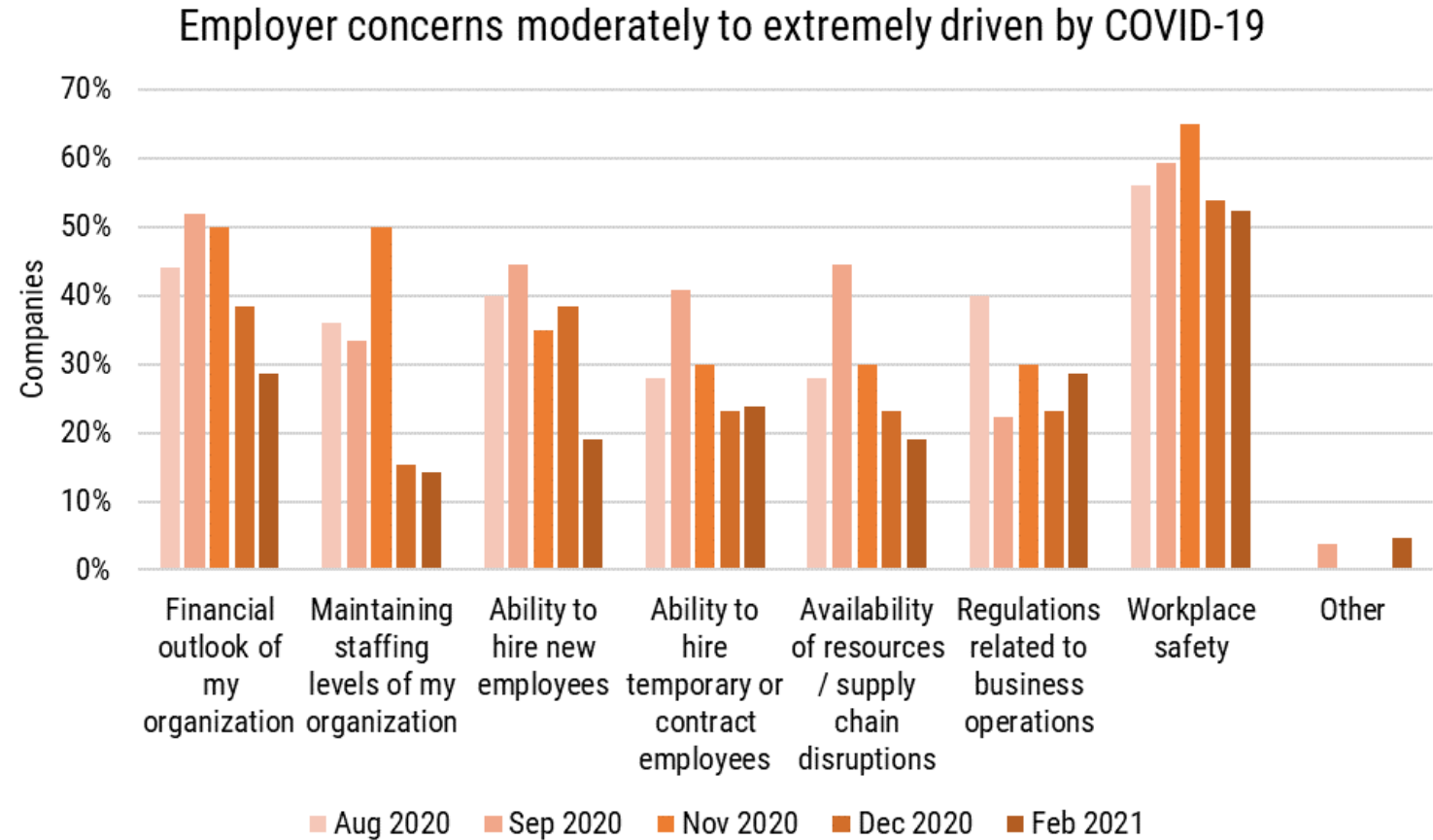
## Job openings and hiring activity



# Employers

Declines across the board for concerns moderately to extremely driven by COVID-19.

Workplace safety still top concern.



# Employers - What we've learned so far...

## Business operations

- Financial performance and productivity are improving.
- Business impacts lessening overall.
- Some layoffs and furloughs still occurring.
- Expectations for permanent and temporary / contract staffing nearing pre-pandemic levels.

# Employers - What we've learned so far...

## Workplace environments and staffing

- Permanent telework and limited in-office attendance continue as primary work modalities.
- More employees in the lab, field, and at client sites / remote offices.
- Increase in employees not on travel or in the field due to personal decisions and organizational policies.
- 30%-40% of employers are seeking geoscience talent.
- 20%-30% of employers have hired geoscience talent.

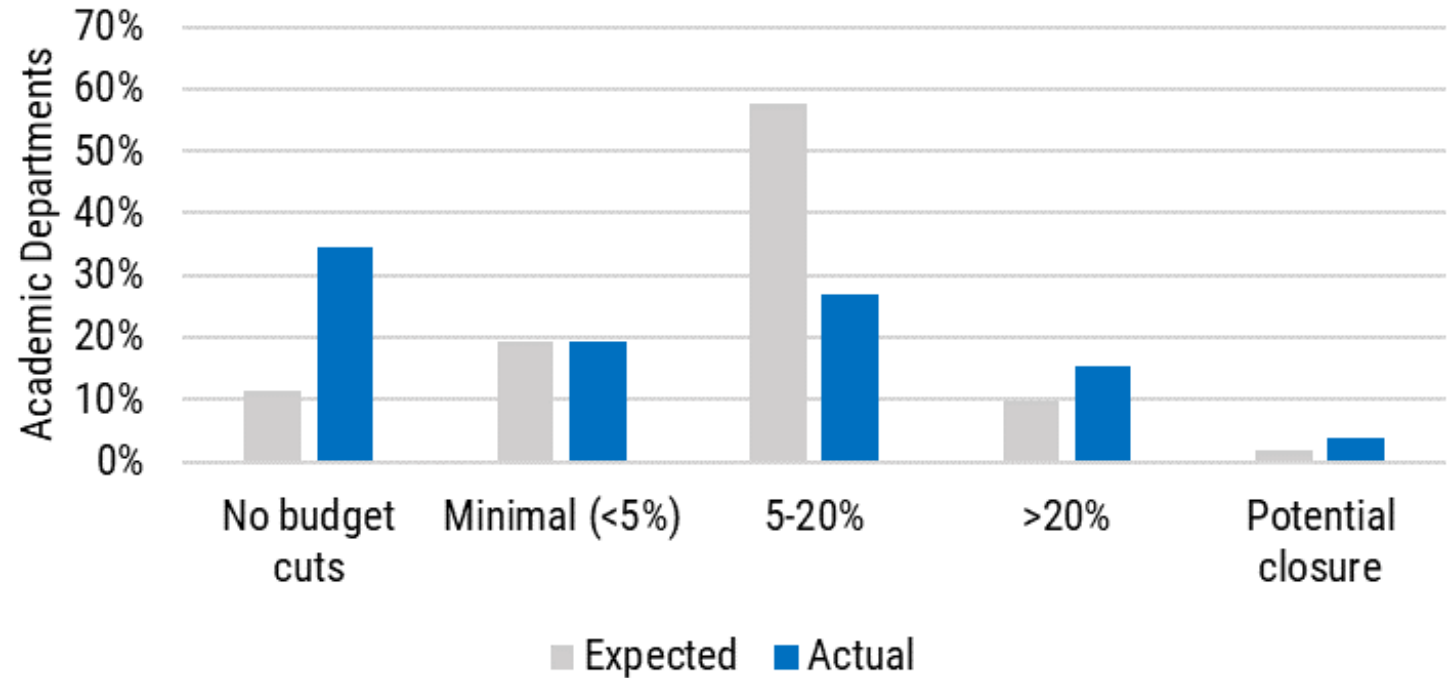
# Dept Operations

Budget cuts less severe than expected for most departments.

~1/3 of departments reported no budget cuts.

16% of departments reported cuts worse than expected.

Expected vs. actual budget cuts for 2020-2021 academic year



# Dept Operations

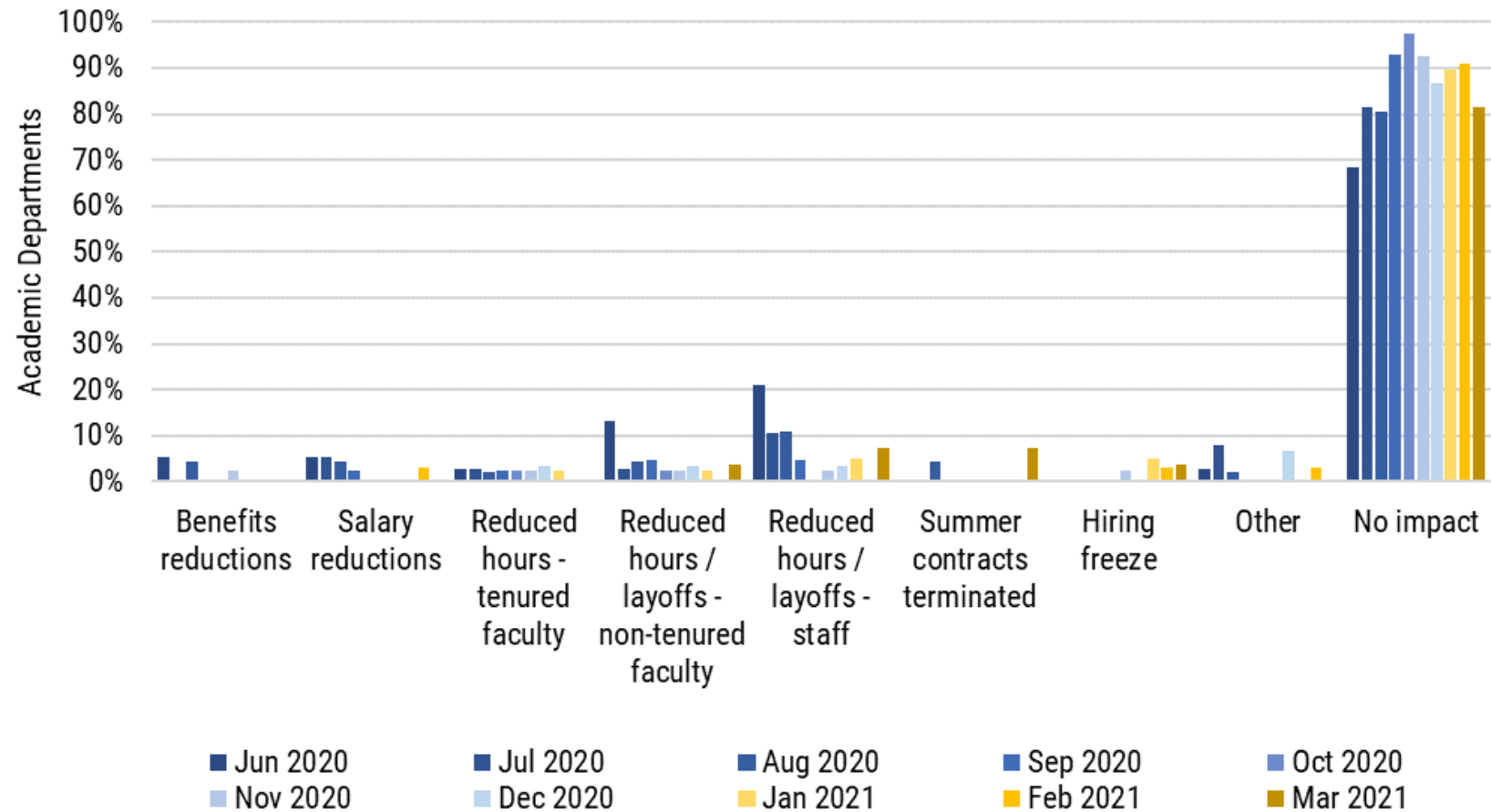
Staffing impacts primarily occurred in Summer 2020.

Most impacts centered on reduced hours and furloughs of staff and non-tenured faculty.

Current impacts:

- hiring freezes
- reduced hours (staff and non-tenured faculty)
- layoffs (staff)
- termination of summer contracts

Departmental staffing impacts





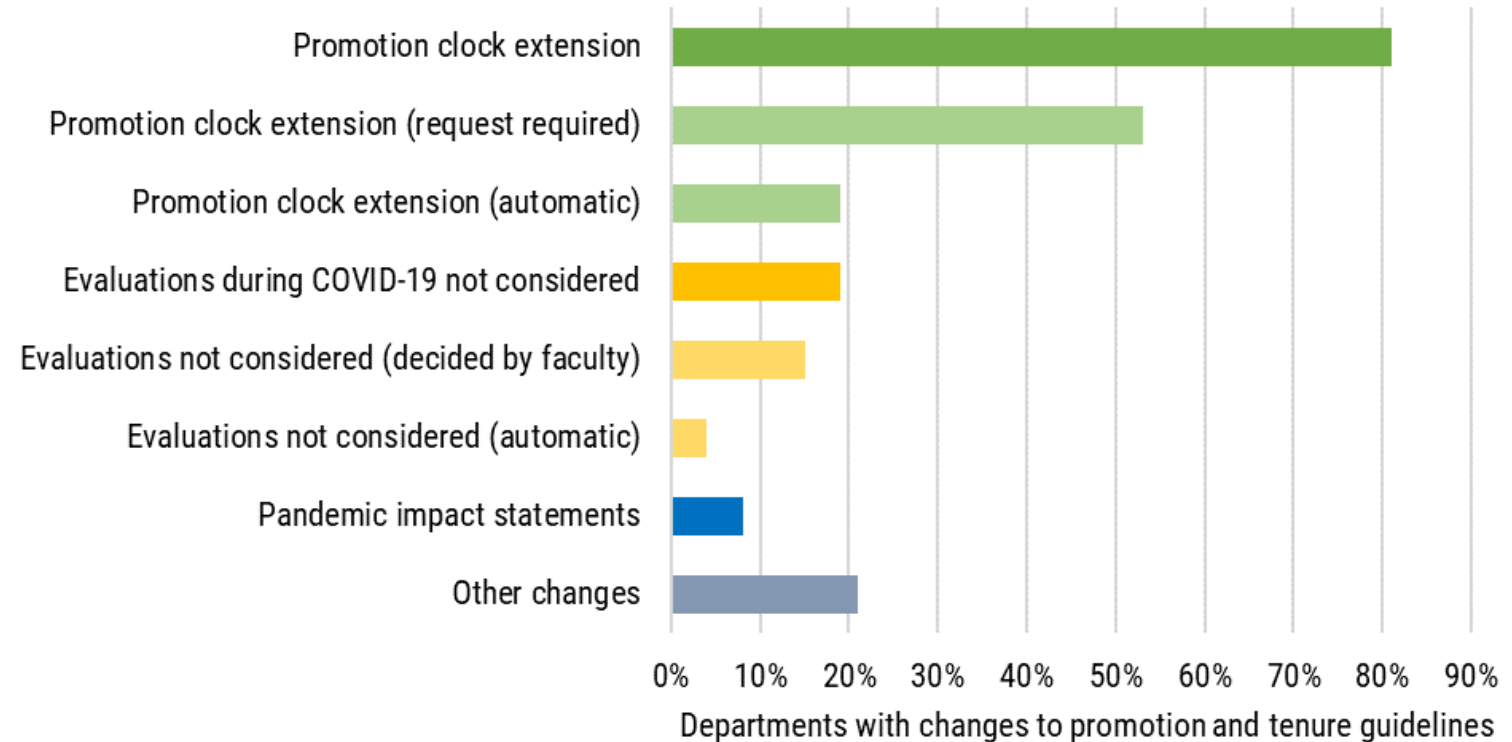
# Dept Operations

~50% of departments changed promotion and tenure guidelines.

Most common change was extension of promotion clock by one year. In most departments, faculty were required to request the extension.

13% of faculty opted to take advantage of the changes to guidelines.

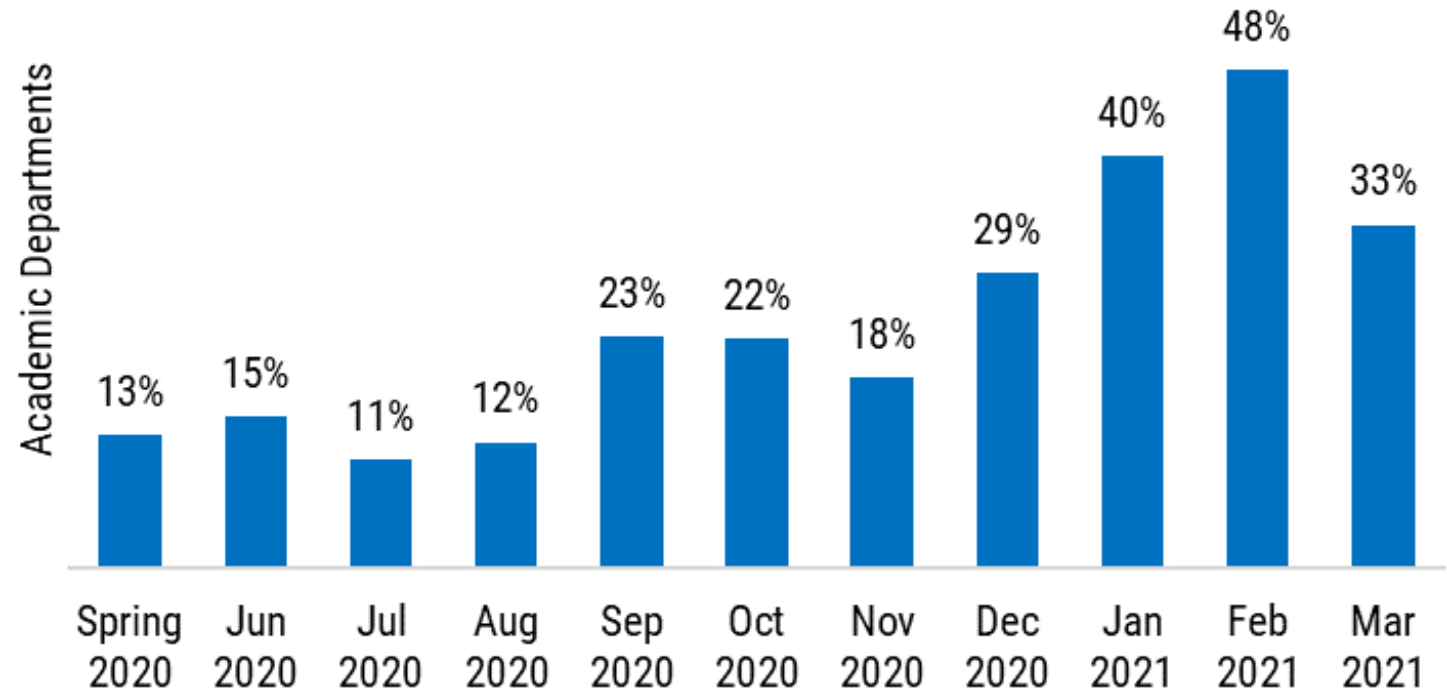
Types of changes to promotion and tenure guidelines to address COVID-19 impacts on faculty



# Dept Operations

Increase in departments with active faculty searches since November.

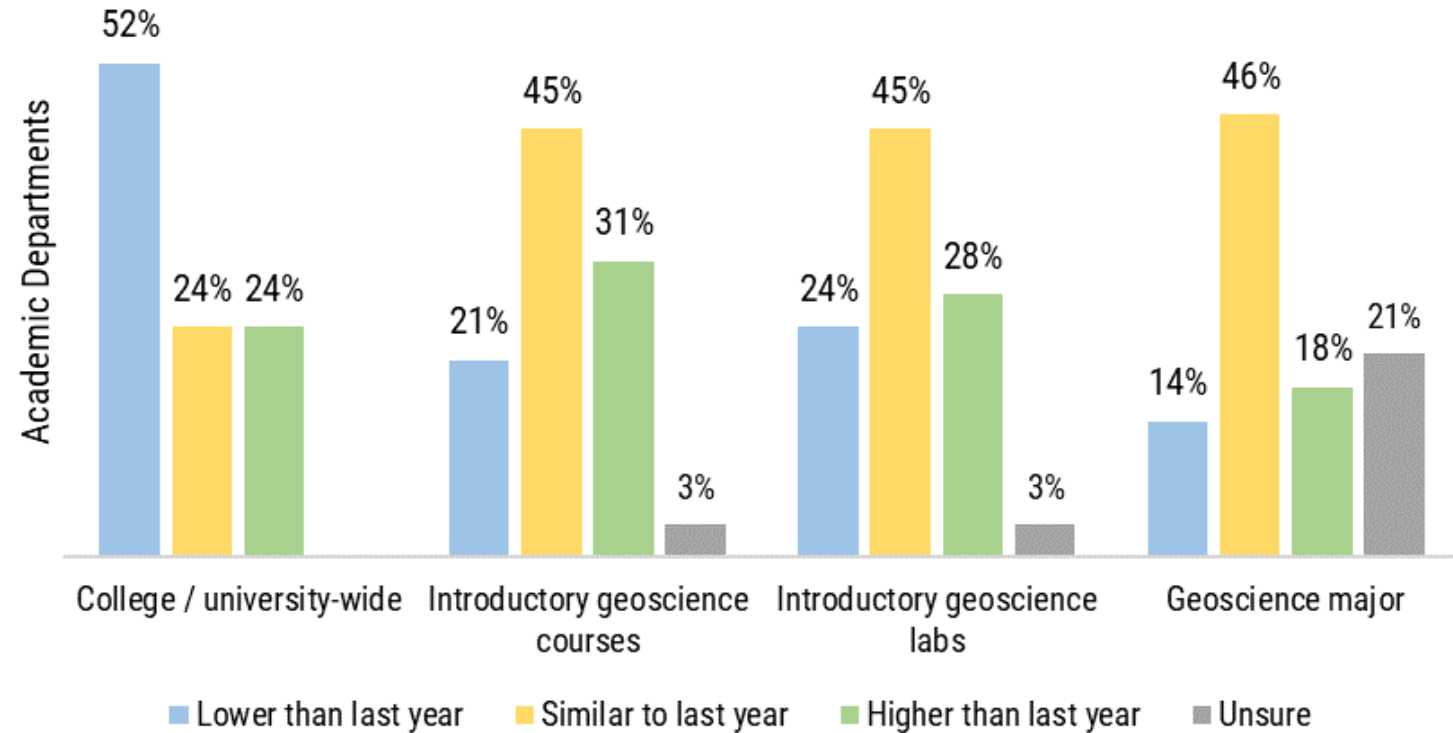
Departments with active faculty searches



# Dept Operations

Enrollments generally down at institutions but similar to or higher than last year for geoscience courses.

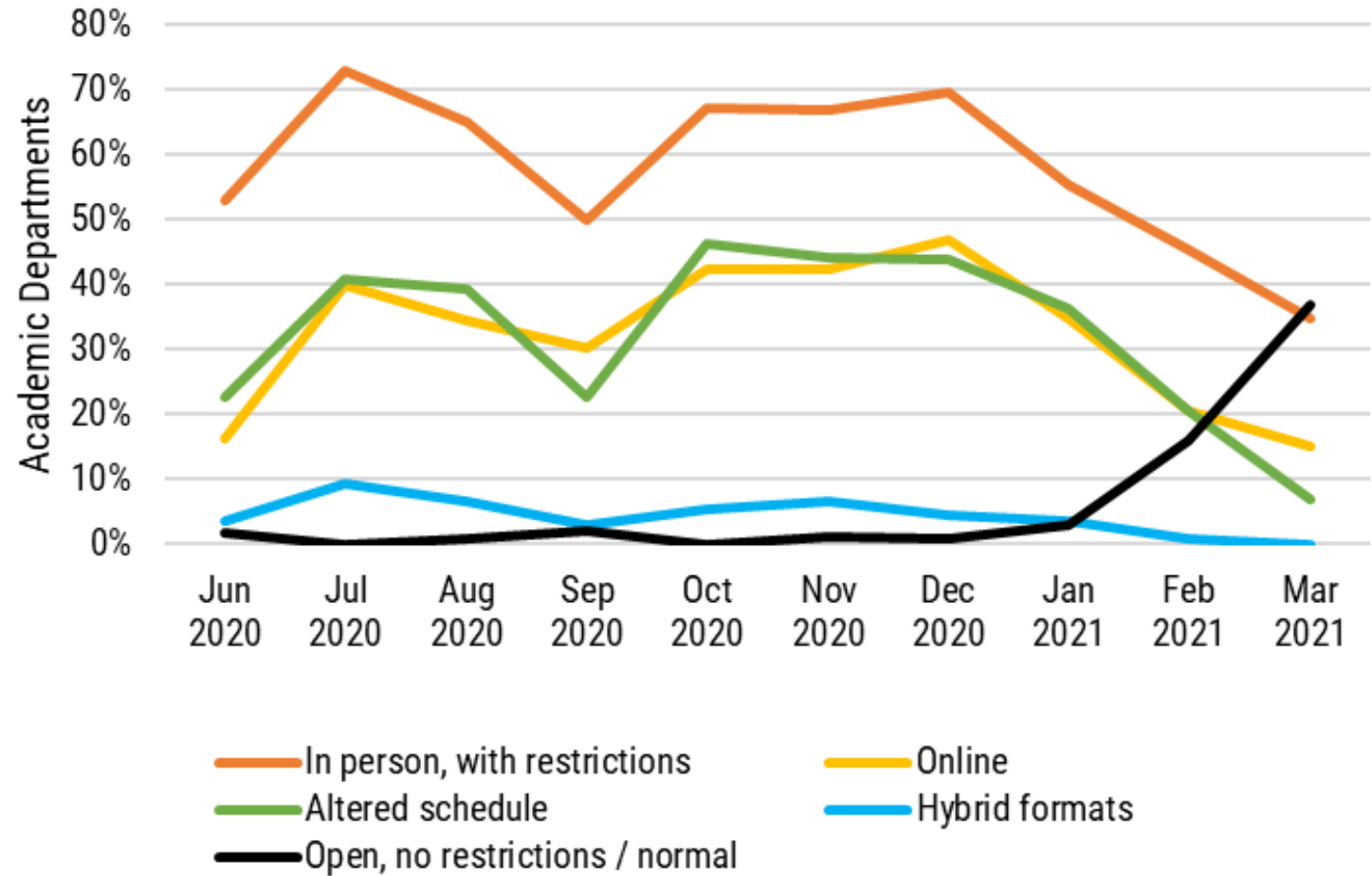
Enrollments relative to last academic year



# Dept Operations

Increasing expectations to open as normal for the Summer and Fall 2021 terms.

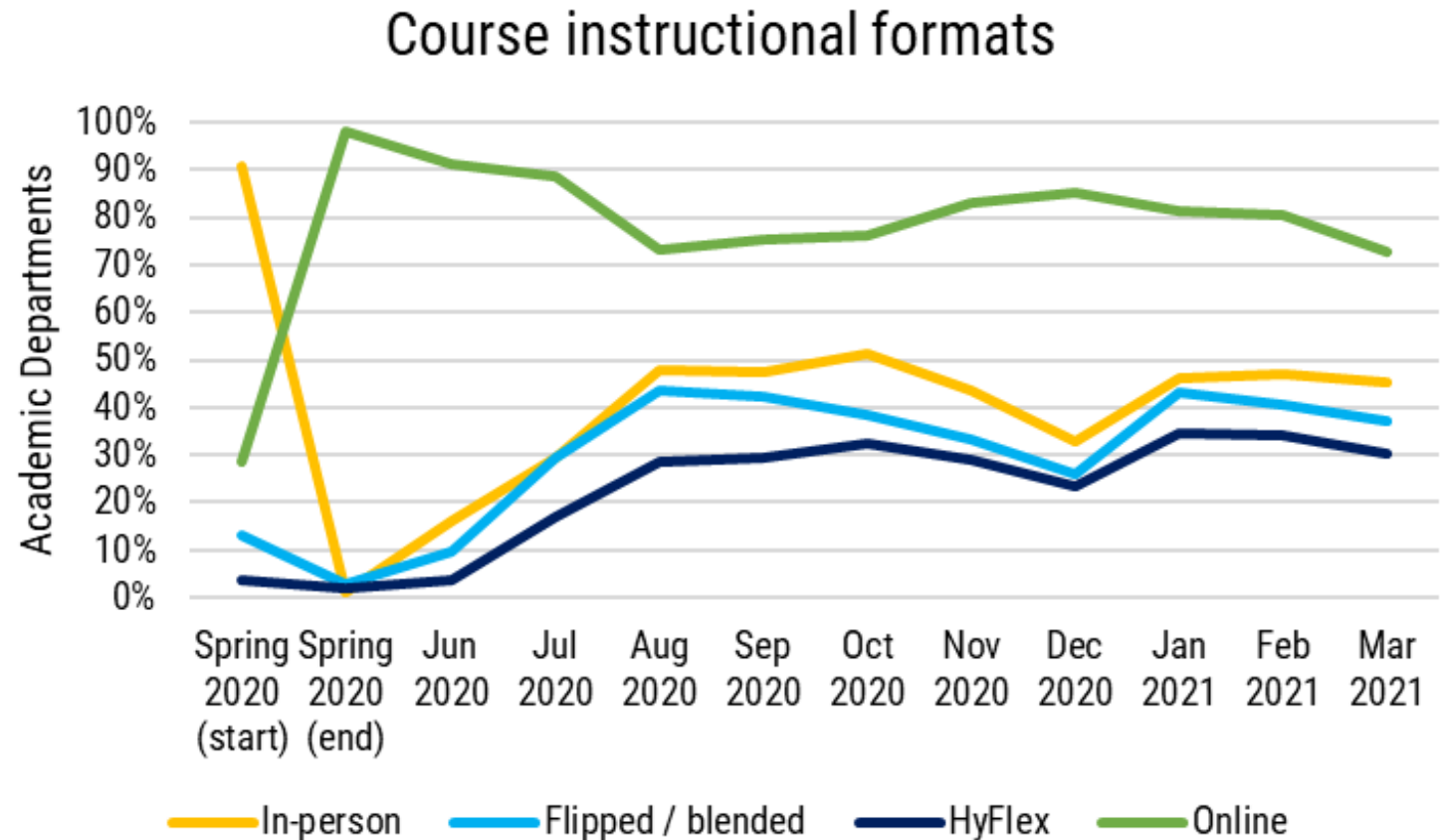
## Institutional plans for next academic term



# Instructional Formats

Course instructional formats are still predominantly online.

Some downward trending since December and January for online and hybrid formats.

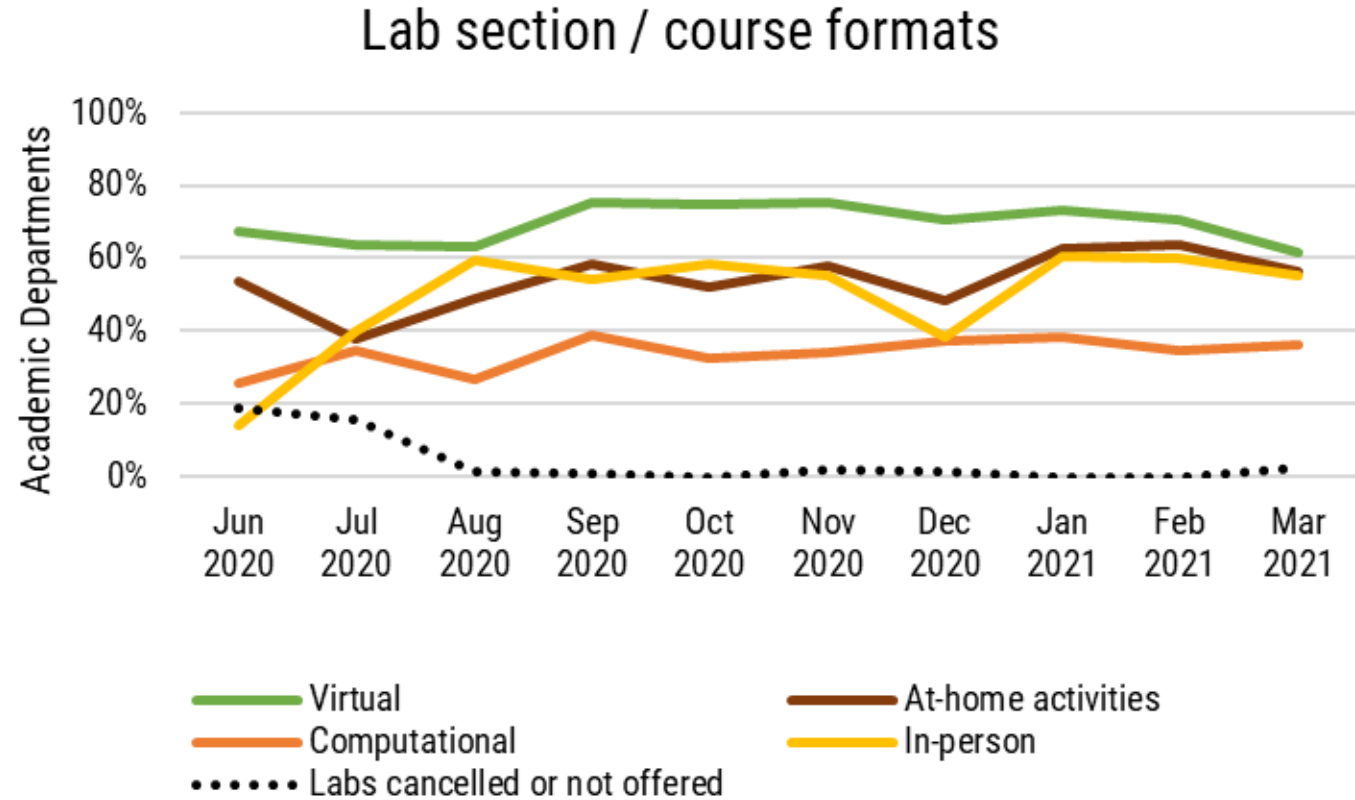
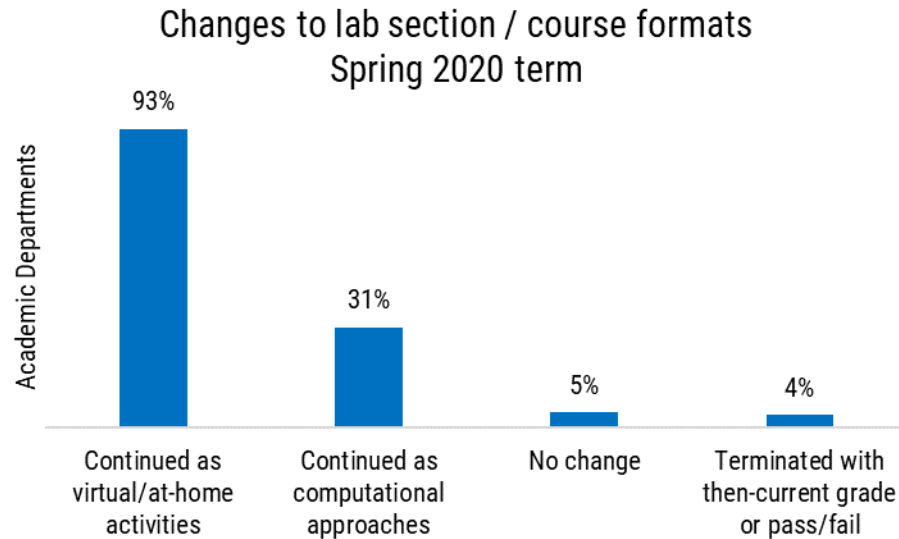


# Instructional Formats

Lab sections continue as mix of virtual, in-person, and at-home activities.

## Are virtual labs here to stay?

Not as replacements for in-person lab sections / courses. Plans for incorporation into existing courses as supplemental material.



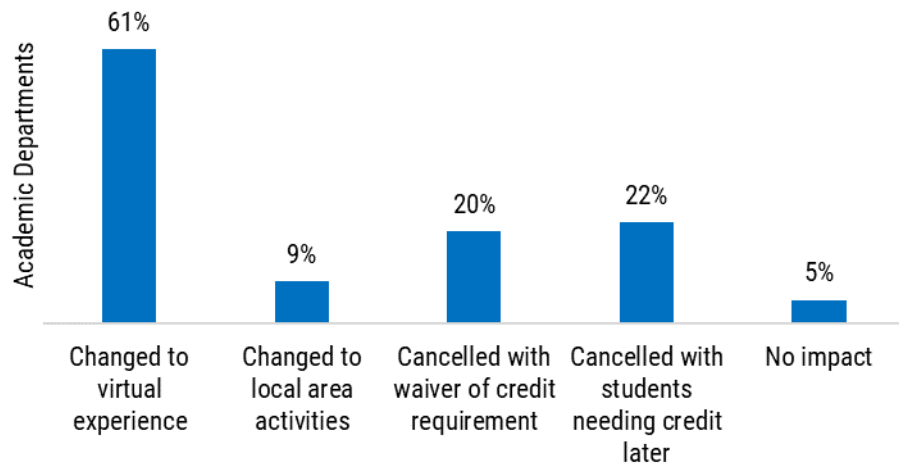
# Instructional Formats

Field instruction a mix of virtual and local instruction, often self-guided local fieldwork.

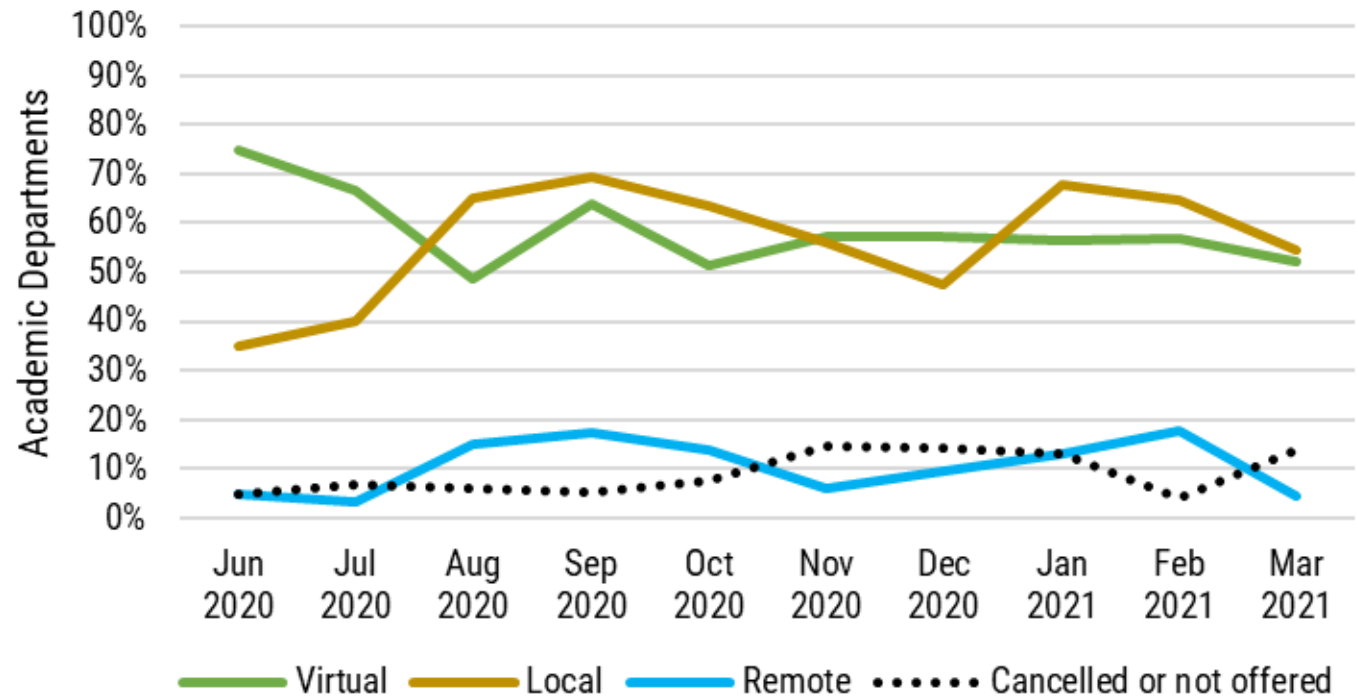
Recent uptick in cancellation or lack of field instruction offerings.

**Are virtual field experiences here to stay?**  
Not as replacements, but plans for use in courses as supplemental activities.

Changes to field instruction, Spring 2020



Field instruction format



# Departments - What we've learned so far...

- Budget cuts were less severe than expected
- Most staffing impacts occurred in Summer 2020
- Recent staffing impacts minimal, but center on hiring freezes and impacts to staff and non-tenured faculty.
- Increase in faculty searches through Fall 2021
- Looking ahead to opening up as normal in Summer/ Fall terms this year
- Concerns center on staffing and student retention/enrollments

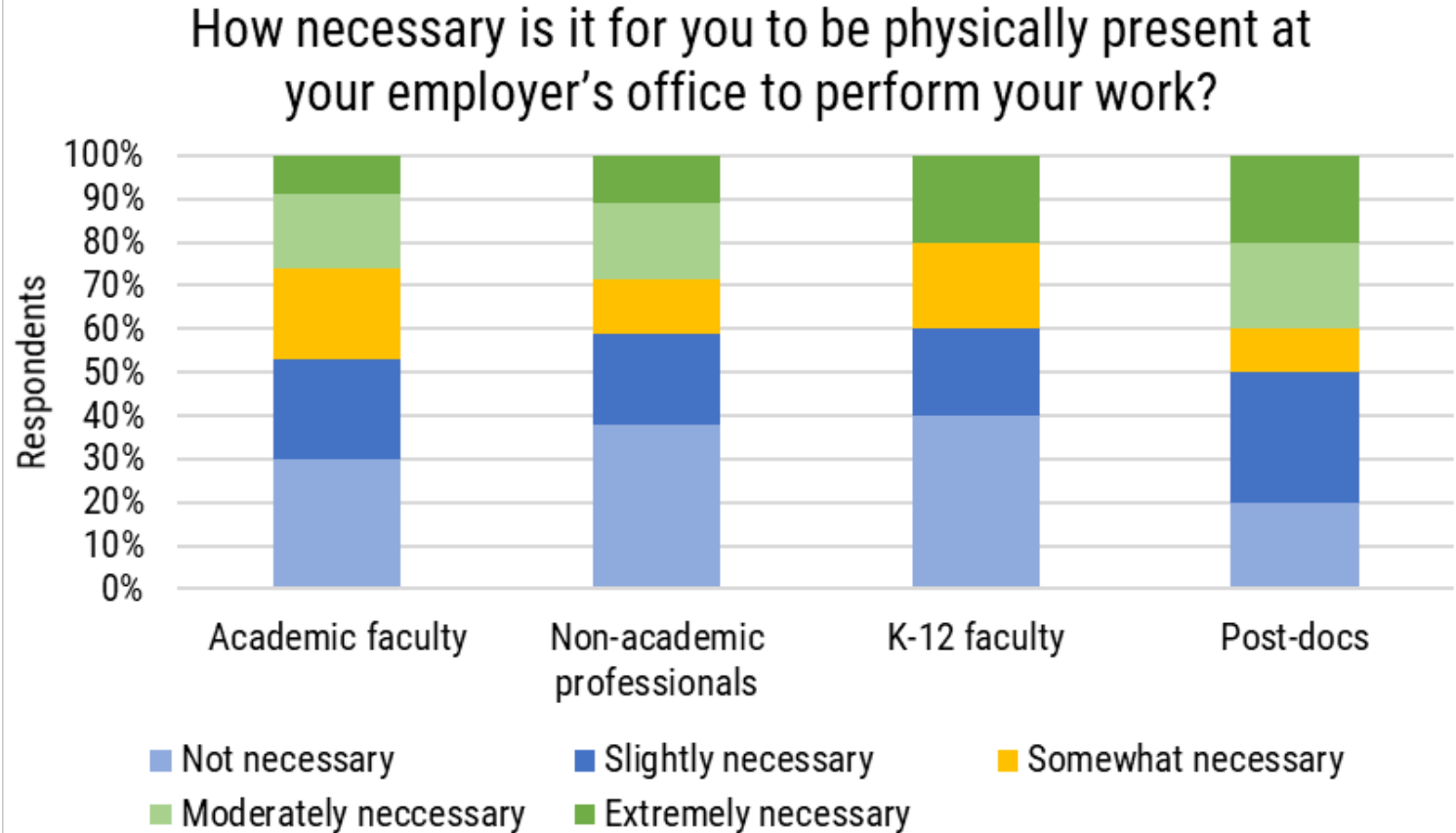


# Departments - What we've learned so far...

- Promotion clock extensions by half of departments, with most requiring opt-in by faculty.
- About half of departments report faculty are on travel or in the field in limited locations.
- Instruction still predominantly online, with some in-person components
- Enrollments up in departments, and down at institutions. Department trend may be due to class caps / smaller classes.

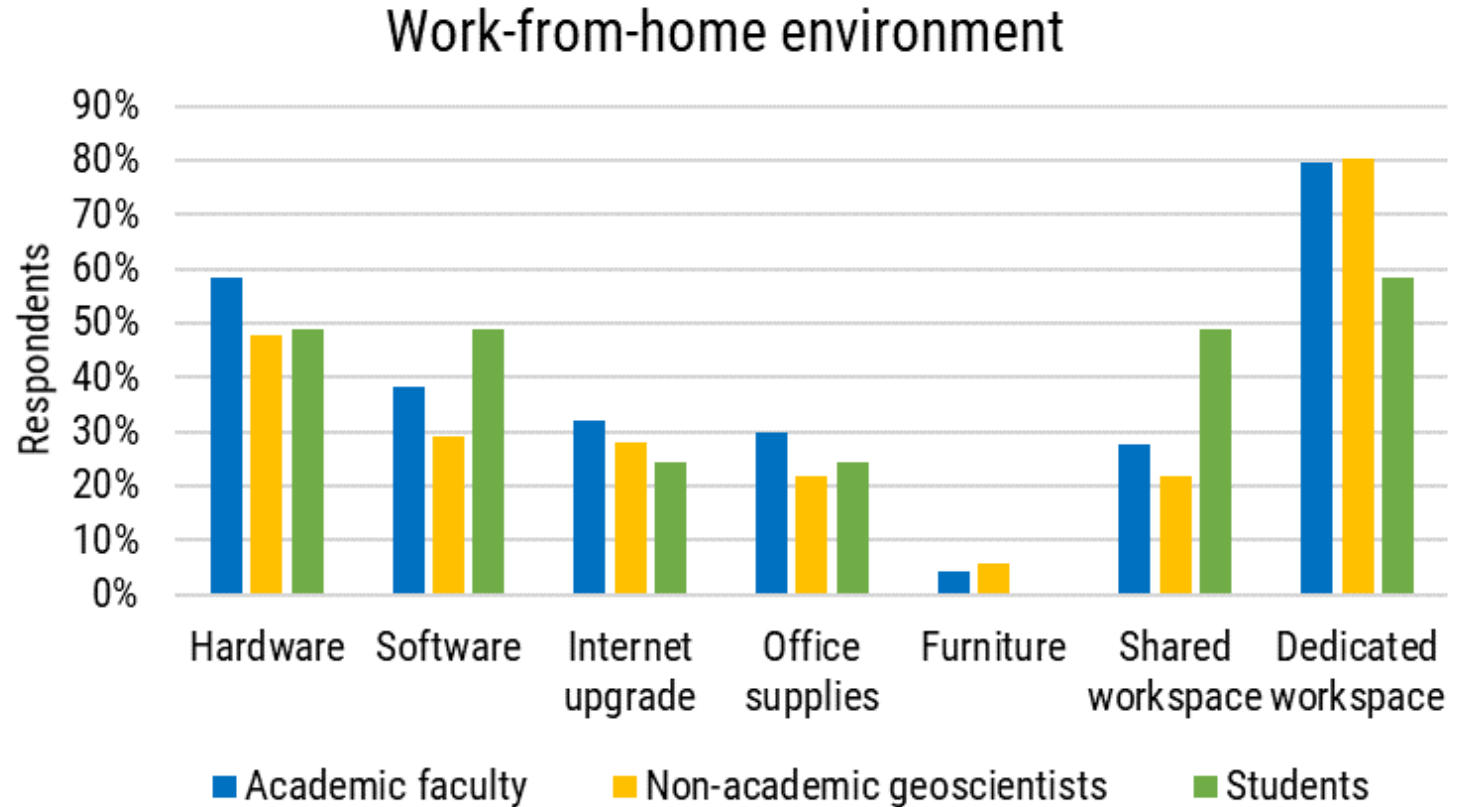
# Individuals – Work environments

Over half of participants report that working at the office either not necessary or only slightly necessary.



# Individuals – Work environments

Students more likely to be using a shared workspace with others than faculty or non-academic geoscientists.



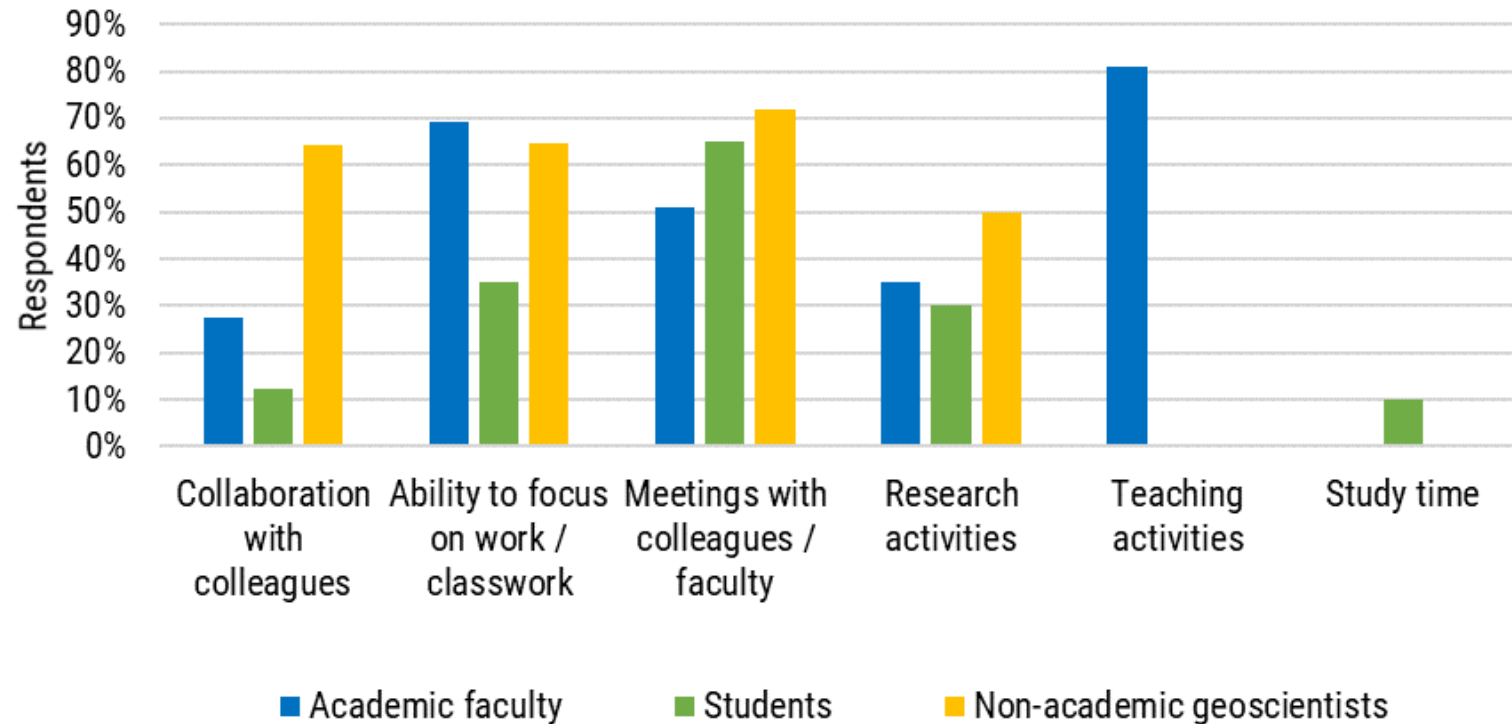
# Individuals – Work environments

Non-academic geoscientists more productive with collaboration and with meetings.

Faculty very productive with teaching activities.

Students least productive with focus, research, study time, and collaborative activities.

Moderately to extremely productive working from home compared to in-office / at-school



# Individuals – Work environments

## Challenges

- Work-from-home environment is not always ideal (technology, distractions, etc.)
- Increased teaching workloads for multiple instructional formats
- Facility restrictions impeding research and work
- Students needing more attention
- Lack of informal discussions, networking, and business prospecting
- Difficulty with supervising employees
- Online meeting fatigue

# Individuals – Work environments

## Benefits

- Less commute time and less cost
- More time to focus on research, work, writing
- Increased access to conferences and meetings
- Increased international collaboration
- Increased productivity

# Employment status

Over 90% of working participants remained employed.

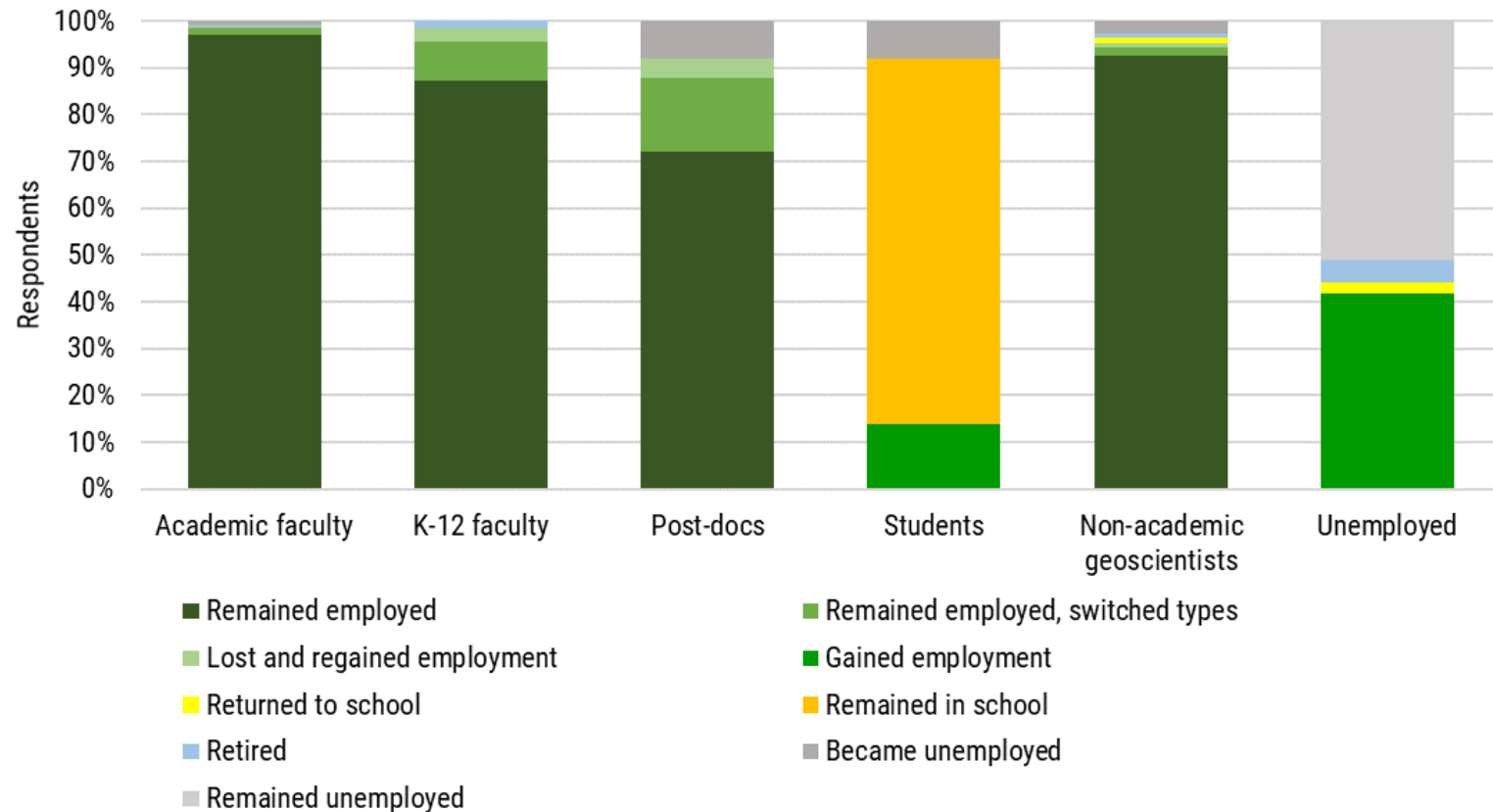
Over 90% of students either remained in school or gained employment.

Post-docs and students had highest rates unemployment (8%), followed by non-academic geoscientists (3%).

Those that remained unemployed comprise 2% of *all* study participants.

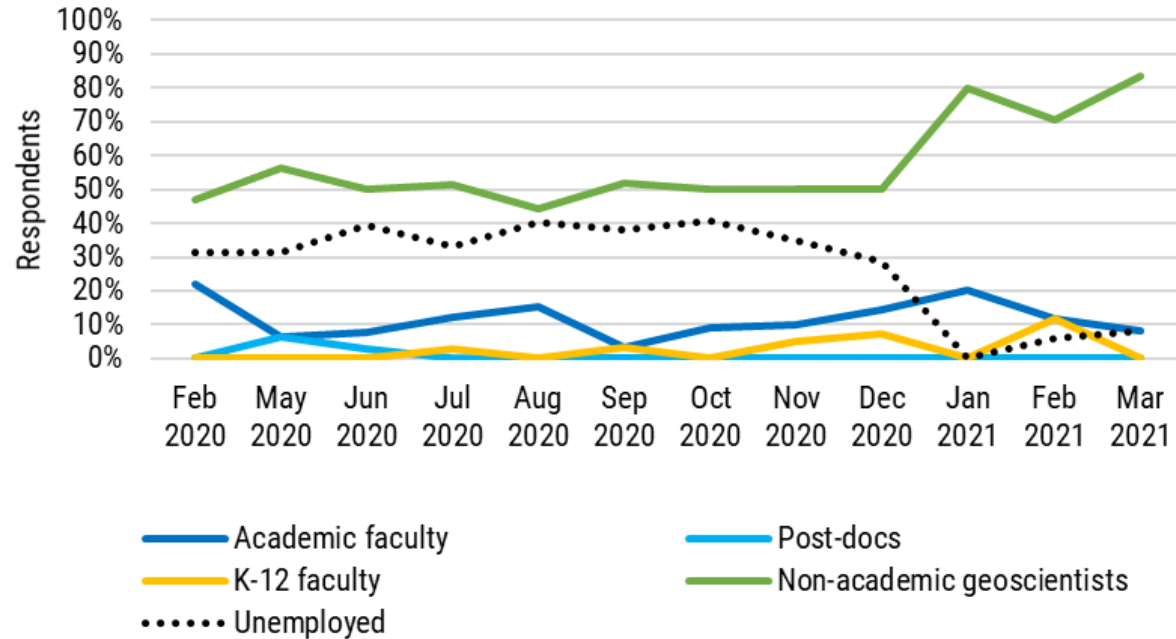
Unemployed individuals are predominantly seeking work within the geosciences.

Employment changes since start of study participation

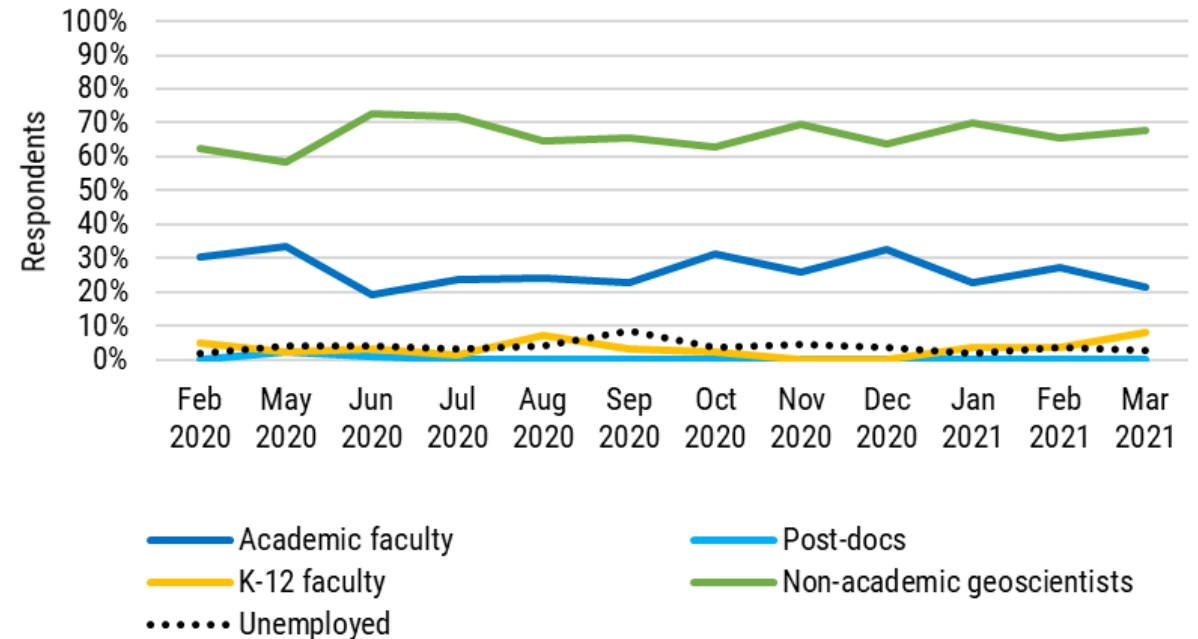


# Employment status - Recent graduates

Employment status: 2019-2020 recent graduates



Employment status: 2014-2018 recent graduates



Most recent graduates are working in non-academic geoscience occupations.

Employment status is relatively stable, especially for older recent graduates (2014-2018).

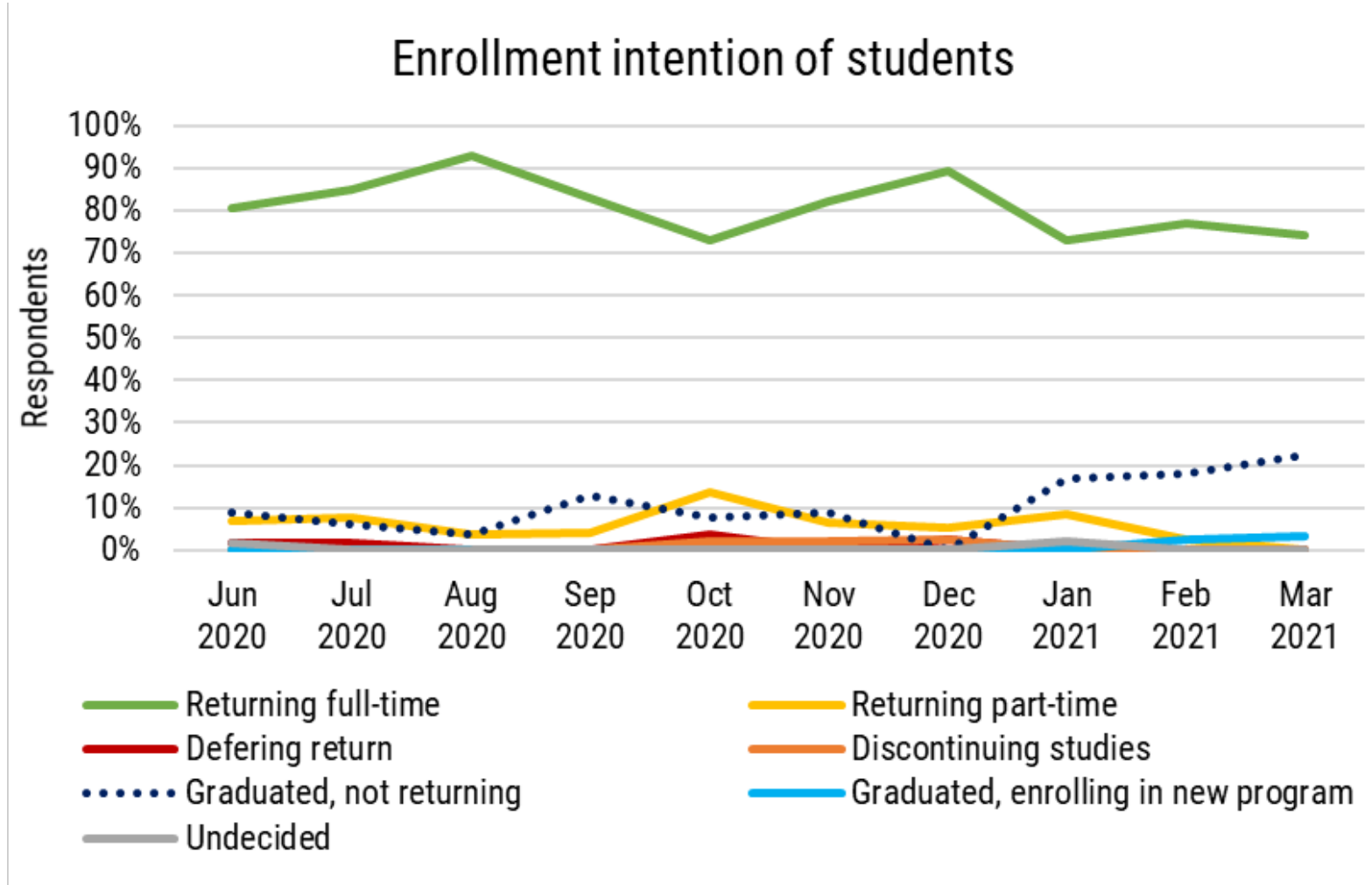
Pick-up in employment for newer graduates (2019-2020) starting in November 2020, with acceleration in 2021.



# Students - Enrollment intention

Most students plan to return full-time.

Those returning part-time are usually in the last part of their graduate studies.



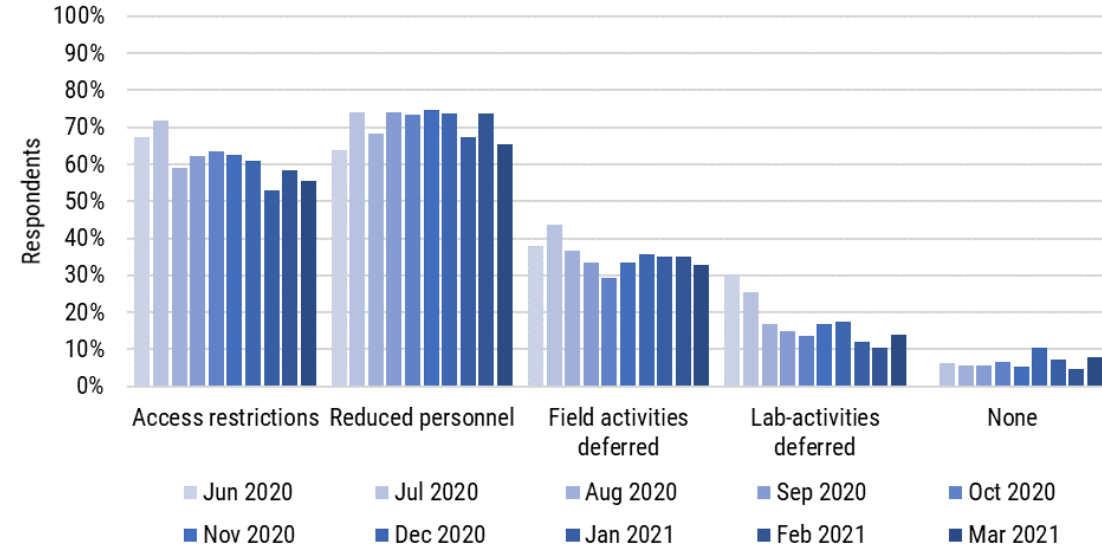
# Facility access

Increase in reduced staffing at facilities.

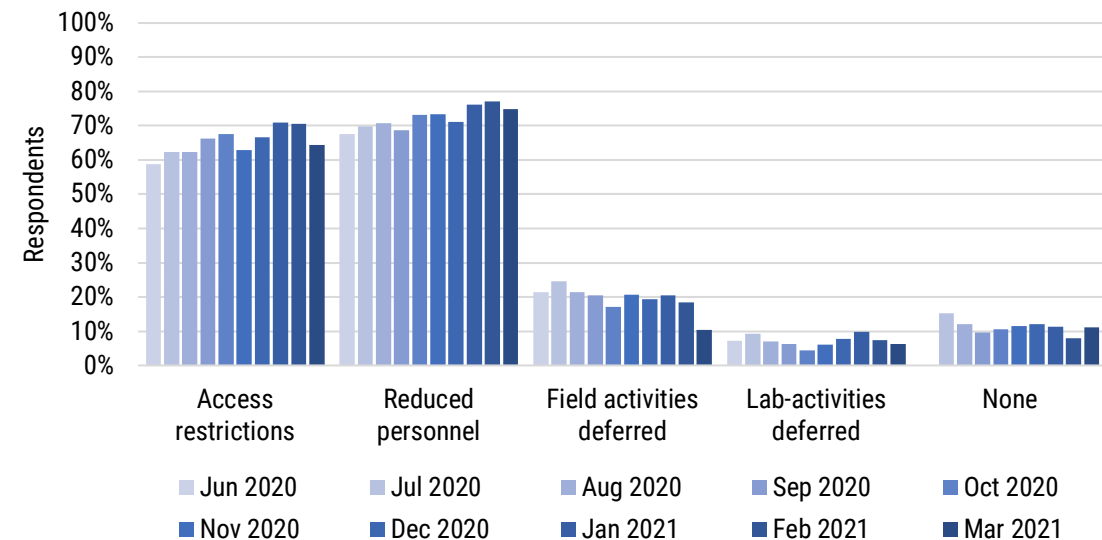
Field activities and lab activities deferred more by academic faculty than by non-academic geoscientists.

Majority of facilities still have access restrictions.

COVID-19 related facility restrictions for academic faculty



COVID-19 related facility restrictions for non-academic geoscientists

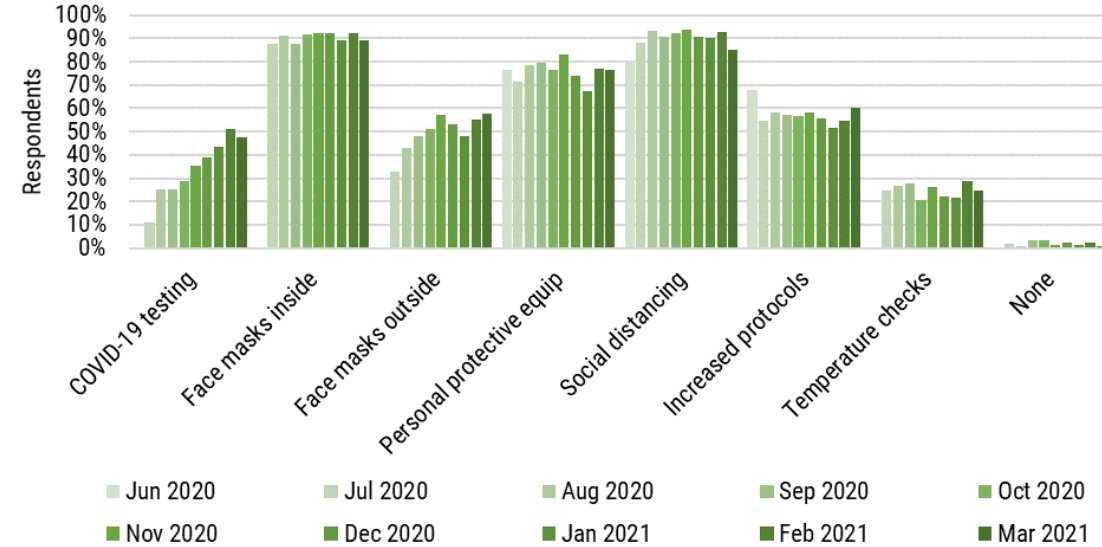


# Health & safety

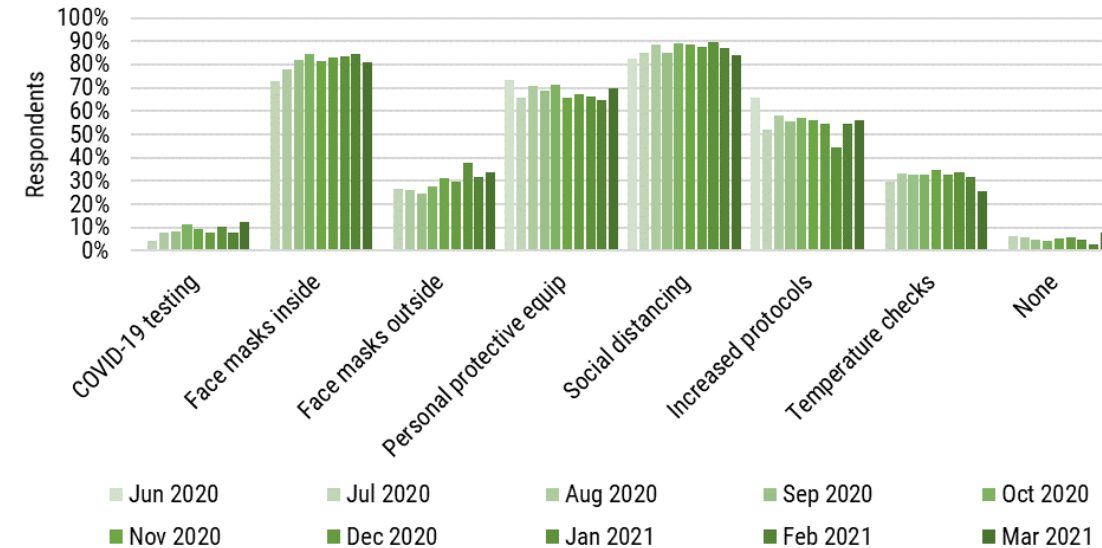
Health & safety restrictions relatively steady for non-academic geoscientists.

Increased protocols for academic faculty for COVID-19 testing and use of facemasks outside.

COVID-19 related health and safety restrictions for academic faculty



COVID-19 related health and safety restrictions for non-academic geoscientists



# Meetings & travel

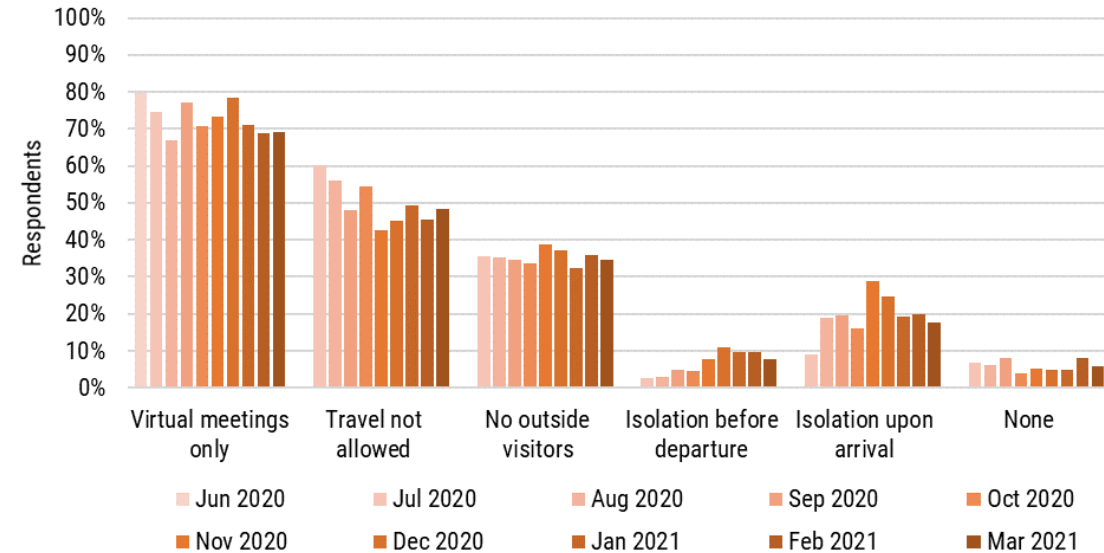
Meeting and travel restrictions relatively steady.

Travel restrictions are easing, but limitations still exist.

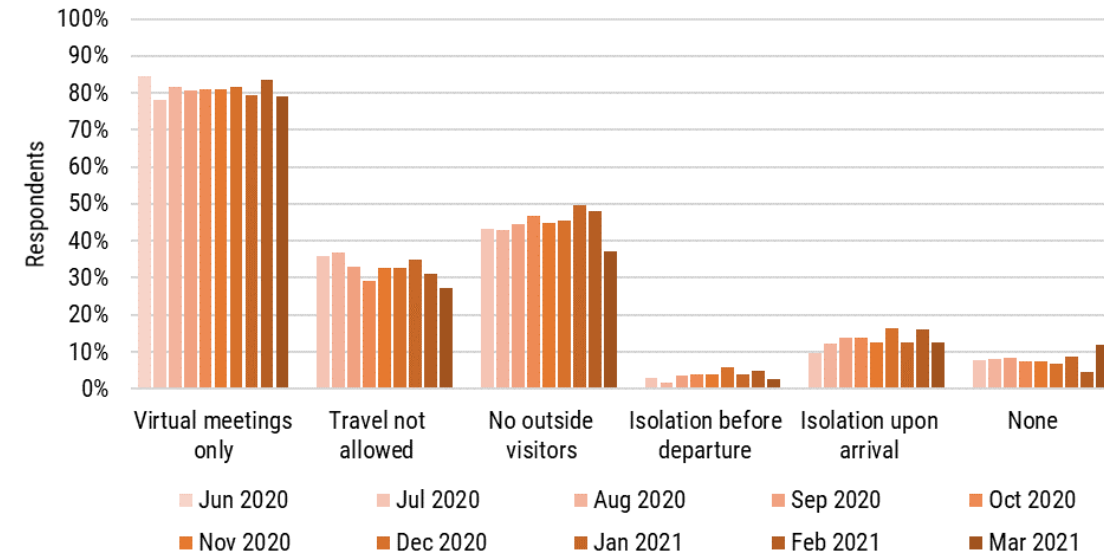
Increase in isolation before departure for academic faculty.

Other restrictions often mention include vehicle usage.

COVID-19 related meeting and travel restrictions for academic faculty



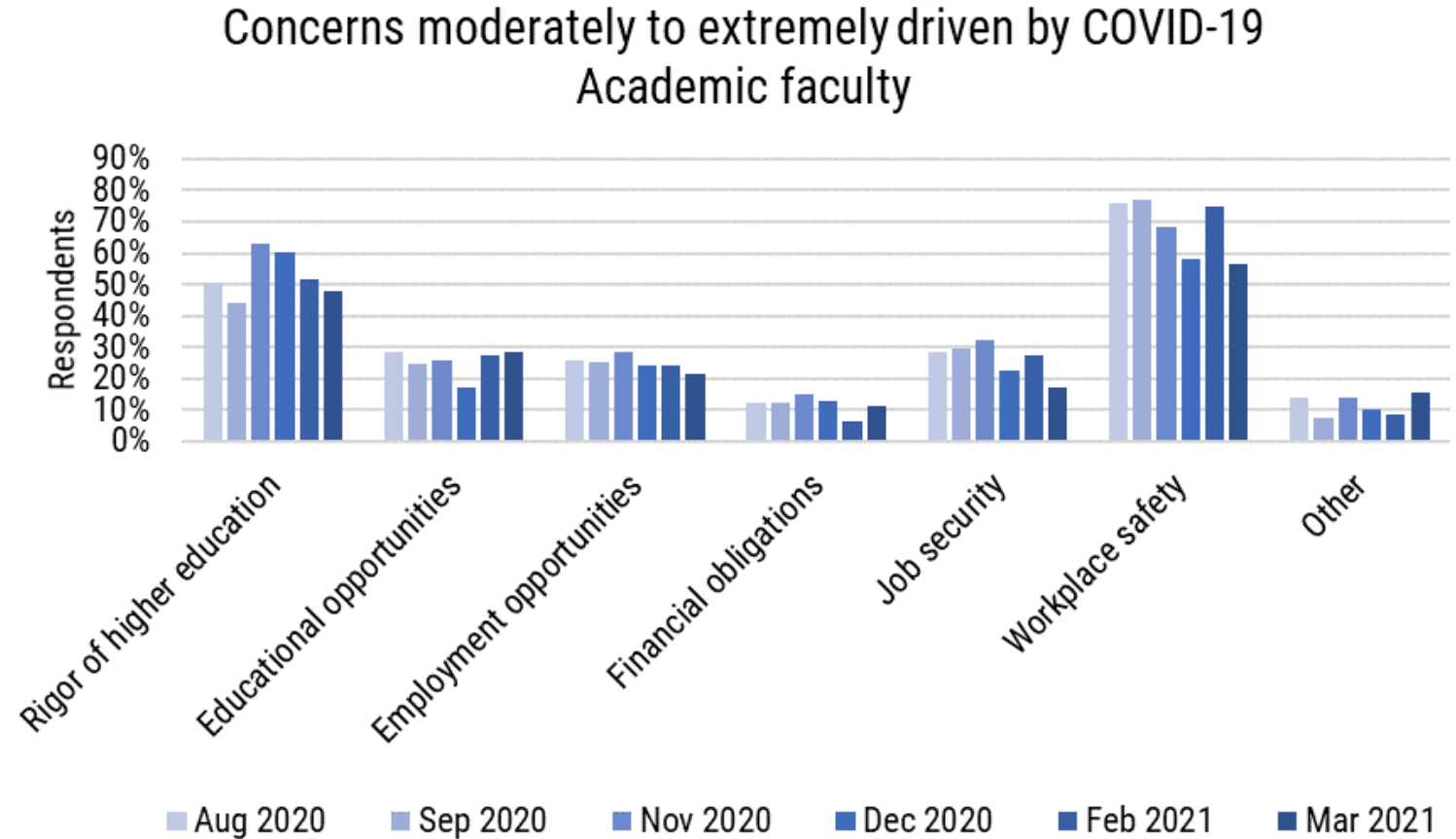
COVID-19 related meeting and travel restrictions for non-academic geoscientists



# Concerns

Overall, COVID-19 driven concerns easing, or at least not increasing.

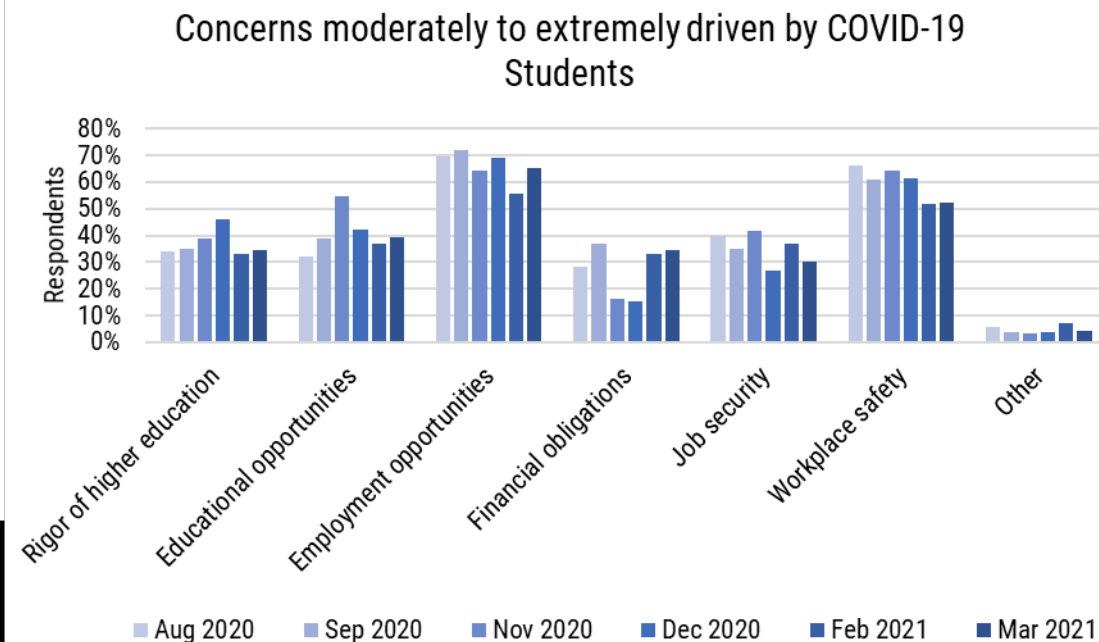
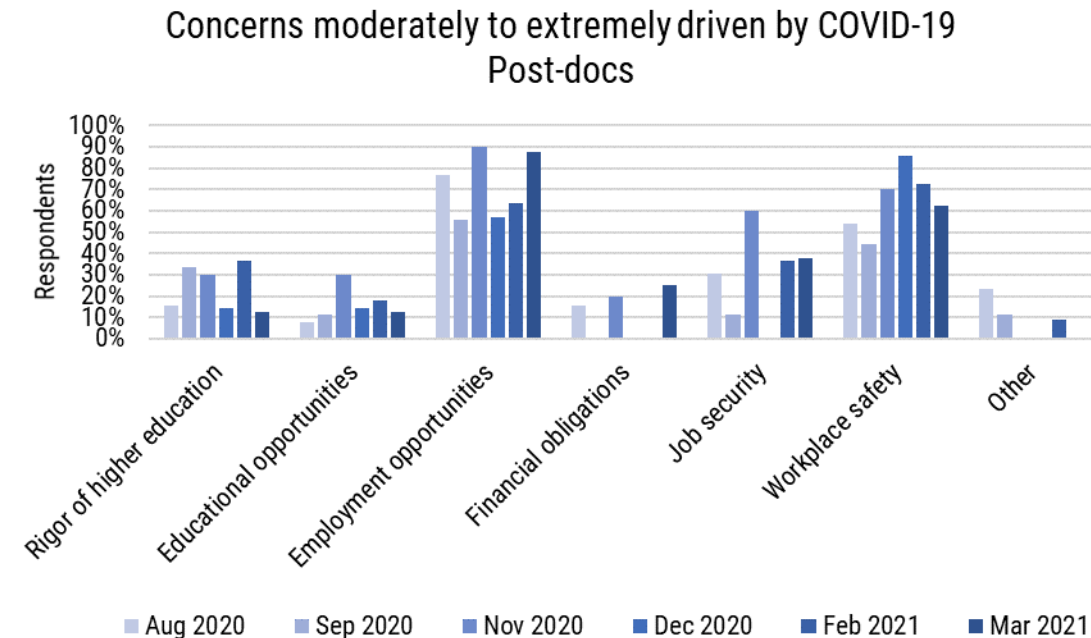
Workplace safety is a top concern.



# Concerns

Top concerns for post-docs and students: employment opportunities and workplace safety.

Post-docs – increase in concerns over employment opportunities.



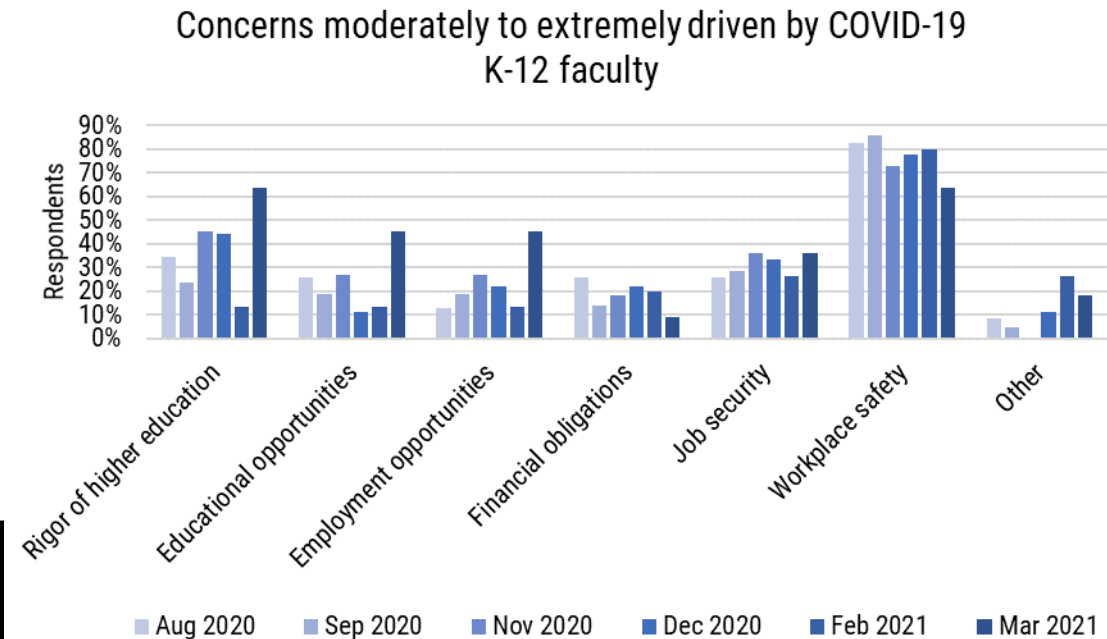
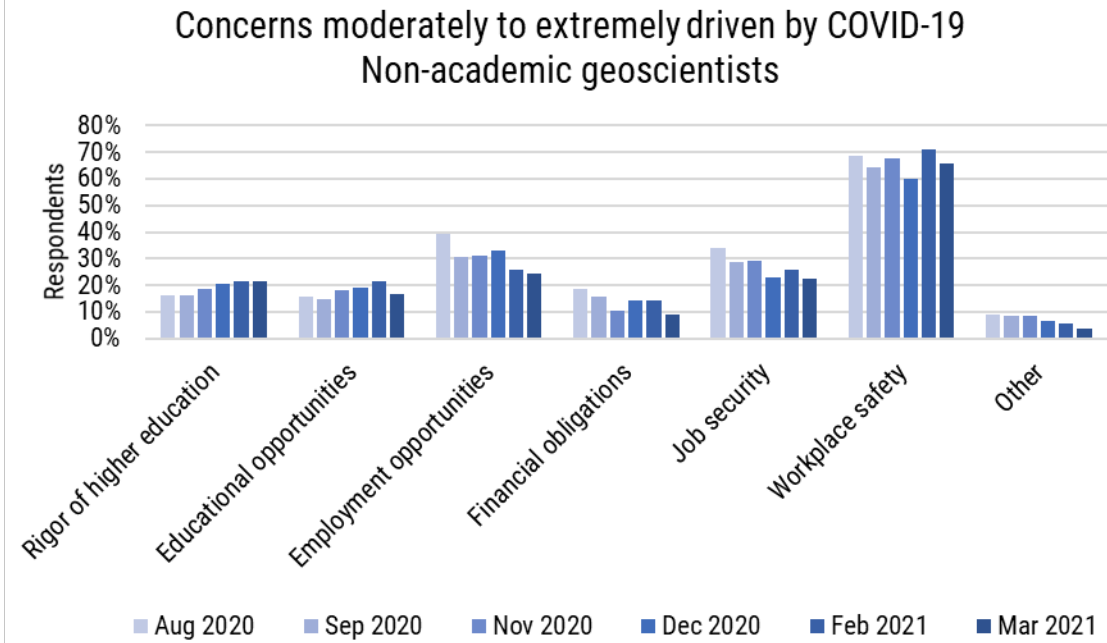
# Concerns

Workplace safety still top concern.

## Non-academic geoscientists

Declines in concerns over employment

Increases in concerns over education



# Individuals - What we've learned so far...

- Over 90% of study participants remained employed or in school or gained employment during this period.
- 5% of study participants became or remained unemployed.
- Students planning to return full-time for next academic term.



# Individuals - What we've learned so far...

- Primary work locations are at home for most individuals, with increasing amounts of splitting time between home and employer facilities.
- No major changes in how work and research activities are being conducted.
- High proficiency on virtual platforms across all cohorts

# Individuals - What we've learned so far...

- Most participants report not needing to be at the office to do their jobs.
- Biggest drawbacks to virtual work - lack of informal in-person communication
- Work-at-home set up is very important for successful remote working and learning experiences.

# Individuals - What we've learned so far...

- Work and research restrictions still in place, no signs of easing.
- Top concerns are still workplace safety for all cohorts
- Academic faculty and non-academic geoscientists also concerned about educational programming.
- Post-docs and students also concerned about employment opportunities.

# Looking ahead

- Study has been extended through March 2022
- New round of study recruitment to increase participation
  - **Employers** – environmental services
  - **Departments** – more departments in MSIs
  - **Individuals** – more students, early-career geoscientists, post-docs, environmental services sector, improved engagement with diverse populations
- Continue bi-monthly surveys of all cohorts
- Intensify surveying of students and recent graduates to assess “lost year” impacts

# Looking ahead

- Monthly data briefs
- Data brief primary focus will be on departments, faculty, students, and recent graduates
- Employment briefs will focus on hiring, business operations, and workplace policies

# Looking ahead

Questions to explore:

- How have work and instructional environments changed permanently?
  - Incorporation of virtual teaching/learning modes?
  - Higher percentages of employees working remotely?
  - Changes in hiring and onboarding of employees?
- Has there been a skills/knowledge gap from the pandemic period on students and graduates?
  - Impacts to academic achievement and progress, career trajectories
  - Strategies being implemented by departments and employers to address these impacts

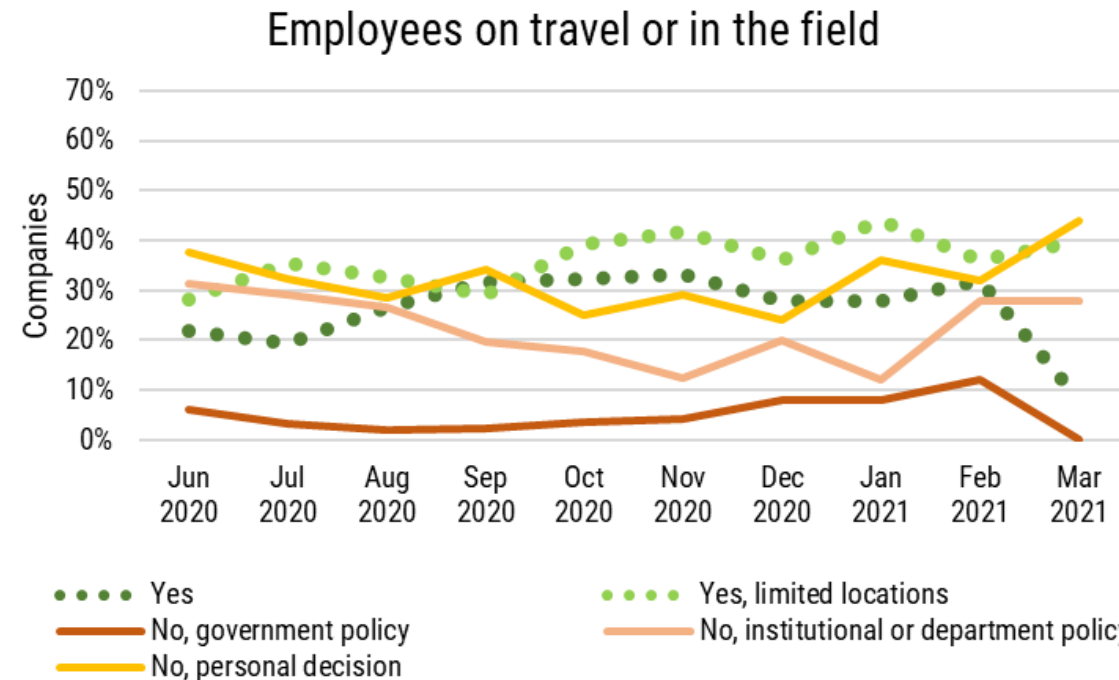
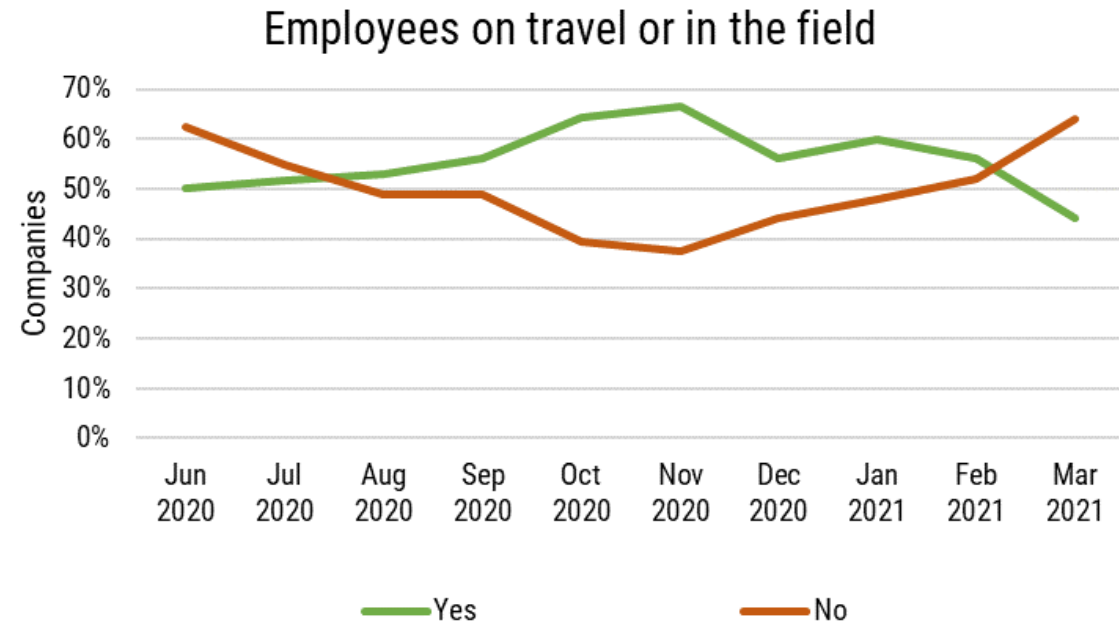
# Questions?

# Additional Data



# Employers: Staffing

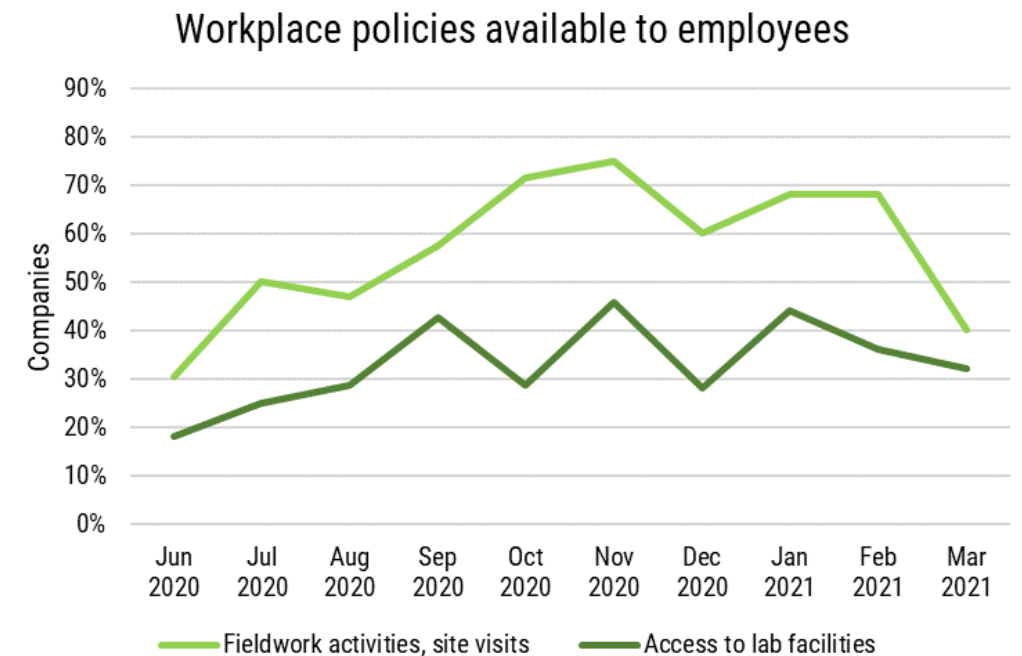
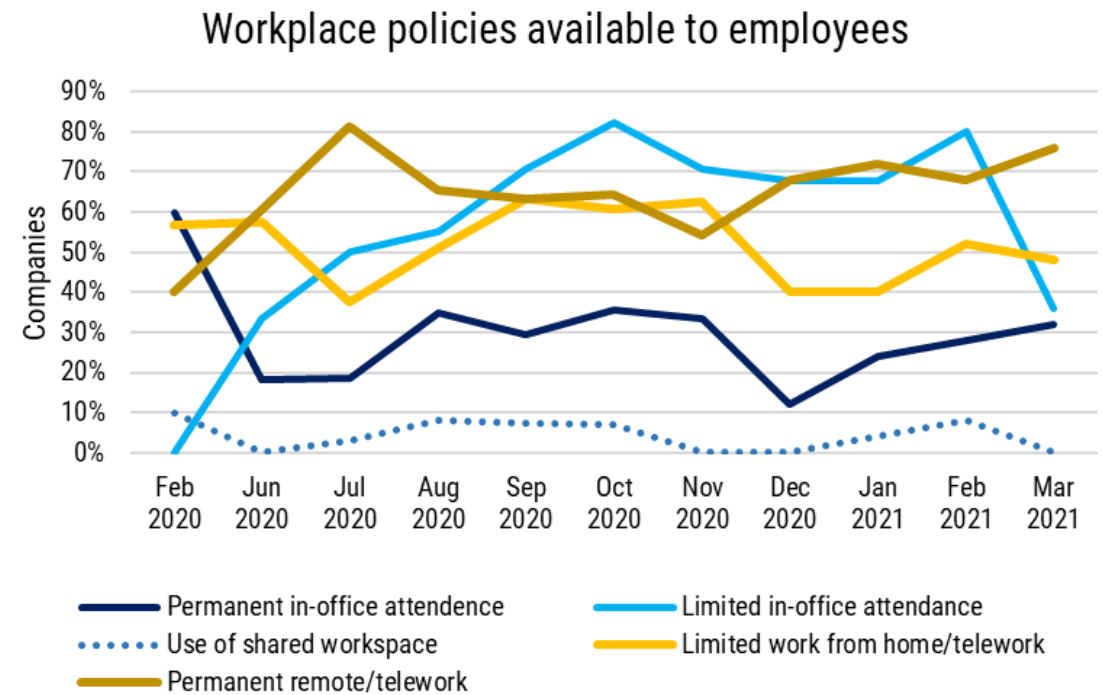
Since November, increasing percentage of employees not on travel or in the field due to personal decision and institutional policies.



# Employers

Permanent telework and limited in-office attendance continue as the primary work modalities.

Fieldwork and lab access improved since June 2020.



# Employers - What we've learned so far...

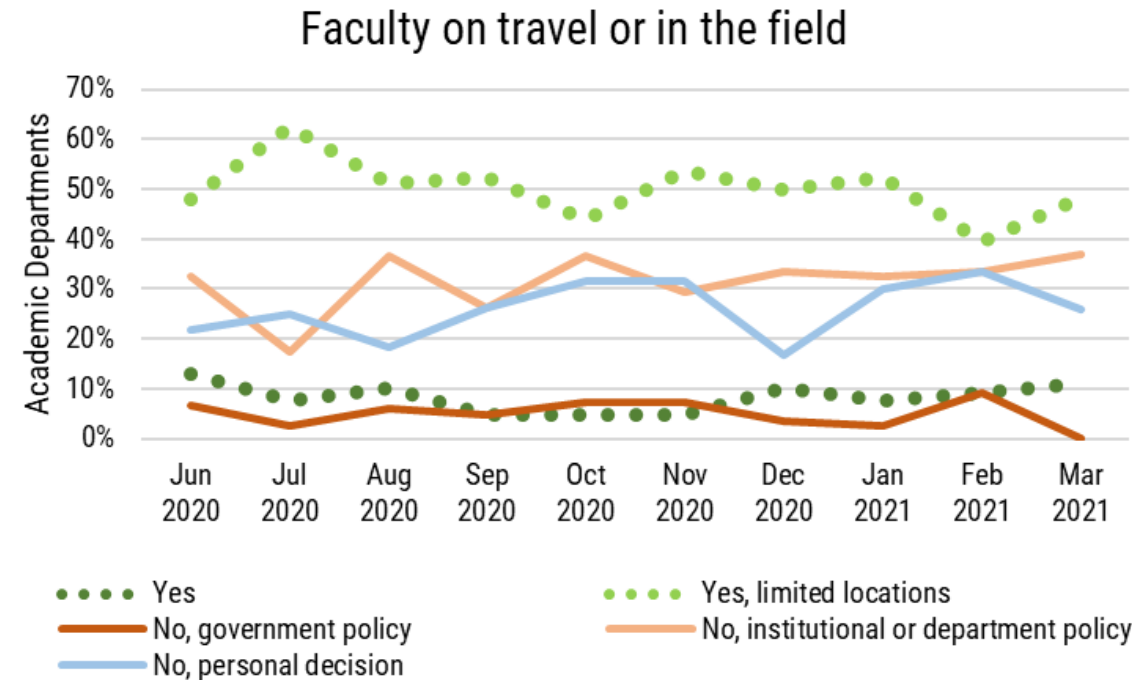
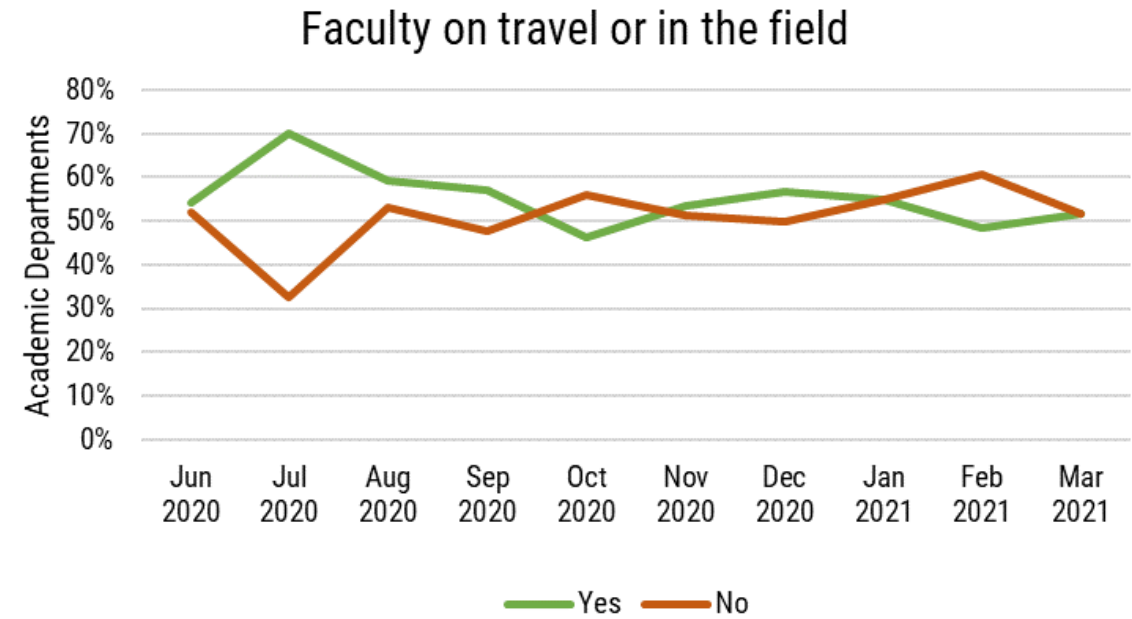
## Concerns

- Concerns moderately to extremely driven by COVID-19 are decreasing.
- Workplace safety, however, is still top concern for over half of employers.

# Dept Operations

40%-50% of faculty are on travel or in the field in limited locations.

Lack of travel and field activities primarily driven by institutional / personal decisions.

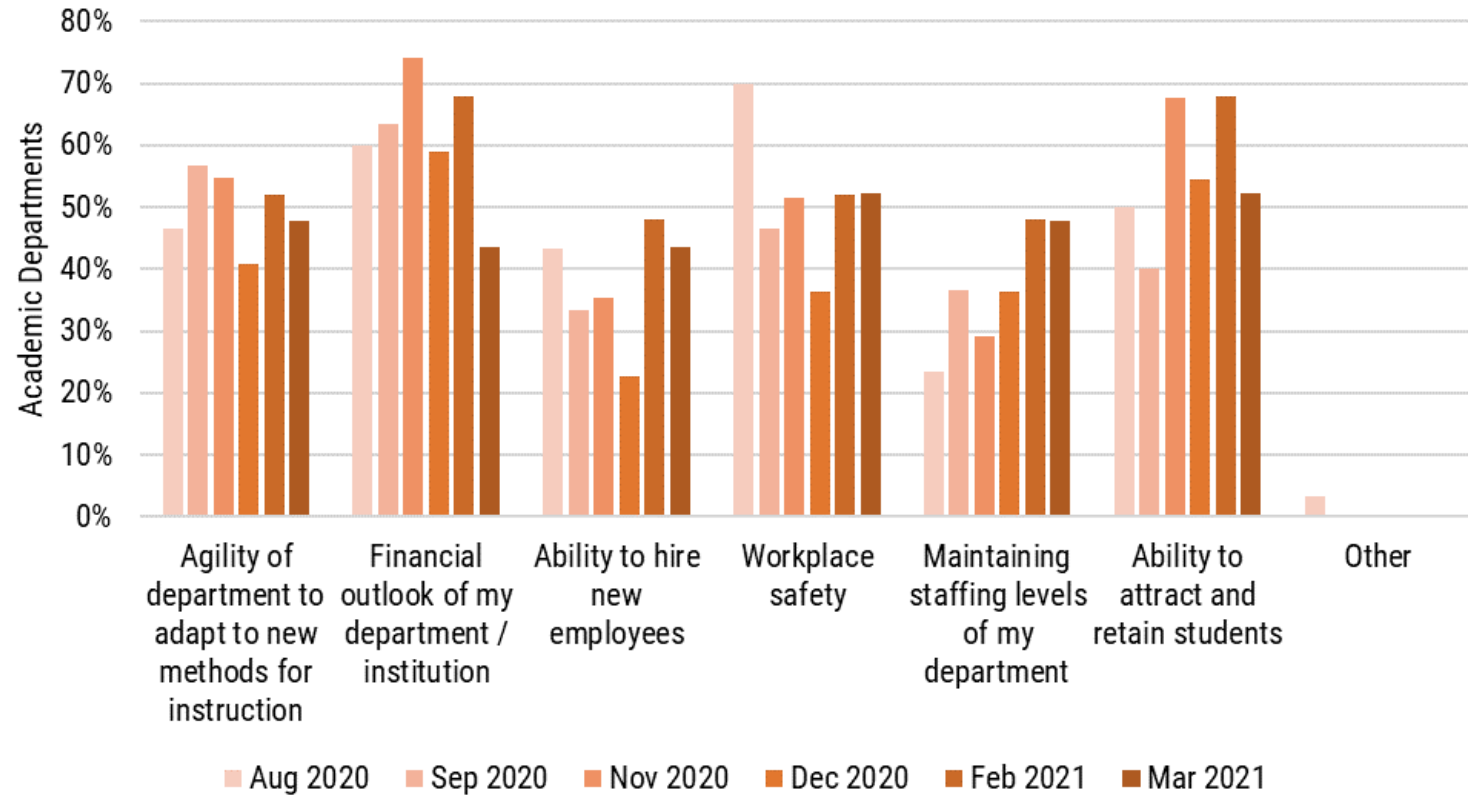


# Dept Operations

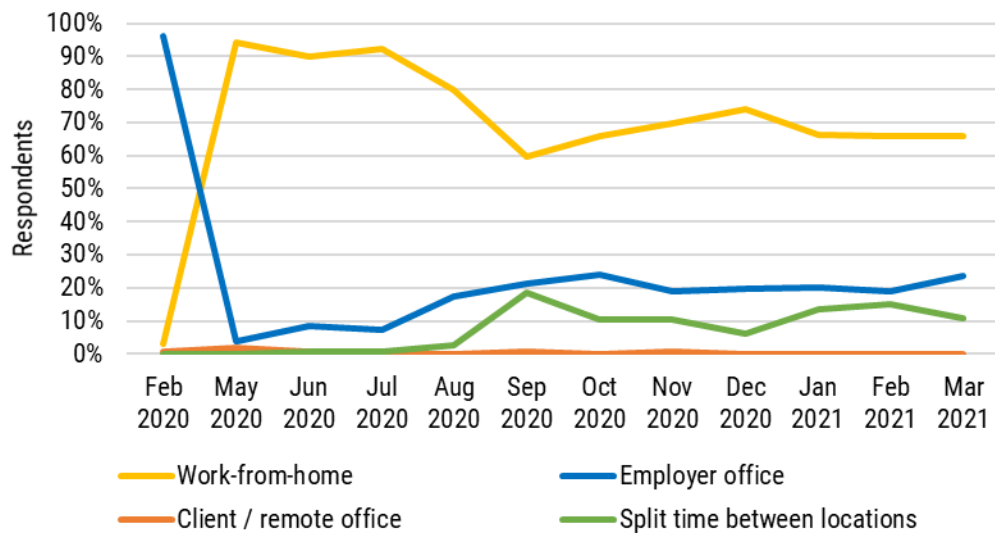
Increasing concerns about staffing and ability to hire new employees and retain students.

Decline in concerns about workplace safety and the ability to shift to new methods of instruction.

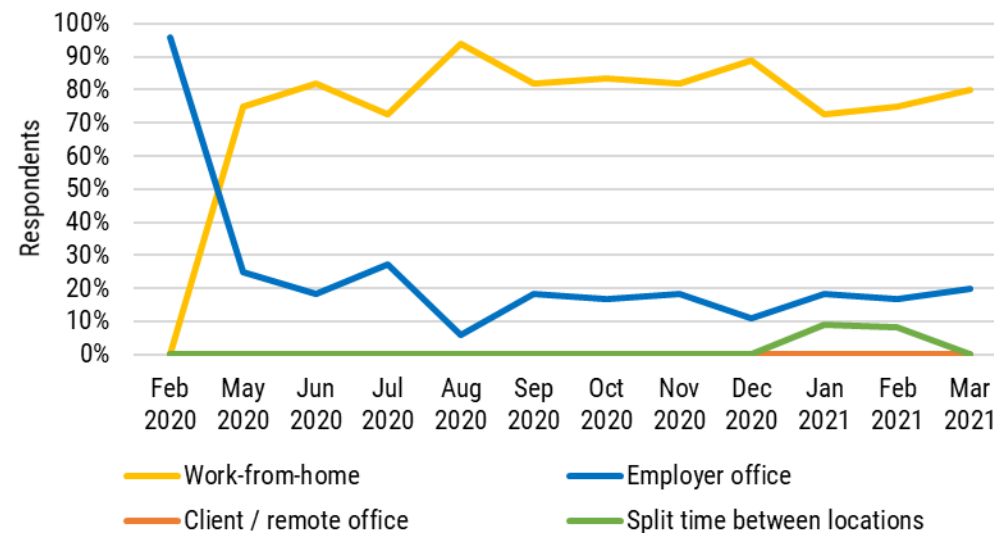
Department concerns moderately to extremely driven by COVID-19



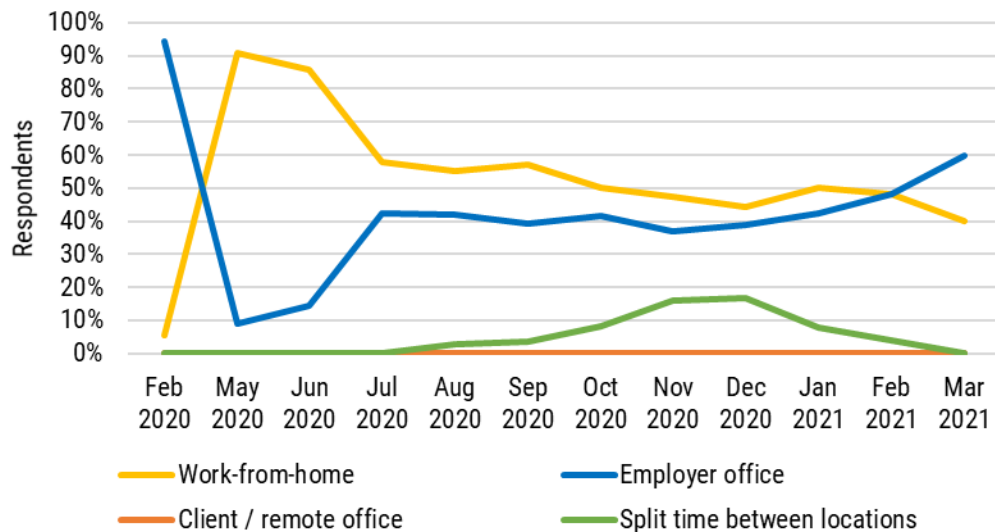
Primary work location: Academic faculty



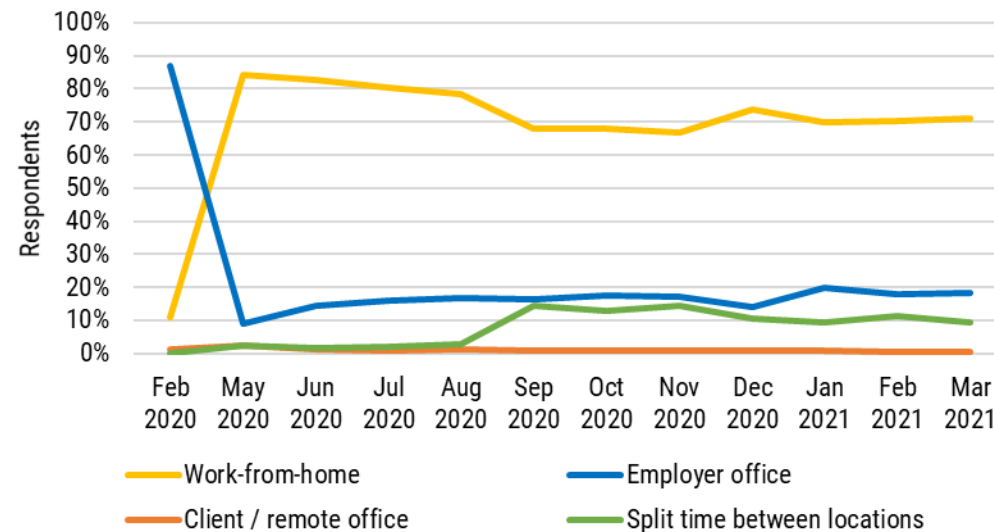
Primary work location: Post-docs



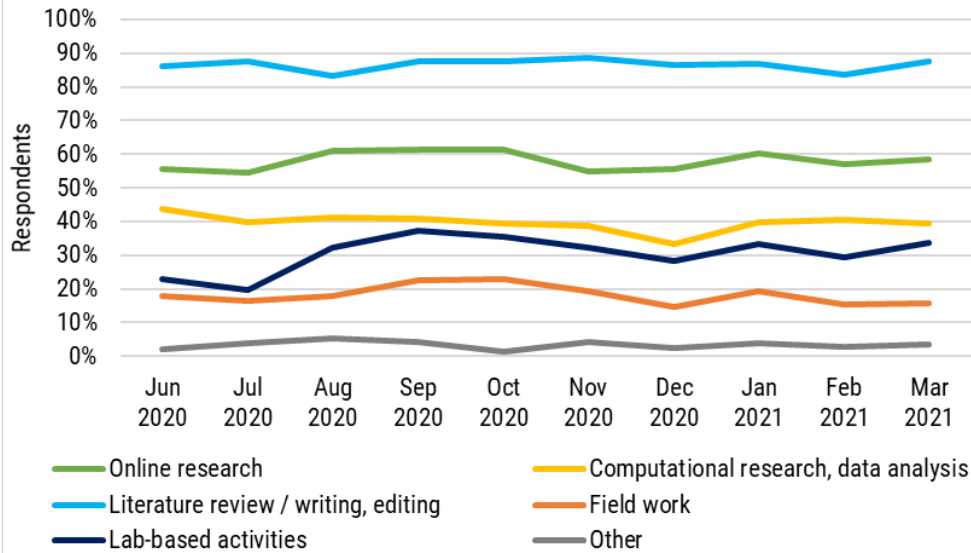
Primary work location: K-12 faculty



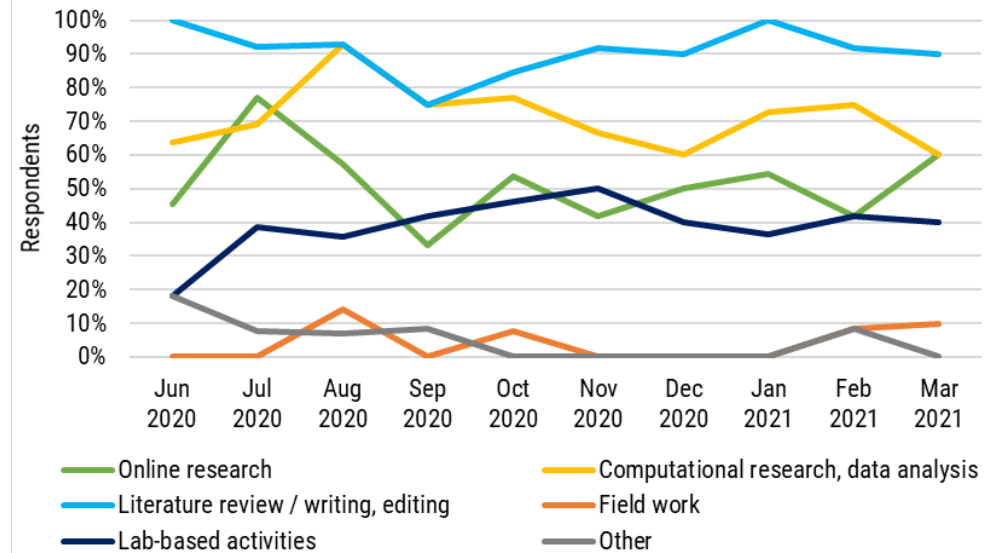
Primary work location: Non-academic geoscientists



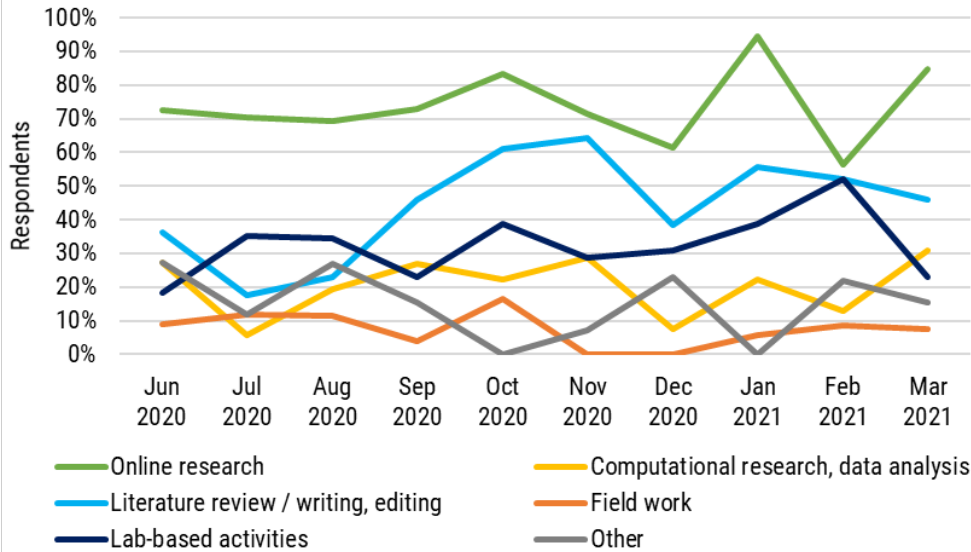
### Work and research activities: Academic faculty



### Work and research activities: Post-docs



### Work and research activities: K-12 faculty



### Work and research activities: Non-academic geoscientists

