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ABSTRACT

This document reports on a 1995 survey of students graduating with a bachelor's degree in physics or astronomy as part of an ongoing series of surveys that have been conducted by the American Institute of Physics (AIP) since the 1960s. The data obtained on the 1995 class build upon established trends in students' immediate postbaccalaureate plans and student characteristics. The information in this report is supplemented with departmental data gathered in AIP's Enrollments and Degrees Survey. Highlights of the report include the following: the total number of physics bachelor's degrees produced each year continued to decline; 40 percent of the physics bachelors took longer than 4 years to obtain their degree; employment prospects showed improvement for the class of 1995; and the median starting salary for physics bachelors in the class of 1995 was $29,800, up from prior years. Postbaccalaureate plans for physics majors continued to shift, with fewer opting for graduate study in physics and more entering directly into the job market. There were 205 astronomy bachelor degrees conferred during the 1994-95 academic year. Information on postbaccalaureate plans for astronomy graduates is presented. (Contains four tables and seven figures) (KG).

AIP REPORT

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August 1996

1995 BACHELOR'S DEGREE RECIPIENTS REPORT

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HIGHLIGHTS

- The total number of physics bachelor's degrees produced each year continued to decline, with the class of 1995 reaching a 37 year low. See **Figure 1**.
- Forty percent of the physics bachelors took longer than four years to obtain their degree. This was lower than the average for all students where over 50% took more than four years. See **Table 3**.
- Employment prospects showed improvement for the class of 1995. See **Figure 3**.
- The median starting salary for physics bachelors in the class of 1995 was $29,800, up from previous years. See **Figure 5**.
- Postbaccalaureate plans for physics bachelors continued to shift, with fewer opting for graduate study in physics and more entering directly into the job market. See **Figure 2**.
- Degree recipients pursuing graduate study in physics or astronomy continued to receive better support than those choosing other disciplines. See **Figure 4**.
- Degree recipients rated their problem-solving skills as the most important aspect of their undergraduate training for obtaining their current positions. See **Figure 6**.

After pursuing physics graduate studies in greater numbers in the early 1990s, students graduating in recent years with a bachelor's degree in physics have shifted their initial pursuits from graduate study in physics back to entering directly into the work force. This increase in students entering the work force parallels an improvement in this year's initial employment outlook as compared with the last few years.

The shift in initial post-degree plans has occurred at a time when total undergraduate physics degrees have declined, almost 8% from last year and a cumulative drop of 15% over the last 6 years. The combination of the two trends has contributed in part to rapidly declining first-year graduate physics enrollments. This decline in degree production is expected to continue at least in the near future.

The data in this report is based on responses to a survey sent to senior level physics majors at the end of the academic year. Completed questionnaires were received from 1,976 physics bachelors who earned their degrees between September 1994 and August 1995. This survey is part of an ongoing series that has been conducted by the American Institute of Physics (AIP) since the 1960s. The data obtained on the current class build upon established trends in immediate postbaccalaureate plans and student characteristics.

The information in this report is supplemented with departmental data gathered in AIP's **Enrollments and Degrees Survey**. Single copies of the **Enrollment and Degrees Report**, which incorporates information at all degree levels, are available free from the Education and Employment Statistics Division.

BACKGROUND

The decision to pursue an undergraduate degree in physics is made at varied times and in response to many influences. Some students pursue the subject because of influences in their home environments, while for others, interest does not develop until they enter college. One leading influence is exposure to physics in high school. Over 90% of all physics bachelors in the class of 1995 had taken a high school physics course. This compares to less than one-fourth of all US high school seniors taking physics. Another less widely recognized setting for exposure to physics is the two-year colleges. About 10% of each year's physics bachelors indicated they transferred from a two-year college.

➤ The number of students obtaining bachelor's degrees in physics continues to fall (**Figure 1**). There were 4268 physics majors in the class of 1995, representing a 7.5% decline from the previous year. The cumulative drop in physics bachelors production over the last six years now stands at 15%. This decline is expected to continue and the physics bachelor's degree production will remain at levels not seen since the mid 1950s.

➤ The representation of women among the physics bachelors continues to be low (**Table 1**). Women made up 17% of the class of 1995, the same as in 1994 and up only 3% from a decade earlier. Harvard, MIT and Bryn Mawr produced the largest number of women in the class of 1995: 15, 12 and 10 respectively. The twelve women's colleges that have physics departments represent 1.5% of the departments and contributed about 5% of the total physics degrees granted to women during the last five years.

➤ The number of non-US students obtaining physics bachelor's degrees in this country continues to be relatively small (8%) when compared to the proportion of students with foreign citizenship receiving doctorates in physics (48%) (**Table 1**). At both degree levels, the majority of the non-US citizens come from Asia.

Figure 1. Physics bachelors production in the US, 1955 to 1995.

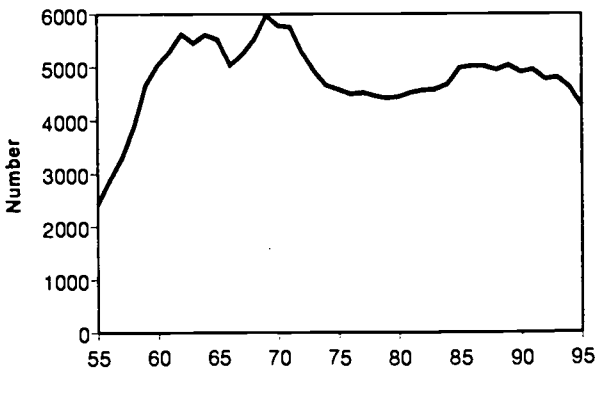


Table 1. Demographic characteristics of new physics bachelors, class of 1995.		
		%
Gender	Men	83
	Women	17
Citizenship	US	92
	Foreign*	8
Race / Ethnicity**	White	88
	Black	4
	Asian	4
	Hispanic	2
	Other	2

* Includes individuals with permanent resident status and on temporary visas.

** US students only.

➤ African-Americans and Hispanic-Americans continue to be underrepresented among the physics bachelors with US citizenship (**Table 1**). Their representation of 4% and 2%, respectively, has held steady for many years.

➤ Degrees granted to African-Americans are not distributed evenly across physics degree-granting departments. The nation's thirty-four historically black colleges and universities that have degree-granting physics departments produce just over half of all physics degrees granted to African-Americans. **Table 2** lists the colleges and universities with the largest average number of degrees conferred to African-American students over the last three years. All but one (Harvard) are historically black colleges or universities.

➤ Undergraduate study in physics requires students to take a considerable amount of coursework in mathematics. Consequently, many physics majors use this to their benefit and obtain a second major or a minor in the subject (**Table 3**). Overall, 62% of the class of 1995 had a minor or double major subject, with 6% having both.

➤ The doctorate-granting departments comprise only one quarter of the departments that grant bachelor's degrees in physics, but they produced almost half of all the physics baccalaureates conferred (**Table 3**). Overall, doctorate-granting departments average 12 degrees per year, which contrasts with 4 per year for departments offering a bachelor's as their highest degree.

Table 2. Institutions averaging the largest number (4 or more) of African-American physics bachelors, 1993-1995.	
	3 yr average
Xavier U (LA)	9
Tuskegee Institute (AL)	8
Hampton U (VA)	6
Morehouse College (GA)	6
Grambling St U (LA)	5
Morgan St U (MD)	5
Benedict College (SC)	4
Delaware St U (DE)	4
Fisk U (TN)	4
Harvard U* (MA)	4
Howard U (DC)	4
Southern U A&M College (LA)	4

* Data for Harvard combine degree recipients from both the physics and applied physics departments.

Table 3. Educational characteristics of new physics bachelors, class of 1995.

Graduating with a double major	No 72%		
	Yes 28 --->	Math	39%
		Eng.	12
		Comp. Sci.	6
		All others	43
Graduating with a minor	No 58%		
	Yes 42 --->	Math	55%
		Eng.	4
		Comp. Sci.	4
		All others	37

Highest degree of institution	Percent of Departments	Percent of physics bachelors granted
PhD	24	47
Masters	10	10
Bachelors	66	43

Number of calendar years to degree	< 4 yrs	7%
	4 yrs	53
	4.5 - 5 yrs	25
	5.5 - 6 yrs	8
	> 6 yrs	7

➤ Forty percent of the responding physics bachelors indicated their degree took longer than four calendar years to complete (**Table 3**). While this may appear high, it is still below the national average for all subjects, which exceeds 50%. The degree recipients gave numerous explanations for why their studies took longer than the once-customary four years. The most frequently cited reasons were: a delay in declaring or changing their major, holding some type of employment while in school, and the extra coursework associated with obtaining a double major.

POSTBACCALAUREATE PLANS

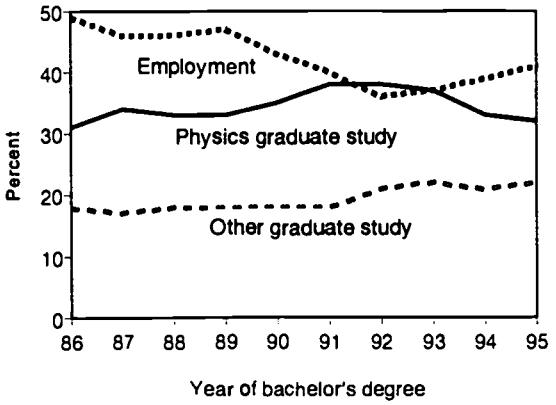
➤ The tendency of new physics bachelors to enter directly into the job market rather than graduate study in physics, which had previously occurred in the 1980s, is reasserting itself (**Figure 2**). However, it should be noted that 23% of the bachelors who indicated an intention to enter directly into the labor force also anticipated entering graduate study in one year, with a third of them indicating physics as their future discipline.

➤ As in past years, physics bachelor recipients from institutions which offered a doctorate in physics were more likely to pursue graduate study in physics than those who did not come from these larger research universities (39% and 27%, respectively).

➤ The proportion of students intending to enter directly into graduate study in physics not only continued to decline, but within this group, the proportion choosing a cross-disciplinary area of study rather than one of the traditional physics subfields continued to increase (**Figure 3**).

➤ The initial employment prospects for the class of 1995 showed improvement when compared to recent years. The proportion of employment-oriented degree recipients who indicated they had

Figure 2. Postbaccalaureate plans of physics bachelors, 1986 to 1995.



Note: Each year 2-7% of the graduates had no postbaccalaureate plans at the time the survey was conducted.

not yet secured a job commitment at the close of the academic year declined from 24% to 19% between 1994 and 1995 (**Figure 3**).

➤ Many of the degree recipients had not resolved their post-degree employment status at the time they responded to the survey and were continuing in part-time or temporary positions that they had held while in school. Of the employed physics bachelors, 15% indicated their positions were part-time and 32% said their positions were only temporary (including students in summer positions).

GRADUATE STUDY

➤ Virtually all students planning on entering graduate study immediately, regardless of subject, anticipated attending on a full-time basis. Similarly, 90% indicated plans to attend a department with a doctoral program.

➤ However, only 18% of the bachelor degree recipients who obtained their undergraduate degree from PhD-granting departments and who were planning to continue with graduate study in physics intended to remain at the same institution.

➤ Teaching assistantships continued to be the dominant source of support (52%) for bachelors planning to continue immediately with graduate study in physics (**Figure 4**). Only 7% of the bachelors planning graduate study in physics anticipated supporting themselves with their own funds, compared with 39% for those planning graduate study in other fields.

Figure 3. Postbaccalaureate plans of physics bachelors, class of 1995.

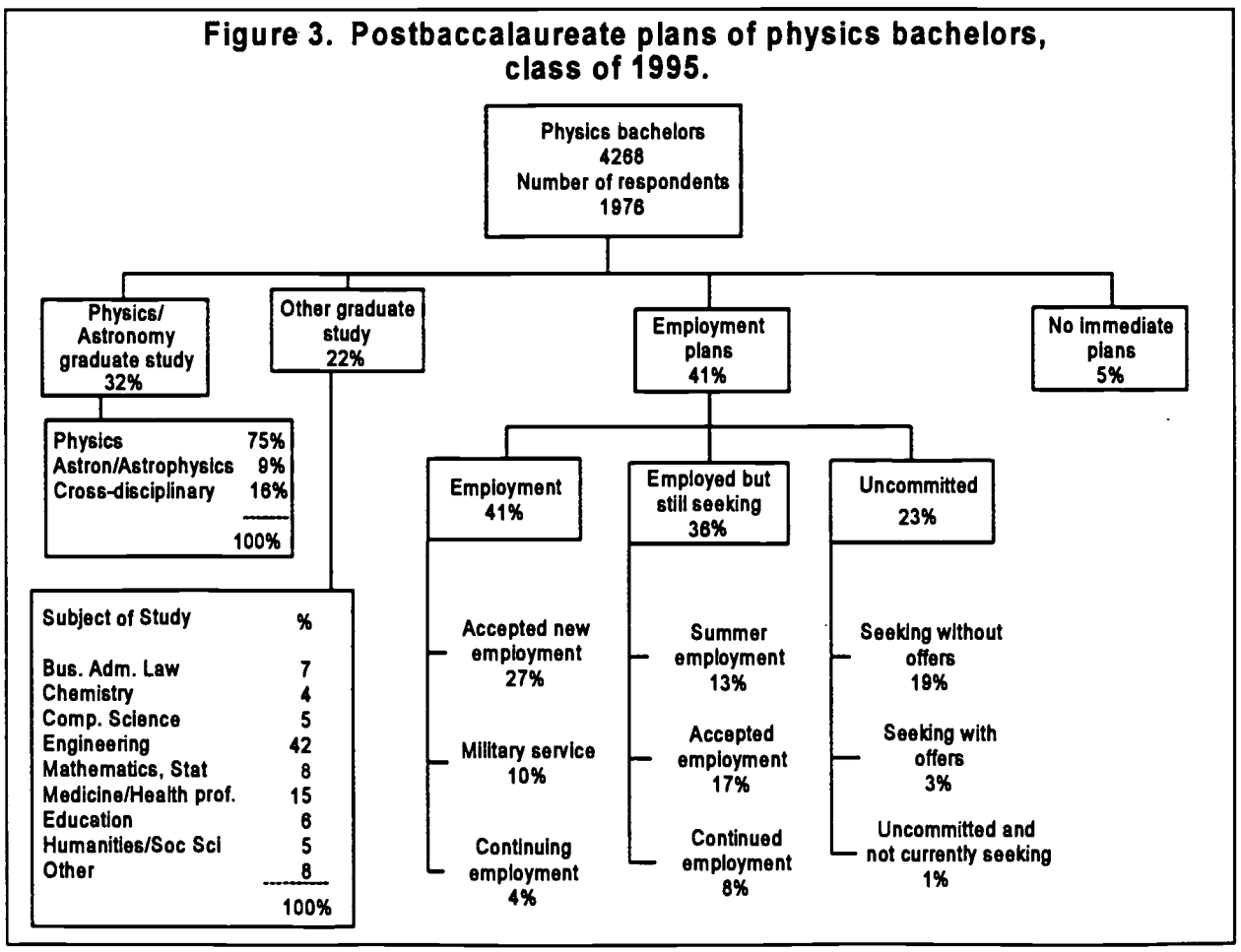
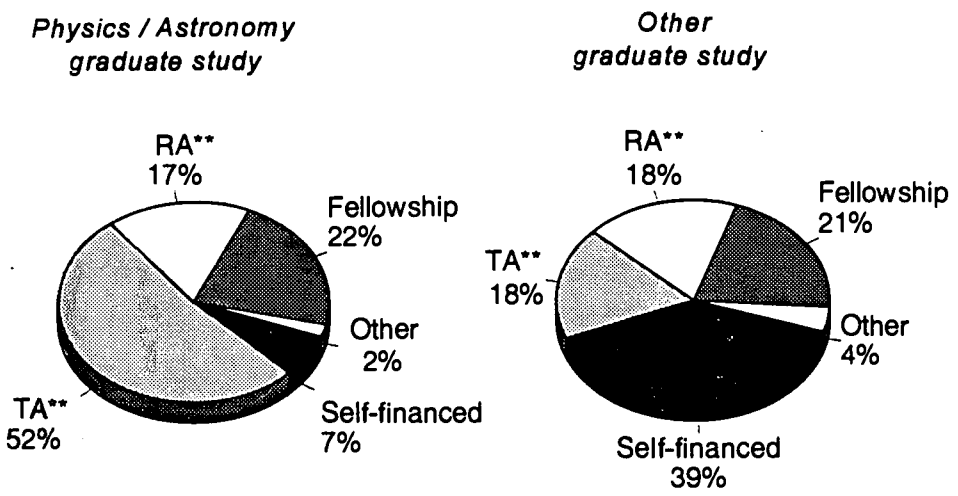


Figure 4. Primary sources of anticipated support for students planning to begin graduate study in the fall, class of 1995.



* Self-financed includes: funds from employment, family, savings and loans.
** RA stands for Research Assistantships; TA stands for Teaching Assistantships.

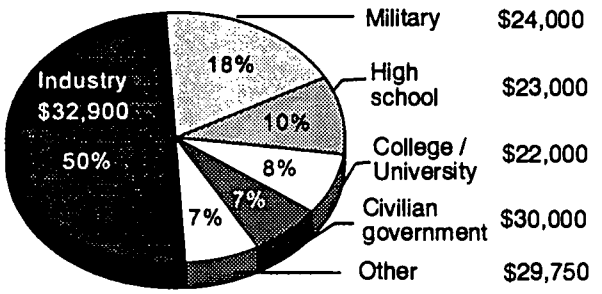
EMPLOYMENT

➤ Industry continued to dominate as the primary employer of new physics bachelors, employing about half of the degree recipients who held full-time, non-summer employment upon completing their degrees (**Figure 5**).

➤ There was very little change in the employer distribution between the class of 1994 and the class of 1995. The largest shift occurred in the proportion of students whose initial employment was with the military. A decline of 3% pushes this group to below 20% for the first time in over a decade (**Figure 5**).

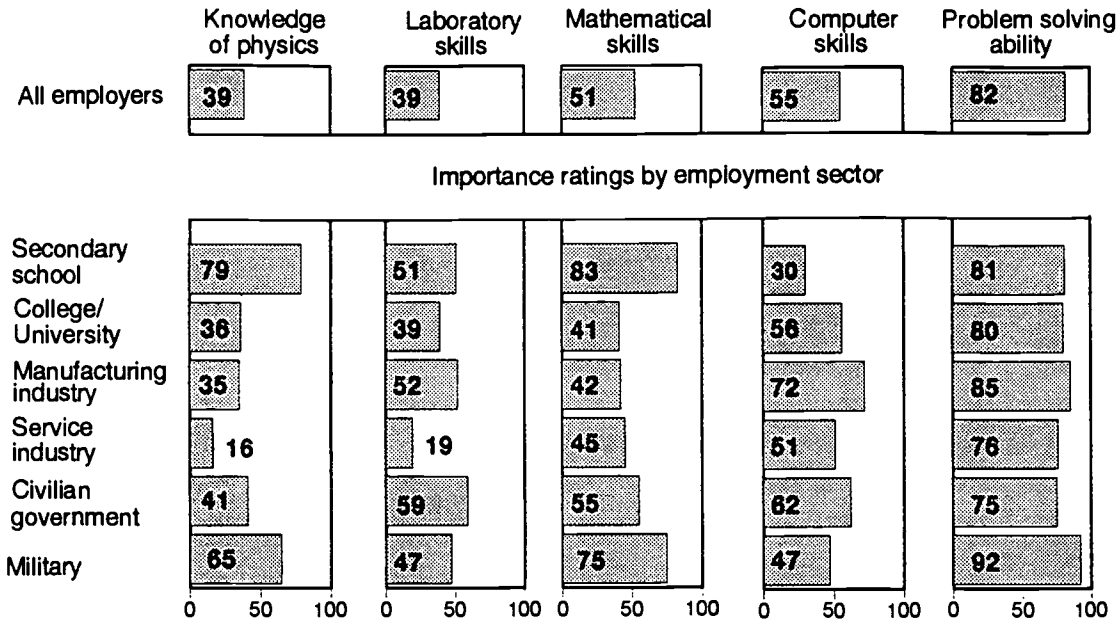
➤ The starting salaries for full-time employed physics bachelors rose for the class of 1995. The median starting salary was $29,800, up from $27,000 the previous year. This represents a rise of 9%, well ahead of the inflation rate. (This excludes individuals employed in the military and in summer-only positions.)

Figure 5. Employer distribution and median salaries for full-time employed physics bachelors, class of 1995.



* Note: Graph includes degree recipients continuing employment which they held prior to graduation and excludes those with summer only positions.

Figure 6. Percent of employed degree recipients indicating which aspects of their undergraduate training they felt were important* in obtaining their current position, class of 1995.



* Percentages shown are the proportion of degree recipients who answered a 4 or 5 on a scale of 1 (not important) to 5(very important).
Note: Figure does not include degree recipients in summer only programs.

➤ Industry not only dominated as the largest employer of physics bachelors, but also continued to offer the highest starting salaries (**Figure 5**).

➤ Degree recipients who indicated they were continuing in full-time employment positions which they started prior to graduation had a median salary of $26,000. Many of these hold-over positions were considered temporary and half of these degree recipients indicated they were actively seeking employment at the time the survey was conducted.

➤ Degree recipients were asked to rate which aspects of their undergraduate training they felt were important in obtaining their current positions (**Figure 6**). For the most part, they rated the conceptual tools and skills acquired as a result of their undergraduate physics education higher than their knowledge of physics or their ability to use lab equipment.

➤ Specifically, degree recipients perceived their problem solving abilities as the most important aspect of their undergraduate training, with 82% indicating that it was influential in obtaining their current position (**Figure 6**). Computer and mathematical skills followed, at 55% and 51%, respectively. Physics knowledge and lab skills ranked lowest, at 39%.

➤ These importance ratings also varied by the employment sector in which the degree recipients had obtained their position (**Figure 6**). Degree recipients employed in secondary schools rated the importance of their physics knowledge the highest of all the employment sectors.

➤ Respondents employed in the government (civilian and military) and in secondary schools gave the highest overall ratings to their undergraduate training as it pertained to obtaining their current position.

ASTRONOMY

➤ There were 205 astronomy bachelor degrees conferred during the 1994-95 academic year. Of these degrees 27% were awarded to women, a higher proportion than the 17% awarded to women among the physics bachelors (**Table 4**).

➤ As was true for the physics bachelors, the vast majority of astronomy degree recipients (93%) had taken a physics course in high school (**Table 4**).

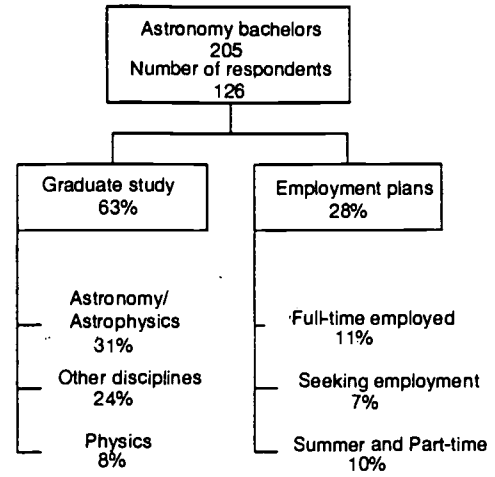
➤ Almost half (48%) of the astronomy bachelors indicated it took them longer than four calendar years to complete their degrees.

➤ Over half of the degree recipients indicated they had obtained a second major, with physics the most frequently cited subject (**Table 4**). Among astronomy students graduating with a minor, mathematics was the most popular subject, with one-third choosing this combination.

Table 4. Background and educational characteristics of astronomy bachelors, class of 1995.

Characteristics		%
Sex	Female	27
	Male	73
Citizenship	US	95
	Foreign	5
Took HS physics	Yes	93
	No	7
Graduating with a double major	Yes	55
	No	45
Graduating with a minor	Yes	31
	No	69

Figure 7. Postbaccalaureate plans of astronomy bachelors, class of 1995.



Note: Nine percent of the Astronomy bachelors indicated they had no immediate plans at the time the survey was completed.

➤ Almost two-thirds of the astronomy bachelors in the class of 1995 anticipated immediately continuing with graduate study (**Figure 7**). The majority of these students planned to remain within the field of astronomy or physics. As was true for physics, financial support is more readily available for these students than for the students switching to other disciplines.

➤ Of the astronomy bachelors entering directly into the job market, over half indicated they intended to pursue graduate study at some point in the future.

➤ The majority of the employed astronomy bachelors indicated they had secured only a temporary position at the time the survey was conducted and consequently were continuing to seek employment.

This report was prepared with the help of Starr Nicholson.

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