

#### INTRODUCTION

Because of rapid technological change, labor market observers identify the lack of well trained scientists as a recurring problem. Scientific specialties face different labor markets depending upon economic, political and social conditions. When the energy industry recently encountered difficult times, for example, the demand for earth scientists dropped sharply. Similarly, budget cuts for research and development in both the public and private sectors have influenced the number of job opportunities. In planning for science careers, students often need some information on starting salaries, which provides some insight into prevailing market conditions.

This bulletin presents salary information for the past eight years (1978-1986), taking into account the effect of inflation on starting salary levels. This bulletin is a summary of Salary Report No. 9, Starting Salary

Trends and Analysis: College of Natural Science, 1978-85 (available from the Collegiate Employment Research Institute), plus data from the 1985-86 graduating class.

#### STARTING SALARY TRENDS

The average starting salary (current dollars not adjusted for inflation) reported for 1978-79 was \$13,917. Salaries have increased at rates ranging from 2% to 14% per year, except for 1984-85 when salaries decreased by 5% from the previous year. The largest incremental change in salaries occurred in 1983-84 when salaries increased 14% over the previous year. Even with the decrease experienced in 1984-85, the average salary at the end of the study period was \$16,850.

After adjusting starting salaries for inflation,<sup>1</sup> the impact of inflation on current salary levels can be determined. Between 1978 and 1983, current salary increases failed to keep up with inflation, as indicated by the downward sloping line for real salary in figure 1. The failure of current salary increases to keep pace with inflation may also

suggest a weak labor market for science graduates. Opportunities in education, a popular employer of science graduates, were limited during this period.

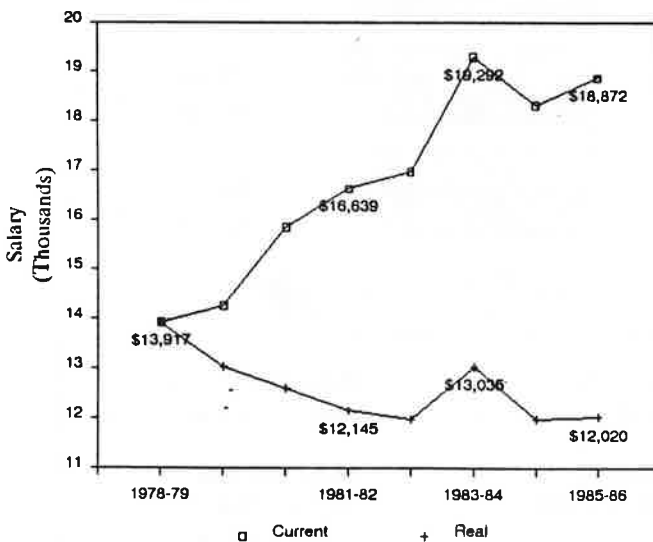
Even when salaries dramatically improved in 1983-84, the increase could not be sustained, as salaries declined the following year. In general, salaries for natural scientists have not followed the overall improvement of the economy, as evidenced in university wide trends (Bulletin No. 1). Increased participation in graduate school may be the result of both a weak job market and the need for an advanced degree to participate in the job market.

#### COLLEGE MAJOR

Graduates from different academic areas within natural science have experienced slightly different labor markets which are reflected in starting salary offers. The highest salary average was reported by geology graduates at \$16,024 (real figures are reported unless noted), while salaries for physicists, chemists, and mathematicians ranged from \$13,076 to \$14,811. At the lower end of the salary range were microbiology, zoology, and "other" (comprised of physiology, botany, medical technology, and general science graduates).

Yearly salary increases for the different academic programs tended to fall below the inflation rate over much of the study period. All majors, with the exception of chemistry, had salary levels in 1985-86 below natural science graduates of 1978-79. Geology, physics, mathematics and zoology salaries followed similar patterns of decreasing throughout the study period and then recovering in 1985-86 with an

**Figure 1: Average Starting Salary**  
All Natural Science Graduates  
(Current and Real)



<sup>1</sup>The CPI index has been calculated for the annual period from July to June which closely approximates the academic year. For the academic year, 1980-81, the period covers July, 1980 to June, 1981. The 1978-79 year equalled 100 in the index.

average salary increase of almost 10%. Chemistry, on the other hand, seemed to level off in 1985-86 after experiencing modest salary increases in the two preceding periods. Microbiology appeared to be the most stable major within the college. After seeing their salaries decrease throughout the early periods of the study, microbiology graduates have seen their salaries rebound and increase at an average of almost 7% during the last three years.

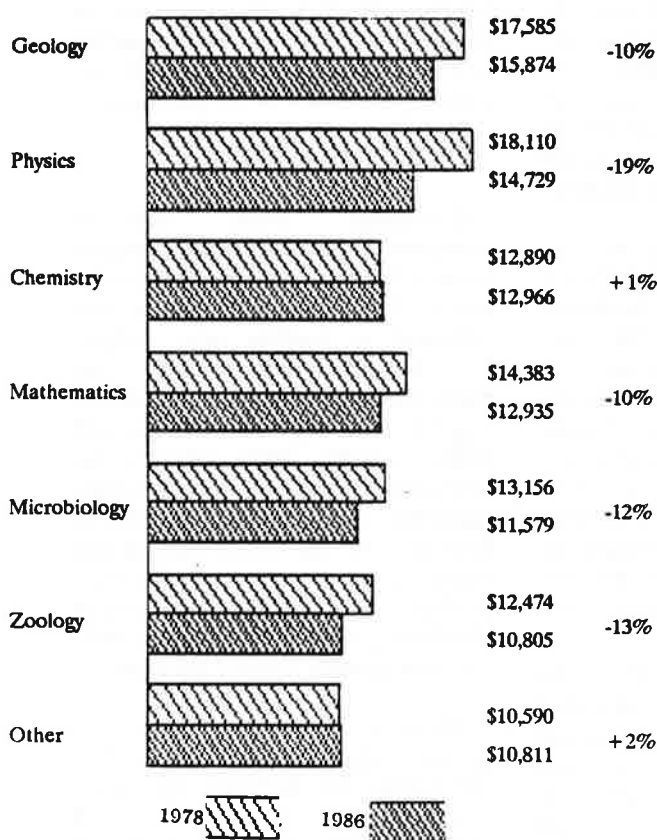
### EMPLOYER

The overall average starting salary offered by manufacturing firms was significantly higher than the other sectors at \$15,526. The average starting salary paid by "other" employers, including consulting firms, volunteer organizations, and self employment, was \$12,139. The average starting salaries for service, education, and government varied, ranging from \$10,600 to \$11,700.

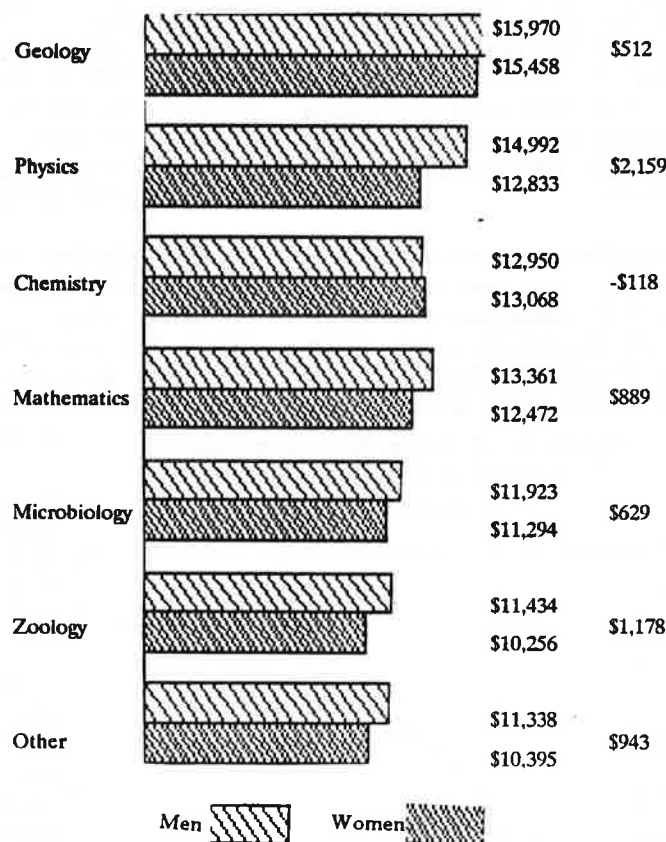
When sorted by year of graduation, the sample sizes in some cases became too small, restricting the in-

terpretation of salary trends. The general university trend showed a decline between 1978 and 1982 for the different employment sectors followed by a gradual increase through 1986 (see Salary Bulletin No. 1). The salary pattern for service and education sectors was very similar to this general trend. Manufacturing, government, and "other" employers followed a more cyclical pattern with both manufacturing and "other" rebounding with an average increase of 9% in 1985-86 after both had decreases greater than 12% in 1984-

**Figure 2: Salary (real) by Academic Major in Natural Science Bachelor's Degree, Overall Average**



**Figure 3: Average Salary (real) by Gender for Natural Science Majors (Difference = Men - Women)**



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85. Meanwhile government showed a decrease of 32% in 1985-86 after a strong increase of 23% in 1984-85.

### JOB LOCATION

The decision to accept a position in Michigan versus one outside the state may be based on the salary offer. The difference in starting salary averages between those working in and out-of-state was \$2,092 (real), with the advantage to out-of-state positions.

To clarify starting salaries by location, salary trends for different locations were examined. In 1978-79, Michigan's new scientists were starting at an average salary of \$14,040 (real) which was \$139 less than the average out-of-state salary. The state's economic condition further compounded the effects of high inflation negating most of the increases in salaries obtained between 1979 and 1982. Between 1978-79 and 1979-80, there was a decrease of 8%. At the same time, graduates accepting jobs outside the state received a salary increase of 3% after inflation. During this period, out-of-state salaries began to exceed Michigan salaries.

During the time period of 1982-83 to 1985-86, both in and out-of-state salaries have fluctuated, apparently leveling off in 1985-86. In-state salaries have fared better, resulting in a reduction of the salary gap from a high of \$3,270 in 1980-81 to \$1,875 in 1985-86. Because of the cyclical nature of salary patterns, a short run

prediction regarding whether this gap will be further reduced cannot be made at this time.

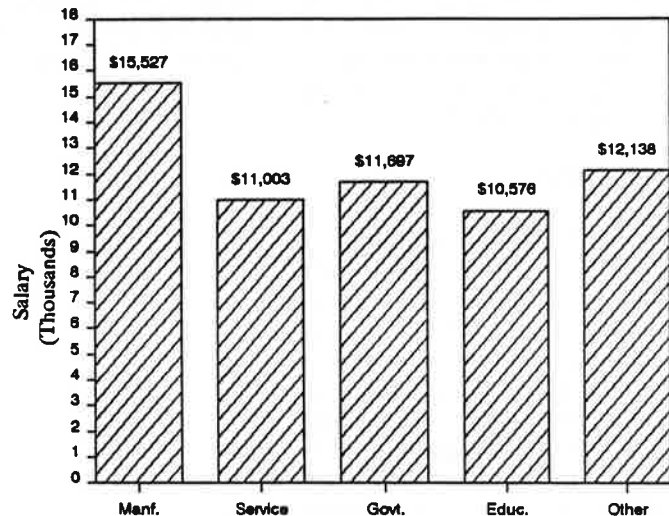
### GENDER

The average starting salary for men was \$13,385 (real) as compared to the \$11,869 (real) average for women; a difference of \$1,516. This difference was statistically significant.

Women's salaries dropped approximately 24% between 1979 and 1982, while men's salaries only decreased by 5% over the same period. Over the next four years, men's salaries continued to decrease by 3% while women's salaries began to increase 5% against inflation. This better performance by women reduced the gender difference to \$860 in 1984-85. Unfortunately, the difference increased slightly in 1985-86 to \$1,166. This is far less than the largest differential of \$2,376 experienced in 1980-81.

Across programs, the salary position of men and women varied. In chemistry, women commanded a slightly higher starting salary (\$118) than men. Men had higher salaries in all other fields, ranging from \$512 in geology to \$2,152 in physics.

Figure 5: Natural Science Salaries (real) by Type of Industry

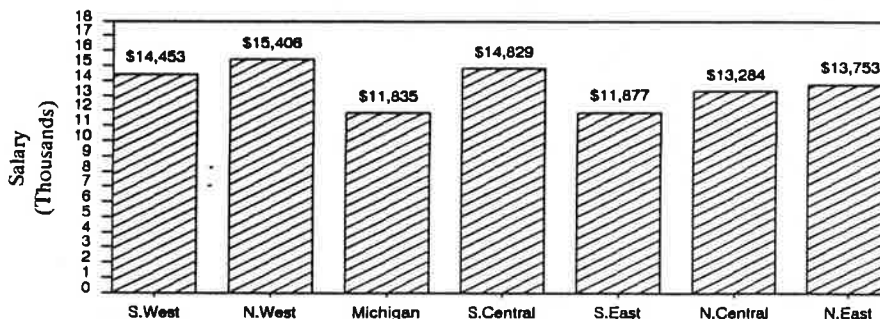


### GRADE POINT AVERAGE

In some cases, graduates with high grade point averages do not necessarily receive the highest salaries. In technical fields such as engineering, there is a positive relationship between grades and salaries. Results from several other colleges within the University have shown that graduates with GPAs below 2.5 often have higher salaries than graduates with grades above 2.5. In the College of Natural Science graduates with higher grades tended to receive higher salaries though the difference between the 2.5-3.0 and 3.0-3.5 groups was small.

All GPA groups were affected by inflation and poor economic conditions. The groups with GPAs below 2.5 and above 3.5 experienced cyclical patterns of increases and decreases throughout the study period. Both groups had an average increase of 10% in 1985-86 overcoming a decrease in the previous period. The groups with GPAs between 2.5 and 3.0, and between 3.0 and 3.5 saw their salaries continue to decrease in 1985-86, marking two consecutive years when their salaries did not keep up with the rate of inflation.

Figure 4: Natural Science Salaries (real) by Region



## ETHNIC GROUP

Because of the very small number of minority graduates in the college of Natural Science, all racial groups have been aggregated into one group. The average non-white salary was \$12,622 slightly lower than the white average of \$12,629.

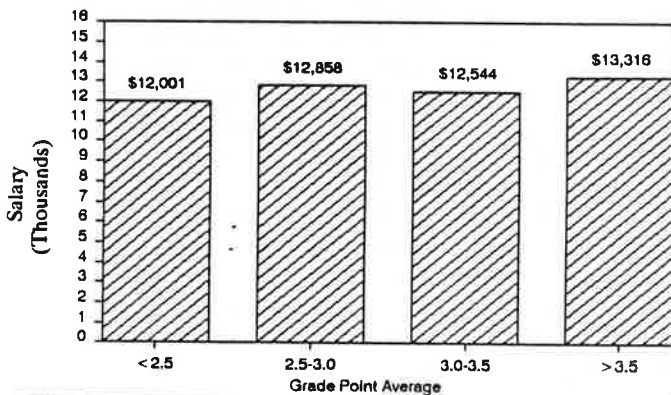
Another encouraging trend is the reduction in the salary gap between men and women. Women's salaries rebounded from inflation and economic conditions slightly faster than men's salaries, but the gap persists at approximately \$1,000.

## CONCLUSION

Inflation did have a negative impact on salaries throughout much the study period. Only in 1983-84 did natural science graduates actually experience a robust increase in salary. For other years, annual increase fell below the inflation rate. Poor economic conditions contributed further to the suppression of salary increases as the number new positions was reduced.

What stands out is the variation in salary trends across the natural science majors. Each science specialty has faced different labor market conditions over the last eight years. Geology graduates received the highest salaries, though the level has been declining because of problems in the energy sector of the economy. Recently, salaries for all majors have shown improvement, an encouraging sign.

**Figure 6: Natural Science Salaries (real) by Grade Point Average**



**Figure 7: Natural Science Salaries (real) by Ethnic Group**

