Forecasting School-Based Agricultural Education Teacher Supply and Demand in the Western AAAE Region

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Introduction

The availability of qualified teachers is essential for sustaining existing programs and supporting program growth. School-based agriculture education (SBAE) teacher shortages have been documented consistently since 1965 (Kantrovich, 2010). This is not exclusively a SBAE teacher issue, nationally there are teacher shortages for almost a century (Sherratt, 2016; Sutcher et al., 2019). Many factors influence the supply and demand of teachers including but not limited to student enrollment, pupil-teacher ratio attrition, program completers, salaries and working conditions (Sutcher et al., 2019). Alternative certified teachers have been a means to counter the growing shortage of teacher nationally (Sutcher et al., 2019) and in SBAE programs (Bowling & Ball, 2018). Rather a position is filled by a traditional program completer or an alternatively certified teacher, workforce planning requires simultaneous examination of the teacher-preparation pipeline and the positions that states must fill.

The purpose of this study was to forecast SBAE teacher supply, demand, and shortfall in the Western Region of the American Association for Agricultural Education through 2028. This study aligns to the AAAE research value "*Advancing Public Knowledge of AFNR Systems*" (AAAE, 2023, pg. 14) by identifying future needs of SBAE teachers who will teach the next generation about our AFNR systems. This study is addressed by the following objectives:

1. Forecast state-level supply and demand for 2028 in the Western AAAE Region
2. Identify states projected to experience the largest shortages or potential surpluses

Conceptual and Theoretical Framework

The study was conceptually guided by a workforce supply-and-demand model (Foster et al., 2026). Supply is represented by the number of program completers reported by each state staff. Demand is calculated by teachers leaving the profession minus positions loss then adding new positions created. Finally, shortfall is defined as demand minus supply. Human capital theory provided the theoretical foundation of the study. Human capital theory describes education and professional preparation as investments that develop the knowledge and skills needed for participation in a specialized workforce (Becker, 1994). From this perspective, agriculture teacher-preparation programs create a potential supply of qualified human capital.

Methods

The National Agricultural Education Supply and Demand Project (Foster et al., 2026) provides longitudinal data built upon existing processes and protocols in place for the Agricultural Education Supply and Demand research developed over the last 60 years. Annual state-level supply, demand, and shortfall data from 2020 through 2025 were obtained for the AAAE Western Region. This dataset included Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Separate ordinary least-squares linear regression models were estimated for supply, demand, and reported shortfall within each state having at least four usable annual observations. Therefore, Alaska, Hawaii, Nevada, New Mexico, and Wyoming had too few observation to model. Models were used to forecast outcomes for 2028 with 95% prediction intervals. A derived shortfall was

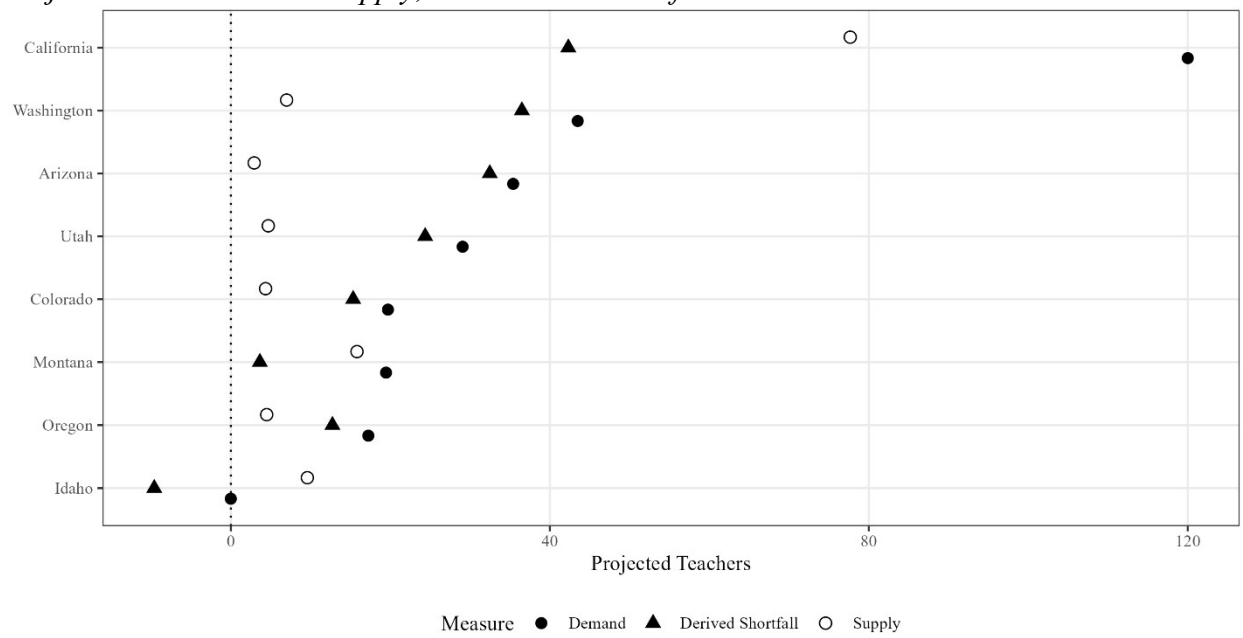
calculated by subtracting the forecasted supply from the forecasted demand. Data were analyzed using R version 4.5.0 (R Core Team, 2025) with script development assisted by OpenAI (2026).

Results

The 2028 forecasts suggested substantial differences in SBAE workforce conditions across the AAAE Western Region (Figure 1). California had the largest derived shortfall, with approximately 120 teachers demanded, 77.68 supplied, producing a projected gap of 42.32. Washington had the second-largest projected shortfall at 36.50 teachers, followed by Arizona at 32.47 and Utah at 24.37. Colorado and Oregon had smaller projected gaps of 15.34 and 12.74 teachers, respectively. Montana was comparatively close to equilibrium, with a derived shortfall of 3.64 teachers. Idaho was the only modeled state with a negative derived shortfall, indicating a projected surplus of approximately 9.60 program completers relative to forecasted demand.

Figure 1

Projected SBAE Teacher Supply, Demand and Shortfall in 2028



Discussion and Implications

California has the highest demand, supply and shortfall predicted in 2028. However, even more concerning is Arizona's shortfall, as it's demand is projected to increase and supply is decreasing. Washington will experience the second largest shortfall, followed by Utah, Colorado, then Oregon. Montana estimates are closest to equilibrium and Idaho has a projected surplus of program completers by 2028 if current trends continue. Also, the inability to forecast Alaska, Hawaii, Nevada, New Mexico, and Wyoming is itself an important finding.

Across the AAAE Western Region, recruitment efforts for program completers should be paired with retention initiatives, interstate employment partnerships, and improved annual reporting. Future research should investigate the unique differences and similarities between each state such as teacher salary, cost of living, pupil-teacher ratio and geographic program growth to better predict regional and local supply and demand needs for SBAE teachers.

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