College Football Transfer Portal Analysis

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Introduction:

In recent years, the NCAA transfer portal has become one of the most influential mechanisms shaping roster construction and competitive balance across college football. Since its introduction in 2018, and especially following expanded player movement rights during the Name, Image, and Likeness era beginning in 2021, barriers to transferring have been substantially reduced. As a result, transfer activity has increased across all levels of the Football Bowl Subdivision (FBS), fundamentally altering how programs manage roster composition, respond to performance outcomes, and plan for long-term competitiveness.

Players now enter the portal for a combination of competitive and organizational reasons. Opportunities for playing time, scheme compatibility, and development pathways all influence transfer decisions. At the program level, coaching stability and on-field trajectory play a central role in shaping roster turnover. Quantitative indicators such as win totals, expected wins, and the Football Power Index provide measurable signals of program direction that athletes may implicitly evaluate when deciding whether to remain with a team or pursue opportunities elsewhere.

This project examines how these factors relate to transfer behavior using exploratory data analysis. We first establish baseline patterns across the FBS to identify national relationships between performance, coaching stability, and transfer activity. We then narrow our focus to the Southeastern Conference (SEC), where competitive pressure and roster churn are most pronounced. The analysis concludes with a network-based examination of player movement across the Power Five conferences, highlighting how transfers redistribute talent both within and between conferences, particularly around the dissolution of the Pac-12 after the 2023 season.

Using data from the 2022 through 2024 seasons, this study relies on descriptive statistics, grouped visualizations, and directional network graphs to identify structural patterns in player mobility. Rather than predicting individual decisions, the goal is to clarify how performance, stability, and conference structure interact in the modern transfer era.

Motivation:

Despite the prominence of the transfer portal in media coverage and public discourse, much of the discussion centers on individual or high-profile cases. Less attention is paid to broader structural trends that determine which programs consistently gain or lose players and how these patterns relate to performance and organizational stability. For coaching staffs and

athletic departments, understanding these dynamics has become increasingly important as roster management extends beyond traditional recruiting cycles.

The SEC offers a particularly informative environment for studying these trends. The SEC combines high expectations, intense internal competition, and frequent coaching transitions, which together amplify the consequences of roster turnover. Even small changes in roster composition can materially influence outcomes, making transfer activity especially consequential within the conference. Because the SEC often sets national competitive standards, patterns observed within the league tend to reflect broader forces across the FBS.

From an analytical perspective, transfer data is well suited for exploratory visualization. Grouped comparisons by performance tiers, coaching stability, and program momentum allow patterns to emerge without imposing strong modeling assumptions. As the portal and NIL era continue to evolve, descriptive analysis provides a necessary foundation for understanding how performance outcomes and organizational conditions shape player movement in practice.

Data Cleaning and Preparation:

Data for this analysis were obtained from CollegeFootballData.com and include team performance records, FPI ratings, head coaching information, and transfer portal activity from the 2022 through 2024 seasons. All data processing was conducted in Python using pandas and NumPy, with matplotlib and seaborn used for visualization.

Team performance data were first combined across seasons and filtered to include only FBS programs. Core variables retained include wins, losses, games played, expected wins, conference affiliation, and FPI. These metrics provide both realized outcomes and expectation-based context for evaluating program performance.

FPI data were merged using team name and season as join keys. To measure program trajectory rather than static strength, year-over-year changes in FPI were calculated within each team. This allowed identification of meaningful improvements and declines in program direction.

Coaching data were standardized by consolidating coach names and removing duplicate entries. A coaching change indicator was constructed by comparing head coaches across consecutive seasons for each program.

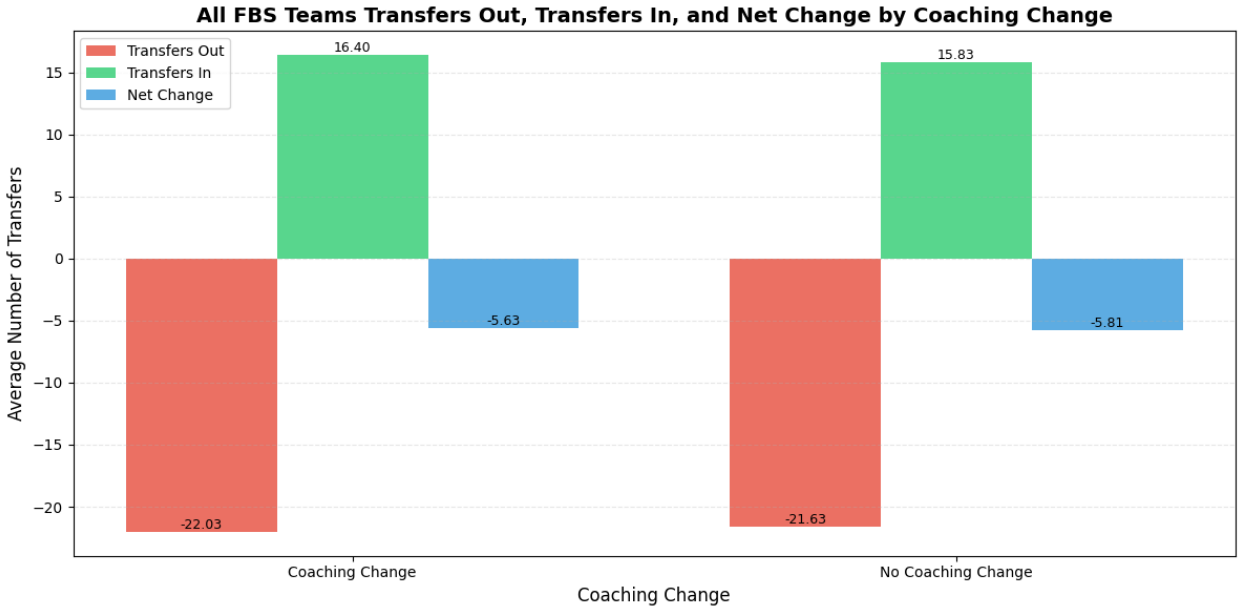
Transfer portal data required more extensive preprocessing. Records from multiple seasons were combined, withdrawn players were removed, and unique player identifiers were created to avoid double counting. Transfers were aggregated by team and season to compute inbound and outbound counts. Because portal activity occurs after a season concludes, transfer years were aligned with the preceding competitive season.

The final dataset contains one observation per team per season, integrating performance metrics, coaching stability indicators, and transfer volumes. This structure enables consistent aggregation and visualization across performance groups, conferences, and time.

FBS Transfer Patterns:

This section provides national context for transfer activity across the FBS. While the SEC analysis forms the core of this study, examining FBS-wide patterns allows us to identify baseline relationships between performance, coaching stability, and transfer behavior before narrowing to a single conference. The goal of this section is not to exhaustively analyze every FBS trend, but to establish broad structural regularities that shape roster movement at the national level.

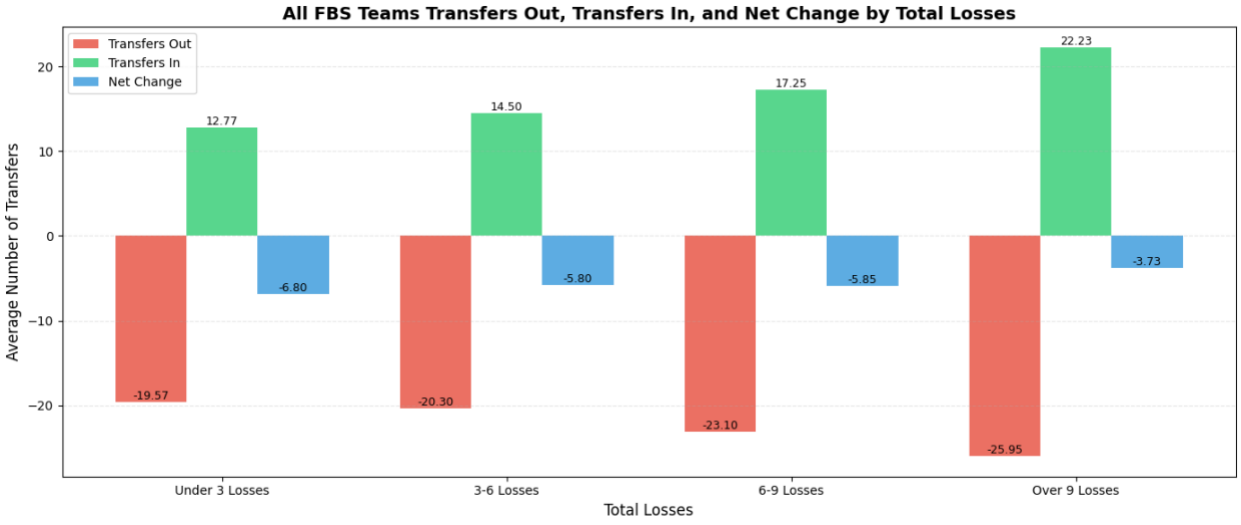
All analyses in this section include only FBS teams and aggregate data across the 2022 through 2024 seasons. Transfer counts are summarized at the team-season level and interpreted descriptively. As with the SEC analysis, net transfer change is reported for completeness but should be interpreted cautiously. A large negative net change often reflects a strong high school recruiting class rather than roster deterioration, while positive net change typically signals short-term rebuilding through the portal.



This visualization compares average transfers out, transfers in, and net change for teams that experienced a head coaching change versus those that did not. The x-axis separates teams based on coaching stability, while the y-axis measures average transfer volume per team-season.

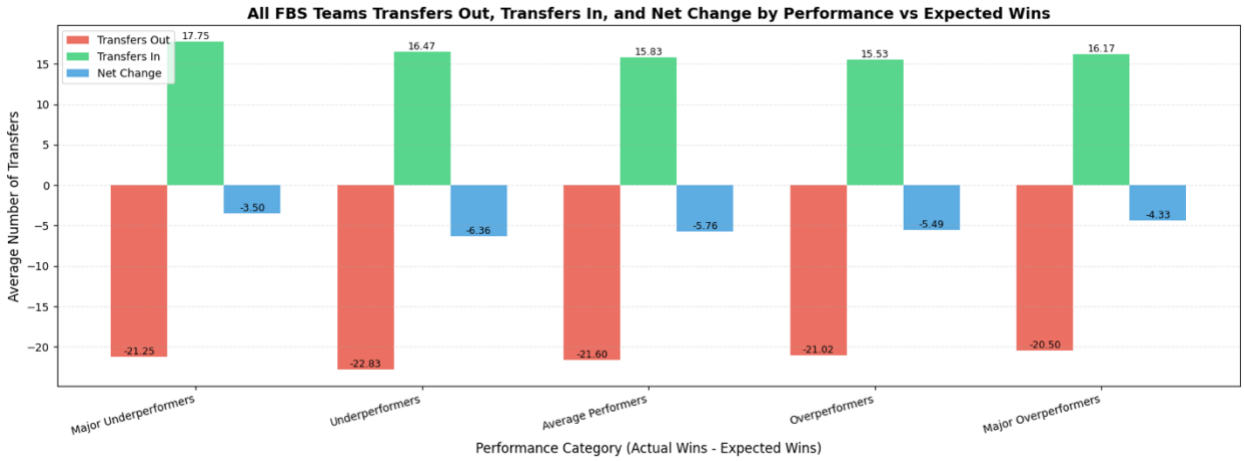
Across the FBS, teams undergoing coaching transitions consistently experience elevated transfer activity in both directions. Outgoing movement increases as players reassess their fit

within a new system, while incoming transfer volume also rises as new staffs seek to reshape the roster quickly. This indicates that coaching changes increase roster volatility rather than simply driving attrition. Teams with stable coaching staffs show lower overall transfer volume, suggesting that continuity moderates roster churn even in the modern portal era. This pattern establishes coaching stability as a primary driver of transfer activity across college football and motivates its more detailed examination within the SEC.



This visualization groups teams by total losses and displays average transfers out, transfers in, and net change for each loss tier. The x-axis represents loss categories, while the y-axis measures average transfer volume.

A clear positive relationship emerges between losses and outbound transfer activity. Teams with higher loss totals lose more players on average, which is consistent with dissatisfaction following poor performance. These teams also tend to add more incoming transfers, indicating reliance on the portal as a corrective mechanism. In contrast, teams with few losses exhibit lower transfer volume overall, reflecting greater roster continuity and perceived internal opportunity. This result suggests that nationally, the transfer portal functions as a pressure-release valve for underperforming teams while reinforcing stability among stronger programs.

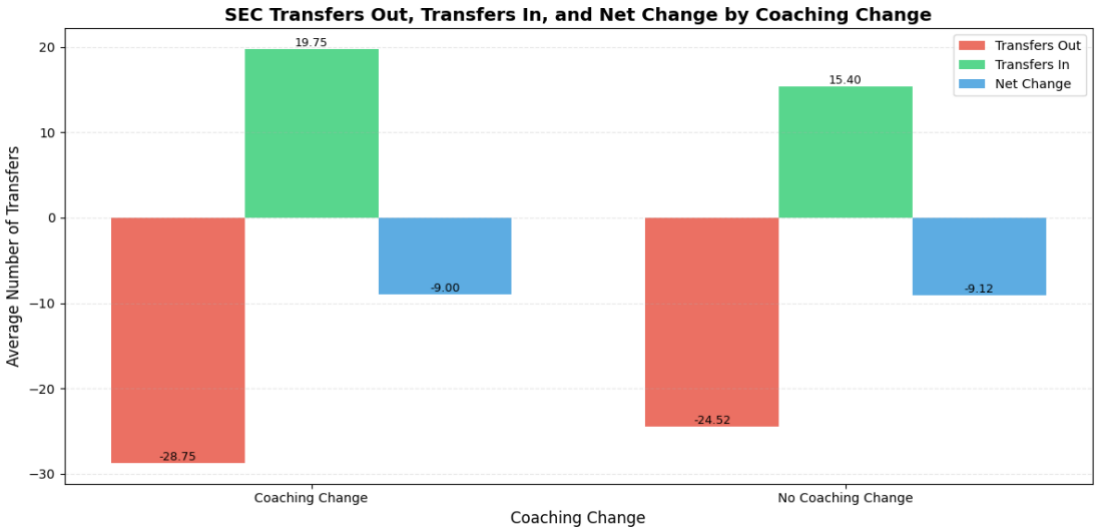


This visualization categorizes teams based on the difference between actual wins and expected wins, grouping them into underperformers, average performers, and overperformers. This approach controls for baseline team quality and strength of schedule.

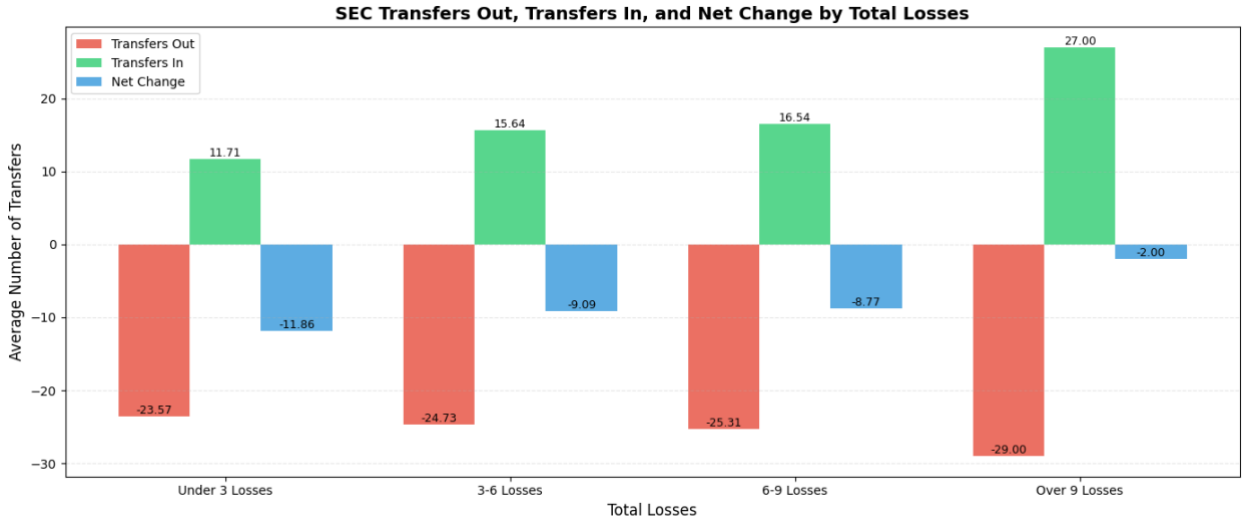
Transfer activity is highest among moderate underperformers and moderate overperformers. Underperformers experience frustration-driven exits, while overperformers face increased internal competition as players reassess their roles on unexpectedly strong teams. Teams whose performance closely matches expectations show the lowest transfer volume, indicating that predictability and alignment with expectations promote roster stability. This finding highlights that perceived trajectory, not just absolute success or failure, plays a meaningful role in transfer behavior.

SEC Transfer Dynamics:

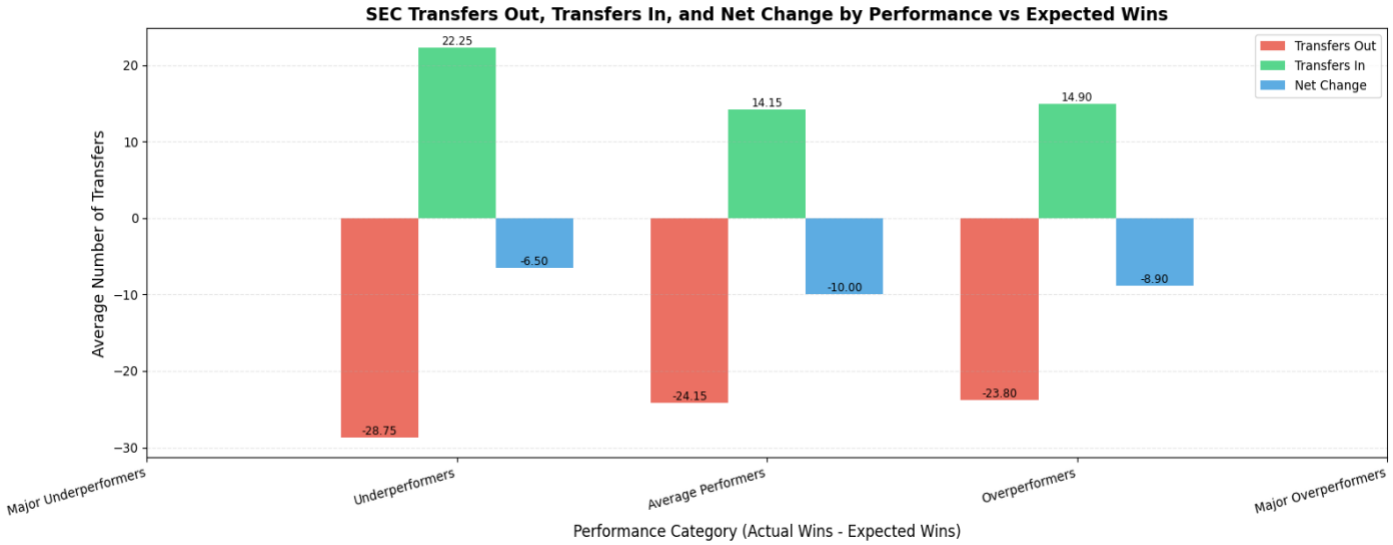
To contextualize transfer behavior, SEC teams were grouped by both absolute performance and performance relative to expectations. Loss-based groupings capture realized outcomes, while expected wins provide a baseline measure of team quality. Teams substantially exceeding expectations were labeled overperformers, those close to expectations were treated as average performers, and those falling well short were labeled underperformers. Thresholds were selected to reflect meaningful deviations rather than marginal variance.



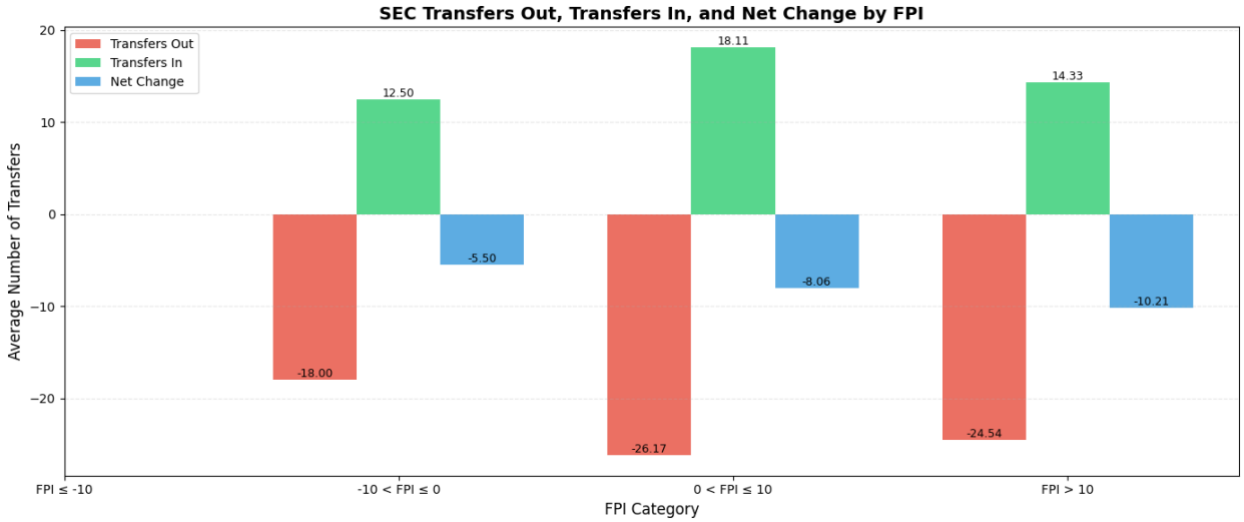
Within the SEC, coaching changes produce pronounced spikes in roster movement. Teams with new head coaches experience higher outbound transfer volume while simultaneously adding larger transfer classes. This reflects uncertainty for incumbents and increased opportunity for incoming players.



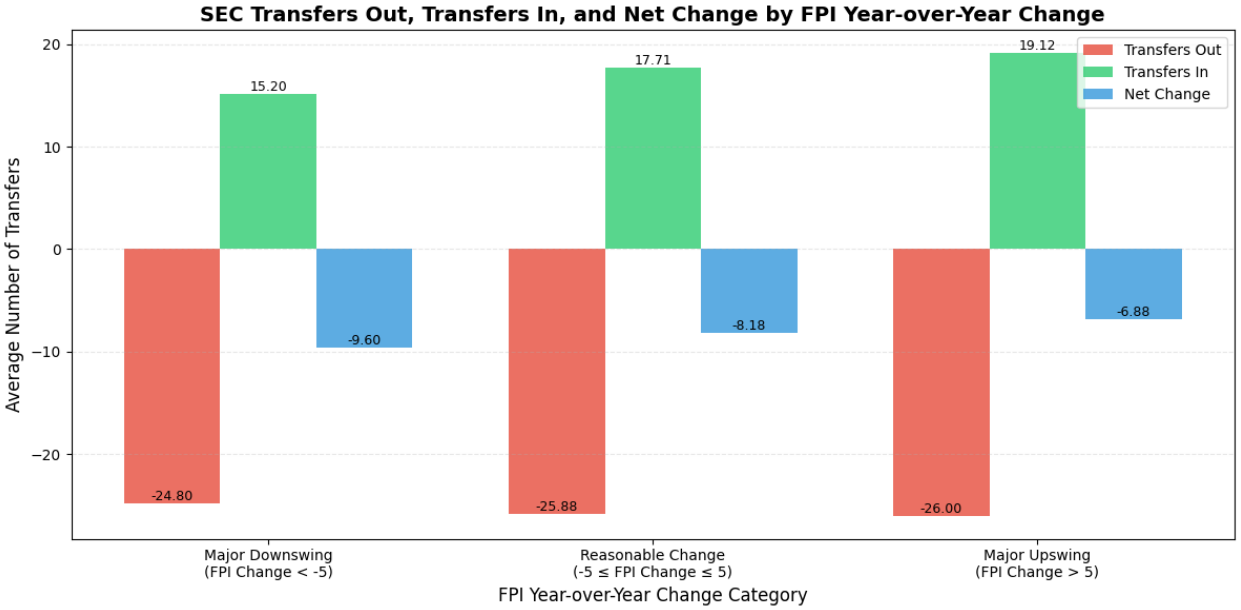
Teams with higher loss totals experience significant roster churn. Programs with nine or more losses show the highest levels of departure and replacement, suggesting rapid reconstruction strategies. More successful teams display greater continuity.



Transfer activity peaks among moderate underperformers and moderate overperformers. Underperformers experience dissatisfaction-driven exits, while overperformers see heightened internal competition. Extremely poor or strong seasons tend to be associated with slightly lower movement.

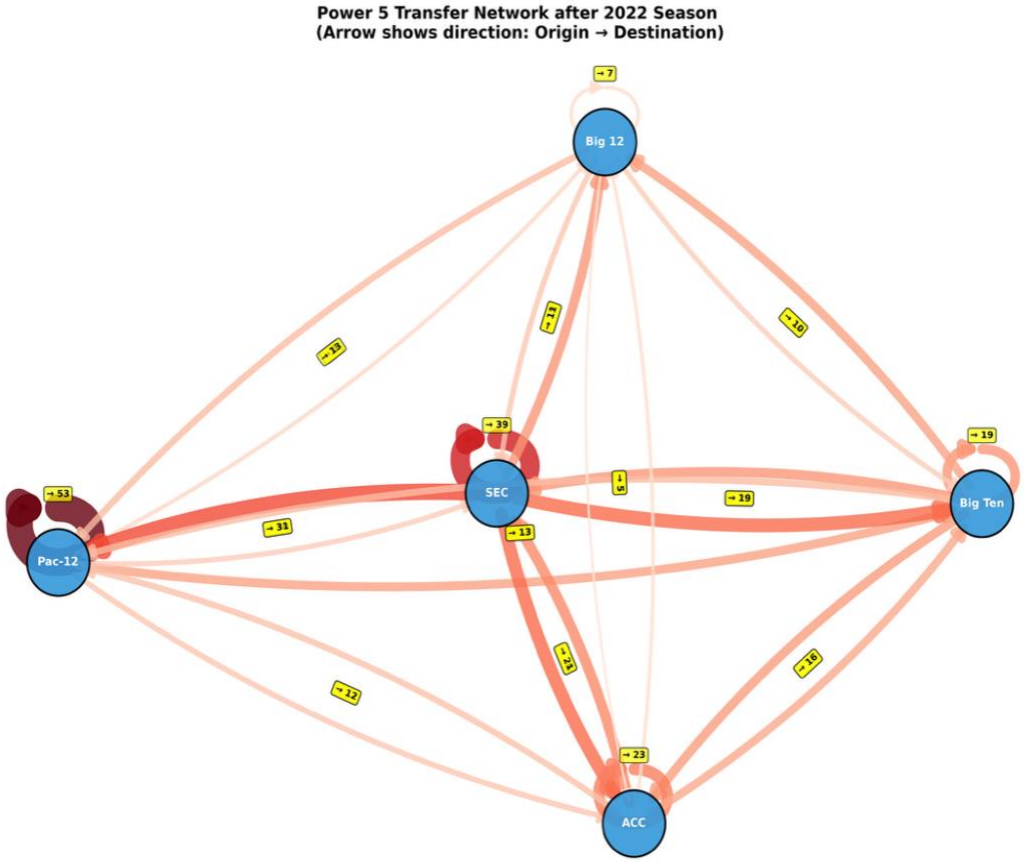


The FPI-based graph is ordered with lower-FPI teams on the left and higher-FPI teams on the right. Stronger teams display large outbound transfer counts but smaller inbound transfer classes. This reflects roster depth, internal promotions, and reliance on high school recruiting rather than portal dependency. Negative net change for high-FPI teams often indicates large recruiting classes rather than decline.

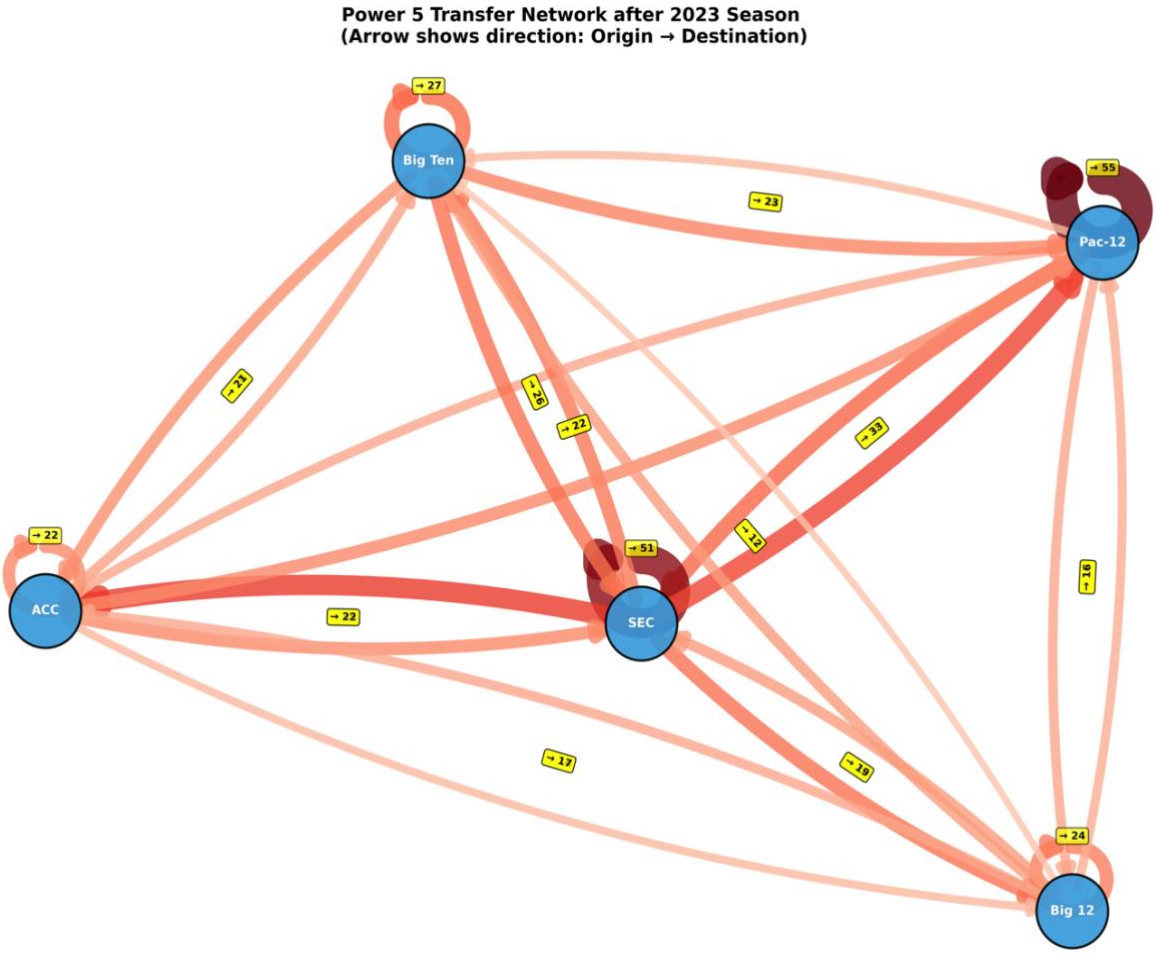


Teams experiencing rising FPI attract inbound transfers, while sharp declines correspond with elevated departures. Perceived trajectory plays a central role in player decision making.

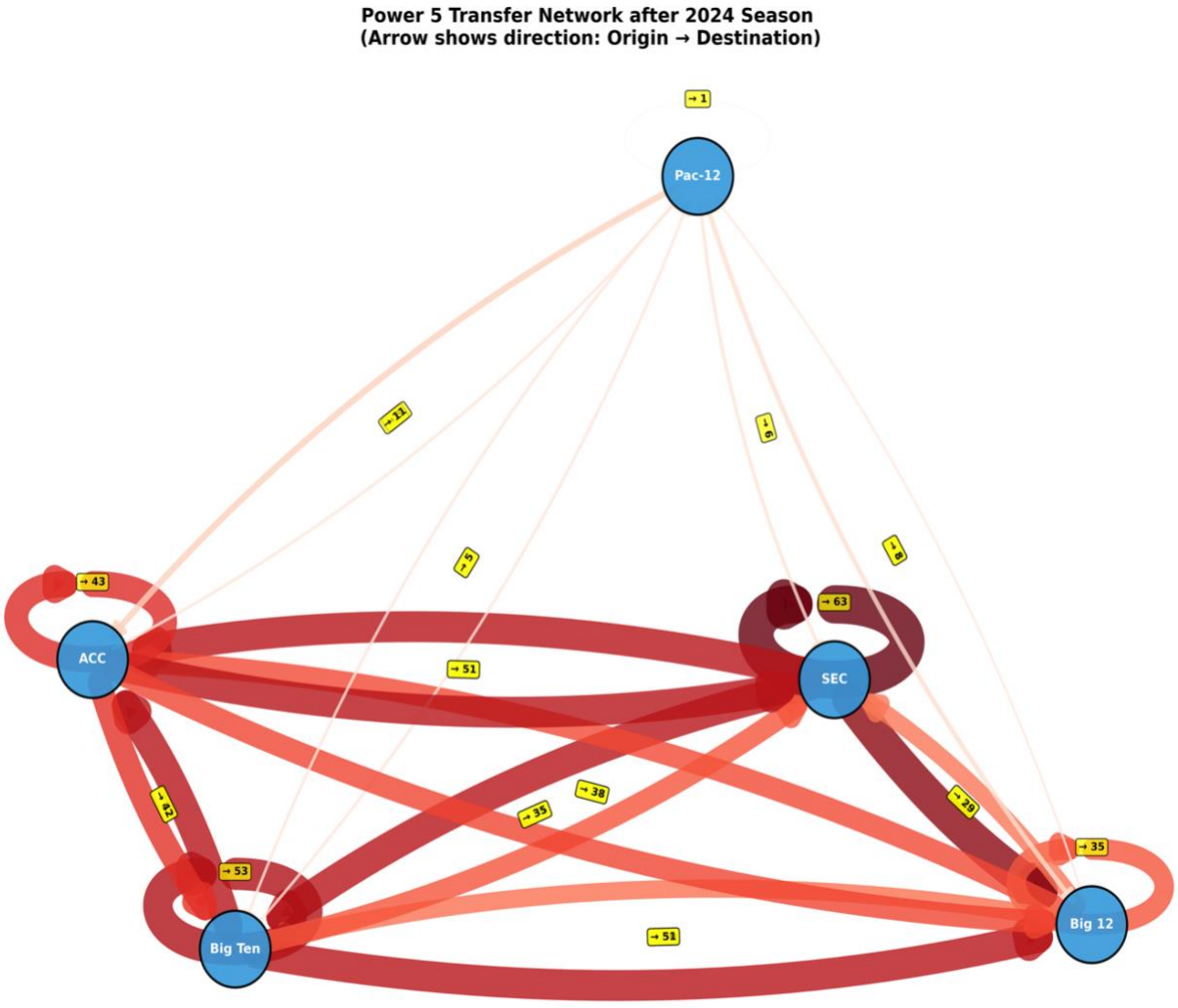
Network Analysis of Player Movement in the Power Five Conferences:



In 2022, intraconference transfers represent a substantial share of movement, particularly in the SEC and Big Ten. The Pac-12 also shows high interconference outflows.



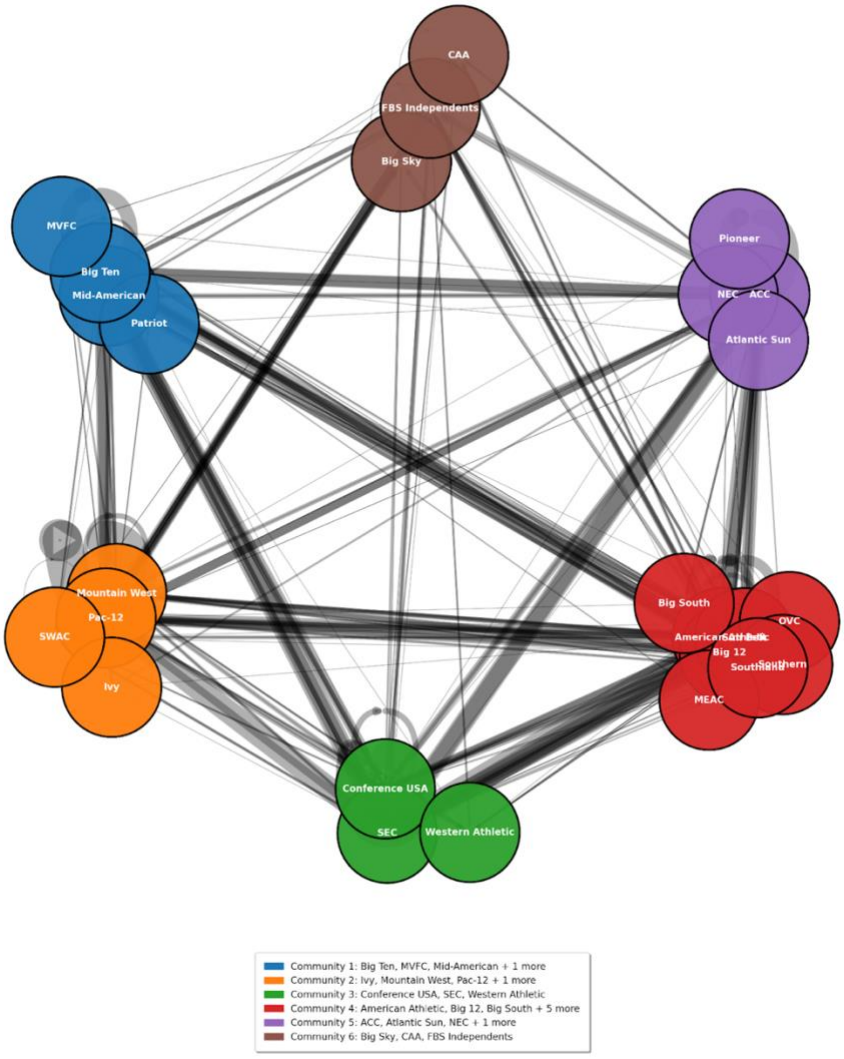
Prior to its dissolution, the Pac-12 exhibits the greatest interconference transfer volume. Strong flows toward the SEC and Big Ten are visible. Geographic isolation and increasing instability likely contribute to this pattern.



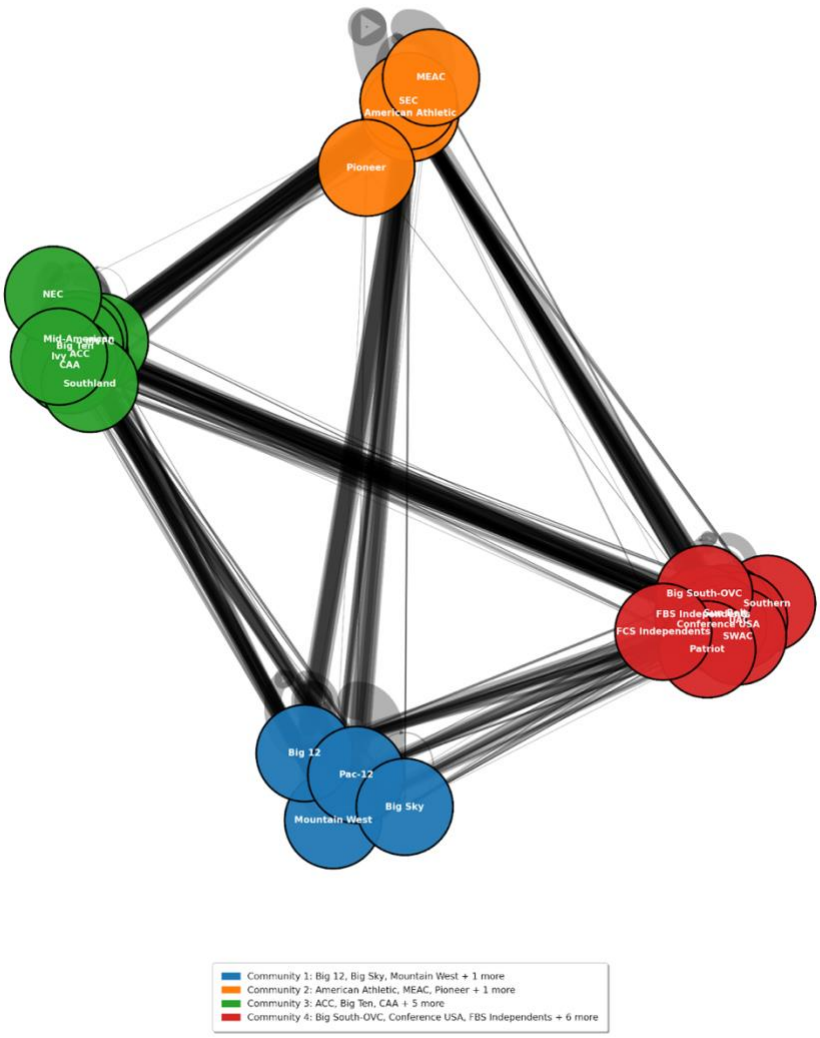
After the Pac-12 ceased operating following the 2023 season, the SEC emerges as the dominant interconference transfer hub. Movement becomes more centralized, reinforcing structural hierarchies. Intraconference transfers remain prominent, reflecting competitive depth.

Community Detection in Conference-Level Transfer Networks:

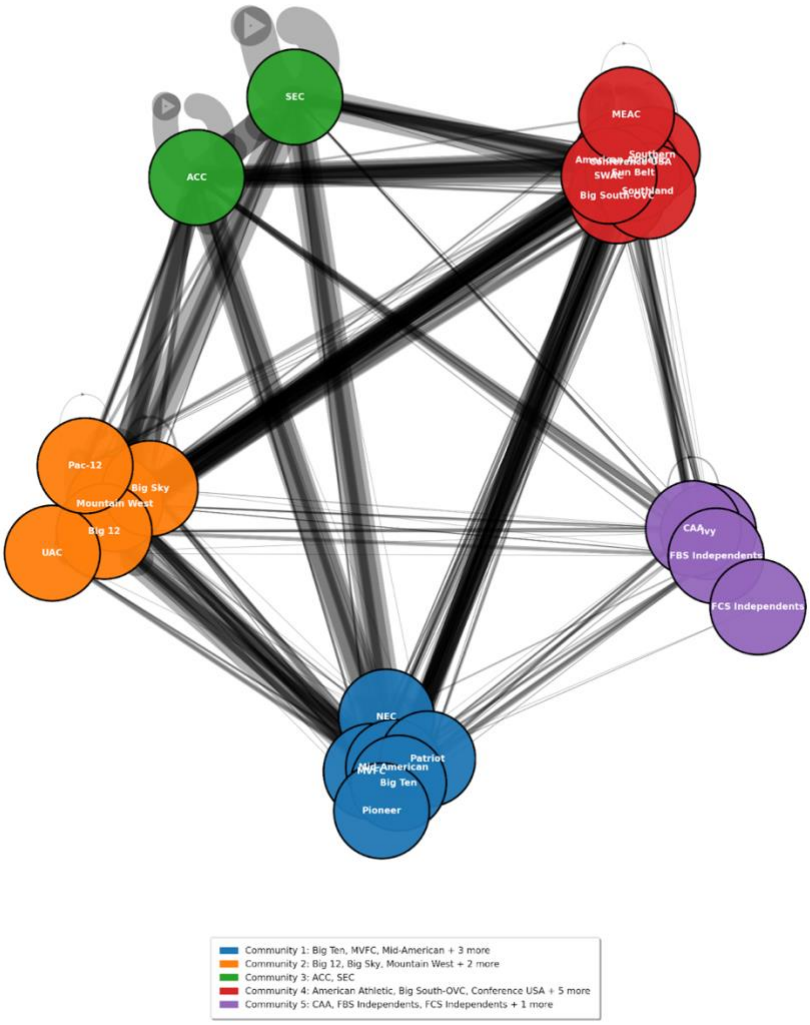
To further understand how transfer activity is organized, we apply community detection to the conference-level transfer networks for each season. This approach groups conferences that exchange players more frequently with one another than with the rest of the network, allowing us to examine how structural organization evolves over time as roster mobility increases and conference alignment changes.



The 2022 network is highly fragmented, with several distinct communities that reflect relatively localized and tiered transfer behavior. Power Five conferences are embedded within broader clusters that include mid-major FBS and FCS leagues, indicating that transfer activity at this stage remains dispersed and not yet dominated by a small number of elite conferences. The SEC is well-connected but still integrated into a wider ecosystem that includes Conference USA and other regional FBS leagues, rather than forming a standalone core.



By 2023, the network condenses into fewer and larger communities, signaling increased consolidation in transfer pathways. The Pac-12 becomes more weakly integrated, with outgoing connections to multiple communities rather than stable reciprocal exchanges. At the same time, the SEC and Big Ten grow more central, increasingly anchoring the dominant clusters of player movement. This shift reflects intensifying portal usage and early signals of structural instability within the Pac-12.



The 2024 network shows the clearest consolidation following the dissolution of the Pac-12. Transfer activity concentrates around a smaller number of dominant communities, with the SEC and Big Ten occupying central positions. The SEC and ACC form a tightly connected cluster, reflecting a strong and relatively self-contained transfer corridor between two stable Power Five conferences. Peripheral conferences are more clearly separated, reinforcing the idea that player movement increasingly funnels toward a narrow group of structurally secure and competitively prominent leagues.

Limitations:

This analysis relies on publicly available transfer and performance data, which may not fully capture late roster updates, positional context, or Name, Image, and Likeness incentives that factor into player decisions. Transfer activity is analyzed at the team and conference levels, which limits insight into individual motivations and roster-specific dynamics. In addition,

performance measures such as expected wins and the Football Power Index are model-based and reflect underlying assumptions that may not perfectly represent true team strength. Finally, ongoing conference realignment, particularly the dissolution of the Pac-12, introduces structural breaks that complicate direct comparisons across seasons and limit the ability to interpret long-term trends.

Future Analysis:

Future exploratory analysis could extend this work through additional visualizations that provide finer-grained descriptive insight into transfer behavior. Position-specific breakdowns would help distinguish depth-driven movement from scheme-related transfers, while school-level network graphs or Sankey diagrams could more clearly illustrate the direction and magnitude of player flows. Temporal visualizations examining transfer activity throughout the offseason may reveal event-driven spikes related to coaching changes or postseason outcomes. Distributional comparisons between high- and low-transfer programs could further clarify how roster turnover varies across competitive tiers without relying on predictive modeling.

Conclusion:

This study presents an exploratory examination of transfer portal activity across the FBS, with particular focus on the SEC and conference-level flow of player movement. The results indicate that transfer behavior reflects a combination of performance outcomes, coaching stability, and structural opportunity rather than isolated individual decisions. Nationally, the transfer portal serves both as a mechanism for roster rebuilding and as a depth-management tool for established programs. Within the SEC, these dynamics are amplified by competitive intensity and concentrated talent. At the conference level, network and community analyses reveal increasing consolidation of player movement toward stable conferences following the dissolution of the Pac-12. Together, these findings underscore that the transfer portal has become a central organizing force in modern college football, reshaping competitive balance and program strategy across the sport.

Appendix:

Link to Dataset: CollegeFootballData.com

GitHub Repository: https://github.com/harrisonsrubin/eda_final_project