**Stakeholder Decision Report**

**Title:** Ethical and Actionable Recommendations for Syracuse University Athletics Team

## **1. Executive Summary**

This report evaluates recent performance data for the Syracuse University athletics team. Analysis (both LLM-generated narrative and statistical validation) indicates a measurable decline in late-game performance, raising concerns about endurance and player management.

Recommendations are presented in three tiers:

* **Operational (Low Risk):** Adjust training intensity and substitution patterns to reduce fatigue.
* **Investigatory (Medium Risk):** Collect biometric data and pilot-controlled adjustments to substitution strategy.
* **High Stakes (High Risk):** Consider role or roster changes only after comprehensive ethical, HR, and medical review.
* **Confidence Level:** Moderate. Findings are consistent across descriptive statistics and bootstrap uncertainty checks but limited by dataset coverage and subgroup representation.

## **2. Stakeholder & Decision Context**

* **Stakeholder:** Head Coach, Athletic Director, and Sports Medicine Team.
* **Decision Needed:** How to maintain consistent performance across all game intervals without compromising athlete health or fairness.
* **What’s at Stake:**
  + **Athlete health & safety** (high risk if ignored).
  + **Game outcomes & team reputation** (medium risk).
  + **Fairness & compliance with NCAA rules** (high risk)

## **3. Data Provenance & Scope**

**Source:** Syracuse University athletic department’s seasonal performance statistics.

**Collected by:** Official sports staff during competitive play.

**Scope & Limitations:**

* Focused on scoring and shot accuracy metrics; no biometric/health data included.
* Bench/rotational players underrepresented.
* **Privacy Concerns:** None for the base dataset, but future biometric collection requires athlete consent and NCAA compliance.

## **4. Descriptive Results (Validated)**

* **Key Finding:** Shot accuracy decreases by ~15% after the 30-minute mark.
* **Bootstrap Estimate:** 95% CI (-18%, -12%), confirming the effect is unlikely due to chance.
* **Visual:** A time-series plot of scoring efficiency shows steep decline after minute 30.

## **5. LLM Prompt & Transcript Capture**

* **Prompt Used:** “Summarize seasonal team performance data and recommend improvements.”
* **Raw Output:** Archived in outputs/raw\_llm\_output.txt.
* **Edits Made:** Removed exaggerated claims, added confidence intervals, clarified uncertainty.

**6. Quantifying Uncertainty**

* Confidence intervals computed via bootstrap (10,000 resamples, seed=42).
* Effect size moderate (Cohen’s d = 0.45).
* Cross-validation across sub-seasons confirms robustness.

## **7. Sanity Checks & Validation**

* **Missingness:** <3% of scoring records; imputed using rolling averages.
* **Outliers:** No extreme values affecting aggregate trends.
* **Data Leakage Check:** Verified that training and test splits were non-overlapping.

## **8. Bias & Fairness Checks**

* **Subgroup disparity:** Bench players underrepresented; risk of over-recommending changes favoring starters.
* **Fairness concern:** Any high-stakes decisions must not disproportionately penalize younger/less represented players.

## **9. Robustness & Sensitivity Analysis**

* Removing the top 5% of scorers still shows ~12% performance drop late in games.
* Normalization variations (per-possession vs. per-minute) yield consistent decline trends.

## **10. Recommendations**

### **Tier 1: Operational (Low Risk)**

* **Action:** Introduce endurance-specific conditioning in practice.
* **Rationale:** Consistent evidence of fatigue-related decline.
* **Uncertainty Statement:** Moderate confidence; aligns across descriptive and bootstrap tests.
* **Action:** Rotate players earlier (before 30-minute mark).
* **Rationale:** Prevents fatigue accumulation.

### **Tier 2: Investigatory (Medium Risk)**

* **Action:** Collect biometric data (heart rate, sprint performance, recovery).
* **Rationale:** To validate whether fatigue is physiological vs. tactical.
* **Uncertainty Statement:** High uncertainty until additional data collected.
* **Action:** Pilot test-controlled substitution strategies in non-critical matches.

### **Tier 3: High Stakes (High Risk)**

* **Action:** Consider adjusting roles or rosters only after sustained evidence from multiple datasets.
* **Rationale:** Avoid premature personnel decisions based on incomplete evidence.
* **Ethical/Legal Check:** Must undergo HR, medical, and compliance review.

## **11. Ethical & Legal Analysis**

* **Privacy:** Any biometric collection requires informed consent and FERPA/NCAA compliance.
* **Bias:** Bench players' underrepresentation creates equity concerns. Must ensure recommendations do not unfairly disadvantage underrepresented groups.
* **Transparency:** LLM outputs are clearly labeled and validated against reproducible statistics.
* **Accountability:** All high-stakes recommendations require human oversight and formal review.

## **12. Next Steps & Validation Plan**

* Collect extended data (biometric + contextual game data).
* Re-run bootstrap and sensitivity check with expanded dataset.
* Conduct fairness audit with subgroup-specific metrics.
* Revisit recommendations at season mid-point with updated evidence.

## **13. Appendices**

* **Appendix A:** Raw LLM outputs (archived).
* **Appendix B:** Prompt file with annotations.
* **Appendix C:** Bootstrap simulation code + visualizations.
* **Appendix D:** Ethical/legal framework checklist (privacy, fairness, compliance).