

Article

Social-Ecological Misalignment in Private-Land Wildlife Stewardship: An Exploratory Study of Reconfigured Working Lands

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Abstract

Working lands are undergoing substantial social and ecological transformations as amenity migration and associated land-use changes contribute to increasingly fragmented ownership patterns and more diverse stewardship objectives. Explanations of stewardship outcomes often emphasize individual knowledge and capacity while giving less attention to the broader social–ecological conditions affecting private-land sustainability. This study examines whether landowners’ perceptions of wildlife stewardship align with a relative, within-sample ecological indicator based on size-adjusted native mammal richness detected during short-term camera-trap surveys and identifies processes associated with alignment and misalignment. We combined camera-trap observations and semi-structured interviews from 12 wildlife-oriented properties with findings from broader focus groups conducted with Land Steward Amenity Migrants in Texas rangelands. Perceptions and the ecological indicator were misaligned in 9 of 12 cases (75%), with overestimation relative to the ecological indicator occurring most frequently. Qualitative analysis associated these patterns with self-referential evaluation processes, limited ecological feedback, institutional guidance mismatched with property scale, and limited local peer networks for learning and comparison. These findings suggest that variation in perceived and observed stewardship outcomes cannot be understood through individual capacity alone but reflects interacting individual, ecological, institutional, and relational processes operating across scales. Supporting the long-term sustainability and resilience of fragmented rangelands therefore requires guidance suited to smaller properties, cross-boundary ecological strategies, and stronger opportunities for relational learning and coordination.

Keywords: rangelands; sustainable private land stewardship; landscape fragmentation; social–ecological systems; wildlife management; land stewardship



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1. Introduction

Stewardship of rangeland ecosystems, which depend on management choices related to grazing, wildfire, and wildlife habitat to sustain biodiversity, ecosystem productivity, and long-term resilience [1,2], is becoming increasingly complicated because of unfolding demographic changes and shifting land uses associated with amenity migration [3]. Across predominantly privately owned regions of the eastern United States, amenity-driven exurbanization has expanded the number of small-acreage properties managed

by new landowners with diverse backgrounds, experiences, and land-use goals, driving fragmentation [4–7].

Compared with more traditional landowners, amenity migrants often place less emphasis on production-based goals, focusing instead on biodiversity conservation, wildlife habitat, landscape restoration, and long-term ecosystem health, aligning in many cases with contemporary conservation priorities and multifunctional landscape uses [8,9]. At the same time, they frequently manage smaller and increasingly fragmented properties while operating outside the ranching traditions, social networks, and experiential knowledge systems that historically shaped rangeland stewardship [10,11]. As amenity-oriented landowners assume stewardship over a growing proportion of working rangelands, understanding the factors that shape their management outcomes has become increasingly important.

These transformations raise questions about how sociodemographic shifts and accompanying land use changes reshape stewardship and whether individual landowner capacity is sufficient to explain variation in environmental outcomes. Much of the literature explains variation in stewardship outcomes through individual landowners' knowledge, experience, technical skills, and management capacity [12–14], potentially overlooking interactions with institutional, community, and ecological dynamics. From a social-ecological systems perspective, however, stewardship outcomes emerge through interactions among individual, institutional, community, and ecological domains rather than from individual decisions alone [15,16]. As rural landscapes become increasingly fragmented and socially heterogeneous, institutional arrangements, social relationships, ecological feedbacks, and cross-boundary processes may all shape environmental outcomes alongside individual management decisions.

Amenity migrants illustrate this challenge particularly well. Their backgrounds, experiences, and values shape mental models that influence how they interpret landscapes, establish management priorities, and evaluate stewardship success [17,18]. Consequently, amenity migrants may evaluate their stewardship differently from more traditional land managers, even when managing similar ecological systems [7]. Importantly, this does not imply that ecological assessment itself is inappropriate. Rather, it raises questions about how ecological outcomes are interpreted and explained.

To examine this question, we compare landowners' perceptions of their wildlife stewardship with ecological outcomes, measured here through one selected relative ecological indicator. We use detected native mammal richness derived from camera-trap surveys as a relative ecological indicator because biodiversity conservation is a stewardship objective shared across both production-oriented and post-productivist rangeland systems. This provides a common within-sample basis for examining alignment between perceived and measured outcomes while allowing the analysis to focus on the processes that explain convergence and divergence rather than on differences in evaluation criteria.

Accordingly, this study addresses the following research questions:

- Q1. Are amenity migrants' perceptions of their wildlife stewardship aligned with the ecological indicator?
- Q2. What factors are associated with patterns of alignment and misalignment between landowners' perceptions of stewardship and a selected ecological indicator?

To address these questions, we combine semi-structured interviews and focus groups with amenity migrant landowners and camera-trap surveys conducted on twelve wildlife-oriented private properties in Texas rangelands. Interviews document how landowners evaluate their wildlife stewardship, while detected native mammal richness provides an independently measured ecological indicator for within-sample comparison. Together, these data allow us to examine how stewardship outcomes emerge through interacting multiscale processes across fragmented landscapes.

Sustainability across fragmented rangelands depends on aligning property-level management with landscape-scale ecological processes, institutionally feasible practices, and relational mechanisms for learning and coordination. As amenity migrants manage a growing share of working rangelands, understanding how their stewardship decisions shape ecological outcomes across properties and landscapes is increasingly important to the long-term sustainability of these systems [2,4–6]. By conceptualizing stewardship performance as a multiscalar social-ecological process rather than solely an individual attribute, this study contributes to private-land stewardship scholarship and offers practical insights for agencies and extension professionals seeking to strengthen conservation across fragmented landscapes.

1.1. Amenity Migration and Private-Land Stewardship

This study focuses on private lands undergoing substantial changes in ownership, use, and stewardship through amenity migration, defined as movement from urban to rural areas motivated by proximity to nature and rural lifestyle benefits [4,19]. Amenity migrants vary in how they engage with rural landscapes. Landscape Consumer Amenity Migrants (LCAMs) primarily value landscapes for recreation, scenery, and lifestyle, whereas Land Steward Amenity Migrants (LSAMs) actively manage their properties for ecological restoration, wildlife conservation, or small-scale agriculture [20]. This study focuses on LSAMs because their management activities directly influence ecological processes and stewardship outcomes.

Research on LSAMs has largely focused on relatively affluent landowners acquiring large ranches in highly scenic regions such as the Greater Yellowstone Ecosystem [8,10]. In these contexts, landowners often rely on professional managers or consultants, and stewardship challenges center less on technical capacity than on identity formation, integration into rural communities, and reconciling conservation values with traditional rangeland practices. More recently, however, a different form of amenity migration has emerged following the COVID-19 pandemic. This wave consists largely of middle-class households purchasing smaller rural parcels in more affordable, nontraditional amenity regions, contributing to increasingly fragmented ownership patterns across many rangelands [9,21,22]. Research indicates that these newer LSAMs often possess limited management experience, knowledge, and resources while pursuing diverse stewardship goals [9]. Further, in fragmented landscapes, ecological processes such as grazing, fire, and wildlife habitat extend across multiple ownerships, making stewardship more complex than management decisions on individual properties alone. Consequently, LSAMs frequently struggle to translate stewardship intentions into effective ecological outcomes [9,12,13] and are often portrayed as well-intentioned but capacity-limited stewards whose success depends largely on acquiring knowledge, skills, and technical assistance [6,9].

In this view, improving ecological outcomes depends largely on increasing landowners' technical expertise through education, outreach, and access to institutional support [4,13,14]. This assumes that sufficient ecological knowledge, management experience, and technical assistance should translate into improved stewardship outcomes [5,12,23]. If so, landowners' perceptions of stewardship success should generally correspond with independently measured ecological outcomes. Yet the extent to which these assumptions hold remains uncertain in fragmented landscapes where ecological processes, governance arrangements, and landownership patterns operate across multiple scales. Examining the relationship between landowners' stewardship perceptions and ecological outcomes therefore provides an opportunity to move beyond capacity-centered explanations and better understand how stewardship outcomes emerge through interactions across multiple levels of the social–ecological system. When discrepancies occur, they may reflect not only individual

knowledge limitations but also broader ecological constraints, institutional mismatches, and gaps in relational learning and feedback among landowners, agencies, and ecological systems [3,23,24].

1.2. Framework for Analysis

This study employs the Rangeland Social-Ecological Framework (RSEF) [3] to examine the relationship between Land Steward Amenity Migrants' (LSAMs) perceptions of their stewardship and independently measured ecological outcomes. The RSEF provides a conceptual lens for situating social-ecological processes at the center of rangeland inquiry by tracing multi-actor and multiscale interactions among land managers, institutional actors, and ecological systems operating across parcels, landscapes, and governance levels. Originally developed to examine the effects of demographic change on rangeland stewardship, the framework is particularly well suited for analyzing LSAMs, whose management decisions are shaped by diverse motivations, varying levels of technical experience, and reliance on informal and cross-scale knowledge networks [6].

By linking landowners' self-evaluations with independently measured ecological indicators, this study operationalizes the RSEF to examine whether stewardship perceptions align with observed ecological outcomes and to identify the conditions under which alignment or misalignment occurs. From this perspective, stewardship outcomes are understood as emergent properties of interactions among individual, ecological, and institutional processes, rather than as the direct result of individual decision-making alone.

Within the framework, several interrelated factors mediate the relationship between rangeland managers and ecosystems. These include landowners' values and perceptions, their understanding of broader socio-economic and environmental conditions (e.g., markets, climate variability, and policy change), adaptive capacity, and technical knowledge. These factors influence both the selection of management practices and the interpretation of ecological feedback. For example, while long-time ranchers may rely on generational and institutional knowledge embedded in local networks, LSAMs often depend on emergent learning processes and cross-boundary interactions to guide stewardship decisions (Figure 1).

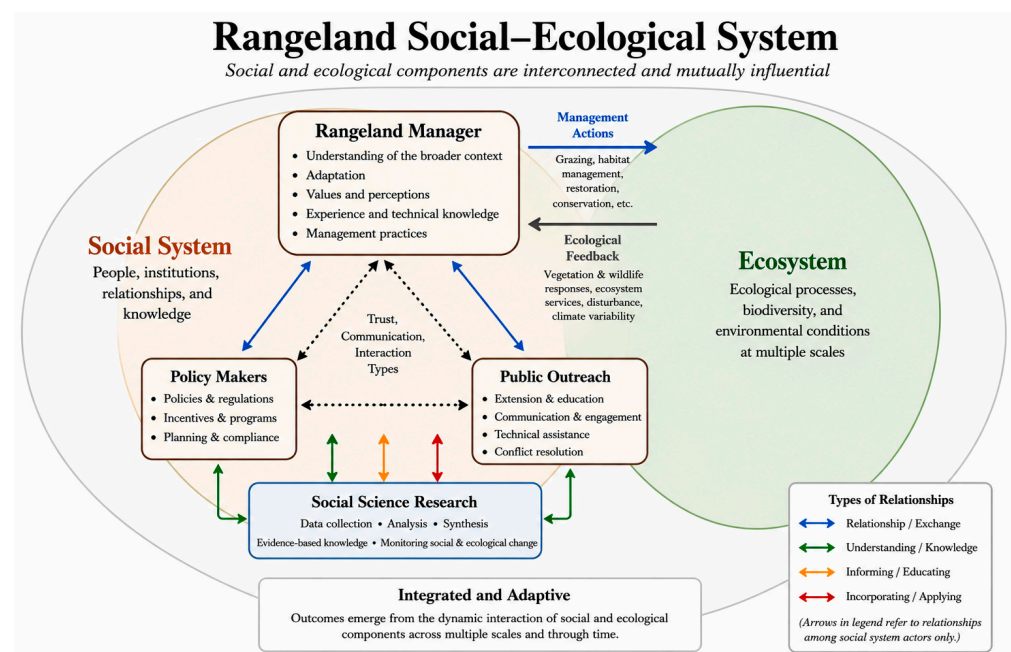


Figure 1. Social and ecological factors shaping interactions between rangeland managers and ecosystems within the Rangeland Social–Ecological System Framework.

The framework also highlights the role of institutions, outreach systems, and technical assistance in shaping stewardship outcomes indirectly through multi-actor interactions. The quality of relationships with extension agents and agencies, including trust, communication, and perceived credibility, influences how information is interpreted, whether practices are adopted, and how ecological feedback is incorporated into decision-making. These relational dynamics are particularly important in contexts where landowners lack prior management experience and must rely on external knowledge sources.

By applying the RSEF to the analysis of perception–outcome alignment, this study advances understanding of how stewardship outcomes are produced in changing rangeland systems characterized by fragmented ownership and diverse landowner motivations. In doing so, it shifts attention from individual capacity alone toward the multiscale social, ecological, and institutional processes that shape rangeland management outcomes and provides a framework for identifying how misalignments among these domains shape stewardship outcomes.

2. Materials and Methods

2.1. Study Context and Population

This study integrates data from two complementary components of a broader research program on Land Steward Amenity Migrants (LSAMs) in Texas rangelands. The first consisted of focus groups conducted through a Natural Resources Conservation Service-supported initiative to characterize LSAMs' motivations, stewardship goals, management experience, and assistance needs (reference removed to protect author anonymity). The second involved follow-up property visits of those LSAMs, funded by Texas A&M AgriLife Research (College Station, TX, USA). These visits combined semi-structured interviews with camera-trap monitoring to examine relationships between landowners' stewardship perceptions and ecological conditions. Property-level semi-structured interviews have also been analyzed elsewhere to identify broader drivers of LSAM management decisions (reference removed to protect author anonymity).

For this study, individual interviews and focus groups drawn from the same study population provided complementary forms of evidence [25,26]. Property-level interviews provided case-specific information on landowners' perceptions, management practices, experiences, and property contexts, while focus groups provided broader contextual evidence on processes operating across individual, institutional, community, and ecological domains. The property-level participants were drawn from the larger focus-group sample, linking these two sources of evidence.

The present study links interview-based assessments of wildlife stewardship with independently collected camera-trap data. Its novel contribution is to examine alignment between landowners' perceived stewardship effectiveness and size-adjusted detected native mammal richness at the property level and to identify the processes associated with alignment and misalignment. Qualitative data were therefore analyzed in relation to the perception–outcome classifications developed for this study, focusing on evaluation processes, ecological feedback, institutional fit, and relational learning. This analysis differs from the broader descriptive and management-decision analyses previously conducted with these datasets.

The analyzed properties in this study were distributed across five EPA Level III ecoregions in Texas, including the Cross Timbers, High Plains, Western Gulf Coastal Plain, Southern Texas Plains, and East Central Texas Plains. Ecoregion assignments were determined by spatially intersecting camera deployment locations with EPA Level III ecoregion polygons based on the Omernik ecoregion framework [27,28]. Exact property coordinates are withheld to protect landowner confidentiality. This distribution captures substantial variation

in regional species pools, vegetation structure, precipitation regimes, and surrounding land-use contexts, all of which may influence camera-trap detections independently of property-level stewardship. Properties ranged from 12 to 1900 acres and included small exurban parcels, medium-sized mixed-use properties, and one larger ranching–wildlife property. Dominant land uses included wildlife management, mixed ranching–wildlife management, habitat restoration, small-scale livestock use, and recreational land stewardship. Wildlife-relevant habitat features varied among properties and included grasslands, savannas, wooded edges, riparian areas, water sources, and mixed rangeland vegetation.

2.2. Research Design and Analytical Approach

Two complementary data streams were used for each property: (1) size-adjusted detected native mammal richness derived from camera-trap detections and (2) landowner self-assessments of wildlife stewardship collected through a perceptions scale contained within the property-level semi-structured interview protocol. The analysis proceeded in two sequential steps. First, landowners' self-evaluations were compared with size-adjusted ecological indicators to classify each case as aligned or misaligned. Second, qualitative data from property-level interviews and focus groups were used to interpret the conditions associated with observed patterns of alignment and misalignment.

Focus groups were conducted with 64 LSAMs across five regions of Texas (i.e., Lubbock, Corpus Christi, San Angelo, Bryan, and Stephenville) during January and May of 2024. Focus group participants, who included individuals who self-identified as having migrated from urban to rural areas to acquire and manage land, were recruited through a combination of outreach strategies, including extension networks, print media, social media campaigns, and local advertising. Focus group questions examined landownership motivations, stewardship goals and plans, stewardship obstacles, previous experience and knowledge managing land, learning processes shaping land management decisions, and needed assistance. Altogether, the focus-group questions provided insights into the broader social-ecological context within which LSAM stewardship occurs.

A subset of the focus group participants volunteered to participate in follow-up property visits that took place in June and July of 2024, which included semi-structured interviews and ecological monitoring conducted directly on their land. Sixteen landowners participated in this second phase of the study. The semi-structured instrument examined exurban landowners' stewardship goals, management practices, knowledge sources, barriers to implementation, and perceptions of stewardship effectiveness, which were subsequently compared with independent ecological assessments of their properties. Additionally, camera traps were placed on each property during the property visits. Each on-site visit lasted approximately one and a half to two hours.

Perceived stewardship was operationalized as landowners' self-evaluations of wildlife management, while ecological outcomes were operationalized as size-adjusted detected native mammal species richness derived from camera-trap detections. We use this measure as a relative indicator of detected native mammal richness during the sampling period, rather than as a comprehensive assessment of wildlife community condition or overall stewardship success. Because detected native mammal richness is relevant across both production-oriented and post-productivist rangeland systems, it provides a common ecological benchmark for examining patterns of alignment and misalignment independent of differing stewardship objectives.

2.3. Social Data Sources and Analysis

Social data were generated through two complementary sources that served distinct analytical purposes: focus groups and property-level interviews. The 12 properties

provided the basis for identifying patterns of alignment and misalignment, while the broader focus-group data helped explain the individual, institutional, community, and ecological processes associated with those patterns and the relational mechanisms connecting them. Although these processes cannot be attributed uniformly to every individual property, their recurrence across the broader LSAM population provides evidence of the wider conditions shaping stewardship perceptions and outcomes. The qualitative analysis was intended to identify recurring and substantively meaningful patterns across the data rather than to estimate the prevalence of particular perspectives among participants.

As part of the semi-structured interview process, landowners were asked to evaluate their wildlife management practices using a five-point scale (Poor, Average, Good, Very Good, Excellent). To facilitate direct comparison with the ecological assessment, which was expressed in three ordered categories, the original five-category self-assessment scale was collapsed into three categories. Because the analysis focused on alignment between perceived and ecological stewardship rather than on differences in the intensity of positive self-assessments, Good, Very Good, and Excellent were combined into a single “Good” category, while Poor and Average were retained as distinct categories, resulting in a final three-level scale of Poor, Average, and Good. Among the 12 wildlife-oriented landowners included in the analysis, the original self-evaluations were Average ($n = 3$), Good ($n = 6$), and Very Good ($n = 3$); no participants selected Poor or Excellent. After recoding, the self-assessment measure therefore included three Average and nine Good evaluations. This transformation preserved the ordinal direction of the original measure while aligning its level of categorization with the ecological assessment. This approach is consistent with Matell and Jacoby (1971) [26], who found that collapsing multi-category rating scales into trichotomous measures did not result in significant reductions in reliability or validity and can facilitate comparisons among data originally measured using different rating formats.

Because the analysis for this paper focuses specifically on wildlife stewardship, cases were retained only when landowners identified wildlife management as a central stewardship objective during the interview. Based on this criterion, twelve landowners were included in the final analytical sample, while four were excluded because wildlife management was not identified as a primary management goal. These twelve cases form the basis for the alignment and misalignment analysis presented in this study. The property-level data enable comparison between landowners’ self-assessments of stewardship and the relative ecological indicator derived from camera-trap detections. Interviews and ecological monitoring were conducted within the same field season to ensure temporal alignment between social and ecological data.

When landowners expressed uncertainty about how to evaluate wildlife management, interviewers clarified that the assessment referred to practices intended to support native wildlife presence, including habitat maintenance, water provisioning, vegetation management, and grazing decisions. This clarification helped ensure that responses were grounded in comparable stewardship objectives while still allowing landowners to evaluate their practices relative to their own management goals. The self-assessment was intended to capture landowners’ overall evaluation of their wildlife stewardship practices and was not designed to separately distinguish perceived effort, practice quality, visible wildlife presence, or ecological outcomes. The qualitative analysis was subsequently used to examine the evaluative criteria underlying these self-assessments.

The two qualitative datasets were initially analyzed separately for their original research purposes. For the present study, both the property-level interview and focus-group data were subsequently reanalyzed in relation to the observed patterns of alignment and misalignment. This second-pass analysis was conducted by the lead author, who reviewed the transcripts multiple times to facilitate familiarization with the data and used

constant comparison across participants and data sources to identify recurring evidence related to evaluation processes, ecological feedback, institutional fit, and relational learning. The interview data provided case-specific evidence associated with the classified properties, while the focus-group data were revisited to identify broader patterns within the study population that were consistent with or provided context for processes emerging from the property-level analysis. Throughout the reanalysis, emerging themes and interpretations were discussed with the researcher who collected the qualitative data, with questions or differences in interpretation resolved through ongoing consultation and confirmation. Intercoder reliability coefficients were not calculated; instead, this iterative researcher review, together with triangulation across the two qualitative data sources, was used to support analytical consistency and trustworthiness. No qualitative coding software was used.

2.4. Ecological Data Sources and Analysis

Wildlife occurrence data were collected using motion-activated infrared camera traps (Bushnell Trophy Cam HD E3, Bushnell Corporation, Overland Park, KS, USA) deployed on the participating properties described above. Across the 12 wildlife-oriented properties, the final dataset included 23 camera deployments: 11 properties had two camera deployments, and one property had one camera deployment. Based on deployment start and end dates, total sampling effort averaged 185 camera-days per property and ranged from 116 to 257 camera-days. Sampling effort varied among properties because deployment windows differed and one property contributed one usable camera deployment rather than two. To evaluate whether this unequal effort affected the ecological classification, we conducted a sensitivity check to determine whether total camera-days influenced detected native mammal richness or changed the size-adjusted wildlife classifications. Camera placement followed a consistent set of criteria across properties. Cameras were preferentially installed along property fences, trails, or near water sources, as appropriate to the specific characteristics and conditions of each property, at spatially separated locations to reduce overlap in the areas monitored, and at sites where landowners had prior knowledge or evidence of wildlife movement. Locations near residences or areas of concentrated human activity were avoided. Overall, camera placement combined commonly used wildlife-monitoring locations, such as fences, trails, and water sources, with landowners' site-specific knowledge of wildlife movement. Because cameras were intentionally placed at features expected to increase mammal detections, the survey design is best interpreted as a targeted detection survey rather than a randomized property-wide occupancy or abundance survey [29,30].

Camera-trap detections were exported from Wildlife Insights and summarized in R version 4.2.1 [31] using property-level deployment identifiers to link detections with site attributes. Detections were reviewed and classified to the finest reliable taxonomic level. For this analysis, repeated detections of the same species within a property were collapsed to a single property-level detection, and detected native mammal richness was calculated as the number of unique native terrestrial mammal species detected on each property. We retained only terrestrial mammal detections identified to species or interpretable native mammal categories and excluded domestic species, vehicles, birds, unidentified animals, and higher-level taxonomic placeholders from the detected native mammal richness metric. Species were classified as native using regional mammal references for Texas, primarily Schmidly and Bradley [32]. The complete list of native mammal species and interpretable native mammal categories detected across the 12 wildlife-oriented properties is provided in Supplementary Table S1.

Property sizes among the twelve wildlife-oriented properties ranged from 12 to 1900 acres, reflecting substantial variation in parcel scale within the analytical sample.

The median property size was 38 acres. For interpretive and comparative purposes, properties were grouped into three descriptive size classes: small (10–50 acres; LS), medium (50–200 acres; LM), and large (>200 acres; LL). These categories were used to describe patterns in the sample and to anonymize properties in figures and tables; they were not used as statistical predictors in the species–area model.

To account for the influence of property size on detected species richness, detected native mammal richness was modeled as a function of log-transformed property area using a species–area relationship for the twelve wildlife-oriented properties [33–35]. Figure 2 shows the fitted relationship between property size and detected native mammal richness. The fitted model was: detected native mammal richness = $0.177 + 0.718 \times \ln(\text{property acres})$. The estimated coefficient for log-transformed acreage was positive but uncertain ($\beta = 0.718$, $SE = 0.670$, $t = 1.072$, $p = 0.309$; $R^2 = 0.103$, adjusted $R^2 = 0.013$). Residuals were calculated as the difference between detected native mammal richness and model-predicted richness, representing whether each property had more or fewer detected native mammal species than expected given its size.

Species–Area Relationship for Native Mammals

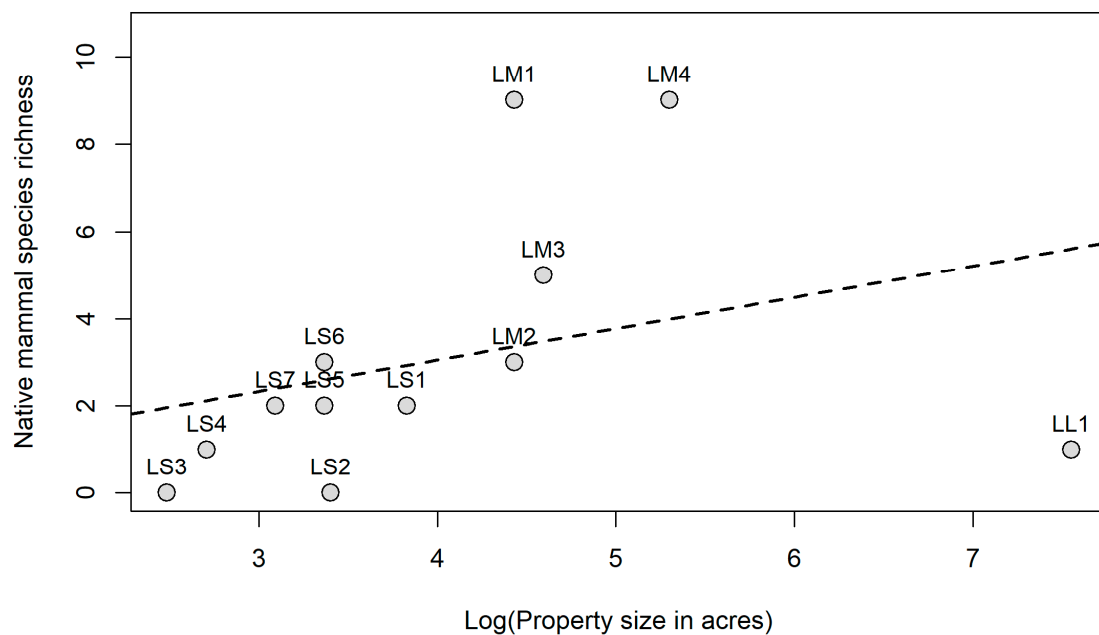


Figure 2. Relationship between detected native mammal richness and property size across wildlife-focused private lands ($n = 12$). Points represent individual properties, with property size expressed as log-transformed acreage. The dashed line represents the fitted linear species–area relationship used to estimate expected native mammal richness as a function of property size: detected native mammal richness = $0.177 + 0.718 \times \ln(\text{property acres})$, $R^2 = 0.103$, adjusted $R^2 = 0.013$, $p = 0.309$. Deviations from this relationship were used to derive size-adjusted wildlife ratings. The fitted line is shown as the basis for within-sample size adjustment and should not be interpreted as evidence of a strong predictive relationship.

Detected native mammal richness was not rarefied because detections were analyzed as property-level incidence from targeted camera placements rather than as standardized abundance or count data. To evaluate the robustness of the ecological classification, we conducted sensitivity checks examining whether total camera-days influenced detected native mammal richness or changed the size-adjusted wildlife classifications, whether classifications changed under alternative standardized residual thresholds of ± 0.25 and

± 0.75 , and whether the classification pattern changed when the large-property case LL1 was excluded or when robust regression was used.

Residuals were standardized as z-scores to enable comparison across properties, and the resulting predicted values, standardized residuals, and size-adjusted Wildlife Ratings are reported in Table 1. Because no established thresholds exist for classifying size-adjusted detected native mammal richness in this application, standardized residual cutoffs of ± 0.50 were used as a heuristic classification tool: Good (>0.50), Average (-0.50 to 0.50), and Poor (<-0.50). These categories were used to support within-sample comparison and should be interpreted as relative ratings rather than absolute measures of wildlife community condition.

Table 1. Detected native mammal richness, predicted richness based on the species-area relationship, standardized residuals, and resulting size-adjusted Wildlife Ratings for wildlife-focused properties ($n = 12$). Predicted richness values were derived from a linear model relating detected native mammal richness to log-transformed property size. Standardized residuals were calculated from raw residuals to enable comparison across properties. Positive standardized residuals indicate properties with more detected native mammal taxa than expected for their size, whereas negative standardized residuals indicate fewer detected taxa than expected. Wildlife Ratings classify properties as Good, Average, or Poor relative to size-based expectations within this sample. These ratings are relative, within-sample classifications and should not be interpreted as absolute ecological quality classes.

Wildlife Rating	Standardized Residual	Predicted Richness	Native Mammal Richness	Property Acres	Site ID
Good	1.928	3.360	9	84	LM1
Good	1.715	3.983	9	200	LM4
Good	0.520	3.478	5	99	LM3
Average	0.138	2.596	3	29	LS6
Average	−0.123	3.360	3	84	LM2
Average	−0.136	2.397	2	22	LS7
Average	−0.204	2.596	2	29	LS5
Average	−0.317	2.927	2	46	LS1
Average	−0.384	2.122	1	15	LS4
Poor	−0.671	1.962	0	12	LS3
Poor	−0.896	2.620	0	30	LS2
Poor	−1.573	5.600	1	1900	LL1

2.5. Linking Social and Ecological Data

To address Research Question 1, perception scores and size-adjusted wildlife ratings were paired at the property level to evaluate the relationship between landowners' assessments of wildlife stewardship and the relative ecological indicator derived from camera-trap detections.

Within misaligned cases, directionality was used to further distinguish patterns. Overestimators are cases in which landowners rated their stewardship more positively than indicated by ecological outcomes, whereas underestimators are cases in which ecological outcomes exceeded landowners' self-assessments. In addition, aligned cases were distinguished as accurate high performers (Good–Good) and accurate low performers (Poor–Poor). These classifications were used to organize cases into perception–outcome categories representing distinct relationships between perceived and measured stewardship outcomes, which form the basis for subsequent analysis. For ease of presentation, these classification terms are used as shorthand for the direction and pattern of the relationship between landowner self-assessments and the size-adjusted detected native mammal richness indicator. They should not be interpreted as absolute assessments of landowner stewardship performance.

To address Research Question 2, which seeks to explain patterns of alignment and misalignment, qualitative data from the focus groups and the semi-structured interviews were used to interpret the conditions associated with the observed perception–outcome relationships.

Given that the results for Research Question 1 indicate that misalignment constitutes the majority of observed perception–outcome relationships, the qualitative analysis places particular emphasis on these cases. Misalignment is treated as an analytically revealing condition, allowing for identification of recurring processes associated with divergence between perceived and ecological outcomes, including limited ecological feedback, uncertainty about appropriate management practices, and reliance on informal and cross-boundary learning networks.

3. Results

3.1. Q1: Are Amenity Migrants' Management Perceptions Aligned with Ecological Indicators?

The comparison between landowners' self-evaluations of wildlife management and size-adjusted wildlife ratings derived from camera-trap detections revealed both alignment and misalignment, with misalignment occurring in 9 of 12 cases (75%; Figure 3). Overestimation was the dominant pattern, occurring in 8 of 12 cases (67%), while underestimation occurred in 1 of 12 cases (8%). Perceptions and ecological indicator classifications were aligned in 3 of 12 cases (25%), including 2 cases (17%) classified as accurate high performers and 1 case (8%) classified as accurate average performer.

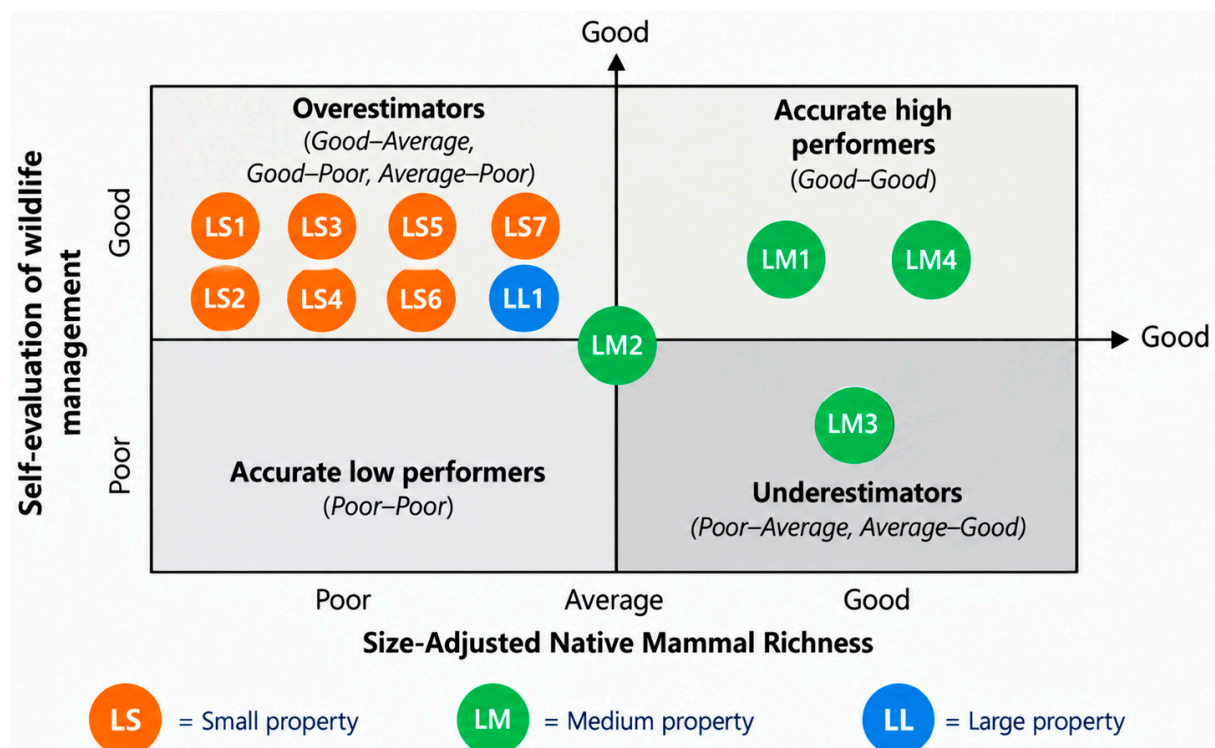


Figure 3. Size-adjusted detected native mammal richness indicator Alignment and misalignment between social and ecological data by property. Category labels are shorthand for relationships between landowner self-assessments and the relative, within-sample size-adjusted detected native mammal richness indicator and do not represent absolute assessments of stewardship performance.

Cases classified as overestimating relative to the size-adjusted detected native mammal richness indicator included all small-property landowners (LS1, LS2, LS3, LS4, LS5, LS6, LS7), as well as one large-property case (LL1). These landowners generally rated their

wildlife management as good or average, yet the size-adjusted detected native mammal richness indicator placed them in average or poor wildlife rating categories. The clustering of small properties within this quadrant suggests a possible association between property scale and patterns of overestimation relative to the ecological indicator.

Accurate high performers, defined by alignment between good self-evaluations and good size-adjusted wildlife ratings, constituted a small subset of the sample and were represented by medium-sized properties (LM1 and LM4). These cases reflect landowners whose perceptions of wildlife management effectiveness were aligned with the selected ecological indicator.

Underestimation relative to the ecological indicator was observed in a single medium-property case (LM3), whose wildlife rating exceeded the landowner's self-evaluation. A neutral reference case (LM2) occupied the midpoint of the distribution, showing alignment between average self-evaluation and average wildlife rating.

Overall, these patterns show that perceptions of wildlife stewardship were frequently misaligned with the size-adjusted detected native mammal richness indicator, even among landowners who explicitly prioritized wildlife management. The concentration of small properties within the overestimation quadrant suggests a potential association with property scale, although the small sample and role of property size in constructing the ecological indicator limit further inference.

Sensitivity checks indicated that individual ecological classifications were partly sensitive to threshold choice and model specification, but the overall perception-to-indicator pattern remained qualitatively consistent across analytical alternatives (Supplementary Table S2). Total camera-days did not explain additional variation in detected native mammal richness after accounting for property size ($\beta = -2.778$, $SE = 3.881$, $p = 0.492$), and camera effort did not explain the size-adjusted standardized residuals ($R^2 = 0.048$, $p = 0.496$). Wildlife-rating classifications were unchanged after accounting for camera effort, and the perception-to-indicator pattern remained 3 aligned cases, 8 cases of higher self-assessment relative to the ecological indicator, and 1 case of lower self-assessment. Using an alternative threshold of ± 0.25 produced the same overall pattern. Using a threshold of ± 0.75 produced 4 aligned cases and 8 cases of higher self-assessment, with no cases of lower self-assessment. When LL1 was excluded, the remaining 11 cases included 2 aligned cases and 9 cases of higher self-assessment, with no cases of lower self-assessment. Robust regression produced 4 aligned cases and 8 cases of higher self-assessment, with no cases of lower self-assessment. These results indicate that some individual ratings are sensitive to analytical decisions, but the predominance of higher self-assessment relative to the ecological indicator remained qualitatively consistent across analytical alternatives.

3.2. Q2: What Factors Are Associated with Observed Patterns of Alignment and Misalignment?

The distribution of cases indicates that misalignment between perceived and ecological wildlife outcomes predominated within this sample. To interpret these patterns, we draw on property-level interviews and broader focus-group discussions. While interviews provide case-specific insight into how landowners evaluate their own management outcomes, focus groups reveal shared patterns in how stewardship is conceptualized, how ecological feedback is interpreted, and how structural factors shape management decisions.

Across these accounts, four recurring dimensions associated with these patterns emerged: individual evaluation processes, ecological feedback constraints, institutional scale mismatches, and relational learning gaps. Together, these findings suggest that observed patterns of misalignment are associated with interacting processes operating across multiple scales of the rangeland social–ecological system, rather than solely with capacity limitations or isolated errors in individual judgment.

3.2.1. Individual-Level Evaluation and Learning

The qualitative data indicate that LSAMs evaluate stewardship success through individualized learning trajectories rather than externally calibrated ecological benchmarks. Landowners frequently described management as an ongoing process of experimentation, adaptation, and incremental improvement, grounded in the specific conditions of their properties. As one participant explained:

“I just started reseeding some native plants and trying different things to see what works. It’s kind of trial and error, but we’re trying to improve things as we go.”

Another landowner emphasized the contextual nature of their management decisions:

“Understanding the information in the context of your operation is different for everyone. The principles may be the same, but how you apply them depends on your place.”

These accounts illustrate that stewardship is commonly interpreted through a learning-oriented and context-dependent lens. Under this perspective, success is evaluated by study participants relative to perceived improvement over time rather than against standardized ecological indicators. One landowner described evaluating success in terms of perceived change over time: “So, while it’s a long-term plan, in three years, we’ve really seen quite a bit of change.” Overall, positive self-assessments often reflect effort, commitment, and a sense of ongoing contextualized improvement, rather than measurable wildlife outcomes, providing one explanation for the predominance of overestimation in the sample.

While these individualized evaluation processes shape how landowners interpret stewardship success, they do not operate in isolation. The extent to which self-referential assessments persist depends in part on the availability and clarity of ecological feedback linking management actions to observable outcomes. When such feedback is limited or ambiguous, learning-based evaluations are less likely to be corrected or recalibrated, allowing positive self-assessments to endure even in the absence of measurable ecological gains. In this sense, individual evaluation processes are closely intertwined with ecological conditions that shape what can be observed and learned from management actions.

3.2.2. Ecological Feedback Constraints

Ecological factors constitute a second dimension associated with how landowners estimate stewardship effectiveness. Many participants expressed uncertainty about whether observed wildlife presence reflected their own management actions or broader landscape dynamics. Such uncertainty is particularly relevant on small, parcelized properties, where ecological responses to property-level management may be incremental, spatially diffuse, and difficult to detect. Wildlife populations also move across property boundaries and depend on habitat conditions extending beyond individual parcels. This cross-boundary dynamic was recognized by landowners themselves. As one participant noted:

“You can do things in your place, but wildlife doesn’t stop at the fence. What happens next door matters just as much.”

Other participants expressed uncertainty about whether wildlife observed on their properties could be attributed to their management at all. As another landowner explained:

“Well, I mean, we have wildlife, but I’m not doing anything specific. They just come.”

These conditions create a scale mismatch between management actions and ecological processes, limiting the visibility of cause–effect relationships. As a result, ecological feedback linking management actions to observable outcomes is often weak or delayed. This constrains landowners’ ability to accurately evaluate stewardship effectiveness and

may contribute to observed patterns of misalignment between perceived and measured wildlife outcomes.

These ecological constraints not only limit the observability of management outcomes but also shape how individual learning processes unfold. When feedback is weak, delayed, or spatially diffuse, landowners are more likely to rely on subjective indicators of progress, reinforcing self-referential evaluation patterns. At the same time, the ability to respond to these ecological conditions is further mediated by the institutional context within which landowners operate. The extent to which management practices can be adjusted, scaled, or supported depends on how well institutional guidance aligns with the realities of small, fragmented properties.

3.2.3. Institutional Scale Mismatches

Institutional guidance and programmatic recommendations constitute a third dimension associated with observed patterns of alignment and misalignment, particularly when recommendations do not align with the realities of small, non-commercial parcels. Across cases, landowners described how recommended management practices implicitly assume larger properties, greater financial resources, and access to specialized equipment, conditions that are often absent among LSAMs. As one landowner noted, “I need 30 acres for conservation easement. . .,” highlighting how acreage requirements can limit access to certain conservation programs.

Consistent with prior research, LSAMs frequently operate under conditions of limited acreage, constrained labor, and partial reliance on off-farm income, while simultaneously navigating institutional systems designed for production-oriented landowners. As a result, recommended practices are often difficult to implement in practice. Participants commonly noted that practices such as prescribed burning or large-scale habitat management were constrained by parcel size, proximity to neighboring properties, liability concerns, and regulatory requirements. As one landowner explained:

“Everything we hear is designed for big ranches. On a place like ours, you can’t just go out and burn or move things around as they say.”

Similarly, study participants emphasized how small property sizes constrain the feasibility of recommended management practices. One landowner noted, “I don’t know that I have the perfect situation for [fire] here. . .,” pointing to the challenges of applying prescribed burning in fragmented landscapes with nearby neighbors. Another stated more directly, “It’s just too small of a place to do that with,” highlighting how scale alone can limit the implementation of certain interventions. In addition to spatial constraints, concerns about risk and the need for technical support further restricted adoption, as reflected in the comment, “I would never attempt a burn on my own. . . it’s so scary. . .” Together, these accounts illustrate how institutional recommendations, while technically appropriate at larger scales, become impractical or inaccessible at the parcel level, reinforcing a mismatch between prescribed management practices and the conditions under which LSAMs operate.

Beyond technical constraints, participants also described challenges navigating institutional programs and requirements, including agricultural exemptions, conservation programs, and land-use regulations. Many indicated that they lacked familiarity with these systems and struggled to access or interpret available support, a pattern consistent with findings that LSAMs often depend on institutional guidance that is poorly aligned with their needs and capacities. As another participant noted:

“There’s a lot out there, but it’s hard to know what applies to you or how to actually get started with it.”

These conditions reflect a broader institutional mismatch in which stewardship capacity is contingent on systems that were not designed for this emerging landowner population. While LSAMs often express strong commitments to ecological stewardship and conservation-oriented goals, their ability to translate these intentions into observable ecological outcomes may be constrained by limited institutional fit, accessibility, and flexibility. Stewardship outcomes are therefore not solely a function of individual motivation or knowledge, but also of the degree to which institutional structures align with landowners' scale, resources, and goals. Even highly motivated landowners may be unable to implement practices at scales capable of producing detectable ecological responses, potentially contributing to misalignment between perceived and measured outcomes. These constraints may also limit opportunities to generate ecological feedback that informs learning and evaluation, pointing to the importance of the relational contexts through which knowledge, experience, and expectations are exchanged.

3.2.4. Relational Learning and Calibration Gaps

Social networks play a critical role in shaping how landowners interpret and evaluate stewardship outcomes. Across cases, participants described limited interaction with neighboring landowners or experienced ranchers, particularly in recently subdivided landscapes where newcomers often lack shared histories, place-based knowledge, and established ties to local community networks. This pattern is consistent with prior work showing that LSAMs frequently enter working landscapes with limited integration into local social fields and reduced access to established networks for information, support, and learning [36].

Several landowners described relying on external sources of information in the absence of established local peer networks and relational feedback mechanisms. LSAMs indicated relying primarily on individualized learning strategies, including trial-and-error experimentation, online information sources, or occasional workshops. For instance, one participant noted that she “researched wildlife management plans online,” suggesting a reliance on self-directed and non-local sources of knowledge. Another indicated that their understanding of management practices came primarily from “the workshop,” referring to a training provided within the context of this study rather than to pre-existing community-based knowledge exchange. While these approaches provide valuable knowledge, they do not consistently offer the comparative feedback necessary to calibrate expectations against observable ecological outcomes. Prior research similarly finds that LSAMs depend heavily on outreach systems and informal learning channels that are often disconnected from locally specific conditions or peer-based exchange.

Interactions with neighbors, when mentioned, tended to be limited and instrumental. For example, one landowner described how a neighbor helped with tractor work, reflecting occasional assistance rather than an ongoing exchange of knowledge or collaborative learning. In other cases, neighbors were perceived as potential constraints rather than sources of support. As one landowner explained when discussing the use of prescribed fire, “I don’t know that my neighbors would like it,” revealing a degree of uncertainty and lack of confidence regarding how management decisions might be received within the local context. Together, these accounts illustrate how limited integration into local knowledge networks shifts learning toward dispersed, externally mediated, and non-comparative sources of information.

Importantly, relational dependence is not unique to new landowners. Even experienced ranchers rely extensively on local peer networks for knowledge exchange, labor sharing, informal advice, and reciprocal support. These interactional processes provide ongoing opportunities for comparison, feedback, and adjustment that help align management practices with ecological conditions. In contrast, LSAMs often operate with reduced access

to these networks, limiting opportunities for relational learning that underpin effective land stewardship.

Without access to trusted and ecologically comparable peers, landowners have limited ability to benchmark their management practices or outcomes against others operating under similar environmental and institutional conditions. As one participant explained:

“We don’t really know what others are doing around here, and everyone’s place is so different. You kind of just figure it out on your own.”

Another landowner highlighted the absence of locally grounded guidance:

“I wish there was someone nearby doing something similar so we could compare notes. Most of what we get is general advice, not really tied to places like ours.”

As a result, evaluation processes may become increasingly self-referential. Without regular opportunities for comparison, reflection, and adjustment through interaction with knowledgeable peers, perceptions of stewardship success may persist even when ecological indicators suggest weaker outcomes. Limited integration into local peer networks may therefore constrain feedback processes that would otherwise help landowners refine expectations and calibrate perceptions against ecological conditions.

Taken together, these findings suggest that observed patterns of misalignment are associated with processes extending beyond individual knowledge deficits. Relational learning provides a mechanism through which landowners can compare experiences, interpret ecological feedback, access locally relevant knowledge, and calibrate expectations within institutional and ecological contexts. From this perspective, the predominance of higher self-assessment relative to the ecological indicator within this sample may be associated with the combined influence of limited ecological feedback, institutional mismatch, and constrained opportunities for relational learning and social calibration in increasingly fragmented and socially reconfigured rural landscapes.

4. Discussion

While focused empirically on the sociodemographic shifts and related land ownership and use changes resulting from amenity migration, this study addresses the broader question of how fragmentation and heterogeneity in working landscapes reshape the processes through which stewardship emerges. The findings challenge the common assumption that differences in stewardship outcomes among amenity landowners can be explained primarily by variation in individual capacity. Existing scholarship on amenity migration, particularly studies of LSAMs, has often emphasized landowners’ knowledge, experience, and technical competence as key determinants of stewardship [9,12,13,37]. Guided by the RSEF, our multiscalar analysis suggests that divergence between perceived stewardship and ecological performance may arise from interacting processes across individual, institutional, community, and ecological domains, together with the relational mechanisms connecting them. The quantitative component of the study should be interpreted as exploratory rather than as a test of statistically generalizable relationships. The species–area model was used to construct a transparent within-sample ecological indicator for comparison with landowner self-assessments, not to establish a strong predictive relationship between property size and detected native mammal richness. More fundamentally, the study distinguishes between the measurement of ecological outcomes and explanations for divergence between perceived and measured outcomes. Independently measured ecological indicators remain indispensable for evaluating environmental performance. However, understanding why measured outcomes differ from those perceived by landowners requires attention to the multiscalar processes through which stewardship is enacted.

We interpret these findings cautiously because native mammal richness from a short-term camera-trap survey provides only a limited indicator of wildlife response. Richness may be influenced by seasonal activity patterns, regional species pools, detection probability, camera placement, adjacent land management, and landscape context. Accordingly, the ecological metric is best understood as a relative within-sample indicator used to compare wildlife-oriented properties, not as a comprehensive measure of stewardship success. The small analytical sample further warrants caution in interpreting these patterns. Nonetheless, we believe the findings signal the importance of incorporating multiscale analysis of changing social-ecological systems and outcomes.

At the individual level, LSAMs evaluated stewardship success through learning-oriented and context-dependent processes rather than externally calibrated ecological benchmarks. Many LSAMs interpret success in terms of effort, improvement, and commitment to land care, rather than observable ecological outcomes such as wildlife diversity or habitat condition. These evaluations are not necessarily inaccurate but reflect alternative definitions of stewardship grounded in experiential learning. However, they may diverge from ecological conditions when not anchored in observable ecological feedback or comparative benchmarks. These divergences are shaped not only by knowledge, but also by how landowners conceptualize nature and stewardship. Amenity migrants may approach landscapes through aesthetic and lifestyle-oriented lenses often shaped by the way they socially construct views of nature and how those inform their stewardship goals [18]. These can differ from functionally oriented management approaches [4,5]. In fire-prone systems, for example, such perspectives may conflict with disturbance-based management practices and influence how risks and interventions are perceived [37–39]. As a result, differences between perceived and observed outcomes reflect not only knowledge gaps, but differences in how stewardship success is defined.

At the ecological level, relationships between management actions and observed outcomes are complicated by property size and landscape fragmentation. Fragmentation can constrain wildlife movement and access to spatially distributed resources while disrupting ecological processes that operate across large, heterogeneous rangeland landscapes [40]. In small-parcel landscapes, wildlife populations and habitat dynamics may therefore operate at spatial scales exceeding individual property boundaries. Consequently, ecological conditions observed on a property may reflect broader landscape dynamics as well as site-level management, making it difficult for landowners to discern clear ecological responses to their own actions. These dynamics highlight a fundamental scale mismatch: ecological processes operate across landscapes, while management and evaluation occur at the parcel level. This limits the visibility of cause–effect relationships and complicates the interpretation of stewardship effectiveness.

At the institutional level, stewardship guidance and evaluation frameworks remain largely oriented toward larger, production-focused systems. Many LSAMs manage properties that fall below the operational scales assumed in traditional rangeland management recommendations [7,13]. When guidance is mismatched with these conditions, landowners face constraints in implementing practices capable of producing detectable ecological outcomes. This limits not only adoption and effectiveness of recommended practices, but also how success is defined and evaluated. Prior research similarly identifies misalignments between amenity landowners' needs and institutional design [4,9,13]. These institutional constraints are compounded by limited alignment between program design and the spatial realities of fragmented landscapes. Technical guidance often does not account for the configuration of small, adjacent properties or the cross-boundary ecological and social dynamics characteristic of fragmented landscapes. As a result, LSAMs may be

constrained in their ability to implement practices at scales sufficient to generate detectable ecological responses.

Relational processes connect these individual, institutional, and ecological dynamics by shaping opportunities for learning, comparison, feedback, and access to knowledge and resources. In recently subdivided and socially heterogeneous landscapes, limited access to local peer networks constrains both the calibration of stewardship expectations and access to practical support [7]. Without these relational feedback processes, LSAMs may rely more heavily on individualized experimentation and their own definitions of success, allowing perceptions of stewardship attainment to diverge from ecological indicators. Relational networks may therefore become particularly important where ecological feedback is difficult to interpret and institutional guidance is poorly aligned with the conditions of small, fragmented properties.

These findings underscore the importance of relational processes in shaping stewardship outcomes. Such integration is common among traditional producers who exchange knowledge, pool equipment and labor, and gain access to resources that would be difficult to secure independently [41–43]. Interactions with experienced land stewards and locally embedded networks provide opportunities for comparison, feedback, and adjustment that are often absent among LSAMs [9,13]. In their absence, evaluation processes become more self-referential, reducing opportunities for calibration between perceived and ecological outcomes. Further, relational processes may help reduce misalignments by facilitating communication and interaction across individual, institutional, and community domains. Through these interactions, actors can engage, negotiate, and learn about and with others, potentially developing capacities that better reflect the needs and realities of the reconfigured social-ecological system.

These findings suggest several implications for extension and future program design in privately managed working landscapes. Sustainability in these systems depends not only on whether individual landowners adopt recommended practices, but also on whether ecological feedback, institutional support, and relational networks allow management efforts to function across properties and over time. Cross-domain misalignment may undermine biodiversity conservation and landscape resilience even when landowners possess strong stewardship intentions. Conversely, improving alignment may strengthen the capacity of fragmented rangeland systems to sustain ecological functions while accommodating changing ownership patterns and diverse land-use objectives.

Taken together, these findings suggest that stewardship outcomes in contemporary fragmented and heterogeneous working landscapes cannot be adequately understood through individual-level explanations alone, without also accounting for how fragmentation reshapes the social-ecological conditions under which management occurs. Across regions of the Global North where land is predominantly privately owned, amenity migration, land subdivision, and changing land uses are transforming working landscapes into increasingly heterogeneous social-ecological systems [7]. Our findings extend social-ecological systems scholarship by providing exploratory evidence of how socially driven fragmentation may contribute to cross-domain misalignments that shape stewardship outcomes. Understanding these changing conditions is essential for advancing conceptual frameworks of fragmented landscapes while informing extension, conservation, and governance approaches better suited to increasingly heterogeneous working landscapes. Ultimately, fragmentation is not simply a change in landscape pattern; it is a transformation in the conditions under which stewardship and governance take place.

5. Conclusions

This study provides exploratory evidence from twelve wildlife-oriented properties in Texas, interpreted through interviews and focus groups. Findings suggest that stewardship outcomes in amenity-driven rangeland systems cannot be understood through individual capacity alone. Instead, alignment between perceived stewardship effectiveness and a relative, within-sample indicator of size-adjusted detected native mammal richness appears to reflect interactions across ecological processes, spatial scales, institutional arrangements, and relational networks. From a multiscale social–ecological perspective, misalignment may therefore emerge not simply from knowledge deficits, but when management efforts are not accompanied by meaningful ecological feedback, appropriately scaled institutional support, and opportunities for coordination and learning.

These findings highlight implications for extension and stewardship programs in increasingly fragmented working landscapes. Rather than relying primarily on information delivery, programs may benefit from combining ecological feedback that helps landowners assess stewardship outcomes, guidance appropriate to the scale and conditions of their properties, and relational learning opportunities that facilitate knowledge exchange and cross-boundary coordination. Such approaches may better support stewardship as demographic, economic, and land-use changes continue to reshape working landscapes.

Study Limitations

Several limitations related to the social component of the study should be considered when interpreting the findings. First, the property-level analysis relies on a small, self-selected sample of landowners who volunteered for follow-up property visits and who identified wildlife management as a central stewardship objective. The findings should therefore not be interpreted as statistically representative of the broader LSAM population. Second, perceived stewardship effectiveness was based on landowners' self-assessments and consequently reflects their own understandings, experiences, and criteria for evaluating successful stewardship. Third, comparing these perceptions with an independently derived ecological indicator brings together distinct evaluative systems that do not necessarily define or measure stewardship success in equivalent ways. The resulting patterns of alignment and misalignment should therefore be understood as correspondence between these different forms of assessment rather than as determinations that landowners' evaluations are inherently correct or incorrect. Finally, while property-level interviews provide case-specific evidence, the broader focus-group data identify recurring processes within the study population and cannot establish that those processes operated uniformly across each of the classified properties. Accordingly, the qualitative findings are interpreted as processes associated with patterns of alignment and misalignment rather than as causal explanations for individual cases.

Several ecological limitations should also be considered. The ecological indicator used here represents detected native mammal richness from targeted camera-trap surveys, not true native mammal richness or a comprehensive measure of wildlife stewardship success. Detections may have been influenced by seasonal activity patterns, regional species pools, surrounding habitat, landscape connectivity, water availability, detection probability, camera placement, and adjacent land management. Some species may have been present but undetected, particularly given the short sampling period and the use of only one or two cameras per property. Cameras were intentionally placed at features expected to increase mammal detections, such as fences, trails, water sources, and other wildlife-use areas, and the design should therefore be interpreted as a targeted detection survey rather than a randomized property-wide inventory. Sampling effort also varied among properties, although the camera-effort sensitivity check indicated that total camera-days did

not explain additional variation in detected native mammal richness or change the wildlife-rating classifications. Finally, the size-adjusted wildlife ratings are heuristic, within-sample classifications derived from a small sample of 12 properties and should be interpreted as exploratory indicators rather than absolute ecological quality classes.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su18189629/s1>, Supplementary Table S1. Native mammal species and interpretable native mammal categories detected across the twelve wildlife-oriented properties included in the alignment analysis. Supplementary Table S2. Sensitivity of perception-to-indicator alignment patterns across ecological classification approaches. Higher SA indicates cases in which landowner self-assessment was higher than the ecological indicator. Lower SA indicates cases in which landowner self-assessment was lower than the ecological indicator. Ecological indicators are based on size-adjusted detected native mammal richness. The camera-effort adjusted classification produced no classification changes. At the ± 0.25 threshold, LS1 and LS4 changed ecological classifications. At the ± 0.75 threshold, LM3 and LS3 changed ecological classifications. Excluding LL1 changed classifications for LS3, LM3, LS1, and LM2. Robust regression changed classifications for LM3 and LS3. The sensitivity output supports those exact classification changes.

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