

INITIATING ORGANIZATIONS

SHANGHAI FORESTRY STATION
INSTITUTE OF BIODIVERSITY SCIENCE, FUDAN UNIVERSITY
SHAN SHUI CONSERVATION CENTER

2025

SHANGHAI

RACCOON DOG CENSUS REPORT

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Introduction

1. Conservation and Management Needs for Raccoon Dogs in Shanghai

The raccoon dog (*Nyctereutes procyonoides*) is a Class II national protected species in China and is widely distributed across eastern, central, and southern China. During the process of urban expansion in Shanghai, the species once experienced a rapid contraction in its local distribution. In recent years, however, with the continuous improvement of Shanghai's ecological environment, raccoon dogs have gradually adapted to urban habitats, and their distribution has continued to expand. Since 2021, preliminary estimates have suggested that approximately 3,000-5,000 wild raccoon dogs inhabit urban Shanghai, occurring in more than 300 residential compounds and urban green spaces. The phenomenon of species urbanization has attracted widespread public attention and has also created a series of challenges for wildlife conservation and management. For example, improperly disposed household food waste and cat food feeding contributed to excessive population densities, abnormal behavioral patterns, and increased health risks such as sarcoptic mange. Meanwhile, insufficient public awareness of wildlife conservation may also lead to conflicts between raccoon dogs and domestic pets.

To address these challenges and advance harmonious coexistence between humans and wildlife, the Shanghai Forestry Station, the Institute of Biodiversity Science, Fudan University, and the Shan Shui Conservation Center jointly launched the Raccoon Dog Census project in 2022. The project aims to comprehensively assess the distribution and population density of raccoon dogs in Shanghai, accurately identify the key factors influencing changes in their abundance, and gain an in-depth understanding of local residents' attitudes toward the species. The findings are intended to provide a scientific basis for fostering harmonious coexistence between people and nature in Shanghai's urban ecosystem.

2. Development of the Raccoon Dog Census Project

The Raccoon Dog Census project has developed through two main phases:

1) Phase I: 2022-2023

A stratified sampling approach was adopted. The survey area was divided into different grid cells based on human population density and the

vegetation index, and representative residential compounds were selected for field surveys. During this phase, the geographic scope of the Raccoon Dog Census project expanded from Songjiang District to three districts - Songjiang, Qingpu, and Minhang - and the number of surveyed residential compounds increased to 90. Over the two-year period, there were a total of 566 participants of team leaders and volunteers.

2) Phase II: From 2024 onward

To gain a more comprehensive understanding of the citywide distribution of raccoon dogs, the survey strategy was adjusted beginning in 2024. Building on the stratified sampling framework, information from previous online questionnaires and reports of raccoon dog sightings received through the 12345 Shanghai Citizen Service Hotline was incorporated, with targeted surveys focusing on residential compounds where raccoon dogs had recently been reported. In 2024, the survey coverage expanded to eight administrative districts, with a total of 511 participants by team leaders and volunteers.

In 2025, the survey coverage was further expanded to nine administrative districts. A total of 519 volunteers surveyed 112 residential compounds. The survey activities included investigating the distribution and abundance of raccoon dogs, conducting interviews with community residents, and documenting environmental conditions and management practices within residential compounds. A total of 262 valid transect survey tracks and 253 survey records were collected. Approximately 95% of the surveys achieved complete coverage of the designated survey areas as planned, with the total length of transects exceeding 560 km. Through resident attitude interviews, 440 questionnaires on residents' perceptions were collected, providing important data support for understanding the current status of human-raccoon dog coexistence.

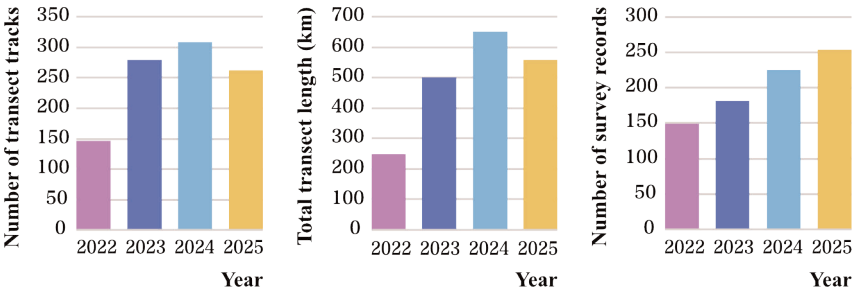


Figure 1. The number of completed transects (left), total transect length (middle), and number of valid survey forms (right) in the Raccoon Dog Census project all showed significant increases from 2022 to 2025.

Volunteers who participated in the surveys were invited to provide feedback on their survey experiences. A total of 170 valid questionnaires

were collected, with an average satisfaction score of 4.77 out of 5.

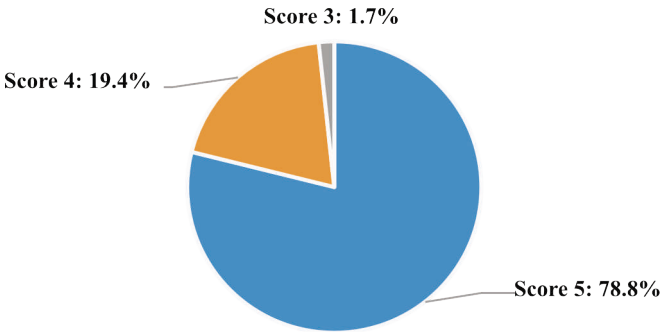


Figure 2. Feedback results from volunteers (maximum score: 5 points).

3. Significance and Outcomes of the Project

The Raccoon Dog Census project is the first citizen science-based city-wide survey of urban wild mammals conducted in a megacity in China. The project has established a collaborative model involving the Shanghai Forestry Station, the Institute of Biodiversity Science, Fudan University, and the Shan Shui Conservation Center, integrating government coordination, scientific support, and public participation. Through complementary strengths and joint efforts, the project provides a replicable and scalable “Shanghai model” for promoting harmonious coexistence between people and nature in megacities.

In terms of research outputs and knowledge transfer, the project published a total of seven peer-reviewed academic papers between 2022 and 2025, including five SCI papers and two papers in Chinese core journals, produced nearly 100 science communication articles, and delivered more than 90 public lectures and outreach events. In September 2024, the “Raccoon Harmony Community” science education center in Yushanghai Community was officially established and opened. In October 2024, the community handbook “Urban Wildlife in Shanghai: A ‘What to Do’ Handbook” for Common Urban Wildlife in Shanghai was released, followed by the release of the Shanghai Urban Nature Observation Themed Science Education Course Package in May 2025. These efforts have gradually shaped a community-based urban biodiversity conservation solution developed in Shanghai and applicable nationwide.

The social impact of the project has continued to grow, and it has developed into a long-term initiative widely recognized in the fields of biodiversity conservation management and public participation. In 2022, the project was selected as one of the “100+ Global Typical Cases of Biodiversity Conservation” recommended by the Convention on Biological Diversity (COP-15). In 2023, it was recognized as an outstanding biodiversity

conservation case in Shanghai. In 2024, the project was showcased at the opening ceremony of the Shanghai Science Festival and received multiple awards, including the 12th Liang Xi Science Popularization Award (Activity Category), the Top 10 Public Participation Cases of the “Beautiful China, I Am a Contributor” initiative launched by the Ministry of Ecology and Environment of China, the Silver Award at the 4th “Dedication Cup” Shanghai Youth Volunteer Service Project Competition, the Silver Award at the 7th China Youth Volunteer Service Project Competition, and the First Prize in the Science Communication Achievement Category of the Shanghai Science Popularization Education Innovation Award. In addition, the project was supported by the Science Popularization Special Program of the 2024 “Science and Technology Innovation Action Plan” of the Shanghai Science and Technology Commission (Grant No. 24DZ2307300).

Photo by Li Yuhan



Survey Methods

The Raccoon Dog Census project innovatively adopted citizen science, an internationally recognized approach widely applied in ecological monitoring, biodiversity surveys, climate change research, and other fields. This approach effectively addressed two key challenges. First, raccoon dogs are widely distributed across urban residential compounds in Shanghai, with their habitats highly overlapping with human living environments. The participation of citizen volunteers enabled the research team to collect data across a broader spatial range and conduct more accurate analyses. Second, under standardized training and scientific guidance, citizen volunteers participated in transect surveys and interview-based data collection. Through these activities, they not only gained scientific knowledge related to urban biodiversity but also enhanced their scientific literacy and conservation awareness, thereby promoting broader social recognition and support for harmonious human-wildlife coexistence.

To ensure the scientific reliability of the data, the project adopted rigorous approaches in both survey design and implementation. For site selection, survey locations were determined through systematic sampling. A combination of questionnaire-based interviews and transect surveys was applied to comprehensively investigate the distribution range and population abundance of raccoon dogs across nine administrative districts in Shanghai, including Songjiang, Qingpu, Minhang, Changning, Jiading, Jinshan, Baoshan, Putuo, and Pudong District, while also assessing community residents' attitudes toward raccoon dogs.

Regarding survey timing, the project team considered the diurnal activity patterns of raccoon dogs (with peak activity occurring from dusk to early morning, when individuals are more likely to be detected), together with residents' typical availability, volunteer safety considerations, and the survey schedule used in previous years. Field surveys were conducted on the evenings of July 12 (Saturday) and July 19 (Saturday), from 18:00 to 21:00. Including team leaders, a total of 519 participants were recorded across the two survey sessions (excluding accompanying individuals). Consistent survey timing was maintained throughout the 2022-2025 period, ensuring the comparability of survey results across different years.

1. Recruitment of Citizen Scientists

In May 2025, the project published recruitment announcements through

the official WeChat accounts of the Shan Shui Conservation Center and Shanghai Forestry, which were widely reposted by multiple organizations. The announcements received more than 6,000 views in total, ultimately leading to the successful recruitment of 366 volunteers and team leaders.

The demographic composition of participants demonstrated the project's broad public appeal and distinctive participation characteristics. First, volunteers were predominantly young people under the age of 40, accounting for nearly 80% of participants, and female participation was notably higher, accounting for 71%. Second, more than half of the participants (55%) had previous experience in biodiversity surveys, providing a strong foundation of expertise within the volunteer team. Third, participants' professional backgrounds aligned well with the needs of biodiversity surveys, with students, teachers, and freelancers representing the three largest occupational groups.

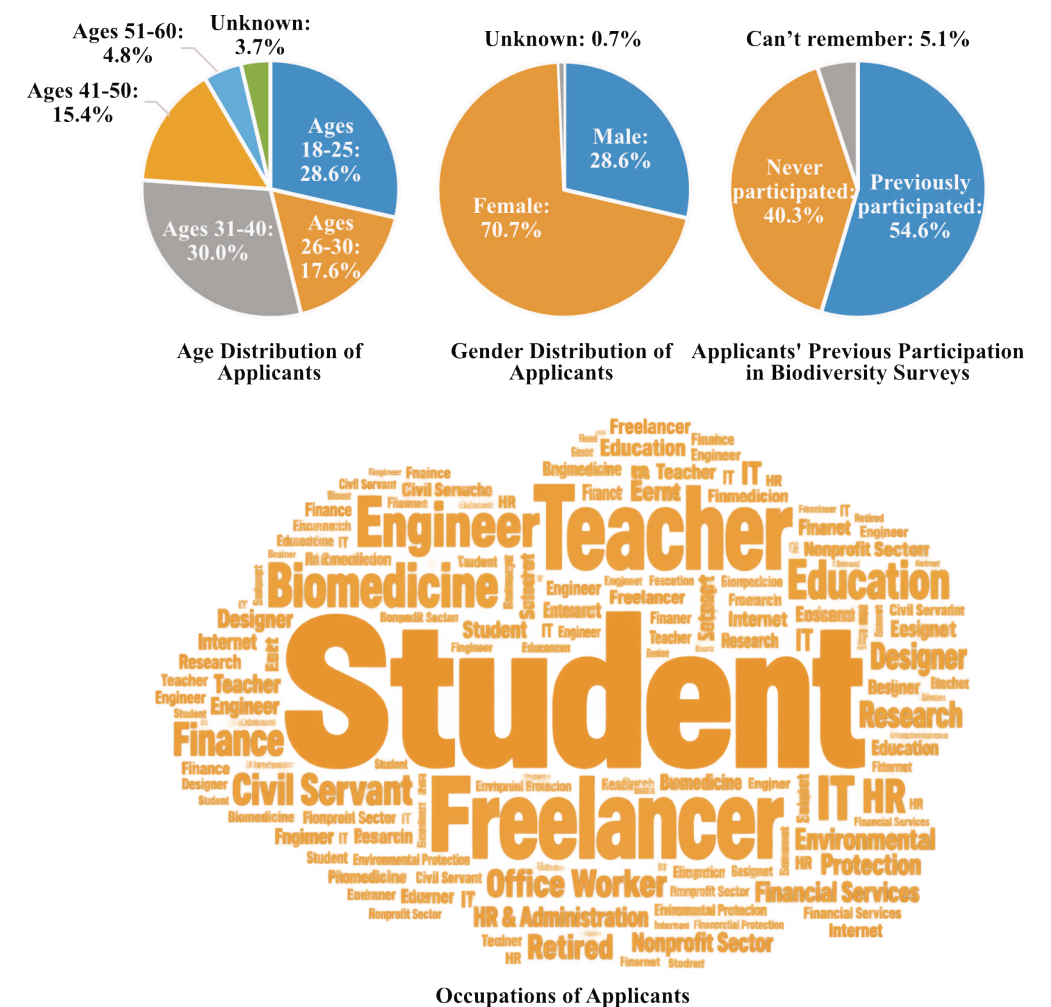


Figure 3. Age, gender, and other characteristics of citizen volunteers.

2. Survey Site Selection

In 2025, the Raccoon Dog Census project improved its site selection strategy. Based on results from online questionnaires and reports submitted through the 12345 Citizen Service Hotline, the survey focused on residential compounds where raccoon dog occurrences had been reported between January 2024 and April 2025. Using a systematic sampling approach, the project selected residential compounds with higher reported raccoon dog abundance and a greater likelihood of raccoon dog sightings. A total of 112 residential compounds were ultimately selected as survey sites. This improvement enhanced the targeting of surveys, increased the representativeness of selected residential compounds, and enabled the survey results to better address residents' concerns and support residential compounds in mitigating human-raccoon dog conflicts, while also improving the survey experience for volunteers.

Each survey team consisted of one team leader and 1-10 citizen volunteers. Team leaders included members from the three partner organizations, as well as professional staff from the Shanghai Natural History Museum, Songjiang District Forestry Station, Forest City Studio, and other organizations. Notably, among the 59 team leaders in 2025, 35 had previously participated in the Raccoon Dog Census as citizen volunteers and voluntarily applied to become team leaders this year.

3. Transect Surveys

To ensure consistency in survey methods and data reliability, all participants of the Raccoon Dog Census project received online training one week before the survey. Standardized survey protocols were introduced, and WeChat groups were established for each residential compound to facilitate communication between team leaders and survey members.

Before fieldwork, team leaders designed survey transects for each site based on satellite imagery. Transects were arranged to avoid overlap, maintain similar lengths, and maximize coverage of community pathways.

During field surveys, all teams started at 19:30 and surveyed along assigned transects, recording raccoon dog occurrences within 10 m on both sides of the transect using flashlights and urban lighting. For each sighting, data on the number of individuals, age class, behavior, habitat type, and health condition were recorded, along with information on community management practices such as cat feeding and waste management. Survey routes and observation locations were recorded using the "Two Steps" app, and all data were reviewed and submitted by team leaders after the survey.

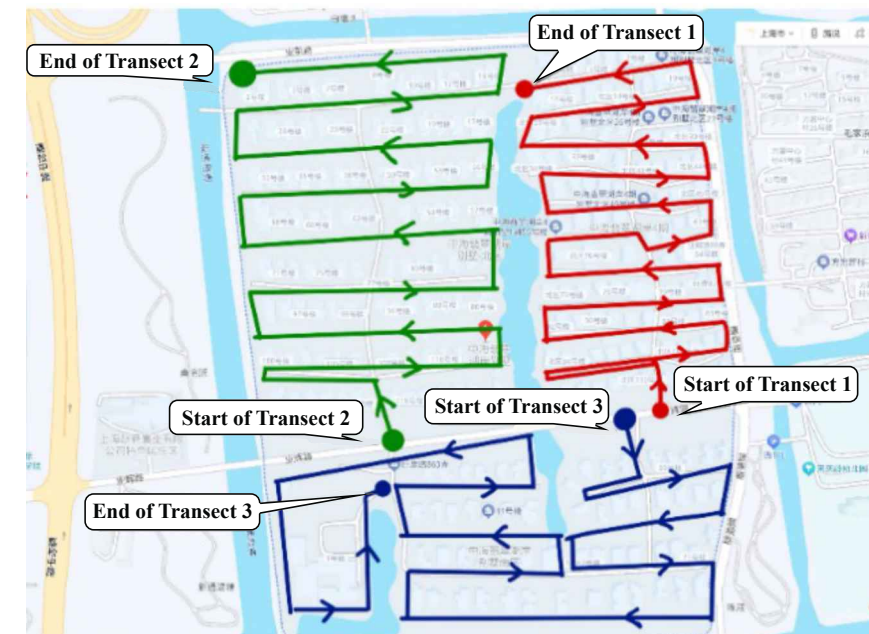


Figure 4. Example of survey transects (three survey teams conducted surveys along transects marked in different colors).

4. Interview Surveys

Before the field surveys began at 19:30, survey teams conducted community interviews from 18:00 to 19:30. The interviews collected information on raccoon dog sightings in the residential compounds during 2025, including the number of individuals observed, behavior types, sighting locations, surrounding habitat types, and health conditions. The collected information was recorded in survey forms (Appendix I). At the same time, community residents were invited to complete the "Residents Attitudes Toward Raccoon Dogs Questionnaire" (Appendix II).



Table 1. Survey record form

No.	Time	Location	Location number Date + community name + transect number + observation point ID e.g., 241101 Yushanghai A01	Number of individuals			Distance (m)	Behavior	Habitat type	Skin conditions such as manges	Notes
				Total	Adult	Juvenile					
Example	19:13	Shrubland south of Building No. 11		3		Leave blank if uncertain	20	☒ Walking/ Running ☐ Vocalizing ☒ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/ concrete/brick/stone pavement, etc.) ☒ Grassland ☒ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☒ Uncertain ☐ Other	One individual was observed at first, and two were observed later.
1								☐ Walking/ Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/ concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
2								☐ Walking/ Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/ concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
3								☐ Walking/ Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/ concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	



03 Key Results

1. Changes in Raccoon Dog Abundance, Density, and Key Influencing Factors

1) Expansion of Raccoon Dog Distribution

Comprehensive analysis of the four-year Raccoon Dog Census data shows that the current core distribution areas of raccoon dogs remain concentrated in Songjiang and Qingpu districts of Shanghai (Figure 5). Notably, in 2025, raccoon dogs were recorded for the first time in Putuo District, indicating that the species’ expansion and movement within Shanghai’s urban environment are still ongoing. This dynamic process highlights the importance of long-term continuous monitoring. Long-term urban biodiversity monitoring programs, such as the “Raccoon Dog Census,” can provide timely information on changes in wildlife abundance and spatial distribution,

offering critical support for wildlife conservation and management efforts.

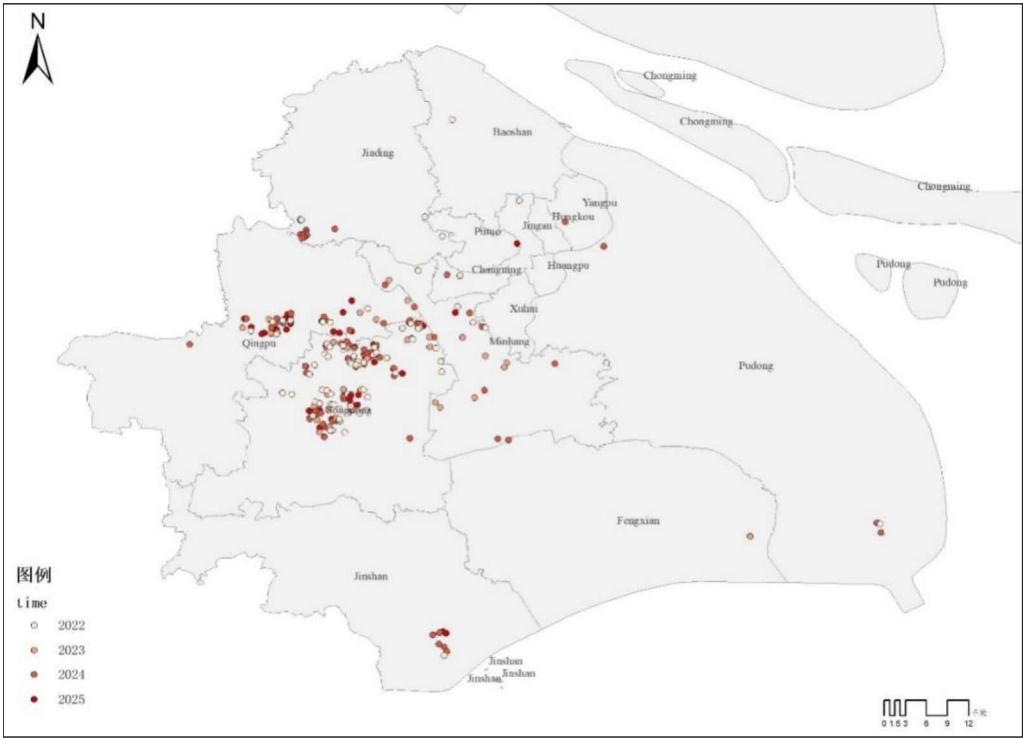


Figure 5. Changes in the distribution of raccoon dogs in Shanghai from 2022 to 2025

2) Raccoon dog population density and encounter rates remained generally stable over three consecutive years

Among the 112 residential compounds surveyed in the 2025 “Raccoon Dog Census,” raccoon dogs were confirmed in 102 residential compounds through transect surveys and community interviews, accounting for 91% of all surveyed residential compounds. No raccoon dog presence was detected in the remaining 10 residential compounds (9%).

Among the 102 residential compounds with raccoon dog presence, direct sightings were recorded in 64 residential compounds through transect surveys, while the remaining 38 residential compounds were identified through resident interviews. Raccoon dog density ranged from 0.03 to 4.66 individuals /ha, with an average of 0.41 individuals /ha. The encounter rate ranged from 0.07 to 12.06 individuals /km of transect, with an average of 1.02 individuals /km of transect.

Songjiang and Qingpu Districts accounted for the majority of surveyed residential compounds (90 residential compounds) and showed the highest average raccoon dog density and encounter rate (Figure 6; Table 2).

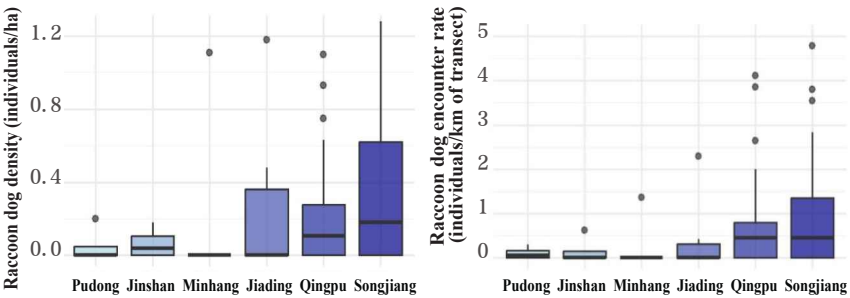


Figure 6. Raccoon dog density and encounter rate across districts in Shanghai

Table 2. Raccoon dog density and encounter rate across districts in Shanghai

District	Number of surveyed residential compounds	Mean raccoon dog density (individuals/ha)	Mean raccoon dog encounter rate (individuals/km of transect)
Songjiang	58	0.54	1.36
Qingpu	32	0.36	0.92
Jiading	6	0.28	0.45
Minhang	5	0.22	0.27
Jinshan	4	0.07	0.11
Pudong	4	0.05	0.16

In the 2025 Raccoon Dog Census, an approximate 10% of surveyed residential compounds showed relatively high raccoon dog density and encounter rates. Specifically, eight residential compounds (7% of all surveyed residential compounds) had raccoon dog densities exceeding three times the overall average, with a mean density of 2.85 individuals /ha. Meanwhile, ten residential compounds (9%) had encounter rates exceeding three times the overall average, with a mean encounter rate of 3.75 individuals /km of transect. These results reflect spatial variation in urban wildlife distribution and indicate that some local areas may face higher ecological carrying capacity pressures and corresponding management needs.

Compared with data from 2022, the current raccoon dog population has declined substantially. In 2022, residential compounds with raccoon dog presence had an average density of 1.08 individuals /ha and an average encounter rate of 2.80 individuals /km of transect. By 2025, these two indicators had decreased by 62.0% and 63.6%, respectively. This substantial decline suggests that the previously high local densities of raccoon dogs in urban residential compounds, which attracted considerable public attention in 2022, have been significantly reduced.

Over the past three years, the raccoon dog population in Shanghai has remained relatively stable. In residential compounds with raccoon dog presence, average density was 0.43 and 0.44 individuals /ha in 2023 and 2024, respectively, while average encounter rates were 1.15 and 1.06 individuals /km of transect. In 2025, both indicators remained stable, with only minor decreases compared with 2024 (6.8% decrease in density and 3.8% decrease in encounter rate).

Despite the expanded survey coverage and focus on residential compounds with raccoon dog presence, density and encounter rates showed a stable trend with a slight decline from 2023 to 2025, suggesting that the overall raccoon dog population in Shanghai has remained stable. The declining encounter rate may indicate reduced human-raccoon dog interactions and help lower potential human-wildlife conflict risks.

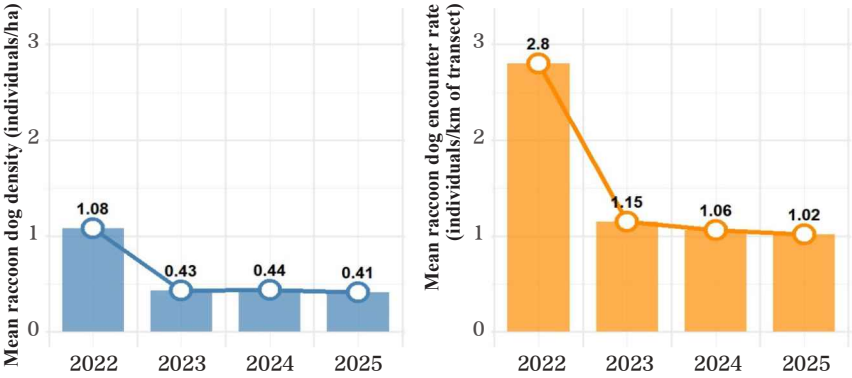


Figure 7. Changes in raccoon dog density and encounter rate from 2022 to 2025

Longitudinal data from four residential compounds (Yushanghai, Mil-anuoguidu, Ludiqiangweijiuli, and Yueliangheguiyuan) over four consecutive years indicate that their raccoon dog population dynamics have reached a stable phase. Except for a single-year fluctuation in Mil-anuoguidu in 2024, the average density and encounter rate in the other three residential compounds remained unchanged or continued to decline in 2025 compared with 2024 (Figure 8).

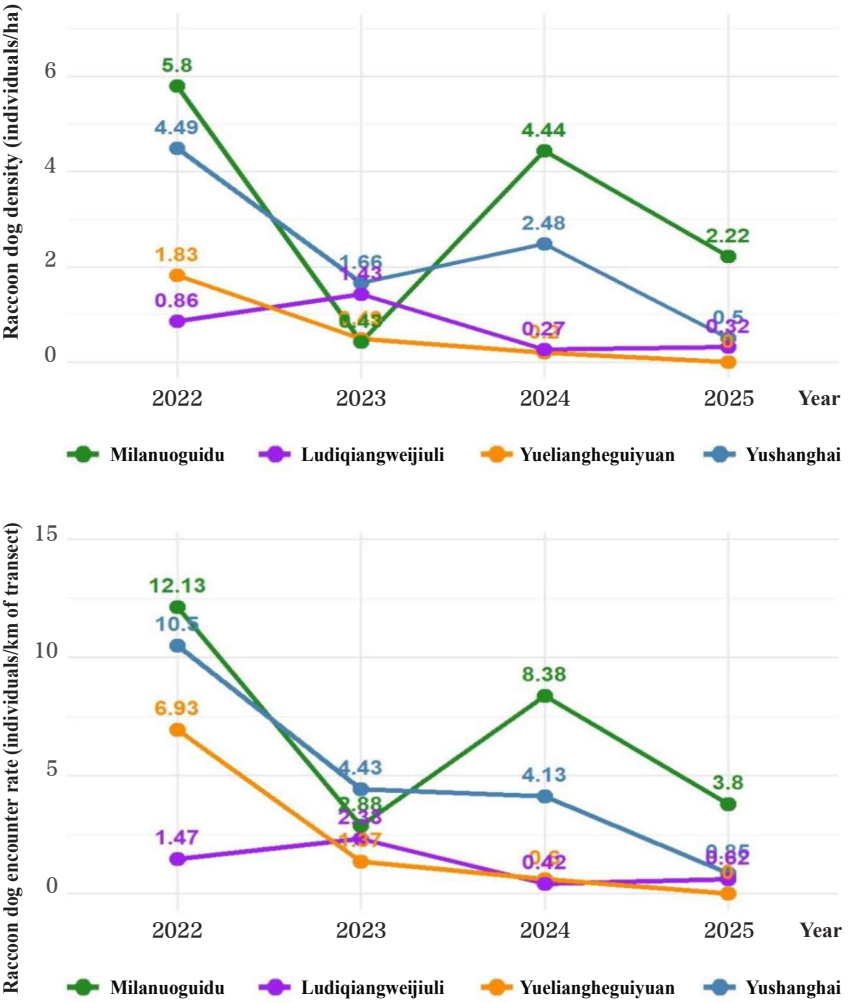


Figure 8. Changes in raccoon dog density and encounter rate in four residential compounds from 2022 to 2025

Overall, raccoon dog density and encounter rates in urban Shanghai have remained relatively stable over the past three years (Figure 7). This suggests that, with the implementation of current management and public education measures, raccoon dog population dynamics have transitioned from an earlier rapid growth phase to a more stable phase, indicating initial effectiveness of the integrated management strategy.



Photo by Wu Yiqian

Despite the overall stable trend, some surveyed residential compounds still showed substantially higher raccoon dog density and encounter rates than the citywide average, reflecting ongoing spatial variation in raccoon dog distribution within urban Shanghai. Future management should maintain overall stability while focusing on these high-density residential compounds through targeted and adaptive monitoring and interventions. Key measures include strengthening waste and pet food management, optimizing habitat conditions, and improving community communication and co-management mechanisms to address potential emerging human-wildlife conflict challenges.

3) Urban raccoon dogs prefer highly vegetated and low-disturbance environments

As a medium-sized carnivore highly adapted to urban environments, raccoon dogs show clear responses to different urban ecological factors, including habitat preferences and avoidance patterns (Figure 9). Model results showed that raccoon dog abundance was significantly positively correlated with canopy cover ($P < 0.001$). As canopy cover increased, raccoon dog abundance also increased, suggesting that mature trees provide suitable vegetation structures for shelter and habitat use. In addition, the proportion of water bodies was positively associated with raccoon dog abundance ($P < 0.001$), indicating that urban water features and moist habitats may provide supplementary resources and movement corridors, supporting population activity and connectivity.

Meanwhile, raccoon dog abundance was significantly negatively correlated with road density ($P < 0.001$), suggesting that traffic disturbance and human activity restrict raccoon dog activity. Population density showed a marginally negative association with raccoon dog abundance ($P < 0.1$), indicating that raccoon dogs can tolerate moderate levels of human activity but tend to select habitats characterized by a “preference for vegetation and avoidance of disturbance.”

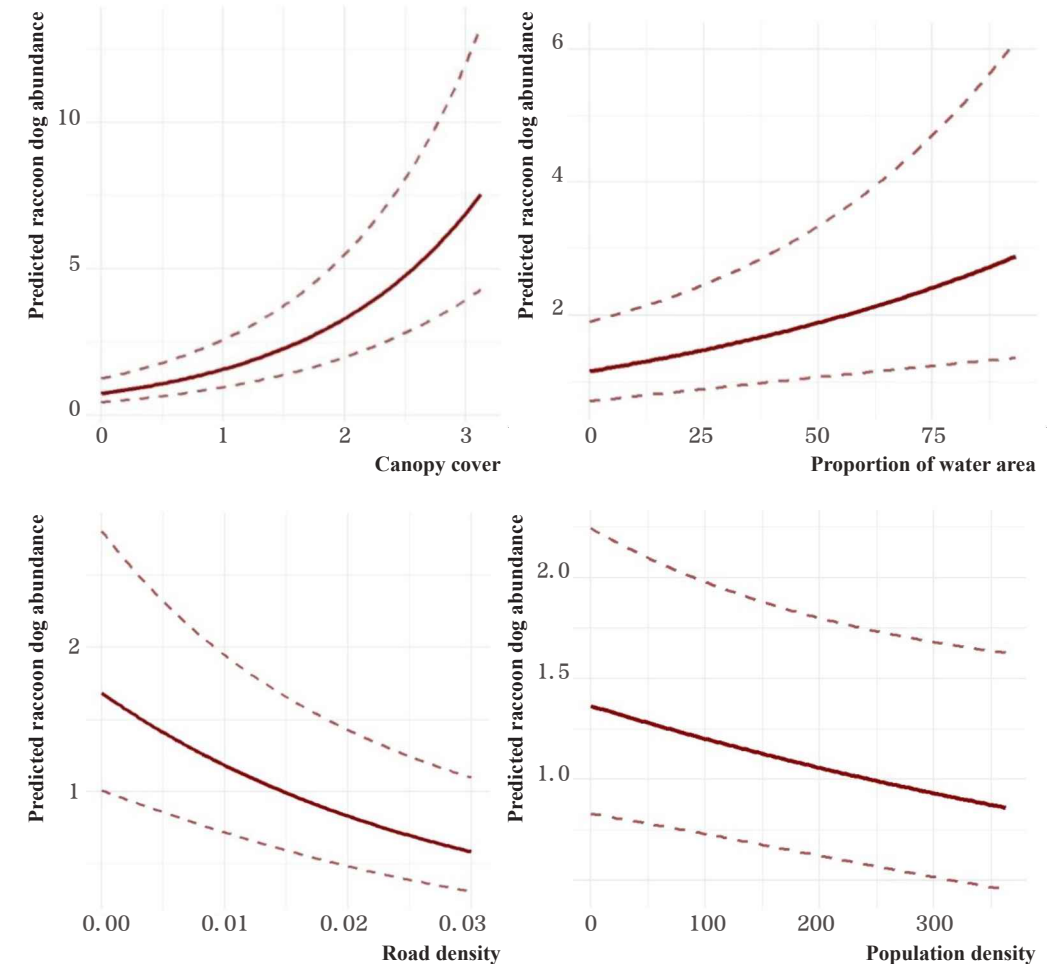


Figure 9. Responses of raccoon dog abundance to environmental factors

Overall, raccoon dogs in urban environments exhibit a “preference for vegetation and avoidance of disturbance” pattern, showing dual responses to both natural and anthropogenic factors. **They tend to select urban-natural transitional areas with abundant vegetation, sufficient water resources, and lower road density, while showing relatively lower activity levels in areas with high population density or heavy traffic.** By balancing natural resources and anthropogenic disturbances, raccoon dogs demonstrate high behavioral plasticity in urban environments.

4) Improper feeding practices and waste management contribute to abnormal raccoon dog abundance

Multivariate generalized linear regression analysis showed that **cat feeding and improper wet waste management were the primary factors contributing to increased raccoon dog abundance in local areas** ($P < 0.001$) (Figure 10), with effects substantially stronger than those of natural environmental factors such as vegetation and water availability.

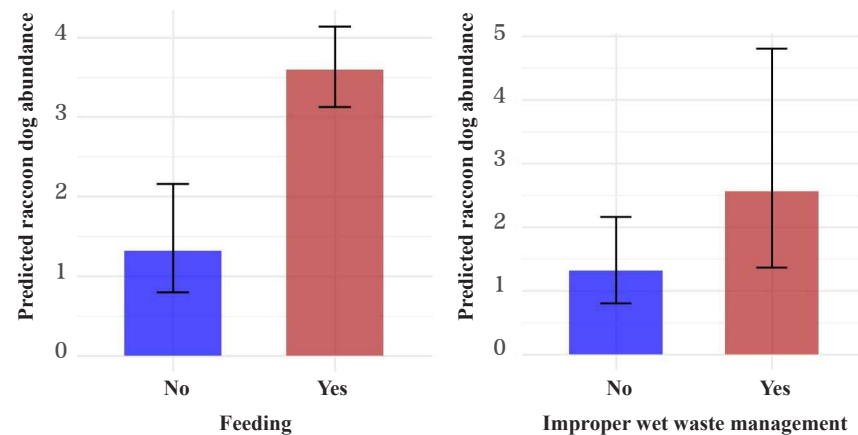


Figure 10. Effects of feeding and wet waste management on raccoon dog abundance

Residential compounds with cat feeding had a mean of 3.60 ± 0.50 raccoon dog sightings, 2.75 times higher than residential compounds without cat feeding (1.31 ± 0.68), representing an increase of approximately 175%. Residential compounds with improper wet waste management had 2.56 ± 1.72 sightings, 1.95 times higher than those with proper management (1.31 ± 0.68).

When both factors co-occurred, raccoon dog sightings increased further to 4.36 ± 1.10 individuals, 3.32 times higher than residential compounds without either factor. **These results suggest that anthropogenic factors, particularly feeding practices and waste management, have become key drivers of local raccoon dog aggregation in urban environments.**

5) Higher raccoon dog abundance increases skin disease risk

Among the 102 residential compounds with raccoon dog presence surveyed in 2025, skin diseases were detected in 17 residential compounds, with an overall prevalence of 16.6%. Sarcoptic mange caused by animal-associated mites was the main suspected pathogen. Although it generally does not infect humans, it can cause skin lesions such as mange and hair loss in raccoon dogs, free-ranging cats, and domestic dogs through cross-species transmission, and may lead to secondary infections or mortality in severe cases.

Multivariate generalized linear regression showed that among all tested variables, skin disease occurrence was positively associated only with raccoon dog abundance ($P < 0.1$) (Figure 11). When raccoon dog abundance exceeded 30 individuals per community, the probability of disease occurrence increased markedly to 43%. These results suggest that higher raccoon dog abundance may increase contact rates among individuals and elevate the transmission risk of pathogens such as mange mites among raccoon dogs, free-ranging cats, and domestic dogs, highlighting the need for attention in urban wildlife and animal health management.

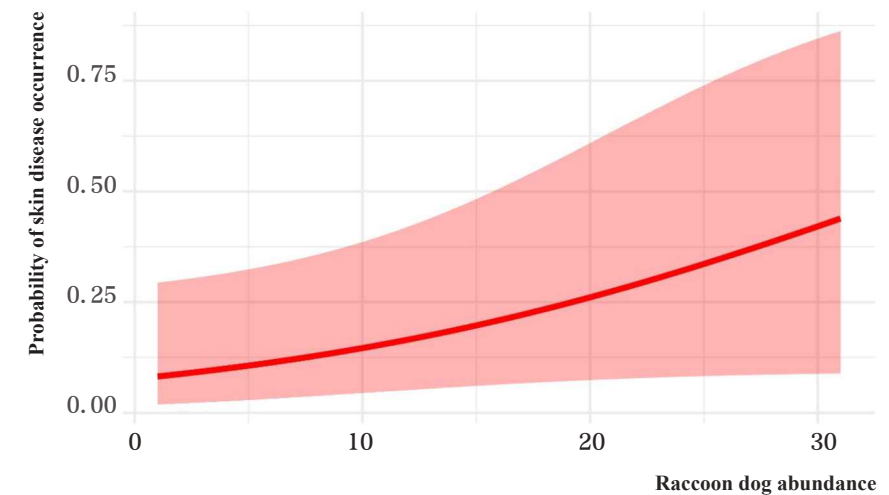


Figure 11. Relationship between raccoon dog abundance and the probability of skin disease occurrence

2. Changes in Shanghai Residents' Awareness and Attitudes toward Raccoon Dogs

The distribution and density of raccoon dogs in urban residential compounds are not only ecological issues but also directly influence residents' daily lives and perceptions. To examine changes in residents' awareness and attitudes toward their "wildlife neighbors" and provide support for future community management and public education, the project conducted the Survey on Shanghai Residents' Attitudes toward Raccoon Dogs during the "Raccoon Dog Census." A total of 1,652 valid questionnaires were collected from 2022 to 2025.

It should be noted that the questionnaire sampling strategy was adjusted according to different stages of the "Raccoon Dog Census." In 2022-2023, random sampling was applied, representing the general attitudes of Shanghai residents. In 2024-2025, sampling focused on residential compounds with recent reports of raccoon dog presence, reflecting residents' attitudes in areas with frequent human-raccoon dog interactions.

1) Residents' overall attitudes toward raccoon dogs have become more neutral, with significantly increased acceptance

A five-point Likert scale was used to assess residents' attitudes toward raccoon dogs (5 = strongly like, 4 = like, 3 = neutral, 2 = dislike, 1 = strongly dislike), enabling quantitative evaluation of residents' emotional responses.

When the Raccoon Dog Census was first conducted in 2022, residents' attitudes toward raccoon dogs in Shanghai residential compounds were relatively negative, with an average score of 2.46. This result was consistent with the social concerns caused by high local raccoon dog densities and human-raccoon dog conflicts reported in some residential compounds during 2020-2022. Since 2023, residents' attitudes have shifted significantly toward a more positive direction, with the mean score increasing to 3.15. In 2024-2025, although surveys focused on residential compounds with raccoon dog presence and included more residents who had encountered raccoon dogs, the average scores remained within the neutral range (2.94 and 3.06), indicating stable acceptance levels.

Overall, the proportion of residents who considered raccoon dogs in their residential compounds "tolerable" increased significantly from 50.9% in 2022 to 78% in 2025 (responses of "strongly like," "like," and "neutral" were collectively classified as "tolerable").

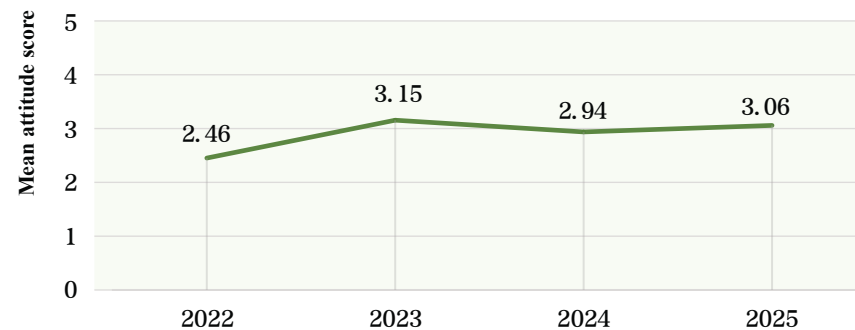


Figure 12. Residents' attitudes toward raccoon dogs were relatively negative in 2022, with an average score of 2.46. From 2023 to 2025, residents' attitudes showed a positive shift following the implementation and continuation of the "Raccoon Dog Census."

This positive shift was closely associated with the continuous community outreach and education efforts implemented since the launch of the "Raccoon Dog Census." These efforts included community visits and science outreach activities, promoting the "Four No's" principles among community managers and residents, and providing practical recommendations such as improving waste management and implementing scientific management of stray cat feeding sites. The combination of effective ecological management and enhanced public education has created a positive feedback loop, jointly promoting changes in residents' attitudes toward raccoon dogs.

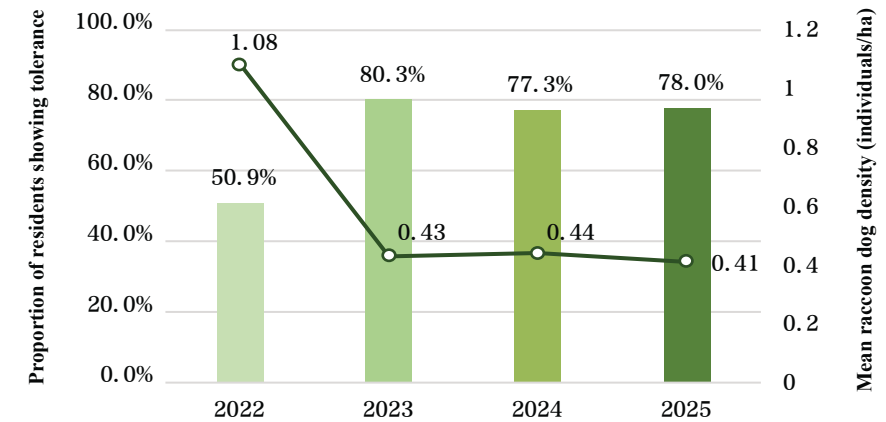


Figure 13. Changes in residents' tolerance toward raccoon dogs from 2022 to 2025 and its relationship with raccoon dog density. Most residents tolerated coexistence with raccoon dogs when population density remained at a relatively low level.

2) Public awareness of raccoon dogs' protected status has significantly increased

The questionnaire classified residents' responses to the question "Is the raccoon dog a protected animal?" into four categories: "Correct" (national first- or second-class protected wildlife), "Partially correct" (terrestrial wildlife with important ecological, scientific, and social values), "Incorrect," and "Unclear."

In 2022, 51.9% of residents correctly identified the protected status of raccoon dogs, while 35.5% had incorrect or unclear knowledge. In 2023, as the survey area expanded from Songjiang District, where extensive raccoon dog-related outreach had already been conducted, to Songjiang, Qingpu, and Minhang districts, the proportion of correct responses decreased to 42.4%. By 2024-2025, the proportion of residents with correct knowledge steadily increased to 60.2%, while the proportion of "unclear" and "incorrect" responses declined to 32.3% (Figure 14).

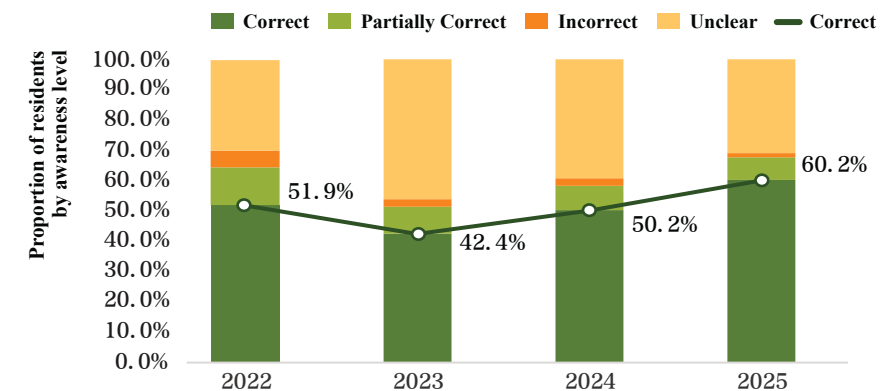


Figure 14. Changes in residents' awareness of raccoon dog conservation status from 2022 to 2025. The proportion of correct recognition increased from 51.9% to 60.2%, while unclear or incorrect responses decreased from 35.5% to 32.3%.

These results indicate that a series of public education initiatives in recent years, including outreach lectures, educational signage, community manuals, and community science education facilities, have effectively improved public understanding of wildlife conservation status and enhanced awareness of raccoon dog protection.

3) Awareness level and personal experience are key factors influencing residents' attitudes

Residents' attitudes toward raccoon dogs are not formed independently but are strongly influenced by their knowledge and personal experiences. Through cross-analysis, this study identified key factors shaping residents' attitudes.

Higher species awareness is associated with greater tolerance: Residents with "correct" or "partially correct" knowledge of raccoon dog conservation status had higher mean attitude scores (2.90 and 3.05, respectively) than those with "unclear" (2.74) or "incorrect" knowledge (2.17). This suggests that scientific knowledge can promote more tolerant attitudes. Residents who understand that raccoon dogs are legally protected native wildlife are more likely to adopt inclusive and rational perspectives toward their presence.

Personal experiences shape attitude tendencies: Residents who experienced conflict-related interactions (e.g., conflicts between raccoon dogs and pets or disturbance caused by raccoon dog vocalizations) had the lowest mean attitude score (2.22). Those experiencing neutral or avoidance interactions (e.g., raccoon dogs fleeing upon encountering humans or showing no obvious response) had scores close to the overall average (3.03). Residents who experienced curiosity-based interactions (e.g., actively approaching or observing raccoon dogs) showed the highest attitude scores (3.74).

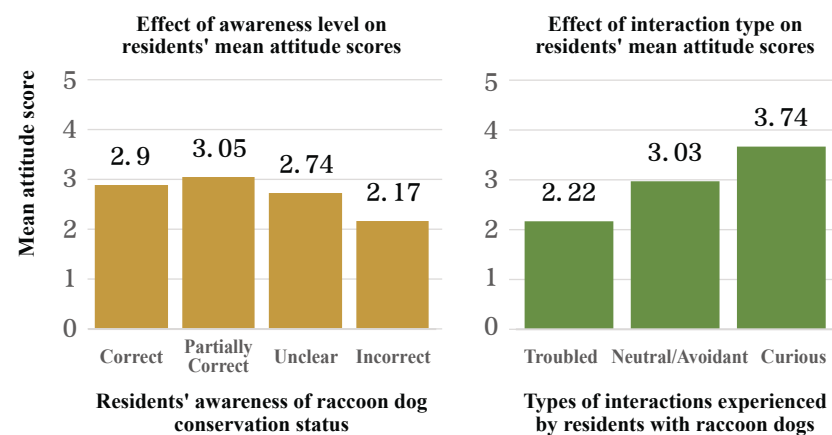


Figure 15. Effects of residents' awareness of raccoon dog conservation status and interaction experiences on their attitudes toward raccoon dogs



Photo by Wang Yuxi

The analysis of factors influencing raccoon dog population density in the second section of this report indicates that improper waste management and cat feeding provide excessive food resources, resulting in abnormally high local raccoon dog densities and changes in their behavior. More raccoon dogs have shifted from avoiding humans to observing or even approaching them. This behavioral change increases the frequency of conflict-related interactions between humans and raccoon dogs, such as conflicts with pets and begging for food, eventually leading to negative public attitudes and complaints. This clear "conflict formation pathway" highlights the need to control artificial food sources at the source and reduce negative human-raccoon dog interactions.

4) Human-raccoon dog interactions are predominantly peaceful, with conflicts remaining manageable exceptions

Frequency analysis of different interaction types showed that the most commonly reported experiences were neutral/avoidance interactions, including "raccoon dogs flee when encountering me" and "raccoon dogs show no obvious response," accounting for 55% of all reported interactions.

Although extreme cases often attract public attention and amplify emotional responses, with concerns sometimes intensified by unverified reports (e.g., rumors in community groups that raccoon dogs have attacked people), the data from this project provide an evidence-based perspective: in most cases, raccoon dogs are cautious wildlife that naturally avoid humans.

In the future, measures such as improving community waste management, regulating cat feeding practices, and scientifically sealing building gaps can effectively interrupt the "conflict formation pathway" and minimize the probability of negative interactions. Meanwhile, science outreach communicating the evidence-based message that "peaceful coexistence is the norm, while conflicts are manageable exceptions" can help reduce unnecessary fear and promote a more rational public perception of urban wildlife.



04 Community Conservation and Management Recommendations

Based on four consecutive years of the Raccoon Dog Census and related research, the following management recommendations are proposed, incorporating suggestions from wildlife conservation authorities, to promote harmonious coexistence between urban residents and wildlife and achieve a balance between biodiversity conservation and community governance.

1. Further strengthening collaborative mechanisms and mobilizing diverse stakeholders to advance wildlife conservation

Wildlife conservation and management is a form of social governance involving multiple sectors and disciplines, requiring the active participation of diverse stakeholders. Wildlife conservation authorities, research teams, social organizations, residential committees, and property management services should leverage their respective strengths and collaborate in areas including raccoon dog research, public attitude surveys, science outreach, and community-based management, forming a joint effort among government, residential compounds, and professional institutions. Establishing cross-sector communication mechanisms can facilitate coordinated solutions to systemic issues such as feeding management, waste disposal, and small-scale habitat modifications, thereby advancing urban wildlife conservation.

2. Further strengthening local responsibility and establishing a grid-based management and response system

The survey results indicate that raccoon dogs in Shanghai exhibit a spatial pattern characterized by both scattered distribution and localized aggregation, with significant spatial variation in residents' attitudes, population pressure, and human-raccoon dog conflict risks. It is recommended to further clarify local responsibilities and establish a territorial responsibility system based on a three-level framework of districts, subdistricts/townships, and residential compounds.

■ District-level authorities:

District wildlife conservation authorities should be responsible for collecting information on raccoon dog-related complaints and population distribution within their jurisdictions, establishing wildlife management databases, organizing wildlife conservation training, and providing field guidance for wildlife management activities at the subdistrict and township levels. They should also ensure the timely rescue and transfer of injured or trapped wildlife to the Shanghai wildlife rescue and rehabilitation facilities.

■ Subdistrict/township level:

Local government staff should collect information on raccoon dog distribution and residents' attitudes within their jurisdictions and report relevant findings to district wildlife conservation authorities in a timely manner.

■ Residential committees and property management services:

As the groups with the closest connection to residents, residential committees and property management services should identify raccoon dog activity hotspots, den locations, and resident complaints within their residential compounds. This information will support targeted conservation management and help address residents' concerns. They should also improve their knowledge of wildlife conservation and conduct public education through lectures, educational materials, and other outreach activities. In addition, they should strengthen wet waste management, regulate stray cat feeding practices, and promote responsible pet ownership.

3. Further improving fine-scale community management

1) Strengthening feeding and waste management

Surveys conducted over the past four years indicate that cat feeding and improper waste management are the key drivers of abnormal increases in raccoon dog abundance. Therefore, reducing artificial feeding and ensuring that wet waste is properly managed at the community level through improved waste management practices and resident participation are essential for controlling raccoon dog populations in residential areas and preventing human-raccoon dog conflicts caused by population increases.

2) Standardizing the management of building settlement gaps

Raccoon dogs frequently use settlement gaps at the ground level of buildings, resulting in substantial overlap between their activity areas and human living spaces. When residents perceive raccoon dog activities or vocalizations as disruptive to daily life, residential compounds and prop-

erty management services may collaborate to scientifically seal these gaps during the non-breeding season (September to March of the following year), after confirming that all raccoon dogs have left the dens.

■ Purpose of sealing:

Before sealing, residents should be informed that the purpose is to reduce situations where raccoon dogs occur in close proximity to residential areas and interfere with daily life, rather than to cause harm to the animals.

■ Timing and procedures:

All actions should comply with relevant wildlife protection regulations and ensure that no raccoon dogs remain inside the dens. When necessary, harmless repellents (such as capsaicin, citrus essential oils, or vinegar) may be used, combined with methods such as thermal imaging cameras, to confirm that raccoon dogs have vacated the sites.

■ Materials and maintenance:

Durable materials such as concrete, stones, and chew-resistant expanding foam are recommended for sealing. During the process, the internal connectivity of dens and the overall structure of buildings should be carefully inspected. After sealing, regular inspections should be conducted, and any collapsed or reopened sections should be repaired promptly.

3) Strengthening protection measures for private yards and balconies

For residents with private yards or low-floor balconies, customized and practical protection measures should be provided to prevent conflicts caused by raccoon dogs entering private spaces.

■ Physical barriers:

As a canid species, raccoon dogs have limited climbing and jumping abilities. For private yards, it is recommended to install fences or wire mesh with gaps smaller than 3 cm and a height of at least 1 m around the perimeter. The lower edge of the fence or mesh should extend underground to a depth of at least 20 cm to prevent raccoon dogs from digging underneath. Drainage channels and other openings connected to the outside environment should also be inspected and sealed with durable covers or wire mesh. For yards with wooden decking structures, regular inspections should be conducted, and any large gaps between the decking and the ground should be properly filled.

■ Environmental management:

Residents should promptly remove leaf piles, construction waste, and

other clutter from yards and balconies. If balcony floors show signs of subsidence, regular maintenance is recommended to reduce potential shelter sites for raccoon dogs.

■ Eliminating food sources:

Surveys indicate that raccoon dogs may aggregate in private yards and balconies not only because these areas provide shelter and reduced disturbance, but also due to the availability of food resources. Residents should strictly avoid feeding raccoon dogs and ensure that outdoor pet food bowls and stored food are completely removed after use. Waste bins with foot pedals and secure lids are recommended. As raccoon dogs may consume fruits, grains, and other crops, fallen fruits should be promptly removed during harvest seasons, and appropriate physical barriers should be implemented in areas where such crops are grown.

4) Installing warning and educational signs in key areas

To reduce potential incidents caused by close encounters between residents or pets and raccoon dogs, residential compounds with raccoon dog presence are encouraged to install warning and educational signs in areas frequently visited by raccoon dogs under the guidance of wildlife conservation professionals. These signs can provide timely reminders and relevant information to community residents.

2. Strengthening public education and promoting ecological values for human-wildlife coexistence

Preliminary results from interviews and questionnaire surveys indicate that some residents lack scientific knowledge of raccoon dog ecology and biodiversity conservation, which may contribute to negative perceptions toward raccoon dogs. Therefore, public education efforts should be further strengthened through various approaches, including promoting the “Urban Wildlife in Shanghai: A ‘What to Do’ Handbook” and the “Shanghai Urban Nature Observation Themed Science Education Course Package”, organizing volunteer training programs, and producing science outreach videos and publications. These initiatives should disseminate wildlife conservation knowledge and promote the “Four No’s” principles - do not fear, do not approach, do not feed, and do not harm - to encourage harmonious coexistence between humans and wildlife.

In September 2024, Shanghai’s first community science education center dedicated to the national second-class protected species, the raccoon dog, officially opened at the Party-Mass Service Station of Yushanghai Residential Committee in Guangfulin Subdistrict, Songjiang District. The establishment of this center represents an extension and enhance-

ment of community service functions and provides an important platform for improving residents’ environmental awareness and scientific literacy, serving as a new model for promoting coexistence between residential compounds and urban wildlife.

In May 2025, the Shanghai Urban Nature Observation Themed Science Education Course Package was officially released. By October of the same year, 127 volunteers had registered to participate, and science education activities on raccoon dogs and biodiversity had been conducted in six primary and secondary schools and residential compounds across Shanghai. These volunteers have helped convey scientific conservation concepts to young people and community residents, fostering evidence-based understanding of urban wildlife from an early stage and laying a solid foundation for building long-term community cultures of human-wildlife coexistence.

Photo by Wu Yiqian





Summary of Implementation Experiences and Future Prospects of the Raccoon Dog Census Project

1. Lessons Learned

1) Project Implementation: From Initial Exploration to Mature and Stable Operation

■ Purpose of sealing:

A key factor behind the success of the Raccoon Dog Census project was the transformation of complex scientific tasks into survey modules accessible to the general public. By engaging thousands of volunteers as citizen scientists, the project greatly expanded the coverage and efficiency of data collection. **Stable multi-stakeholder collaboration mechanism:** The project established a “government agency (Shanghai Forestry Station) + university research team (Fudan University) + social organization (Shan Shui Conservation Center)” collaboration model, ensuring scientific rigor, institutional credibility, and broad public engagement. **Optimized organizational processes:** From the initial pilot in 2022 to continuous improvements in volunteer recruitment, training, team assignment, and feedback mechanisms from 2023 to 2025, the project gradually enhanced its operational efficiency. In particular, the introduction of a second-round survey adjustment mechanism for residential compounds improved survey effectiveness and increased volunteer participation.

■ Challenges and limitations - Increasing coordination demands:

As the project expanded, the workload associated with volunteer grouping, team leader coordination, and data collection increased substantially, creating greater organizational challenges. **Variation in volunteer capabilities:** Although volunteers showed strong enthusiasm, differences in professional backgrounds and observation skills may have introduced minor variations in data recording accuracy.

2) Survey Coverage: From Small-Scale Pilot Surveys to Citywide Monitoring

■ Key achievements - Steady expansion of survey coverage:

The survey coverage expanded progressively from 50 residential compounds in Songjiang District in 2022, to 90 residential compounds across three districts in 2023, and further expanded to 124 residential compounds across eight districts in 2024 and 112 residential compounds across nine districts in 2025, representing a transition from localized surveys to citywide monitoring. **Scientific sampling design:** The project adopted grid-based stratified sampling, combined with information from the 12345 citizen hotline reports and online questionnaires, ensuring the representativeness of survey sites and effectively identifying areas with higher raccoon dog occurrence.

■ Challenges and limitations - High dependence on human resources:

The expansion of survey coverage relies heavily on increasing volunteer participation. In particular, the limited availability of experienced team leaders responsible for quality control and technical guidance has become a potential bottleneck. **Remaining monitoring gaps:** Due to differences in monitoring coverage, ecological spatial patterns, and public participation levels, some suburban areas may still contain potential monitoring gaps.

3) Survey Methods: Balancing Standardization and Flexibility

■ Key achievements - Standardized methodology:

The project consistently applied the core methods of transect surveys combined with resident interviews, ensuring longitudinal comparability across four years of data. Standardized training procedures and recording forms helped maintain data quality and consistency. **Technological innovations:** The project introduced the “Two Steps” app for GPS track recording and location marking, combined with paper-based survey forms, enabling the digitization and spatialization of survey data and providing effective support for subsequent data integration and analysis.

■ Challenges and limitations - Risks of double counting and missed detections:

As nocturnal and highly mobile animals, raccoon dogs are difficult to accurately quantify through visual observations and interviews alone. Therefore, the survey may have potential biases, including underestimation or overestimation of population abundance. **Limited survey time window:** Field surveys were conducted from 18:00 to 21:00, which may not fully overlap with the peak activity period of raccoon dogs during late night hours. Therefore, encounter rates may underestimate actual occurrence levels.

4) Survey Findings: Effectively Informing and Supporting Management Practices

■ Key achievements - Revealing critical population trends:

Four consecutive years of monitoring clearly showed that the mean density and encounter rate of raccoon dogs in Shanghai residential compounds peaked in 2022, followed by stabilization and a slight decline in 2023 and 2024. These findings suggest that management measures developed based on survey results have begun to show positive effects. **Identifying key influencing factors:** Through rigorous statistical analyses, the project identified artificial cat feeding and improper waste management as the most important human-related factors contributing to abnormal increases in raccoon dog abundance, providing strong scientific evidence for management decisions and policy development. **Filling research gaps:** The project has published five SCI-indexed papers and two Chinese core journal articles, contributing to the understanding of raccoon dog ecology in China. These studies also validated the reliability of the survey data and findings, providing scientific support for the development of conservation and management strategies.

■ Challenges and limitations - Insufficient monitoring of full-cycle population dynamics:

Currently, the project mainly relies on annual snapshot surveys and follow-up investigations, which may not fully capture seasonal population dynamics (e.g., changes before and after the breeding season) or the complete life-cycle processes of raccoon dogs, from birth and reproduction to mortality.

5) Questionnaire Feedback: Changes in Public Awareness and Attitudes

■ Key achievements - A dual-feedback approach to evaluating public responses:

The project not only collected residents’ attitudes toward raccoon dogs but also assessed volunteers’ participation experiences, providing a comprehensive evaluation of its social impacts. Volunteer satisfaction was exceptionally high, with an average score of 4.77/5 in 2025, demonstrating the strong appeal and effectiveness of citizen science. **Promoting changes in public awareness and bridging knowledge gaps:** Before receiving scientific information about raccoon dogs or participating in the “Raccoon Dog Census,” some residents developed fear and negative perceptions due to limited understanding of raccoon dog ecology. After engaging with science outreach activities, many residents not only became less fearful and resistant but also actively joined volunteer efforts to promote human-nature coexistence and wildlife conservation. This trans-

formation highlights the importance and necessity of sustained public education.

■ **Challenges and limitations - Need to increase resident questionnaire participation:**

Compared with the large volunteer community, the number of valid resident attitude questionnaires collected (e.g., 350 in 2024 and 440 in 2025) remains relatively limited and may not fully represent the views of all residents. Concerns about online survey scams, reluctance to spend time completing paper questionnaires, and practical challenges during field surveys, such as limited lighting, weather conditions, and mosquitoes, were major factors affecting questionnaire response rates.

2. Directions for Improving the Raccoon Dog Census Project in 2026 and Beyond

1) Optimizing project organization and implementation procedures

Building on the existing organizational framework, the project should further optimize operational procedures, including survey site allocation, team formation, survey schedules, and data reporting processes. Greater consideration should be given to volunteers' individual preferences and availability, while improving transparency throughout the workflow. This will enable volunteers to better understand the overall progress of the project and the value of their individual contributions, thereby enhancing long-term engagement and team cohesion.

2) Strengthening the capacity building of team leaders

The participation experience and sense of achievement among volunteers, as well as the quality of survey data, depend heavily on the commitment, expertise, and coordination ability of team leaders. Therefore, future efforts should focus on enhancing team leaders' professional skills, communication abilities, and organizational capacity. At least one practical training session should be arranged before formal surveys to reduce variations in survey quality caused by differences among team leaders.

3) Enhancing the scientific value of survey outputs

Additional data validation procedures should be incorporated after surveys, including random re-checks, cross-validation, and follow-up monitoring, to evaluate data accuracy and reliability. Requirements for survey route design, personnel responsibilities, survey timing, and data recording procedures should be further refined to minimize inconsistencies caused by objective conditions and methodological variations.

3. Future Prospects of the Raccoon Dog Census Project

Drawing on the experiences and lessons learned from the past four years of the "Raccoon Dog Census," and addressing the challenge of increasing overlap between human living spaces and wildlife habitats in densely populated megacities, the project will continue to promote the ecological principle of harmonious coexistence between humans and nature. Future development will focus on integrating fine-scale management with modern information technologies, with potential breakthroughs in the following areas:

1) Technology empowerment: Building a "Smart Raccoon Dog Census"

■ **Integration of infrared camera networks:**

Based on the findings from the past four years, long-term infrared camera monitoring could be established in key residential compounds to achieve 24-hour continuous monitoring. This approach would help validate field survey results, improve population estimates, monitor reproductive behaviors, and support the development of an individual identification database.

■ **Development of a mobile application:**

A mobile application integrating real-time reporting, science education, and community interaction could be explored. Residents could upload photos and records of raccoon dog sightings during daily activities (similar to citizen "spotting" platforms), creating a year-round distributed monitoring network to complement annual census efforts.

2) Moving from monitoring to intervention: Developing an "intervention-evaluation" framework

■ **Community-based intervention experiments:**

Pilot targeted management interventions in residential compounds with severe raccoon dog-related issues, including measures such as centralized elevated feeding sites for stray cats, enhanced nighttime wet waste collection, and settlement gap repairs. Long-term comparative monitoring between intervention and control residential compounds would allow scientific evaluation of management effectiveness and support the development of scalable, year-round management strategies.

3) Cultivating key volunteers and establishing a core volunteer network

Drawing on citizen science models such as birdwatching residential compounds, the project could cultivate a group of enthusiastic and committed "core volunteers" in residential compounds with raccoon dog popula-

tions. Through a “routine raccoon dog census” approach, core volunteers could conduct monthly standardized tracking and data collection in designated monitoring residential compounds, addressing the limitations of annual surveys in temporal coverage and full-cycle population monitoring.

At the same time, core volunteers could contribute to improving resident questionnaire participation and support frontline science outreach and conflict mediation by leveraging their familiarity with local residential compounds.

4) Deepening science outreach and fostering a culture of coexistence

■ Expanding the influence of the Raccoon Dog Census initiative:

The project should continue to enhance the outreach value and public influence of the Raccoon Dog Census by introducing more engaging and interactive science communication approaches, using the project as a platform to promote biodiversity conservation and wildlife protection awareness.

■ Transforming volunteers into “community educators”:

Experienced volunteers could be provided with the Shanghai Urban Nature Observation Themed Science Education Course Package as advanced learning material. They could then return to their own residential compounds to organize small-scale sharing sessions, using personal experiences and stories about raccoon dogs to communicate conservation messages in a more relatable and persuasive way.

■ Innovating science communication approaches:

The functions and educational value of Shanghai’s first raccoon dog-themed community science education center, established in 2024, should be further explored. Future efforts could include developing immersive exhibitions, children’s interactive games, AR-based raccoon dog exploration experiences, and other innovative approaches to make science education more engaging and accessible.

In summary, the Raccoon Dog Census has evolved from a purely scientific research project into a bridge connecting government agencies, scientists, citizens, and urban wildlife. Looking ahead, through integrated innovation combining technological advancement, closed-loop management, and enhanced science communication, we aim to make Shanghai a global model for harmonious coexistence between humans and wildlife. This effort is not only about protecting raccoon dogs, but also about safeguarding our shared urban environment.

Acknowledgments

We would like to express our sincere gratitude to all project partners, including Shanghai Natural History Museum, Forest City Studio, and Songjiang District Forestry Station, for providing team leader support during the survey activities. We also thank all citizen volunteers for their enthusiastic participation and contributions. Special thanks go to Huatai Securities for its strong support of this project.

Finally, we would like to thank all staff members and volunteers for their dedication and support (listed in no particular order):

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■ 上海市林业总站 (Shanghai Forestry Station):

李梓榕 (Li Zirong) | 季镭 (Ji Lei) | 郑运祥 (Zheng Yunxiang)

■ 复旦大学 (Fudan University):

王放 (Wang Fang) | 赵兮 (Zhao Xi)

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Pu) | 杜已洁 (Du Yijie) | 成峤峰 (Cheng Jiaofeng) | 潘晓晔 (Pan Xiaoye) | 姚莉 (Yao Li) | 张怡婧 (Zhang Yijing) | 钱安琪 (Qian Anqi) | 蒋礼 (Jiang Li) | 黄忠垚 (Huang Zhongyao) | 马新宇 (Ma Xinyu) | 沙雅爽 (Sha Yashuang) | 高子涵 (Gao Zihan) | 黄璐 (Huang Lu) | 石普霖 (Shi Pulin) | 徐良 (Xu Liang) | 吴易 (Wu Yi) | 顾佳 (Gu Jia) | 李欣妍 (Li Xinyan) | 程徐歆 (Cheng Xuxin) | 陈红 (Chen Hong) | 汤易迎 (Tang Yiyi) | 丁夏 (Ding Xia) | 雒悻 (Luo Yi) | 李子于 (Li Ziyu) | 杨轩宇 (Yang Xuanyu) | 马楼 (Ma Lou) | 李玥歆 (Li Yuexin) | 王怡蕾 (Wang Yilei) | 张华文 (Zhang Huawen) | 马路牙 (Ma Luya) | 汪懿 (Wang Yi) | 杨先菊 (Yang Xianju) | 陆莹 (Lu Ying) | 甄婷 (Zhen Ting) | 陶瑱 (Tao Zhen) | 姜达吉 (Jiang Daji) | 曾美子 (Zeng Meizi) | 姚惠琴 (Yao Huiqin) | 王子麟 (Wang Zilin) | 陈毅敏 (Chen Yimin) | 覃颖妮 (Qin Yingni) | 姚莉 (Yao Li) | 魏士崴 (Wei Shiwei) | 黄春蓉 (Huang Chunrong) | 尹璇 (Yin Xuan) | 朱旭初 (Zhu Xuchu) | 刘斐天 (Liu Feitian) | 袁晗思 (Yuan Hansi) | 施诗颐 (Shi Shiyi) | 徐嘉雯 (Xu Jiawen) | 陈玺撼 (Chen Xihan) | 吴钰 (Wu Yu) | 王佳怡 (Wang Jiayi) | 陈默 (Chen Mo) | 钱晨 (Qian Chen) | 雷抒雁 (Lei Shuyan) | 邓挺安 (Deng Ting'an) | 李宸烨 (Li Chenye) | 葛燕 (Ge Yan) | 李晓旋 (Li Xiaoxuan) | 莫英 (Mo Ying) | 陈慧一 (Chen Huiyi) | 叶钰童 (Ye Yutong) | 马中慧 (Ma Zhonghui) | 龚睿婕 (Gong Ruijie) | 陈菲洋 (Chen Feiyang) | 李娴 (Li Xian) | 李琦 (Li Qi) | 訾叶 (Zi Ye) | 申明军 (Shen Mingjun) | 钟建勇 (Zhong Jianyong) | 赵相儒 (Zhao Xiangru) | 斯凌悦 (Si Lingyue) | 郭金梁 (Guo Jinliang) | 宋亚楠 (Song Yanan) | 夏仕芳 (Xia Shifang) | 王志翱 (Wang Zhiao) | 徐静 (Xu Jing) | 陈子昂 (Chen Zi'ang) | 梅丽敏 (Mei Limin) | 倪易为 (Ni Yiwei) | 李慧 (Li Hui) | 冯剑辉 (Feng Jianhui) | 杜多兰 (Du Duolan) | 朱骅 (Zhu Hua) | 杨波 (Yang Bo) | 余婷婷 (Yu Tingting) | 沈榆涵 (Shen Yuhan) | 朱林芳 (Zhu Linfang) | 罗佳琦 (Luo Jiaqi) | 徐艺鸣 (Xu Yiming) | 严梦佼 (Yan Mengjiao) | 方婵娟 (Fang Chanjuan) | 周娴 (Zhou Xian) | 丁博文 (Ding Bowen) | 王岚 (Wang Lan) | 凤晓星 (Feng Xiaoxing) | 曾乐 (Zeng Le) | 吉馨 (Ji Xin)

Note:

We sincerely appreciate the contributions of all participants, the volunteers who supported the Raccoon Dog Census from 2022 to 2024, and the individuals and organizations whose support made this project possible. We have made every effort to acknowledge everyone and apologize for any inadvertent omissions or inaccuracies in the list.

Appendix I: Raccoon Dog Census Survey Record Form

Instructions: Record the survey track and mark observation locations using the “Two Steps” app

Survey date:		Year	Month	Day	Recorder and data uploader:						
Community:											
No.	Time	Location	Location number	Number of individuals			Distance (m)	Behavior	Habitat type	Skin conditions such as manges	Notes
				Total	Adult	Juvenile					
Example	19:13	Shrubland south of Building No. 11	Date + community name + transect number + observation point ID e.g., 241101 Yushanghai A01	3	Leave blank if uncertain		20	☒ Walking/Running ☐ Vocalizing ☒ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☒ Grassland ☒ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☒ Uncertain ☐ Other	One individual was observed at first, and two were observed later.
1								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
2								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
3								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	

Appendix I (continued)

No.	Time	Location	Location number	Number of individuals			Distance (m)	Behavior	Habitat type	Skin conditions such as manges	Notes
				Total	Adult	Juvenile					
4								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
5								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
6								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
7								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
8								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	

No.	Time	Location	Location number	Number of individuals			Distance (m)	Behavior	Habitat type	Skin conditions such as manges	Notes
				Total	Adult	Juvenile					
9								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
10								☐ Walking/Running ☐ Vocalizing ☐ Foraging ☐ Fighting ☐ Resting	☐ Hardened surfaces (buildings/concrete/brick/stone pavement, etc.) ☐ Grassland ☐ Shrubland ☐ Woodland ☐ Water bodies (streams/lakes)	☐ Yes ☐ No ☐ Uncertain ☐ Other	
Cat/dog food feeding status: ☐ No feeding ☐ Feeding present, with _____ feeding sites Feeding site information (e.g., whether food is placed at elevated locations, whether feeding occurs at fixed times and locations, whether feeders wait until stray cats finish eating before leaving):											
Types of raccoon dog dens: Building settlement gaps _____ sites: Locations: _____ Rockeries/artificial hills _____ sites: Location: _____ Other types _____ sites: Locations: _____ Raccoon dog responses to humans (Overall behavior of raccoon dogs within this community; multiple choices allowed): ☐ Flees immediately upon seeing humans ☐ Makes eye contact with humans ☐ Shows no obvious response when encountering humans ☐ Approaches humans voluntarily ☐ Other: _____											
Is improper wet waste disposal present? ☐ Yes ☐ No Are there overflowing waste stations? ☐ Yes ☐ No Additional notes:											
Additional notes (e.g., stories or observations related to human-raccoon dog interactions):											

Appendix II:

Raccoon Dog Census Survey Record Form

In recent years, raccoon dogs living in Shanghai have received increasing public attention and have sparked discussions on how humans and wildlife can coexist in urban environments. This questionnaire aims to understand Shanghai residents’ attitudes toward raccoon dogs, as well as their experiences, feelings, and perceptions during interactions with these urban wildlife neighbors.

The questionnaire takes approximately 5 minutes to complete. All information provided will be used solely for research and conservation purposes.

Initiating organizations:

Shan Shui Conservation Center | Shanghai Forestry Station | Institute of Biodiversity Science, Fudan University

Partners:

Shanghai Natural History Museum | Forest City Studio | City Insects Studio | Heping Park Nature Education Center

Supervising organizations:

Wildlife Conservation Division, Shanghai Greening and City Appearance Administration Bureau | Shanghai Forestry Station | Shanghai Park Administration Affairs Center | Shanghai Wildlife and Natural Protected Areas Research Center

Supporting organizations:

Shanghai Wildlife Conservation Association | Huatai Securities | Huatai Public Welfare Foundation | Amity Foundation

1. How did you complete this questionnaire?

- A. Online questionnaire
- B. Paper questionnaire
- C. On-site completion through volunteer interviews

Residential compound Information

2. Which district of Shanghai is your community located in? _____

3. Name of your residential compound: _____

This information will help us evaluate the spatial coverage of the survey.

4. Your role in the community (multiple choices allowed)

- ☐ Resident
- ☐ Property management staff
- ☐ Security staff
- ☐ Residential committee staff
- ☐ Other: _____

5. Does your community have any of the following facilities or environmental features? (Multiple choices allowed)

- ☐ Lakes or streams
- ☐ Rockeries/artificial hills
- ☐ Private gardens
- ☐ Vegetable plots/gardens
- ☐ Shrublands
- ☐ Green belts adjacent to building walls
- ☐ None of the above

6. Does your community have any of the following conditions? (Multiple choices allowed)

If applicable, please provide specific details on the line after the selected option.

- ☐ Feeding stray animals with cat/dog food: _____
- ☐ Improper waste disposal: _____
- ☐ Overflowing waste bins: _____
- ☐ Unknown
- ☐ None of the above

7. Does your community implement pedestrian-vehicle separation?

- A. Complete pedestrian-vehicle separation (vehicles use underground parking/ roads, while pedestrians use ground-level areas)
- B. Partial pedestrian-vehicle separation (vehicles are restricted to designated areas and do not enter major residential activity zones)
- C. No pedestrian-vehicle separation

8. What types of residential buildings are present in your community? (Multiple choices allowed)

- ☐ Apartments
- ☐ Villas
- ☐ Other: _____

9. What type of residential building do you live in?

- A. Apartment
- B. Villa (Skip to Question 11)
- C. Other: _____

10. Which floor do you live on?

- A. First floor
- B. Lower floors (2nd-7th floors)
- C. Higher floors (8th floor and above)

11. Does your residence have a private yard?

If yes, please indicate the location of the yard after the option, such as the first floor, basement, etc.

- A. Yes: _____
- B. No
- C. Other: _____

12. Do you live with any minor children or grandchildren?

- A. Yes
- B. No (Skip to Question 14)
- C. Other: _____

13. What is the age of your child/grandchild?

- A. 0-6 years old
- B. 7-12 years old
- C. 13-18 years old

14. How long have you lived or worked in your current community?

- A. Less than 1 year
- B. 1-3 years
- C. More than 3 years

15. Which areas of your community do you usually visit or spend time in? (Multiple choices allowed)

- ☐ Rockeries/artificial hills
- ☐ Green spaces, gardens, and other landscaped areas
- ☐ Parking garages
- ☐ Your private yard
- ☐ Other: _____



16. Does your community have raccoon dogs?

The raccoon dog is a wildlife species that is slightly larger than a stray cat. It is mainly active at night and is distributed in many residential compounds across Shanghai.

You may answer “Yes” if you have seen a raccoon dog yourself or have seen photos/videos shared by other residents.

- A. Yes, I have seen one
B. No, I have not seen one (If you select B, please only answer Questions 17, 18, 24, 28, 29, and 36-40.)

Attitudes and Perceptions

17. Do you like raccoon dogs?

You may write the reason for your preference after the selected option.

- A. Strongly like: _____
B. Like: _____
C. Neutral: _____
D. Dislike: _____
E. Strongly dislike: _____
F. Other: _____

18. Is the raccoon dog a protected animal?

- A. National first- or second-class protected wildlife species
B. Terrestrial wildlife with important ecological, scientific, and social values
C. Not a protected animal
D. Not sure

19. Since you moved into this community, how do you think the number of raccoon dogs has changed?

- A. There were no raccoon dogs before, but they have appeared now
B. Raccoon dogs were present before and their number has increased
C. Raccoon dogs were more numerous before and have decreased now
D. Raccoon dogs have always been present, and their number has remained unchanged
E. Raccoon dogs were present before but are no longer observed
F. Not sure / Do not know

20. What is the maximum number of raccoon dogs you have seen at one time in your community this year? _____

Please enter a number. If uncertain, please provide an approximate estimate.

21. How many raccoon dogs do you think currently live in your community this year?

22. Do you have any stories or experiences about living alongside raccoon dogs that you would like to share? (Optional)

Positive or negative experiences are both welcome.

23. Which of the following experiences have you personally encountered? (Multiple choices allowed)

Please select only experiences that you have personally witnessed or experienced.

- ☐ I have actively approached or interacted with raccoon dogs (e.g., touched or chased them)
☐ Raccoon dogs chased stray cats
☐ Raccoon dogs killed stray cats
☐ Raccoon dogs fled when they saw me
☐ Raccoon dogs showed no obvious response when they saw me
☐ Raccoon dogs approached me voluntarily
☐ Raccoon dogs attacked me and caused injuries
☐ Raccoon dogs attacked pets
☐ Raccoon dog vocalizations disturbed residents
☐ Raccoon dogs damaged green spaces or buildings
☐ Other: _____

Awareness Level

24. Which statement best describes your level of understanding of raccoon dogs?

- A. No knowledge at all (Skip to Question 28)
B. Have some knowledge
C. Very knowledgeable

25. Through which channels have you received information about raccoon dogs this year? (Multiple choices allowed)

- ☐ Printed newspapers or books
- ☐ Television
- ☐ Online news
- ☐ Public social media accounts, such as WeChat official accounts, Weibo, or video platforms
- ☐ Other online channels, such as residential compound chat groups
- ☐ Online or offline lectures and exhibitions
- ☐ Face-to-face conversations with others
- ☐ None of the above
- ☐ Other: _____

26. What information about raccoon dogs have you learned? (Optional)

27. Approximately how many times have you read science outreach information about raccoon dogs this year?

Science outreach information may come from different sources, including news reports, WeChat articles, newspaper articles, videos, and online platforms.

- A. Never
- B. 1-2 times
- C. 3-5 times
- D. 6 times or more

28. What information about raccoon dogs would you like to learn more about? (Optional)

29. Are you aware of the Shanghai Wildlife Protection Regulation issued in 2023?

- A. Yes
- B. No
- C. Other: _____

Management Measures

30. What frequency of encounters with raccoon dogs in your community would you accept?

- A. I cannot accept the presence of raccoon dogs in my community (Skip to Question 32)
- B. I can accept raccoon dogs living in my community as long as I never encounter them

- C. I can accept encountering one or two raccoon dogs on rare occasions
- D. I can accept occasionally encountering a small number of raccoon dogs in my community
- E. I can accept encountering groups of raccoon dogs in my community
- F. No preference / Not concerned

31. In which areas of your community can you accept the presence of raccoon dogs? (Multiple choices allowed)

- ☐ Outdoor public areas (rockeries, green spaces, gardens, etc.)
- ☐ Parking garages
- ☐ Inside residential buildings
- ☐ Private yards
- ☐ Inside my home
- ☐ Other: _____

32. What measures have the residential committee or property management already taken regarding raccoon dogs in your community? (Multiple choices allowed)

- ☐ Installed educational/warning signs
- ☐ Sealed building settlement gaps
- ☐ Organized lectures or sharing sessions to improve residents' understanding of raccoon dogs
- ☐ Not sure
- ☐ Other: _____

33. How do you think food sources for raccoon dogs in the community should be managed?

- A. Actively feed raccoon dogs
- B. Do not intentionally feed raccoon dogs
- C. Reduce food sources available to raccoon dogs, such as wet waste and stray cat food
- D. Maintain the current situation without management
- E. No preference / Not concerned
- F. Other: _____

34. How do you think raccoon dog activity spaces in the community should be managed?

- A. Create suitable habitats for raccoon dogs within the community
- B. Maintain the current situation without intervention
- C. Destroy raccoon dog habitats within the community
- D. No preference / Not concerned
- E. Other: _____

35. In your opinion, how should the relationship between residents and raccoon dogs in the community be managed? (Optional)

Basic Information

36. How would you like us to address you?

37. What is your gender?

- A. Male
- B. Female
- C. Prefer not to disclose

38. What is your age?

- A. Under 18 years old
- B. 18-30 years old
- C. 31-50 years old
- D. 51-70 years old
- E. Above 70 years old
- F. Prefer not to disclose

39. Do you have any other information or thoughts about raccoon dogs that you would like to share? (Optional)

40. If you would like to receive further information about raccoon dogs, please leave your WeChat ID. (Optional)

Please note that this refers to your WeChat ID, not your nickname. You can find your WeChat ID by going to “WeChat → Me → WeChat ID.” If you provide your mobile phone number, please make sure that “Add me via WeChat ID/phone number” is enabled under “Settings → Friends and Privacy → Ways to Add Me”.





INITIATING ORGANIZATIONS

SHANGHAI FORESTRY STATION

INSTITUTE OF BIODIVERSITY SCIENCE, FUDAN UNIVERSITY

SHAN SHUI CONSERVATION CENTER