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Repeated occurrence of Yangtze finless porpoises (Neophocaena asiaeorientalis) in an engineered navigation and water-diversion canal in Jiangsu, China

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Abstract

The Critically Endangered Yangtze finless porpoise (*Neophocaena asiaeorientalis*) has shown signs of recovery since the 10-year fishing ban in the Yangtze basin, and is increasingly reported in tributaries and human-modified waterways. We compiled and independently verified 30 georeferenced observation events (May 2025–October 2026) at 22 sites (SP1–SP22) along the Tongyu–Taidong engineered navigation and water-diversion canal system in Jiangsu, part of the eastern route of the South-to-North Water Diversion Project. The dataset combines original photographs and videos from our shore-based surveys, validated citizen-science short-video footage and semi-structured resident interviews; team-collected imagery independently documents events at seven of the 22 sites. Observations include repeated sightings of mother–calf pairs and multi-individual groups. Most events occurred along hardened urban, bridge, sluice-station and navigation-channel shorelines, whereas a minority were recorded at the three sites that still retain reed, lotus or reed-shrub habitat. This heavily engineered waterway poses substantial hazards: vessel strike, shipping-related underwater noise, abrupt water-level fluctuations driven by sluice and pumping operations, and scarce shallow vegetated refuge. We outline spatially targeted conservation measures that reconcile canal navigation and water-transfer functions with porpoise protection. Given the opportunistic nature of sampling, we draw no strong inference about permanent colonization or range expansion; sustained monitoring of cetaceans entering artificial canals across the Yangtze floodplain is urgently needed.

Introduction

The Yangtze finless porpoise (*Neophocaena asiaeorientalis*) is a Critically Endangered freshwater cetacean endemic to the Yangtze River basin. Since the 10-year commercial fishing ban took full effect in 2021, regional prey resources have rebounded and porpoises have been increasingly recorded in secondary waterbodies rarely used in previous decades (Ministry of Agriculture and Rural Affairs of China 2023; Wang et al. 2024; Xiong et al. 2026). This re-expansion brings new conservation challenges, because many of these newly used waterways are heavily engineered for navigation and water regulation.

Large artificial navigation and water-diversion canals are widespread across the Yangtze floodplain. They are characterized by hard bank revetments, sluice- and pump-controlled hydrology and intensive freight traffic, and may offer foraging opportunities while also acting as ecological traps for freshwater cetaceans (Chen et al. 2020; Robertson & Hutto 2006). Peer-reviewed empirical documentation of finless porpoise use of major water-conveyance canals nonetheless remains scarce.

The Tongyu–Taidong water system in the Lixiahe lowland of Jiangsu Province is a Class-III freight navigation canal integrated into the eastern route of the South-to-North Water Diversion Project. Hydrological exchange with the lower Yangtze occurs only intermittently, during scheduled sluice openings or floods. From 2025 onward, residents began posting videos of porpoises in this canal, which prompted our team to launch targeted shore-based surveys. Here we report verified occurrences from

combined field and citizen-science data, describe sighting patterns and associated anthropogenic risks, and set out conservation implications, while acknowledging the limitations inherent to opportunistic sampling.

Materials and methods

Study area

Observations were distributed across the interconnected Tongyu and Taidong river canals in Dongtai City, Jiangsu Province (Fig. 1). The waterway is dominated by vertical concrete and stone revetments, with only small, fragmented patches of emergent reed and floating lotus. It carries regular passage of 1000-dwt cargo vessels, and water diversion and drainage are regulated by the Dongtai Pumping Station. We established 22 georeferenced sites (SP1–SP22) along a continuous shore-based route with a straight-line extent of c. 32 km: SP1–SP14 follow the Tongyu River from the Yingbin Avenue bridge downstream past Huiyang Bridge, the Dongtai Pumping Station, Tengjin wharf and Anfeng Town to the Tongyu River Bridge; SP15–SP22 continue west along the Taidong River from Wushenmiao, Liangduo Town, through the G204 bridge reach, to Waijiaweizi, Qindong Town. Nineteen sites have hardened shorelines (urban and peri-urban waterfronts, bridge piers and pier eddies, sluice-station reaches and backwaters, a navigation-channel revetment and an old quay), whereas only three retain natural or semi-natural vegetation (SP1, SP6 and SP16).

Multi-source data compilation and verification

Three complementary sources were used between May 2025 and October 2026. First, we conducted 36 repeated daytime shore-based surveys (two per month), each lasting 2–4 h, from public shorelines without entering restricted areas or disturbing wildlife. Second, candidate clips were collected from the Douyin and Kuaishou short-video platforms; duplicate reposted videos were removed by frame-by-frame comparison, and only clips with clear geographic landmarks and unambiguous porpoise surface behaviour were retained. Third, we carried out 25 semi-structured interviews (15–40 min each) with long-term waterfront fishers and residents, retaining only accounts that could be georeferenced to a named landmark; most were duplicates of video footage or lacked precise spatial information and were not counted as independent events.

Two independent observers checked the morphological diagnostic features of *N. asiaeorientalis* (absence of a true dorsal fin, low dorsal ridge, rounded rostrum, stocky grey body) in all visual records, from both field surveys and citizen science, to exclude fish, otters or misidentified marine cetaceans. All retained records were georeferenced to WGS84 coordinates. We defined an independent verified event as a discrete sighting separated from other events by a substantial time or spatial gap, to avoid double counting. Even with original imagery we cannot exclude that the same individual or group was recorded

at different places on different dates, a recognised limitation of shore-based sampling without photo-identification.

For each event we recorded coordinates, date and time, data source, shoreline habitat type and surface behaviour identifiable from footage (slow surface transit, spouting or surfacing, leaping, group milling). We did not reconstruct movement trajectories or calculate travel distances, because no photo-identification data link records from different dates and places. Threat assessment relied on canal engineering characteristics and published literature rather than on in-situ measurements.

Results

Across the 22 sites we verified 30 porpoise events (Table 1), 20 in the Tongyu River reach and 10 in the Taidong River reach. Sightings extended from the urban Tongyu reach downstream past Tengjin wharf and Anfeng Town and then westward along the Taidong River, the westernmost record lying c. 32 km in straight-line distance from the northernmost site. Records in the open, river-connected Taidong reach showed animals surfacing with the dorsal ridge exposed and were interpreted as transient passage, whereas records in canalized reaches mainly described sustained foraging and milling; several events, including team-filmed sequences, occurred within 50–100 m of moving cargo vessels.

Table 1
Verified observation events of Yangtze finless porpoises (*Neophocaena asiaeorientalis*) in the Tongyu–Taidong canal system, Jiangsu, China, May 2025–October 2026

Site	River	Location	Longitude (°E)	Latitude (°N)	Events	Shoreline habitat	Surface behaviour
SP1	Tongyu	Yingbin Bridge	120.3122	32.8920	2	Reed bank	Foraging; surfacing
SP2	Tongyu	Huiyang Bridge	120.3445	32.8412	2	Hardened urban	Transit; leaping
SP3	Tongyu	Panshe Village	120.3544	32.8268	1	Bridge/pier eddies	Foraging; breaching
SP4	Tongyu	Daijiadun	120.3663	32.8080	2	Sluice backwater	Foraging; milling
SP5	Tongyu	Jijiawa	120.3212	32.8783	1	Bridge/pier eddies	Milling; spouting
SP6	Tongyu	Tongyu River Scenic Belt	120.3269	32.8694	1	Lotus patch	Group milling
SP7	Tongyu	Tengjin wharf	120.3834	32.7810	3	Hardened urban	Group activity; expulsion
SP8	Tongyu	Leida Hwy., Tengjin	120.3835	32.7807	1	Hardened urban	Transit; leaping
SP9	Tongyu	Liangnan Village	120.3960	32.7618	1	Hardened urban	Transit; leaping
SP10	Tongyu	Yuanjiazao, Anfeng	120.4076	32.7434	2	Hardened urban	Foraging; breaching
SP11	Tongyu	Fengnan	120.4152	32.7320	1	Sluice backwater	Milling
SP12	Tongyu	Tongyu Village	120.4210	32.7227	1	Sluice backwater	Milling
SP13	Tongyu	Zhulin Village	120.4330	32.7029	1	Sluice backwater	Milling
SP14	Tongyu	Tongyu River Bridge	120.4493	32.6779	1	Sluice backwater	Milling
SP15	Taidong	Wushenmiao	120.2668	32.8249	1	Old quay	Sighting only
SP16	Taidong	Dingxin Village	120.2933	32.8370	2	Reed-shrub shoal	Transient passage
SP17	Taidong	Shibali confluence	120.2535	32.8050	1	Sluice backwater	Transient passage

Site	River	Location	Longitude (°E)	Latitude (°N)	Events	Shoreline habitat	Surface behaviour
SP18	Taidong	Fentou, Liangduo	120.2419	32.7954	2	Channel revetment	Transient passage
SP19	Taidong	Liangguang Rd.	120.2190	32.7755	1	Channel revetment	Sighting only
SP20	Taidong	Xibeizhuang, Shiyan	120.2011	32.7571	1	Sluice backwater	Milling
SP21	Taidong	Shiyan Bridge	120.1855	32.7292	1	Sluice backwater	Milling
SP22	Taidong	Waijiaweizi, Qindong	120.1160	32.6574	1	Channel revetment	Group activity; expulsion

 Events supported by original photographs or video from the 36 shore-based field surveys; these seven sites yielded 13 of the 30 events. Behaviour categories follow field notes and validated footage; “sighting only” denotes confirmed presence for which surface behaviour could not be classified. Coordinates are WGS84 decimal degrees.

Because hardened structures dominate the canal perimeter, most events (83.3%) were recorded along urban and peri-urban waterfronts, at bridge piers and pier eddies, in sluice-station backwaters or along the navigation-channel revetment; this distribution reflects habitat availability rather than demonstrated selection. The remaining 16.7% came from the three sites that retain natural or semi-natural vegetation, where porpoises foraged along a reed margin, milled beside an in-channel lotus patch and passed a reed-shrub bank with a shallow shoal. Surface behaviour was classifiable for 28 of the 30 events: slow transit, spouting or foraging dominated, leaping or breaching occurred at five sites, group milling or aggregation at three and near-shore water expulsion at two. Surfacing frequency increased at the reed-margin site during a typhoon-related low-pressure event. Mother–calf pairs were reported repeatedly, and observers described aggregations of up to 7–8 individuals, although no single clip confirmed a group of that size.

Discussion

Our multi-source dataset, combining original field imagery and validated citizen-science material, confirms repeated use of this sluice-regulated navigation canal by Yangtze finless porpoises, including mother–calf pairs. We cannot distinguish transient visitors from temporary residents or from part of a locally self-sustaining group, and therefore draw no conclusion about permanent colonization or range expansion. Episodic sluice openings provide the rare hydrological connectivity that allows entry from the lower Yangtze mainstem, and elevated prey availability in this eutrophic canal may attract animals following the basin-wide fishing ban (Huang et al. 2020; Xiong et al. 2026).

Sighting frequency is strongly shaped by accessibility and detection bias. Survey effort concentrated on publicly accessible bridges, waterfront promenades and wharves, and because the canal perimeter is itself overwhelmingly hardened, the dominance of records from hardened habitat cannot be read as habitat selection. The few records from reed, lotus and reed-shrub shorelines nevertheless show that these fragments are used for foraging and milling, and they merit priority protection, consistent with the preference of finless porpoises for non-hardened littoral habitat (Chen et al. 2020).

The canal carries substantial risks, especially for vulnerable mother–calf pairs: vessel strike by 1000-dwt cargo ships (Reeves et al. 2013), reverberant underwater noise within narrow concrete-lined channels that disrupts foraging and biosonar function (Nowacek et al. 2007; Wisniewska et al. 2018; Duan et al. 2023), physiological stress from chronic vessel traffic (Nabi et al. 2018), abrupt water-level drawdowns during pumping and sluice operations, and the overall scarcity of shallow vegetated refuge habitat. The canal may thus offer foraging opportunities while simultaneously acting as a high-risk ecological trap.

Conservation implications

Navigation and water-diversion functions cannot be suspended, so protective measures must be spatially targeted and compatible with existing water management. We recommend that: (i) Protect the remaining vegetated bank segments (the SP1 reed margin, the SP6 lotus patch and the SP16 reed-shrub belt with its shallow grassy shoal) from further hardening, dredging and sediment disposal, and pilot soft-bank restoration where navigation clearance permits. (ii) Implement seasonal vessel speed limits (≤ 8 knots, no-wake rules) in core use zones near bridges, the Dongtai Pumping Station and the Tengjin–Anfeng reach (SP7–SP14), with extra vigilance where mother–calf pairs are confirmed. (iii) Adopt ecological operating rules for the Dongtai Pumping Station: avoid rapid drawdowns while porpoises are present and carry out visual checks before major sluice or pump activation. (iv) Establish a unified local reporting pathway linking citizen observers, volunteers, water-administration authorities and our research team for real-time sighting validation.

Limitations and research priorities

Survey effort was uneven across the 22 sites: our surveys concentrated on the accessible urban Tongyu reach, most Taidong River sites rest on single opportunistic records, and event numbers differ markedly among sites, which precludes rigorous frequency-based comparison of habitat use. We also lack photo-identification, long-term passive acoustic monitoring, standardized repeated transect surveys and eDNA sampling, so that residency status, fine-scale movement and true group size remain unresolved (Duan et al. 2023), and threat inferences rest on canal structure and published literature rather than continuous field measurements. Priority follow-up actions are therefore the deployment of passive acoustic loggers, standardized repeated surveys, eDNA sampling and vessel-traffic monitoring, which will show whether use of this canal is ephemeral or sustained, and whether such artificial waterways are supplementary foraging habitat or high-risk ecological traps.

Conclusions

This Short Communication documents repeated, independently verified occurrence of Yangtze finless porpoises, including mother–calf pairs, in the Tongyu–Taidong engineered canal system, supported by research-team photo-video evidence and validated citizen-science records. The waterway attracts porpoises but exposes them to multiple anthropogenic hazards, and the measures proposed here aim to balance canal operation with porpoise protection. Recovering finless porpoises are increasingly entering artificial conveyance infrastructure across the Yangtze floodplain, yet published empirical records of such use remain uncommon; systematic monitoring is needed to separate transient visits from longer-term occupancy and to assess the conservation value and risks of these canal habitats.

Declarations

Statement of suitability for the Short Communication category: the data are an opportunistic, time-sensitive record of Critically Endangered Yangtze finless porpoises entering an engineered water-conveyance canal; the dataset is too limited for a full-length analysis, and the core message is conveyed concisely.

Competing interests:

The authors declare no competing interests.

Ethics approval:

No animals were captured, handled or disturbed. All field observations were made from public shorelines, citizen-science video material was analysed in accordance with platform user terms, and the study complied with Chinese wildlife protection regulations.

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Author Contribution

Yanyu Zhao: Conceptualization, methodology, field investigation, data curation, formal analysis, writing-original draft, writing-review & editing, supervision, project administration.Hualin Yang: Field investigation, data curation, validation, writing-review & editing.Shijuan Li: Field investigation, citizen-science data screening, validation.Yahui Li: Methodology, formal analysis, writing-review & editing.

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Data availability:

Georeferenced metadata for the verified sightings are available from the corresponding author on reasonable request. Original field photographs and videos, and validated citizen-science footage, remain the property of their respective owners. Interview records are fully anonymized.

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Figures

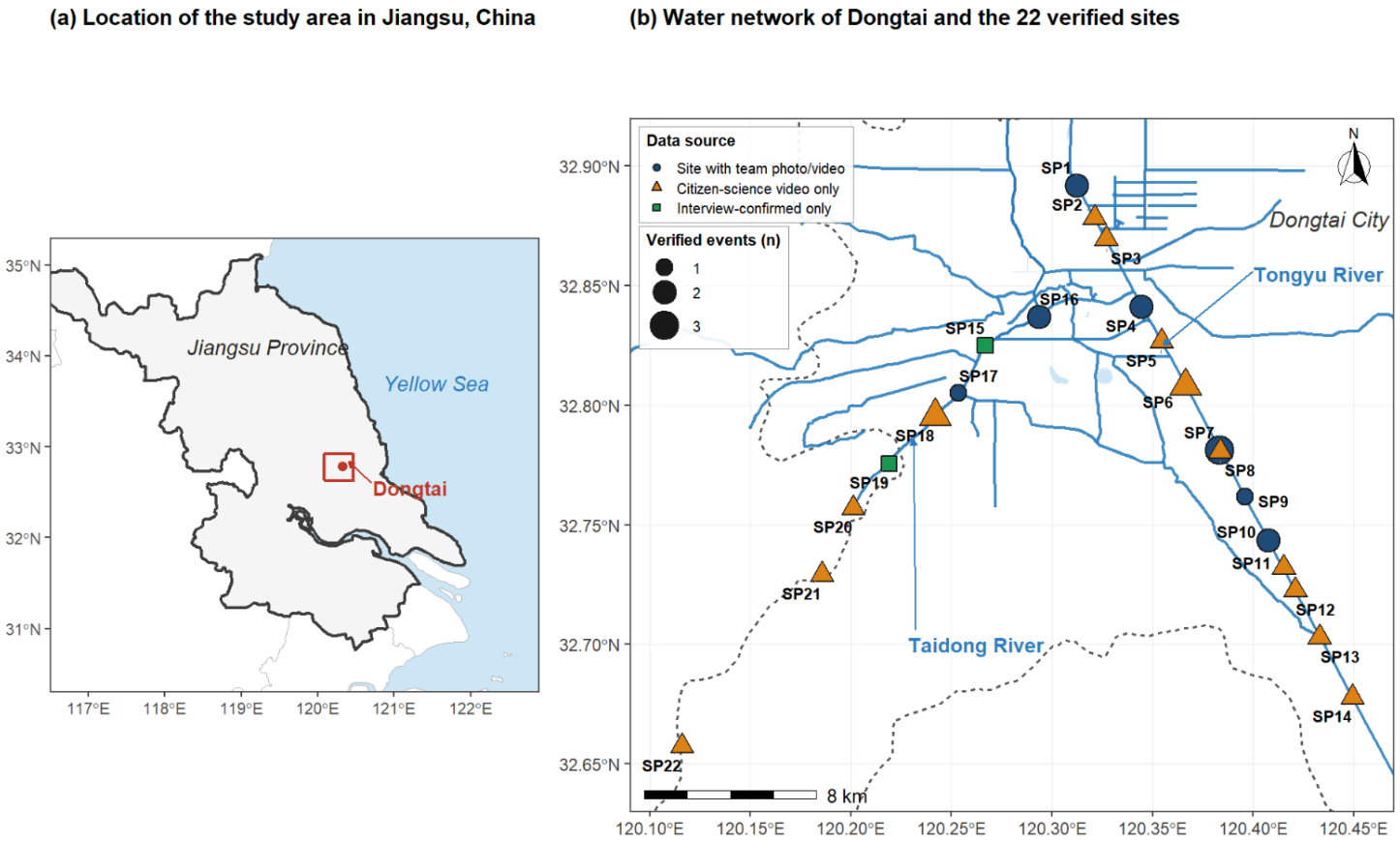


Figure 1

Spatial distribution of verified Yangtze finless porpoise observation sites (SP1–SP22) in the Tongyu–Taidong canal system, Jiangsu, China. Symbols distinguish research-team photographs and videos, validated citizen-science records and interview-confirmed sightings, and symbol size corresponds to the number of verified events at each site.