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NOTE

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Probable signature whistle production in Atlantic white-sided (*Lagenorhynchus acutus*) and short-beaked common (*Delphinus delphis*) dolphins near Cape Cod, Massachusetts

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Some delphinids produce a learned, individually specific tonal whistle that conveys identity information to conspecifics (Janik & Sayigh, 2013). These whistles, termed signature whistles, were first described by Caldwell and Caldwell (1965) and have been studied intensively over the past several decades (Janik & Sayigh, 2013). In common bottlenose dolphins (*Tursiops truncatus*) and potentially other species, signature whistles facilitate many ecologically-important behaviors, including individual recognition and maintenance of group cohesion (Janik & Slater, 1998). Additionally, signature whistle contours, or patterns of frequency change over time, can remain stable for several decades, aiding in long-term social bonds (Sayigh et al., 1990). Signature whistles account for approximately 38%–70% of all whistle production in free-swimming animals (Buckstaff, 2004; Cook et al., 2004; Watwood et al., 2005); this percentage can be up to 100% for isolated individuals in captivity (Caldwell et al., 1990). Most of our knowledge on the function and use of signature whistles stems from *Tursiops* spp., and their use and presence in other delphinid taxa is less understood. Nonetheless, seven additional delphinid species have been reported to produce signature whistles: Indo-Pacific bottlenose dolphins (*Tursiops aduncus*; Gridley et al., 2014), common dolphins (*D. delphis*; Caldwell & Caldwell 1968; Fearey et al., 2019), Atlantic spotted dolphins (*Stenella plagiodon*; Caldwell et al., 1970), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*; Caldwell & Caldwell, 1973), Pacific humpback dolphins (*Sousa chinensis*; Van Parijs & Corkeron, 2001), and Guiana dolphins (*Sotalia guianensis*; Duarte de Figueiredo & Simão, 2009).

Early signature whistle investigations in wild populations were hindered by the inability to conclusively link whistles to individuals. To address this, Janik et al. (2013) developed SIGnature IDentification (known as SIGID), which is a set of criteria used to identify signature whistle types of free-ranging *T. truncatus*. Leveraging that signature whistles often occur in bouts (Janik & Sayigh, 2013), SIGID defines signature whistle types as whistles of similar contour having 75% or more occurrences within 1–10 s. These criteria are conservative, and application of SIGID on *T. truncatus* (four captive and seven wild, all with known signature whistles) correctly identified 8 of 11 signature whistles (Janik et al., 2013) with no false positives. To date, multiple studies have applied the SIGID method on other bottlenose dolphin populations and other delphinid species (Fearey et al., 2019; Gridley et al., 2014; Longden et al., 2020; Luís et al., 2016; Matsushiro et al., 2022; Panova et al., 2021; Papale et al., 2015; Rio et al., 2022; Terranova et al., 2022).

In the present study, we sought to examine the whistle repertoires of *L. acutus* and *D. delphis*, and if present, describe signature whistle parameters. Several studies have quantified *D. delphis* whistle parameters and broadly described whistle types (Ansmann et al., 2007; Goold, 1996, 1998; Oswald et al., 2003, 2007; Petrella et al., 2012). In addition, two studies provided evidence for signature whistle production: Caldwell and Caldwell (1968), Fearey et al. (2019). Caldwell and Caldwell (1968) recorded a group of four captive common dolphins and noted that three animals emitted theiown distinct stereotyped whistle, while the fourth produced two stereotyped whistles, with one occurring much less frequently. Fearey et al. (2019) described individually specific whistles in a population of *D. delphis* off southern Africa, identifying 29 signature whistle types from 10 focal follows. Fearey et al. (2019) also noted that probable *D. delphis* signature whistles had shorter interwhistle intervals than probable nonsignature whistles, reinforcing the utility of the SIGID method.

The vocal repertoire of *L. acutus* is less understood. Of the few existing studies, Steiner (1981) recorded 1,691 whistles from a population off Nova Scotia and documented basic whistle parameters (e.g., minimum and maximum frequency, whistle duration). Hamran (2014) described whistles, buzzes, and clicks in the *L. acutus* vocal repertoire, and noted that whistles and clicks were commonly emitted in all activity states. Repeated whistle contours were observed, although the quantity was not specified, leaving open whether *L. acutus* emit signature whistles.

To identify signature whistle presence in *D. delphis* and *L. acutus*, we used a combination of confirmed sightings, stranding responses (*D. delphis* only), and passive acoustic monitoring (PAM) through SIGID. Acoustic recordings of free-ranging *L. acutus* and *D. delphis* were collected in Wellfleet Harbor, Massachusetts (41°53′51.15″N, 70°3′22.50″W) from April 2014 to January 2018, excluding November 2014 to April 2015. Soundtrap acoustic recorders (Ocean Instruments, Auckland, New Zealand) were moored near the entrance of Wellfleet Harbor and recorded acoustic data at 72–96 kHz sampling rate at 5–45 min/hr duty cycles. Wellfleet Harbor is a mass stranding hotspot and is frequently monitored by the International Fund for Animal Welfare (IFAW) for delphinids, which is the organization permitted to respond to marine mammal strandings in the area. During this study period, there were both confirmed sightings of *D. delphis* and *L. acutus* swimming in Wellfleet Harbor. Additionally, some groups stranded and were rescued by IFAW. As a result, we were able to temporally link some acoustic data to IFAW delphinid sighting data around the recorder location. Whistles of the same type were assigned to a species when IFAW documented species presence in Wellfleet Harbor on the same day whistles were recorded. There were no days in which both *D. delphis* and *L. acutus* were reported in the harbor.

Acoustic data totaling 1,093 days were audited for the presence of whistles in Raven Pro 1.5 (Brightness: 30–35; Contrast: 60–65; FFT 2350). When whistles were boxed in RavenPro, parameters including start and end times were stored in a selection table, along with annotations including call type. This makes the process of calculating interwhistle intervals between calls of the same type straightforward. Whistles were visually grouped into types based upon contour similarity. Whistles of the same type that were repeated in bouts were classified as probable signature whistles if their parameters met SIGID requirements (Janik et al., 2013). Five human observers verified a subset of our visual classifications. Each observer was given five examples of 31 randomly selected signature whistle types, and they were instructed to place them into groups of five based upon contour similarity (Janik, 1999; Sayigh et al., 2007). No further guidance was given. The observers' classifications had 98.7% overlap, with four of the five scoring 100% in accordance with the author's classifications.

Of the 1,093 recording days, 114 contained odontocete whistles. Using the IFAW sighting log, one recording day with whistle detections was linked to *L. acutus* and 8 days were linked to *D. delphis* (Table 1). In the confirmed *D. delphis* detection days, 651 whistles were found. Of these, 251 whistles (39% of total whistle selections) were classified into 17 call types that met SIGID criteria and were deemed probable signature whistles (Figures 1 and 2).

TABLE 1 Mean and standard deviation of whistle duration, maximum frequency, and minimum frequency for all signature whistles recorded for *L. acutus* and *D. delphis*.

Species	# Signature whistles recorded	# Probable signature types	Whistle duration (s)	Maximum frequency (kHz)	Minimum frequency (kHz)
Lagenorhynchus acutus	556	66	0.83 ± 0.3	14.16 ± 2.6	8.17 ± 2.4
Delphinus delphis	251	17	0.89 ± 0.3	15.28 ± 3.0	8.09 ± 1.5

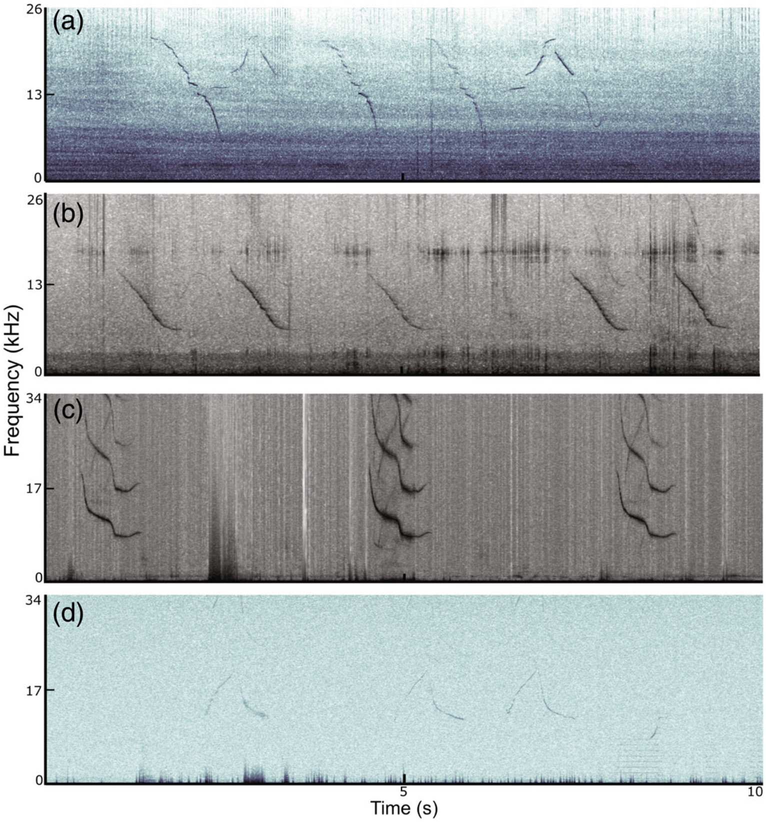

FIGURE 1 Probable signature whistle bouts of free-ranging *L. acutus* (a; note two different whistle types) and *D. delphis* (b) in Wellfleet Harbor, MA. Stereotyped whistle production during health assessments of stranded *D. delphis* adult (c) and subadult (d).

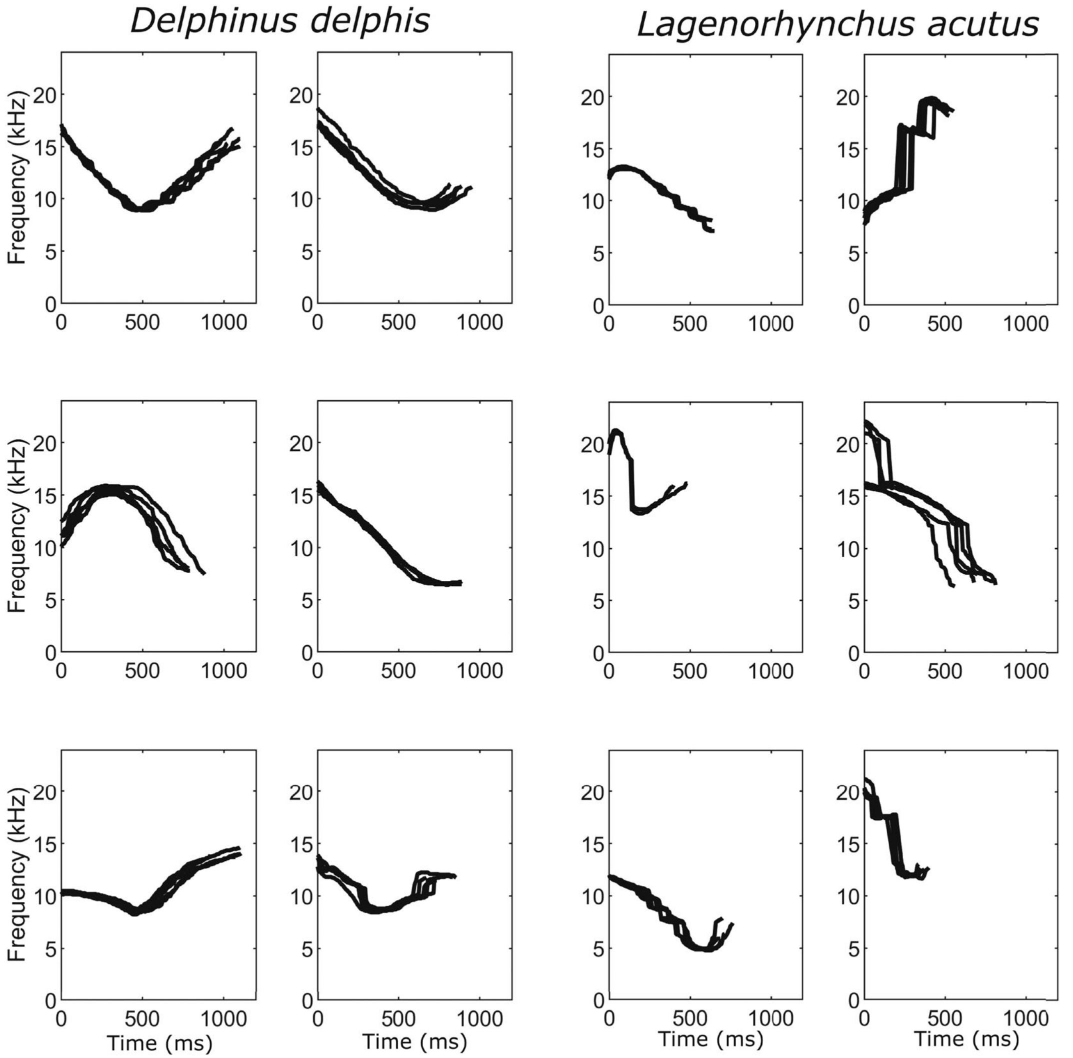

FIGURE 2 Contour tracings of six randomly selected *L. acutus* and *D. delphis* signature whistle types. Five contours of each whistle type were traced and overlaid on the same spectrogram to convey stereotypy.

Average maximum and minimum frequencies of probable signature whistles were (*M* ± *SD*) 15.28 ± 3.0 kHz and 8.09 ± 1.5 kHz, and average whistle duration was 0.89 ± 0.3 s. Seven signature whistle instances were multilooped, with an interloop interval between 0 s and 0.25 s. In the one confirmed recording day of *L. acutus*, over 100 animals were reported by IFAW, and 1,369 whistles were selected in the recording. Of these, 556 whistles (41% of total whistle selections) were classified into 66 call types that met SIGID requirements (Figures 1 and 2). Average maximum and minimum frequencies of probable signature whistles were 14.16 ± 2.6 kHz and 8.17 ± 2.4 kHz, and average whistle duration was 0.83 ± 0.3 s. *L. acutus* emitted 24 probable signature whistles with multiloop components with interloop interval between 0 s and 0.25 s. One hundred and five recording days contained whistles, but we were unable to link the recordings to IFAW visual sightings. During these days, 221 probable signature whistle types were classified.

In addition to the PAM data, one male adult and one male subadult *D. delphis* stranded in Wellfleet Harbor in October 2015, and both individuals were acoustically recorded during health assessments and transportation from the stranding to release site. Throughout the entire response, both animals received appropriate supportive care and were continuously monitored. The adult and subadult were recorded for 72 and 65 min, respectively. The adult was notably more stressed during relocation and ultimately died before being released. Both individuals emitted highly stereotyped whistles (Figure 1C, D). The adult emitted 718 whistles (10 whistles/min), all of which were visually categorized into one whistle type. The subadult, however, emitted two whistle types throughout the recording period. The prominent whistle type, and probable signature whistle, was emitted 230 times (3.5 whistles/min), while a secondary whistle was produced 35 times.

D. delphis and *L. acutus* whistle parameters measured in the present study varied from previously published accounts. *D. delphis* whistle duration in our study (0.89 ± 0.3 s) was greater than other populations measured in the Celtic Sea (0.65 ± 0.3 s; Ansmann et al., 2007), English Channel (0.64 ± 0.3; Ansmann et al., 2007), Tropical Pacific (0.7 ± 0.4 s; Oswald et al., 2007), and New Zealand (0.27 ± 0.3 s; Petrella et al., 2012). These differences in whistle duration suggest there may be geographic variation in whistle production or differences in duration between whistle types (i.e., signature and nonsignature) as seen in *T. truncatus* (Esch et al., 2009b; Rendell et al., 1999). *L. acutus* whistles in the present study were longer in duration and with higher maximum frequency than found for a Nova Scotian population (0.50 ± 0.3 s, maximum 12.1 kHz; Steiner 1981), again suggesting possible geographic differences in whistle parameters. Another potential explanation for the discrepancy in whistle parameters was the behavioral context of our PAM recordings. The majority (91%) of signature whistle occurrences for *D. delphis* occurred on days of stranding events. Strandings are stressful for the animals, and these events may have caused individuals or groups to vocalize differently. In fact, *T. truncatus* signature whistle rates have been shown to be impacted by stress, but it is unknown if similar trends are found in *D. delphis* and *L. acutus* (Esch et al., 2009a; Perez-Ortega et al., 2021).

We acknowledge that PAM data do not have unequivocal visual ground truthing that linked whistles to a species, but the large sample size of probable signature whistles identified with SIGID both linked and not linked to the sighting log, as well as whistle stereotypy in the isolated *D. delphis* pair (Janik & Slater, 1998; Sayigh et al., 2007), all point to a strong likelihood of signature whistles in both species' vocal repertoires. Our work strengthens the growing list of delphinid species that likely produce signature whistles, illustrating their central role in delphinid behavior and communication systems.

AUTHOR CONTRIBUTIONS

Seth Cones: Conceptualization; data curation; formal analysis; investigation; methodology; validation; writing–review and editing. **Molly Dent:** Formal analysis; investigation; validation; writing – review and editing. **Sam Walkes:** Conceptualization; investigation; methodology; writing – review and editing. **Alessandro Bocconcelli:** Conceptualization; funding acquisition; investigation; methodology; writing – review and editing. **Christianna DeWind:** Investigation; writing – review and editing. **Kayla Arjasbi:** Investigation; writing – review and editing. **Kathryn S. Rose:** Data curation; methodology; writing – review and editing. **Tammy Silva:** Conceptualization; data curation; formal analysis; investigation; methodology; writing – review and editing. **Laela S. Sayigh:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; resources; software; supervision; validation; writing – review and editing.

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REFERENCES

Ansmann, I. C., Goold, J. C., Evans, P. G. H., Simmonds, M., & Keith, S. G. (2007). Variation in the whistle characteristics of short-beaked common dolphins, *Delphinus delphis*, at two locations around the British Isles. *Journal of the Marine Biological Association of the United Kingdom*, *87*(1), 19–26. https://doi.org/10.1017/S0025315407054963

Buckstaff, K. C. (2004). Effects of watercraft noise on the acoustic behavior of bottlenose dolphins, *Tursiops truncatus*, in Sarasota bay, Florida. *Marine Mammal Science*, *20*(4), 709–725. https://doi.org/10.1111/j.1748-7692.2004.tb01189.x

Caldwell, M. C., & Caldwell, D. K. (1965). Individualized whistle contours in bottlenose dolphins. *Nature*, *207*, 434–435. https://doi.org/10.1038/207434a0

Caldwell, M. C., & Caldwell, D. K. (1968). Vocalization of naive captive dolphins in small groups. *Science*, *159*(3819), 1121–1123. https://doi.org/10.1126/science.159.3819.1121

Caldwell, M. C., & Caldwell, D. K. (1970). *Statistical evidence for individual signature whistles in the Pacific whitesided dolphin*, Lagenorhynchus obliquidens (Office of Naval Research Technical Report Number 9). Los Angeles County Museum of Natural History Foundation.

Caldwell, M. C., Caldwell, D. K., & Miller, J. F. (1973). Statistical evidence for individual signature whistles in the spotted dolphin, *Stenella plagiodon*. *Cetology*, *16*, 1–21.

Caldwell, M. C., Caldwell, D. K., & Tyack, P. L. (1990). A review of the signature-whistle hypothesis for the Atlantic bottlenose dolphin. In S. Leatherwood & R. Reeves (Eds.), *The bottlenose dolphin* (pp. 199–234). Academic Press.

Cook, M. L. H., Sayigh, L. S., Blum, J. E., & Wells, R. S. (2004). Signature-whistle production in undisturbed free-ranging bottlenose dolphins (*Tursiops truncatus*). *Proceedings of the Royal Society B: Biological Sciences*, *271*(1543), 1043–1049. https://doi.org/10.1098/rspb.2003.2610

Duarte de Figueiredo, L., & Simão, S. M. (2009). Possible occurrence of signature whistles in a population of *Sotalia guianensis* (Cetacea, Delphinidae) living in Sepetiba Bay, Brazil. *Journal of the Acoustical Society of America*, *126*(3), 1563–1569. https://doi.org/10.1121/1.3158822

Esch, H. C., Sayigh, L. S., Blum, J. E., & Wells, R. S. (2009a). Whistles as potential indicators of stress in bottlenose dolphins (*Tursiops truncatus*). *Journal of Mammalogy*, *90*(3), 638–650. https://doi.org/10.1644/08-MAMM-A-069R.1

Esch, H. C., Sayigh, L. S., & Wells, R. S. (2009b). Quantifying parameters of bottlenose dolphin signature whistles. *Marine Mammal Science*, *25*(4), 976–986. https://doi.org/10.1111/j.1748-7692.2009.00289.x

Fearey, J., Elwen, S. H., James, B. S., & Gridley, T. (2019). Identification of potential signature whistles from free-ranging common dolphins (*Delphinus delphis*) in South Africa. *Animal Cognition*, *22*(5), 777–789. https://doi.org/10.1007/s10071-019-01274-1

Goold, J. C. (1996). Acoustic assessment of populations of common dolphin *Delphinus delphis* in conjunction with seismic surveying. *Journal of the Marine Biological Association of the United Kingdom*, *76*(3), 811–820. https://doi.org/10.1017/s0025315400031477

Goold, J. C. (1998). Acoustic assessment of populations of common dolphin off the west Wales coast, with perspectives from satellite infrared imagery. *Journal of the Marine Biological Association of the United Kingdom*, *78*(4), 1353–1364. https://doi.org/10.1017/s0025315400044544

Gridley, T., Cockcroft, V. G., Hawkins, E. R., Blewitt, M. L., Morisaka, T., & Janik, V. M. (2014). Signature whistles in free-ranging populations of Indo-Pacific bottlenose dolphins, *Tursiops aduncus*. *Marine Mammal Science*, *30*(2), 512–527. https://doi.org/10.1111/mms.12054

Hamran, E. T. (2014). *Distribution and vocal behavior of Atlantic white-sided dolphins* (Lagenorhynchus acutus) *in northern Norway* [Unpublished master's thesis]. Universitetet i Nordland.

Janik, V. M. (1999). Pitfalls in the categorization of behaviour: A comparison of dolphin whistle classification methods. *Animal Behaviour*, *57*(1), 133–143. https://doi.org/10.1006/anbe.1998.0923

Janik, V. M., King, S. L., Sayigh, L. S., & Wells, R. S. (2013). Identifying signature whistles from recordings of groups of unrestrained bottlenose dolphins (*Tursiops truncatus*). *Marine Mammal Science*, *29*(1), 109–122. https://doi.org/10.1111/j.1748-7692.2011.00549.x

Janik, V. M., & Sayigh, L. S. (2013). Communication in bottlenose dolphins: 50 years of signature whistle research. *Journal of Comparative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology*, *199*(6), 479–489. https://doi.org/10.1007/s00359-013-0817-7

Janik, V. M., & Slater, P. J. B. (1998). Context-specific use suggests that bottlenose dolphin signature whistles are cohesion calls. *Animal Behaviour*, *56*(4), 829–838. https://doi.org/10.1006/anbe.1998.0881

Longden, E. G., Elwen, S. H., McGovern, B., James, B. S., Embling, C. B., & Gridley, T. (2020). Mark–recapture of individually distinctive calls—a case study with signature whistles of bottlenose dolphins (*Tursiops truncatus*). *Journal of Mammalogy*, *101*(5), 1289–1301. https://doi.org/10.1093/jmammal/gyaa081

Luís, A. R., Couchinho, M. N., & dos Santos, M. E. (2016). Signature whistles in wild bottlenose dolphins: long-term stability and emission rates. *Acta Ethologica*, *19*(2), 113–122. https://doi.org/10.1007/s10211-015-0230-z

Matsushiro, M., Nakamura, M., Chayahara, Y., & Kooriyama, T. (2022). Contour variations and acoustic characteristics of whistle sounds emitted by Pacific white-sided dolphins in shallow coastal waters of the Sea of Japan. *Marine Mammal Science*, *38*(3), 881–897. https://doi.org/10.1111/mms.12892

Oswald, J. N., Barlow, J., & Norris, T. F. (2003). Acoustic identification of nine delphinid species in the eastern tropical Pacific Ocean. *Marine Mammal Science*, *19*(1), 20–37. https://doi.org/10.1111/j.1748-7692.2003.tb01090.x

Oswald, J. N., Rankin, S., Barlow, J., & Lammers, M. O. (2007). A tool for real-time acoustic species identification of delphinid whistles. *Journal of the Acoustical Society of America*, *122*(1), 587–595. https://doi.org/10.1121/1.2743157

Panova, E., Agafonov, A., & Logominova, I. (2021). First description of whistles of Black Sea short-beaked common dolphins, *Delphinus delphis ponticus*. *Bioacoustics*, *30*(6), 662–679. https://doi.org/10.1080/09524622.2020.1842245

Papale, E., Buffa, G., Filiciotto, F., Maccarrone, V., Mazzola, S., Ceraulo, M., Giacoma, C. Buscaino, G. (2015). Biphonic calls as signature whistles in a free-ranging bottlenose dolphin. *Bioacoustics*, *24*(3), 223–231. https://doi.org/10.1080/09524622.2015.1041158

Perez-Ortega, B., Daw, R., Paradee, B., Gimbrere, E., & May-Collado, L. J. (2021). Dolphin-watching boats affect whistle frequency modulation in bottlenose dolphins. *Frontiers in Marine Science*, *8*. https://doi.org/10.3389/fmars.2021.618420

Petrella, V., Martinez, E., Anderson, M. G., & Stockin, K. A. (2012). Whistle characteristics of common dolphins (*Delphinus* sp.) in the Hauraki Gulf, New Zealand. *Marine Mammal Science*, *28*(3), 479–496. https://doi.org/10.1111/j.1748-7692.2011.00499.x

Rendell, L. E., Matthews, J. N., Gill, A., Gordon, J. C. D., & Macdonald, D. W. (1999). Quantitative analysis of tonal calls from five odontocete species, examining interspecific and intraspecific variation. *Journal of Zoology*, *249*(4), 403–410. https://doi.org/10.1017/S0952836999009875

Rio, R., Rosales-Nanduca, H., Piuma, L. A., Piuma, J. F., Piuma, M., Redecker, G. S., & Hoffmann, L. S. (2022). First report of signature whistles in an oceanic common bottlenose dolphin (*Tursiops truncatus*) population from Revillagigedo Archipelago, Mexico. *Marine Mammal Science*. Advance online publication. https://doi.org/10.1111/mms.12921

Sayigh, L. S., Esch, H. C., Wells, R. S., & Janik, V. M. (2007). Facts about signature whistles of bottlenose dolphins, *Tursiops truncatus*. *Animal Behaviour*, *74*(6), 1631–1642. https://doi.org/10.1016/j.anbehav.2007.02.018

Sayigh, L. S., Tyack, P. L., Wells, R. S., & Scott, M. D. (1990). Signature whistles of free-ranging bottlenose dolphins *Tursiops truncatus*: Stability and mother-offspring comparisons. *Behavioral Ecology and Sociobiology*, *26*(4), 247–260. https://doi.org/10.1007/BF00178318

Steiner, W. W. (1981). Species-specific differences in pure tonal whistle vocalizations of five western north Atlantic dolphin species. *Behavorial Ecology and Sociobiology*, *9*(4), 241–246. https://doi.org/10.1007/BF00299878

Terranova, F., Raffa, A., & Floridia, S. (2022). Vocal behaviour of a bottlenose dolphin pod during a deadly bycatch event in the Gulf of Catania, Ionian Sea. *Marine Science and Engineering*, *10*, Article 616. https://doi.org/https://doi.org/10.3390/jmse10050616

Van Parijs, S. M., & Corkeron, P. J. (2001). Evidence for signature whistle production by a Pacific humpback dolphin, *Sousa chinensis*. *Marine Mammal Science*, *17*(4), 944–949. https://doi.org/10.1111/j.1748-7692.2001.tb01308.x

Watwood, S. L., Owen, E. C. G., Tyack, P. L., & Wells, R. S. (2005). Signature whistle use by temporarily restrained and free-swimming bottlenose dolphins, *Tursiops truncatus*. *Animal Behaviour*, *69*(6), 1373–1386. https://doi.org/10.1016/j.anbehav.2004.08.019

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