A PETREL PRIMER
The Gadflies of North Carolina

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How times change—and how quickly. As terrestrial frontiers for students of bird distribution have become fewer and more remote, birders seeking adventure and challenge have gradually turned to the pelagic zones off North America, whose exploration began in earnest in the last decade of the twentieth century. No one imagined, a few decades ago, that in the twenty-first century birders would spend countless hours plying the very deep waters off the Outer Banks of North Carolina, hoping to connect with some of the seven storm-petrel species or four species of gadfly petrel now known to be visitors to these waters.

The challenges are many: The identification of many of the lesser-known species has yet to be settled, and the range of variation in plumage is poorly known for many species. As with other groups of birds, "splitting" and renaming have redrawn the checklist many times over in recent years, and birders have had to keep abreast of the technical literature on the tubenoses and their taxonomy. And then there is the habitat—the open ocean—which requires both experience and instrumentation to interpret, as well as sea-legs and some stamina, along with patience and a practiced eye to scan across what can seem an empty sea and sky. While the rewards can be great, the physical and intellectual investments are commensurate. But for those birders who love the salt breezes and cornflower-blue tropical waters, the attraction of the Gulf Stream and its rare fauna is irresistible. For many, the visit to Carolina's Outer Banks has become an annual pilgrimage.

Fig. 1. This is a typical dark-morph **Trinidade Petrel**. We assume that the birds studied off North Carolina each year come from the South Atlantic, but there is also an Indian Ocean population of this species, the dark morph of which often shows a white blaze around the base of the bill, a character documented only once off North Carolina. *Off Hatteras, North Carolina; August 1996. © J. Brian Patteson.*

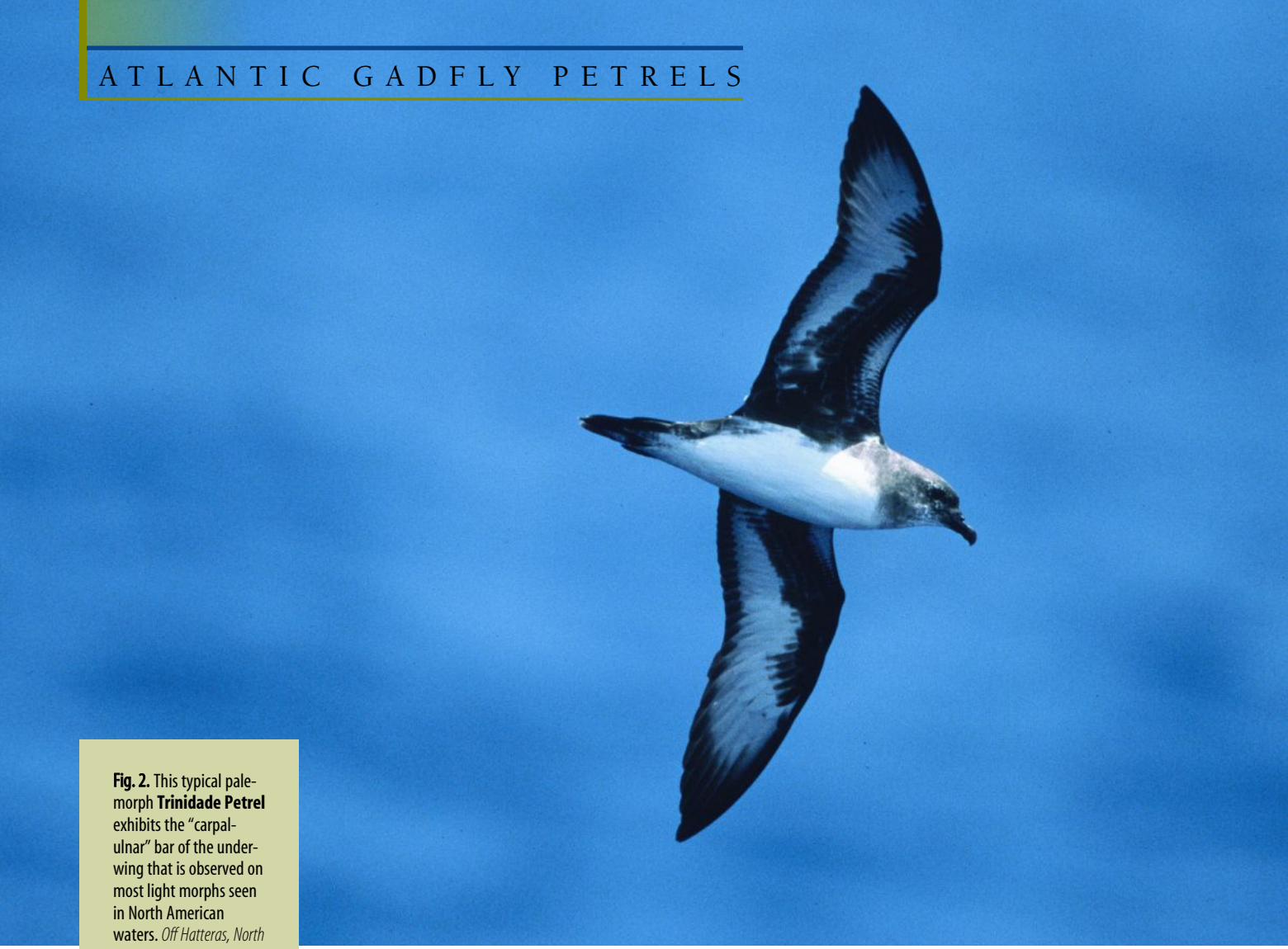


Fig. 2. This typical pale-morph **Trinidade Petrel** exhibits the "carpal-ulnar" bar of the underwing that is observed on most light morphs seen in North American waters. *Off Hatteras, North Carolina; 27 August 2000. © J. Brian Patteson.*

In this article, we digest several decades' worth of thinking about the most charismatic of the Atlantic tubenoses, the agile "gadfly petrels" of the genus *Pterodroma*, species that have become much sought-after by birders off both the Atlantic and Pacific coasts but that still pose a true frontier for the restless and the curious. Here we consider the identification, variation, and colorful, if confusing, taxonomic histories of the five extant North Atlantic species, four of which have been conclusively documented in the ABA Area.

Trinidade [Herald] Petrel, *Pterodroma arminjoniana*

The odds of seeing one of these sleek, small, variable gadfly petrels off North Carolina during the warmer months are good: Between 1994 and 2004, as few as three to as many as 18 per year have been seen, between mid-May and September (average of 10 per year), and our understanding of the bird's appearances and behavior increases each year. These petrels breed only on the small Brazilian islands of Martin Vaz (Martim Vas) and Trinidade (Trindade) in the South Atlantic Ocean and on Round Island, Mauritius, in the Indian Ocean. At a great distance, it is possible to confuse them with shearwaters or jaegers, but their manner of flying—in high arcs above the sea when the winds are brisk—should be a good clue that a jaeger is not involved. The rare and smaller Bulwer's Petrel should also be considered, as it has been recorded twice off North Carolina (LeGrand et al. 1999). As with other medium-sized tubenoses, a careful study of plumage and structure is needed to confirm identification.

Like several other species of gadfly petrel, Trinidade Petrel is polymorphic in plumage and also shows variation within these morphs. Historically, Trinidade was combined with the Herald Petrel (*P. heraldica*) of the Pacific Ocean, from which it differs in body and bill size, plumage, and ectoparasites (Imber 1985), as well as genetically (Brooke and Rowe 1996, 2000). Researchers have also split *heraldica* itself, with the two former "morphs" now recognized as distinct species: The dark form is now called Henderson Petrel (*P. atrata*), with *heraldica* applied to the paler birds, whose call-structure and breeding cycle differ from dark birds', and which usually mate assortatively with other pale morphs (Brooke and Rowe 1996). In North America, the AOU (1998) recognizes the early work of Brooke and Rowe (1996) but has yet to rule on the reorganization of taxa in this complex, as is true in the cases of most other recent worldwide taxonomic re-orderings within the Procellariiformes.

The history of naming the petrels found on Trinidade and Martin Vaz Islands is fascinating and still relevant to modern

taxonomy. Wilson (1904) and Nicoll (1909) both describe the brown gadfly petrels as nesting earlier, higher on the cliffs, and separately from the pale-bellied petrels—which were then called "Arminjon's Petrels" and treated as a species separate from the ventrally dark *trinitatis*, the "[South] Trinidad Petrel". This treatment was in keeping with the descriptions of these birds by the Italian explorers Enrico Giglioli and Tomasso Salvadori (1868), who had named the pale-bellied gadfly petrel there after their corvette's captain, V.F. Arminjon. In fact, the pale-bellied petrel at Trinidade had probably already been discovered—as early as 22 December 1768—and then named *Procellaria sandaliata* by Sir Joseph Banks (University of Sydney Library 1997), the naturalist aboard the H.M.S. *Endeavour* with Captain Cook. But that specimen has been lost, and the description did not come to light until after the description by the Italians had been published in English in 1869. Note that Murphy and Pennoyer (1952) apparently considered *sandaliata* a *nomen nudum* and subsumed it under *arminjoniana*.

Wilson (1904) and Sharpe (1904) also described a third species among the gadfly petrels nesting on Trinidade, which was named "*wilsoni*", and in 1914, Robert Cushman Murphy visited Trinidade and did not find *wilsoni* among the gadfly petrels but instead located a petrel he described as yet another new species, "the Snowy-mantled Petrel, *Æstrelata chionophara*" (Murphy 1914). Although a dazzling individual, this bird appears to have been a leucistic Trinidade Petrel, a "sport" as Murphy later termed it (Murphy and Pennoyer 1952), and "*wilsoni*" has also been forgotten, believed now to be simply an intermediate plumage between dark and light morphs. Early in his career, Murphy (1915) countered arguments by Salvin and others that all gadfly petrels on Trinidade Island belonged to the same species, but later he reversed this position, not only lumping all petrels there into one species but also combining them with the Pacific *heraldica*, once again *contra* Salvin (Murphy and Pennoyer 1952). Whatever their ultimate status, all birds nesting on Trinidade Island indeed show morphometric and plumage differences from *heraldica*, and we treat only the Trinidade Island birds here.

The dark morph

The dark morph of Trinidade Petrel is a beautiful bird, chocolate brown throughout (a bit darker on the head in some birds), with the underwing variable but usually showing silvery-whitish bases to flight feathers and greater coverts, with darker tips to both (Fig. 1, p. 587). This pattern is more muted in some birds (Gochfeld et al. 1988), and molting birds have remarkably varied appearances, as is true in other tubenoses. We have not observed a freshly plumaged Atlantic bird with a white protopatagium (i.e., the leading edge of the underwing), a mark that is apparently typical of Pacific *atrata* (A. Jaramillo, personal communication). Observers using Harrison's *Seabirds* (1985)—which combines *arminjoniana* and *heraldica* but depicts only Pacific birds' plumages—have expected to see this mark on Atlantic birds (Patteson 1996). On some occasions off North Carolina, though, we have observed darker Trinidade Petrels with paler but still dusky bellies. These individuals do not match any described "morph", but several specimens in the Yale Peabody Museum that are labeled "*trinitatis* × *wilsoni*" are similar. Some birds with slightly paler abdomens may also simply have more wear in the contour feathers, which have extensive white bases (see illustration of "intermediate morph" in NGS 2002; cf. Smithsonian specimen USNM 527621). In several cases, molting dark-morph birds have shown a mottled brown-and-white protopatagial bar, as well as a paler but still dusky belly and

Fig. 3. Shown here are two specimens of the "*wilsoni*" race of **Trinidade Petrel**—named for the Antarctic explorer Edward Adrian Wilson—taken at Trinidade Island in late December 1924 by K.W. Cuyler and H. Rockwell. These birds were first described as a third species of gadfly petrel nesting on Trinidade Island, but soon thereafter all gadfly petrels nesting there were lumped into one species, *Pterodroma arminjoniana*. *© Kristof Zyskowski / Peabody Museum, Yale University.*

mottled underwing.

Molting birds photographed off North Carolina have even been mistakenly interpreted (e.g., by Imber 2004) to be the larger Kermadec Petrel (*P. neglecta*). This Pacific Ocean species was claimed at Hawk Mountain, Pennsylvania, on 4 October 1959 (Heintzelman 1961), just after the passage of Hurricane *Gracie*. Our 1998 study of film footage of that bird leads us to think it was potentially an asymmetrically leucistic dark-morph Trinidade Petrel, as partial leucism is fairly common in *arminjoniana* specimens from Trinidade Island. But we could not rule out Kermadec Petrel, for which there is an English specimen, albeit of dubious provenance, from 1908 (Newstead and Coward 1908). Note that the Pennsylvania record is not accepted by ABA (2002) or AOU (2004).

The pale and intermediate morphs

Pale morphs of Trinidade Petrel appear to be more variable than the dark birds. Most are evenly medium-brown above and pale below, with a brown head and pale throat bordered by a faint, mottled brownish collar, sometimes with a barred appearance; the underwing is mostly pale but shows a blackish-brown carpal-ulnar bar and dark edges to the rectrices, widest in the primaries (Fig. 2, p. 588). Above, most pale morphs are uniformly brown, although some show a moderate to strong carpal-ulnar "M" pattern, as do some dark morphs (Sibley 2000; cf. Enticott and Tipling 1998).

Paler "intermediate" morphs of Trinidade Petrel, however, have presented a field identification puzzle for birders in North America—and a nomenclatural problem since they were described in the early twentieth century. Where Giglioli and Salvadori found two species, Wilson and Sharpe in 1904 described the additional "*wilsoni*". We have reviewed two of Wilson's own "*wilsoni*" (taken in 1910) in the collection of the American Museum of Natural History, as well as 18 specimens of "*wilsoni*" dating from 1924–1925 in the Yale Peabody Museum and one in the University of Michigan collection from the same expedition. Most of these birds resemble what we currently consider simply duskier examples of the pale morph (Fig. 3, p. 589), which has been recorded several times in the North Atlantic off North Carolina, most recently as an in-hand study of a bird that wrecked in southern Virginia during Hurricane *Isabel* in 2003 (Fig. 4). Such birds are darker around the head and throat than the lightest pale morphs, and some have an underwing pattern like neither typical morph, showing

Fig. 4. This **Trinidade Petrel** was found by Brian Patteson after the passage of Hurricane *Isabel*. Note the gray-brown underwing and the rather dark hood, similar to the birds in Fig. 3. *Chesapeake Bay Bridge-Tunnel, Virginia; 19 September 2003. © Brian L. Sullivan.*

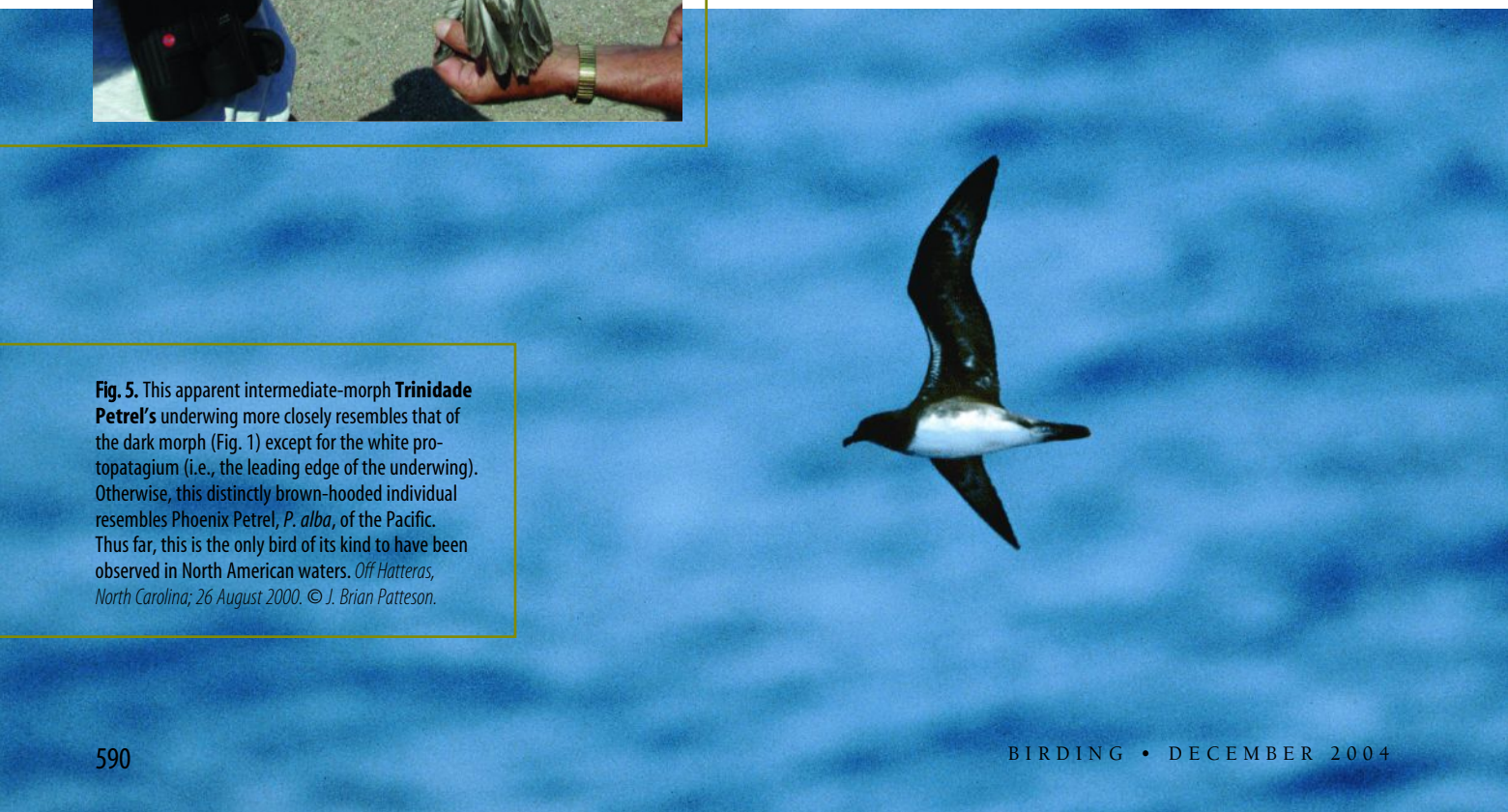


Fig. 5. This apparent intermediate-morph **Trinidade Petrel's** underwing more closely resembles that of the dark morph (Fig. 1) except for the white protopatagium (i.e., the leading edge of the underwing). Otherwise, this distinctly brown-hooded individual resembles Phoenix Petrel, *P. alba*, of the Pacific. Thus far, this is the only bird of its kind to have been observed in North American waters. *Off Hatteras, North Carolina; 26 August 2000. © J. Brian Patteson.*

instead a mix of grayish-brown and paler feathers without a distinct pattern (Fig. 4). One of Wilson's "*wilsoni*" (AMNH 528147) shows fairly heavy flank-barring as well; a darker Trinidade specimen in the collection of the Smithsonian (USNM 527614) is closer to the very mottled intermediate morph depicted in Sibley (2000), as are several of Yale's "*trinitatis* × *wilsoni*". "Wilson's Petrel" is quite varied in appearance, it would seem!

A very different phenotype, documented recently off North Carolina, was a presumed Trinidade Petrel that showed the underwing pattern of a dark morph—but with the exception of a white protopatagium—along with an almost completely dark brown hood (Fig. 5). There are several similar brown-hooded Pacific species, the most similar being Phoenix Petrel (*P. alba*), which typically shows a more uniformly brown underwing, with the exception of the white protopatagium. Nevertheless, we surmise that this bird must be yet another variant Trinidade Petrel.

What to make of these intermediate birds?—Hybrids or intergrades, discrete morphs, or simply various points on a spectrum from darkest to lightest forms? Murphy (1915) at one point distinguished two intermediate plumages, a "light '*wilsoni*' phase" and a "dark '*wilsoni*' phase"—but his descriptions are too brief to match to extant specimens. Our sense is, with Murphy (1915), that the taxonomic difficulties reflect problematic species limits, which may also be the case between the populations designated as *atrata* and *heraldica* (Brooke and Rowe 1996, 2000). Still other plumage characters have been documented among Trinidade Petrels in the Round Island, Mauritius, colony in the Indian Ocean (Dubois and Seitre 1997, Brinkley and Patteson 1998), which are taxonomically undifferentiated from the South Atlantic birds, but the genetics of the two populations have yet to be compared. There is surely much more to be learned about the relationships among these near cousins from distant islands.

Fea's (*P. feae*) and Zino's (*P. madeira*) Petrels and Related Taxa

Ever since Grayson Pearce spotted the first individual of the so-called "Soft-plumaged Petrel" complex off Hatteras on 24 May 1981, it has proved challenging to assign a name to the birds of this group seen annually (since 1992) off North Carolina, where there are now, as of the end of 2004, at least 49 records of birds identified as Fea's Petrels. Most of the birds studied to date have shared features that are easily discerned at sea: a pale caudal area (tail/rump) that contrasts with the darker bluish-gray back; a darker carpal-ulnar "M" pattern on the upperwing; a mostly slate-colored underwing contrasting with a white abdomen; and usually a cowl of light gray around the crown and sides of the breast that does not meet as a breast-band. At close range, some birds show a brownish cast in the upperparts and underwing coverts.

With such a distinctive bird, identification would seem straightforward, but the taxonomic statuses of the petrels in this group have changed frequently over the past two decades, and multiple cryptic species have been described and widely accepted as valid. Research into genetics, morphology, vocalizations, and ectoparasites confirms that Fea's Petrel (*P. feae*) is a species distinct from the smaller Zino's Petrel (*P. madeira*); moreover, unpublished biochemical studies (Nunn and Zino in preparation) suggest that the two taxa of Fea's Petrel—the nominate race *feae* that nests on the Cape Verde Islands and the *deserta* race that nests on Bugio in the Desertas Islands—are distinct species. Unresolved is the taxonomic identity of birds found in the Azores, although all are believed to be Fea's Petrels of some kind, and probably the *deserta* taxon (Bibby and del Nevo 1991, Monteiro and Furness 1995). Thus, we are probably not out of the taxonomic thornwoods yet.

Fig. 6. On this **Fea's Petrel** (subspecies unknown) note the heavy bill; the related Zino's Petrel, in contrast, has a much smaller, shallower bill. Note also the unbarred sides on this bird, which may be a supporting mark for the taxon *deserta*, which nests chiefly on Bugio, in the Desertas Islands. *Off Hatteras, North Carolina; 31 May 1998. © J. Brian Patteson.*

The history of the discovery and description of Fea's Petrel is remarkably similar to that of Trinidade Petrel: First noted by Sir Joseph Banks on 15 October 1768, it was given the name *Procellaria crepidata*, but that specimen has been lost. Hooker (1896) provided nearer details, but these did not reach the general English ornithological community until Mathews (1912) brought them to light. Meanwhile, in 1898, the Italian collector Leonardo Fea had discovered two petrels at São Nicolau, Cape Verde Islands, and these were described in his honor by Salvadori (1899) as *Œstrelata feae* (Fea's Petrel). Later authors lumped *feae* with the most similar petrel of the southern hemisphere, namely *mollis* (Soft-plumaged Petrel)—a taxonomic fate similar to that of the petrels on Trinidade—until the late twentieth century, when Bourne (1983)

Figs. 7 & 8. This **Fea's Petrel** is the only individual detected to date to show light barring on the body feathering where it meets the wing (not visible in these photos) and an uppertail very close in color to that of the back (see Figs. 9 & 10). **Fig. 7 (top).** *Off Hatteras, North Carolina; 24 August 2002. © J. Brian Patteson.* **Fig. 8 (bottom).** *Off Hatteras, North Carolina; 24 August 2002. © J. Brian Patteson.*

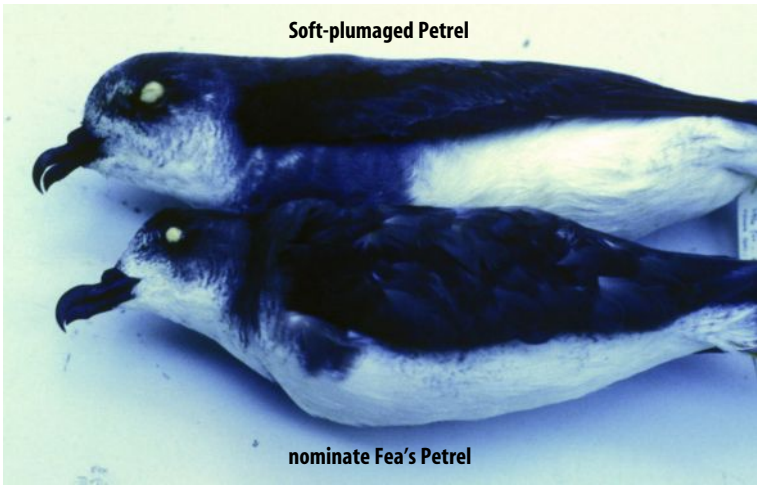
suggested their re-splitting, along with recognition at the species level of *P. madeira*, now called Zino's Petrel. A recent review of the taxonomy, identification, and distribution of the "Soft-plumaged Petrel" complex is given by Harrop (2004).

While some ornithologists reserve judgment on the identification of the birds photographed annually off North Carolina (e.g., AOU 1998, ABA 2002), we are able to confirm at least some of these as Fea's Petrel, most of them probably of the larger *deserta* subspecies. The single photographic record for Canada (Hooker and Baird 1997) is also of a heavy-billed bird. The *deserta* subspecies is characterized by a relatively deep bill, much larger than that of Zino's Petrel; moreover, it is a larger bird, smaller than Black-capped Petrel but not as small as Audubon's Shearwater, which is closer to, but larger than, Zino's Petrel (Zino and Zino 1986; Fig. 6, p. 591). Distinctions between the *deserta* subspecies and nominate *feae* are not yet well known but appear to include moderate to heavy barring in the feathers of the sides near the base of the wings in *feae* (Bretagnolle 1995), a feature observed so far on only one bird off North Carolina (Fig. 7). Pearce and Patteson also noted that the bird in Fig. 7 had a caudal area roughly similar in color to that of the back (see Fig. 8), rather than showing the stark contrast associated with Desertas Petrel.

In studying the specimen collection at the Smithsonian, we located one specimen of Fea's Petrel that showed heavy barring near the base of the wings—a bird taken at the breeding grounds in the Cape Verde Islands and thus a nominate *feae* (Figs. 9 & 10). Hazevoet (1995) describes some specimens of nominate *feae* as being heavily marked and mottled on sides and flanks, which is rarely the case with *deserta*, as far as we can discern from specimens and the published record. An exception could be a specimen taken near "Ilheo do Cal" (presumably Ilhéu Chão), off Madeira, currently in the Royal Scottish Museum, and said to have "fine streaking of all the underparts" (Bourne 1957). Thus, nominate *feae* in some cases would be more difficult to distinguish from *mollis* than from *deserta*.

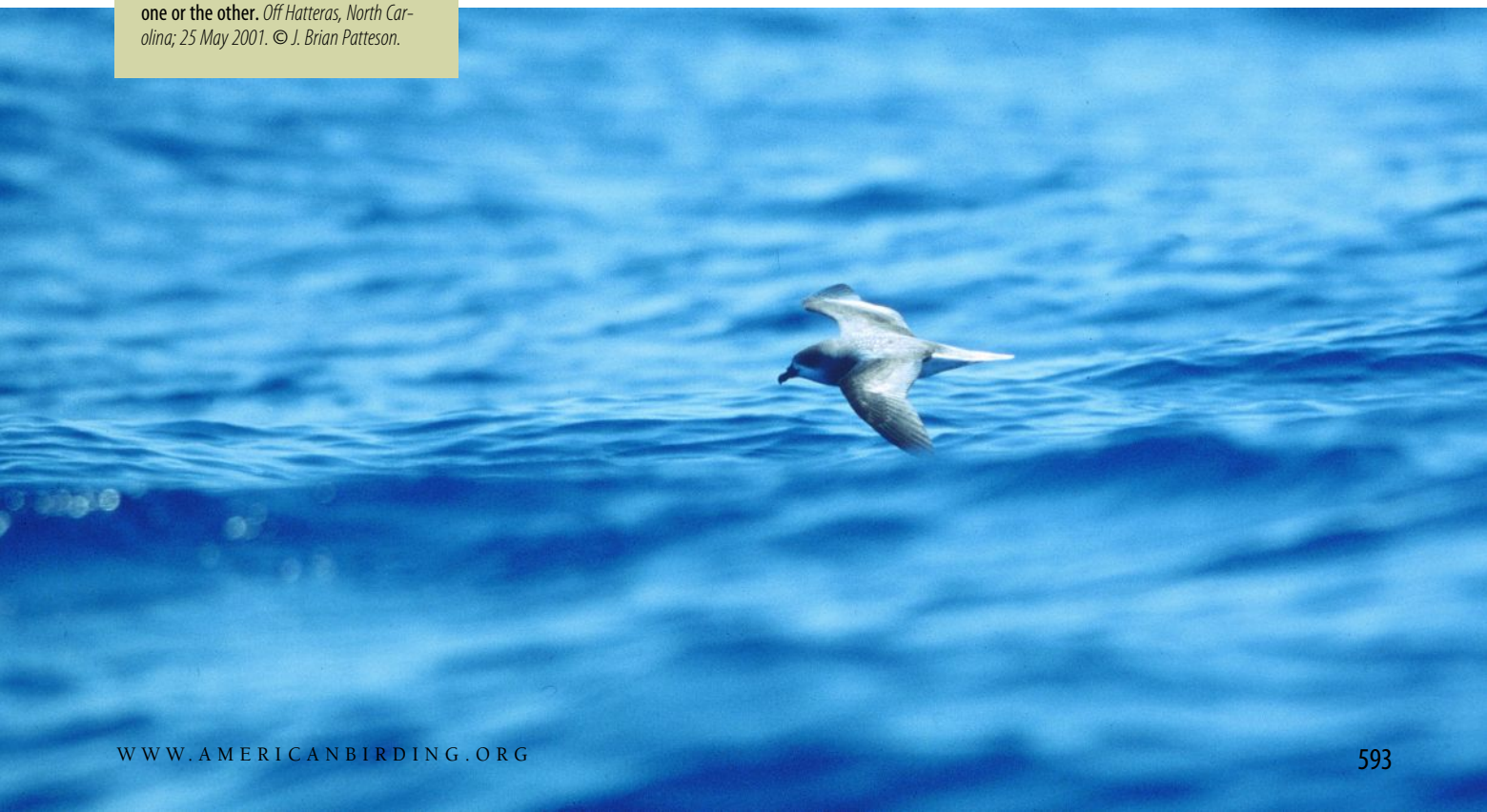
On one occasion a smaller gadfly petrel was observed off North Carolina (Fig. 11); it could not be confirmed as Zino's Petrel, but neither could Zino's be ruled out. Visits to that species' breeding grounds and adjacent waters in 2003 and 2004 by Brinkley suggest that the best mark for identifying

Figs. 9 & 10. Like Soft-plumaged Petrels, with which Fea's and Zino's Petrels had been lumped until about 1983 (Bourne 1983), at least some nominate-race Fea's Petrels—which nest in the Cape Verde Islands—show darker uppertail coverts than the *deserta* Fea's Petrels nesting in the Desertas archipelago at Bugio. In these photographs, the top and left birds are Soft-plumaged Petrels; the bottom and right birds were collected in the Cape Verde Islands at Volcan Fogo, and now are in the specimen collection at the Smithsonian Institution. See also the excellent images of flying *P. f. feae* posted at <www.cursorius.com/mac>. **Fig. 9 (left).** © *Edward S. Brinkley.* **Fig. 10 (below).** © *Edward S. Brinkley.*



Zino's Petrel in the field is the structure of the bill, which is small and shallow (Fig. 12, p. 594), lending the head a dove-like appearance rather like one of the "*Cookilaria*" gadfly petrels, e.g., Cook's Petrel (*P. cookii*). Differences in plumage or wing structure from Fea's Petrel were not apparent in these observations; however, to an experienced observer, the very small size of Zino's Petrel (just larger in body length than the local race of Little Shearwater, *Puffinus assimilis baroli*) might well be apparent at close range. Caution is necessary in identification of birds in this complex, as even moderate distances can confound observers' efforts to assess birds' sizes and proportions, let alone the dimensions of the bill. For confident identification, a close bird is simply a must.

Fig. 11. This small gadfly petrel could not be identified to species. It was thought to be either a small Fea's Petrel or possibly a Zino's Petrel. Caution is warranted in the identification of birds of this complex. A good, close study is needed for a confident identification; in many cases, distant birds can be confidently identified as **Fea's/Zino's Petrel** but not as one or the other. *Off Hatteras, North Carolina; 25 May 2001. © J. Brian Patteson.*



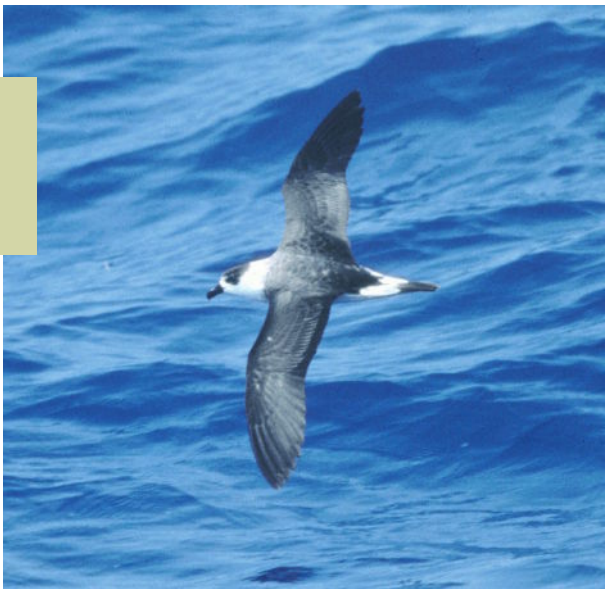


Fig. 13. The handsome **Black-capped Petrel** is seen on virtually every spring, summer, and autumn trip to the Gulf Stream off North Carolina. *Off Hatteras, North Carolina; 9 June 2002. © J. Brian Patteson.*

Fig. 12. On this **Zino's Petrel** at its nest site, note the small bill and dove-like appearance of the head—characters that are apparent on birds at sea at very close range. *Madeira; date unknown. © Francis Zino.*

Black-capped Petrel, *P. hasitata*

The dapper Black-capped Petrel is the most numerous gadfly petrel off North Carolina and is the most likely to be seen on a day-long excursion off the Outer Banks. Most of them are found over deeper water of 100–1,000+ fathoms, which is normally beyond the western edge of the Gulf Stream. A typical trip in May to October encounters dozens, sometimes hundreds, of these sharp-looking petrels, most of which are easily identified by their white collars and starkly white uppertail coverts (Fig. 13). Some individuals have less white in the neck and uppertail coverts (see Wingate et al. 1998), but we have yet to observe a Black-capped Petrel that presented identification difficulties because of this character. Nevertheless, on rare occasions we have seen aberrant individuals, such as one apparently leucistic bird (Fig. 14). We have also observed several individuals that seem to be unusually small; whether these are simply runts or part of a relict population of smaller birds from the Lesser Antilles (where searches are ongoing, as on Dominica) is unknown. The one specimen known to us from the Lesser Antilles is from Guadeloupe (Palmer 1962) and is much smaller than those taken at Hispaniola or off Hatteras, with a very small bill (Wingate et al. 1998).

Bermuda Petrel, *P. cahow*

Identification of Bermuda Petrel has been treated by Wingate et al. (1998). Since the time of that publication, the species has been seen annually in small numbers off North Carolina by Patteson and colleagues, as well as by Brinkley off Bermuda each year. Juveniles, apparent subadults, and adults have all been observed. This petrel in size and structure is nearest to Fea's Petrel, with which it could be most easily confused. The plumage of Bermuda Petrel is rather variable, with some birds showing little or no white in the uppertail coverts and others showing nearly as much as some Black-capped Petrels—at least to the eye; but there is no overlap in the extent of this feature. No Bermuda Petrel shows a black cap, however; all are cowled or hooded (Fig. 15). The underwing pattern can vary as well, from a pattern like that of darker Black-capped Petrel to one more like that of Fea's or Zino's Petrel, with many dusky or gray coverts over the secondaries. This variation is not surprising, as biochemical studies suggest that the North Atlantic gadfly petrels are each others' nearest relatives (Nunn and Zino in preparation). The bill of Bermuda Petrel is smaller and shallower than that of Black-capped but is not quite so small in adults as that of Zino's Petrel, for instance.

Population Estimates for North Atlantic Gadfly Petrels

The population of Bermuda Petrels has been increasing slowly for the past two decades, and despite some setbacks—such as Hurricane *Fabian* of 2003, which destroyed many traditional nest sites—there is guarded optimism that it will continue to do so. In 2004, 36 pairs raised 29 young, and the total population is estimated at over 200 birds (J. Madeiros, personal communication). Rarer still, Zino's Petrel is known from only a few nesting areas, and the total population is probably under 200 birds, with some 48 pairs known, not all of which are productive (F. Zino, personal communication). Heartening was the discovery in 2003 of a new nesting colony of the species on Madeira (Kirby 2003); nevertheless, rats and cats continue to plague this species.

The most recent population estimates available for other taxa are: 150–200 pairs (ca. 500 birds) of *deserta* Fea's Petrels on Bugio (Zino and Biscoito 1994); 500–1,000 pairs of nominate Fea's Petrel on the Cape Verde Islands (Hazevoet 1995); about 2,000 pairs of Trinidade Petrels on Martin Vaz and Trinidade Islands (Stattersfield and Capper 2000); and fewer than 1,000 pairs of Black-capped Petrels on Hispaniola, with probably a few small colonies on other Caribbean islands such as Cuba (Stattersfield and Capper 2000, Norton et al. 2004).

The Others

Lest anyone assume that even-more-outlandish discoveries are beyond possibility, we should not forget the Texas record of Stejneger's Petrel (*P. longirostris*; a tideline corpse), the inland New York record of Mottled Petrel (*P. inexpectata*), or the faint possibility that the striking, all-dark Jamaican Petrel (*P. caribbaea*) still hangs on somewhere in the remote mountains of that island. Let's keep our eyes and minds open in the years to come—that first North American Zino's Petrel may be sitting just beyond the next swell...

Acknowledgments

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Fig. 14. This aberrant **Black-capped Petrel** shows an unusually whitish plumage; it is a bird in fresh feather, probably an adult, so wear is not a factor in this aberration. No other such bird has been seen, although occasionally stray whitish feathers have been seen on birds in fresh plumage, as with other gadfly petrels. *Off Hatteras, North Carolina; August 2002. © J. Brian Patteson.*

Fig. 15. One of the Holy Grails of birding in North America is the Cahow, or **Bermuda Petrel**, until the middle of the twentieth century thought to be extinct. The species has been seen annually since 1995 off North Carolina, but only in very small numbers, at most four per year. *Off Hatteras, North Carolina; 29 May 1998. © J. Brian Patteson.*

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