

Snow Geese in the Oil Field

by Sheldon Dingle
Los Angeles, California

The year is 1940. An unstoppable German army has overrun much of Europe. Thousands of British soldiers have been pushed to the edge of the sea where they are trapped and awaiting annihilation. Bomb blasts, machine gun fire, artillery explosions cause terrible death and destruction. The French shores at Dunkirk are lit by glowing red explosions and darkened by billows of black smoke pouring out of bomb-blasted vehicles and ships.

In a heroic evacuation attempt, Churchill has called for all the small boats in Britain to ply the shallow waters off Dunkirk and shuttle the desperate soldiers from the bloody sand to the huge warships waiting miles offshore.

Amid the shell fire and bomb blasts, thousands of fishing boats, yachts and even tiny sailboats move from beach to ship then back to the beach again for another precious cargo of soldiers — whether it be six or eight men piled into an open sailboat or 200 jammed on a tugboat.

And through the red flames and columns of black smoke, in the glowing sky filled with shrapnel and dive bombers, there floats a great gleaming white bird above a tiny sailboat manned by a wild-haired, hump-backed little man who, with gleaming eyes, was doing his bit to rescue the doomed soldiers.

This great gleaming white bird, shining like an angel of deliverance, was, dear friends, my first introduction to the Snow Goose. The story was told by Paul Gallico in a short masterpiece called *The Snow Goose*, written in 1940 shortly after the Dunkirk evacuation. I read the story as a young boy before I really knew much about birds at all but the image of the large, majestic, white waterfowl was burned into my brain.

But what about the bird itself? Just what is a Snow Goose? Where do they live? What is known of them? It was many years after I read the story that I began to learn about the real bird through reading and talking to bird people.

The Snow Goose *Chen caerulescens*

has two subspecies, the Greater *C.c. atlantica* and the Lesser *C.c. caerulescens*. The Greater, of course, is larger, weighing between six and ten and a half pounds while the Lesser weighs from four to six and a quarter pounds. Except for size, the two subspecies are very much alike and it is difficult to distinguish one from the other in the field. The Greater has a longer, heavier bill but one can't always grab the goose and put the calipers to its bill.

Both subspecies are snowy white in color with jet black wing primaries. Their legs, feet and bills are pinkish. On the bill is a curious black "grinning patch." The Greater Snow Goose is not as widespread as the Lesser. Its breeding grounds are restricted to part of northwest Greenland and a few islands in northeastern Canada. These populations tend to winter along the Atlantic coast from Maryland southward to North Carolina. It was, no doubt, this larger subspecies that was storm blown into England and entered the world of literature. There are, however, examples of *both* subspecies at large in Britain but no one knows for sure whether these birds escaped from captive flocks or whether they actually crossed the

wide Atlantic.

The Lesser Snow Goose is much more abundant and widespread than is its heavier relative. Lesser Snow Geese, indeed, may be the most numerous species of all wild geese. Their breeding range extends along the arctic coast of North America and Siberia from Hudson Bay westward to probably the Lena River in Siberia.

Strange to say, the Lesser Snow Goose is a polymorphic subspecies — that is, there are two different color phases. The white phase is the more numerous but there is a darker "blue" phase which, as late as 1960, was thought by some to be a separate species, the Blue Goose. The Greater Snow Goose population does not seem to have a blue phase.

Blue geese breed in mixed colonies, intermingled with the white geese. There is probably some interbreeding and there are a few geese with intermediate color patterns but blue geese tend to prefer to mate with individuals of their own color. Blue geese are more abundant in the eastern part of the breeding range but seem to be working their way westward.

Snow Geese have strong bills with serrated edges suited for grazing and digging up roots of plants. In the arctic, they feed on grasses and sedges. On the migration route and in the wintering grounds, the geese have learned to take grain and growing shoots of various crops. Occasionally, this puts bird lovers and farmers at odds and I'm sure that many a farmer has eaten the goose that fattened on his grain.

From this point on we'll be considering only the Lesser Snow Goose. These birds breed just about as far north as one can get. They arrive on the arctic coastal plain around the middle of May as the ice melts and leaves open water. Within two or three weeks, the breeding pairs go to nest. Those not breeding usually move off to a separate location to molt and wait out the short summer.

Back at the nesting colonies, the females lay three to five eggs in nests usually placed on raised hummocks on the tundra. The eggs hatch within 22 or 23 days and the parents lead the goslings to the water, then on to separate brood-rearing locations. During this brood-rearing period, the adult geese are flightless because they are molting.

Photo by Bill Wilson



Dr. Gallaway and I hold up the Trans-Alaska Pipeline which has pump station number one not far from the Snow Goose breeding grounds.

As the goslings grow and feather out, the individual families gather into small groups. These little family groups coalesce into larger multi-family groups that merge with yet other groups in staging areas where they prepare to fly south for the winter. Just where they go depends somewhat upon where they nest. Those from the Hudson Bay area generally head for the coastal regions of the Gulf of Mexico. Birds nesting in the western part of their breeding range (western Canada, Alaska, eastern Siberia) winter in the Imperial and Central Valleys of California, the lower Colorado River and northern Mexico. There seems to be considerable mixing and mingling, particularly for males, and a significant percentage of the geese shift from one colony to another.

The above general outline regarding Snow Geese was gleaned from numerous books and nature programs. Anyone interested can do it. Unbeknownst to me, however, my education regarding one population

of Lesser Snow Geese was destined to continue.

At the 1993 AFA National Convention in Salt Lake City, a fortuitous set of circumstances occurred wherein I learned that the estimable Dr. Benny Gallaway (a wildlife biologist) had a long running connection with various mammals, fishes and birds of Alaska. I was interested. Having spent two years in Alaska during the 1950's, I was still enthralled with that magnificent wilderness and its wildlife.

Over coffee, I asked Dr. Gallaway to tell me about his work in Alaska. What kind of research was being done and on what species? He mentioned several obscure fishes and the caribou, then he said Snow Geese. *Snow Geese! I love Snow Geese.* I wanted to know all about them.

In his pleasant, unflappable, scientific demeanor, Dr. Gallaway said that, from 1980 to the present, LGL Ecological Research Associates (a company involved in many aspects of biological research) had been involved in research on the only significant breed-

ing population of Snow Geese in U.S. territory. This time span covered the periods before and during Alaska's arctic oil field development and after continuing oil production. The geese, in fact, nest right in the middle of the Endicott Oil Field near the head of the Trans-Alaska Pipeline.

Alaska! Oil! Wild birds! My God, I thought, it's a disaster. Gallaway calmed me down and we made arrangements to be in Alaska within two weeks. This was something I had to learn about.

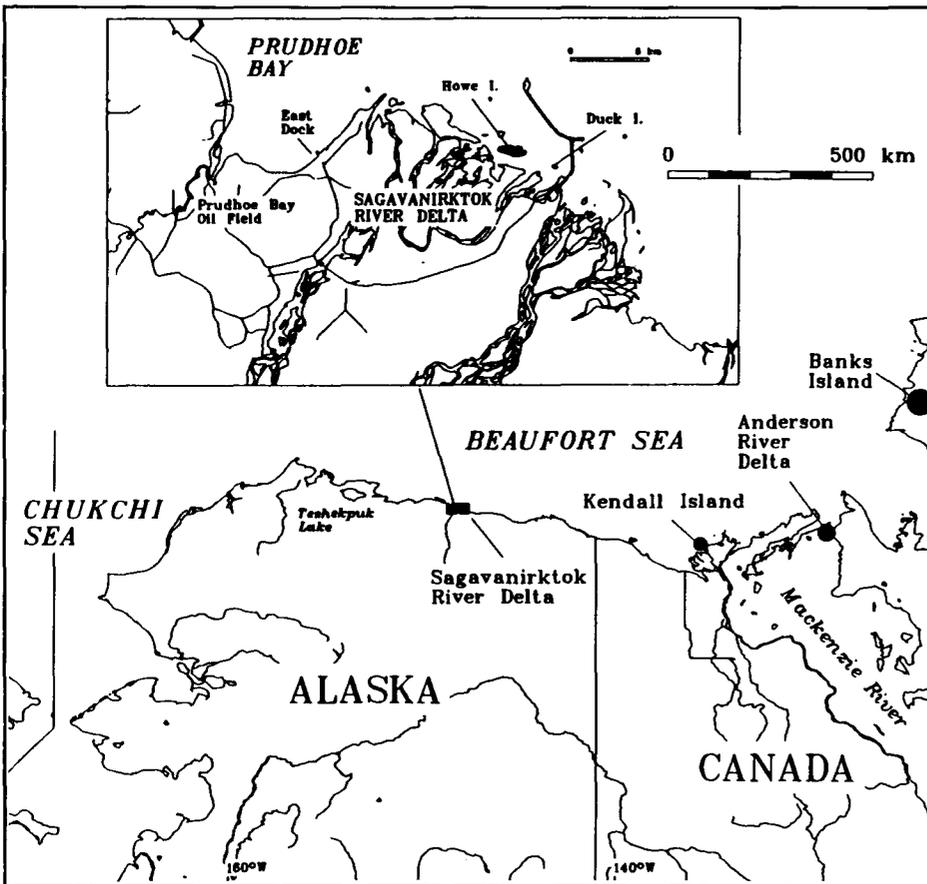
Upon arrival in Anchorage, we went directly to LGL Alaska Research Associates, Inc. (a company connected with LGL Ecological Research Associates) and the highlights of the 13 year Snow Goose research project were explained to me by Dr. Stephen R. Johnson, the biologist in charge of the project since its inception.

Gentle reader, if you think scientists speak or write the English language as we understand it, please let me disabuse your mind of that grievous error. Scientists speak to each other in specialized, esoteric jargon little understood by the average layperson. My purpose here is to recount to you in my own simple language the fascinating things I learned about this population of birds.

These geese nest primarily on Howe Island in the Sagavanirktok River delta (hereinafter called Sag River delta) on the north shore of Alaska. The island is lapped by the waters of the Arctic Ocean during the short summer and is gripped in winter by ice. The Sag River delta is nearly midway between Point Barrow in the west and the Canadian border in the east. Nothing lies to the north of it except the ice pack — solid in the winter, broken during the brief summer. The Sagavanirktok River empties into the Beaufort Sea and creates a large river delta. Howe Island is offshore in this area and, although the Snow Goose is a very abundant bird and nests in Siberia and Canada, this is the only place in the United States where it breeds in significant numbers.

In 1980 when LGL was first commissioned to study the Snow Geese, the objectives were to (1) determine the general distribution and number of Snow Geese in the Sag River delta during the brood-rearing period, (2) capture and band all Snow Geese and record the identity of birds that

Figure 1
Snow Goose Nesting Colonies in the Western Arctic
(inset shows location of Howe Island)



(Source: "Status of the Snow Geese in the Sagavanirktok River Delta Area, Alaska: a 12-year Summary Report 1991.)

returned to the colony and (3) determine the ages, sexes and condition of the geese.

Now you may have noticed that each goose must be physically caught to accomplish the above mentioned items. I envisioned a wild group of mad scientists wearing white lab coats, butterfly nets in hand, darting to and fro across the tundra in hot pursuit of frantic geese. I like that picture. But, alas, the modern, state-of-the-art field biologists take advantage of high-tech methods and devices that are much more efficient, accurate and less stressful for the subjects of study.

Remember that of all the geese that migrate north, only a portion of them actually go to nest. The others move off to various molting grounds. LGL's concern is with the breeding birds and their goslings only. While the birds are actually on their nests on Howe Island, however, the scientists do not interfere with them. They make only discreet observations such as aerial surveys that do not alarm the birds. Through aerial observation and photography, it has been possible to locate and tally the active nests with

considerable accuracy each year, though.

Keep in mind that the brief period of suitable climatic conditions causes the nesting cycle to be very synchronous — that is, all of the geese begin laying at about the same time and all of the clutches are hatched within a period of just a few days. Conditions do not permit stragglers to get out of sequence. If a pair begins very late, it will not succeed.

Once the goslings have hatched, the parents lead them to the water and they swim a few hundred yards to the mainland. On the mainland, they head for various sites that have suitable vegetation and enough open water to make a good escape environment. They stay in these brood-rearing areas until they stage for migration.

Remember that the breeding geese have molted and are flightless. The goslings are growing very fast and feathering out but they can't fly yet, either. Nature has arranged so that the mature geese replace their flight feathers at about the same time the goslings develop theirs. When it comes time to fly south, all the birds

will be prepared.

Before they can fly, however, the LGL biologists will physically catch every bird in every brood-rearing location, a procedure necessary to count, sex, measure and band each bird. This is accomplished in the following manner.

The locations of brood-rearing sites have already been scouted out by air. On the day the banding begins, a helicopter is used to locate the flocks, transport the field crew to the site and to maneuver the birds away from water. Because they are flightless, the Snow Geese rush into the water at the first alarm. This escape mechanism saves them from predators such as Arctic Foxes. The helicopter flies low over the water and herds the flock back onto land. At this point, the helicopter lands the biologists who separate and surround the flock. In actuality, two or three persons can stay between the flock and the water and on each side of the flock and control it using methods similar to those used by sheep dogs to control a flock of sheep.

While the flock is thus being held, other biologists assemble a nylon net trap. This is a cloth wall about five feet high that forms a rectangular pen open on one side. The geese are gently driven into the pen and the open side is closed off.

Now the dip net comes into play. The biologists catch all the goslings first. One person nets the bird; another sexes, weighs, measures and bands it; a third person handles the record keeping. The number of biologists required depends somewhat upon the size of the flock but generally five or six people make up the whole team.

When the goslings have been measured, weighed and banded, they are released into a holding pen just over the fence from the catching pen. All of the sub-adults and finally the adults are captured. Their data are logged, then these birds are released into the holding pen also. When the work is finished, the flock is released as a single unit and normally departs rapidly from the catch area. The biologists watch for awhile until the geese appear to be back to normal.

At this point, the helicopter returns to take aboard the crew and equipment and move quickly to the next brood-rearing site to gather data on

Table 1
The Number and Proportion of Snow Goose Individuals and Flocks Captured West and East of the Endicott Road-Causeway in the Sagavanirktok River Delta During Pre- and Post-construction Years

	West Side				East Side			
	No. Flocks	%	No. Birds	%	No. Flocks	%	No. Birds	%
PRE:								
1980	1	50.0	101	61.2	1	50.0	64	38.8
1981	2	50.0	166	40.4	2	50.0	245	59.6
1982	1	50.0	43	21.3	1	50.0	159	78.7
1983	3	75.0	375	64.2	1	25.0	209	35.8
1984	4	66.7	246	58.7	2	33.3	173	41.3
1980-84	11	61.1	931	52.3	7	38.9	850	47.7
POST:								
1985	6	66.7	388	65.5	3	33.3	204	34.5
1986	3	42.9	301	47.0	4	57.1	339	53.0
1987	3	50.0	262	63.4	3	50.0	151	36.6
1988	7	77.8	583	62.3	2	22.2	353	37.7
1989	2	66.7	199	50.8	1	33.3	193	49.2
1990	4	44.4	823	51.0	5	55.6	791	49.0
1991	0	0.0	0	0.0	2	100.0	25	100.0
1985-91	25	55.6	2556	55.4	20	44.4	2056	44.6

(Source: "Status of the Snow Geese in the Sagavanirktok River Delta Area, Alaska: a 12-year Summary Report 1991.)

another flock. The various brood-rearing flocks have contained from 15 to 600 birds. There have been as many as 13 different brood-rearing flocks that had to be caught and the flocks are found scattered from very near Howe Island to as far as eight miles away.

The exact circumstances and conditions of the field work vary from year to year. The number of breeding pairs increases or decreases, the success rate for fledging goslings varies and the number and location of the brood-rearing flocks always shifts. The biologists have to adapt to the particular situation at hand in any given season.



Helicopters are the best means of transport across the tundra.

Once the flocks are penned up, however, the routine of catching, measuring, banding and logging the data remains constant. The same questions about the birds are asked each year; the answers, i.e., statistical numbers, differ.

Once the raw field data have been collected, the scientists return to their offices and computers to organize and analyze the information. When this work is done year after year on a specific population, a great deal is learned about it. Remember, the original purposes of the study were to determine the general distribution and number of Snow Geese in the Sag River delta area during brood-rearing; capture and band all the geese; and determine the ages, sexes and condition of the geese.

By doing the above things over a period of years, Dr. Johnson was able to (1) learn the measure of the annual production of goslings, and (2) determine a minimum rate of return of the geese, especially the females, to the breeding colony and the general brood-rearing areas located across the delta.

From 1980 through 1984, the studies were conducted in a pristine environment — the Sag River delta area was as wild and primitive as it had been for thousands of years past. During these four years, it was possible to establish a baseline of information about the goose population and to answer questions concerning (1) general trends in the size and rate of growth of the population, (2) the amount and importance of immigration and emigration of birds to and from the population, and (3) the degree to which the same birds use the

Photos by Stephen R. Johnson



An Arctic Fox looking for lunch. When threatened, Snow Geese go into the water. This shallow water, however, is no deterrent to a hungry Arctic Fox.



A research team at work on the tundra.

same general brood-rearing areas from one year to the next.

Ladies and gentlemen, the oil men are coming. The Sag River delta was determined to be a rich oil field and industrial development began in the winter of 1984-1985. The baseline of information on the breeding colony of Snow Geese would be extremely important for making comparisons during and after the development of the Endicott Oil Field.

During the winter of 1984, a raised gravel road was constructed that extended from Prudhoe Bay to the Sag River delta area. The road bisected the delta and extended as a causeway to an artificial island a mile or so off shore. Dock construction, drilling operations and pipeline construction continued into 1986 and 1987. This Endicott Road-Causeway cut directly through the Snow Goose brood-rearing area and there was some question regarding how it would affect the geese. Would the parents lead their goslings across the road to reach their traditional brood-rearing sites?

Table 1 shows graphically that the geese were not overly concerned

about crossing one wimpy little gravel road in the middle of their wilderness. Any old farm boy could have told you that.

As you digested Table 1, I'm sure you noticed that the number of Snow Geese in the Sag River delta area has trended upward dramatically. Figure 1 provides a clear view of numbers of geese year by year.

In making their counts, the biologists pay particular attention to several things. First, the number of adult female geese caught is an indicator of the size of the breeding population. You'll note that the lowest number of females caught was 39 in 1980 going up to a high of 341 in 1990. Second, the number of goslings per adult female is an indicator of the overall nesting success of the breeding females. The above table indicates that the geese *like* the Sag River delta area and are generally unconcerned about the development of the oil field.

The first five years' (1980 - 1984) statistics depicted on Table 1 and Figure 1 reflect the breeding activity of the Snow Geese in a basically primordial wilderness. From 1985 to 1988, the

statistics were gathered during major commercial development (drilling, dock construction, road building, pipeline construction, etc.). From 1989 on, the major construction was over and the oil fields were quietly producing. The main activity was travel along the access road and causeway and various bio-physical scientific investigations. The geese didn't seem to mind.

You'll note from the table and figure that the Snow Geese had some good years and some bad years with respect to breeding success. The overall trend, however, is indisputably upward. The oil factor seems to have had little or no effect on the Snow Geese.

There are several other factors, though, that *do* impact the breeding results. Such things as disease — avian cholera, for instance — can adversely affect breeding. Very heavy weather and other factors that delay the migration north can cause the geese to arrive too late to take full advantage of the very short summer season. Another major factor is ambient temperature.

In 1992, I'm sure you noticed, the Snow Geese had a major failure. In late May, temperatures were below average and most of the shallow water in the Sag River delta froze over. This provided a perfect ice bridge for the Arctic Foxes who took full advantage of the opportunity. The foxes ravaged Howe Island before the geese had invested much time in nesting. Consequently, the geese moved out and attempted to nest at other nearby sites. All these second attempts were unsuccessful except for about five pairs of geese on Duck Island.

The years of failure or decline are transitory and driven by peculiar events of the moment. The overall evidence shows that the U.S.'s only significant breeding population of Snow Geese is flourishing and expanding its numbers.

There are many other aspects to this long-range Snow Goose study that I found fascinating. Unfortunately, this short article doesn't allow room to present them at this time. The main theme, however, is a happy one. The Snow Geese are alive and doing well in the midst of an oil field.

About the first thing I learned when I got to Alaska is that the whole Snow Goose study is funded by a British Petroleum oil company, BP Explora-



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tion (Alaska), Inc. I see your reaction. Yes, I had a similar reaction. An oil company funding environmental and wildlife research, and then letting the chips fall where they may? Right.

So the first thing I did was to get second and third opinions regarding the validity of LGL's science.

To obtain unbiased opinions regarding the validity of LGL's science, I went directly to the University of Alaska, Fairbanks and met with Dr. John Kelley, the chairman of the Science Advisory Committee which oversees all research done in the North Slope Borough. The committee is comprised of eminent scientists and professionals who are extremely learned and experienced in their respective fields. All members are carefully scrutinized to make sure they have no vested interests but are purely unbiased and objective.

Dr. Kelley is a very interesting fellow. I could write a book about him. But the upshot of the meeting was that, yes, Dr. Kelley affirmed LGL's science as *good science*. LGL's science would stand on its own merits.

Upon return to Anchorage, I met with Dr. Dirk Derksen, a Fish and Wildlife Service (FWS) research biologist. Keep in mind that the FWS is the overseer and caretaker of most of Alaska's public land. The FWS does its own environmental studies and it is the FWS which can influence the issuance or denial of permits to explore for oil on government land. In short, the FWS is often highly protective of its responsibility to protect the environment. If anything, the FWS tends to be tough on companies wishing to explore or develop any wilderness area.

In the carefully phrased language of a scientist and government official, Dr. Derksen agreed that LGL's research methods and results regarding the Snow Goose were valid and acceptable.

Folks, I even checked with a fuzzy-faced, sourdough-looking habitué of a local watering hole and he stood Dr. Gallaway to a drink. In view of this overwhelming affirmation and validation of the Snow Goose research personnel, I felt perfectly free to present this article to you in good faith and with all sincerity.

This brings me to a final issue. Our society, our culture and civilization is

currently driven by oil energy. We are not willing to give up the conveniences, indeed, the necessities that oil provides us. Just try to park your car for a week and you'll know what I mean.

At the same time, we have a vague feeling that we are destroying the earth's ecosystems. We have an urge to save the whales, save the spotted owls, save the rain forests, etc., etc. There is a dichotomy in our thinking. On this hand we are absolutely unwilling to give up the benefits taken from the earth while on that hand we feel guilty for taking them.

I was absolutely delighted to learn that, in the case of the Snow Goose at least, we have a win-win situation. We are gaining the use of the oil and the Snow Geese are thriving.

This win-win situation may not be possible everywhere and at all times but, in this case, it is working. My hat is off to British Petroleum for continuing to fund the Snow Goose research far beyond what was required by government regulation. We should all congratulate the oil producers who have developed methods of retrieving

a product we demand with little or no negative impact on the environment or the wildlife.

More of this responsible research and development is needed. Currently, there is extensive oil development in South America. Long-term research is necessary to learn what the impact may be there and how to strive towards the win-win situation that prevails on Alaska's North Slope.

I was very happy to learn that my beloved Snow Goose of literary fame still has relatives that are thriving and happy in their Sag River delta breeding grounds — seemingly unaware or uncaring that they are in the heart of the Endicott Oil Field. Hopefully, similar results will prevail with other species in other oil fields and in other parts of the world. I'll keep you informed.

Acknowledgements

Dr. Stephen R. Johnson wrote the following acknowledgment in appreciation for all the support the Snow Goose project has received over the years.

Since 1980, when we began this project, many individuals, agencies



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A biologist preparing to go to work.



Snow Geese and goslings. In the foreground is a blue phase Snow Goose. Its color is dark but its bill is orange. The goslings are dark colored but their bills are black.



A goose with leg bands and a neck-collar.

and companies have provided support. In recent years (1984-1993), BP Exploration (Alaska) Inc. (formerly Standard Alaska Petroleum Co., and Sohio) has supported all of this research. We especially thank Dr. Christopher Herlugson and Michelle Gilders of BP Exploration for their continued encouragement and support. In earlier years (1980-1983), we received assistance and/or cooperation from ARCO Alaska, Inc.; EXXON Company USA; U.S. Dept. of Interior (Fish and Wildlife Service, National Biological Survey and Minerals Management Service); U.S. Department of Commerce (National Oceanic and Atmospheric Administration); Alaska Department of Fish and Game; ERA Helicopters; Alaska Biological Research and LGL Ecological Research Associates, Inc.

We thank the dozens of people who have helped over the years with the banding in Alaska and the neck-collar resightings in Alaska and along the Central and Pacific flyways. We also thank the Bird Banding Laboratory, National Biological Survey, for allowing us flexibility in our banding program.

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