

**AERIAL SURVEYS TO ASSESS SEA TURTLE OCCURRENCE
AND COMMERCIAL FISHING EFFORT
IN THE OFFSHORE WATERS OF VIRGINIA**

or

VTS

(Virginia Turtle Surveys)



Report: Year One

Submitted To:

National Marine Fisheries Service
Northeast Fisheries Science Center
Ecosystems Surveys Branch
166 Water Street
Woods Hole, MA 02543

Submitted By:

Coastwise Consulting, Inc.
173 Virginia Avenue
Athens, GA 30601
706-543-6859

November 2002

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INTRODUCTION

Aerial surveys were conducted off the coast of Virginia to provide the National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center (NEFSC) with near real-time data on commercial fishing effort, sea turtle occurrence and sea surface temperatures. The surveys covered an area from the North Carolina / Virginia border, northward to Delaware Bay and seaward to the shelf break. In recent years there has been an increase in turtle strandings on beaches in the mid-Atlantic during the northward migration of turtles through this area. Commercial fishing activity may be associated with this observed turtle mortality and the NEFSC needs to identify which fisheries may be involved to prevent, reduce or mitigate the interaction of sea turtles with these fisheries. These data may help identify potential areas of interactions between commercial fishing activity and sea turtles, allowing NMFS to deploy fisheries observers, direct alternative platform work or to enact any other appropriate management efforts that will minimize sea turtle mortalities caused by commercial fishing operations.

METHODOLOGY

Surveys were flown from the NC/VA border and extended northward as far as the Delaware Bay. Transects were spaced 10 nautical miles (NM) apart, out to the shelf break and flown at an altitude of 500' and at a ground speed of approximately 110 knots, using methodology similar to that developed by NEFSC, CeTAP and others (Scott and Gilbert, 1982; CeTAP, 1982; Schroeder and Thompson, 1987; Shoop and Kenney, 1992; Thompson 1991). The survey team was comprised of a pilot, data recorder, and two observers with the observers positioned on each side of the aircraft, in the rear seats. The observers scanned the water surface and reported all sea turtles, denoting species, and all commercial fishing vessels and/or gear, denoting type and area. Fishing vessels and gear sets were reported at right angles to the flight track and the distance from the flight track was estimated for vessels to allow for more accurate plotting vessel locations. Some photographs were taken of fishing vessels.

Data was collected for each sighting event using a computer-logging program that has been in used in previous marine mammal/sea turtle surveys along the southeastern coast. Data collected at each sighting event included date, time, location (lat/long), altitude, speed, environmental conditions (sea state, cloud cover, visibility), number of animals, behavior, sea surface temperature and pertinent comments. All sightings of marine animals except birds (including cetaceans, sea turtles, sharks, rays, other large fishes, schools of fish, etc.) was noted with the above parameters. The Access-based tables created by this system were converted to Excel for electronic transmission to NEFSC. Sea surface temperature was collected using an infra-red sensor provided by NMFS. After each flight, all data was downloaded and electronically transmitted to NEFSC in Microsoft Excel files.

Necessary conditions for the flights included a minimum ceiling of 1000', visibility greater than 2 NM and winds less than 17 knots. We tried to restrict on-transect flying to periods of the day when winds were less than 11 knots. Surveys were conducted in a twin-engine Cessna 02, the military version of the 337 Skymaster. The aircraft was equipped with GPS, full IFR ("instrument flight rules") instrumentation, a life raft, PFD's, flares, a medical kit, a waterproof VHF marine radio, an EPIRB, and an aircraft mounted ELT. The 02 has a redundant fuel system and is able to fly for extended periods on one engine. Its observational qualities are exceptional due to oversized windows and slow flight capabilities (it was built for the U.S. Air Force as a reconnaissance aircraft). Pilots performing this work have the highest rating (Airline Transport) and are instrument-rated instructors with over 5000 hours of flying time. Pilots retained ultimate authority regarding the safety of conditions for flying. Safety was the most important factor regarding the execution of this work.

Two flight days are required to cover the entire project area. We generally flew from south to north, covering the southern portion of the area with one flight and flying the northern portion on the next day that survey conditions were acceptable. We then tried to allow 4-6 days to pass before conducting another paired set of flights. Survey timing was largely guided by the COTR and the weather.

RESULTS

There were 14 flights conducted during this project. Eleven of these flights can be considered full surveys, each covering approximately half of the project area and consisting of 323 - 451 nautical miles of transect-line flight (TNM), plus transits to/from the transects. Another flight was shortened due to weather and covered 161 NM of transect lines. Two flights were conducted, at the request of the COTR, along 100 - 200 NM of coastline to search for stranded marine animals during long periods when weather was unfavorable for surveying offshore.

We flew 4331 TNM during this project and made every attempt to restrict our on-transect effort to periods of the day when sea conditions were Beaufort Force 3 or less. NOAA marine forecasts were compared with real-time data from weather buoys to make fly/no-fly decisions. Over 95% of TNM flown were with a Beaufort sea state of 3 or less. The mean average survey covered 379 TNM. Excluding the one survey that was drastically shortened due to weather (05/25), the mean total flight time was 5.4 hours (range 4.0 - 6.4 hours).

At least 1649 sea turtles were sighted during the surveys. The mean number of turtles sighted during the project was .39 per nautical mile of transect flown. *Caretta caretta* was the most frequently sighted species, accounting for 84% of all sightings (n=1390). Unidentified hard-carapace turtles accounted for 14% (n=226). *Lepidochelys kempii* and *Dermichelys coriacea* accounted for the remaining 2% (n=22 and n=10, respectively).

There were 136 commercial fishing vessels (FV) observed. FVs were counted if they were actively engaged in fishing. Vessels with gear in tow, primarily scallop and groundfish draggers, accounted for 83% of the vessels documented. Gillnetters, longliners and whelk-pot boats comprised the rest. FV occurrence is not necessarily representative of fishing effort, as much of the fixed-gear observed was unattended by vessels. Buoyed gear was more common than flagged gear. Exact location data on fishing vessels and gear is included on CD for further analyses. Charts of all sightings of sea turtles, marine mammals, fishing vessels and gear are also appended to this report.

Table 1. Survey Effort and Results

Date	Transect Numbers	Transect Nautical Miles	Good TNM, ≤ Beau 3 (% of all)	# of Turtles / per TNM	# of FV	Comments
05/01/02	1-6	431	424 (98%)	232 / .54	12	Gear concentrated 37°00 - 37°20
05/04/02	0					Stranding survey
05/06/02	7-10	323	323 (100%)	100 / .31	29	Gear concentrated 37°30
05/10/02	1-6	419	419 (100%)	359 / .86	3	Gear concentrated 36°40 - 36°50
05/21/02	7-10	323	290 (90%)	25 / .08	29	Boats throughout area
05/23/02	1-6	449	360 (80%)	108 / .24	4	Turtles inshore, light FV activity
05/25/02	5-6	161	126 (78%)	15 / .12	1	Bad weather, data excl. from means*
05/31/02	7-10	329	329 (100%)	118 / .36	24	Gear concentrated 37°30
06/01/02	3-6	323	323 (100%)	152 / .47	2	Gear through mid-depth
06/09/02	1-6	456	456 (100%)	141 / .31	0	Light gear presence
06/10/02	7-10	330	330 (100%)	62 / .19	13	Trawlers, some gear
06/15/02	0					Stranding survey
06/16/02	1-6	451	429 (95%)	190 / .42	3	Gear concentrated 36°40 - 37°10
06/17/02	7-10	336	336 (100%)	147 / .44	16	Mostly pots, 36°30 & 36°40
TOTAL		<u>4331 NM</u>	<u>4145 NM</u>	<u>1649 / .39</u>	<u>136</u>	<u>Mean TNM per day = 379*</u> <u>Mean # of Turtles per TNM = .39*</u>

Sea surface temperature (SST) was recorded during flight at 60 second intervals. Spatially, this yields a recorded SST at approximately 1 NM intervals. A SST file of several hundred records was created for each flight in Microsoft Excel. Each record has a time signature which can be merged with the sightings data. During this analysis it should be evident that records near course changes must be disregarded, as the SST probe recorded spikes in temperature when its sensor was rotated away from the water during banked turns, essentially recording air temperatures. Similar anomalies exist in association with over-land flight and periods during transit over Chesapeake Bay.

The CD attached to this report has a file for each flight, labeled with the date. Within each of these files is an Excel file with all flight data, including times, locations, environmental parameters, sightings of animals and fishing activity, and comments. There is an Excel file with all time-stamped SST data. There are also files with charts for each day and a file of all raw data gathered on each flight.

Table 2. Turtle Species Sighted, Sightings and Effort, Temperature

Date	Transect Numbers	Caretta caretta	Lepido. kempii	Dermi. coriacea	Unid. turtles	# of Turtles	Turtles per Trans. Mile	Sea Surface Temperature†
05/01/02	1-6	184	2		46	232	.54	15.9 / 13.6
05/06/02	7-10	84			16	100	.31	14.9 / 14.1
05/10/02	1-6	301	7		51	359	.86	18.7 / 15.9
05/21/02	7-10	18			7	25	.08	16.4 / 16.4
05/23/02	1-6	83	1		24	108	.24	16.7 / 15.6
05/25/02	5-6	14			1	15	.12	17.0 / 16.0
05/31/02	7-10	93	1	1	22	118	.36	21.2 / 21.2
06/01/02	3-6	131	2	2	17	152	.47	22.2 / 19.1
06/09/02	1-6	118	3	2	18	141	.31	19.9 / 19.1
06/10/02	7-10	52		1	9	62	.19	21.0 / 20.6
06/16/02	1-6	175	3	3	9	190	.42	22.4 / 21.3
06/17/02	7-10	137	3	1	6	147	.44	22.5 / 21.1
TOTAL		1390	22	10	226	1649	.39*	

*excluding data from abbreviated flight on 05/25

† SST from NOAA data buoys approximately 15 NME of the mouth of Chesapeake Bay and 64 NM ESE of the mouth of Chesapeake Bay. These buoys are well-placed to provide an easily accessible overview for the temperature variation in the project area. See SST files on CD for more detail.

Marine mammal species were recorded during these surveys. Below is a table summarizing marine mammal sightings.

Date	Trans. #	Turs. trunc.	Del. del.	Sten. species	Unid. dolphin	Gramp. griseus	Balaen. physalus	Phys. macro.	Sea Surface Temperature†
05/01/02	1-6	80		174	36		2		15.9 / 13.6
05/06/02	7-10	47		505	95	20	2		14.9 / 14.1
05/10/02	1-6	136		218	50	12	2		18.7 / 15.9
05/21/02	7-10	28			44				16.4 / 16.4
05/23/02	1-6	101			17				16.7 / 15.6
05/25/02	5-6	10		5	14			1	17.0 / 16.0
05/31/02	7-10	52		50	59	17	1	6	21.2 / 21.2
06/01/02	3-6	38			6		1		22.2 / 19.1
06/09/02	1-6	152		65	54	11			19.9 / 19.1
06/10/02	7-10	4		16	4	4		1	21.0 / 20.6
06/16/02	1-6	281		10	2 beaked whales*			1	22.4 / 21.3
06/17/02	7-10	160		220	7	20			22.5 / 21.1
TOTAL		1089		1263	386	84	8	9	

Tursiops truncatus
 Delphinus delphis
 Stenella species
 Unidentified dolphin

Grampus griseus
 Balaenoptera physalus
 Physeter macrocephalus
 *Ziphiidae species

DISCUSSION

The primary objective of this project was to gather a substantial amount of data and transmit it in near real-time. I think we were successful in that respect. We have created charts for each survey which begin to suggest some conclusions that may be useful to management, but there is a great deal of work, not part of this contract, which remains. Hopefully, the data provided is organized and formatted in such a way to facilitate that work. Further analysis using GIS should yield information regarding the distribution movement of turtles off the coast of Virginia. Incorporating the bathymetric and SST fields with the results plotted on the charts seems to be the first course of action. Stranding records should also be plotted to complete the original goal of this work.

Some observations were made which may be supported by further analysis. Sea turtle distribution dropped off at a specific point, at approximately 45–50 NM from shore. There were days that sea conditions were worse offshore and sightings may have been somewhat reduced but our overall summation is that factor had minimal impact on the results. From the outset, discipline regarding the necessary conditions for an effective survey was stressed as a paramount part of our approach. Observers noted that it was as if they were surveying two different ecosystems with turtles and tursiops inshore and delphinus, larger cetaceans and other species, like manta rays, offshore, on the last 20 NM of each transect.

Obviously, the scope of the project area covers different water masses, water coloration alone indicated this to observers (this may be another data field to add). SST alone is unlikely to account for distribution. Bathymetry will certainly be key. For loggerheads and ridleys, conditions for foraging are drastically reduced at some point where depth prohibits efficient feeding or provides less favorable habitat for primary prey species, such as coastal invertebrates. Turtle distribution and movement relative to the mouth of Chesapeake Bay is another compelling aspect of this work, which will be interesting to relate to the environmental parameters that can be applied to this data set.

One of those parameters, sea-surface temperature, is vitally important but it may be easier to obtain, even at the resolution needed, from satellite-acquired SST data rather than using the onboard SST probe. Merging the SST files will be time consuming and many of the anomalies will need to be identified and culled. Applying the appropriate AVHRR layer when working with the data set in GIS may be a more efficient way of looking at SST.

Logistically, these surveys push the limits of what can be done with the resources available. Because this contract calls for no more than 1-2 surveys per week, personnel are necessarily part-time. Effective aerial surveys for sea turtles requires ideal sea conditions so accessing experienced observers, who usually have other commitments, on the short-notice dictated by weather was the greatest challenge for this team. Such sporadic flights also demand that the observers bring experience to the project from the outset, whereas a more intensive survey schedule would allow less experienced observers to be quickly trained. Fortunately, we were able to assemble a large enough team, with the necessary experience, to handle the demands of this work. Success was also facilitated by the Contracting Officer's Technical Representative, who allowed us the necessary flexibility in scheduling surveys to accommodate the challenges presented by weather. These factors will be necessary for the continued success of this work.

ACKNOWLEDGEMENTS

The people in the plane are the most important cog in this machine. The willingness of the survey team to tolerate such an unpredictable schedule was invaluable. We were extremely lucky to find such a talented and experienced crew that could work under these conditions. Team Leader, Todd Gedamke, displayed extraordinary patience in dealing with the hurry-up-and-wait operation of this survey. It would have been much easier for all involved, pilots and crew, to stick to a more predictable schedule and fly with marginal survey conditions. That would have drastically weakened our results. Gedamke's patience was equaled by his diligence. After organizing each flight and flying a tiresome 4-6 hours in a hot, cramped aircraft, he spent the necessary hours processing and transmitting the data to NEFSC. He also provided the charts and other valuable input for this report. Gedamke's talented colleagues for these flights were Kate Mansfield, Erin Seney, Holly Fearnbach, Robert Carroll, Andrew Walker and David Lange. Ms. Erin LaBrecque was instrumental in training everyone at the start of the project. While the team brought much sea turtle and aerial survey experience to the table, none had Erin's experience with an automated data recording system. Her help in the initial days of the project can't be underestimated.

Environmental Aviation Services, and their pilots Bob Murphy and Buzz Kraus, provided unsurpassed service. There are few other pilots I would trust with a team flying low-altitude surveys so far offshore. There are no other pilots I would prefer for this work.

Finally, we have great appreciation for Cheryl Ryder, NEFSC. As our COTR, she understood the difficulties that a team encounters during this type of field work and provided the flexibility and encouragement we needed to successfully complete our mission.

Note: Coastwise Consulting, Inc., is interested in providing further GIS analyses, which this data set deserves. The cost of this work would probably approximate the cost of two round-trip airfares to Malaysia...

VTS

SUMMARY SHEETS

AND

CHARTS

05/01/02

05/04/02

05/06/02

05/10/02

05/21/02

05/23/02

05/25/02

05/31/02

06/01/02

06/09/02

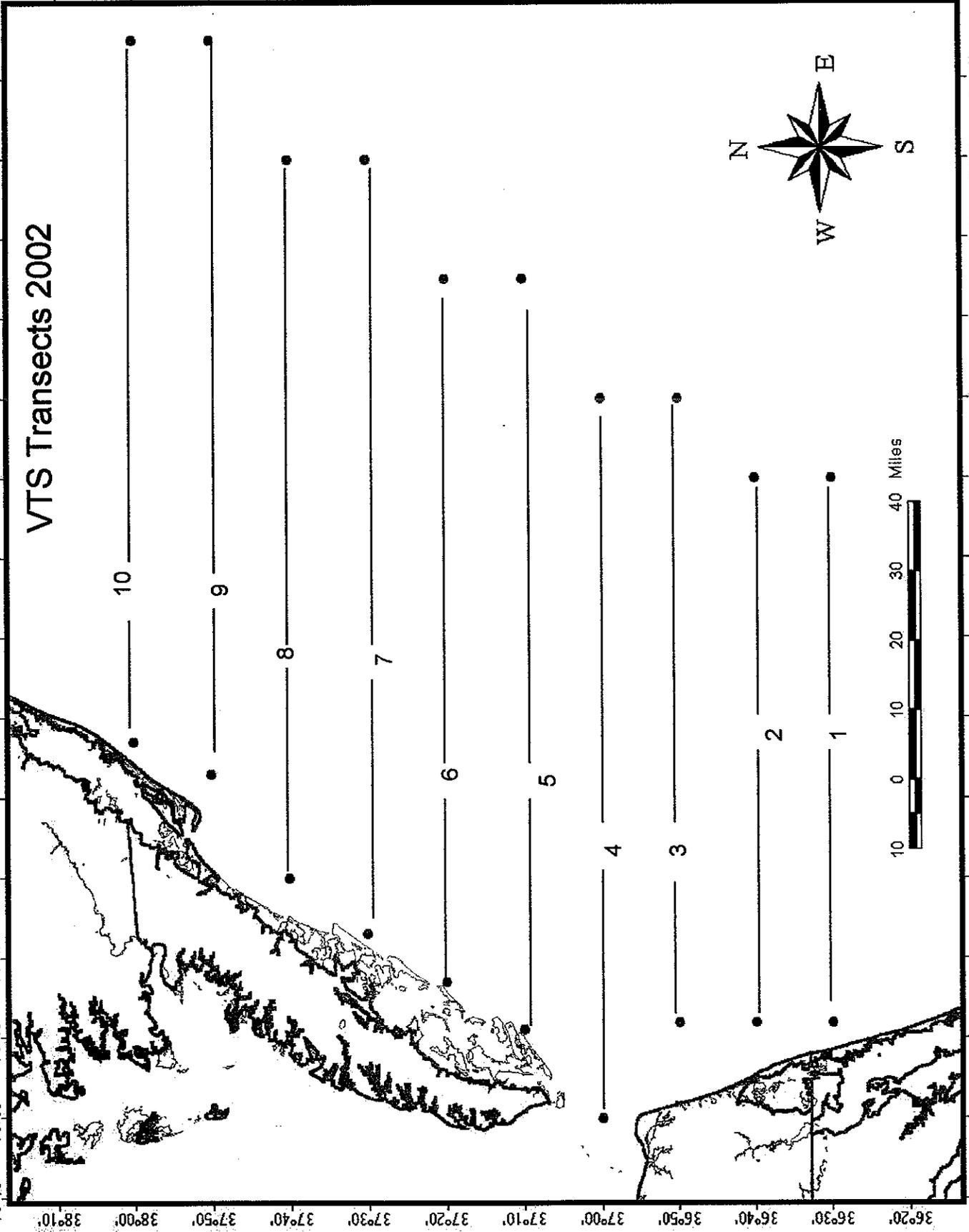
06/10/02

06/15/02

06/16/02

06/17/02

VTS Transects 2002

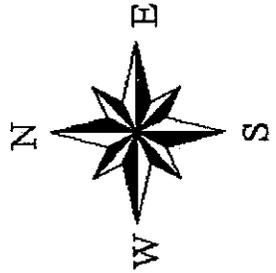


38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

76°10' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

76°10' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

10 0 10 20 30 40 Miles



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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**

Date 5 / 1 / 02

Tansect Lines Surveyed 1-6 Aircraft Cessna 337

Observers/Pilot EAL, TG, KLM, BK H2O Temp Range _____

Beaufort 2-4 Cloud Cover 11/14 Wind: dir. WN/E spd. 6-12 Vis. >2nm

Hobbs Time 6.4 On-Transect Miles 431 On-Transect Miles w/ Beau <3 424

On Watch Time 0906 Off Watch Time 1214

On Watch Time 1417 Off Watch Time 1801

On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 232

Cc 184

Lk 2

Dc _____

Untu 46

Marine Mammals

Tt 80

Ssp 174

Undo 36

Gm _____

Pm _____

Other Odontocetes

Comm Fishing Vessels 12

Vessel Type and Numbers:

Draggers (probably Scallopers) 5

Gillnet 5

FV unspecified 2

Eg _____

Mn _____

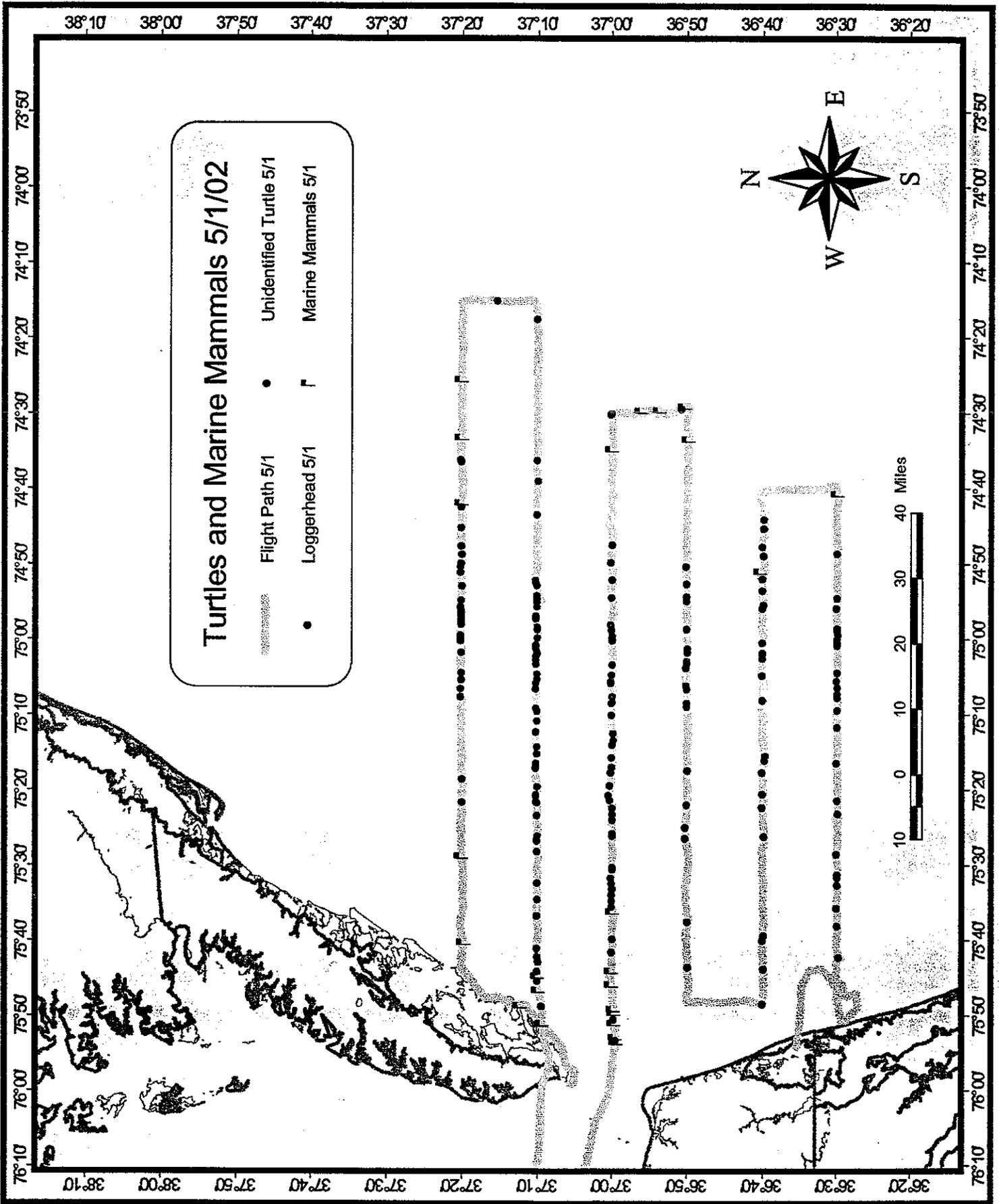
Bp 2

Other Balaenopterids

Comments:

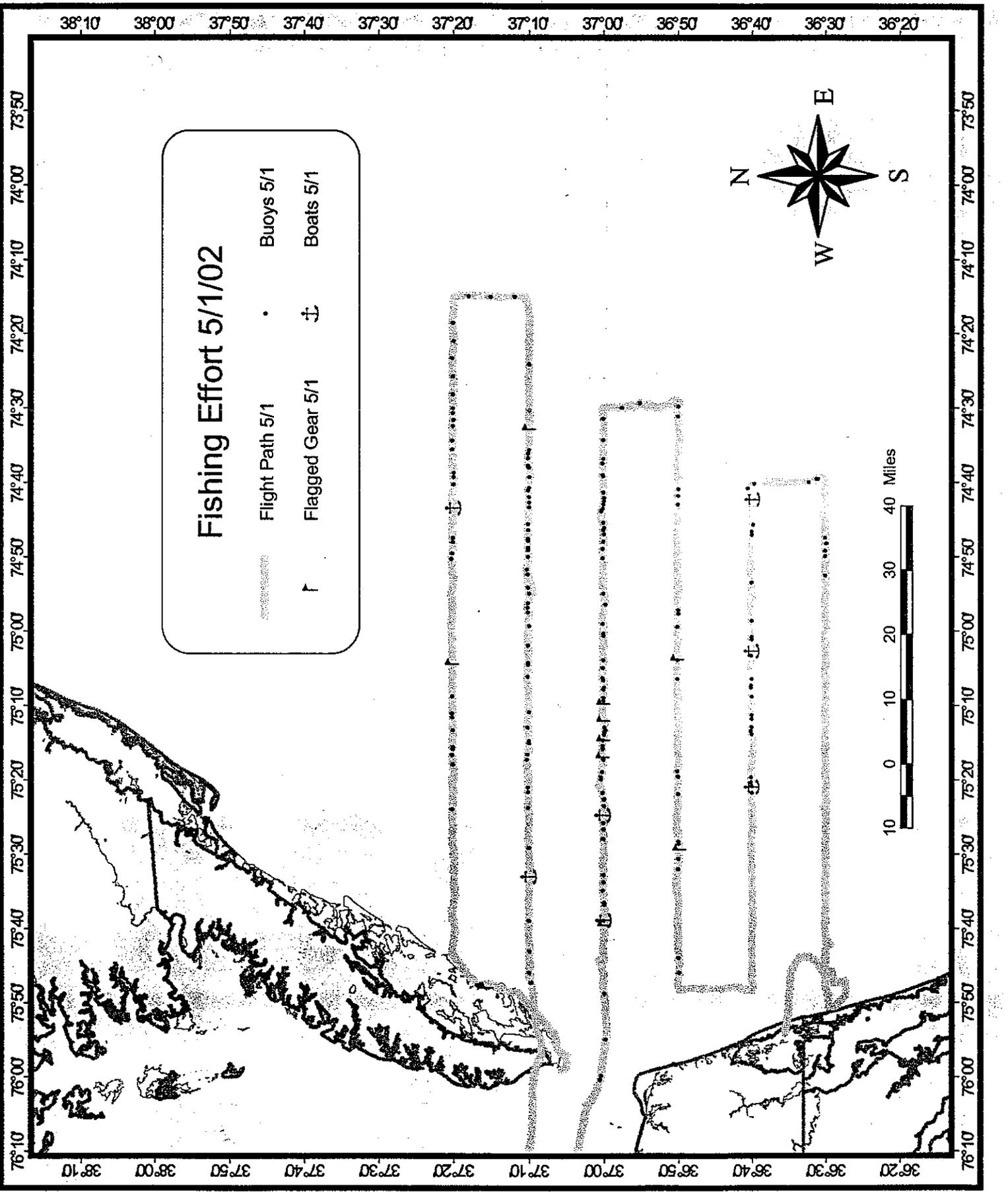
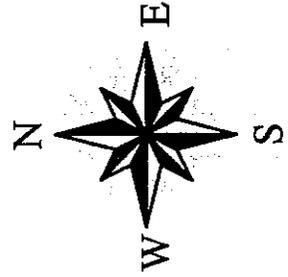
Nice Weather-Good Flying Day-Started overcast and cleared up as day went on. Able to fly lines 1-4 in the morning and 5 and 6 in the afternoon. Beaufort 3 or less for all but the last 7 miles of the last transect line (beaufort 4). Turtles (2 kemps and loggerheads) and fishing gear (primarily buoyed gear-i.e. pots) throughout the area. No clear concentrations of either.

Survey Leader Todd Gedamke



Fishing Effort 5/1/02

- Flight Path 5/1
- Flagged Gear 5/1
- Buoys 5/1
- Boats 5/1



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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**

Date 5 / 4 / 02

Tansect Lines Surveyed 1st 18 miles of line 7, STRANDING SURVEY Aircraft Cessna 337

Observers/Pilot TG, EAL, ES, BK H2O Temp Range _____

Beaufort 4 Cloud Cover 14 Wind: dir. E/ENE spd. 16-18 Vis. >2nm

Hobbs Time 2.2 On-Transect Miles 18 On-Transect Miles w/ Beau <3 0

On Watch Time 0945

Off Watch Time 1103

On Watch Time _____

Off Watch Time _____

On Watch Time _____

Off Watch Time _____

of Sea Turtles Sighted 1

Cc 1

Lk _____

Dc _____

Untu _____

Marine Mammals

Tt _____

Ssp _____

Undo _____

Gm _____

Pm _____

Other Odontocetes

Comm Fishing Vessels 3

Vessel Type and Numbers:

Gillnet 2

FV unspecified 1

Eg _____

Mn _____

Bp _____

Other Balaenopterids

Comments:

Weather at mouth of Chesapeake was questionable but calm (8 kts) just north of study area. Attempted to fly northern 7-10 lines but although wind speed dropped off considerably, beaufort force was still 4. Ran north to line 10 but sea state didn't drop off enough for a reliable survey. Did a stranding survey of entire coastline from transect 10 south to mouth of Chesapeake at Fisherman Island. Only stranding observed was on fisherman island and had been already documented (orange x spray painted).

Survey Leader Todd Gedamke

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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**

Date 5 / 6 / 02

Tansect Lines Surveyed 7-8 and 9-10 Aircraft Cessna 337
Observers/Pilot TG, EAL, JDL, BK H2O Temp Range _____
Beaufort 2/3 Cloud Cover 11 Wind: dir. E/ENE spd. 5-10 Vis. >2nm
Hobbs Time 4.7 On-Transect Miles 323 On-Transect Miles w/ Beau <3 323

On Watch Time 0859 Off Watch Time 1044
On Watch Time 1312 Off Watch Time 1537
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 100
Cc 84
Lk _____
Dc _____
Untu 16

Marine Mammals
Tt 47
Ssp 125
Undo 95
Gm _____
Pm _____

Other Odontocetes
GRAM 20
SADO 380

Comm Fishing Vessels 29

Vessel Type and Numbers:

FV-T 27 (24 were scalloping dredge+net)
FV unspecified 2

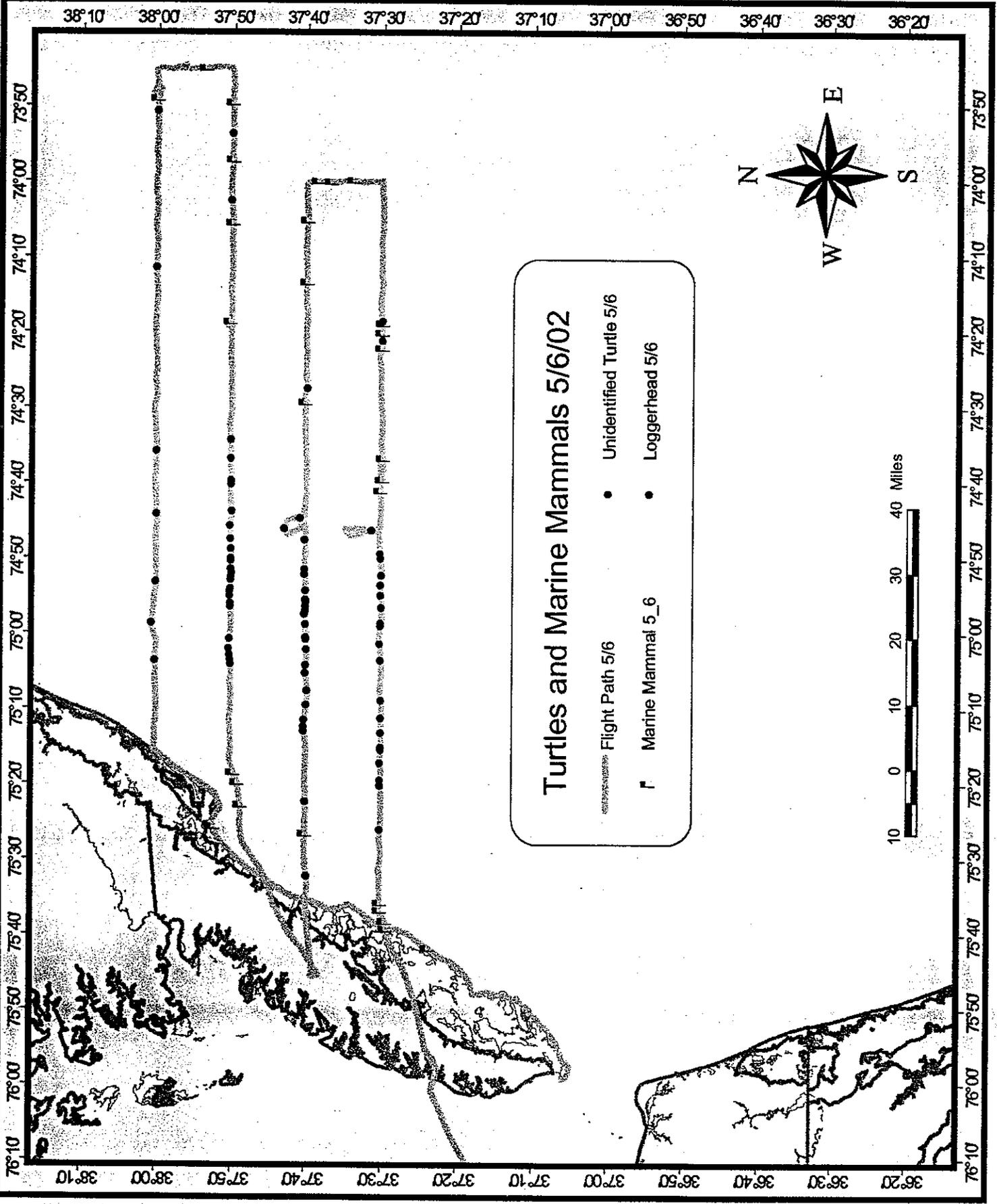
Eg _____
Mn _____
Bp 2

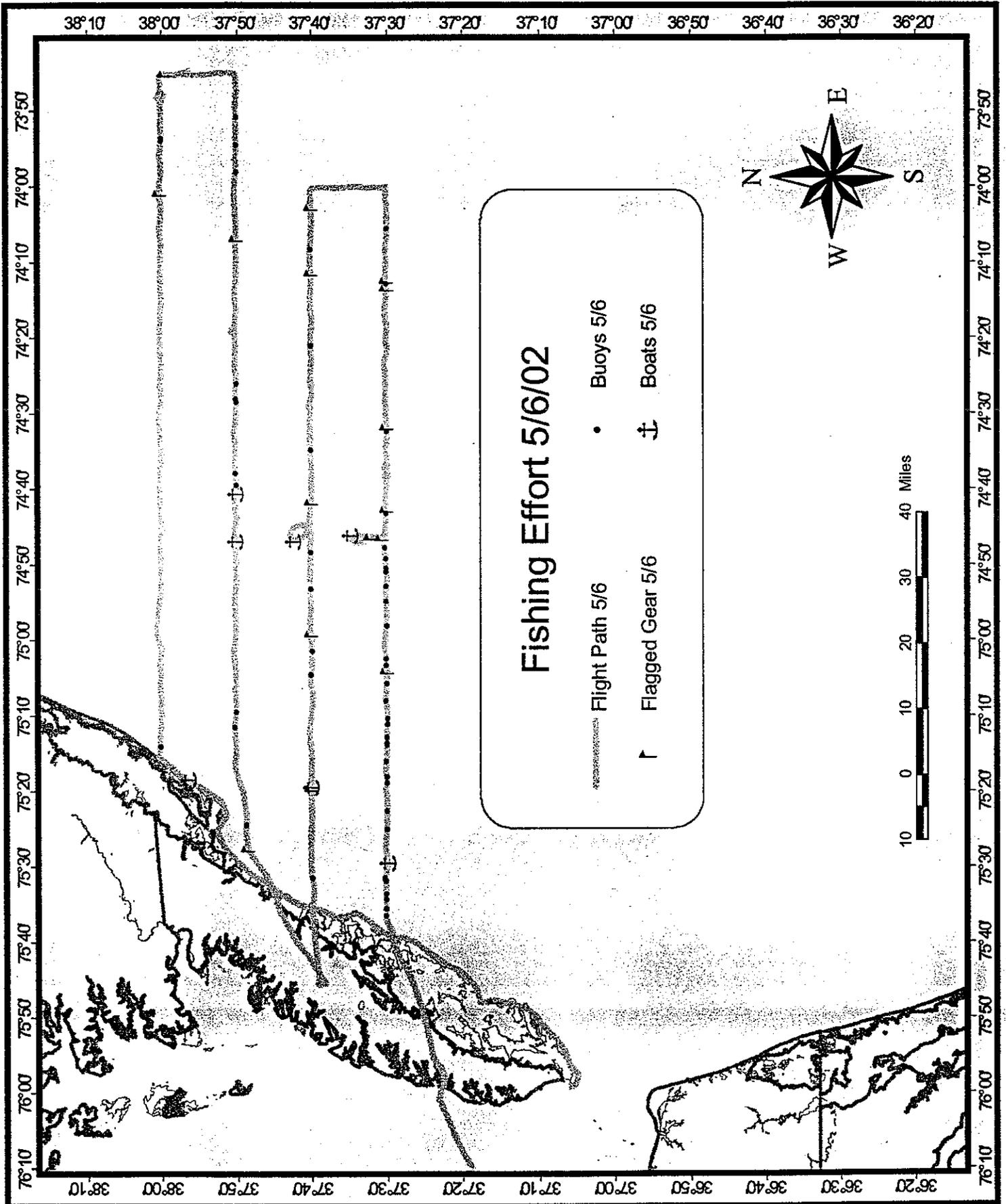
Other Balaenopterids

Comments:

Great weather... Flew lines 7 and 8 in the morning and lines 9 and 10 in the afternoon. Turtle density appeared to drop off as we moved north with only a few sightings on track line number 10. Scallop vessels were seen working along the 35-40 fathom line in a fairly concentrated pack (indicated in the comment field). Vessels were observed using both dredge and nets in the fleet. SST software locked up for line 9 but was restarted for most of line 10.

Survey Leader Todd Gedamke





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Virginia Turtle Survey 2002
DAILY SUMMARY SHEET

Date 5 / 10 / 02

Tansect Lines Surveyed 1-4 and 5-6 Aircraft Cessna 337
Observers/Pilot TG, EES, JDL, BK H2O Temp Range _____
Beaufort 2/3 Cloud Cover 11 Wind: dir. W/N/NE spd. 5-10 Vis. >2nm
Hobbs Time 6.2 On-Transect Miles 419 On-Transect Miles w/ Beau <3 419

On Watch Time 0939 Off Watch Time 1230
On Watch Time 1430 Off Watch Time 1604
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 359
Cc 301
Lk 7
Dc _____
Untu 51

Marine Mammals
Tt 136
Ssp 47
Undo 50
Gm _____
Pm _____

Other Odontocetes
GRAM 12
SADO 171
(SADO=common dolphin)

Comm Fishing Vessels 3
Vessel Type and Numbers:
FV-T (scallop dredge boat transiting)--1
FV-G (gillnetter-transiting 2
FV-C (pot boat)-1

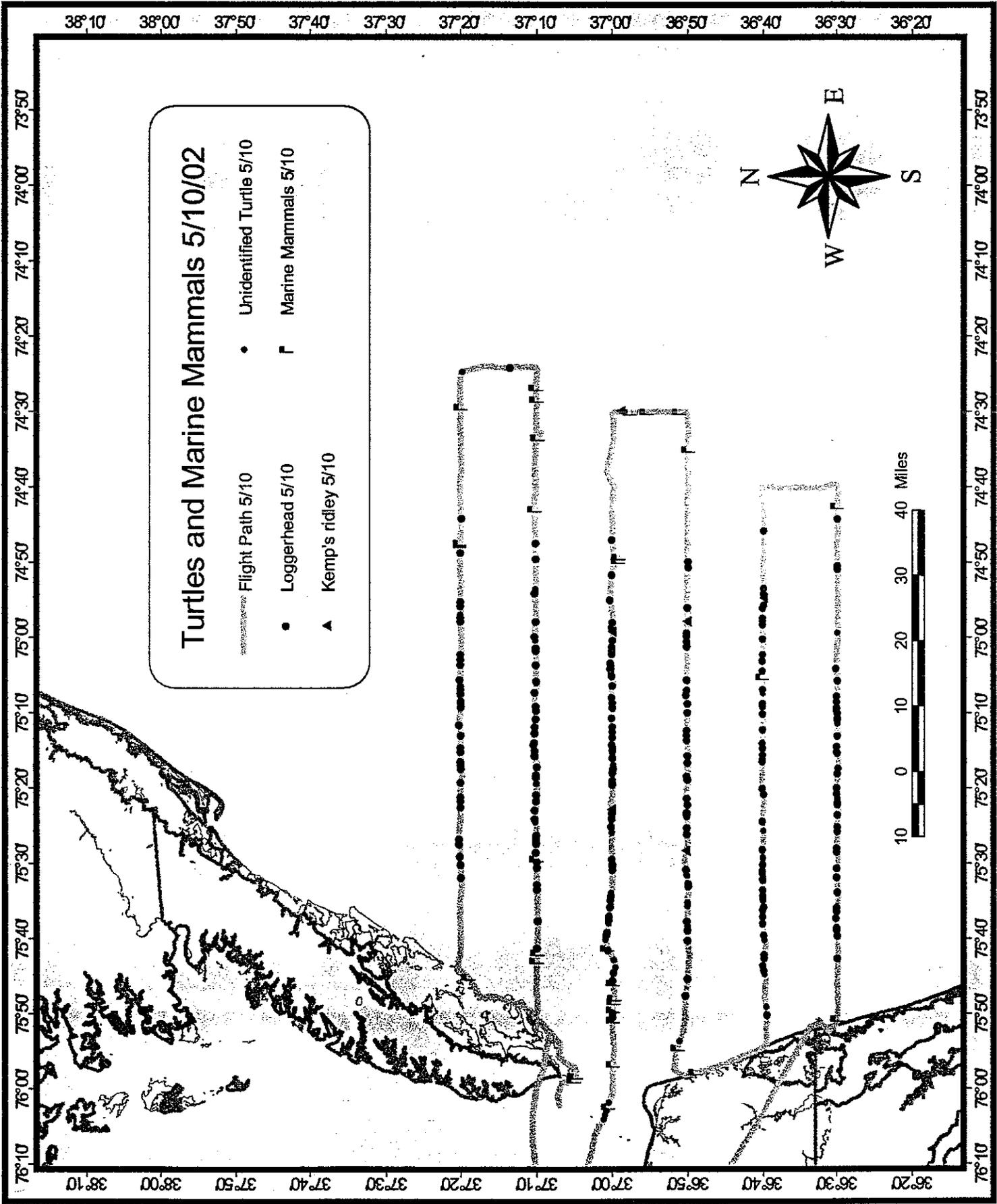
Eg _____
Mn _____
Bp 2

Other Balaenopterids

Comments:

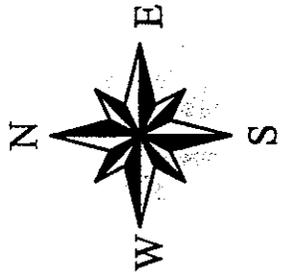
Great weather....Almost flat calm in a few places and never got above a low beaufort 3. Flew lines 1-4 in the morning and lines 8 and 9 in the afternoon. Very little commercial fishing vessel activity observed. Thick fog/cloud bank was present at the eastern end of lines 8-9 so we cut off the last 8 nm of each. Turtle density appeared greater than a week ago with the greatest concentration being found in the central part of each transect.

Survey Leader Todd Gedamke



Turtles and Marine Mammals 5/10/02

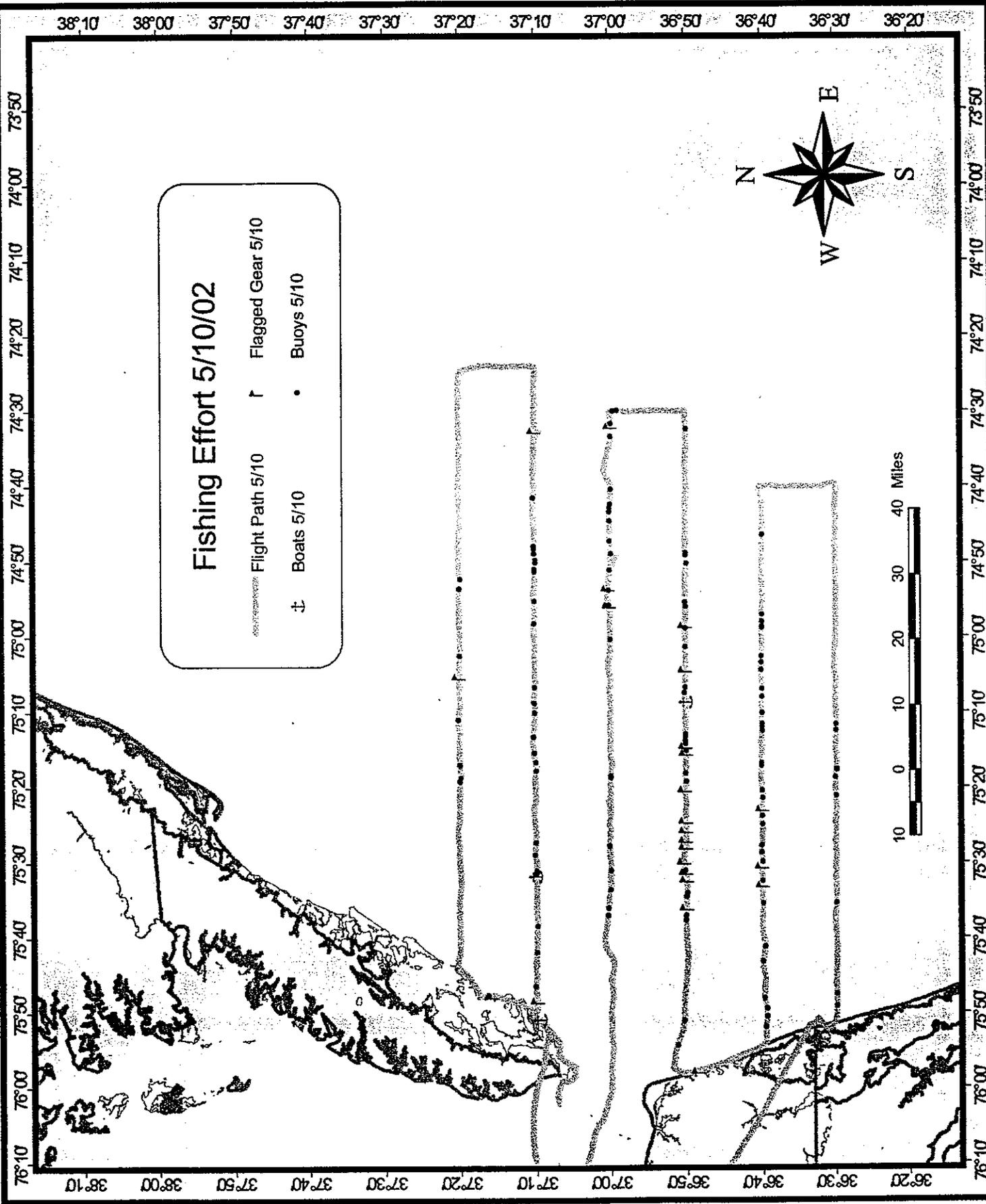
- Flight Path 5/10
- Unidentified Turtle 5/10
- Loggerhead 5/10
- Kemp's ridley 5/10
- ▣ Marine Mammals 5/10



38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

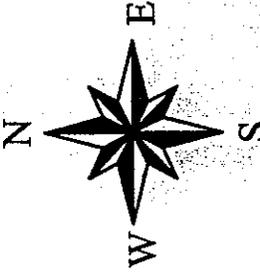
76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'



Fishing Effort 5/10/02

Flight Path 5/10 ▬ Flagged Gear 5/10

Boats 5/10 • Buoy 5/10



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Virginia Turtle Survey 2002
DAILY SUMMARY SHEET

Date 5 / 21 / 02

Tansect Lines Surveyed 7-8 and 9-10 Aircraft Cessna 337
Observers/Pilot TG, EES, BAC, BCM H2O Temp Range _____
Beaufort 2-4 Cloud Cover 11/14 Wind: dir. NE/N spd. 10 Vis. >2nm
Hobbs Time 4.4 On-Transect Miles 323 On-Transect Miles w/ Beau <3 290

On Watch Time 0940 Off Watch Time 1239
On Watch Time 1249 Off Watch Time 1320
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 25
Cc 18
Lk _____
Dc _____
Untu 7

Marine Mammals
Tt 28
Ssp _____
Undo 44
Gm _____
Pm _____
Other Odontocetes

Comm Fishing Vessels 29

Vessel Type and Numbers:

FV-T 25 (scalloping dredge+net)
FV unspecified 2
FV-Gill Net---2

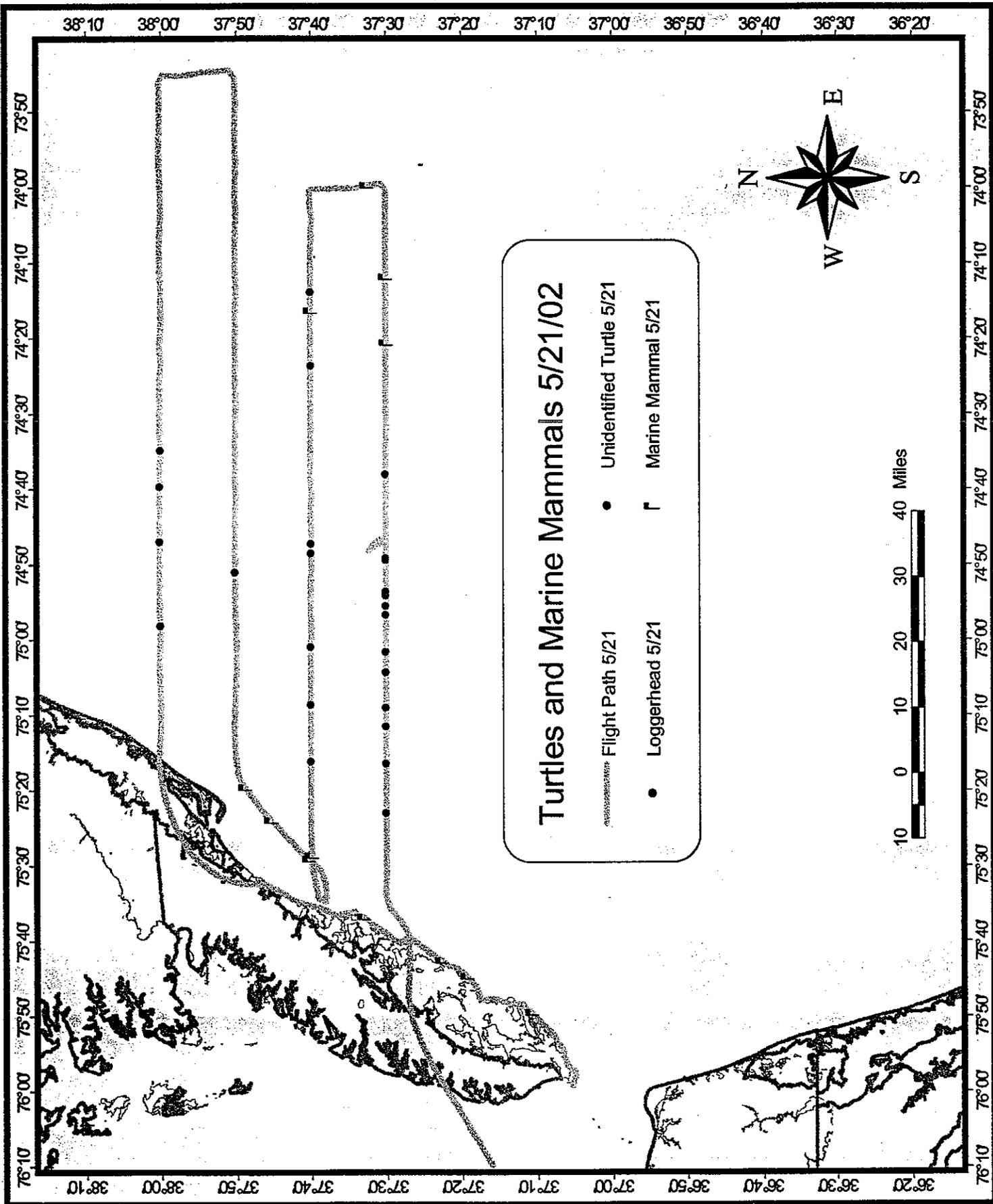
Eg _____
Mn _____
Bp _____

Other Balaenopterids

Comments:

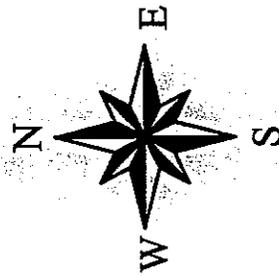
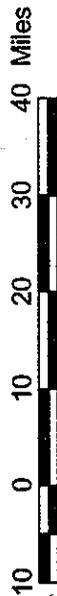
The weather held out for all but approximately 30 miles of Beaufort 4... Flew lines 7 through 10 without breaking in between. Turtle density was lower than any other survey so far. Water temps were in the 50's throughout the range and probably pushed turtles south. Scallop vessels were seen working along the 35-40 fathom line in a fairly concentrated pack elongated N to S along fathom line. Most vessels were observed using dual beam trawls but a couple of dredge boats were also working the area.

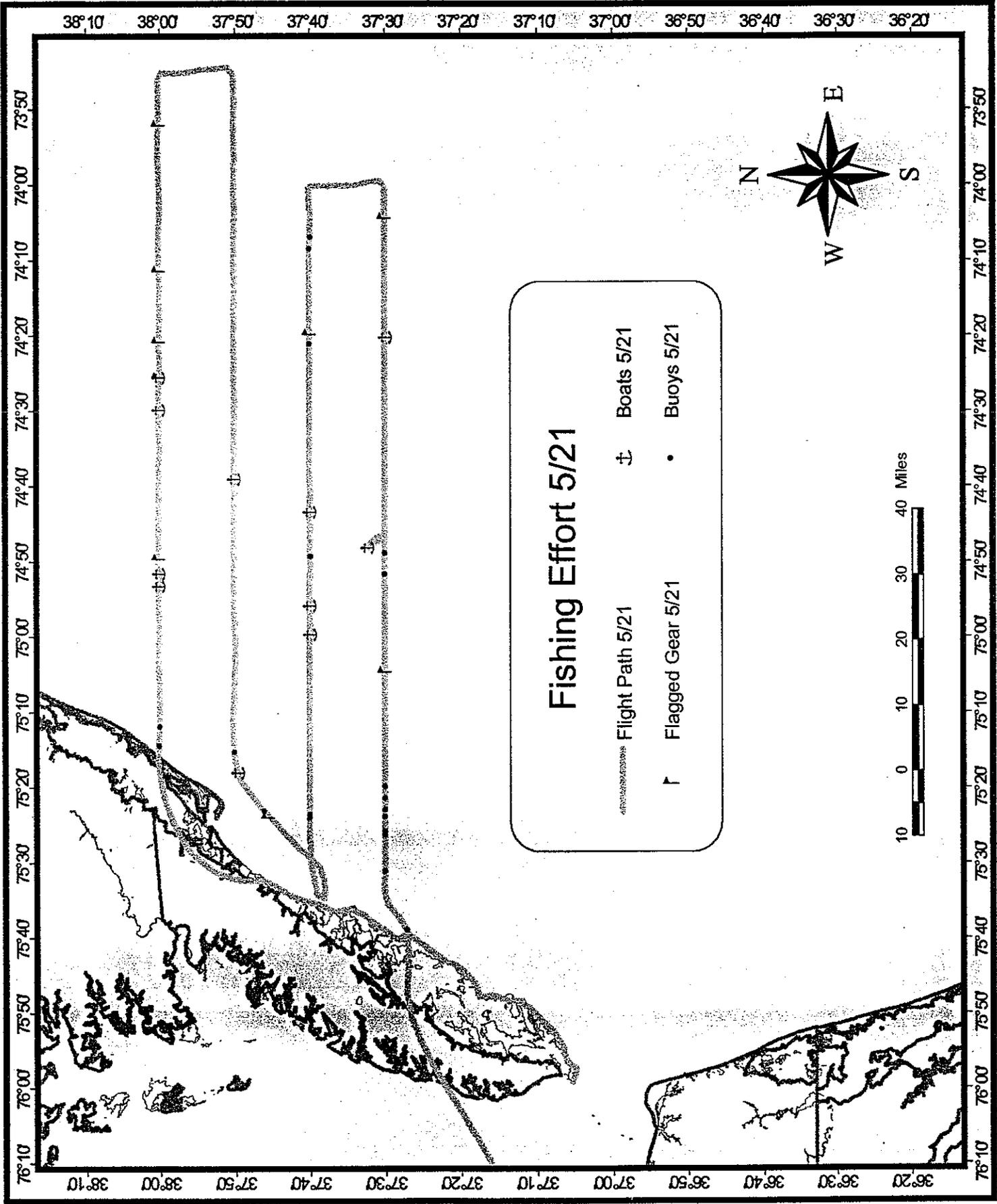
Survey Leader Todd Gedamke



Turtles and Marine Mammals 5/21/02

- Flight Path 5/21
- Unidentified Turtle 5/21
- Loggerhead 5/21
- ┌ Marine Mammal 5/21





Fishing Effort 5/21

- Flight Path 5/21
- Boats 5/21
- Flagged Gear 5/21
- Buoys 5/21



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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**Date 5 / 23 / 02

Tansect Lines Surveyed 1-4 and 5-6 Aircraft Cessna 337
Observers/Pilot TG, EES, BAC, BCM H2O Temp Range _____
Beaufort 2-4 Cloud Cover 11 Wind: dir. NE/N spd. 7-15 Vis. >2nm
Hobbs Time 5.7 On-Transect Miles 449 On-Transect Miles w/ Beau <3 360

On Watch Time 0930 Off Watch Time 1058
On Watch Time 1239 Off Watch Time 1516
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 108Cc 83Lk 1

Dc _____

Untu 24

Marine Mammals

Tt 101

Ssp _____

Undo 17

Gm _____

Pm _____

Other Odontocetes

_____Comm Fishing Vessels 4

Vessel Type and Numbers:

FV-T 3 (scallop net)FV-Gill Net---1

Eg _____

Mn _____

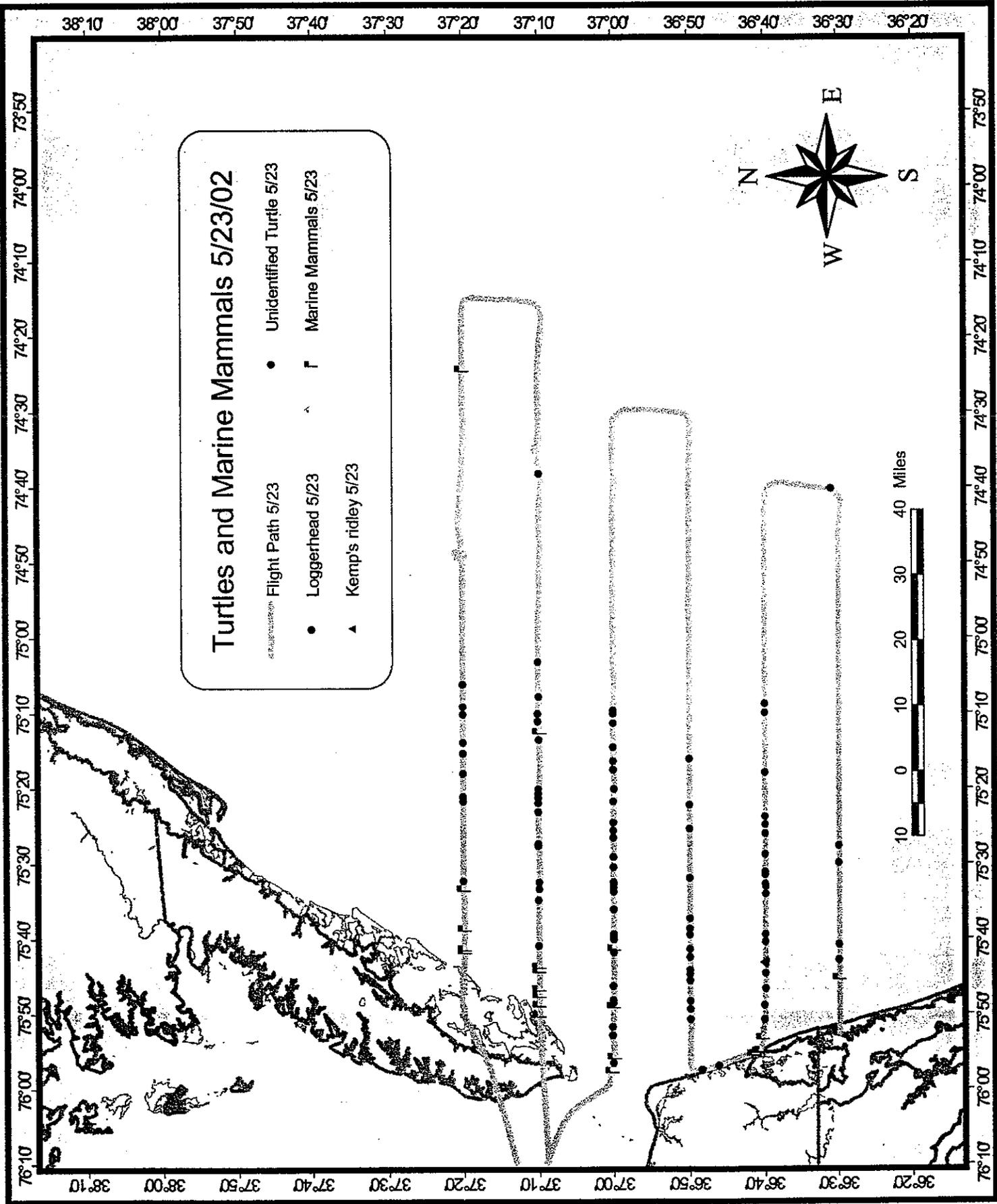
Bp _____

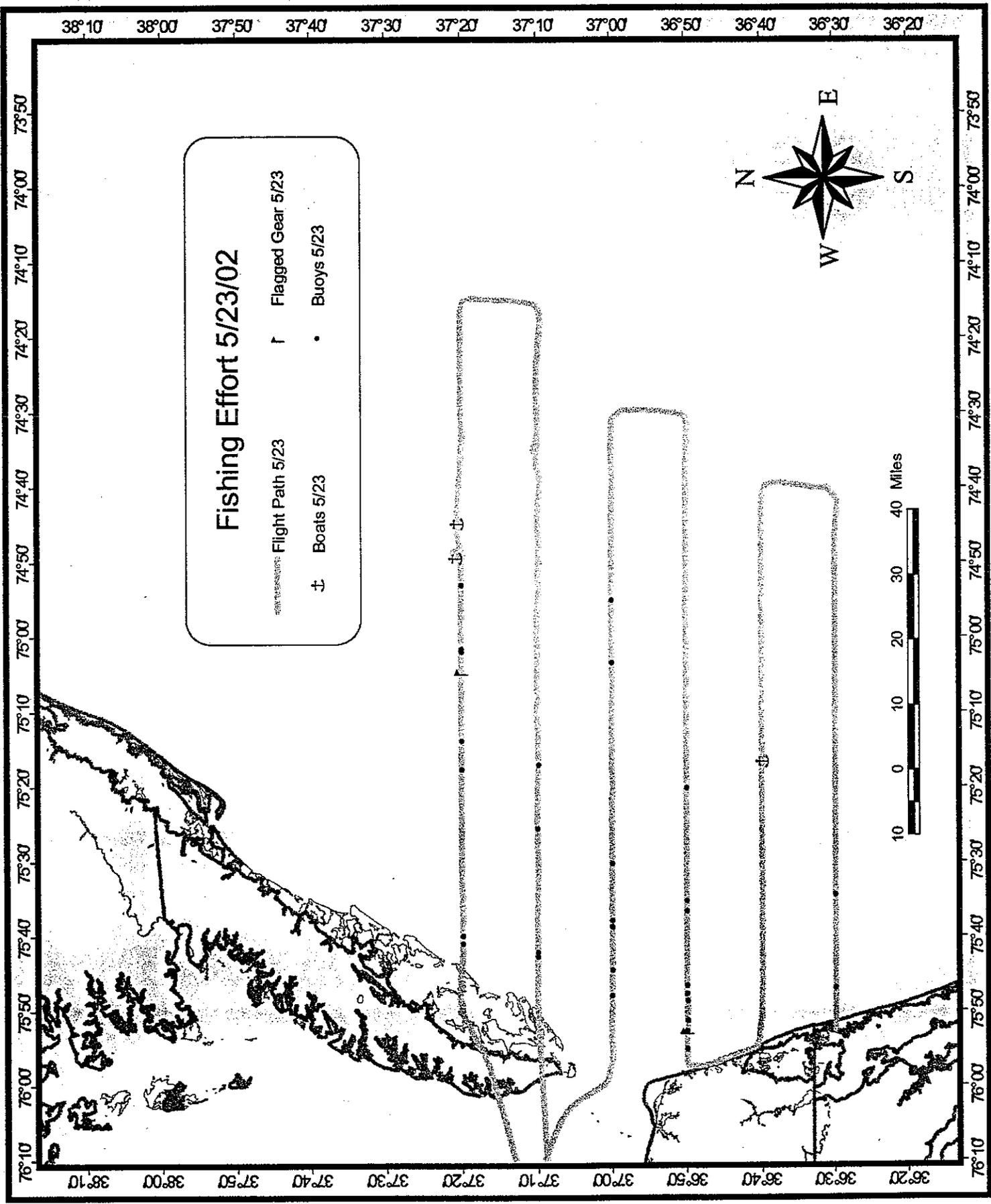
Other Balaenopterids

Comments:

The weather held out to fly lines 5 and 6 in the morning and then 1-4 in the afternoon. Sea state was less than a 4 for all but approximately the last 10 miles of each line. Water temps were still in the 50's with patches of temps in the low 60's (around 65 in clearer water at the offshore end of the lines). The density of turtles still appeared to be much lower than previous surveys with an apparent concentration or constriction of range towards the mouth of the Chesapeake Bay. Three scallop vessel were seen working along a line 40-50 miles offshore. Two vessels were clearly fishing with dual trawls.

Survey Leader Todd Gedamke





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Virginia Turtle Survey 2002
DAILY SUMMARY SHEET

Date 5 / 25 / 02

Tansect Lines Surveyed 5-6, Short Survey-- Weather _____ Aircraft Cessna 337
Observers/Pilot TG, KLM, BAC, BCM H2O Temp Range _____
Beaufort 3-4 Cloud Cover 11 Wind: dir. NE/N spd. 7-20 Vis. >2nm
Hobbs Time 2.3 On-Transsect Miles 161 On-Transsect Miles w/ Beau <3 126

On Watch Time 0918 Off Watch Time 1050
On Watch Time _____ Off Watch Time _____
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 15
Cc 14
Lk _____
Dc _____
Untu 1

Marine Mammals
Tt 10
Ssp 5
Undo 14
Gm _____
Pm 1

Other Odontocetes

Comm Fishing Vessels 1

Vessel Type and Numbers:

FV-T 1 (scallop)

Eg _____
Mn _____
Bp _____

Other Balaenopterids

Comments:

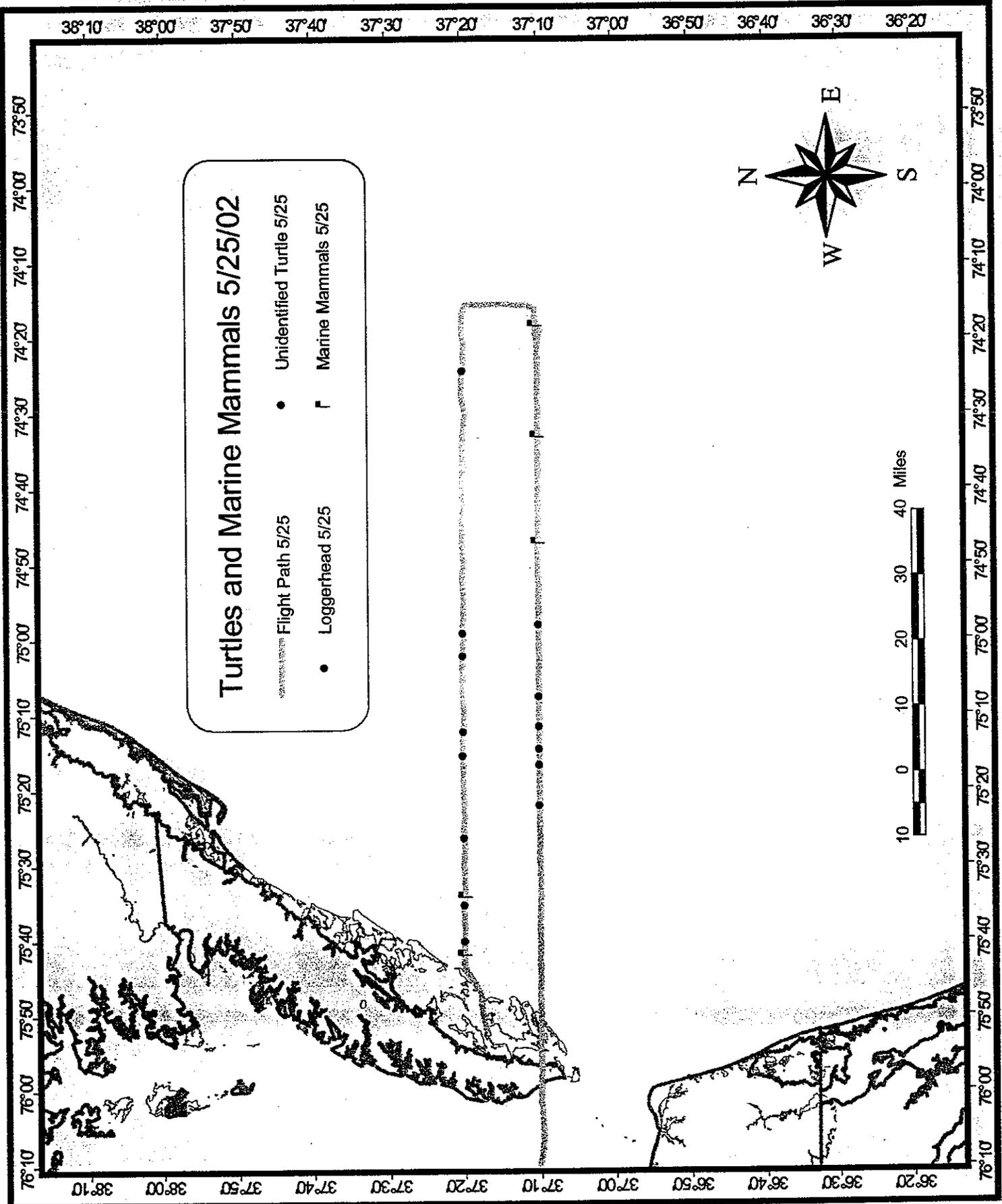
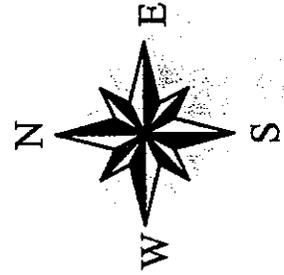
Tried to get out today ahead of a series of fronts that look like they're going to blow us out of the air for most of the coming week. Set out to survey lines 5-8 with winds at the buoys of 6-9 knots and forecast of 10-15 kts. Winds picked up immediately after we took off and were no lower than 10 kts on survey lines with strong gusts near shore and at the offshore end of both lines. Sea state was a three for the middle parts of the lines but a 4 for the first 5 miles off the beach and the last 10 miles of each line. Water temps were in the high 50's and low 60's. Only fifteen turtles were observed with most on the inshore side of the two lines. One scallop vessel was seen working along a line 40-50 miles offshore. Winds had picked up too much to complete lines 7 and 8.

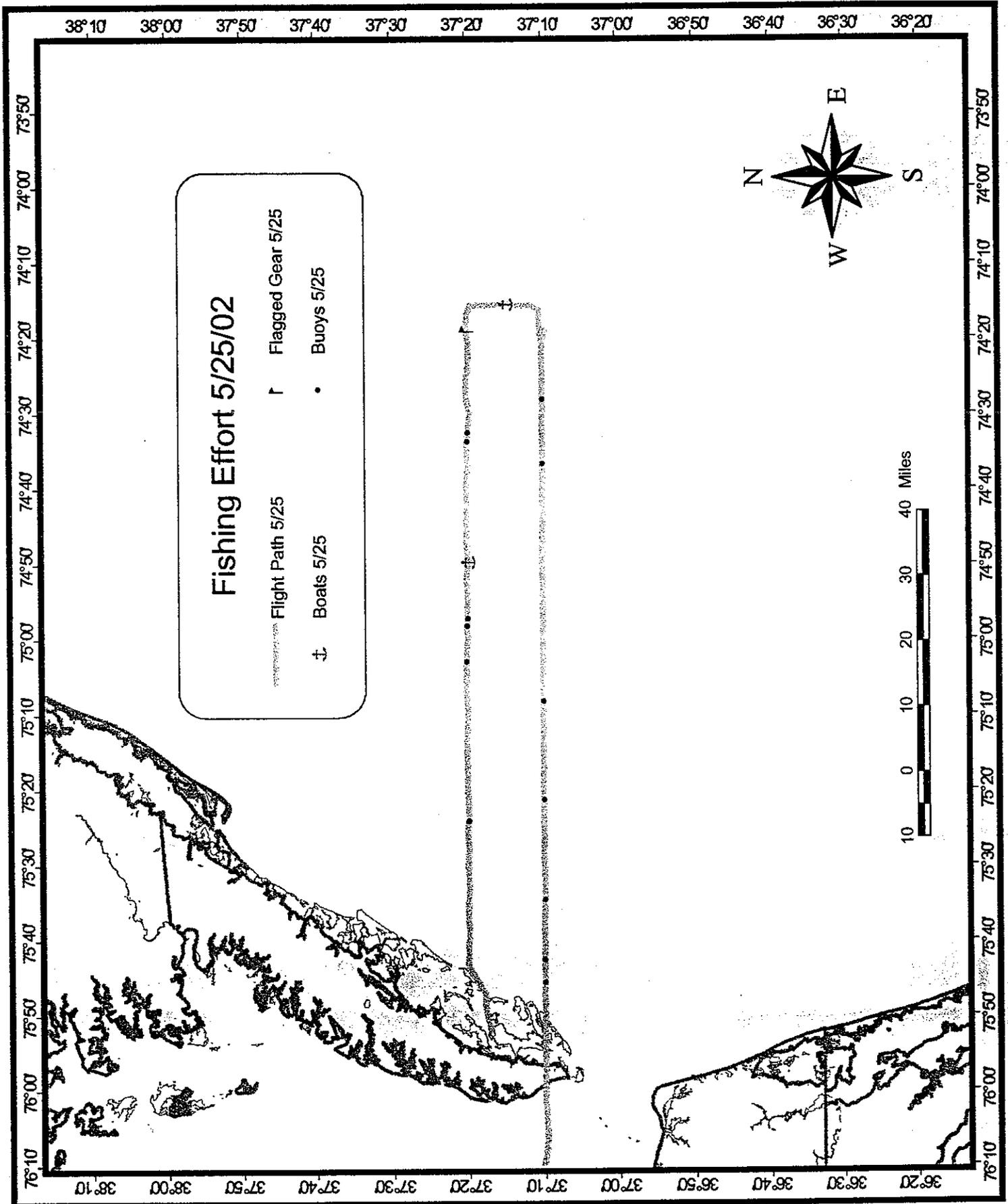
Survey Leader

Todd Gedamke

Turtles and Marine Mammals 5/25/02

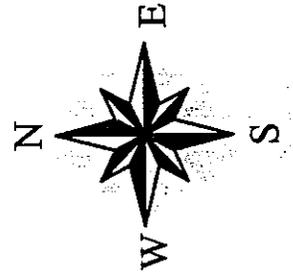
- Flight Path 5/25
- Unidentified Turtle 5/25
- Loggerhead 5/25
- ▮ Marine Mammals 5/25





Fishing Effort 5/25/02

- Flight Path 5/25
- Boats 5/25
- Flagged Gear 5/25
- Buoys 5/25



COASTWISE CONSULTING173 Virginia Avenue
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706-543-6859**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**Date 5 / 31 / 02

Tansect Lines Surveyed 7-10 Aircraft Cessna 337
 Observers/Pilot TG, EES, ACW, BCM H2O Temp Range _____
 Beaufort 2/3 Cloud Cover 12 Wind: dir. S/SW spd. 8-10 Vis. >2nm
 Hobbs Time 4.9 On-Transect Miles 329 On-Transect Miles w/ Beau <3 329

On Watch Time 0937 Off Watch Time 1345
 On Watch Time _____ Off Watch Time _____
 On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 118
 Cc 93
 Lk 1
 Dc 2
 Untu 22

Marine Mammals
 Tt 52
 Ssp 50
 Undo 59
 Gm _____
 Pm 6
 Other Odontocetes
GRAM 17

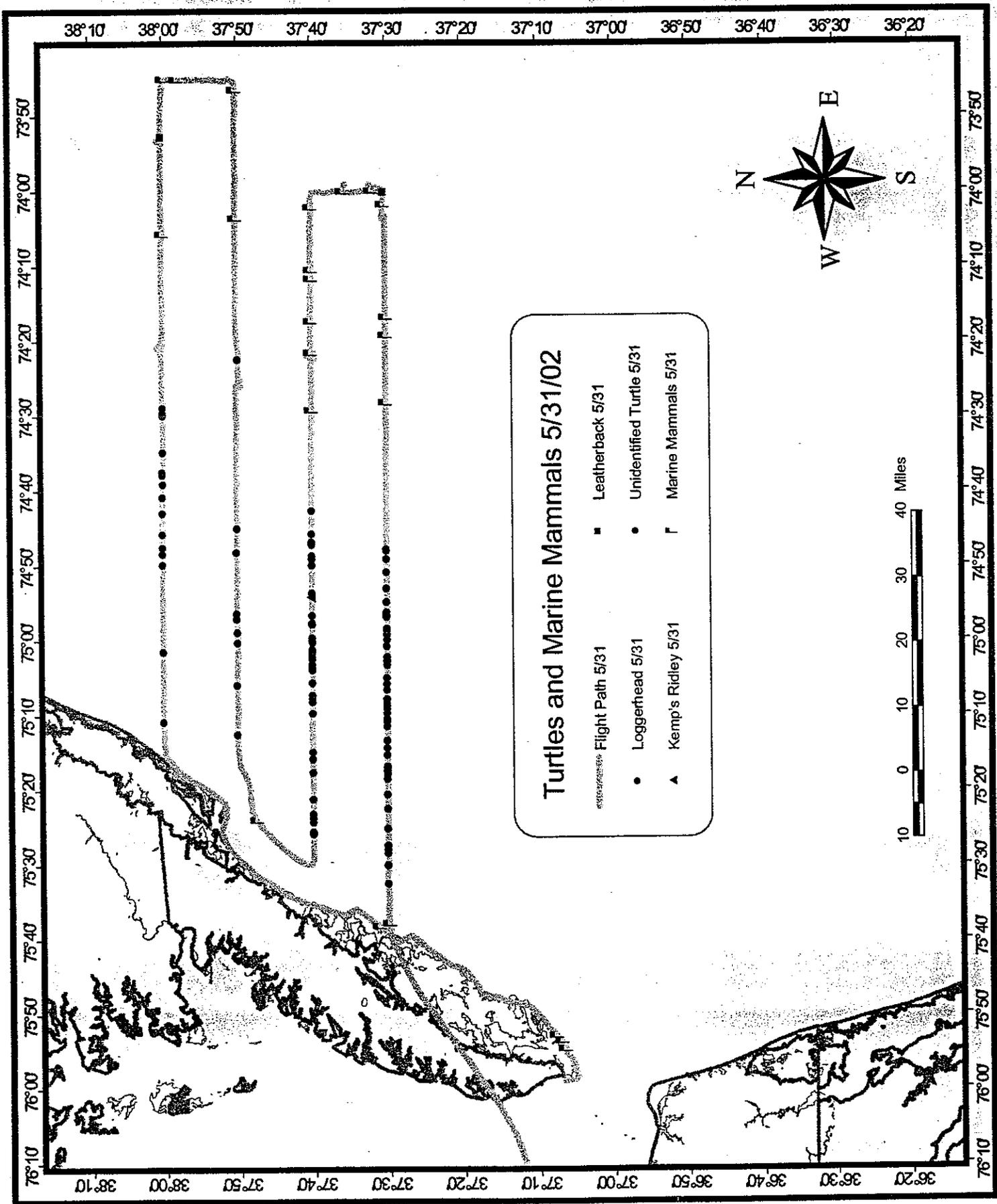
Comm Fishing Vessels 24
 Vessel Type and Numbers:
FV-T 23 (scalping dredge+net)
FV unspecified 1

Eg _____
 Mn _____
 Bp 1
 Other Balaenopterids

Comments:

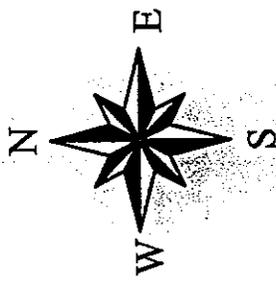
Great weather finally... Flew lines 7 through 10 with a 8-10 kt southerly breeze. First sighting of a leatherback for this survey—two individuals. Turtles were once again more prevalent on the inshore parts of the lines with just a few sightings in the last 30-40 miles of each line. Density appeared to decline as we moved north. Scallop vessels were once again seen working in a relatively concentrated pack elongated along a depth contour. Vessels were observed using both dredge and nets in the fleet. Three different sightings of sperm whales (5 adults and one calf) and one fin whale offshore. Manta rays were also observed at the offshore ends of the lines. Great day!

Survey Leader Todd Gedamke



Turtles and Marine Mammals 5/31/02

- Flight Path 5/31
- Leatherback 5/31
- Loggerhead 5/31
- Kemp's Ridley 5/31
- Unidentified Turtle 5/31
- Marine Mammals 5/31

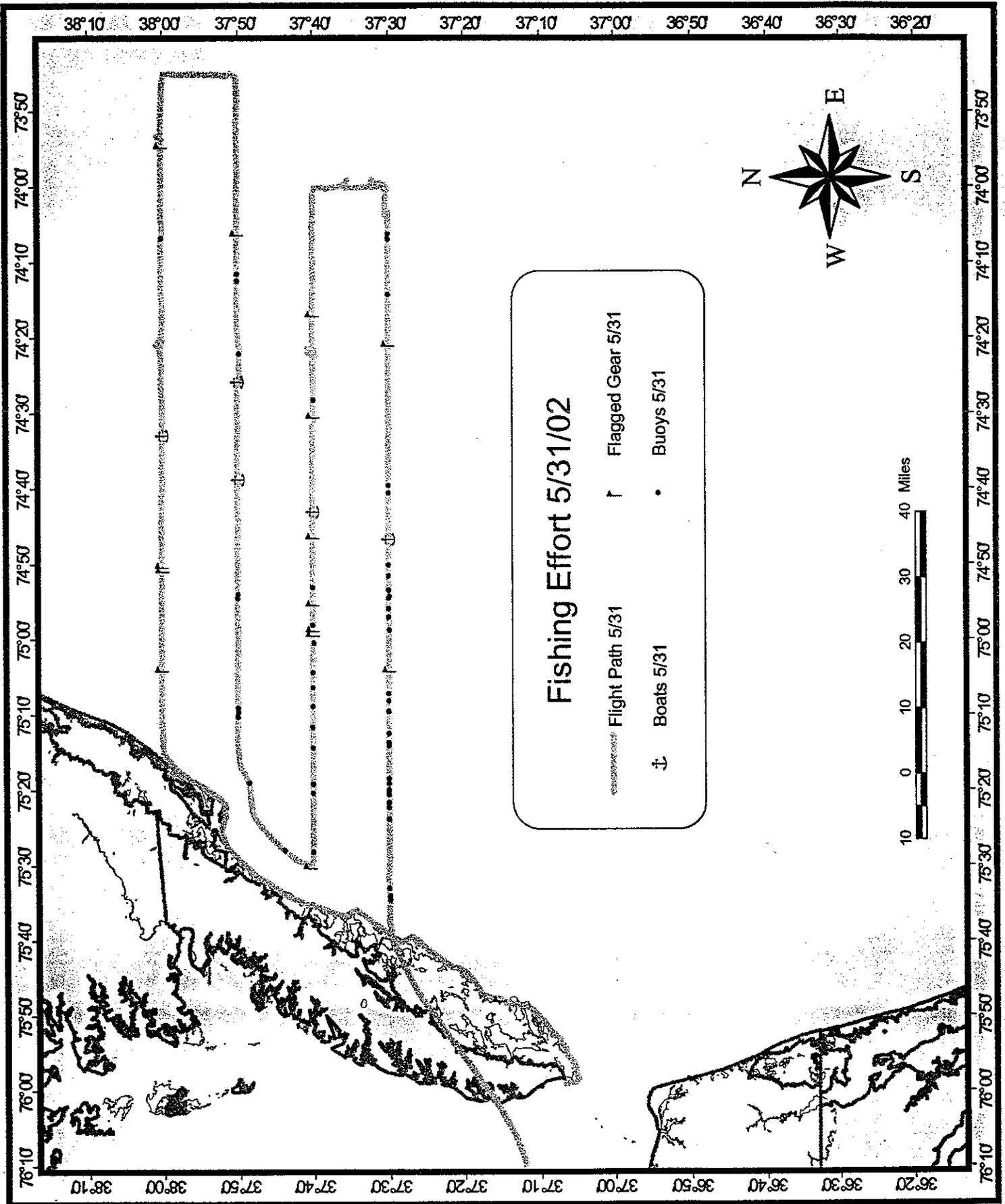


38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

73°50' 74°00' 74°10' 74°20' 74°30' 74°40' 74°50' 75°00' 75°10' 75°20' 75°30' 75°40' 75°50' 76°00' 76°10'

73°50' 74°00' 74°10' 74°20' 74°30' 74°40' 74°50' 75°00' 75°10' 75°20' 75°30' 75°40' 75°50' 76°00' 76°10'

38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'



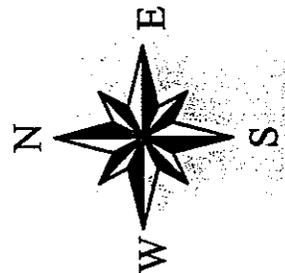
38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

Fishing Effort 5/31/02

- Flight Path 5/31
- Boats 5/31
- △ Flagged Gear 5/31
- Buoy 5/31



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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**

Date 6 / 01 / 02

Tansect Lines Surveyed 3-6 Aircraft Cessna 337

Observers/Pilot TG, KLM, ACW, BCM H2O Temp Range _____

Beaufort 1-3 Cloud Cover 11 Wind: dir. W/NW spd. 0-9 Vis. >2nm

Hobbs Time 4.0 On-Transect Miles 323 On-Transect Miles w/ Beau <3 323

On Watch Time 1135

Off Watch Time 1450

On Watch Time _____

Off Watch Time _____

On Watch Time _____

Off Watch Time _____

of Sea Turtles Sighted 152

Cc 131

Lk 2

Dc 2

Untu 17

Marine Mammals

Tt 38

Ssp _____

Undo 6

Gm _____

Pm _____

Other Odontocetes

Comm Fishing Vessels 2

Vessel Type and Numbers:

FV-G 2

Eg _____

Mn _____

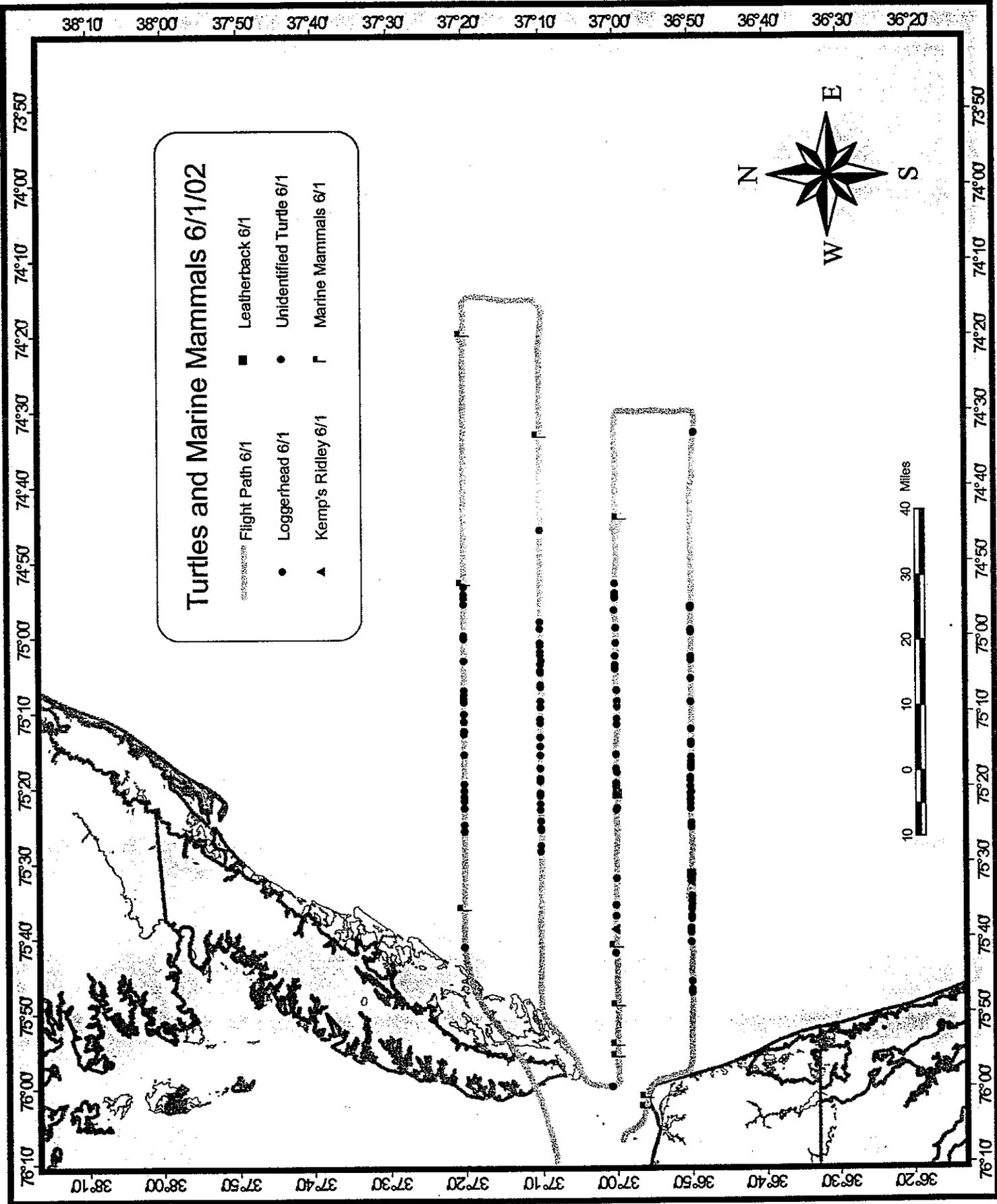
Bp 1

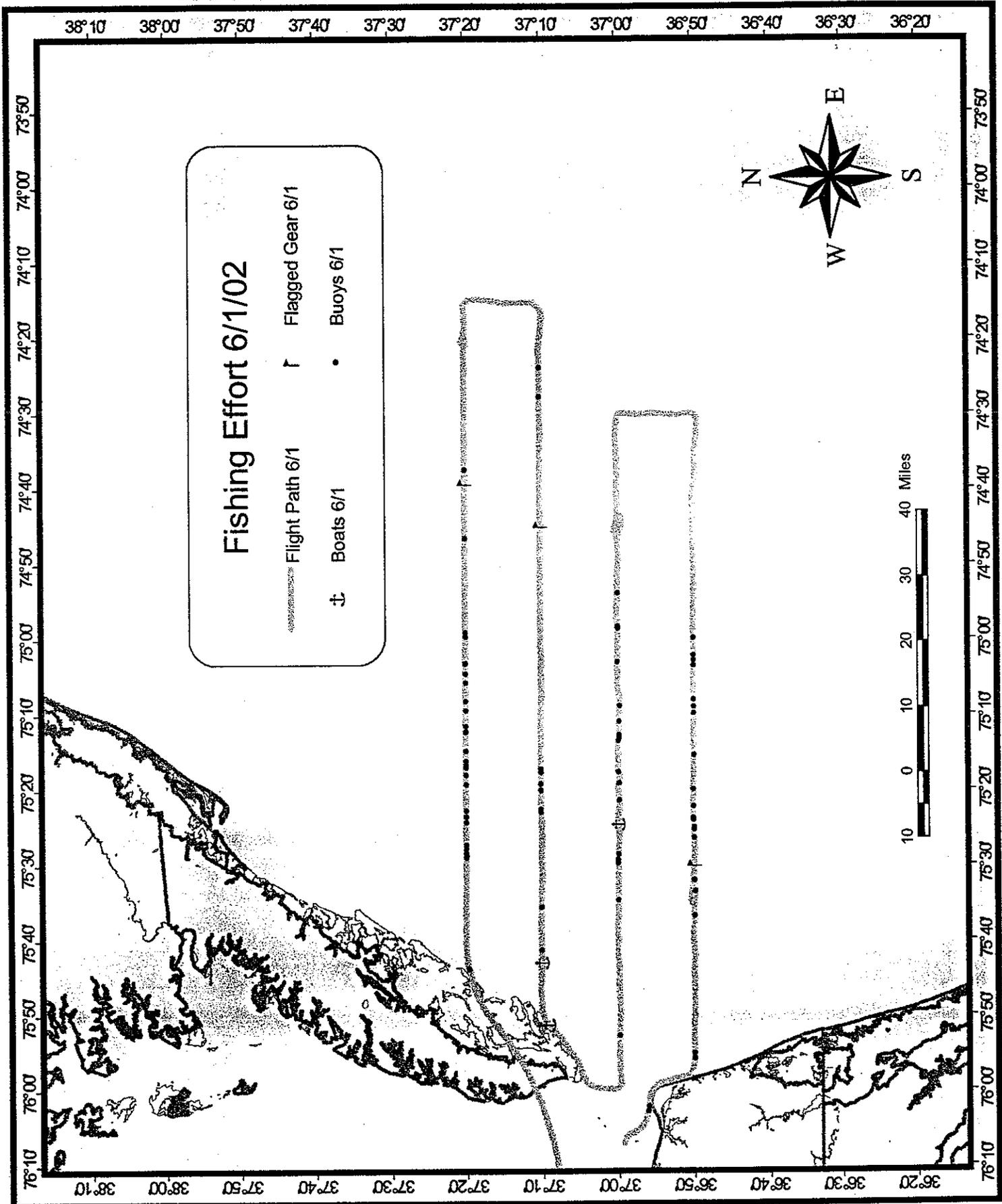
Other Balaenopterids

Comments:

Too windy to fly first thing this morning but by 11am winds had dropped to less than 10 kts. We took advantage of the afternoon and started with line 6 and worked our way south to line 3. Hot, muggy and other than a slight haze but best sea state conditions we've seen so far. Turtles density has increased back to levels closer to those observed prior to the cold front and the water temperature drop. A couple of leatherbacks and couple of ridley's were observed. Two observations of paired loggerheads exhibiting mounting behavior was also recorded. Only observed 2 gill-netters and no trawlers in survey area.

Survey Leader Todd Gedamke

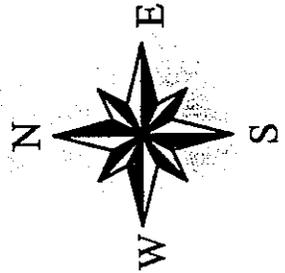




Fishing Effort 6/1/02

- Flight Path 6/1
- Boats 6/1
- Flagged Gear 6/1
- Buoys 6/1

0 10 20 30 40 Miles



38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**

Date 6 / 9 / 02

Tansect Lines Surveyed 1-4 and 5-6 Aircraft Cessna 337
Observers/Pilot TG, EES, ACW, BCM H2O Temp Range _____
Beaufort 1-3 Cloud Cover 11 Wind: dir. E/NE spd. 0-10 Vis. >2nm
Hobbs Time 5.7 On-Transect Miles 456 On-Transect Miles w/ Beau <3 456

On Watch Time 1025 Off Watch Time 1318
On Watch Time 1520 Off Watch Time 1646
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 141
Cc 118
Lk 3
Dc 2
Untu 18

Marine Mammals
Tt 152
Ssp 65
Undo 54
Gm _____
Pm _____
Other Odontocetes
GRAM 11

Comm Fishing Vessels 0

Vessel Type and Numbers:

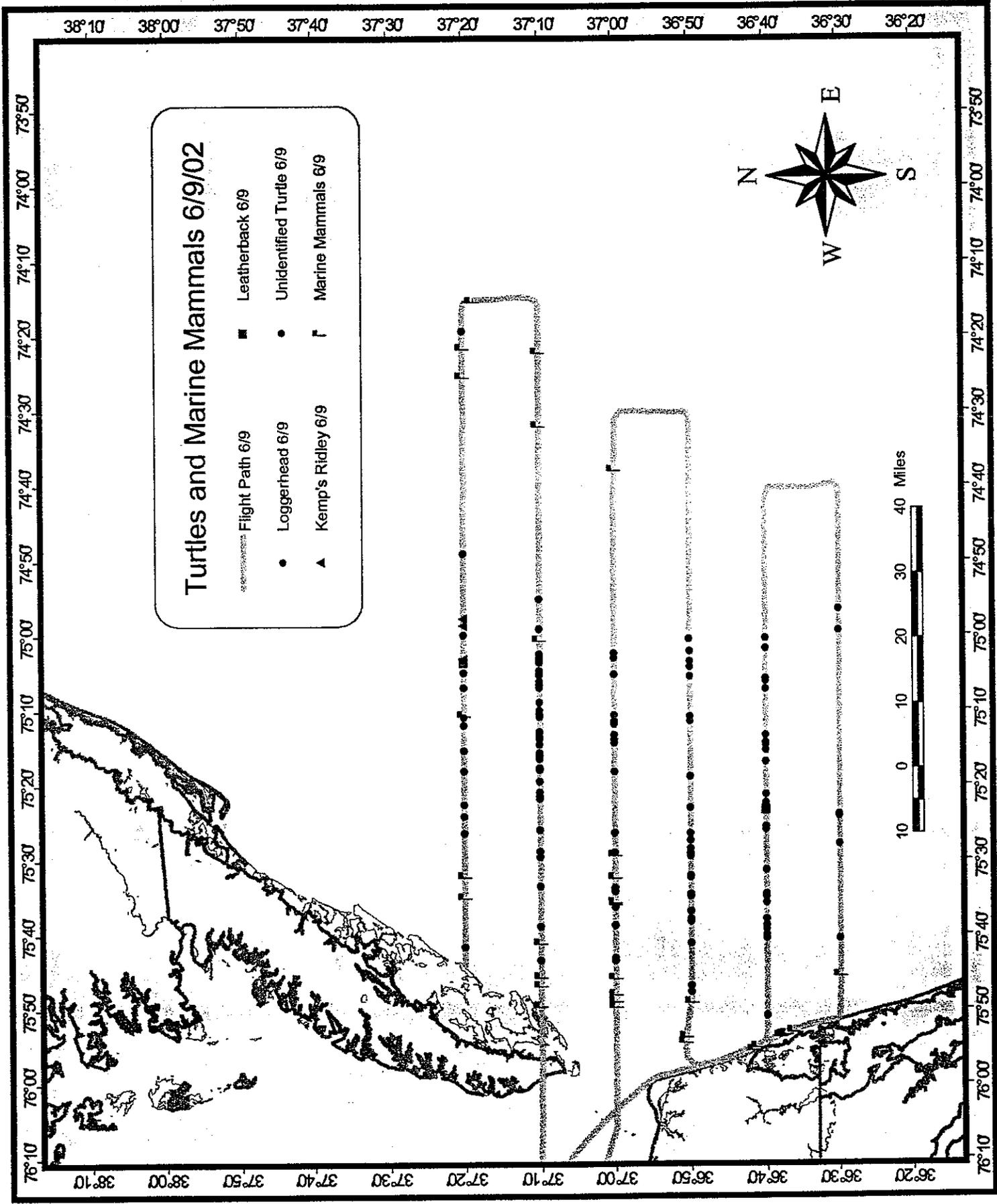
A few scallop vessels were observed
but all were in transit and not fishing

Eg _____
Mn _____
Bp _____
Other Balaenopterids

Comments:

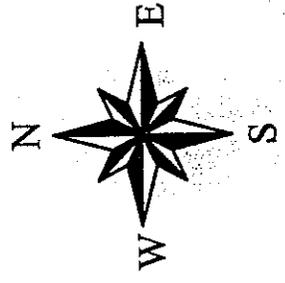
Finally a beautiful day!! Great weather with winds less than 10 kts all day. We had beaufort 3 for just a few of the offshore miles of lines 1-2 but wind died down to nothing for the rest of the day. Turtles appear to be concentrated on the inshore half of all lines again with only a few on the most southern line (1). No commercial fishing vessels were spotted working with a few heading out after the crappy weather we've had for a few days—all fishing effort was fixed gear. Three leatherbacks and two ridleys were spotted. No large marine mammals were observed. Lots of recreational vessels observed fishing on towers, bridges and a pack offshore probably fishing for tuna.

Survey Leader Todd Gedamke



Turtles and Marine Mammals 6/9/02

- Flight Path 6/9
- Leatherback 6/9
- Loggerhead 6/9
- ▲ Kemp's Ridley 6/9
- Unidentified Turtle 6/9
- ┌ Marine Mammals 6/9



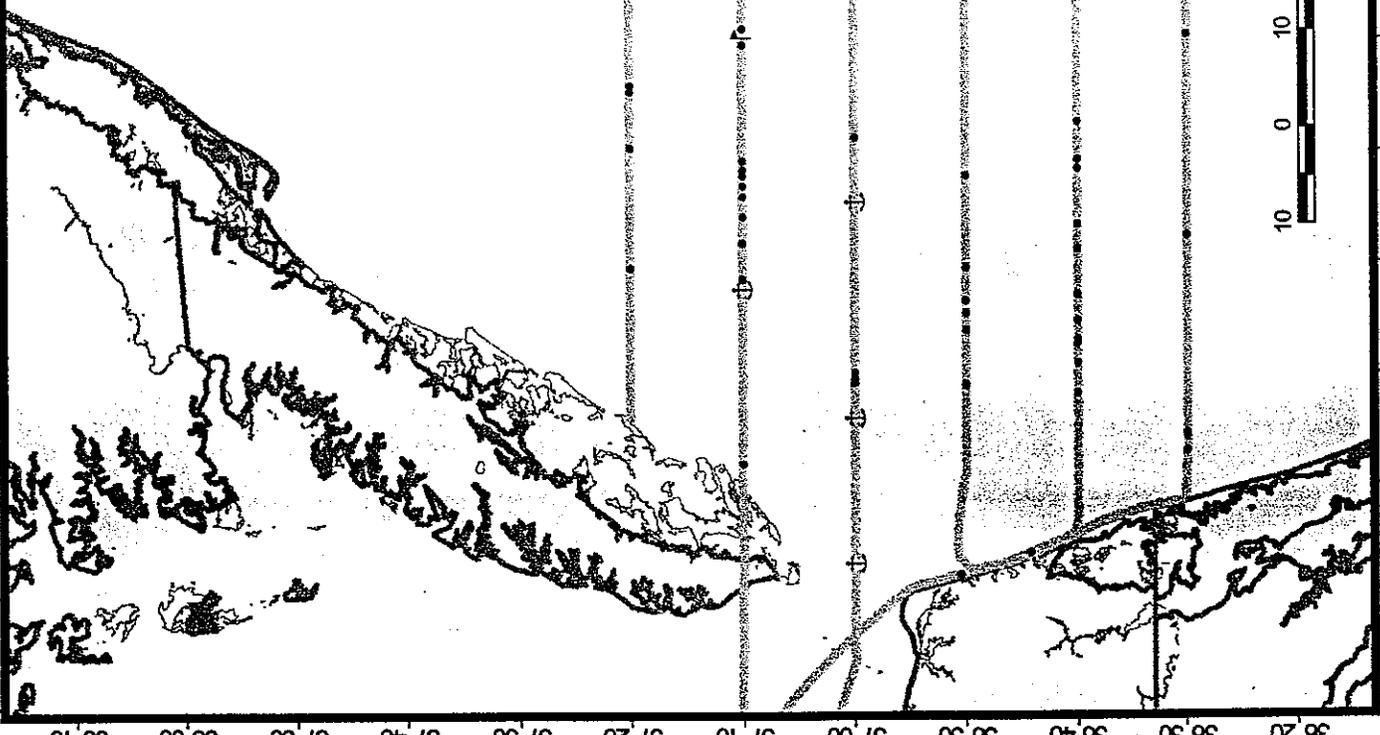
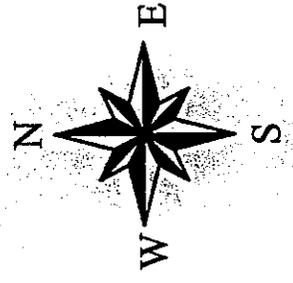
38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

73°50' 74°00' 74°10' 74°20' 74°30' 74°40' 74°50' 75°00' 75°10' 75°20' 75°30' 75°40' 75°50' 76°00' 76°10'

73°50' 74°00' 74°10' 74°20' 74°30' 74°40' 74°50' 75°00' 75°10' 75°20' 75°30' 75°40' 75°50' 76°00' 76°10'

Fishing Effort 6/9/02

- Flight Path 6/9
- Boats 6/9
- ↑ Flagged Gear 6/9
- Buoys 6/9



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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**Date 6 / 10 / 02

Tansect Lines Surveyed 7-10 Aircraft Cessna 337
 Observers/Pilot TG, EES, ACW, BCM H2O Temp Range _____
 Beaufort 1/3 Cloud Cover 11 Wind: dir. S/SW spd. 0-10 Vis. >2nm
 Hobbs Time 5.1 On-Transect Miles 330 On-Transect Miles w/ Beau <3 330

On Watch Time 1037 Off Watch Time 1207
 On Watch Time 1247 Off Watch Time 1514
 On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 62
 Cc 52
 Lk _____
 Dc 1
 Untu 9

Marine Mammals
 Tt 4
 Ssp 6
 Undo 4
 Gm _____
 Pm 1

Other Odontocetes

GRAM 4SADO 10

(SADO=common dolphin)

Eg _____

Mn _____

Bp _____

Other Balaenopterids
_____Comm Fishing Vessels 13

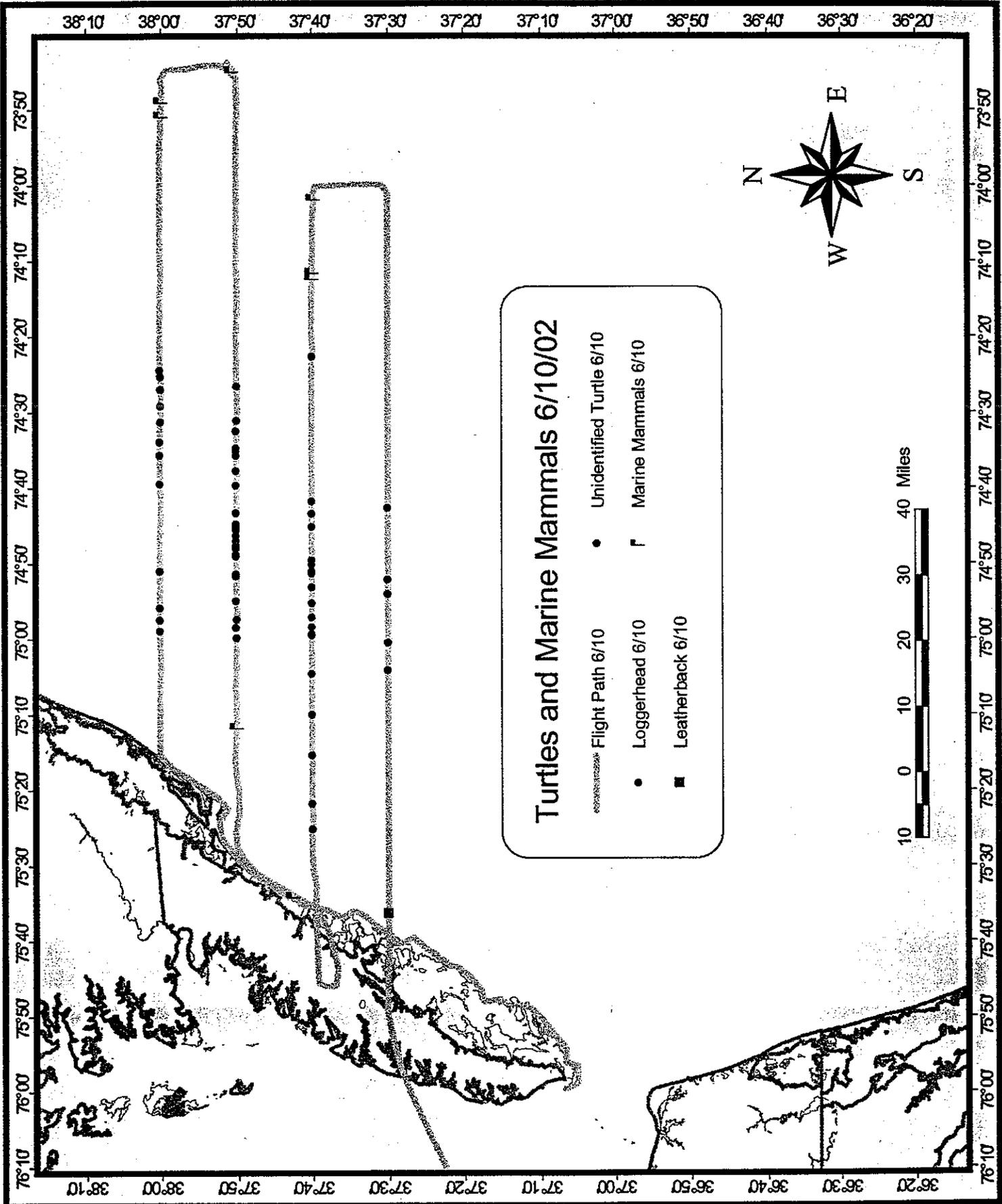
Vessel Type and Numbers:

FV-T 12 (scalloping dredge+net)FV-C 1 (Pot boat)

Comments:

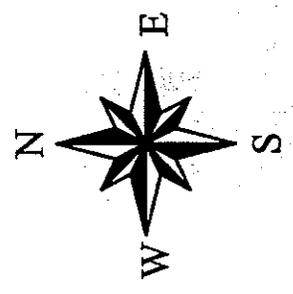
Great weather again...Flew lines 7 and 8 in the morning and 9 and 10 in the afternoon with a light west to southwest breeze. Sea state was a beaufort 3 only in a few places with good observation conditions all day. Relatively few observations however, compared to past surveys. We only had 1 leatherback and 5 loggerheads on the most southerly line (7) and observations of dolphins and marine mammals were also relatively infrequent. Turtles continue to be found clustered in the inshore parts of the lines. Scallop vessels were once again seen working in a relatively concentrated pack elongated along a north/south depth contour. Vessels were observed using both dredge and nets in the fleet. A few longline sets were observed offshore and one pot boat was also seen working a line of pots a mile off the beach. One stranded (dead) dolphin was also observed on Smith Island and reported.

Survey Leader Todd Gedamke



Turtles and Marine Mammals 6/10/02

- Flight Path 6/10
- Unidentified Turtle 6/10
- Loggerhead 6/10
- Leatherback 6/10
- ┆ Marine Mammals 6/10

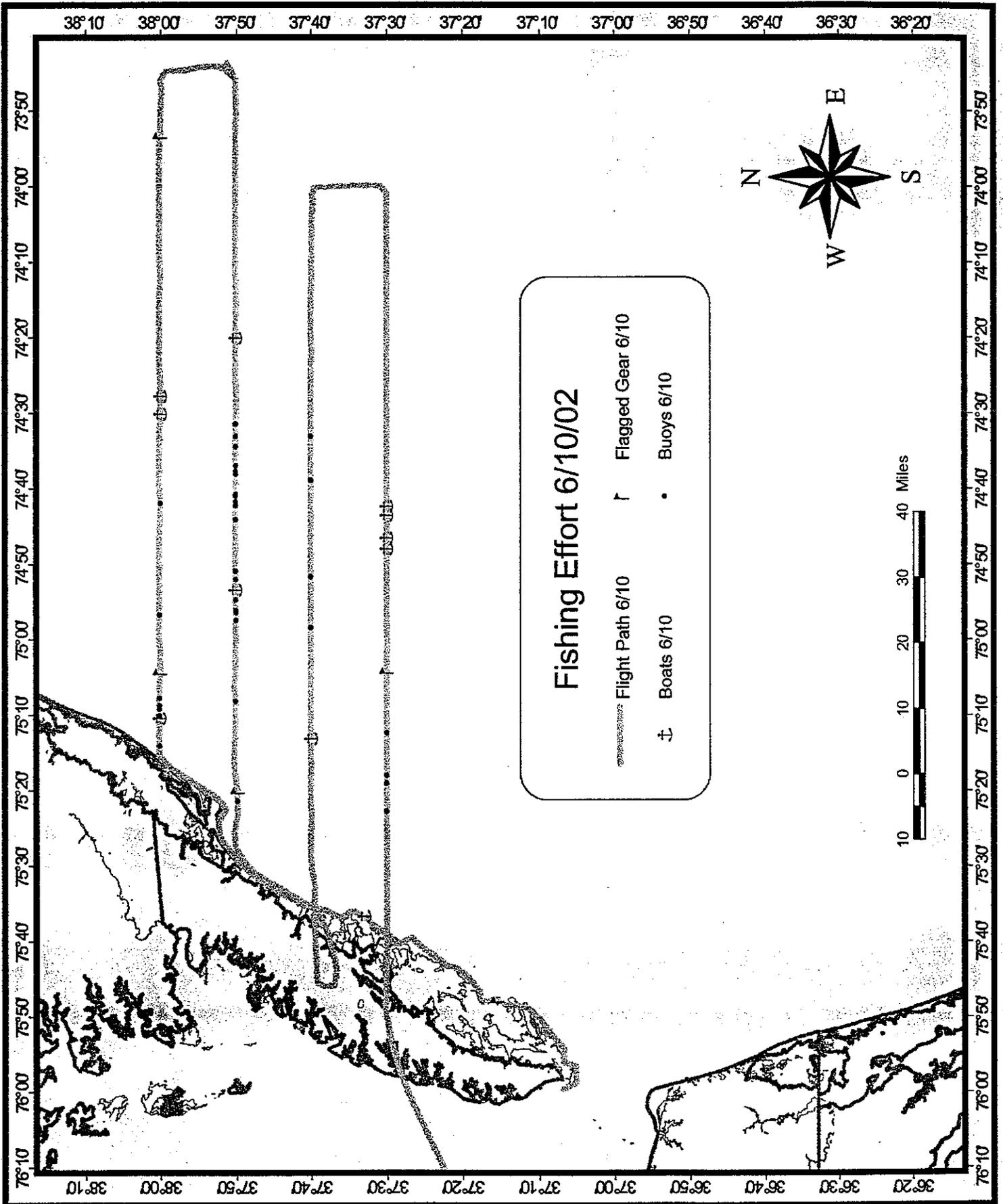


38°10' 38°00' 37°50' 37°40' 37°30' 37°20' 37°10' 37°00' 36°50' 36°40' 36°30' 36°20'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

76°10' 76°00' 75°50' 75°40' 75°30' 75°20' 75°10' 75°00' 74°50' 74°40' 74°30' 74°20' 74°10' 74°00' 73°50'

36°20' 36°40' 36°50' 37°00' 37°10' 37°20' 37°30' 37°40' 37°50' 38°00' 38°10'



38°10 38°00 37°50 37°40 37°30 37°20 37°10 37°00 36°50 36°40 36°30 36°20

76°10 76°00 75°50 75°40 75°30 75°20 75°10 75°00 74°50 74°40 74°30 74°20 74°10 74°00 73°50

76°10 76°00 75°50 75°40 75°30 75°20 75°10 75°00 74°50 74°40 74°30 74°20 74°10 74°00 73°50

Fishing Effort 6/10/02

Flight Path 6/10 Flagged Gear 6/10

Boats 6/10 • Buoys 6/10



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Virginia Turtle Survey 2002
DAILY SUMMARY SHEET

Date 6 / 15 / 02

Tansect Lines Surveyed None—Eastern Shore STRANDING SURVEY Aircraft Cessna 337
Observers/Pilot TG, HF, BFS, BCM H2O Temp Range _____
Beaufort 1 Cloud Cover 13 Wind: dir. variable spd. 0-5 Vis Hazy ~2 miles
Hobbs Time 3.1 On-Transect Miles 0 On-Transect Miles w/ Beau <3 0

On Watch Time 1207 Off Watch Time 1347
On Watch Time _____ Off Watch Time _____
On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 0
Cc _____
Lk _____
Dc _____
Untu _____

Marine Mammals
Tt 9
Ssp _____
Undo _____
Gm _____
Pm 0
Other Odontocetes

Comm Fishing Vessels 0
Vessel Type and Numbers:

Eg _____
Mn _____
Bp _____
Other Balaenopterids

Comments:

Winds were down to light and variable and radar was clear, but a thick haze was hovering over the waters offshore. Decided to run the stranding survey instead of lines. We ran the both the ocean beaches and many of the pockets in the marsh system between the barrier islands and the mainland Eastern Shore, from line 10 south to the north end of the Chesapeake Bay bridge. One severely decomposed turtle and one previously reported dolphin were spotted both on the barrier island ocean sides. No strandings were observed on the back sides of the islands.

Survey Leader Todd Gedamke

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**Virginia Turtle Survey 2002
DAILY SUMMARY SHEET**Date 6 / 16 / 02

Tansect Lines Surveyed 1-4 and 5-6 Aircraft Cessna 337
 Observers/Pilot TG, KLM, HF, BCM H2O Temp Range _____
 Beaufort 1-4 Cloud Cover 11 Wind: dir. S/SW/SE spd. 0-13 Vis. >2nm
 Hobbs Time 6.2 On-Transect Miles 451 On-Transect Miles w/ Beau <3 429

On Watch Time 0920 Off Watch Time 1229
 On Watch Time 1356 Off Watch Time 1537
 On Watch Time _____ Off Watch Time _____

of Sea Turtles Sighted 190Cc 175Lk 3Dc 3Untu 9

Marine Mammals

Tt 281Ssp 10Undo 0

Gm _____

Pm 1

Other Odontocetes

BEWH 2Comm Fishing Vessels 3

Vessel Type and Numbers:

FV-T 2 (both scalloping1 dredge + 1 unid)FV-L---1

Eg _____

Mn _____

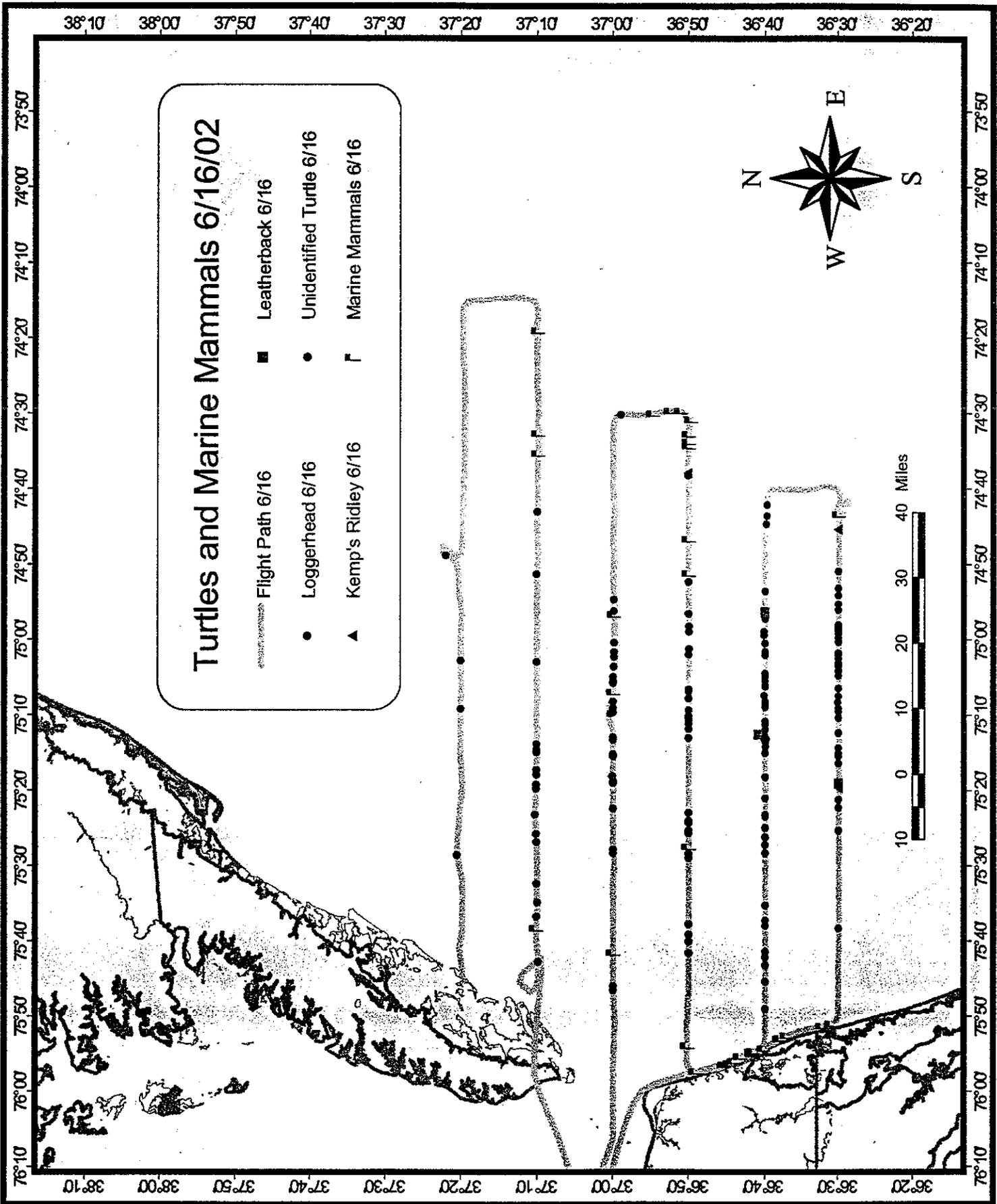
Bp _____

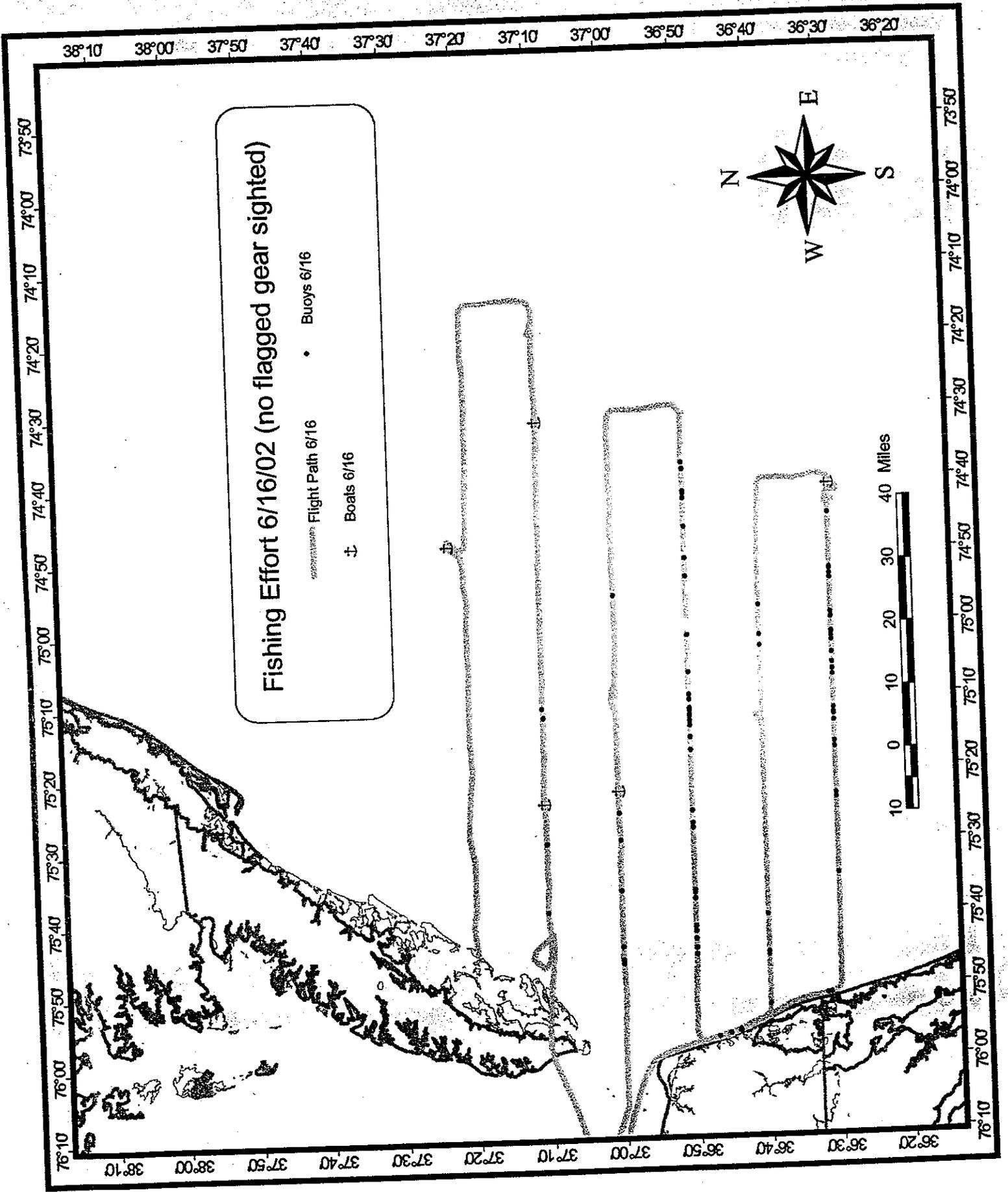
Other Balaenopterids

Comments:

The summer is finally here. Winds were down to almost nothing in the morning when we ran lines 1-4 and a breeze of less than 10 kts. for all but the most offshore part of line 6 in the afternoon. Turtle density was higher than all but the first two survey flights and there was a distinct concentration of animals on the middle part of line 1. Density appeared to drop off as we moved north with only 4 sightings on the most northern line (6). One sperm whale and two beaked whales were observed. Beaked whales dove before photo's could be taken. More sharks, hammerhead or bonnetheads, were observed than on any other survey so far.

Survey Leader Todd Gedamke

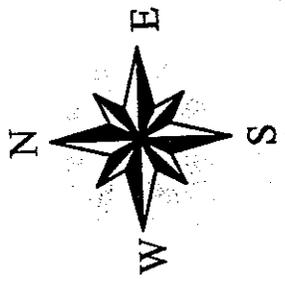




Fishing Effort 6/16/02 (no flagged gear sighted)

----- Flight Path 6/16 • Buoys 6/16

⚓ Boats 6/16



COASTWISE CONSULTING
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Virginia Turtle Survey 2002
DAILY SUMMARY SHEET

Date 6 / 17 / 02

Tansect Lines Surveyed 7-10 Aircraft Cessna 337
Observers/Pilot TG, HF, BFS, BCM H2O Temp Range _____
Beaufort 1/2 Cloud Cover 11/13 Wind: dir. variable spd. 0-5 Vis. >2nm
Hobbs Time 5.4 On-Transect Miles 336 On-Transect Miles w/ Beau <3 336

On Watch Time 1027 Off Watch Time 1215
On Watch Time 1218 Off Watch Time 1416
On Watch Time 1457 Off Watch Time 1521

of Sea Turtles Sighted 147
Cc 137
Lk 3
Dc 1
Untu 6

Marine Mammals
Tt 160
Ssp _____
Undo 7
Gm 8
Pm _____

Other Odontocetes
GRAM 20
SADO 220
(SADO=common dolphin)

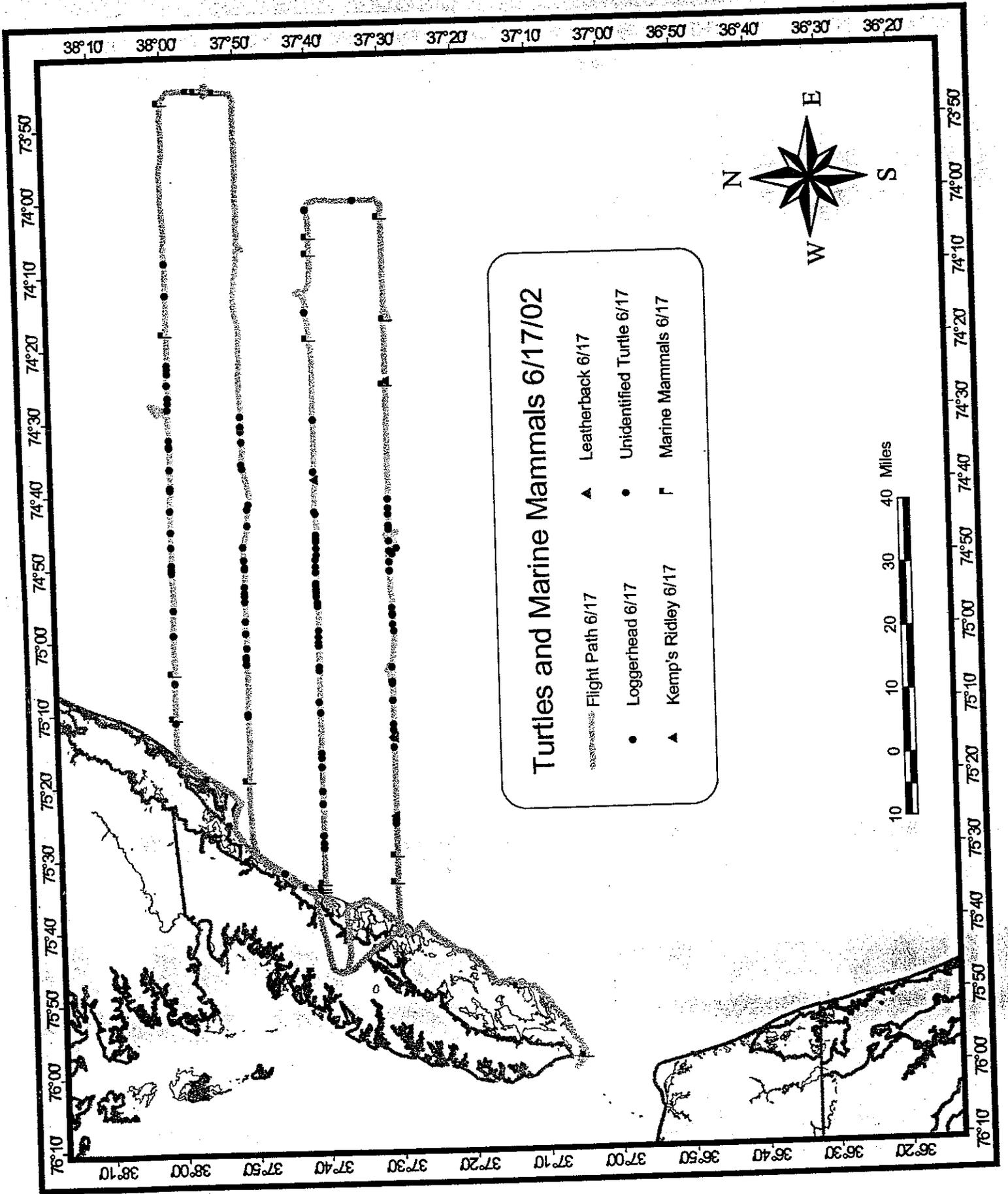
Eg _____
Mn _____
Bp _____
Other Balaenopterids

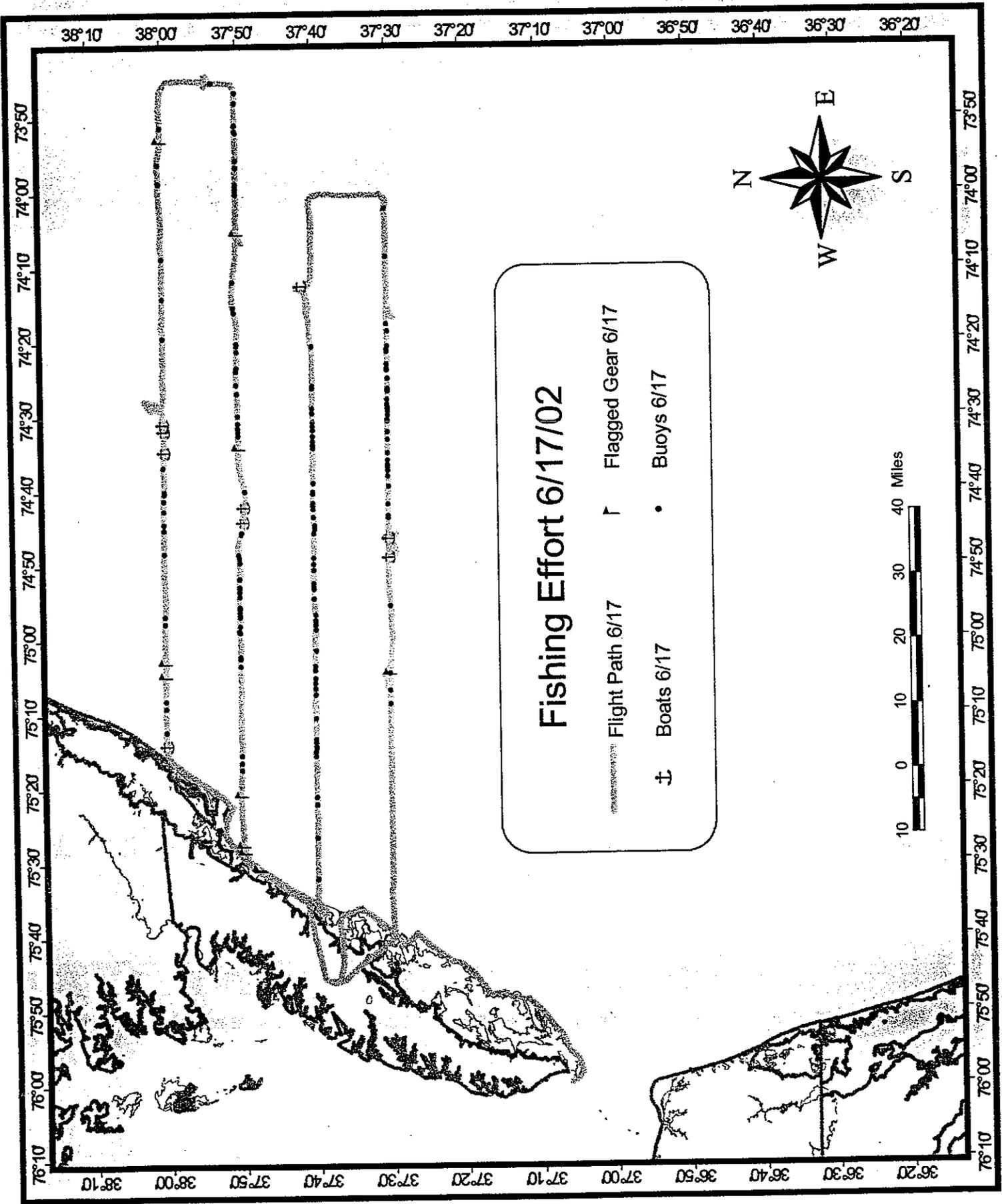
Comm Fishing Vessels 16
Vessel Type and Numbers:
FV-T 15 (scallop dredge+net)
FV-C (Pot boat) 1

Comments:

A great day for the final flight. Winds were still variable and generally less than 5 kts with sea states of 1 and 2. A slight haze made the horizon blurry and difficult to fly but observation conditions were great. Turtle density was once again on the inshore parts of the lines with no clear north/south pattern. Presence of buoys appeared to be greater than usual and should be treated with caution---a lot of debri was observed in the area (noted in comments) but difficulty in distinguishing buoys and debri should be considered prior to analysis. First sighting of pilot whales this survey with 8 individuals spotted. Scallop vessels were still working in the same general area as the past 6 weeks.

Survey Leader Todd Gedamke





Fishing Effort 6/17/02

Flight Path 6/17 Flagged Gear 6/17

Boats 6/17 Buoys 6/17

