Transport Canada's National Aerial Surveillance Program

March 2022

OVERVIEW

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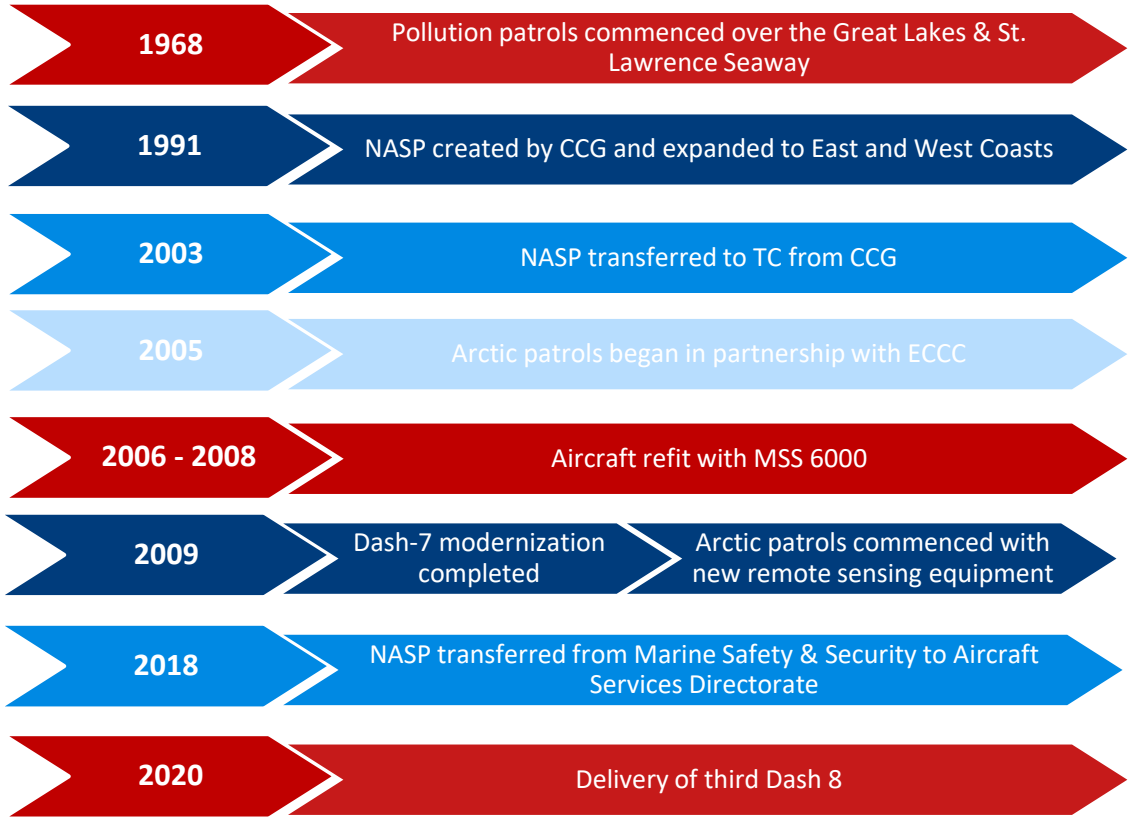
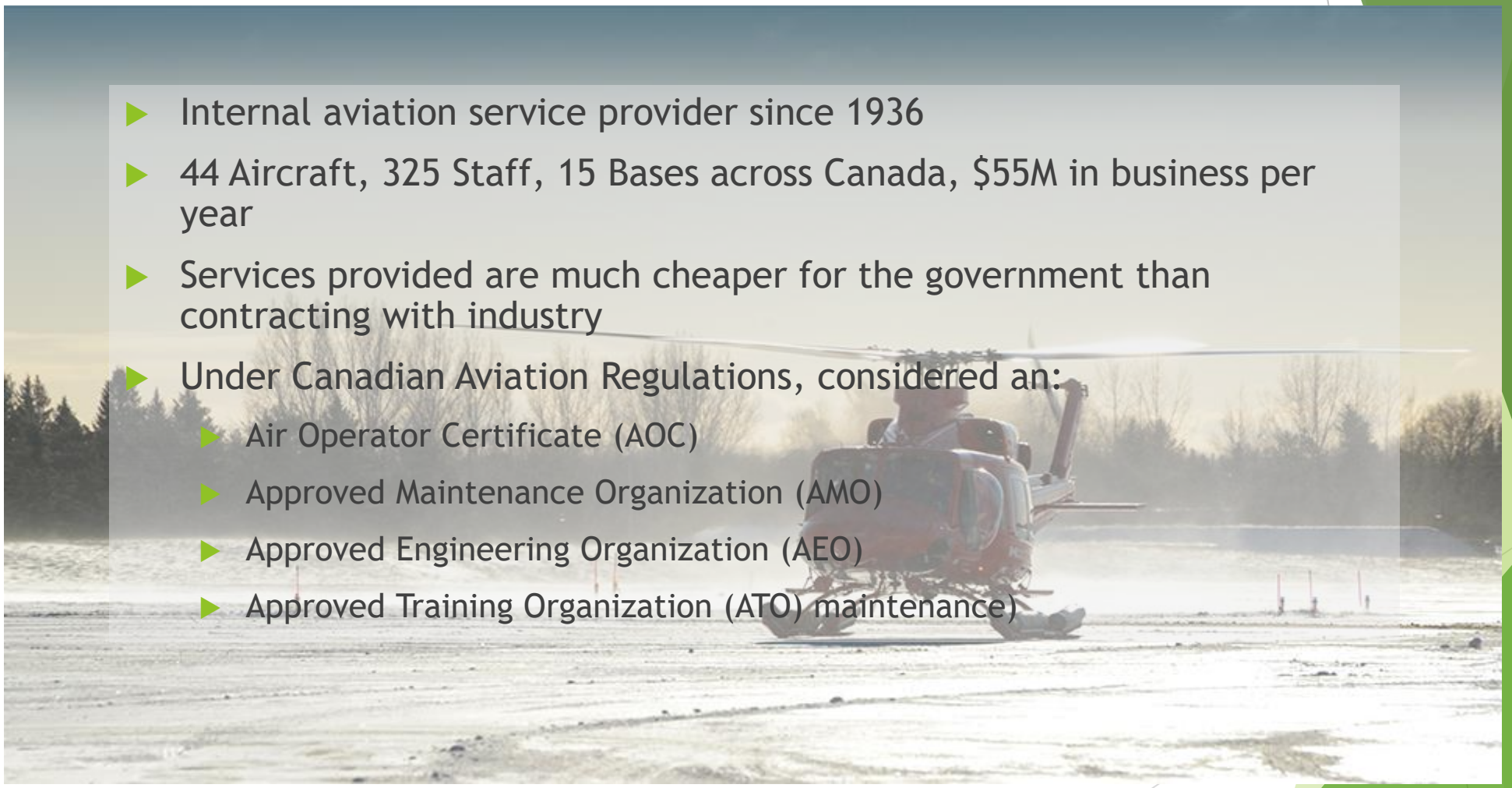
BACKGROUND

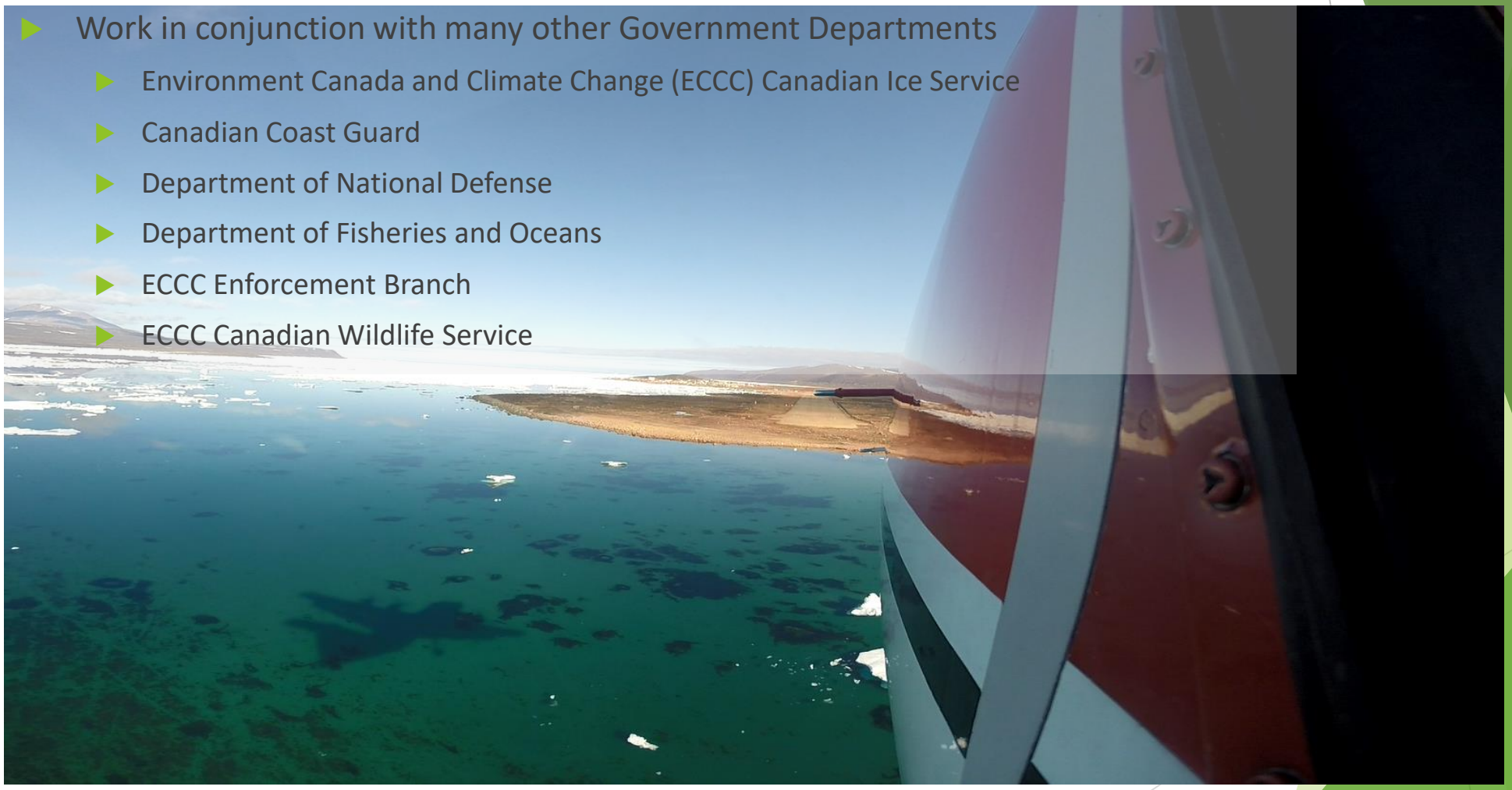

1968
Pollution patrols commenced over the Great Lakes & St. Lawrence Seaway
1991
NASP created by CCG and expanded to East and West Coasts
2003
NASP transferred to TC from CCG
2005
Arctic patrols began in partnership with ECCC
2006 - 2008
Aircraft refit with MSS 6000
2009
Dash-7 modernization completed
Arctic patrols commenced with new remote sensing equipment
2018
NASP transferred from Marine Safety & Security to Aircraft Services Directorate
2020
Delivery of third Dash 8

AIRCRAFT SERVICES DIRECTORATE



- Internal aviation service provider since 1936
- 44 Aircraft, 325 Staff, 15 Bases across Canada, $55M in business per year
- Services provided are much cheaper for the government than contracting with industry
- Under Canadian Aviation Regulations, considered an:
  - Air Operator Certificate (AOC)
  - Approved Maintenance Organization (AMO)
  - Approved Engineering Organization (AEO)
  - Approved Training Organization (ATO) maintenance)

PARTNERSHIPS



- Work in conjunction with many other Government Departments
  - Environment Canada and Climate Change (ECCC) Canadian Ice Service
  - Canadian Coast Guard
  - Department of National Defense
  - Department of Fisheries and Oceans
  - ECCC Enforcement Branch
  - ECCC Canadian Wildlife Service

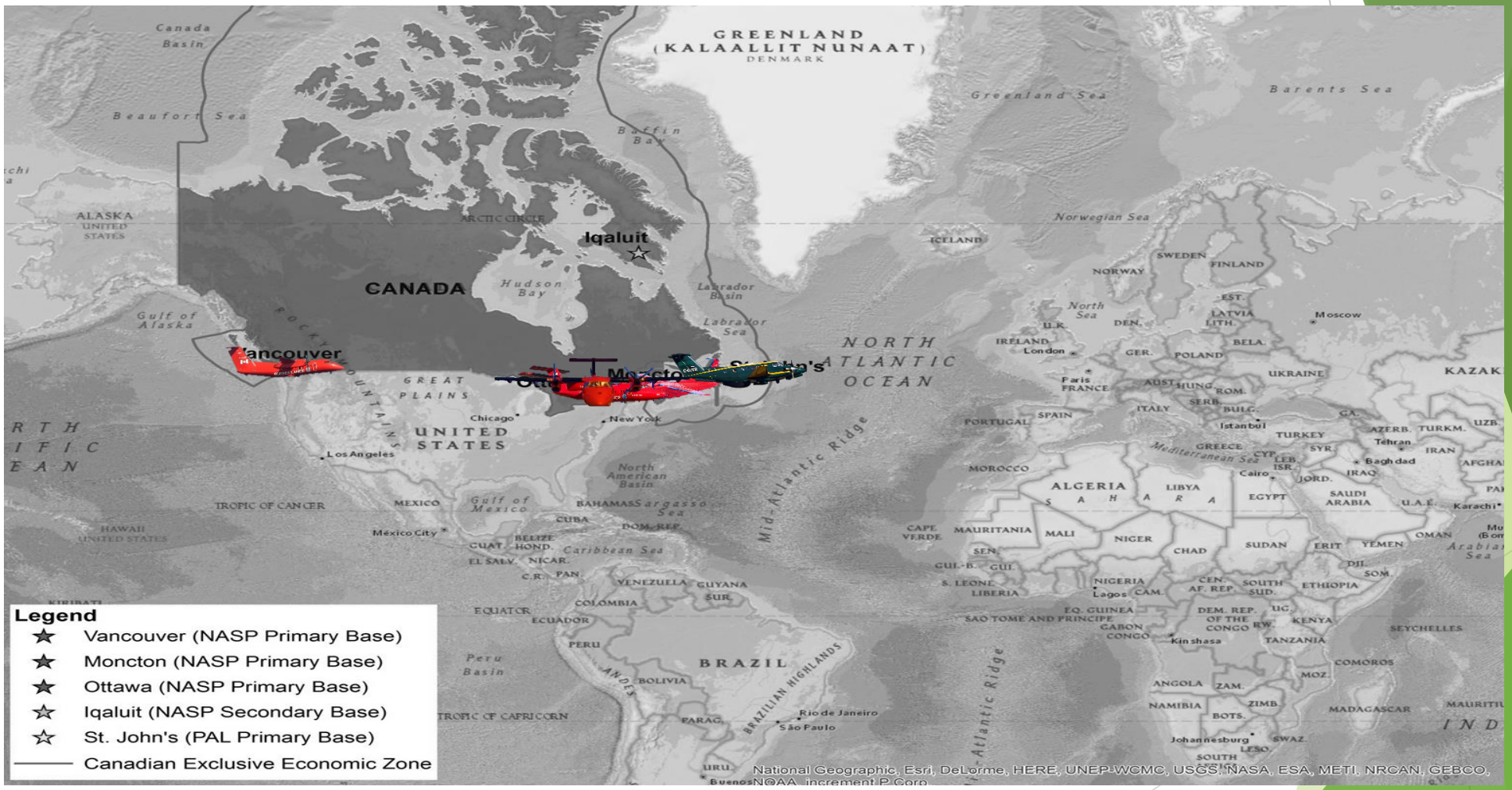
OBJECTIVES

- Enforce pollution prevention regulations
  - CSA2001
  - AWPPA
  - MARPOL 73/78
- Deterrence
- Emergency response
- Program support

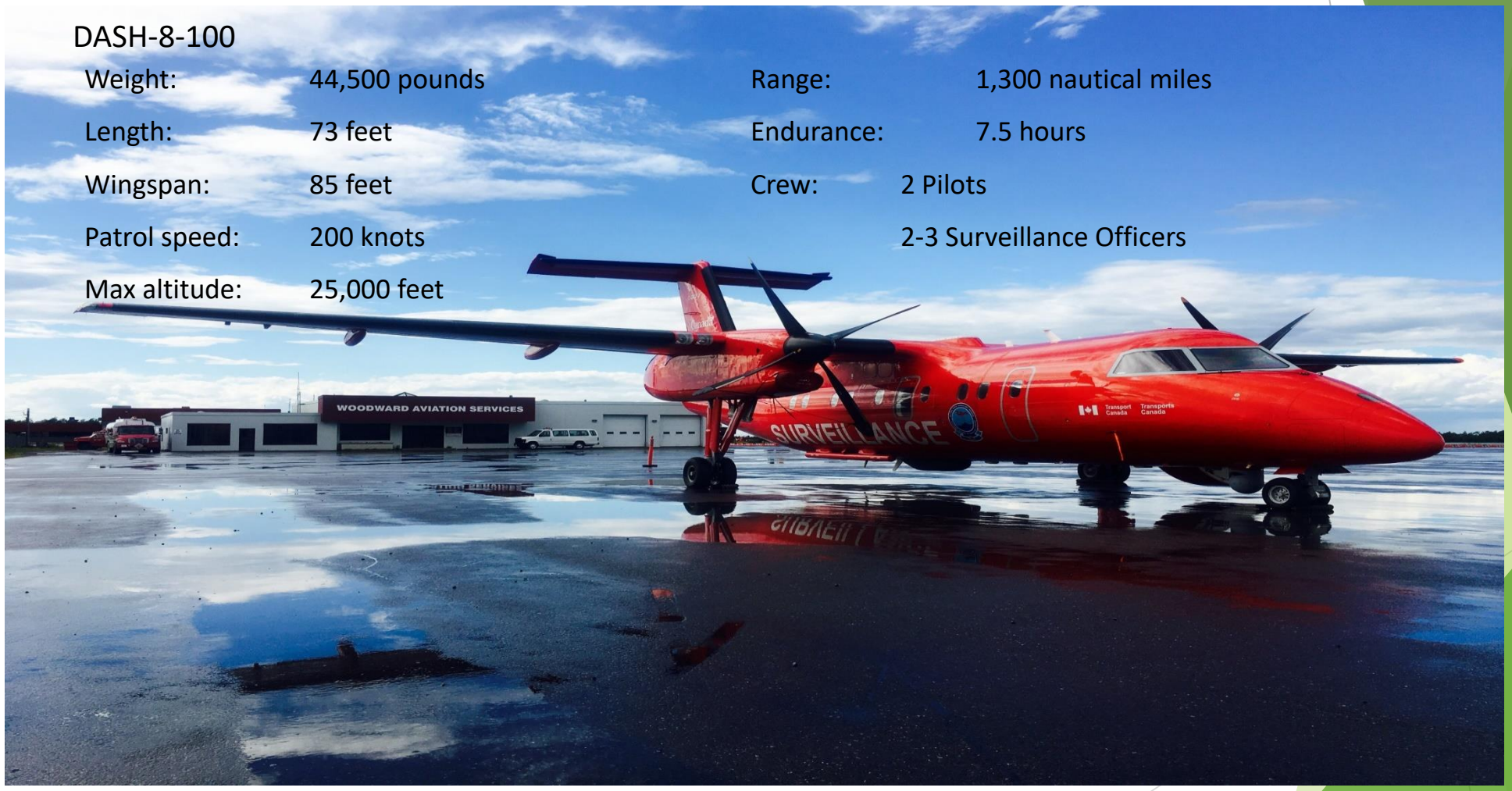
PROGRAM FUNDING

- World Class Tanker Safety System
  - Dash 8 aircraft
- Oceans Protection Plan
  - Dash 7 aircraft
- Whales MC
  - New Dash 8 aircraft

OUR FLEET LOCATIONS



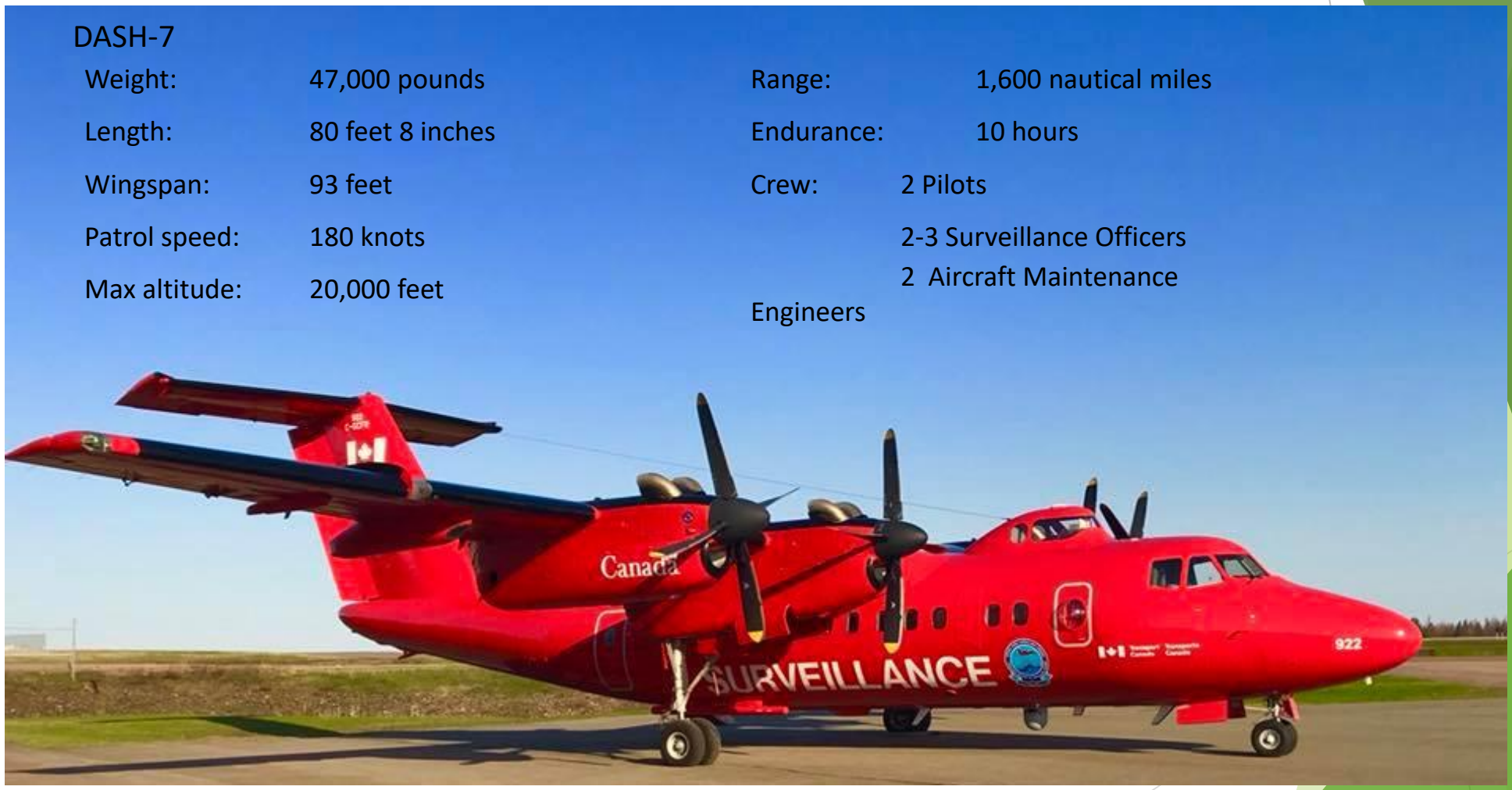
EAST AND WEST COAST AIRCRAFT



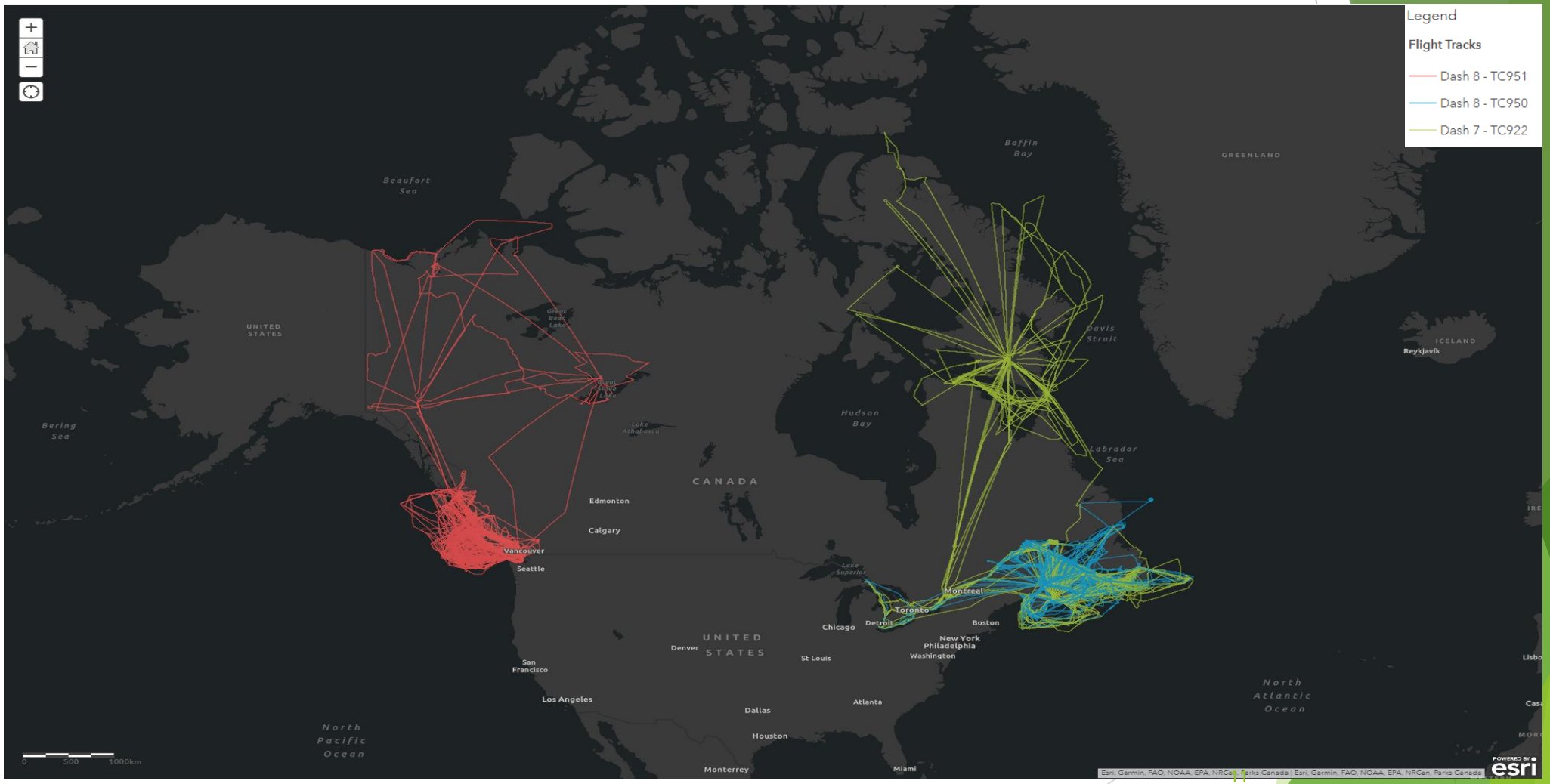
ARCTIC AIRCRAFT

DASH-7

Weight:	47,000 pounds	Range:	1,600 nautical miles
Length:	80 feet 8 inches	Endurance:	10 hours
Wingspan:	93 feet	Crew:	2 Pilots
Patrol speed:	180 knots		2-3 Surveillance Officers
Max altitude:	20,000 feet		2 Aircraft Maintenance Engineers

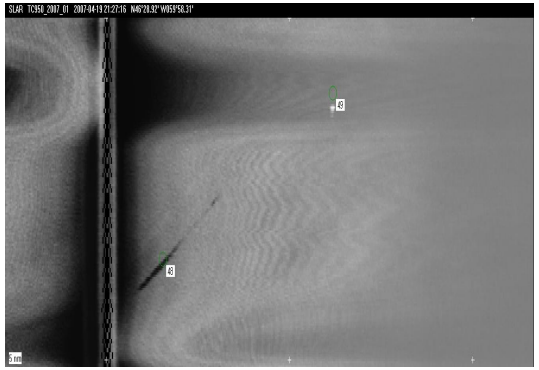


2021-2022 COVERAGE THUS FAR



SENSOR SUITE

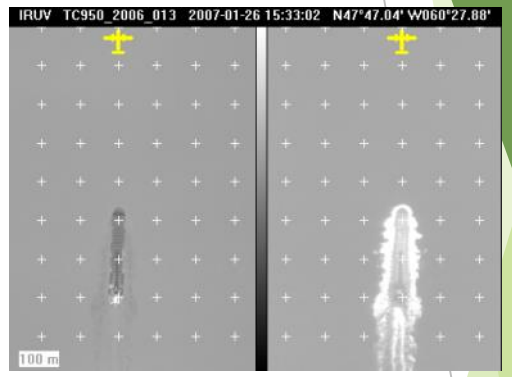
Maritime Security Surveillance (MSS) 6000

1. 

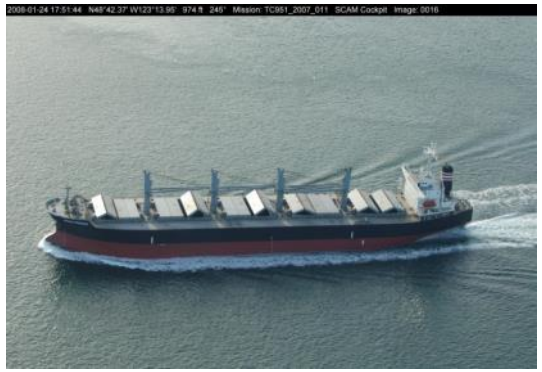
SLAR

2. 

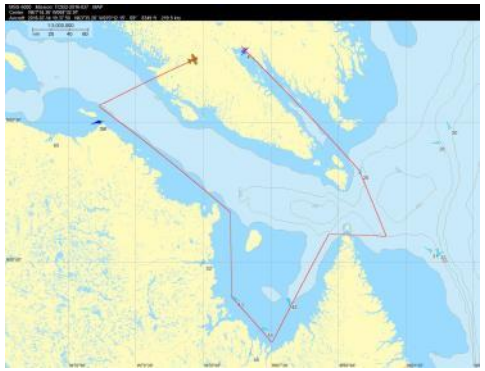
EO/IR

3. 

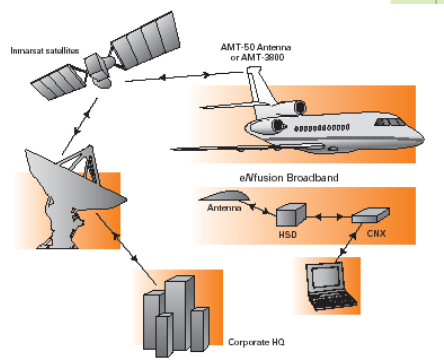
IR/UV

4. 

Cameras

5. 

AIS

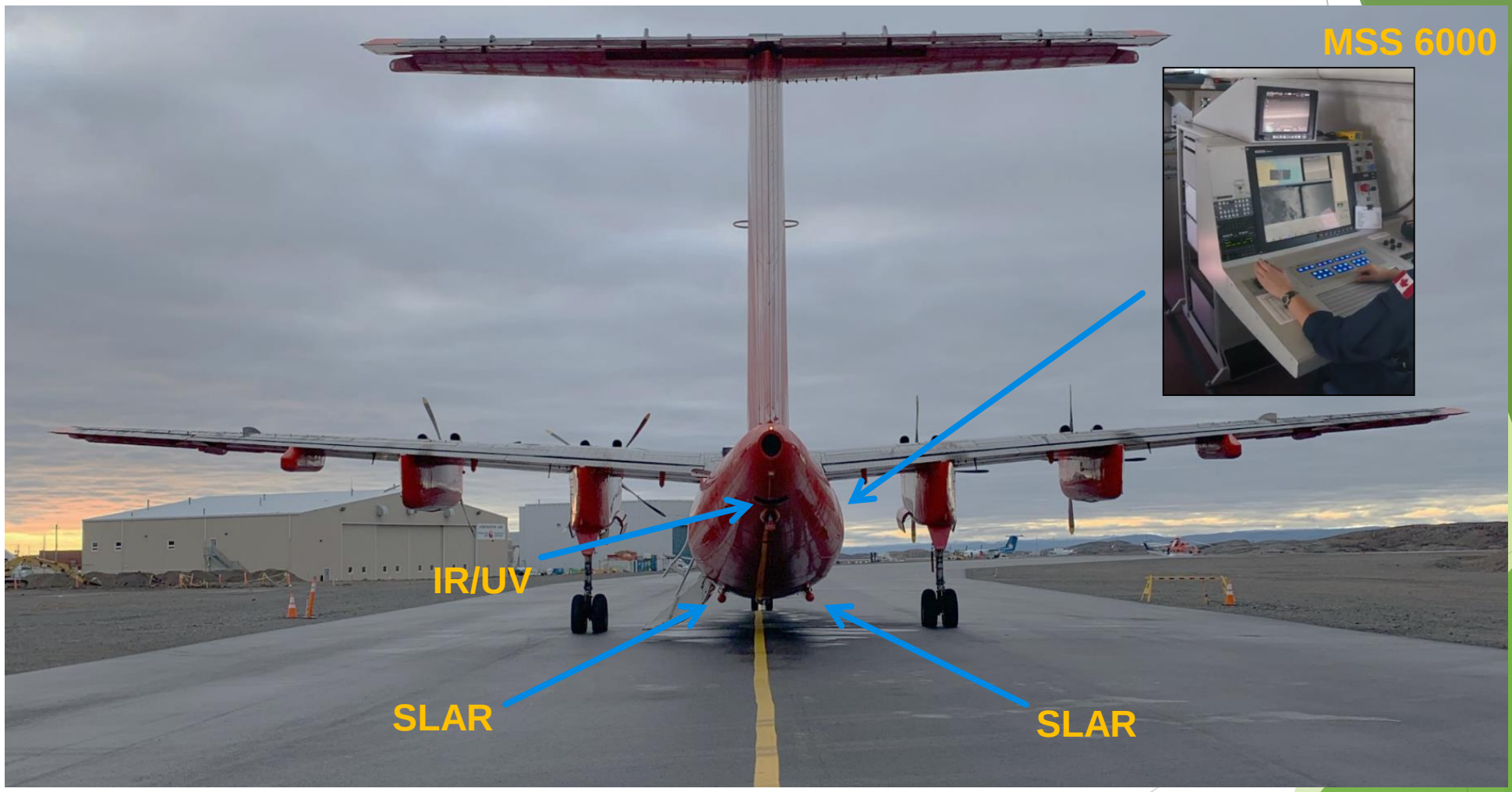
6. 

SATCOM

QUESTIONS?

LOCATION OF SENSORS

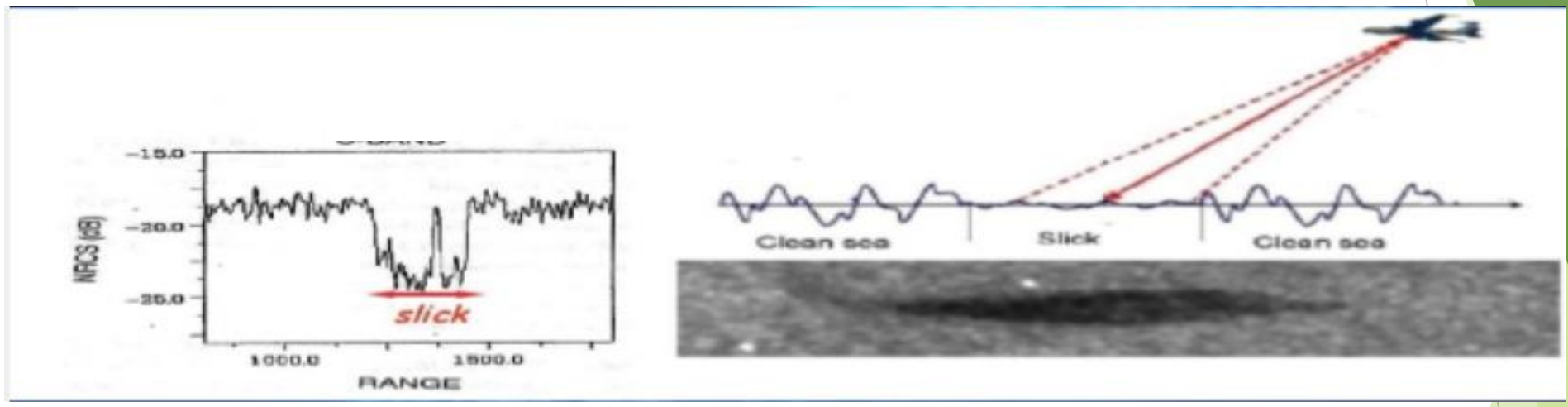
LOCATION OF SENSORS



LOCATION OF SENSORS

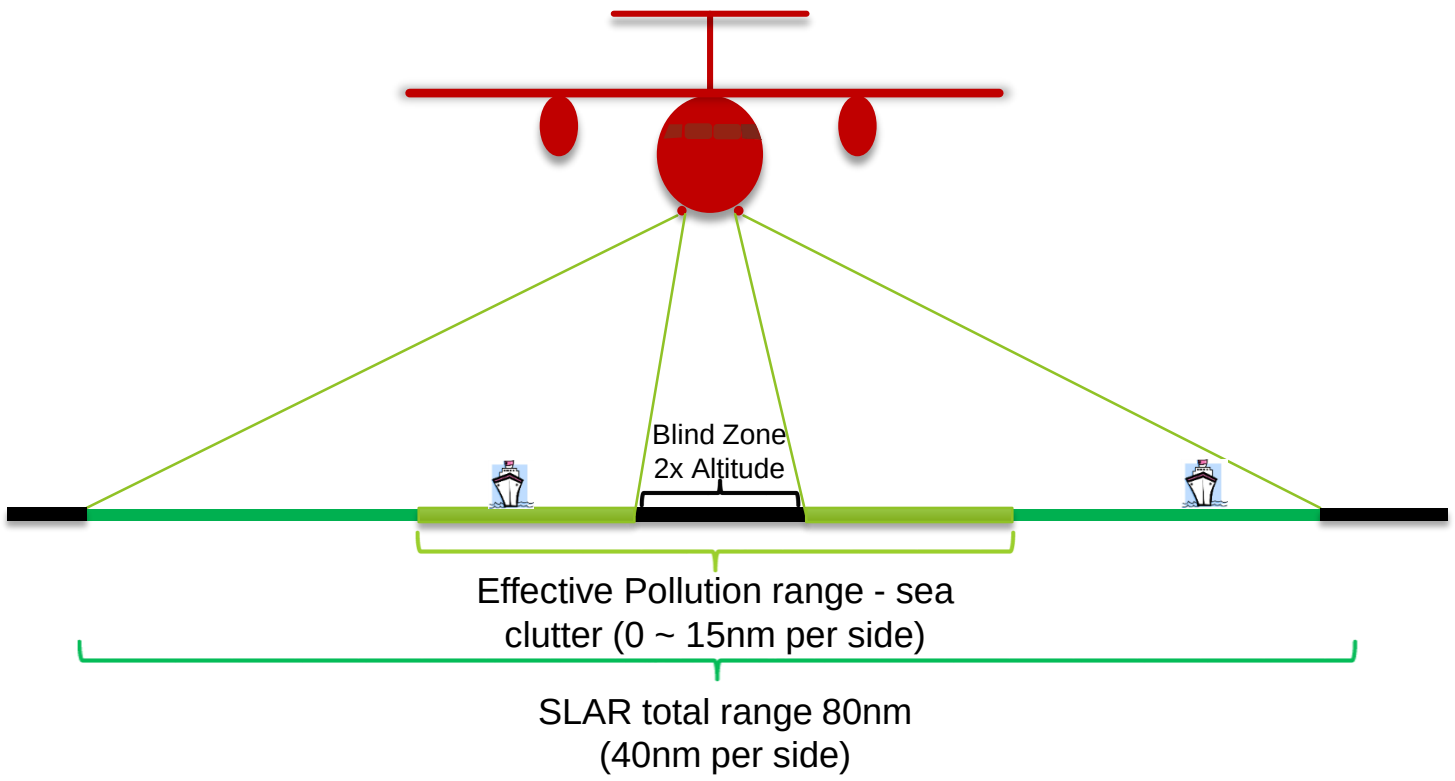
LOCATION OF OPERATORS

1. Side Looking Airborne Radar (SLAR)

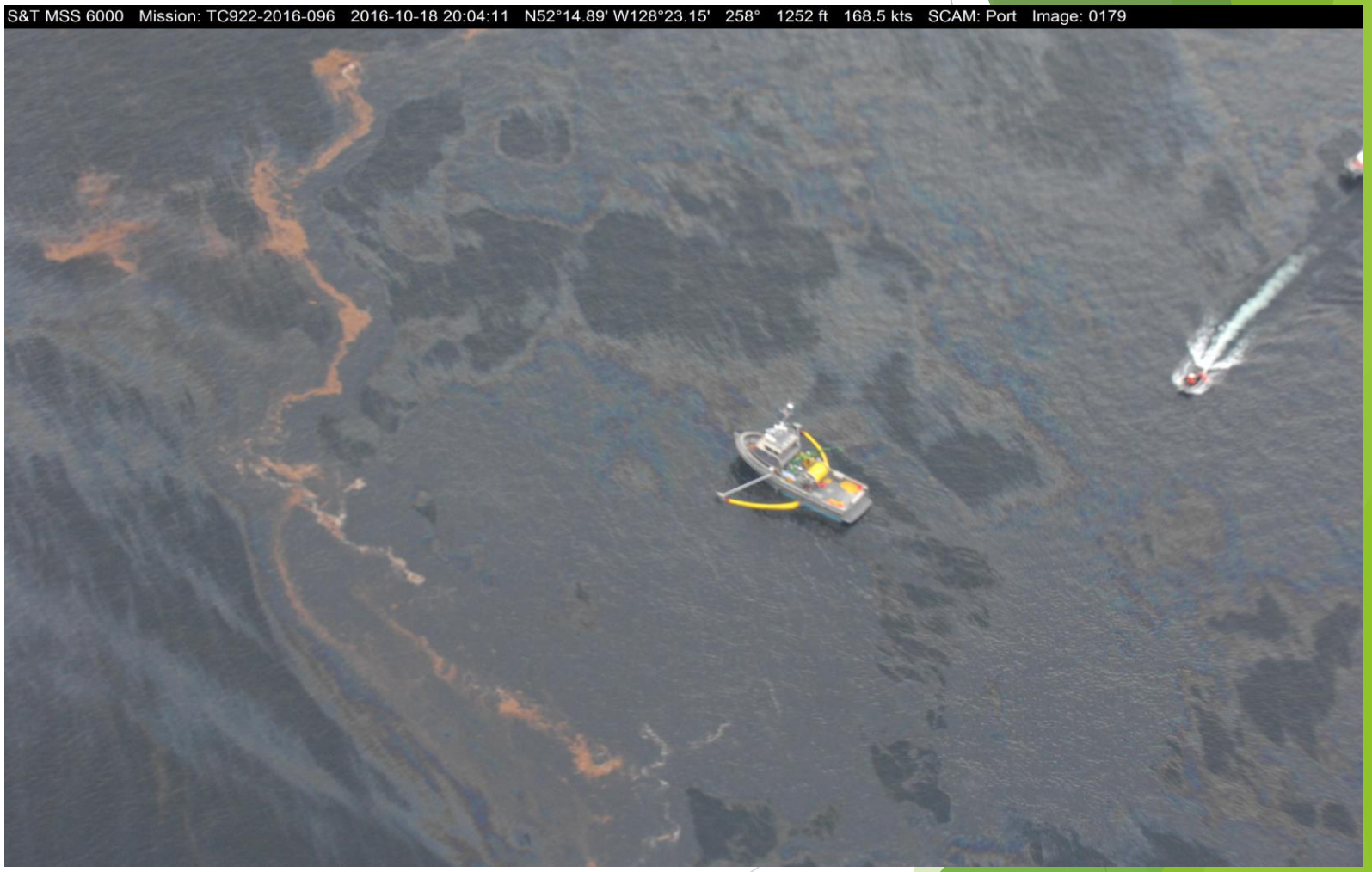


- Primary sensor for anomaly and target detection
- Active sensor
- Pollution detection range: 30 nm
- Insensitive to weather and light conditions
- Resolution: 60m x 60 m
- Mapping: Spills over a large area

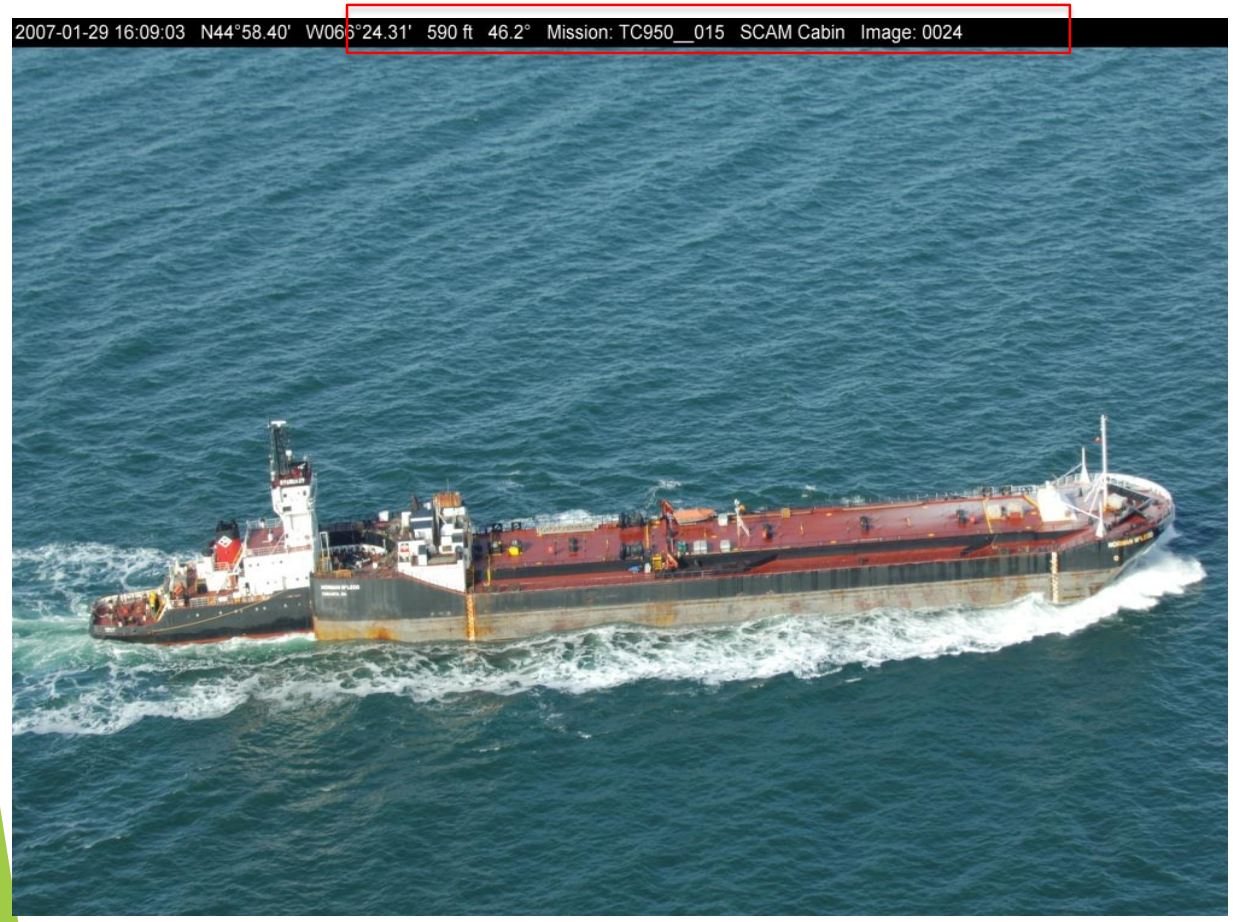
1. SLAR


Blind Zone
2x Altitude
Effective Pollution range - sea clutter (0 ~ 15nm per side)
SLAR total range 80nm (40nm per side)

2. Digital Still & Video Camera Systems



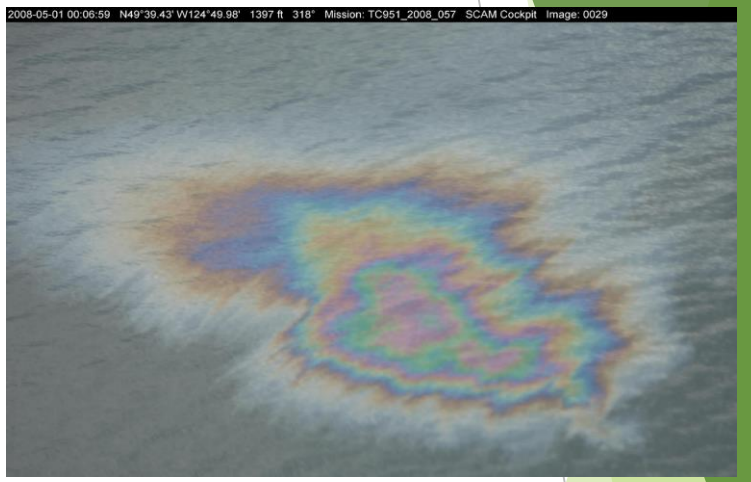
2. Digital Still & Video Camera Systems

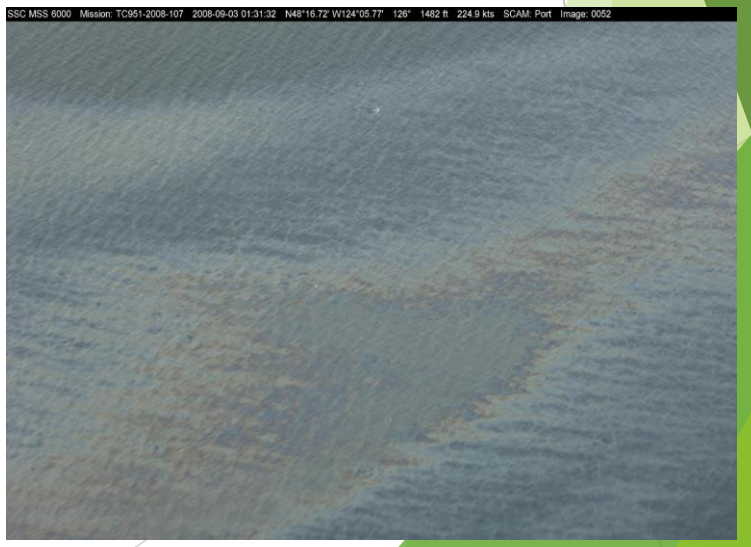


GPS Annotated Data:

- Date: 2007-01-29
- Time: 16:09:03
- Latitude: N44°58.40
- Longitude: W066°24.31
- Altitude: 590 ft
- Heading: 46.2°
- Mission #: TC950_015
- Image # : 0024

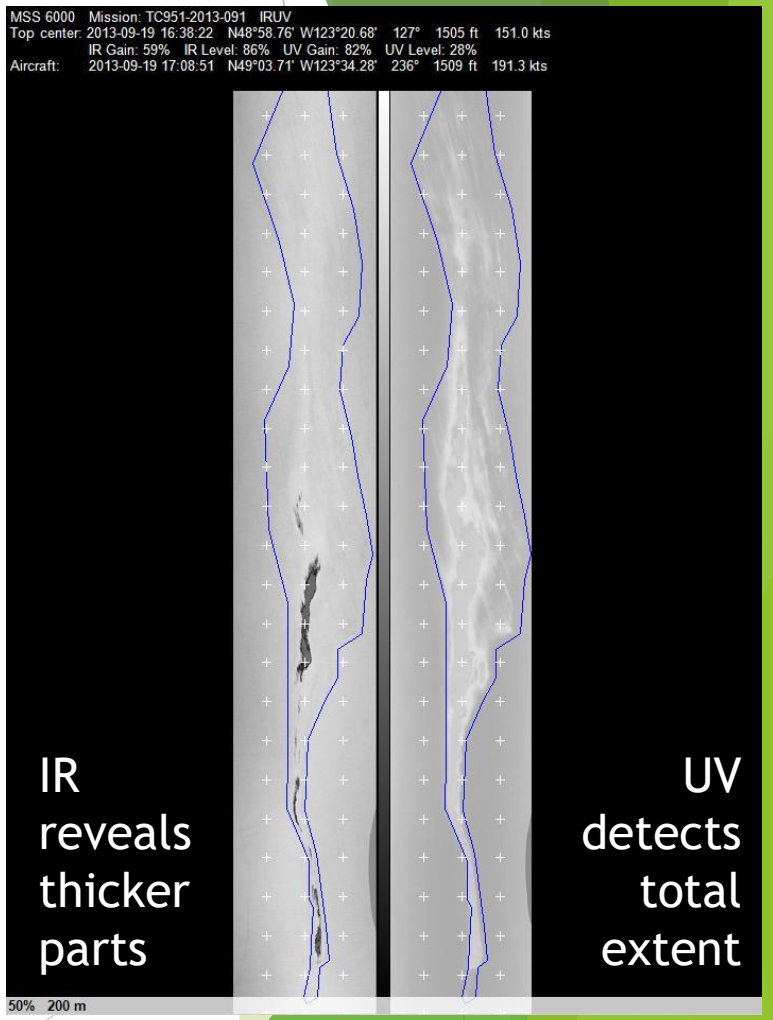
2. Digital Still Camera - Documenting Pollution





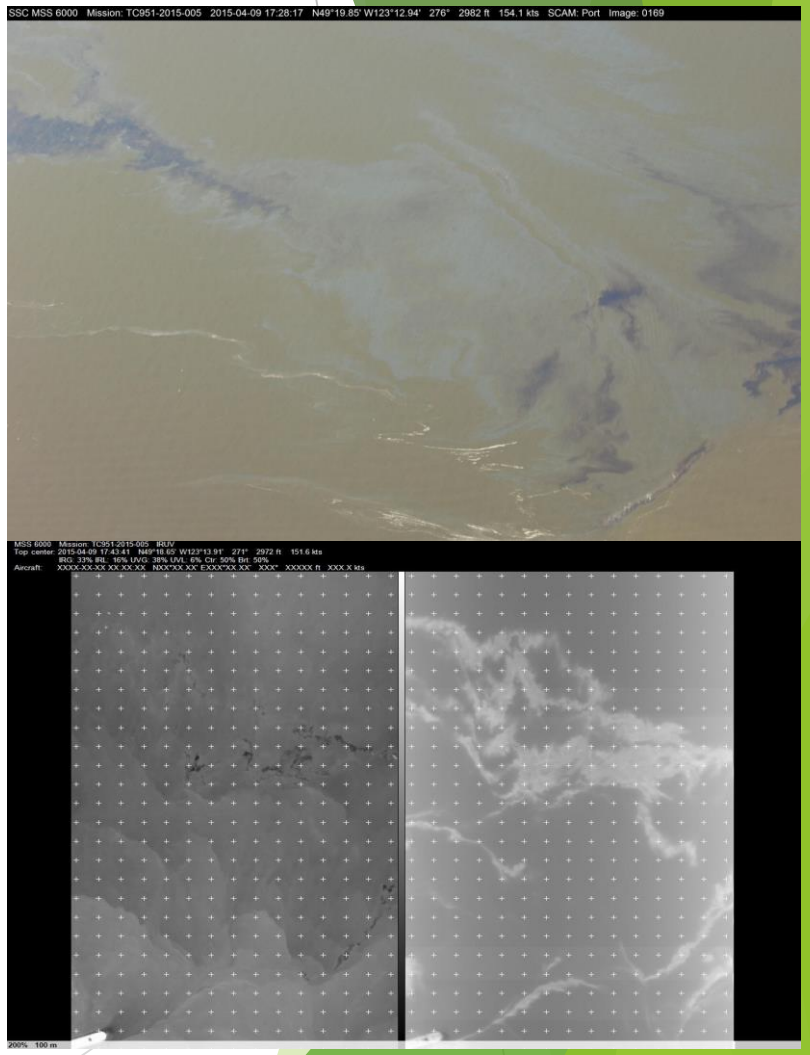
3. IR/UV Line Scanner

- Very narrow swath
- High resolution (based on altitude)
- UV – total spatial extent
- IR – thicker parts of spill

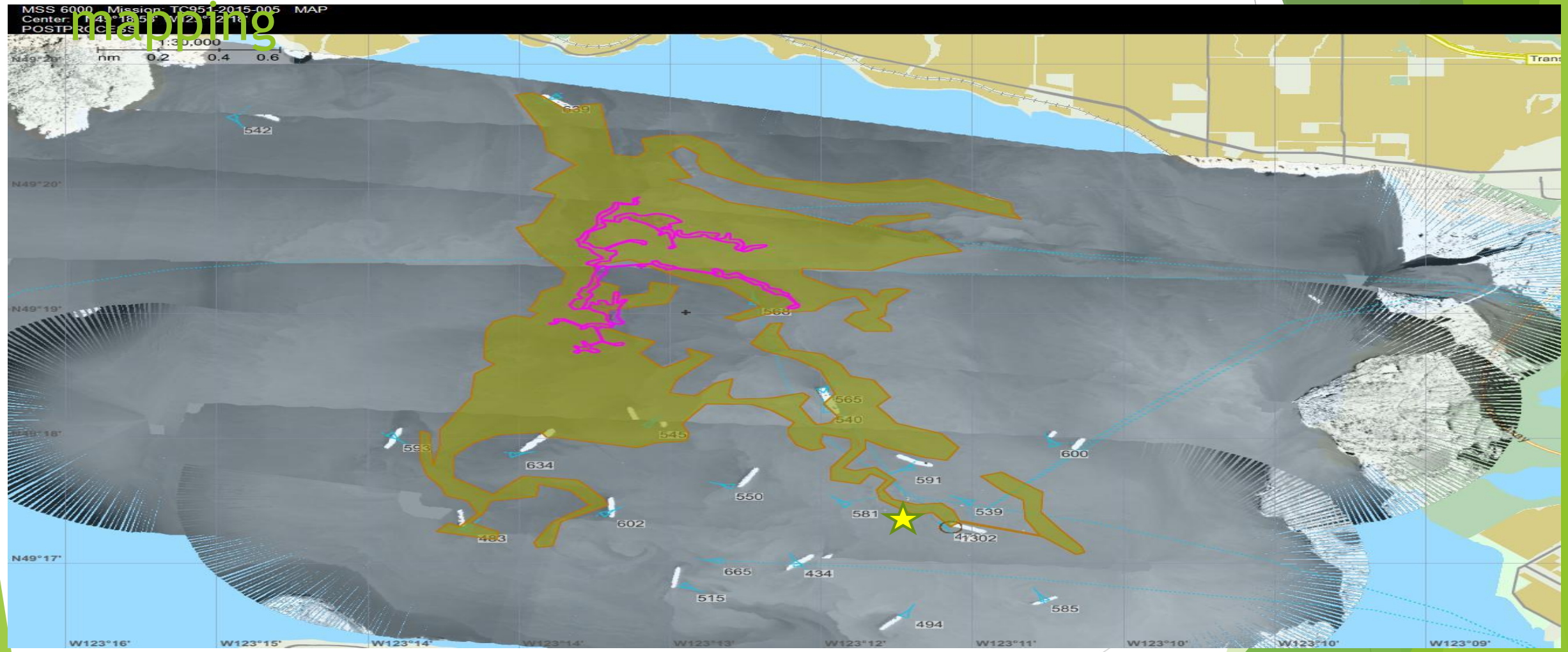


3. Oil Spill Documentation

- Still image
- UV – all surface sheen
- IR thick parts of the oil



3. IR/UV Line-scanner georeferenced for mapping



IR/UV used to map total surface sheen and locate/map actionable oil. Also used to estimate oil volume.

4. Electro-Optical Infrared (EO/IR) Camera

Sensors:

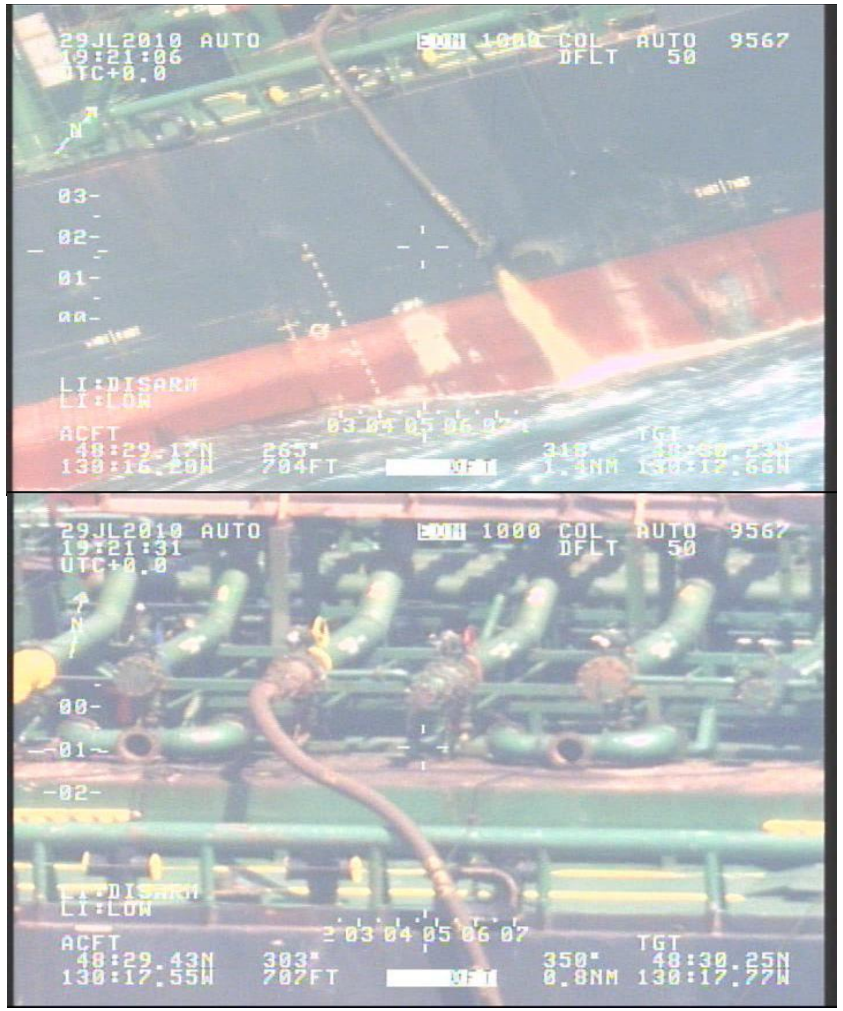
- Electro-optical Wide Camera
- Electro-optical Narrow Spotter Camera
- Infrared Camera
- Laser Illuminator

- Target Identification and Analysis
- Video and still image evidence
- Livestream video to Command Centre
- Laser Illuminator allows evidence in dark hours

4. Electro Optical Infrared Camera EOIR (MX-15)

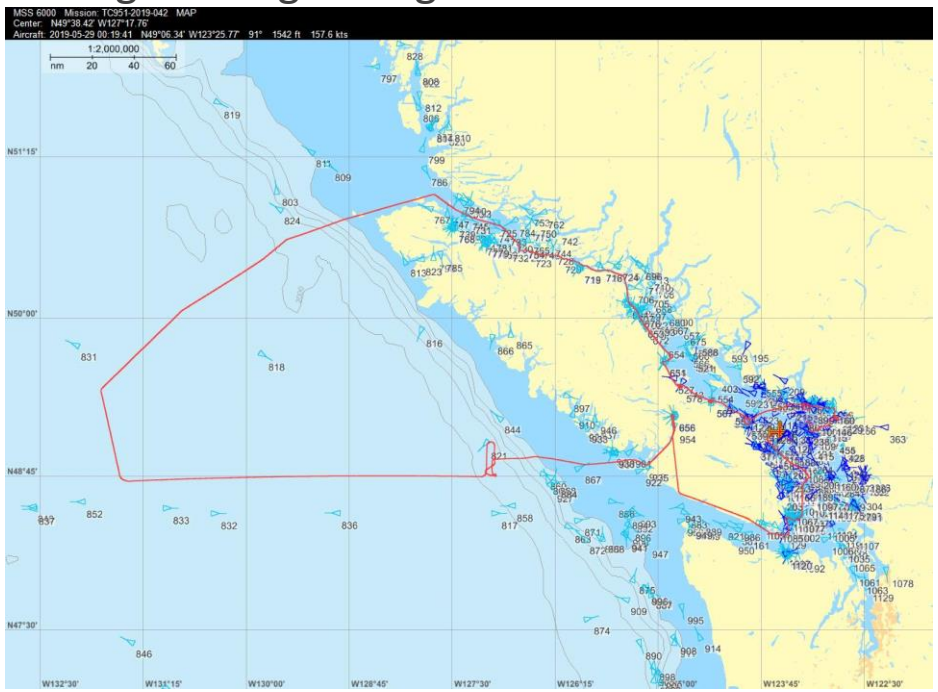
Investigation and Documentation of Suspected

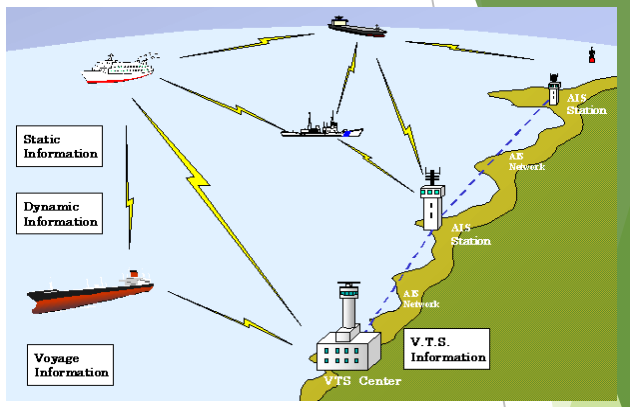
Investigation and Documentation cont…



5. Map and Automatic Identification System (AIS)

- Operator situational awareness
- Evidence gathering during incidents

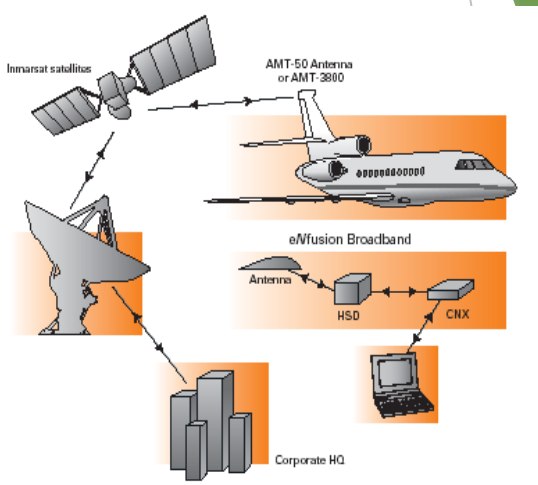




AIS of vessel and 22nm long oil spill astern of it

6. NASP Communication

- Satellite communication system
  - Internet and email access
  - Send images and reports
  - Stream video live to partners (TVI Viewer with user name and password)
- Marine and Aviation VHF radios
- All comms can be recorded on the mission system
  - All radio calls to vessels are recorded



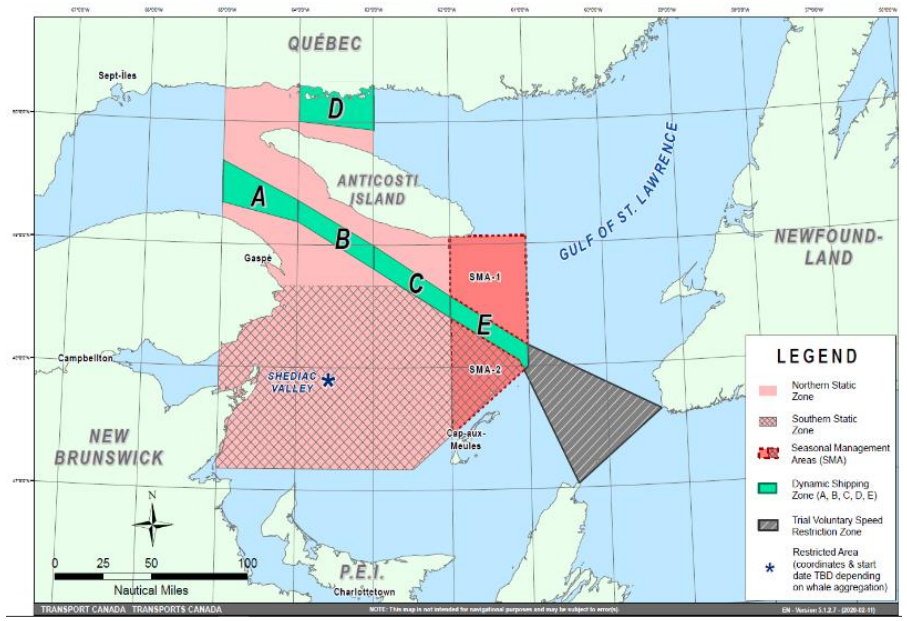
LIVE-STREAMING VIDEO

- Available to select TC and OGD staff
- Requires software and login information
- Not secure
- Expensive

TVI-Viewer

QUESTIONS?

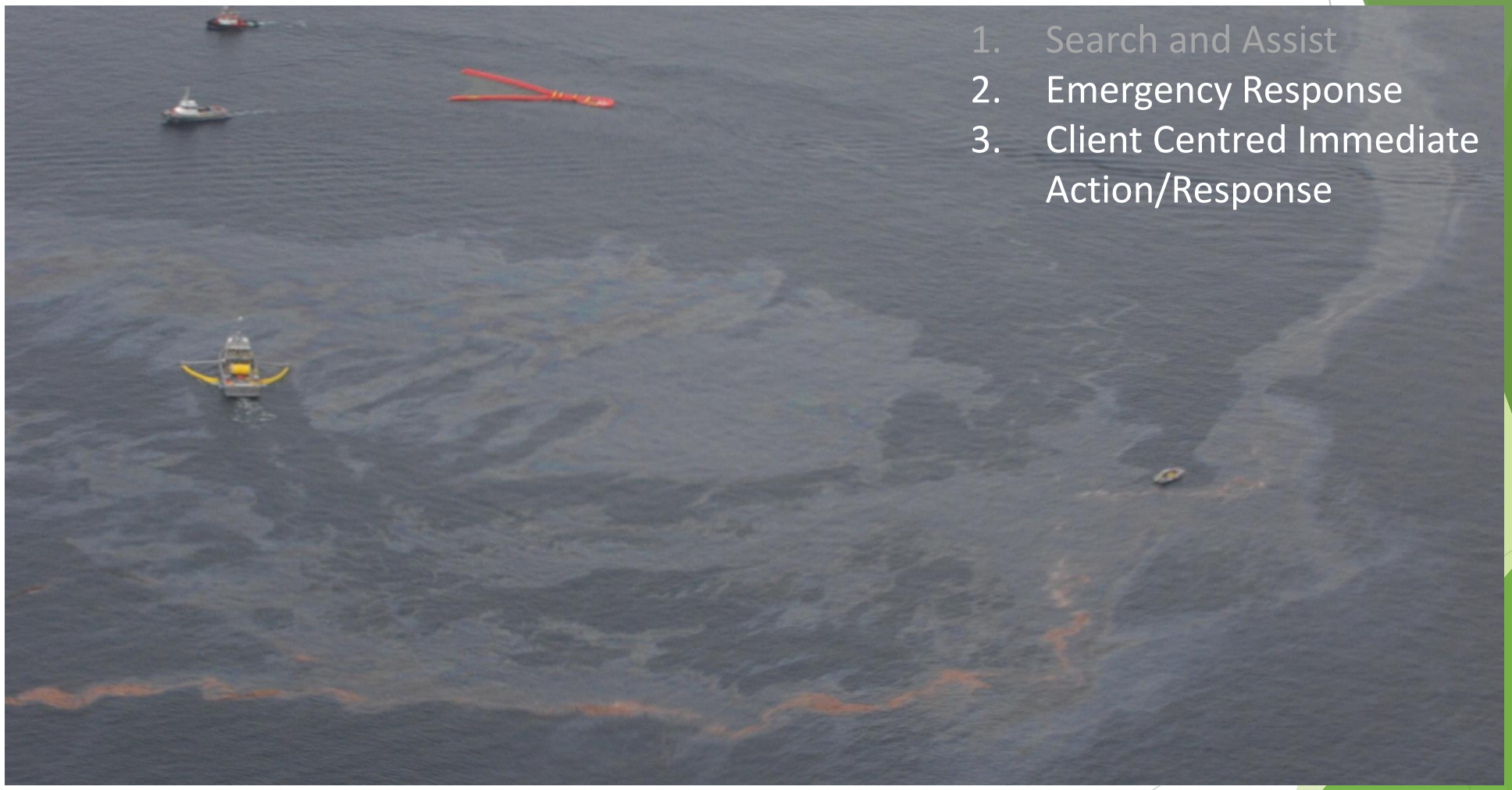
NARW PROGRAM



NASP ACTIVITIES

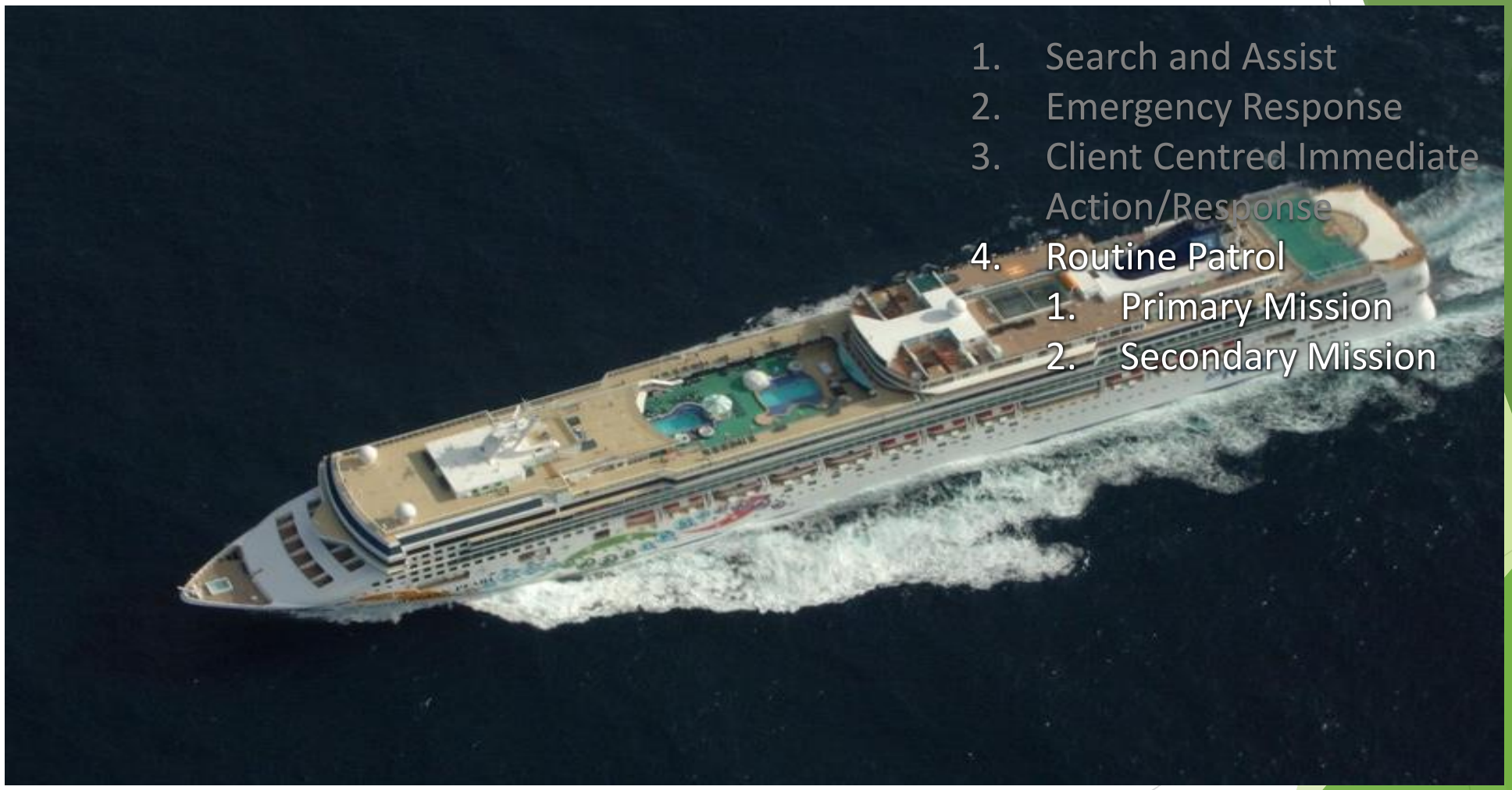
FLIGHT PRIORITIES

FLIGHT PRIORITIES

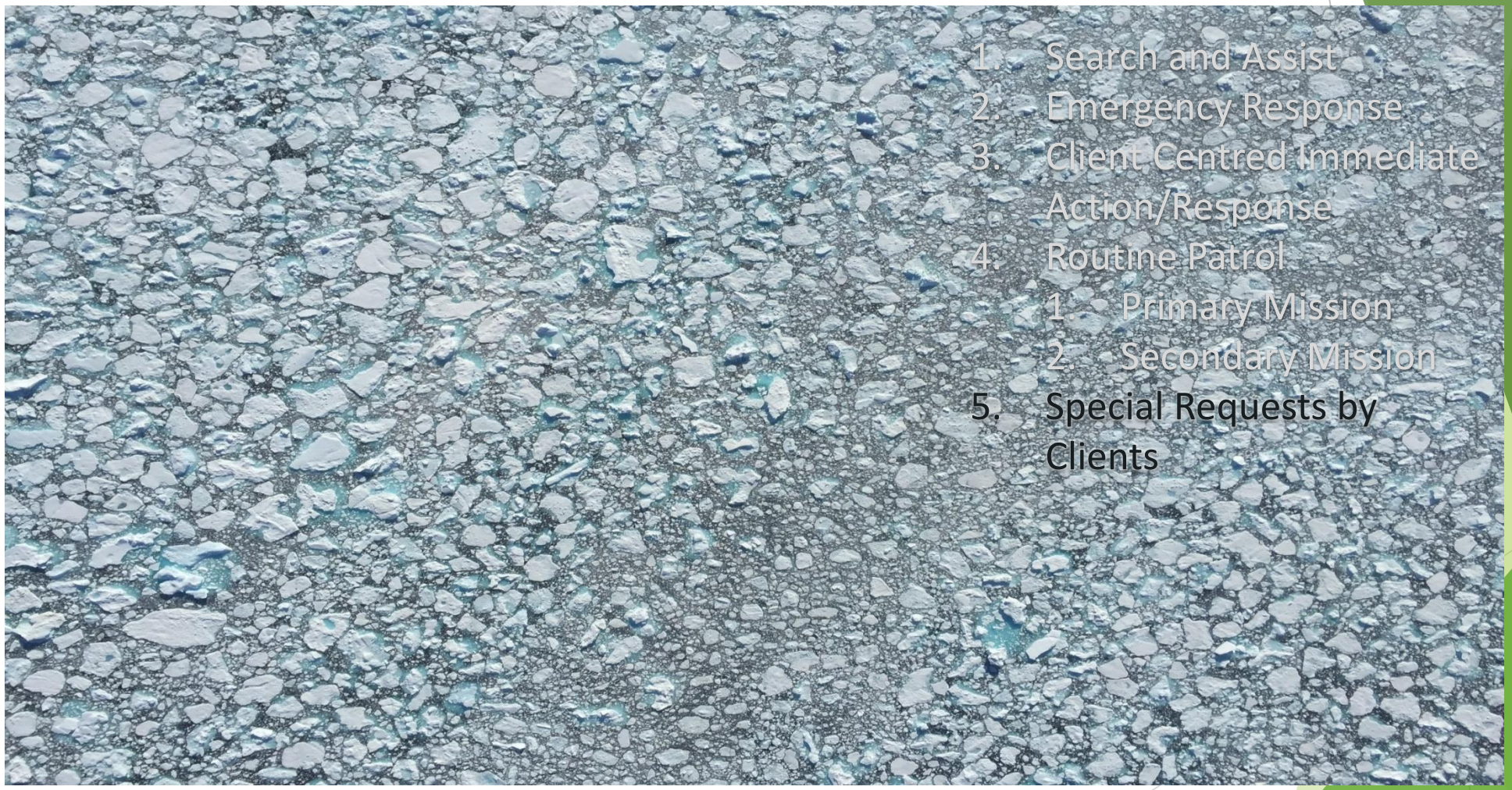


1. Search and Assist
2. Emergency Response
3. Client Centred Immediate Action/Response

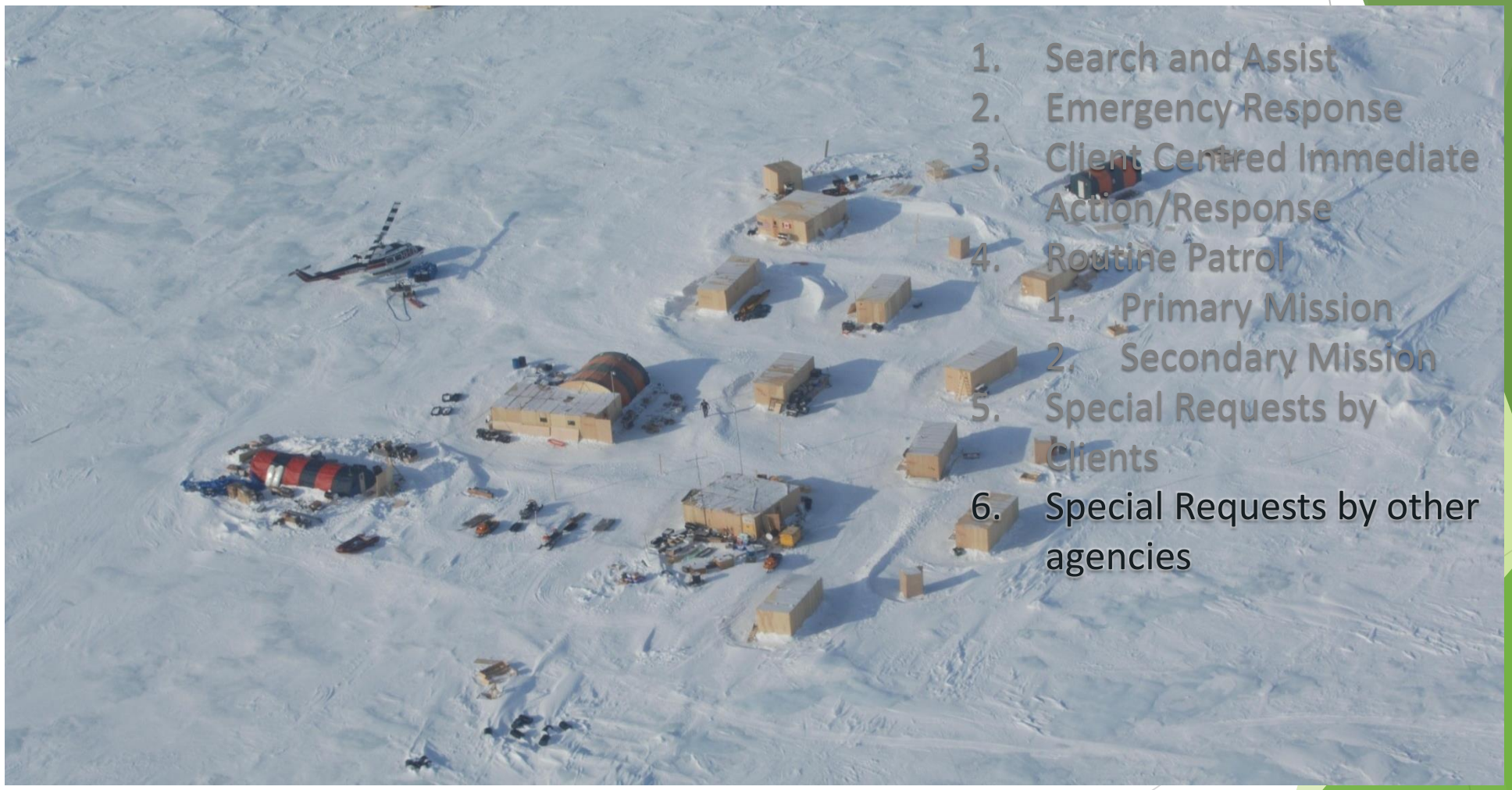
FLIGHT PRIORITIES



FLIGHT PRIORITIES



FLIGHT PRIORITIES



1. Search and Assist
2. Emergency Response
3. Client Centred Immediate Action/Response
4. Routine Patrol
    1. Primary Mission
    2. Secondary Mission
5. Special Requests by Clients
6. Special Requests by other agencies

FLIGHT LIMITATIONS

- Mod – Sev Turbulence
- Mod - Sev icing
- Crosswinds
  - Max 22 kts at 90º
- Low level jets (≥50kts)
- Fog
- Accuracy of TAFs

PREVENTION

- Presence acts as a deterrence
- Conduct overflights of vessels
- Contact vessels

PREPAREDNESS

- Team is ready to respond to an incident immediately
- Time before on location depends on
  - Distance of aircraft from incident
  - Flight planning
  - Weather
  - Requirement to change base

RESPONSE

- Surge capacity
- NASP member sent to Incident Command Post
- Provide top cover
  - Extent of spill
  - Estimate of volume
  - Effectiveness of clean up equipment
  - Presence of marine mammals
  - Images
  - Video
  - Live-stream video
  - Communications with ground crew

QUESTIONS?

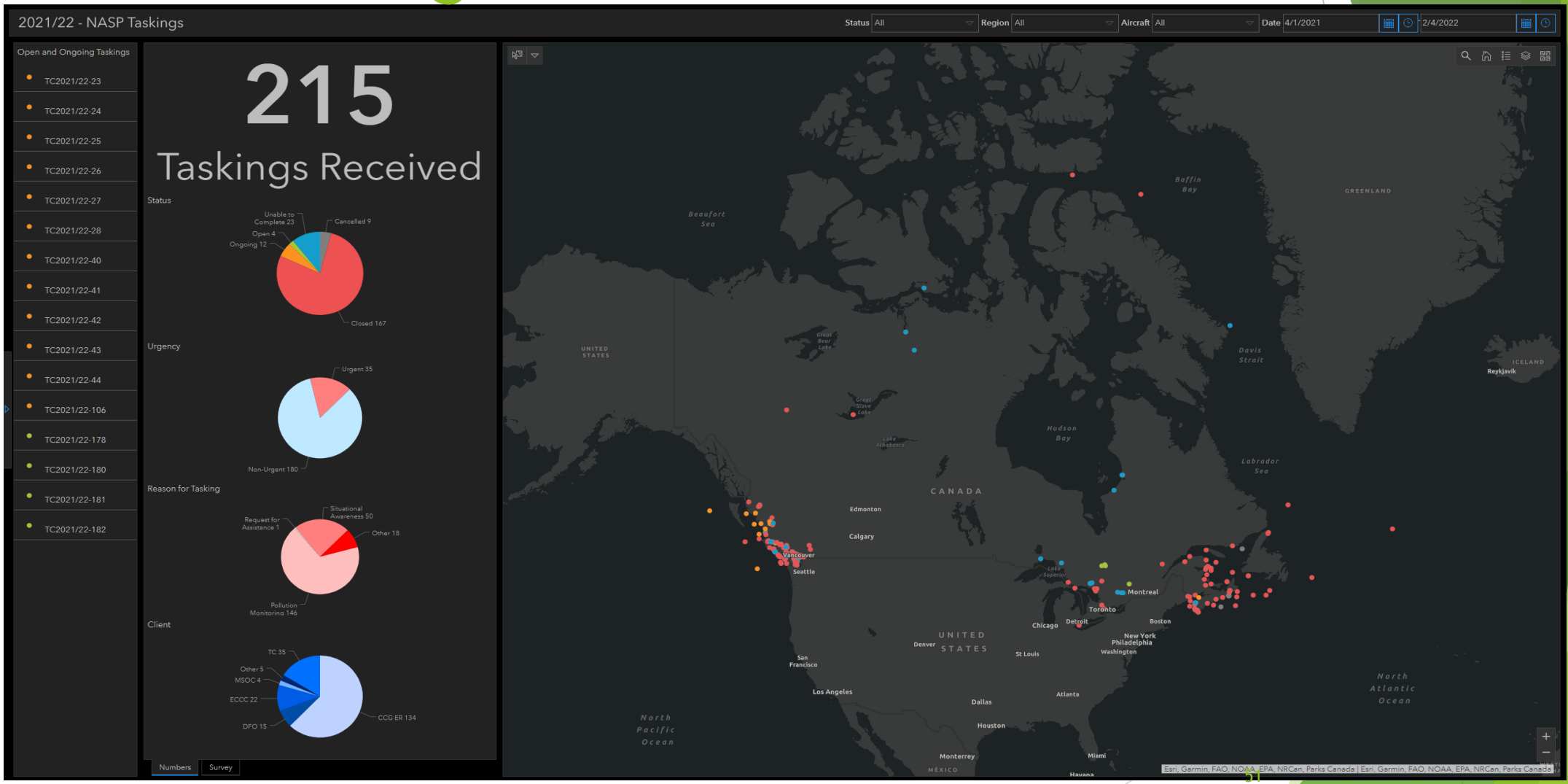
FUTURE INITIATIVES

- Arctic Hangar and Accommodations Unit
- 4th NASP Aircraft retrofit
- Remotely Piloted Aircraft System included in the NASP
- Fleet renewal - TBD

QUESTIONS?

YEAR-ROUND OPERATIONS

2021-22 Taskings Thus Far



TASKING THE NASP

- 1-888-857-4003 or 613-995-9737
- TC.SitcenHQ-CentredinterventionAC.TC@tc.gc.ca

- **Urgency of Request**
- Client
- Name/Nom
- Email
- Phone #
- Aircraft
- Region
- Coordinates/location
- Requested Date
- Requested Time
- Frequency
- Reason for tasking
- Asso. client file #

- Manager will acknowledge and coordinate completion of task

TASKING THE NASP

NASP TASKING TEMPLATE

Please use the Coordinate Converter tab to insert coordinates then fill out the Info column below with pertinent information for a tasking request. Once filled, please copy the first two columns into an email and send to TC.SitcenHQ-CentredinterventionAC.TC@tc.gc.ca . The information will be passed along to the appropriate aircraft for consideration. Each tasking request is for 1 location only. If multiple locations are required, please send in multiple requests.

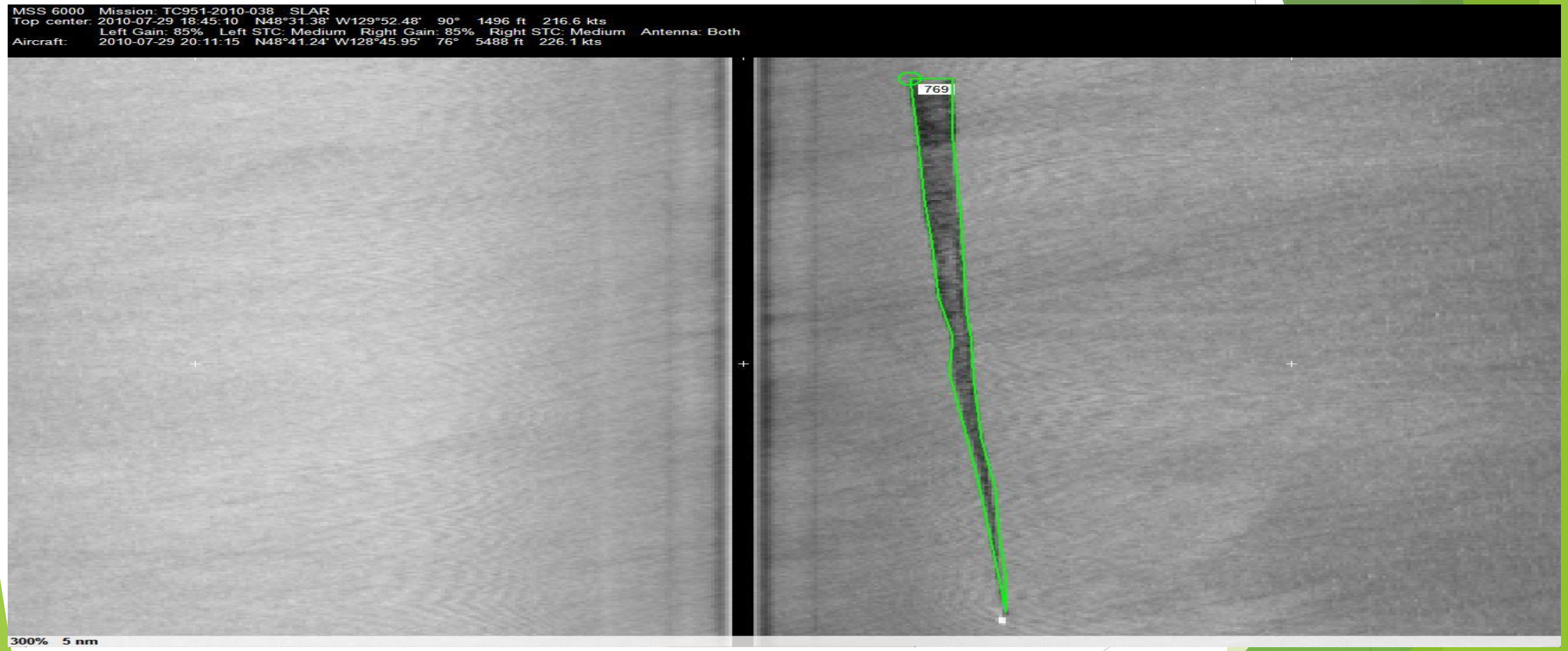
Veuillez utiliser l'onglet"Coordinate Converter" pour insérer des coordonnées puis remplir la colonne Info ci-dessous avec les informations pertinentes pour une demande d'affectation. Une fois rempli, veuillez copier les deux premières colonnes dans un courriel et l'envoyer à TC.SitcenHQ-CentredinterventionAC.TC@tc.gc.ca . L'information sera transmise à l'avion approprié pour considération. Chaque demande d'affectation ne concerne qu'un seul site. Si plusieurs emplacements sont nécessaires, veuillez envoyer plusieurs demandes.

Info	Instructions EN	Instructions FR
Urgency/Urgence :	Select from dropdown • Urgent: time sensitive, must be completed within 24 hours • Non-urgent: to be completed at next available opportunity when in the area	Sélectionnez dans la liste déroulante - Urgent : à réaliser dans un délai de 24 heures. - Non urgent : à effectuer à la prochaine occasion lorsque vous êtes dans la région.
Department / Ministère:	Select from dropdown	Sélectionnez dans la liste déroulante
Other Department / Autre ministère:	Type if not in Department dropdown list	Tapez si ce n'est pas dans la liste déroulante ministère
Name/Nom:		
Email / Courriel :		
Phone #/N° de Tél.:		
Region/Région:	Select from dropdown; TC region to be flown	Sélectionnez dans la liste déroulante; la région de TC à survoler
Place name / Nom du lieu	If applicable	Si applicable
Coordinates (Decimal Degree Minutes)	This will auto fill from other sheet: **for Crew**	Ceci se remplira automatiquement à partir d'une autre feuille : **pour l'équipage**
Coordinates (Decimal Degrees)	This will auto fill from other sheet: **for SitCen for Survey**	Ceci se remplira automatiquement à partir d'une autre feuille : **pour le Centre d'intervention**
Reason for tasking/Besoin opérationnel:	Select from dropdown. Broad categories for tasking. Pollution monitoring: requests for overflights of reported pollution or potential pollution threat Situational awareness: requests for images or videos	Sélectionnez dans la liste déroulante Grandes catégories de tâches. Surveillance de la pollution : demandes de survol de pollutions signalées ou de menaces potentielles de pollution. Connaissance de la situation : demandes d'images ou de vidéos.
Other Reason / Autre besoin	Type if not in reason dropdown list	Tapez si ce n'est pas dans la liste déroulante de besoin
Details of tasking / Détails de l'attribution des taches	Detailed description of tasking and any other pertinent information. Data requirements requested, i.e., photos, video, etc. Include date tasking should be completed on or no later than.	Description détaillée de la mission et toute autre information pertinente. Données requises, c'est-à-dire photos, vidéo, etc. Indiquez la date à laquelle la tâche doit être achevée ou au plus tard le.
Asso. client file #/ N° de client asso.:	If applicable	Si applicable

DETECTION OF ILLEGAL DISCHARGES

VISUAL DETECTION

REMOTE SENSOR DETECTION



TYPES OF SPILLS BY SOURCE

Unknown Source

Suspected Source

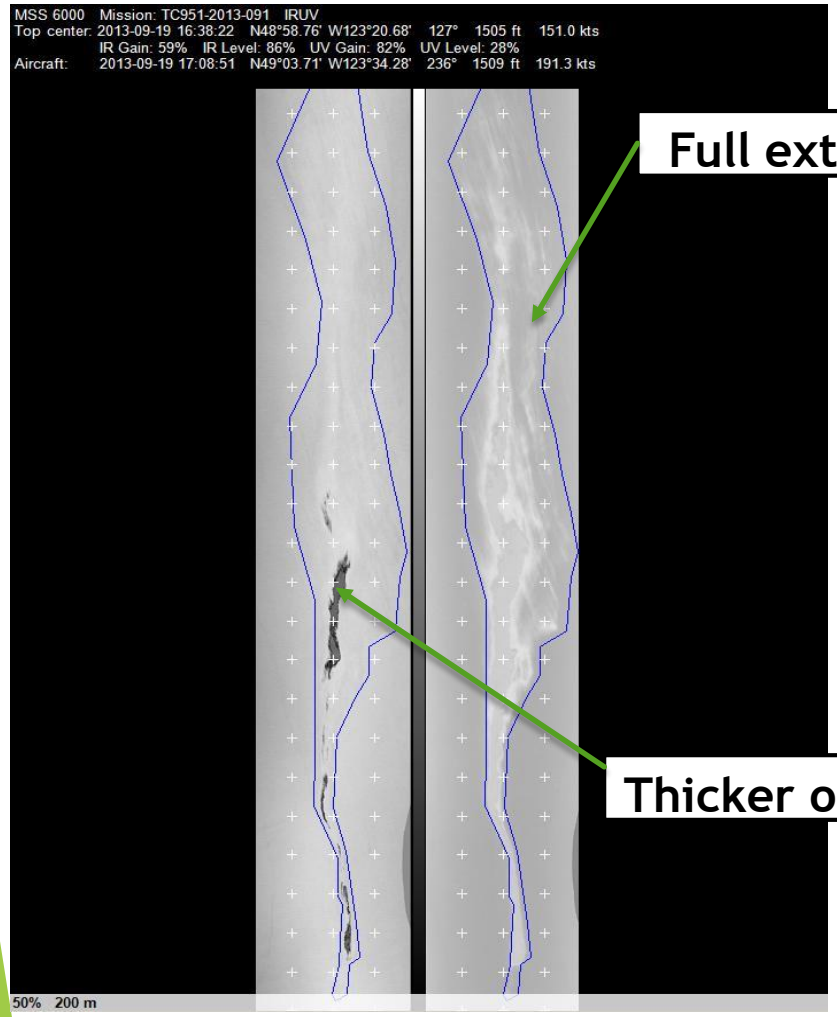
ANOMALIES FROM OTHER SOURCES

SPILL DOCUMENTATION + REPORTING

DOCUMENTING POLLUTION - IMAGES

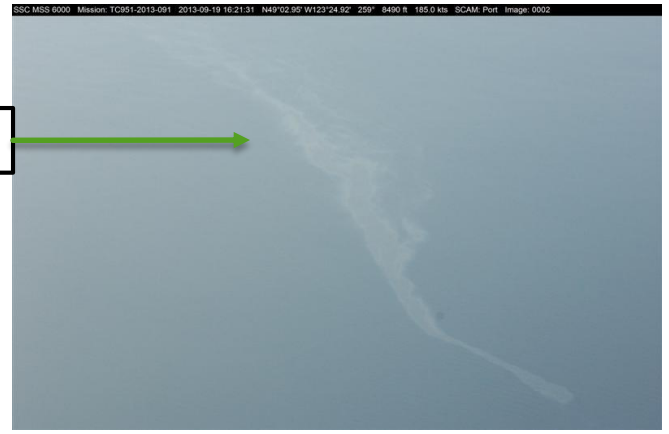
Vessel underway with pollution in its wake

DOCUMENTING POLLUTION – QUANTIFICATION



IR UV

Full extent

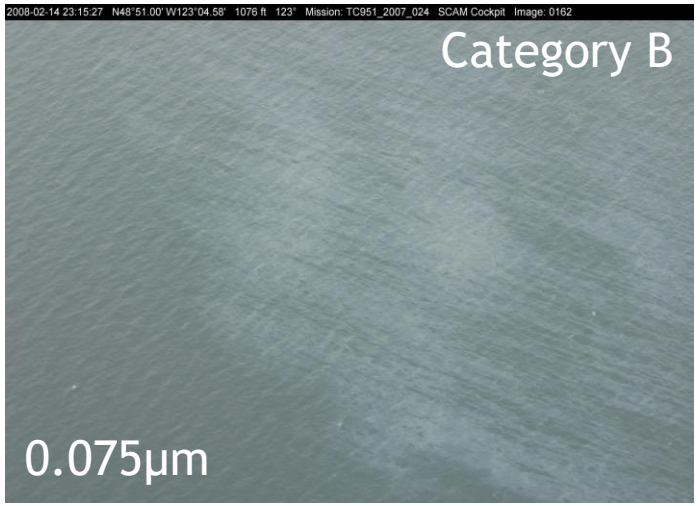


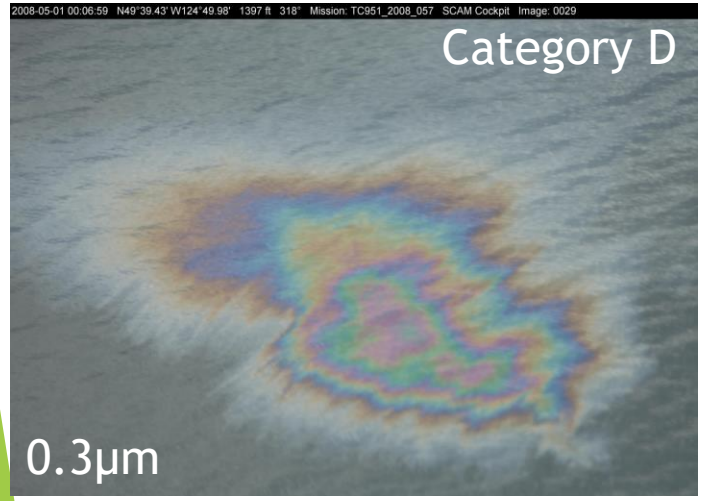
Thicker oil

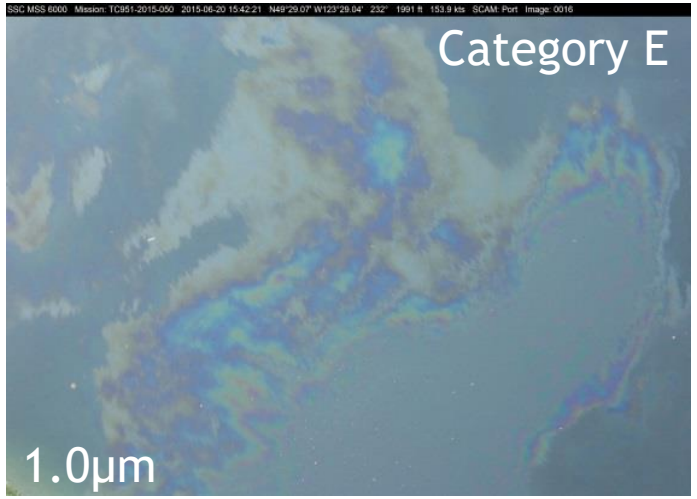
Volume = Length x Width x Thickness

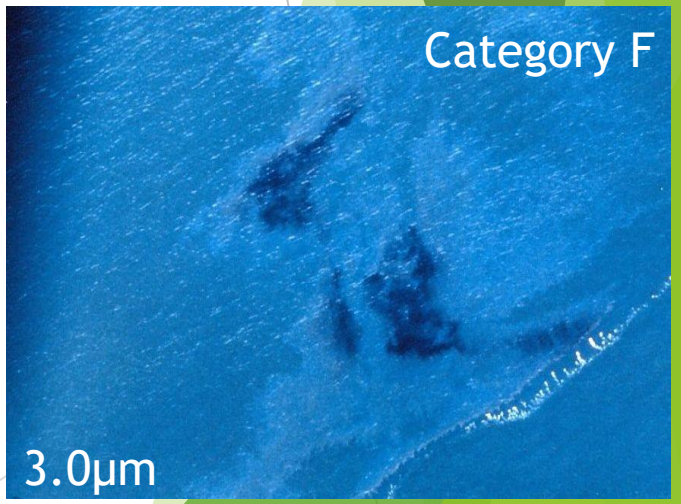
Area of Polygon

QUANTIFICATION - CODING OIL





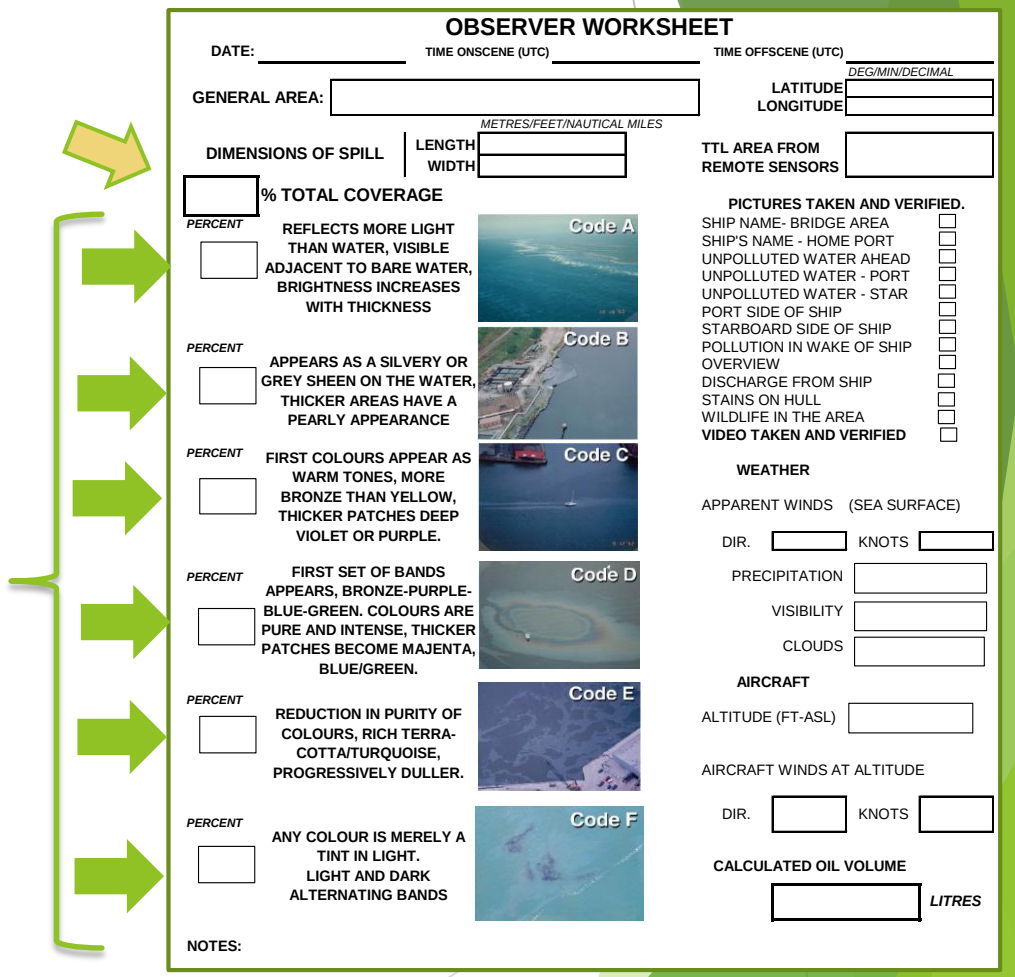




CALCULATING VOLUME

- Oil volume provided by NASP is a single conservative minimum value
- Order of magnitude estimate

Volume calculated from estimated areas of coverage and proportions of each category of oil thickness.



OBSERVER WORKSHEET

DATE: _____ TIME ONSCENE (UTC) _____ TIME OFFSCENE (UTC) _____

GENERAL AREA: _____ DEG/MIN/DECIMAL LATITUDE _____ LONGITUDE _____

METRES/FEET/NAUTICAL MILES

DIMENSIONS OF SPILL LENGTH _____ WIDTH _____ TTL AREA FROM REMOTE SENSORS _____

_____ % TOTAL COVERAGE

PERCENT _____ REFLECTS MORE LIGHT THAN WATER, VISIBLE ADJACENT TO BARE WATER, BRIGHTNESS INCREASES WITH THICKNESS — Code A

PERCENT _____ APPEARS AS A SILVERY OR GREY SHEEN ON THE WATER, THICKER AREAS HAVE A PEARLY APPEARANCE — Code B

PERCENT _____ FIRST COLOURS APPEAR AS WARM TONES, MORE BRONZE THAN YELLOW, THICKER PATCHES DEEP VIOLET OR PURPLE. — Code C

PERCENT _____ FIRST SET OF BANDS APPEARS, BRONZE-PURPLE-BLUE-GREEN. COLOURS ARE PURE AND INTENSE, THICKER PATCHES BECOME MAJENTA, BLUE/GREEN. — Code D

PERCENT _____ REDUCTION IN PURITY OF COLOURS, RICH TERRA-COTTA/TURQUOISE, PROGRESSIVELY DULLER. — Code E

PERCENT _____ ANY COLOUR IS MERELY A TINT IN LIGHT. LIGHT AND DARK ALTERNATING BANDS — Code F

NOTES:

PICTURES TAKEN AND VERIFIED.
- SHIP NAME- BRIDGE AREA ☐
- SHIP'S NAME - HOME PORT ☐
- UNPOLLUTED WATER AHEAD ☐
- UNPOLLUTED WATER - PORT ☐
- UNPOLLUTED WATER - STAR ☐
- PORT SIDE OF SHIP ☐
- STARBOARD SIDE OF SHIP ☐
- POLLUTION IN WAKE OF SHIP ☐
- OVERVIEW ☐
- DISCHARGE FROM SHIP ☐
- STAINS ON HULL ☐
- WILDLIFE IN THE AREA ☐
- VIDEO TAKEN AND VERIFIED ☐

WEATHER

APPARENT WINDS (SEA SURFACE)

DIR. _____ KNOTS _____

PRECIPITATION _____

VISIBILITY _____

CLOUDS _____

AIRCRAFT

ALTITUDE (FT-ASL) _____

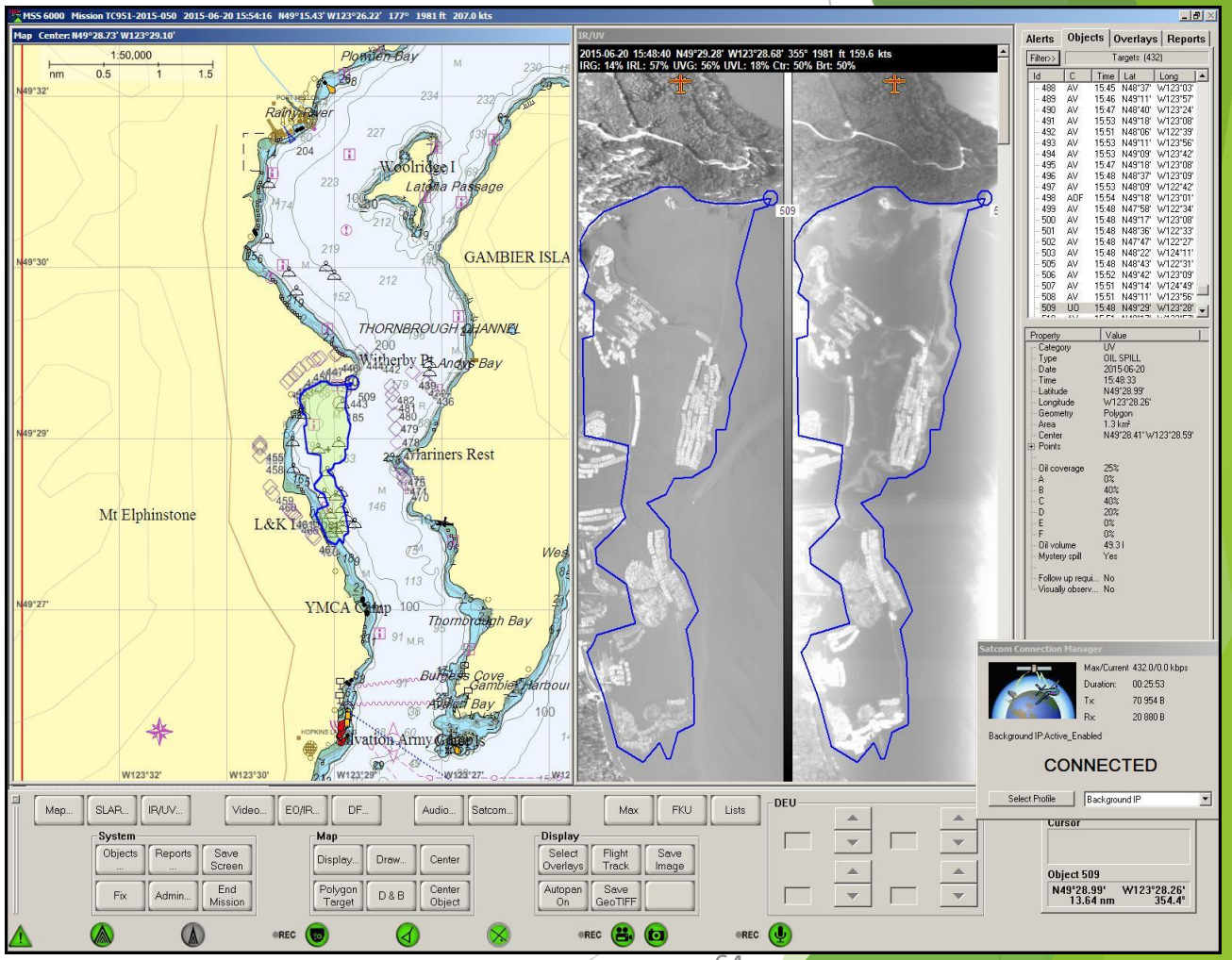
AIRCRAFT WINDS AT ALTITUDE

DIR. _____ KNOTS _____

CALCULATED OIL VOLUME _____ LITRES

MAPPING AND REPORTING - INFLIGHT

- Oil Volume Estimate
- Oil Categories
- Location of the oil
- Area of coverage
- Thicker parts of the oil



REPORTING - INFLIGHT

NASP + SPILL RESPONSE

INCIDENT REPORTED TO NASP TASKING

- Incident Reported to CCG Pollution Desk

Pollution Reported

Assessed

- CG Environmental Response Officer assesses report
- If required, submit tasking request to TC Situation Center

- NASP receives tasking from TC Situation Centre
- Conducts overflight if able

NASP Tasked

ASSESS TASKING TO FLIGHT PRIORITIES

1 – Search and Assist

2 - Emergency Response

3 - Client Centred Immediate Action/ Response

4 - Routine Patrols

5 - Special Requests

NASP PROVIDES

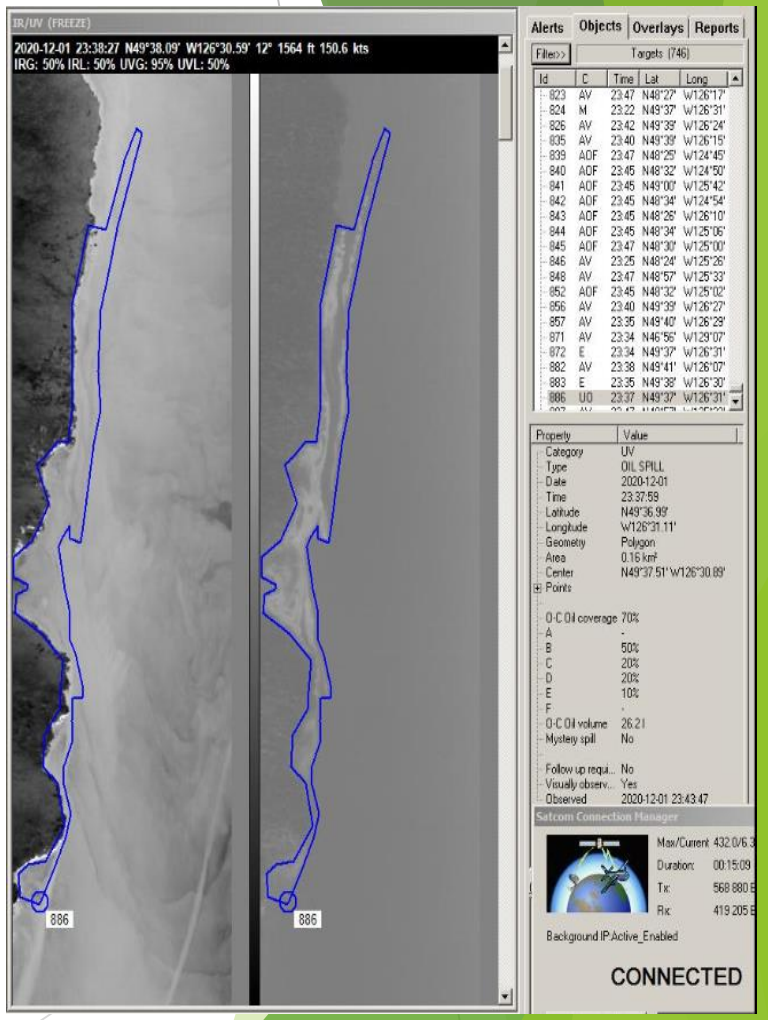
Situational Awareness:

- Still images of the scene
- Live and recorded video of the incident
- Extent of the spill (maps
- Resource deployment (i.e. booms, vessels)
- Effectiveness of the boom

NASP PROVIDES

Pollution Incident Images and Mapping including

- Polygons for location and drift analysis
- Oil volume
- Recurrent overflights to report changes in the incident



NASP PROVIDES

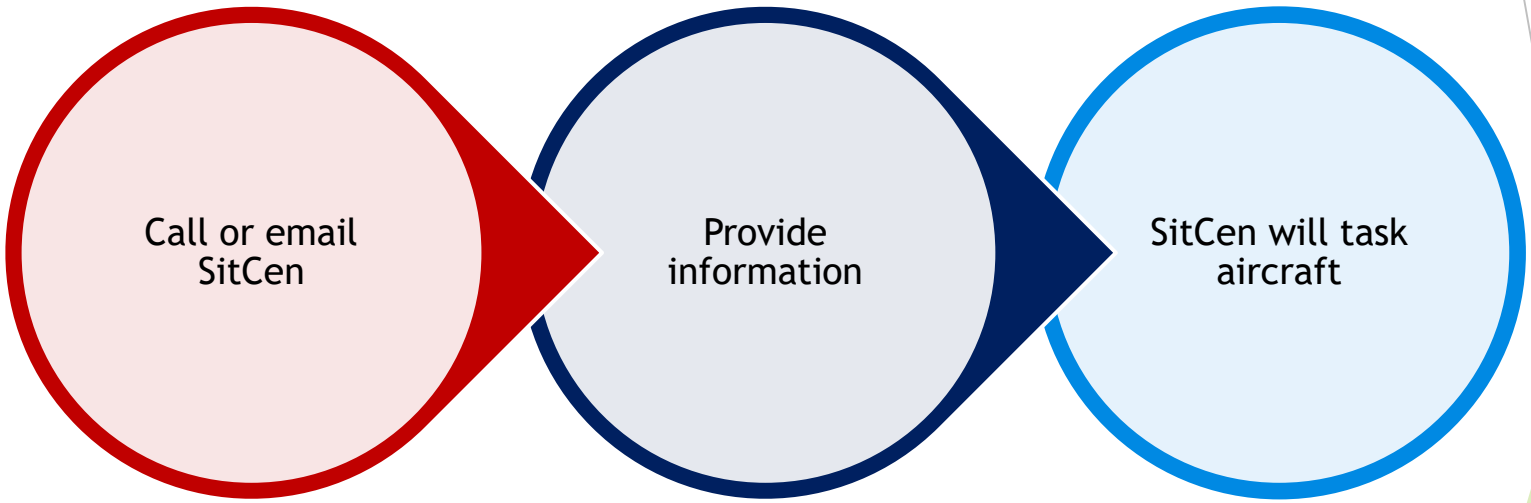
- Oil spill polygons can be in GIS formats
  - kml
  - .shp (shape)
- Attributes of the polygon included (i.e. volume, oil categories)

NASP IN ICP

NASP Surveillance Officer deployed to Incident Command Post:

- In Operation section - Air Ops
- To Coordinate overflights
- To receive and interpret images and video
- Be available to answer questions about reports and imagery

TASKING THE NASP



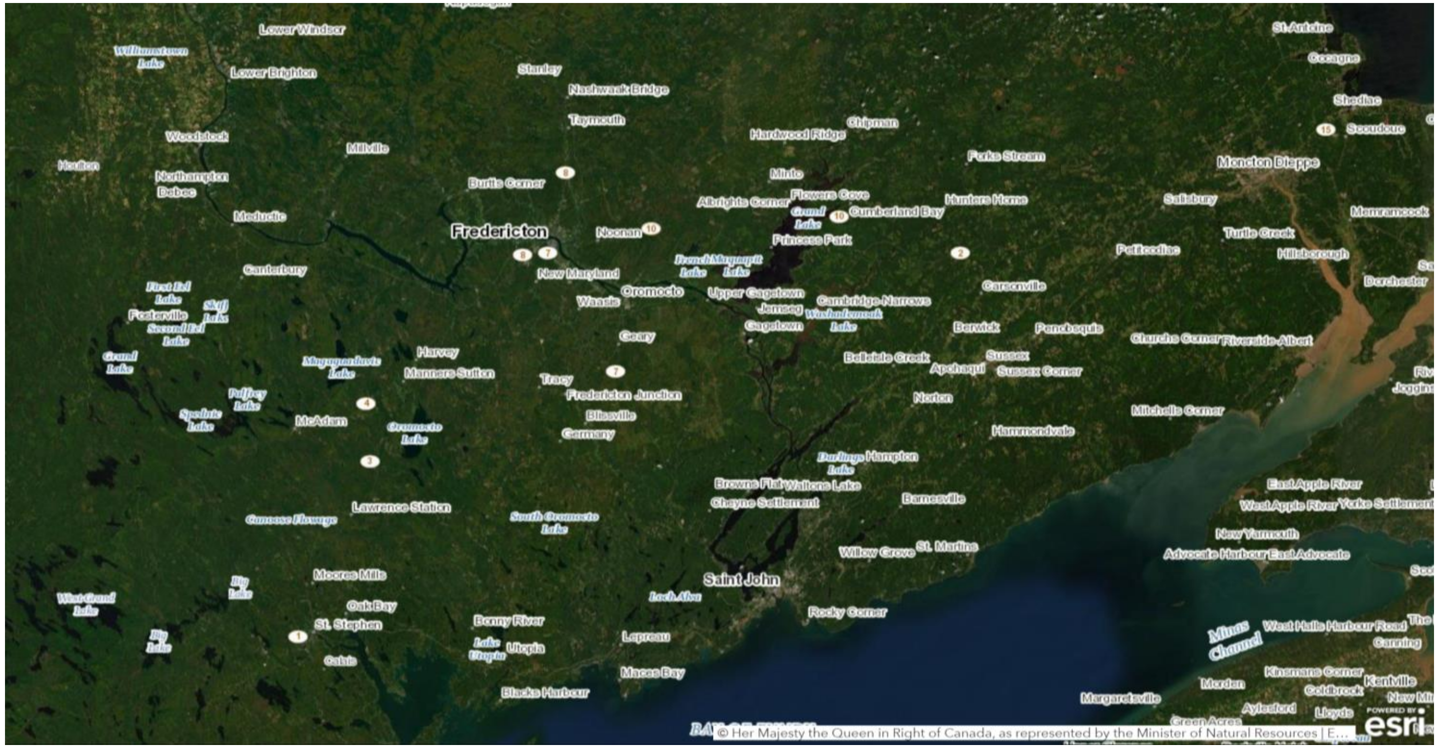
- 1-888-857-4003 or 613-995-9737
- TC.SitcenHQ-CentredinterventionAC.TC@tc.gc.ca

- Urgency of Request
- Client
- Name/Nom
- Email
- Phone #
- Aircraft
- Region
- Coordinates/location
- Requested Date
- Requested Time
- Frequency
- Reason for tasking
- Asso. client file #

- Manager will acknowledge and coordinate completion of task

LINKS

- 2019 NB flood
  - GOC http://www.arcgis.com/home/webmap/viewer.html?webmap=b78e686004e6430f977ae0d81f50735d
  - NRCAN http://nrcan-rncan.maps.arcgis.com/apps/webappviewer/index.html?id=9c53590266a54e7585a8992917a9ff52



COLLABORATION

How can we support one another better on the intelligence side of things?

QUESTIONS?

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Intelligence, Reconnaissance and Surveillance

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506-851-7340

#NASPCrew