

CUTTING EDGE **SAFETY**

**SAFETY
SERVICES**
NOVA SCOTIA

36th ANNUAL

WORKPLACE HEALTH & SAFETY CONFERENCE

April 9 -10, 2018 - HALIFAX CONVENTION CENTRE, HALIFAX, NS

WWW.SAFETYSERVICESNS.CA

NEW CHALLENGES, NEW PEOPLE,
NEW APPROACHES

NOVA SCOTIA
WORK SAFE. FOR LIFE.
WORKERS' COMPENSATION BOARD OF NOVA SCOTIA

Emerging Risk: Drones

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SVP, Business Development

Session Objectives

1. Define drones and various types
2. Discuss the current marketplace for drones
3. Explore new types of risks associated with drones
4. Understand the current regulatory environment
5. Discuss the benefits of drone use
6. Share experiences and Q&A

What is a “Drone”?

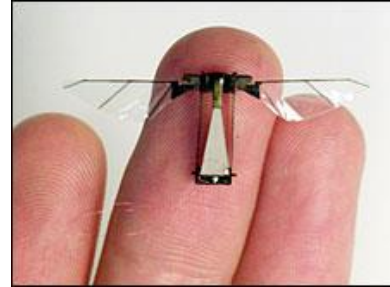
- Popular name for a Unmanned Aerial Vehicle (UAV)
- “Device used or intended to be used for flight in the air that has no onboard pilot” (Federal Aviation Administration Roadmap)
- Part of an Unmanned Aircraft System (UAS)



Drone Types and Sizes

- Types

- Fixed-wing
- Single rotor
- Multi-rotor



http://www.spyworld-actu.com/IMG/jpg_PH2007100801353.jpg

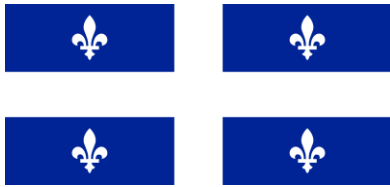
- Sizes

- PD-100 Black Hornet
 - 18 grams
 - 4.7 inch rotor span
- RQ-4 Global Hawk
 - 12,133,596 grams
 - 720 inches long
 - 1,584 inch wingspan



http://upload.wikimedia.org/wikipedia/commons/2/29/RQ-4_Global_Hawk.jpg

First Drone to Hit Aircraft - Canada



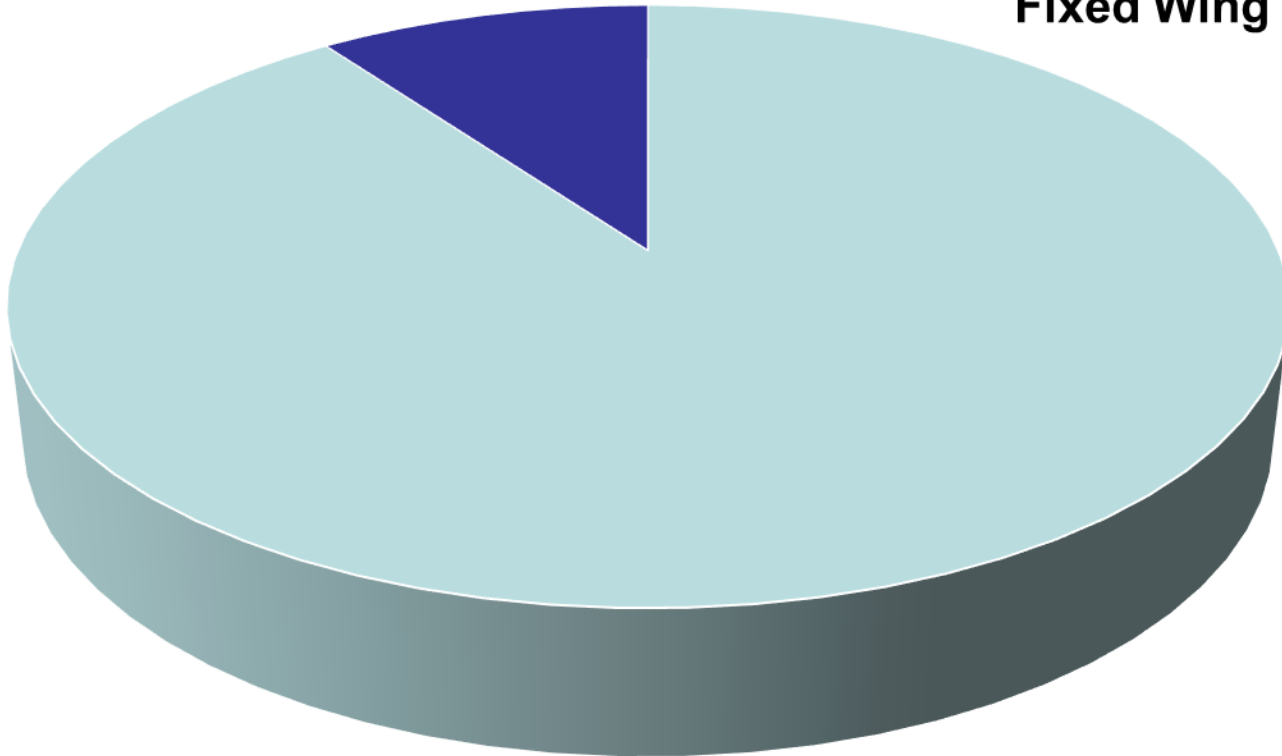
The Drone Market Environment 2018

This infographic displays a wide array of logos from the drone industry in 2018, organized into several key categories:

- Unmanned Platform Manufacturer:** Includes major players like DJI, Parrot, and various regional manufacturers.
- Recreational:** Focuses on consumer-grade drones and accessories.
- Maintenance:** Lists companies providing repair and service for drones.
- Market Research:** Features firms that analyze market trends and provide data.
- Services:** Encompasses a range of professional services from photography to industrial inspection.
- Business Accelerators:** Shows organizations that support startups in the drone space.
- Autonomous Air Taxis / Flying Cars:** Highlights emerging technologies in urban air mobility.
- Launch & Recovery:** Lists companies specializing in drone deployment and retrieval.
- Components & Systems:** Includes manufacturers of drone parts, sensors, and flight controllers.
- Counter Drone:** Features companies developing technologies to detect and neutralize unauthorized drones.
- VTOL:** Focuses on Vertical Take-Off and Landing aircraft.
- Cameras & Vision Systems:** Lists providers of imaging and computer vision solutions.
- Flight & Mission Management:** Includes software for drone navigation and mission planning.
- Media, Blogs & Magazines:** Shows industry publications and content creators.
- Post-Processing:** Lists companies that offer software for processing drone-captured data.

Types of Platforms Being Used

Rotary Wing – 90%
Fixed Wing – 10%



Types of Platforms Being Used

Rotary-Wing Type	% of Platforms
4-Rotor (Quadcopter)	74.70%
8-Rotor (Octocopter)	18.90%
6-Rotor (Hexacopter)	5.50%
Helicopter	0.60%
12-Rotor and other	0.30%

Insurance Industry Spotlight

Insurance Industry Platform Stats

8 Fixed Wing

40 Rotary Wing

Ave. weight: 7.09 pounds

3.37% micro UAS

Ave. endurance: 27.44 min.

Popular Drone Models

#	Model Name	Estimated Price USD	Flight Time	Model Size
1.	DJI Phantom 3	\$699 - Check today's price	17 - 20min	Medium
2.	DJI Inspire 1	\$2899 - Check today's price	18 - 20min	Large
3.	Yuneec Q500 4K	\$1300 - Check today's price	20 - 25min	Medium
4.	3DR Solo	\$999 - Check today's price	20 - 25min	Medium
5.	Hubsan X4	\$45 - Check today's price	5 - 7min	Very small

Popular Drone Models



DJI Quantum Copter

Popular Drone Models



Parrot AR Drone 2.0 Elite Edition Quadricopter

Popular Drone Models



3D Robotics X8

Footage from UAS demonstrating Use Cases

- Here is the link to run the Times, Inc. video:
<http://ti.me/1qgesj0>

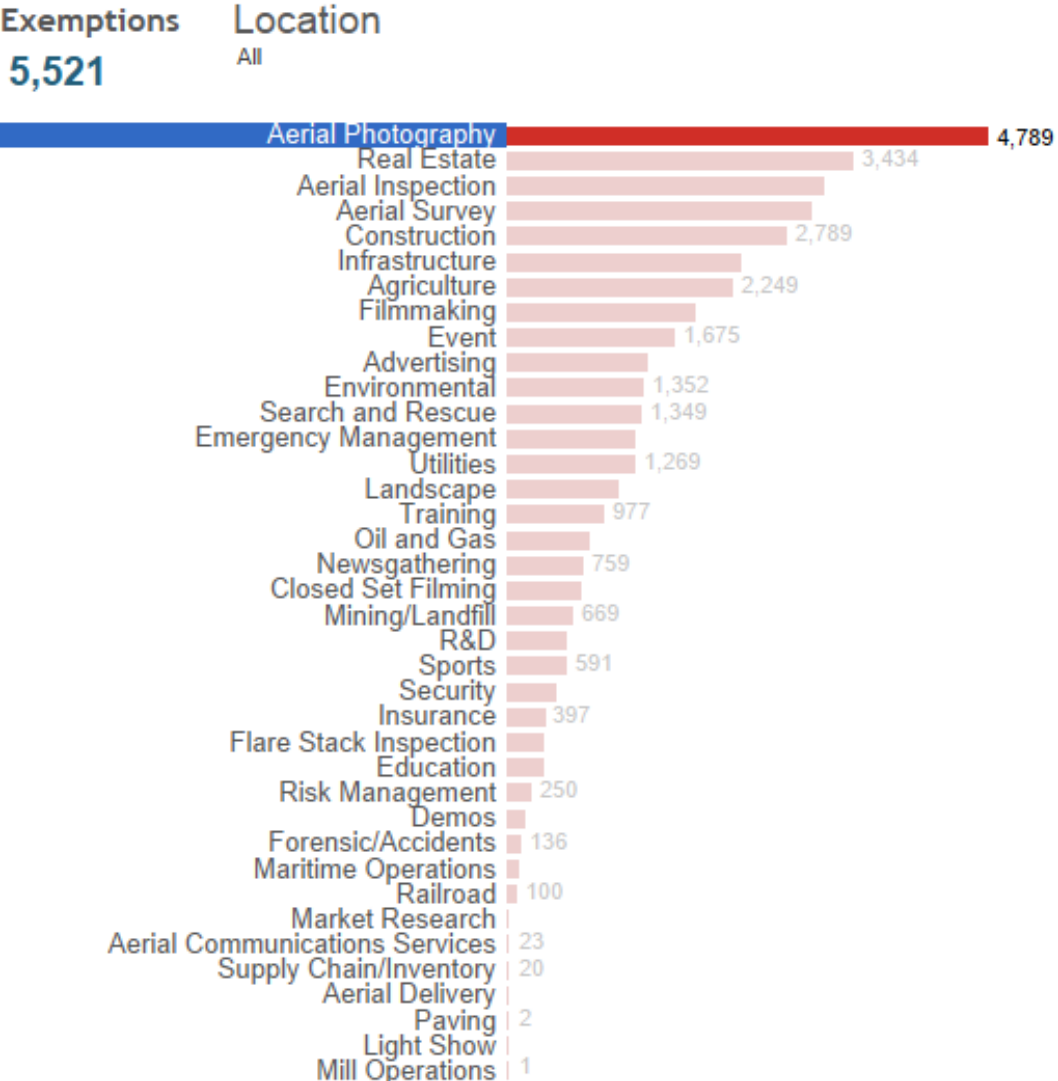
The Drone Marketplace

COMMERCIAL UAS EXEMPTIONS

BY THE NUMBERS

- 3 years of integration
 - 70,000 jobs
 - \$13.6 billion
- Business Insider, June 2016: project \$12 billion in revenues from drones
 - just over \$8 billion in 2015.
 - Consumer drone shipments will quadruple in next 5 years

The Drone Marketplace, cont.'d.



Platform Sales by Country

Manufacturer Location	Total Estimated Cost
United States	\$3,609,215.09
Canada	\$2,568,780.00
China	\$2,210,537.00
Switzerland	\$1,078,000.00
Germany	\$641,608.00
Latvia	\$110,000.00
New Zealand	\$104,413.54
Slovenia	\$100,107.00
Japan	\$86,000.00
Belgium	\$60,000.00
Netherlands	\$55,000.00
France	\$50,006.97
Australia	\$40,000.00
United Kingdom	\$33,103.82
South Africa	\$28,971.00
Austria	\$20,000.00
South Korea	\$17,500.00
Taiwan	\$5,787.59

Platforms Manufactured by State

State	# of Platforms
California	140
Florida	19
Washington	18
North Carolina	14
Colorado	10
Illinois	10
Maryland	8
Ohio	8
Kansas	7
Arizona	7
New Hampshire	5
Texas	3
Massachusetts	2
Minnesota	2
Tennessee	2
Idaho	1
Missouri	1
Mississippi	1
Oklahoma	1
Oregon	1
South Carolina	1
Virginia	1

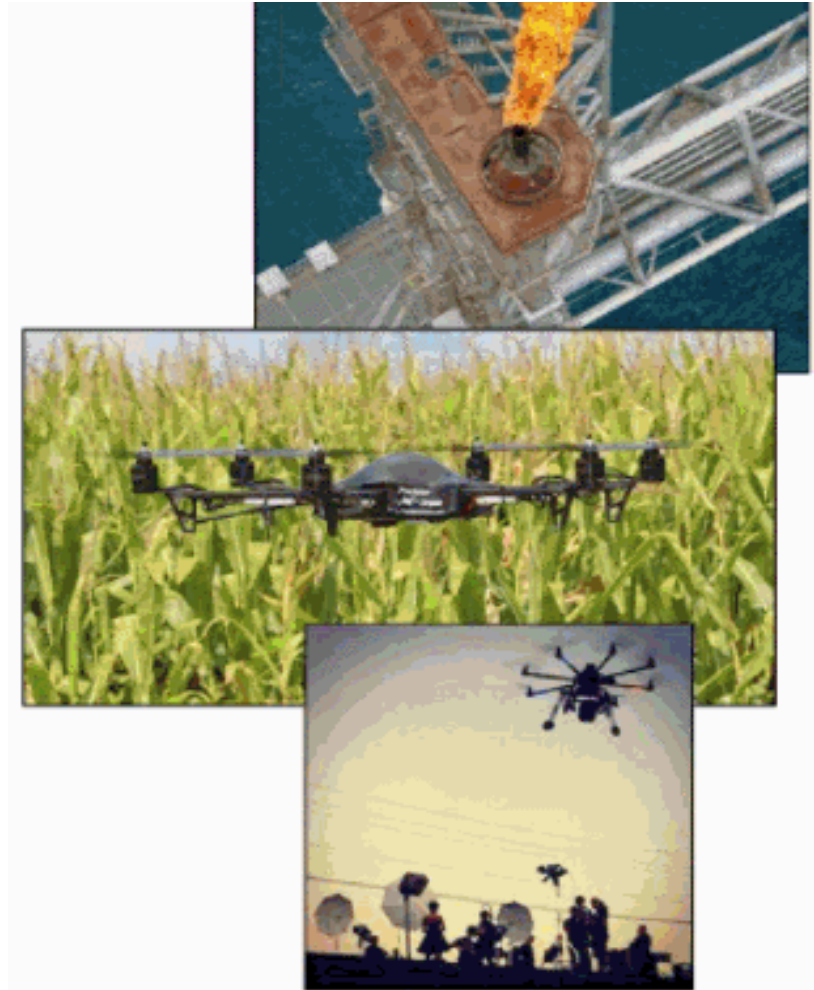
TOP20 Drone Operator Ranking 2018



Feb. 2018, basis of assessment: The ranking is based on the following indicators with different emphasis stated in brackets: Size of company (1), number of followers (1), amount of funding (1), number of partnerships (0.5), and the extent of web activity (two different categories with an emphasis of 1.5). The highest scoring company in each dimension receives a rating of 100%, while all other drone companies receiving a lower percentage in linear relation to the score of the highest ranking company. The total score is an average of all four measured dimensions. A company can reach an index of 100% if he leads all considered sources.

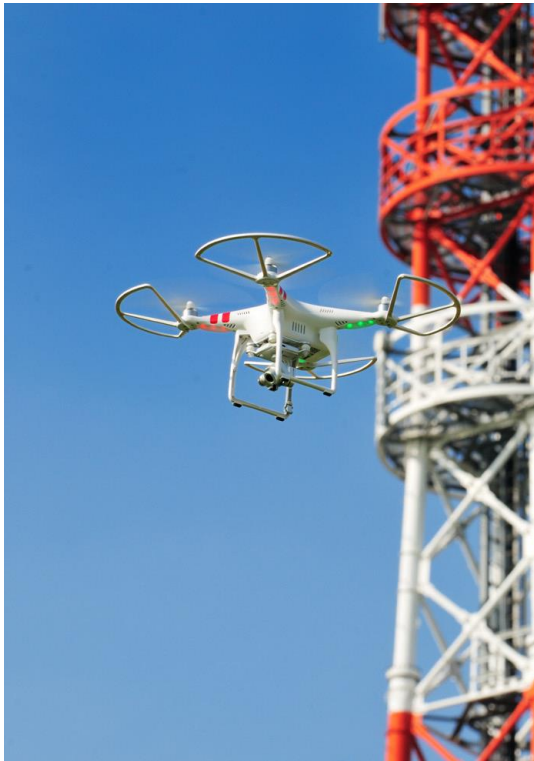
Drone Marketplace - Summary

The FAA has predicted there could be as many as 600,000 drones used for commercial operations during the next year. As of 9/1/16, it said, there were only 18,940 registered for commercial purposes.



UAS Commercial Use Applications

UAS are already being used in a variety of applications, and many more areas will benefit by their use, such as:



Drones – Hazards & Risk

- Drone operators
- Property damage
- First and third party liability
- Personal Injury
- Data protection
- Data ownership
- Manufacturers / Servicers
- Users of drone services

Drone Footage

Drones – Damage to UAS

Exposure exists:

- In use or during flight
- In transit
- In storage
- Repair/replacement costs highly variable
- Who owns payload?
- What is operating environment?
- Who pays for time when drone cannot be used?
- Will uninsured drone coverage be needed?

Damage to Other Property

- Exposure exists in use, transit, or storage as well
- How is drone transported to site?
- Where is drone fueled?
- What fail-safes are in place in case of loss of power/control?
- Does drone deploy objects?



Drone-Equipped UPS Package Car



Bodily Injury

- Potential for both first-party and third-party injuries.
- Drones in use can cause injuries by:
 - Direct or indirect strikes
 - Misapplication/delivery of payloads
 - Other falling objects
 - Accidents getting to and from use location
 - What about near-misses?

Personal Injury

- Any camera- or microphone-equipped drone may be used to:
 - Invade privacy
 - Stalk or harass
 - Internet permits wide dissemination
 - Drone use may also cause a nuisance

I SEE YOU HAVE GUESTS



**YOU MAY ALSO BE INTERESTED IN
CURTAINS**

Other Hazards

- Data protection
- Corruption/Damage
- Mis-delivery/Interception
- Sharing with Others
- Data ownership
- Non-owned liability for users of drone services

Risk Assessment

- There is no reliable data on damages that may be caused by a UAV
- A study reviewed several insurance applications
- Key risk parameters identified:
 - What are the UAS characteristics?
 - Describe UAS storage/maintenance
 - What are the operator qualifications?
 - Describe the mission/operating environment for drone use



UAS Characteristics

- Make and model of drone
- Type of propulsion system or fuel
- Weight and lift capacity
- Speed or operating range
- Launch and recovery methods
- Safety features/attributes
- Payload

Storage

- Location
- Building construction
- Fire protection
- Security
- Fuel storage



Maintenance

- History
- Maintenance in accordance with manufacturer specifications
- Recordkeeping and reports



Operator Qualifications

- Skill level
- Aviation experience
- Medical fitness
- FAA/Air Transport Canada have defined knowledge requirements and now permit operators who pass a knowledge test to operate a UAS
- Pilot training varies in content/quality
- No MVR equivalent

Mission/Operating Environment

- Purpose of drone use
- Location of work
- Duration of flight
- Weather conditions
- Time of day
- External hazards

Current Rules in Canada

- Until the proposed regulations become law, recreational users must comply with the rules in the revised Interim Order (*Interim Order No. 8 Respecting the Use of Model Aircraft*).
- Read about current rules and guidelines for Flying your drone safely and legally

Recreational Users

- Within 90 m above the ground or lower
- At least 30 m away from vehicles, vessels, and the public (if your drone weighs more than 250 g up to 1 kg)
- At least 75 m away from vehicles, vessels, and the public (if your drone weighs more than 1 kg up to 35 kg)
- At least 5.5 km from aerodromes (any airport, seaplane base, or areas where aircraft take-off and land)
- At least 1.8 km away from heliports or aerodromes used exclusively by helicopters
- Outside of controlled or restricted airspace

Recreational Users

- At least 9 km away from a natural hazard or disaster area
- Away from areas where it could interfere with police or first responders
- During the day and not in clouds
- Within your sight at all times
- Within 500 m of yourself or closer
- Only if clearly marked with your name, address and telephone number
- If you fly your drone not following these rules, you could face fines up to \$3,000



Current Rules in Canada

- Non-recreational users must continue to seek authorization from Transport Canada to operate through a Special Flight Operations Certificate (SFOC), unless they meet the strict safety conditions in their exemptions.

Proposed Rules for Drones in Canada



Very small drone operations

Very small drone more than 250 g to 1 kg

Most recreational users will fit into this category. The rules that apply are easy to understand and follow.

Pilots must be 14 years old or older and will be required to:

- [mark their device](#) with their name and contact information;
- pass a [basic knowledge test](#);
- have [liability insurance](#); and
- fly at least:
 - 5.5 km from airports
 - 1.85 km from heliports
 - 30 m from people

Proposed Rules for Drones in Canada



Limited operations (rural)

Small drone more than 1 kg to 25 kg

This category is for users operating in rural areas (e.g., agricultural purposes, wildlife surveys, natural resources).

Pilot must be 16 years old or older and will be required to:

- [mark their device](#) with their name and contact information;
- pass a [basic knowledge test](#);
- have [liability insurance](#); and
- fly at least:
 - 5.5 km from airports
 - 1.85 km from heliports
 - 150 m from open-air assemblies of people (i.e. outdoor concert)
 - 75 m from people, vehicles, vessels
 - 1 km from built-up areas

Proposed Rules for Drones in Canada



Complex operations (urban) Small drone more than 1 kg to 25 kg

This category is for users who intend to fly in urban areas, within controlled airspace or close to anywhere that airplanes, helicopters and floatplanes land and take off.

Pilot must be 16 years or older and will be required to:

- hold a [pilot permit that is specific to small drones](#);
- have [liability insurance](#);
- [register and mark their device](#) with a unique identification Transport Canada will provide;
- operate a drone that meets a [design standard](#);
- follow a set of flight rules;

Proposed Rules for Drones in Canada



Complex operations (urban) cont. Small drone more than 1 kg to 25 kg

- get approval from air traffic control when flying in controlled airspace or near aerodromes; and
- fly at least:
 - 150 m from open-air assemblies of people (i.e. outdoor concert) unless at least 90 m high
 - 30 m from people, vehicles, vessels



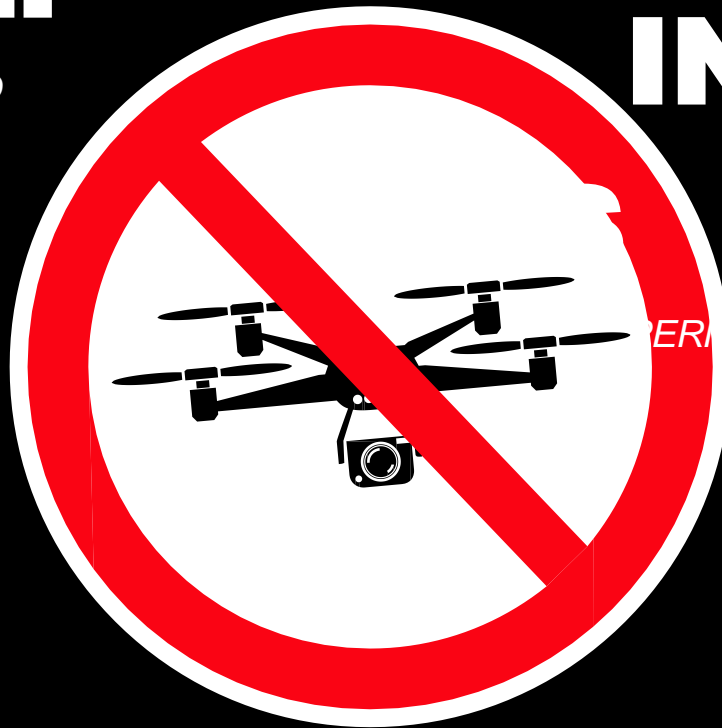


Government
of Canada

Gouvernement
du Canada

NO DRONE ZONE.

PERMIT REQUIRED



DRONES INTERDIT

PERMIS REQUIS

Canada

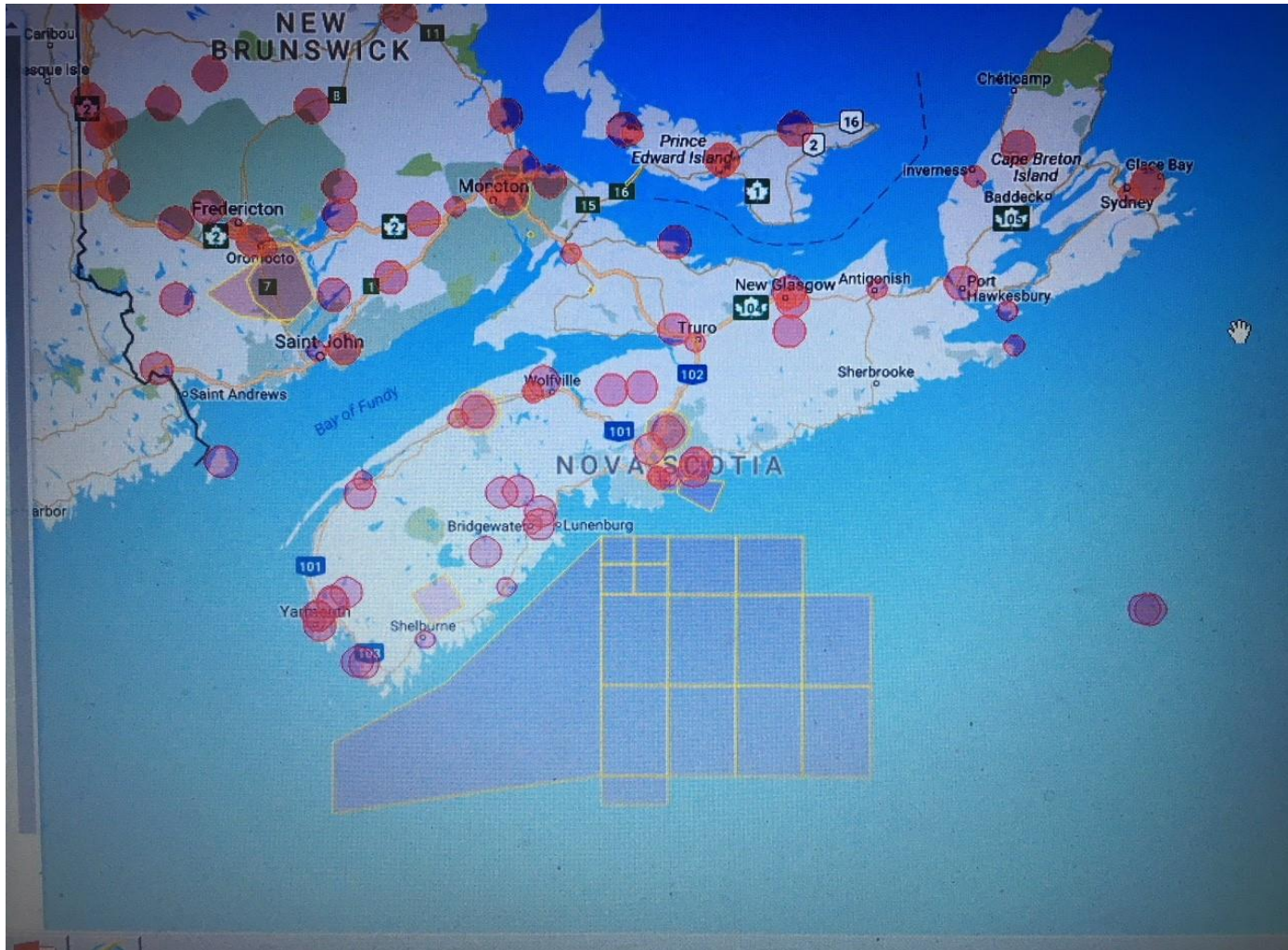
ALEXANDER & SCHMIDT

No Drone Zones – Transport Canada

- “No drone zones” are areas where it may be unsafe or illegal to fly your drone.
- When you fly a drone for any reason you should generally not fly:
 - around airports and aerodromes
 - in busy, populated areas
 - in national parks
 - over border crossings
- You can only fly your drone in these areas for specific purposes by getting permission from Transport Canada.

National Research Council Canada

UAV Site Selection Tool



Manufacturer/Service Company Liability

Traditional hazards such as:

- Product liability or completed operations exposures
- Parties involved
- Loss control analysis
- Areas of concern:
- Limited product safety standards
- Dynamic 'state of the art'
- Post-sale obligations are unclear
- Manufacturer's product safety experience varies

Coverage Options

Common coverages:

- Physical damage to UAS
- Third Party Liability
- Most coverage is written on modified aviation or liability forms
- ISO multi-state drone endorsements for CGL and Excess/Umbrella programs effective on 6/1/15.



SkyWatch, STARR to Offer Usage-Based Insurance to Drone Industry



Oversight and Advisory Committees

Drone Advisory Committee

NTIA [Drone Best Practices](#) – Multistakeholder group

The screenshot shows the FAA website's navigation bar with the logo and links for Home, Jobs, News, and About FAA. A search bar is also present. Below the navigation bar, a menu lists various FAA services: Aircraft, Airports, Air Traffic, Data & Research, Licenses & Certificates, and Regulations & Enforcement. The main content area features a breadcrumb trail: FAA Home > News > Press Releases. A sidebar on the left contains a list of content types: Press Releases (highlighted with a green arrow), Fact Sheets, Speeches, Testimony, News & Updates, Media Advisories, Conferences & Events, FAA Safety Briefing, Public Affairs Contacts, and Stay Connected. The main article is titled "Press Release – Drone Advisory Committee to Hold Inaugural Meeting" and is marked "For Immediate Release". The date is August 31, 2016, and the contact information is Laura Brown or Les Dorr, with email addresses laura.j.brown@faa.gov and les.dorr@faa.gov, and phone number 202-267-3883. The text of the press release states: "WASHINGTON – The newly established Drone Advisory Committee (DAC) will hold its inaugural meeting on September 16 as the Federal Aviation Administration (FAA) continues to build on its strong record of collaborating with the aviation community to safely integrate unmanned aircraft into the nation's airspace."

Using Drones In Insurance



Advisory Committees

- **Property Drone Consortium:** The Property Drone Consortium (PDC), a collaboration that consists of insurance carriers, roofing industry leaders and supporting enterprises
<http://www.propertydrone.org/>
- **Remote Sensing Lab:** The Xactware Remote Sensing Lab is a collaborative industry group dedicated to developing remote sensing technologies specifically for property professionals.
<http://www.xactware.com/en-us/resources/remote-sensing/news/>.

Drone Benefits

- Search & Rescue Missions
- Inspections
- Non-Destructive Testing
- Construction

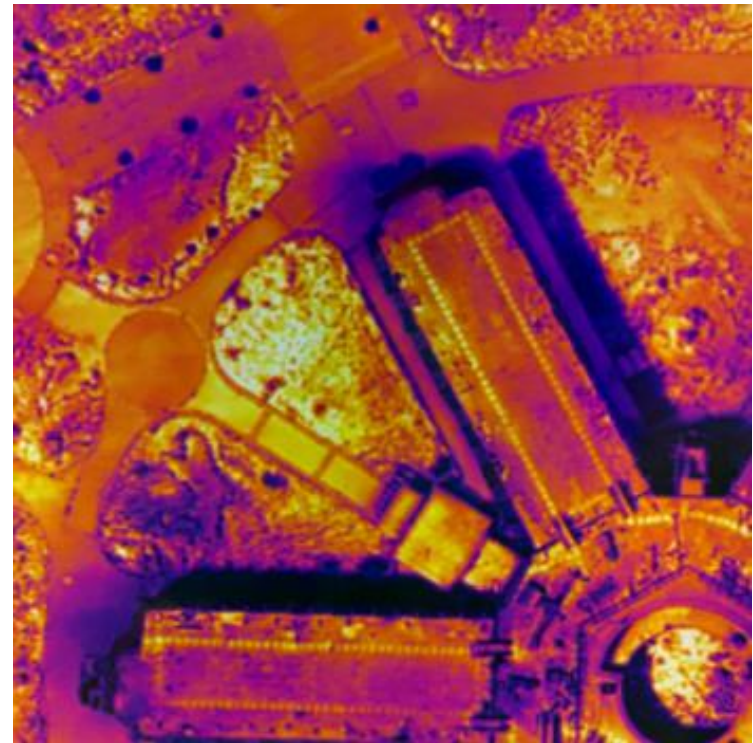
SAR Missions



Inspections



NDT Testing



Construction

1. Improve asset and material management
2. Improve quality
3. Minimize rework
4. Improve safety
5. Mitigate litigation
6. Improve owner's visibility
7. Win more business

Drones – The Future is Now!

Dubai Police Flying Motorbike Drone Hybrid



First Passenger Drone



Firefighting



Airbus Pod/Car/Drone



User Experience

- Questions
- Comments
- Drone use for work?



I love talking about my remote
control aircraft



I can drone on and on about it

funnyism.com

Thank You!

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