Alaskan Aviation
Fall Safety Seminar

Anchorage
Nov 15, 2014

VFR Flight into IMC
Avoiding the Trap!
VFR flight into IMC

- Pilot flies under visual flight rules (VFR) into instrument meteorological conditions (IMC)
- Departs VFR into adverse weather or continues VFR flight into gradually deteriorating weather
- Often results in:
  - Spatial disorientation (SD) & uncontrolled flight into terrain (UFIT)
  - Controlled flight into terrain (CFIT)
  - 13 in AK 2010-2013—8 CFIT, 5 SD/LOC
  - AOPA: 86% fatal vs. 19% all GA accidents
  - 8 fatal, 2 serious in AK accidents
Accident record

- 4% of U.S. GA accidents, 19% fatalities
- 6% all Canadian accidents, 26% fatalities
- 24% of all UK SE aircraft accidents

US & Canada combined:
- 1980s: About 1 accident/2 days
- 1990s: About 1 accident/week
- 2000s: About 1 accident/two weeks
160 accidents, 10 years
1.33/mo, 87% (139) fatal,
276 deaths
VFR-into-IMC accidents involve mostly:

- General Aviation (GA) Pilots
- Private Pilots
- Personal flights (about 75%)
- About half AK accidents fit profile (5 in 60s/70s)
Low-time Pilots... . .
.. . . and very experienced
commercial pilots

- >1/3 involve pilots >1,000 hours
- Alaska has highest GA & Commercial VFR-into-IMC rate in country.
- *Almost half AK accidents commercial*
- ~ 9 with **COM/ATP**
  - 5,000, 8,300, 10,000, 19,500, 25,000 hrs!
half of fatal Air Taxi accidents

two-thirds fatal Commuter accidents

Leading cause of occupational fatalities!
VFR-into-IMC accident rates for five-year period 1989 through 1993
Canada
- 20% involved pilots >3,000 flight hours
- 35% involved commercial operations
- >50% commercial CFIT were VFR-IMC

Worldwide commercial CFIT accidents
- 20% from VFR-IMC
Top Five Fatal GA Accidents
2001 -- 2011

1. Loss of aircraft control in flight (LOC-I)
2. Controlled flight into terrain (CFIT)
3. System/component failure — powerplant (SCF-PP)
4. Low altitude operations, and
5. Unknown/undetermined
VFR flight into IMC

• #1 Killer in GA Weather-related accidents

• Significant cause of fatal commercial accidents
2011-- “GA safety” on NTSB Most Wanted List

2013-- Safety Alert about dangers of flying in conditions of reduced visual references

2014-- “Hazardous Weather” in GA operations on Most Wanted List
Environmental Factors

Adverse Weather

- Poor visibility, cloud, precipitation, fog
- Less than VFR Wx minima
- Inadequate outside visual references
VFR Wx mins established allow pilots to safely maneuver A/C

Several have occurred in higher than VFR Wx minimums!
Environmental Factors

Mountainous terrain

- 40% higher accident rate in 11 western mountainous states
- 580% higher in Alaska
- Of 10 states with highest VFR-IMC rates, 8 in mountainous areas
- In Canada, over half in mountains
- 62% of U.S. registered VFR-IMC accidents in B.C & Yukon
Most AK accidents in mountainous terrain

Canada raised VFR visibility to 2 miles in mountains and later to all uncontrolled airspace below 1,000 AGL
Environmental Factors

Night

- 3X to 4X risk at night
- US and Canada raised visibility from 1 to 3 SM in uncontrolled (Class G) airspace at night
- > 3 AK accidents @ night
Strategies to Avoid a VFR-into-IMC accident
1. Always keep learning about weather

- There is ALWAYS something new to learn about weather
- Pilots are full-time students of weather
  - take a college-level meteorology course
- Practice making weather predictions -- become an amateur Wx forecaster!
- Will be easier to recognize adverse Wx
Alaska/Yukon/BC/WA/OR first targets of approaching low pressure systems
You depart **ANC** for a VFR flight to **CDV**. The sky is clear on departure, but enroute you notice high **CI** cloud coming in from the west, followed by **CS** then **AS**, then **NS**. What type of weather system is coming in?

- Warm front (typical with stable air)
Typical Warm Front

**Extensive** areas of low ceilings and visibilities

Moist Stable Warm Air

Cold Air

Miles

100 200 300 400 500
2. Establish personal Wx limits and **stick to them**

“Commercial operators specify mins in Ops Manual”

- VFR-IMC accidents occur in higher-than-VFR Wx mins
- Provide safety buffer between the “demands of the situation and the extent of your skills”
- FAA “The Art of Aeronautical Decision Making”

[faasafety.gov](http://faasafety.gov)

**Sticking to these avoids SCUD RUNNING!**
Scud running brings you dangerously close to terrain leaving few options for escape.
Multi-national study:

- VFR pilots with most liberal personal weather minimums more likely to inadvertently fly into IMC than those with more conservative ones
- Pilots overestimate vis and ceiling
- Pilots who continued into IMC had higher visibility estimates
- Many pilots (*inexperienced?*) don’t know when they are in/nearing IMC
3. Get a thorough weather briefing and updates

- Majority obtained preflight Wx brief
  - *but 41% did not!*
- The more briefings the better you will be at understanding and interpreting the weather
- Get updates **Flight Watch** (EFAS) 122.0 MHz
  - You have Wx cameras!
- If Wx deteriorating start planning **EARLY** for alternates
“You may be able to push the weather, or push the mountains, ... but you can’t push both!”
4. Be careful in the mountains!

- Mountains and moist Pacific air don’t mix!
- Giant labyrinth of very limited number of narrow winding corridors
- Dead-end and narrow valleys leave no room to perform 180°—many accidents because pilots waited too late
- Personal Wx minimums higher in mountains
- 2,000 feet and 5 SM
5. Be careful at night!

- Hard to see bad Wx!
- Personal Wx minima significantly higher at night
- Fly over well-lighted areas & min obstacle clearance altitudes or $\geq$ min IFR altitude
VFR Sectional Chart

Max Elevation Figure (MEF)

Only provides 100 to 300 feet of obstruction clearance in 30’ lat by 30’ long
Minimum Enroute Altitude (MEA) Provides navigational signal coverage and meets obstacle clearance requirements between fixes
IFR Enroute Low Altitude Chart

Off Route Obstruction Clearance Altitudes (OROCA)
Provides 1,000 foot obstacle clearance in non-mountainous terrain and 2,000 feet in mountainous terrain
5. Be careful at night!

- Monitor T/DP spread on clear nights
6. Get marginal Wx avoidance training

- Get actual experience flying in marginal Wx from experienced instructor

- Such training will help you
  - identify adverse Wx and keep your distance
  - accurately judge ceiling and visibility values
  - determine minimum safe altitudes
  - recognize a safe ‘way out’
  - not overfly visibility
  - learn techniques to conduct safe off-airport landing
  - recognize dangers of scud running
Scud running

Responsible for too many VFR-IMC accidents!
7. Get an instrument rating and stay proficient

NTSB study: non-instrument-rated pilots at 5X greater risk

- Filing IFR keeps you from scud running below the clouds

- Instrument-rated pilots also involved so stay proficient in case you need to use these skills!

- > half of the AK pilots were instrument-rated (some not instrument current)
“If you have time to spare... take to the air!”
8. Expect delays in a light aircraft

- Many pilots pushed Wx to make it on time to funeral only to make it to their own!
- *If we think we absolutely MUST be somewhere, then sooner or later we will probably die in a plane crash*
Better to arrive late in this world than early in the next!
9. Realize we are ... *biased to continue*

Trapped by the weather or

... trapped by our own thinking?

- We are subject to a variety of decision-making flaws
Optimistic & Ability Biases

- cigarette smokers
- Americans
- Drivers
- Professors!
- Most pilots believe they are less likely than others to experience a VFR-IMC accident
- Most believe they are more capable than others at avoiding or escaping IMC
Optimistic & Ability Biases

- Part of 'self-serving' biases that serve to protect our ego by painting unrealistically positive view of ourselves.

  - **Pro:**
    - seem to be good for our mental and physical health

  - **Con:**
    - attitudes of invulnerability (“it-won’t-happen-to-me” effect) and macho (“I-can-do-it”) could develop
You choose:
A. a sure win of $85
B. an 85% chance win $100

most are **risk averse** and choose A
A. a sure loss of $85
B. an 85% chance lose $100

most are *risk seeking* and choose B
Ten percent mortality is more frightening than 90 percent survival!
Framing Bias

- If we frame our go/no-go decision in terms of the *certain loss* of diverting (motel expenses, missed appointments, etc) over only a chance of a loss were we to continue (an accident), we will likely be *risk seeking* and continue pressing on.
If we frame our go/no-go decision in terms of the *certain gain* of landing safely if we divert over only a *chance of a gain* should we continue (i.e., making it to our destination), then we will likely be *risk averse* and divert.

So be careful how you frame your go/no-go decision!
Escalation/Entrapment Bias

- Student out of gas
- *We have too much invested to quit*
- NTSB (03/04), Wx-related accident 5x more likely trips >300 NM
- More VFR-into-IMC accidents occur on last leg of return trip and closer to domicile because desire to get home overrides ability to make a sound go/no-go decision—*last leg syndrome!*
- Race track long-shot bets
- *Several AK close to destination & last flight of day*
- One of many complex & unconscious factors that contribute to *get-home-itis*
2005 Study

- Alaska Air taxi operators with highest fatal accident rates employed pilots who worked on average ten hours more per week than pilots working for other operators.
Research has proven:
- decreases motivation
- increases risk taking

“Fatigue makes cowards of us all”

-Vince Lombardi
“Never fly in the same cockpit with someone braver than you!”

- Compared to other GA accidents, a significantly higher proportion of VFR-IMC accidents carry passengers on board.
- Student gas station
10. Ask, “Who’s flying my airplane anyway?”

- 11 AK flights had Pax (3 had other airplanes also)

- Without being aware, people can influence us to point where they’re making our decisions

- They don’t have to be in the cockpit with you:
  - 70% of Part 135 Alaska pilots felt pressure from others to conduct high-risk flights
  - 50% admitted to flying VFR into IMC at least once in response to these pressures
  - Dependency on air transport for many communities increases pressure
Ask yourself:

“Who’s flying my airplane anyway?”

...me or someone else — a passenger, a customer, my boss?”
11. Don’t be afraid to ask for help

- Don’t wait until it is too late to ask ATC/FSS for assistance
- ATC can provide vectors, minimum altitudes, IFR clearance, etc.
- Don’t be more afraid of possible FAA repercussions than hazardous Wx itself!
- FAA has a fairly forgiving attitude
- Which is worse: talk with FAA or accident?
12. Consider a precautionary landing

- If filing IFR is not possible, this option has saved many pilots when weather has closed-in around them.
- Landing in a field may be your best option.
A superior pilot uses his superior judgment to avoid situations which require the use of his superior skills.

~Frank Borman - Apollo 8
In the soup?

- Maintain aircraft control using flight instruments
- Perform a 180-degree turn
- If high terrain, climb
- Declare an emergency
“Good judgment comes from experience, …and a lot of that comes from bad judgment!”

-Will Rogers
Summary

- Learn to recognize adverse Wx before you get into it
- Stick to your personal Wx minimums--especially at night or in mountains
- Get and instrument rating and stay proficient
- Recognize your own thinking is not always rational and we are biased to continue
Summary

- If it doesn’t feel right it probably isn’t--no matter what others may say
- Don’t be afraid to ask for help

If in doubt, ... wait it out!
It will pass... wait it out!
If you crash because of weather, you can be sure that your funeral will be held on a sunny day.
“Better to be safe 100 times .. than dead once”

Mark Twain?
Learning to Fly Takes Hours...
Learning When Not to Takes Years
www.ASA2fly.com

See Chapter 4 “Pushing Weather”
VFR into IMC
Helping students avoid GA's number one killer

A major reason pilots, especially inexperienced ones, continue flying into deteriorating weather is their inability to determine when they are in or nearing IMC.
Thank You!

Dale Wilson
Department of Aviation
Central Washington University
400 East University Way
Ellensburg, WA 98926-7515

Phone: 509/963-2298
Email: wilsond@cwu.edu
Web: www.cwu.edu/aviation