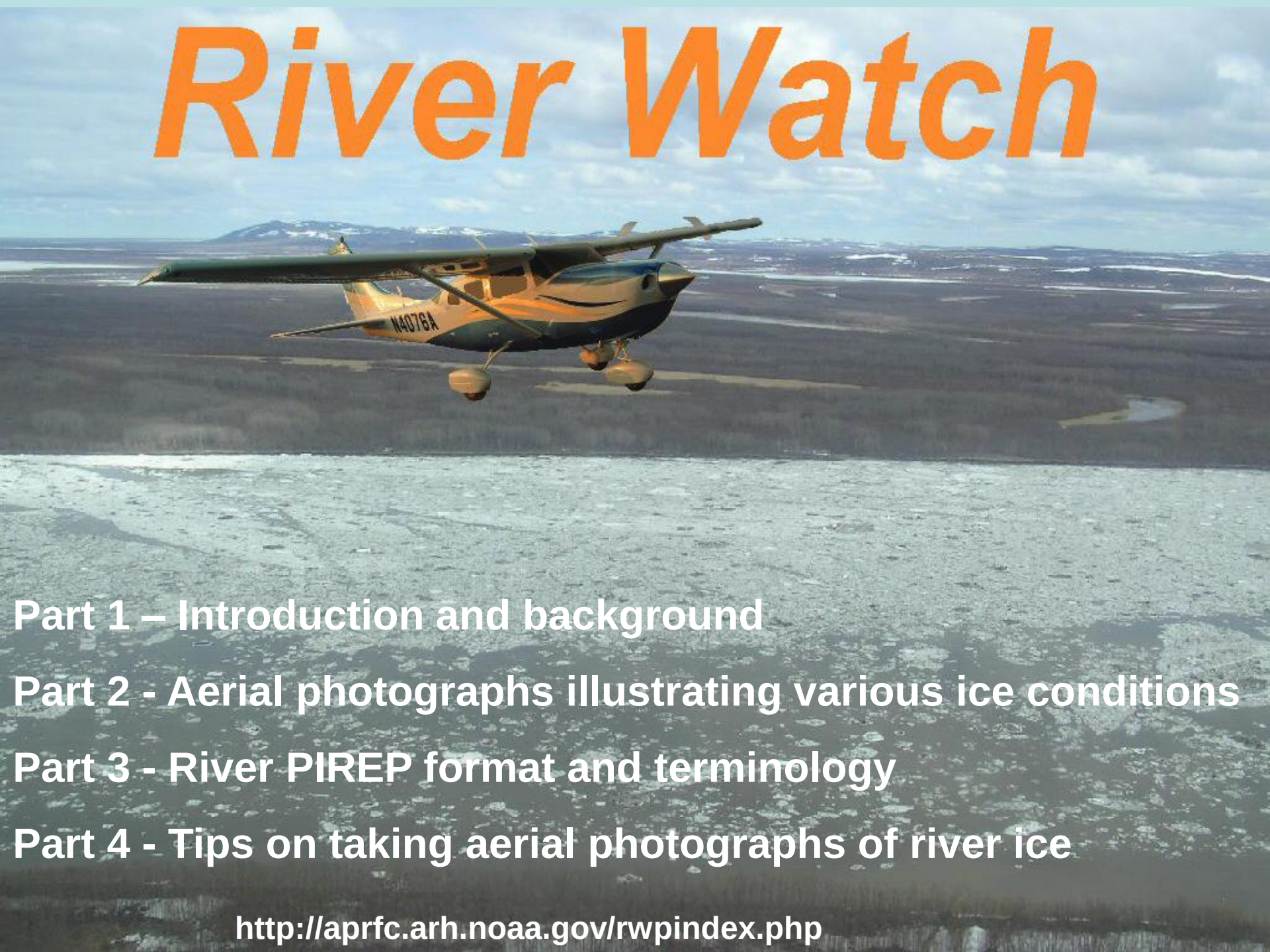
River Watch



Part 1 – Introduction and background

Part 2 - Aerial photographs illustrating various ice conditions

Part 3 - River PIREP format and terminology

Part 4 - Tips on taking aerial photographs of river ice

http://aprfc.arh.noaa.gov/rwpindex.php

BACKGROUND

- National Weather Service (NWS) monitors ice breakup conditions throughout Alaska to assess flood threats and navigational hazards
- Past monitoring capabilities leave large voids in river and lake ice conditions…

✓ A monitoring program conducted in conjunction with Alaska Division of Homeland Security and Emergency Management in chartered aircraft is only done in specific locations when flood threat is high

✓ Observers in villages along rivers can provide a ground based view only in front of their village

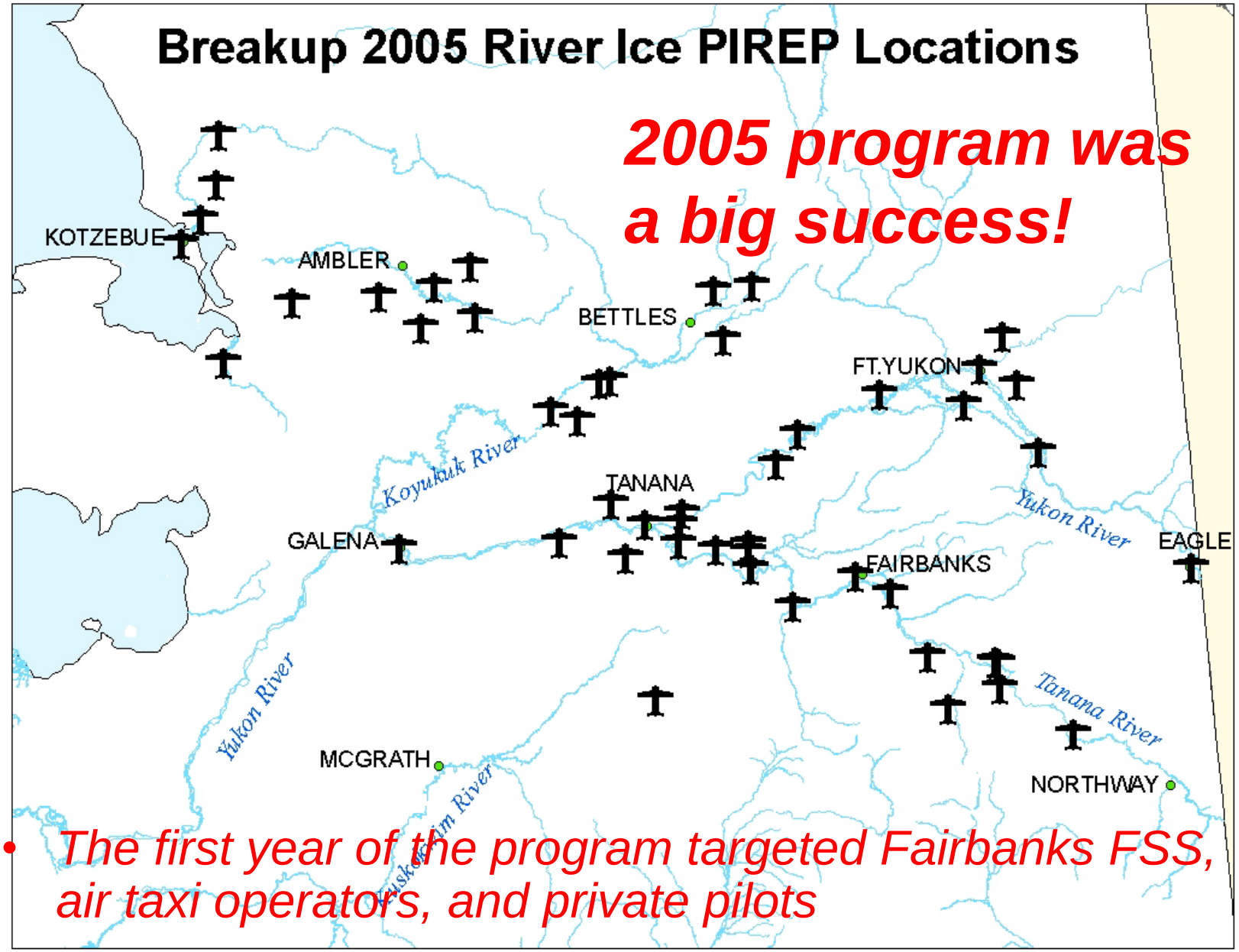
✓ Satellite images can provide some broad information on larger rivers, but lack the resolution to fully understand the ice conditions

- Supplemental aerial observations from aircraft flying at lower altitudes can significantly enhance the spatial and temporal coverage of information on ice characteristics

RIVER WATCH PROGRAM

- A voluntary program asking pilots to report observed river conditions
- Requesting observations that can be obtained without deviation from the normal route or flight level
- Purpose of program is to assist the NWS in providing accurate forecasts, warnings, and navigation information
- Standard method of reporting is to submit pilot report to FAA’s Flight Service Stations by radio

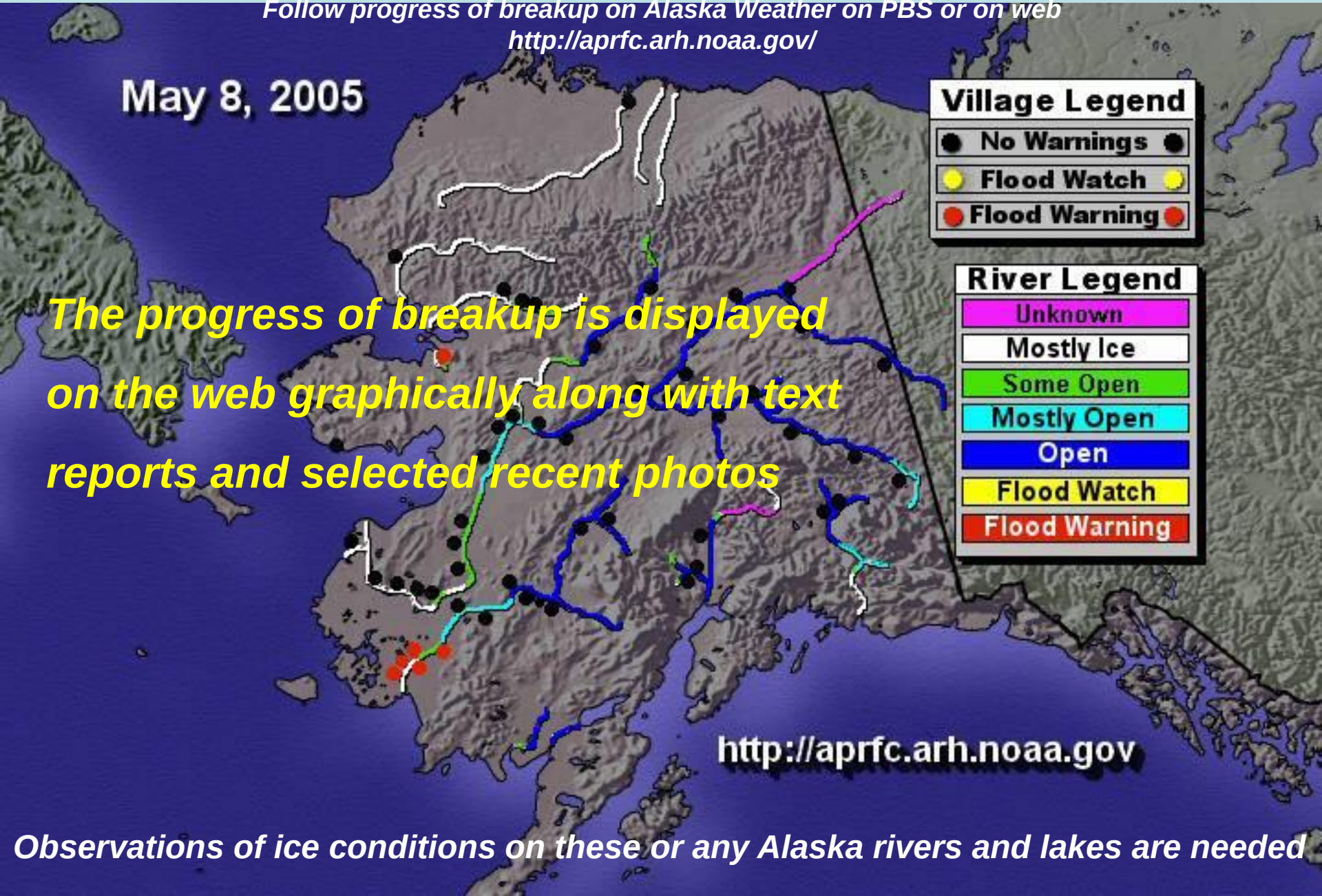
2005 RIVER WATCH PROGRAM



- *The first year of the program targeted Fairbanks FSS, air taxi operators, and private pilots*

FEEDBACK - COMPILATION OF OBSERVATIONS

Follow progress of breakup on Alaska Weather on PBS or on web
http://aprfc.arh.noaa.gov/



The progress of breakup is displayed on the web graphically along with text reports and selected recent photos

Observations of ice conditions on these or any Alaska rivers and lakes are needed

FEEDBACK - SEARCH REPORTS ON WEB

http://aprfc.arh.noaa.gov/php/rivnotes/searchnotes.php

River Notes Database Search

These are unoffical remarks which may not have been quality controlled.
Search by using one of the choices below

Select by River:	Select a River	submit	2006	◉ Date ○ Location
Select by Location:	Select Location	submit	2006	◉ Date ○ River
Select All and order by :	Select Value	submit	2006	
Select All PIREPS and order by :	Select Value	submit	2006	
Search database remarks by a single text word :	Enter Text Here	submit	2006	

Pireps with RIV in remarks are below and are updated each hour - Pireps in database above are entered between 6am and 5pm

Last ran at Thu Mar 30 19:08:01 UTC 2006

Pireps on 03 30 06

UAAK04 KAWN 301700SMU UA /OV GAL 045010/TM 1736/FL045/TP C182/SK CAVU/TB NEG/RM YUKON RIV HARD ARCHED ICE =

Pireps on 03 29 06

Pireps on 03 28 06

Pireps on 03 27 06

TRAINING RESOURCES

Program web site…

http://aprfc.arh.noaa.gov/rwpindex.php

- View River Watch Program Presentation
- Download River Watch Program Presentation
- Text Description of River Breakup
- Maps with River Miles
- **Download River Ice Pilot Report Remarks Checklist...**MS Word **or** Adobe pdf
- Search Observations

Email us about this program:

- Submit an ice report or digital photo
- Submit a comment or question about the program

CONTACT INFORMATION

River Forecast Center - Larry Rundquist
larry.rundquist@noaa.gov 266-5152

Service Hydrologist (FAI) – Ed Plumb
edward.plumb@noaa.gov 458-3714

Aviation Focal Point – Brad Sipperley
brad.sipperley@noaa.gov 458-3708

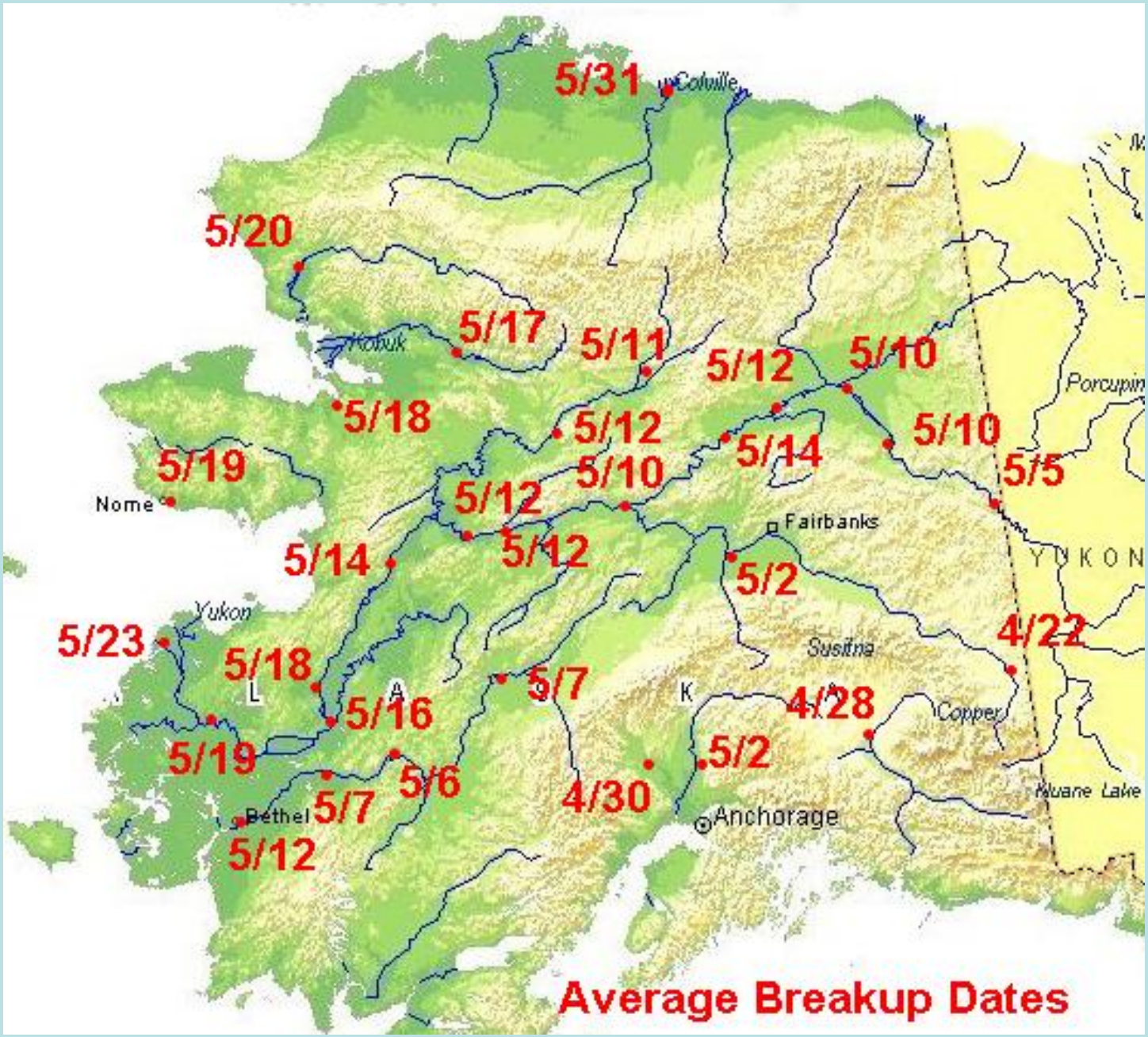
http://aprfc.arh.noaa.gov/rwpindex.php

Part 2 - Aerial photographs illustrating various ice conditions

- Breakup process varies somewhat with river size and with latitude in Alaska
- Great variability is common in ice conditions… the objective in the river PIREP is to report the predominant condition or use qualifiers (ocnl, few, mostly, etc)

Aerial photographs courtesy of APRFC staff, partner agencies, and participating commercial and private pilots

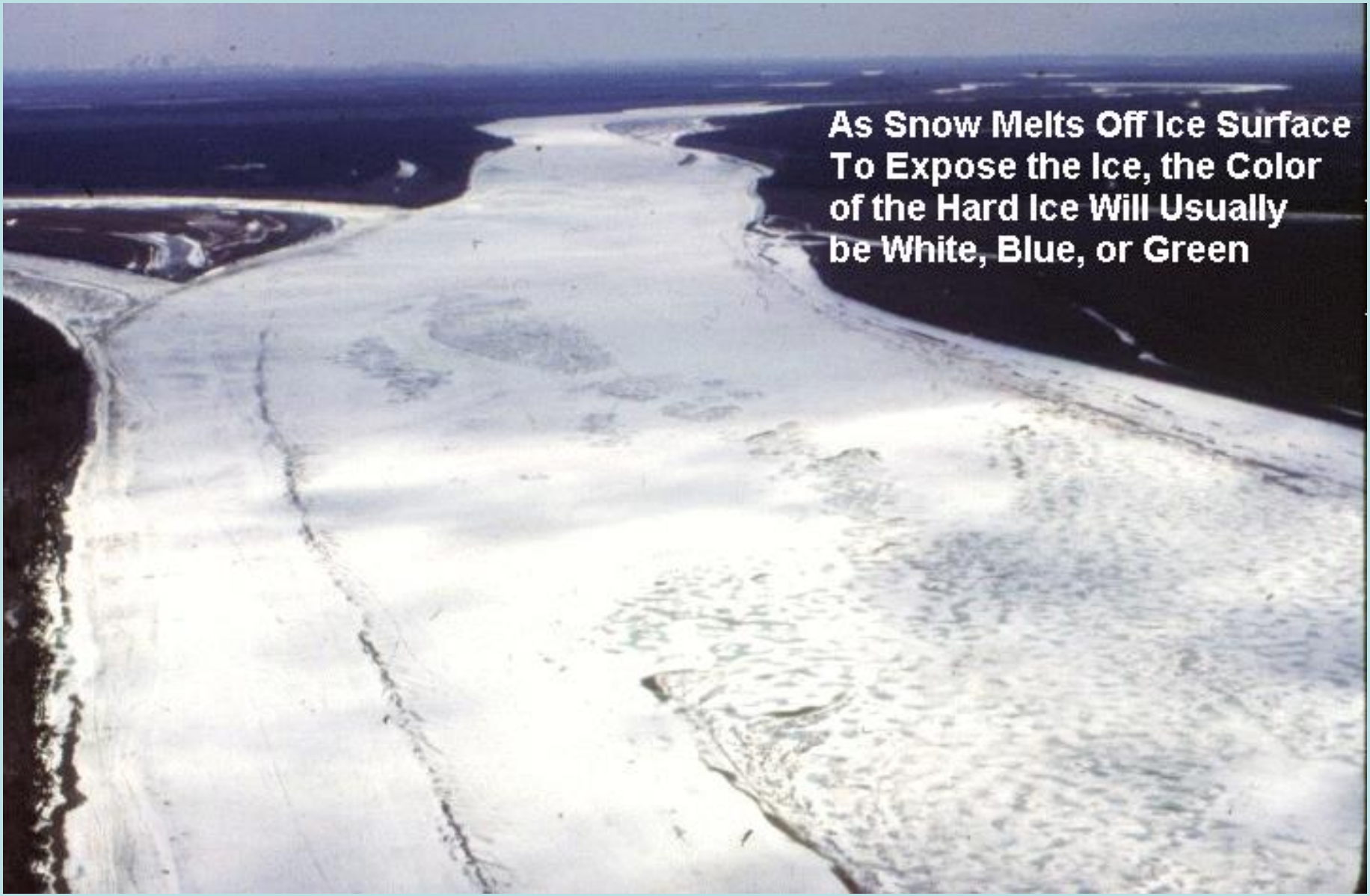
Breakup Timing



PRE-BREAKUP CONDITIONS

- **Unbroken ice** – continuous ice surface that has few if any cracks
- **Arched ice** – ice that is attached to the banks, which rises in the center of the channel due to increased flow beneath the ice causing melt water to collect in channels along the banks
- **Lifted ice** – ice that has broken from the banks and is floating on the river water, but is not moving; usually has river flow along both sides
- **Shifted ice** – large ice sheets that have moved short distances from their original locations as rising water levels create wider areas of open water into which the ice can move
- **Open reach** – a length of river channel with no ice that results from ice shifting a short distance down river
- **Open lead** - A narrow channel of open water in the ice
- **Snow on ice** – snow on the ice surface that appears white from the air
- **Clr water on ice** – snow on the ice surface that is melting and forming pools of water
- **Hard ice** – strong ice that appears white, blue or green
- **Rotten ice** – weak ice that appears black or brown

UA/…/RM YUKON RIV HARD UNBKN W/ SNOW ON ICE



Unbroken ice – continuous ice surface that has few if any cracks

/OV format – Point or Segment

UA/…/RM YUKON RIV UNBKN MOSTLY ROTTEN ICE

Rotten ice – weak ice that appears black or brown

/OV format – Point or Segment

UA/…/RM YUKON RIV ARCHED ICE

Arched ice – ice that is attached to the banks, which rises in the center of the channel due to increased flow beneath the ice causing melt water to collect in channels along the banks

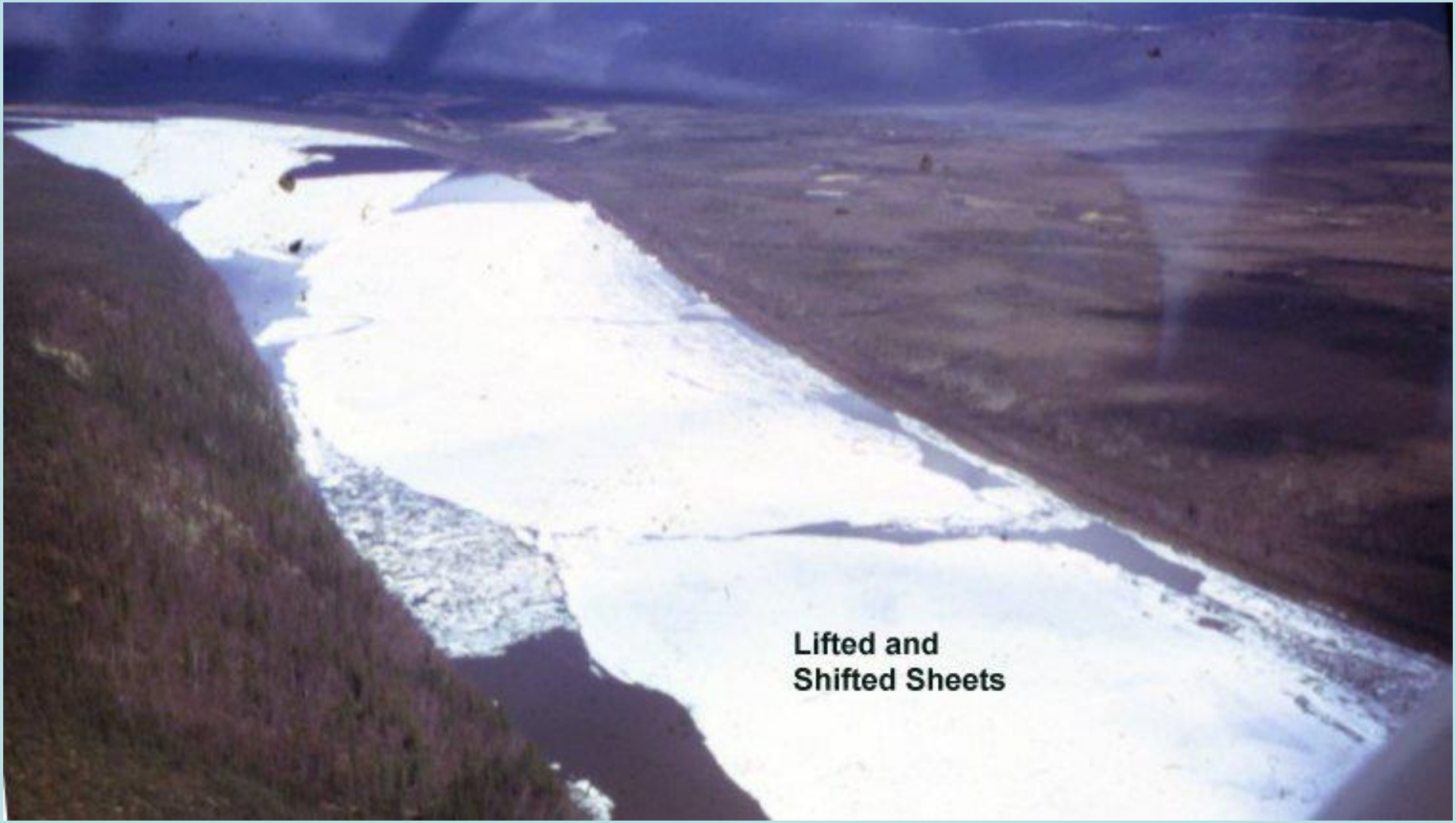
/OV format – Point or Segment

UA/…/RM SUSITNA RIV LIFTED AND ROTTEN

Lifted ice – ice that has broken from the banks and is floating on the river water, but is not moving; usually has river flow along both sides

/OV format – Point or Segment

UA/…/RM YUKON RIV HARD LIFTED AND SHIFTED SHEETS



Shifted ice – large ice sheets that have moved short distances from their original locations as rising water levels create wider areas of open water into which the ice can move

/OV format – Point or Segment

UA/…/RM COLVILLE RIV UNBKN W FLOW ON ICE

Flow on Ice – Most common on small rivers and North Slope rivers as ice attached to the banks or bed collects the increasing snowmelt flow from the basin

/OV format – Point or Segment

UA/…/RM KOGOLUKTUK RIV UNBKN W FLOW ON ICE; SOME OPEN

Flow on Ice – Most common on small rivers and North Slope rivers as ice attached to the banks or bed can not accommodate the increasing flow under the ice

/OV format – Point or Segment

UA/…/RM KOBUK RIV SNOW ON ICE W OPEN LEAD

Open lead - A narrow channel of open water in the ice

/OV format – Point or Segment

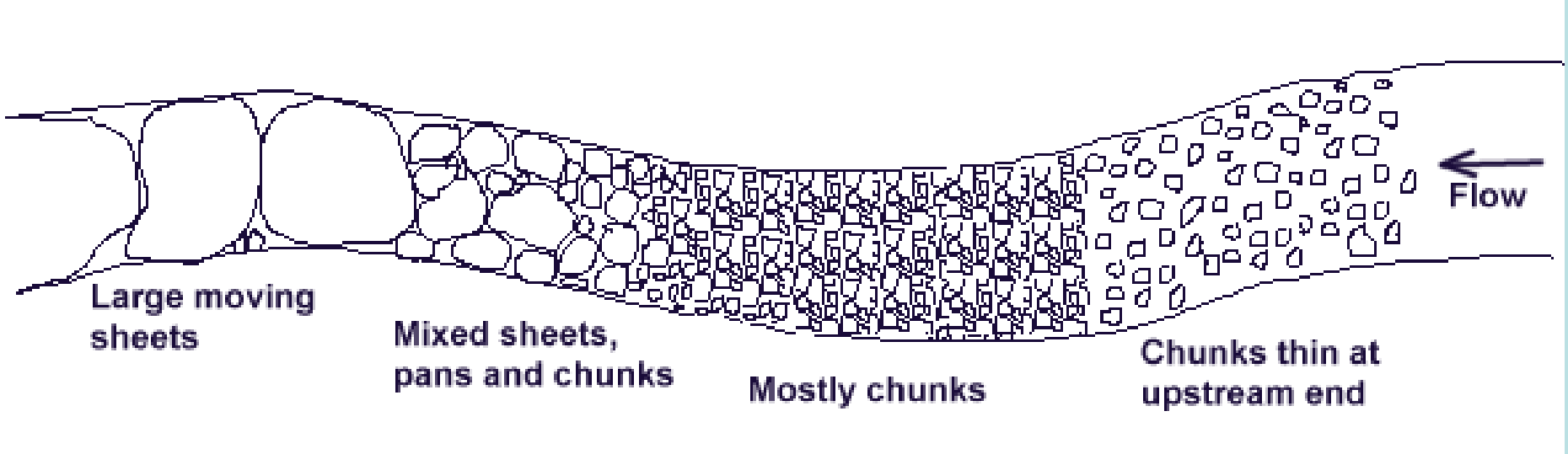
MOVING ICE CONDITIONS

- **Ice run** – a continuous length of moving ice that may be up to 10's of mi in length; typically grades from large ice pieces at downstream end to small ice pieces at upstream end
- **Breakup front** – location along river where ice is moving upstream and not moving downstream
- **Ice sheets** – large pieces of ice with length greater than width and width > 50% of river width
- **Ice pans** – pieces of ice that are 10 to 50% of the river width in size
- **Ice chunks** – small pieces of ice that are <10% of the river width in size

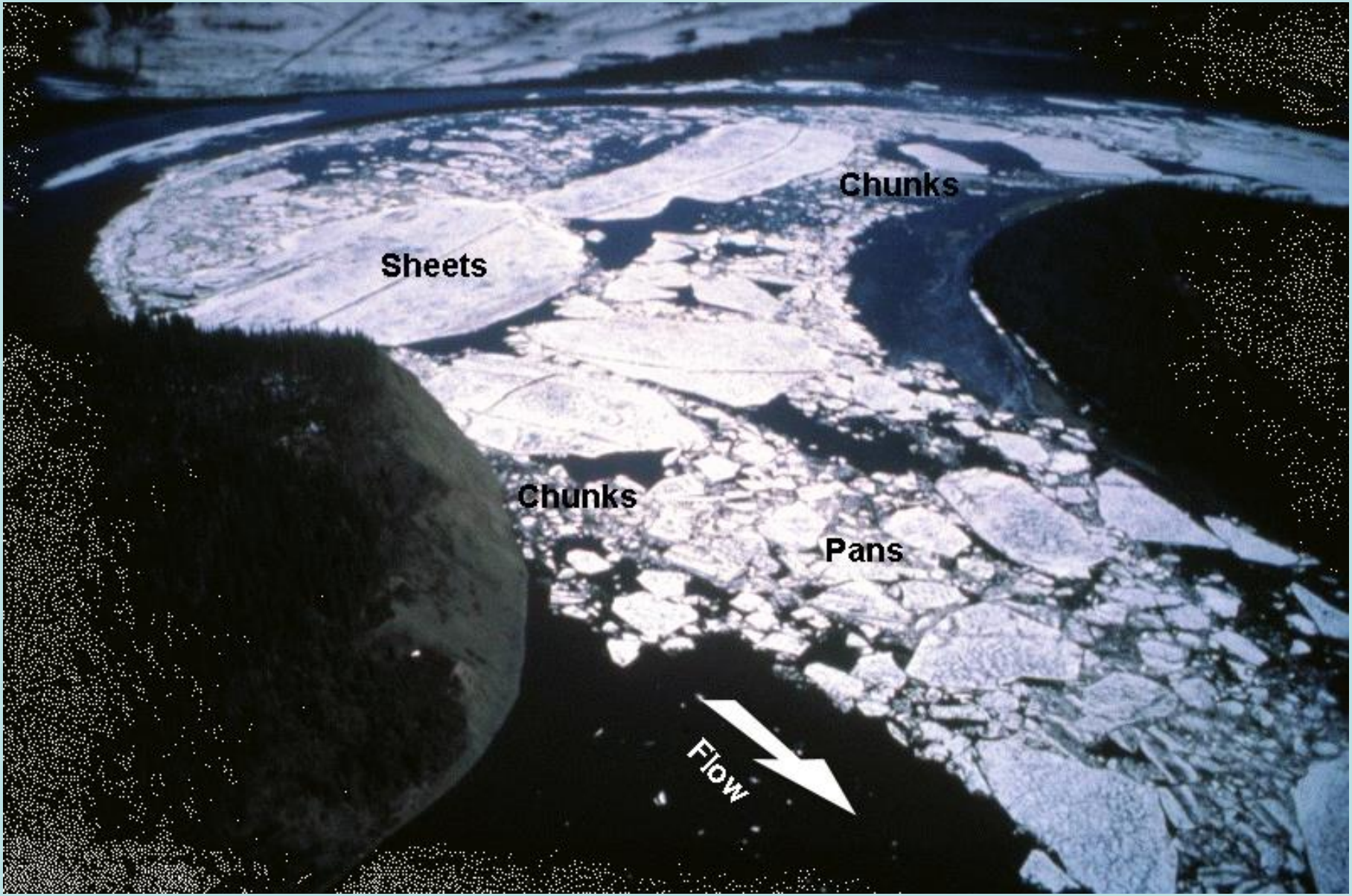
TYPICAL RUN OF ICE

May be 10-20 miles in length

- ***Reach of large moving sheets (nr breakup front)***
- ***Reach of mixed sheets, pans, and chunks***
- ***Reach of mostly chunks***
- ***Subsequent runs are mainly chunks***



UA/…/RM YUKON RIV HVY MXD RUN



Ice run – a continuous length of moving ice

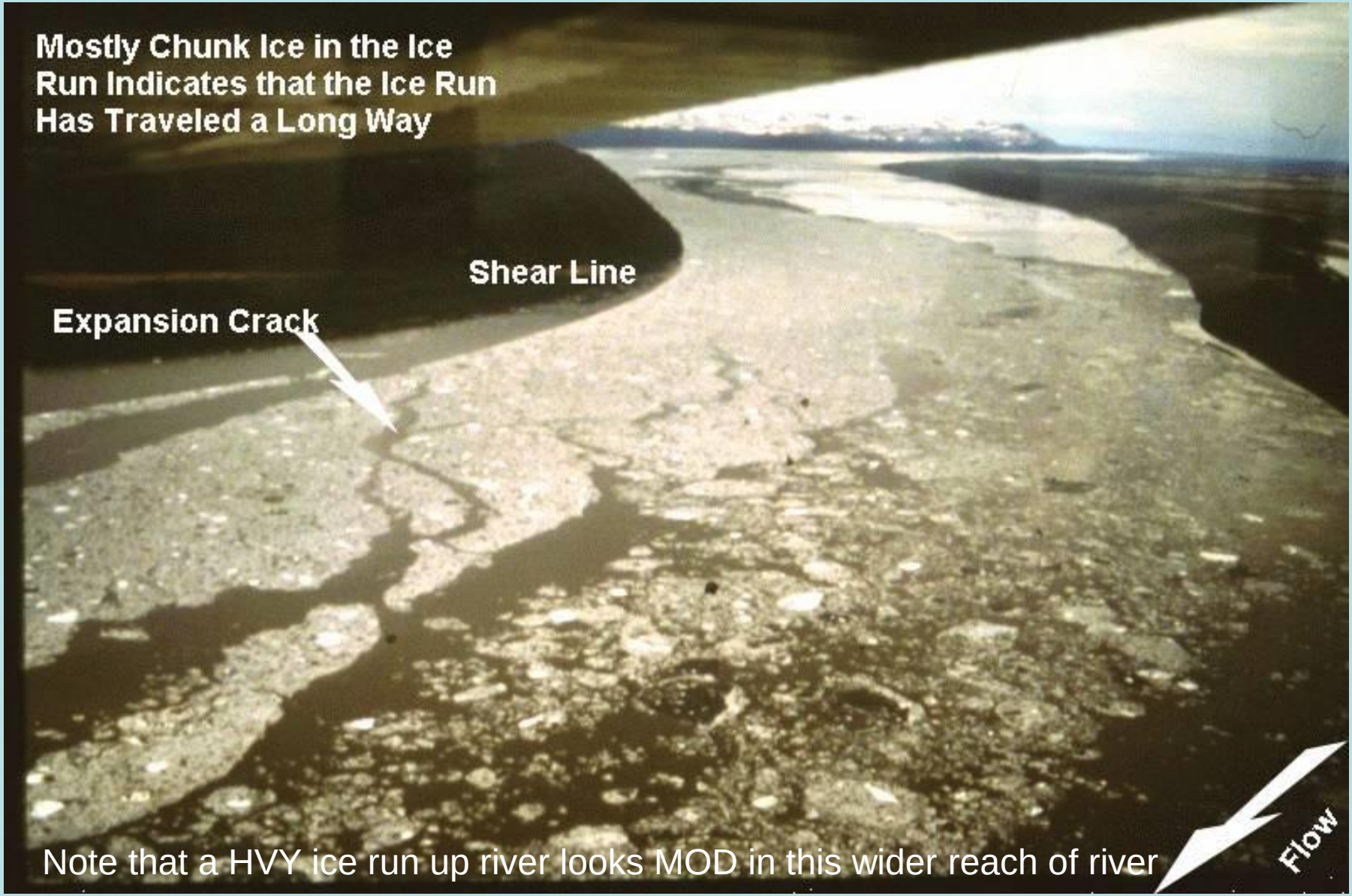
/OV format – Point or Segment

UA/…/RM YUKON RIV HVY RUN MOSTLY CHUNKS BTWN RBY-GAL

Ice run – a continuous length of moving ice

/OV format – Point or Segment

UA/…/RM YUKON RIV HVY 8 MILE LONG ICE RUN

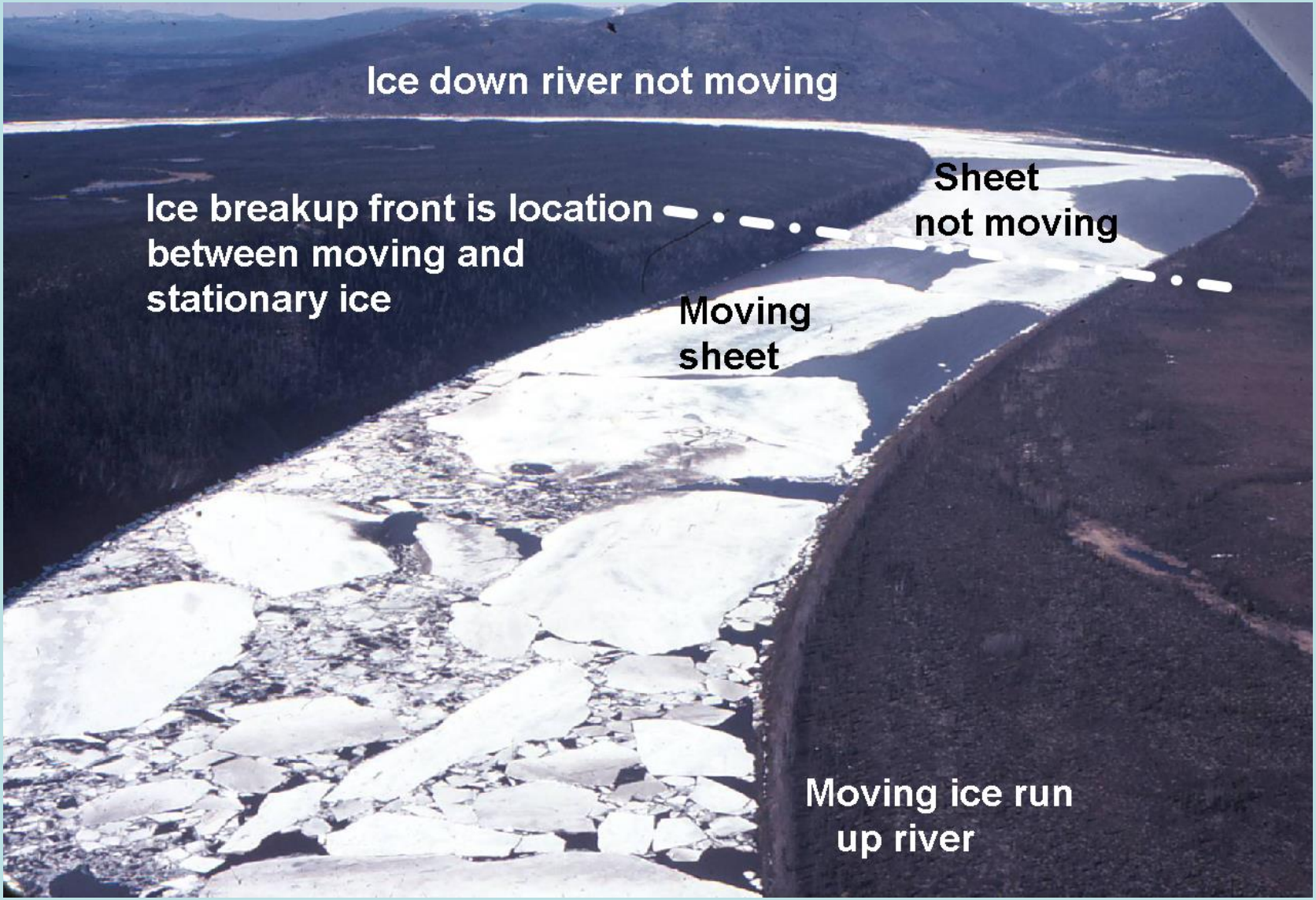


Note that a HVY ice run up river looks MOD in this wider reach of river

Ice run – a continuous length of moving ice

/OV format – Point or Segment

UA/…/RM YUKON RIV BREAKUP FRONT

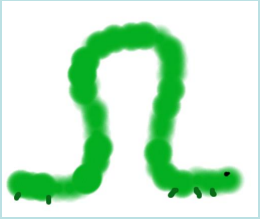


Breakup front – location along river where ice is moving upstream and not moving downstream

/OV format – Point only

ICE BREAKUP FRONT

- ***Breakup date and time is when breakup front passes a location***
- ***Flood threat due to an ice jam is greatest just after breakup front passes village***
- ***Can be difficult to differentiate between breakup front and an ice jam***



The ice breakup front can move down river like an inchworm… the front may stall out temporarily to wait for the back end to catch up… this would not be called an ice jam

Look for a significant amount of the ice run packing in up river from the location where the breakup front stopped… this would be an indication of an ice jam

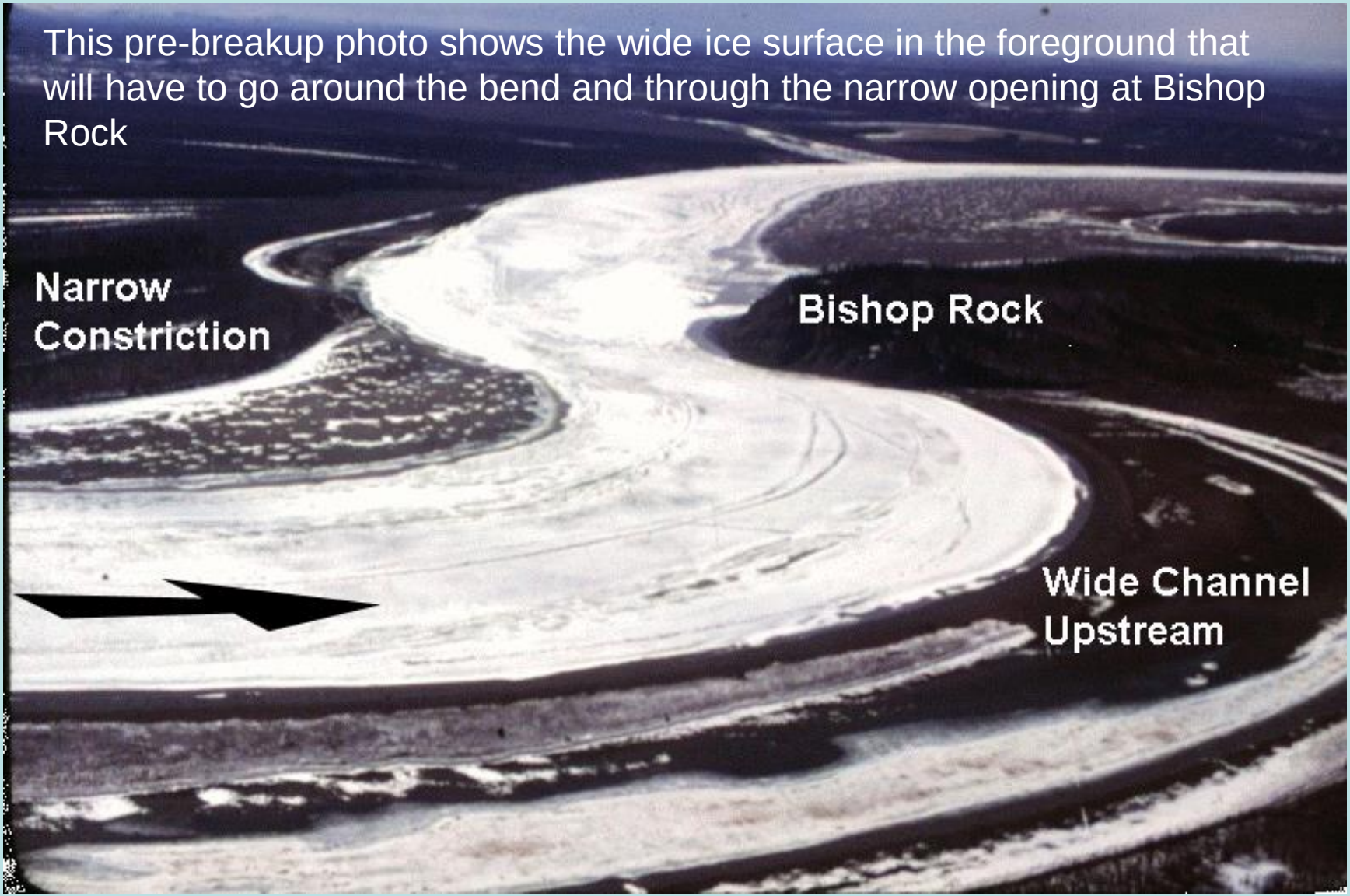
ICE JAM CONDITIONS

- **Ice jam** – an ice run that has stopped moving due to any of a variety of reasons; characterized by a long reach of tightly packed chunk ice
- **Ice jam flood** – water spreading over the banks up river from an ice jam
- **Village flood** – water spreading into a village that covers roads or threatens buildings
- **Widespread flooding** – water that has gone over the banks and covered vast areas of land that are normally dry

BREAKUP JAM

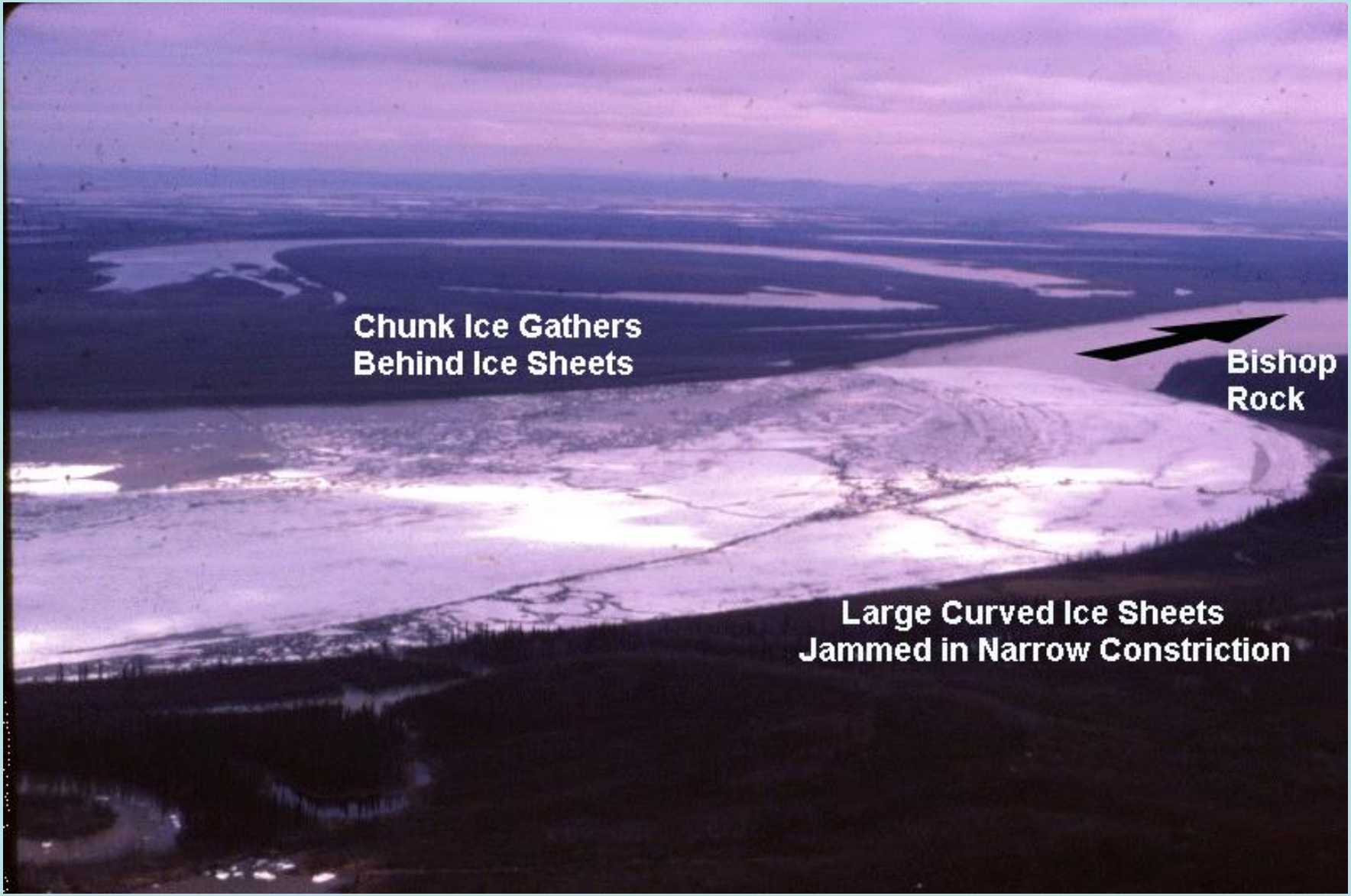
- ***Forms when breakup front encounters a competent ice sheet or constriction***
- ***May be surface, thickened, or hanging, depending on speed of ice movement***
- ***Flood threat upstream varies with type of jam***
- ***Stream level can increase very rapidly upstream of a jam***
- ***Flood threat is greatest just after breakup front passes village***

UA/…/RM YUKON RIV BISHOP ROCK UNBKN; MELTING SNOW ON ICE



Historic ice jam problems at Bishop Rock on Yukon and below Aniak on Kusko

UA/…/RM YUKON RIV BISHOP ROCK APPARENT ICE JAM



Ice jam – an ice run that has stopped moving due to any of a variety of reasons; characterized by a long reach of tightly packed chunk ice

/OV format – Point only

UA/…/RM NULATO RIV SM ICE JAM W OPEN ABOVE AND BELOW

Ice jam – an ice run that has stopped moving due to any of a variety of reasons; this very small jam has broken sheet ice holding back a small run of chunk ice

/OV format – Point only

ICE JAM THREAT LOCATIONS

- Ice jams can occur at any location
- Historic ice jam problems at Bishop Rock on Yukon and below Aniak on Kusko
- Threats also associated with ice conditions at and up to 10 miles down river from…

➢ *Eagle, Circle, Fort Yukon, Galena, Koyukuk, Nulato, Russian Mission, Pilot Station, and delta villages on the Yukon*

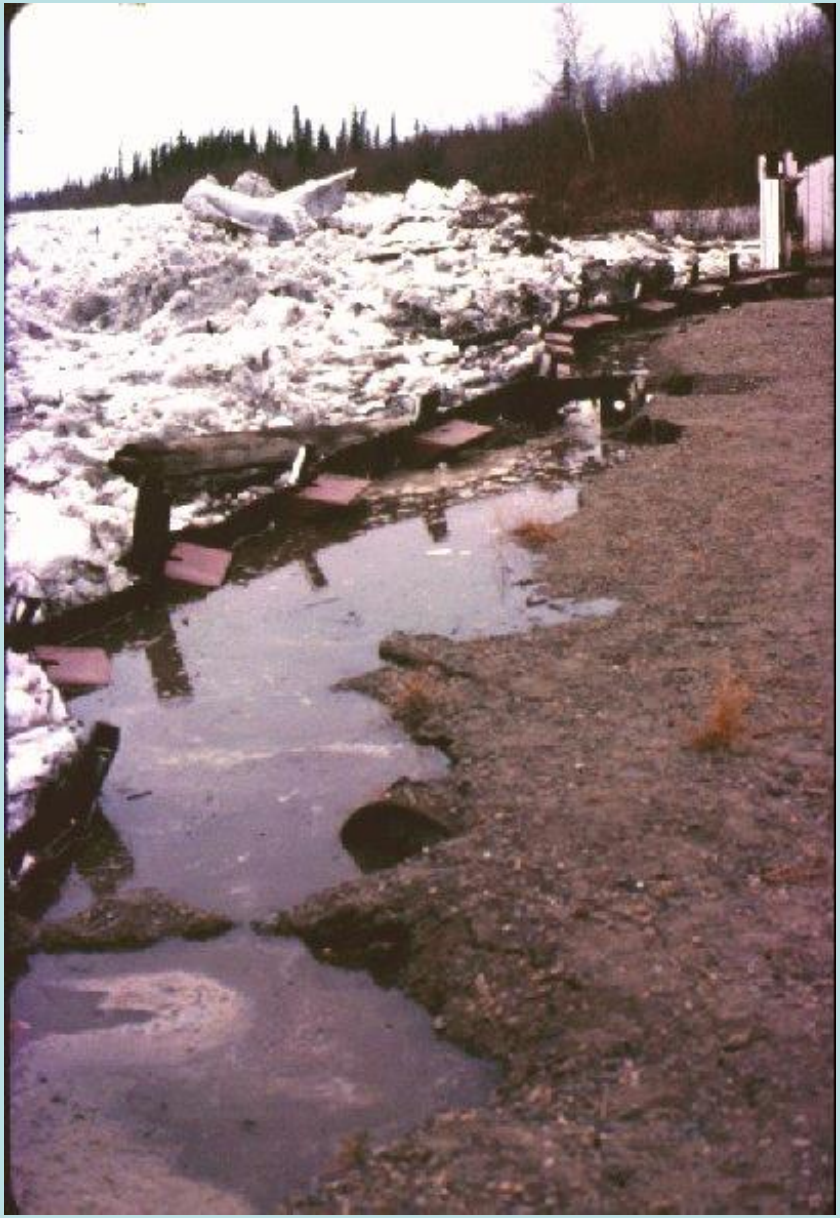
➢ *McGrath, Sleetmute, Red Devil, Crooked Creek, Akiak, Kwethluk, and Bethel on the Kusko*

➢ *Kobuk on the Kobuk and Buckland on the Buckland*

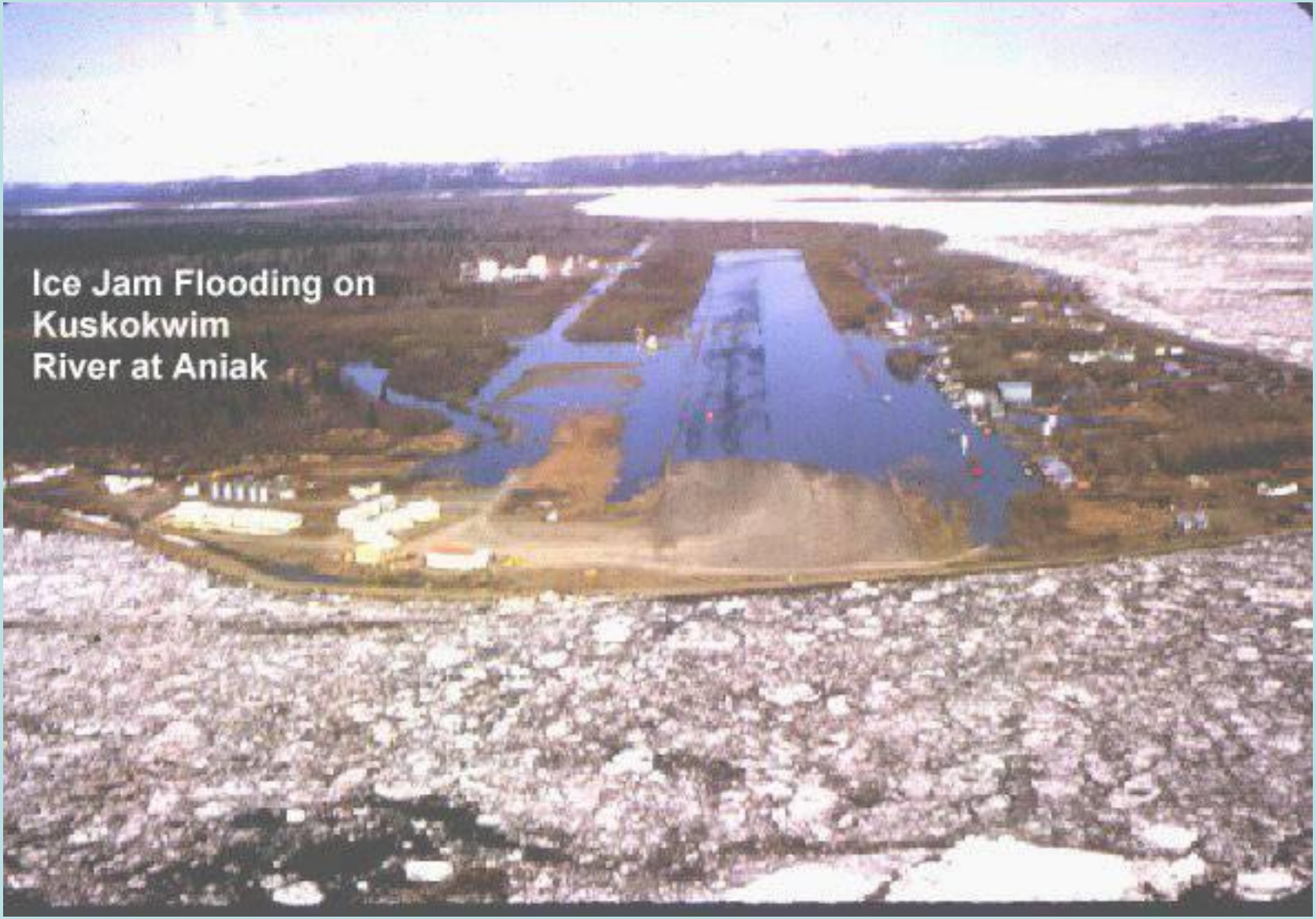
ICE JAM IMPACTS

Upstream from the jam...

- ***Fast water level rise***
- ***Packed ice chunks***
- ***Potential flooding***



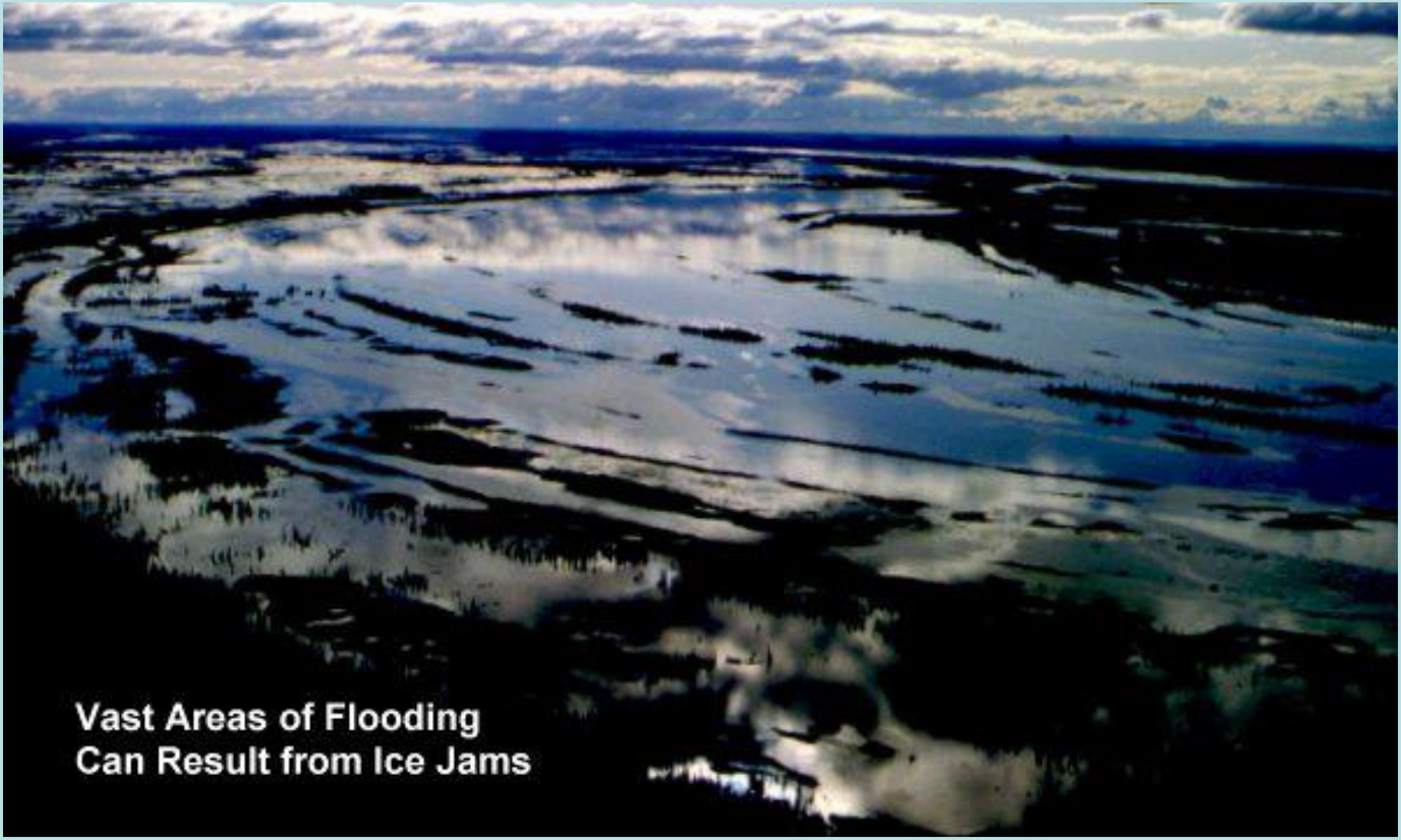
UA/…/RM KUSKO RIV ANI VILLAGE AND RWY (10% USABLE) FLOODING



Village flood – water spreading into a village that covers roads or threatens buildings

/OV format – Point or Segment

UA/…/RM YUKON RIV WIDESPREAD FLOODING



Widespread flooding – water that has gone over the banks and covered vast areas of land that are normally dry

/OV format – Point or Segment

POST-BREAKUP CONDITIONS

- **Stranded ice** – ice pushed onto the banks or into side channels that is left behind after the ice has cleared out of the main channel
- **Open channel** – no ice in the main channel of the river
- **Ice or debris run** – a length of river channel containing moving ice or debris (trees, brush, etc) that is further categorized by amount…

❖ **Light run** – 1 – 25% of surface covered

❖ **Moderate run** – 25 – 75% of surface covered

❖ **Heavy run** – 75 – 100% of surface covered

UA/…/RM YUKON RIV MOD ICE RUN HVY STRANDED ICE ON SHORE

Ice or debris run – a length of river channel containing moving ice or debris (trees, brush, etc)

/OV format – Point or Segment

UA/…/RM YUKON RIV LGT ICE RUN

Ice or debris run – a length of river channel containing moving ice or debris (trees, brush, etc)
/OV format – Point or Segment

UA/…/RM KOYUKUK RIV OPEN HVY STRANDED ICE ON SHORE

Stranded ice – ice pushed onto the banks or into side channels that is left behind after the ice has cleared out of the main channel

/OV format – Point or Segment

UA/…/RM KOYUKUK RIV OPEN MOD STRANDED ICE ON SHORE

Stranded ice – ice pushed onto the banks or into side channels that is left behind after the ice has cleared out of the main channel

***/OV* format** – Point or Segment


ANY
QUESTIONS????

Part 3 - River PIREP format and terminology

- Pilots are familiar with pilot reports (PIREPS) for documenting weather impacts to flight
- River PIREPS supplement a normal PIREP with observations of notable or changing conditions on a river
- Although river PIREPS can be given at any time of year for any condition, this presentation concentrates on ice breakup observations
- Lake ice information can also be included in a river PIREP

PIREP FORMAT

- UA or possibly UUA for severe flood report
- /OV - Point or route segment format
- /TM – UTC time of event observed
- /FL – Assists weather evaluation and observation resolution
- /TP – Assists weather evaluation
- /SK – Assists weather evaluation
- /WX – Assists weather evaluation
- /TA – Assists weather evaluation
- /WV – Assists weather evaluation
- /TB – Assists weather evaluation
- /IC – Assists weather evaluation
- /RM – Heart of the river report

Items highlighted in red are considered to be the most important part of the PIREP for use in river ice assessments but weather reports are encouraged

/OV – LOCATION FORMAT

- Point format (e.g. /OV MCG18030) is useful to describe specific location of an ice feature such as breakup front, ice jam, downstream end of ice run or flooded village
- Segment format (e.g. /OV SRV-SLQ) is useful to describe ice or flooding conditions along a reach of river

/RM - REMARK FORMAT

- /RM *name* **RIV** *description*, where…
  - *name* is the name of the river or lake
  - **RIV** is a key identifier for the NWS and should be included even if it is observations of lake ice
  - *description* is an abbreviated description of the observed ice conditions

For Example….

FAI UA/OV GAL270013/TM 2355/FL060/TP C207/RM YUKON RIV BISHOP ROCK APPARENT ICE JAM

STANDARD RIVER PIREP REMARKS

PRE-BREAKUP CONDITIONS

GENERAL

- **UNBKN**
- **ARCHED**
- **LIFTED**
- **SHIFTED**
- **OPEN**

SUPPLEMENTAL

- **HARD**
- **ROTTEN**
- **SNOW ON ICE**
- **CLR WATER ON ICE**
- **MUDDY WATER ON ICE**
- **OPEN HOLES**
- **OPEN LEADS**
- **FLOW IN SIDE CHAN**
- **FLOW ON ICE**

STANDARD RIVER PIREP REMARKS

MOVING ICE

GENERAL

- **BU FRONT**
- **ICE RUN…**
  - **MIXED**
  - **SHEETS**
  - **PANS**
  - **CHUNKS**
- **X MI ICE RUN (LENGTH = X)**

ICE RUN DENSITY

- **HVY (75-100%)**
- **MOD (25-75%)**
- **LGT (1-25%)**

STANDARD RIVER PIREP REMARKS

ICE JAM AND FLOODING CONDITIONS

ICE JAMS

- **APPARENT ICE JAM**
- **ICE JAM**

FLOODING

- **VILLAGE NAME FLOODING**
- **RWY FLOODING (% USABLE)**
- **WIDESPREAD FLOODING**
- **LOW-LYING FLOODING**

Part 4 - Tips on taking aerial photographs of river ice

Prepared by Tom George
Alaska Regional Representative
Aircraft Owners and Pilots Association

Overview

- Tips on taking pictures
- Transmitting pictures via e-mail to the River Forecast Center

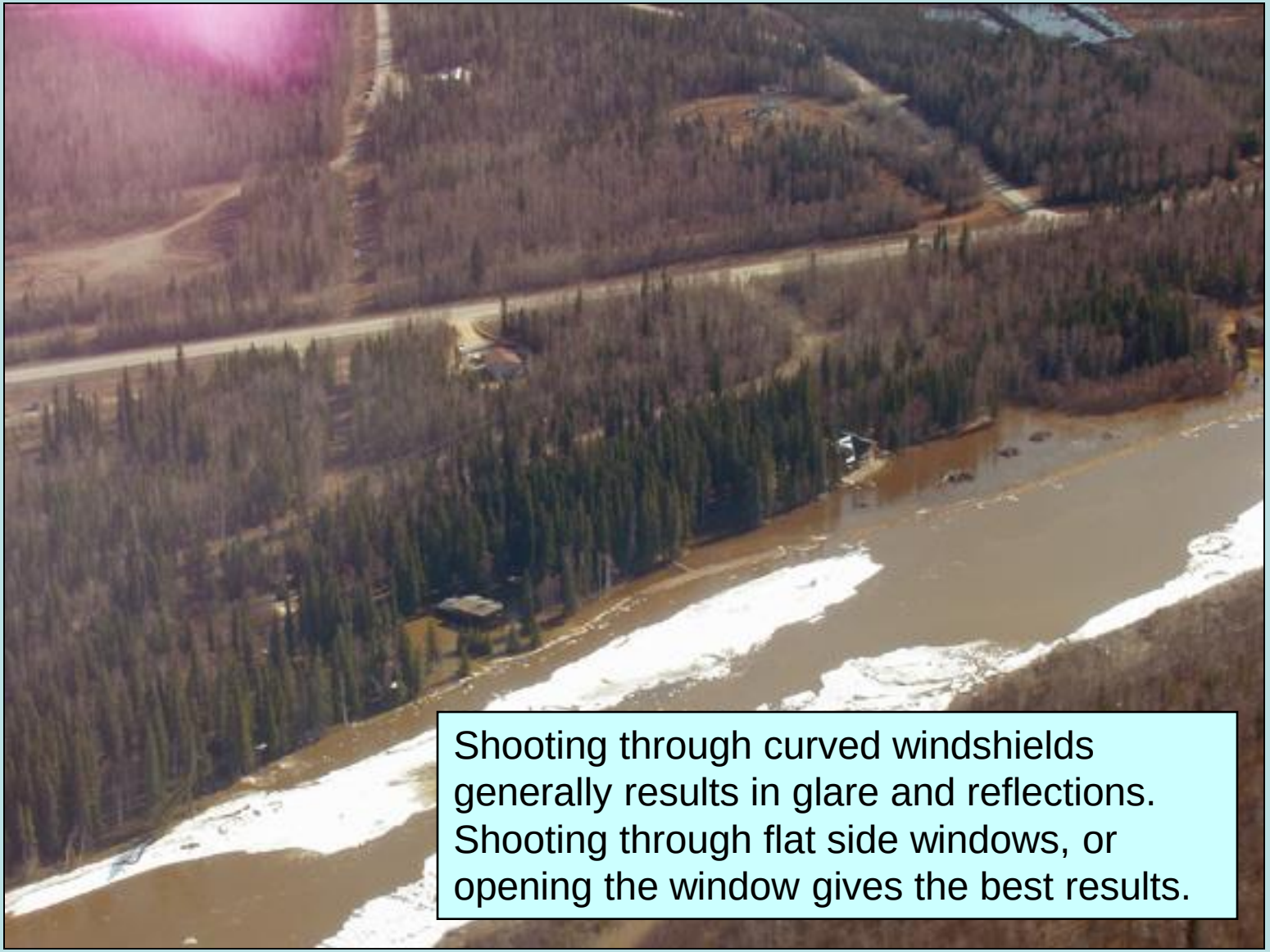
Tips on photographing

- Don’t wear *bright clothing* which may reflect in the windows of the aircraft
- Keep upper body away from airframe to avoid transmitting vibrations to the camera
- Use a *high shutter speed* to avoid image motion
- If possible, *open the aircraft window* to improve the quality of the images—check with the pilot first!
- Use an *intercom system* to aid communications between pilot and photographer

When photographing into the sun, “forward scattering” tends to enhance haze and obscure ground features.


Sun direction
Shooting “down sun” minimizes haze, resulting in a sharper image.

Glare and reflections



Setting up the picture

- Identify the feature you plan to photograph
- Consider the lighting
- Consider the best angle to show the feature
- Position the aircraft relative to the target
  - Typically, behind the strut on the photographer's side of the aircraft
- Take the photograph
- Record the location, time and other significant features:
  - Ice type, jam, flooding, etc.

Flooding impact

Wait for the target…

Too far to see detail

Good detail and reference locations

Focal length of camera

Wide angle shot

Zoomed in telephoto image

- Use wide angle lens to show larger area
- 35 mm lens on a 35 mm film camera
- Easier to:

  -See the “big picture”

  -Identify land marks

Viewing angle

- Generally better to shoot up or down stream
- Cross stream is harder to:

  -Establish location

  -See ice details

Flight altitude

- ~3,000 feet ***above ground level*** is a good altitude for general observations
- Lower shows more detail, but a lot less area
- Higher is some times useful to show the “big picture”


Example:
Tanana River, looking upstream, into the sun, from ~3,000 feet agl.


Example:
Confluence Chena and Tanana, down sun, ~3,000 feet agl.

Transmitting digital pictures to NWS River Forecast Center

- Images and text transmitted via e-mail:
- Image size ~ 7 x 10 inches, 100 pixels/inch
- Jpeg, factor 8 – 10
- Compresses to image size of ~200K
- If sending many images, may need to spread across several e-mail messages due to 5MB limit

Send to: River Forecast Center
nws.ar.aprfc@noaa.gov
Or call: (800) 847-1739

Thanks for your help