# Exploring the Cumulative Effects of Future Land Use in the Dawson Planning Region

April 16th, 2014

**Dawson Planning Commission Meeting #16**

**By Shawn Francis and Sam Skinner**

# Terminology

- Cumulative effects (CE):
  - things that happen (usually impacts) as a result of past, current and potential future situations
- CE indicators:
  - Attributes of CE that we can measure (e.g., habitat loss)
- CE indicator levels:
  - The status of the CE indicator (how much?)





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# Background

- Regional planning is about the future:
  - What is our future vision for the Dawson region?
  - What is likely to happen?
  - Will future events affect our ability to realize that vision?
  - What actions may be needed to manage the effects of future events?



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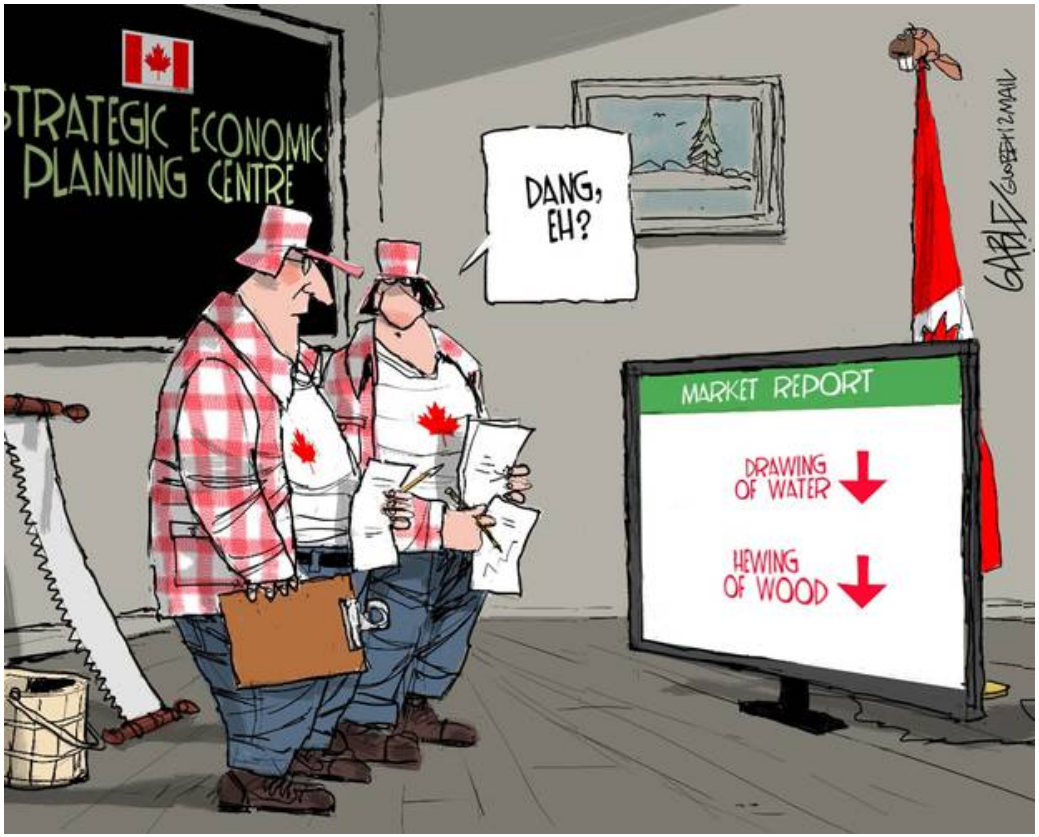
# Background

- To facilitate planning for the future, we first need to explore what the future might be:
  - Types and levels of land use
  - Levels of landscape change
  - Potential risks and benefits
  - Future planning issues





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# Background

- Your role as Commission members is to help establish a future vision for the Dawson region, and to identify management actions that may be required to achieve that vision.
- This project is designed to assist you with understanding the future situation.



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# Purpose

- Purpose #1:
  - Explore plausible future land use scenarios (type, timing and intensity) for Dawson region.
    - Focus on landscape drivers - placer mining, quartz mining, forestry, oil and gas, and transportation
  - Examine levels of landscape change resulting from the future land uses.
  - Evaluate potential risks and benefits for selected values.


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# Purpose

- Purpose #2:
  - Support the development of a land use designation system:
    - Integrated Management Area Zones I-IV
    - Identify LMUs with higher development or conservation management focus
    - Determine CE indicator levels that represent a balance between maintaining ecological and cultural values and economic development


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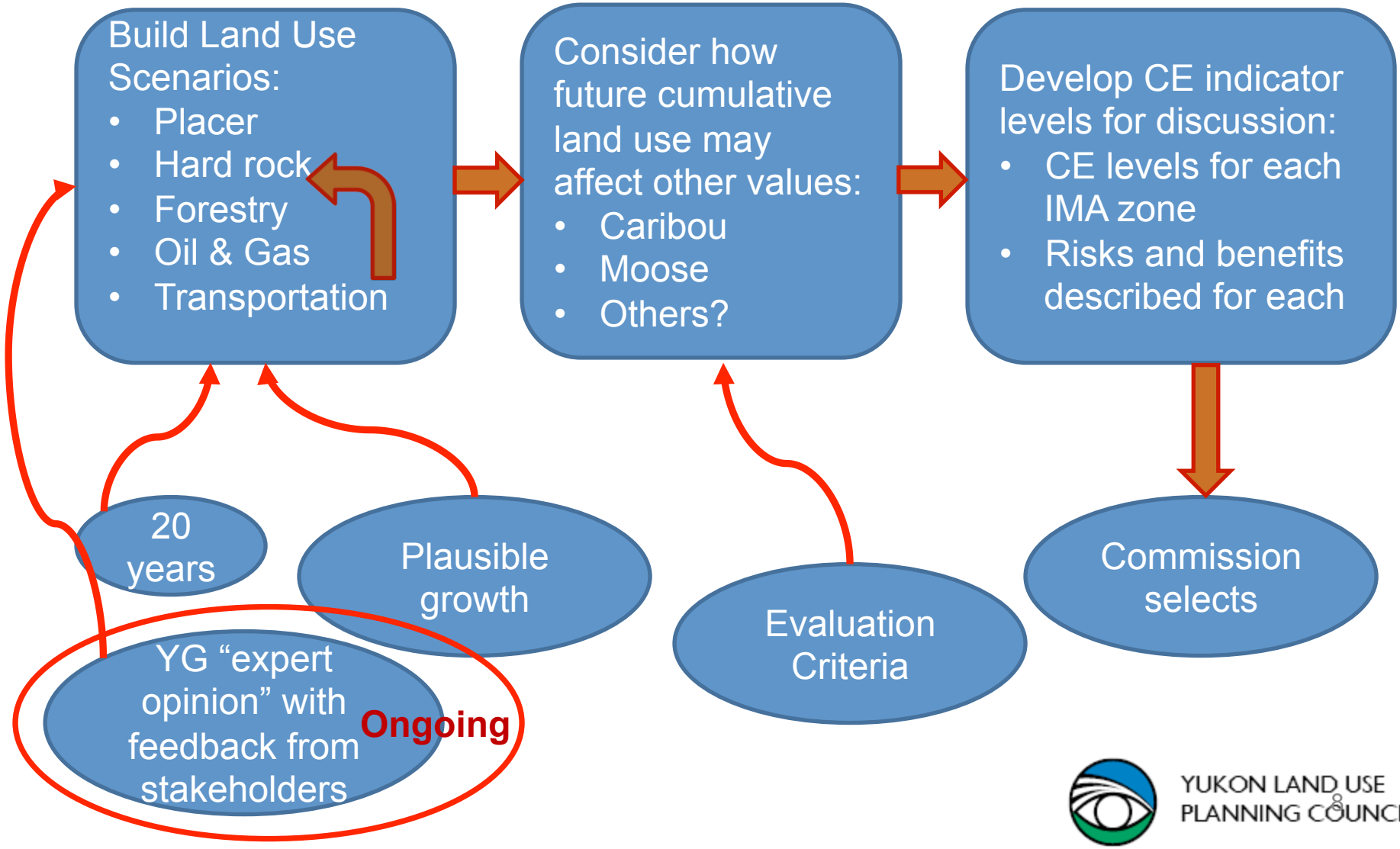
# General approach



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# Work to date

- Technical workshop on March 12
- Sector workshops on March 12-19 (placer mining, quartz mining, forestry, and oil and gas)
- Detailed scenario descriptions developed for each sector
- Beginning to model land use into future (20-year period)


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# What we need from you today

- "Gut check" of the scenarios.
- Input on values for evaluation.



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# Future land use scenarios

- Cannot predict the future, but can define 'likely', or 'plausible' trends.
- Identify a range in activity (lower and higher activity levels).
- 20-year future timeline.
- Track the area and locations affected.





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# Future scenario: Placer mining

- 90% of future activities are anticipated within and adjacent to areas currently being mined.
- **Low-growth** (45,000 oz. gold): expansion from these areas will be confined to 20-year probability drainages.
- **High-growth** (130,000 oz. gold): expansion will include both the 20-year probability drainages and "frontier" areas.
- On average, ~22,500 oz gold is produced per square km of placer mining footprint.
- The rate of revegetation will generally balance the rate of disturbance due to back-log of un-reclaimed historical mined areas.



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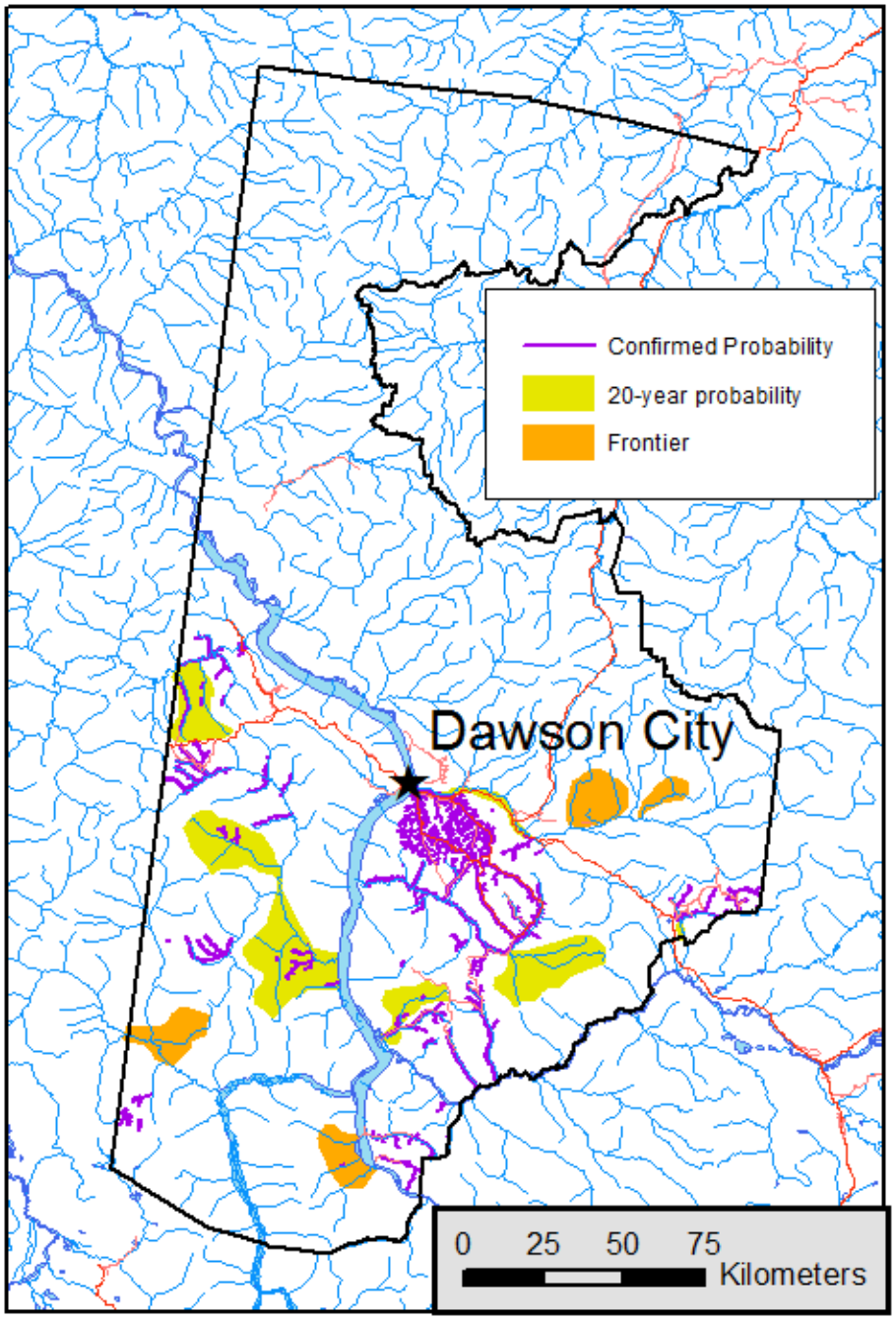
# Future scenario: Placer mining

- All mining activities are in riparian areas or historic floodplains.
- Some new transportation will be developed:
  - Low: 2km/yr all season / 5km/ yr winter
  - High: 5km/yr all season / 10km/yr winter



# Future scenario: Quartz mining

- **Low-growth:** # of active claims will decline, only one mine will start (Brewery Crk), 4 advanced exploration projects/yr.
- **Medium-growth:** # active claims +/-constant, two new mines (Brewery Ck & Coffee), 14 advanced exploration projects/yr.
- **High-growth:** # active claims +/-constant, three new mines (Coffee, Brewery Ck, Whitegold) ), 24 advanced exploration projects/yr.





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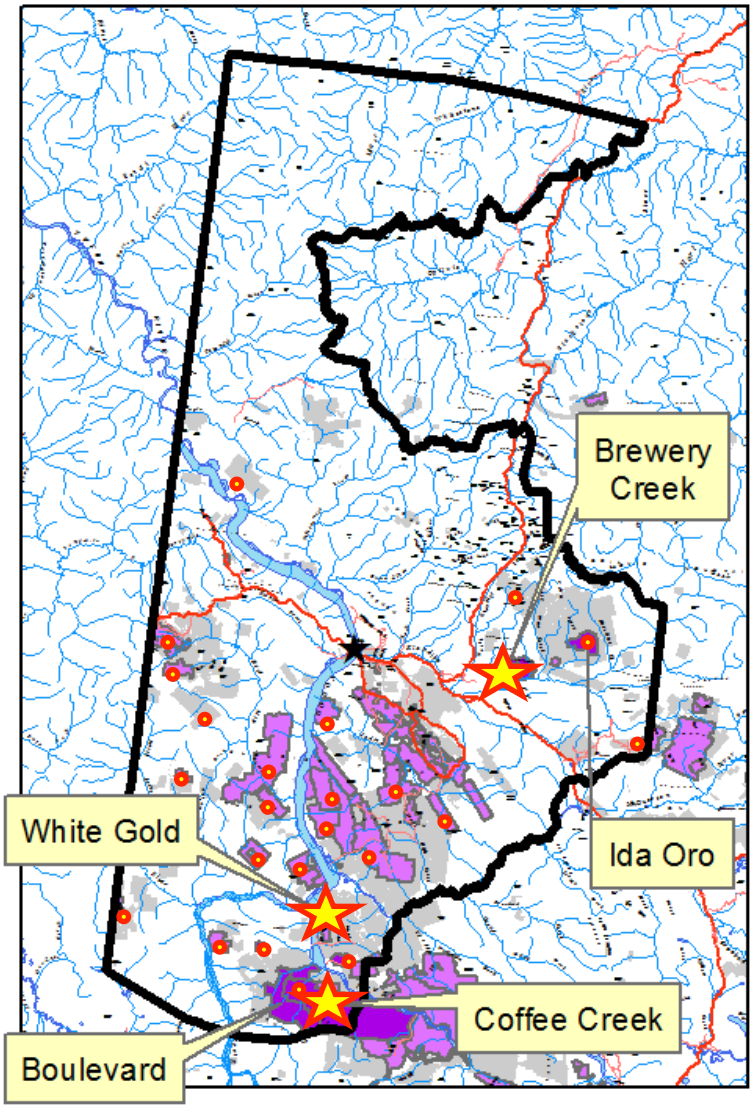
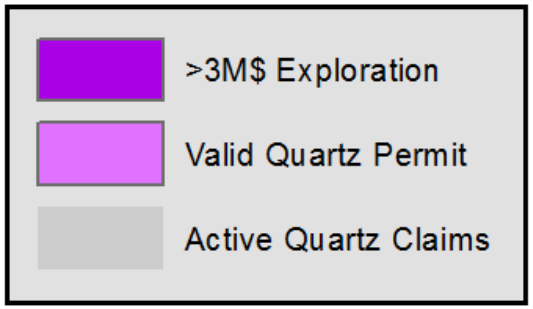
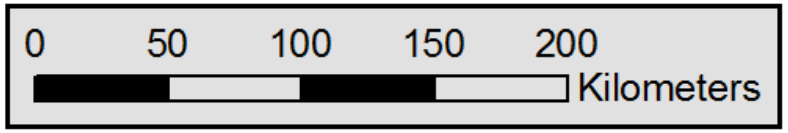
# Mining growth scenario




- Some new transportation will be developed but extensive trail network exists



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# Future scenario: Forestry

- **Low-growth**: 2,000$m^3$/yr birch/standing dead fuel wood, 1km/yr new road.
- **High-growth**: 5,000$m^3$/yr fuel wood and lumber, 2km/yr new road.
- 25% of volume counts as 'disturbance' lasting ~15 years
- 75% of volume from single tree selection and thinning





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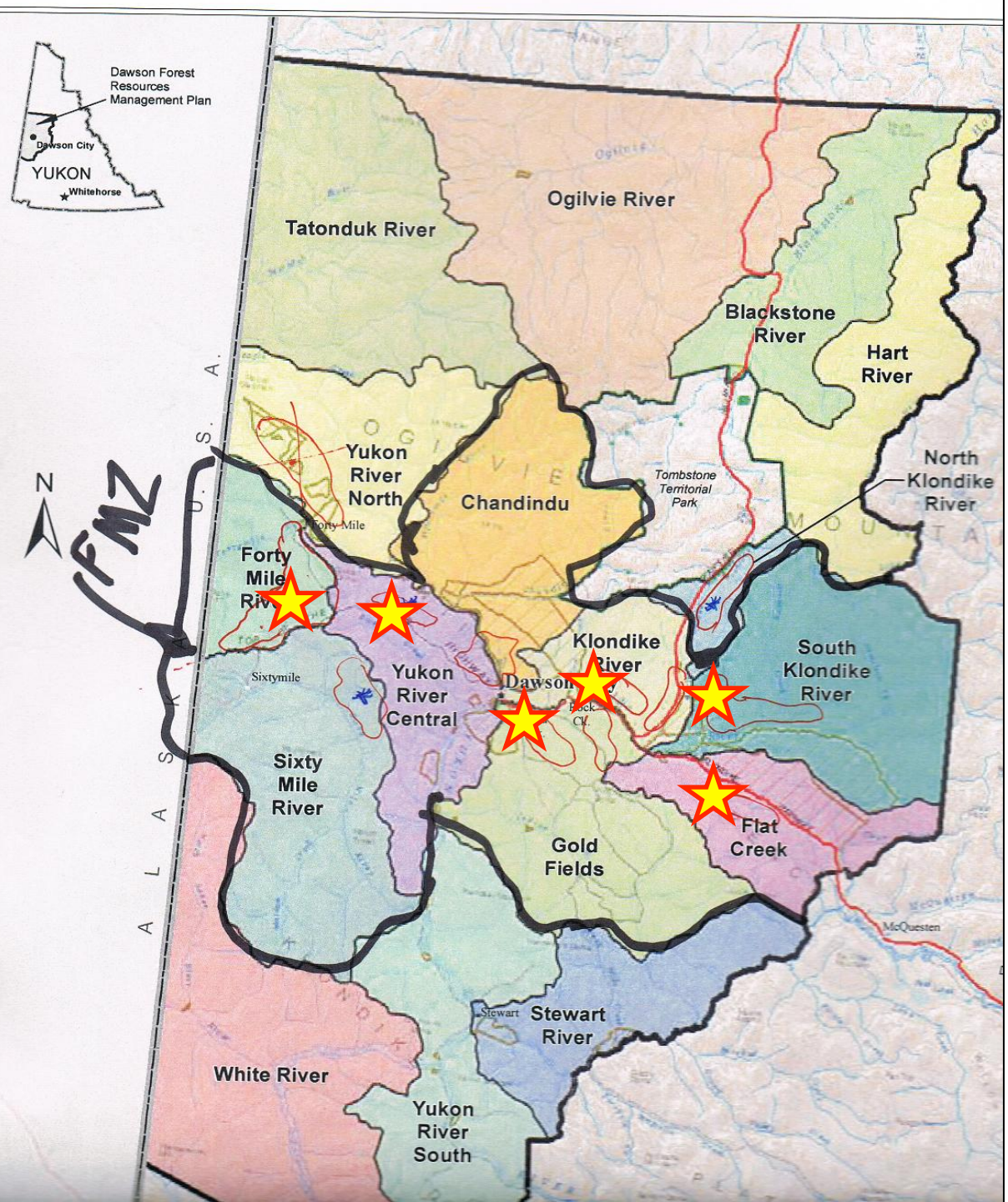


# Future scenario: Forestry

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# Future scenario: Oil & gas

- Eagle Plain focus

**Low-growth:**

- Limited 2D seismic exploration 10 years in the future.
- A few (3) exploratory wells 15 years in the future.

**High-growth:**

- 3D seismic exploration 10 years in the future. This would resemble YESAB #2013-0067.
- More (6) exploratory wells 15 years in the future.
- A few (3) producing wells 20 years in the future.





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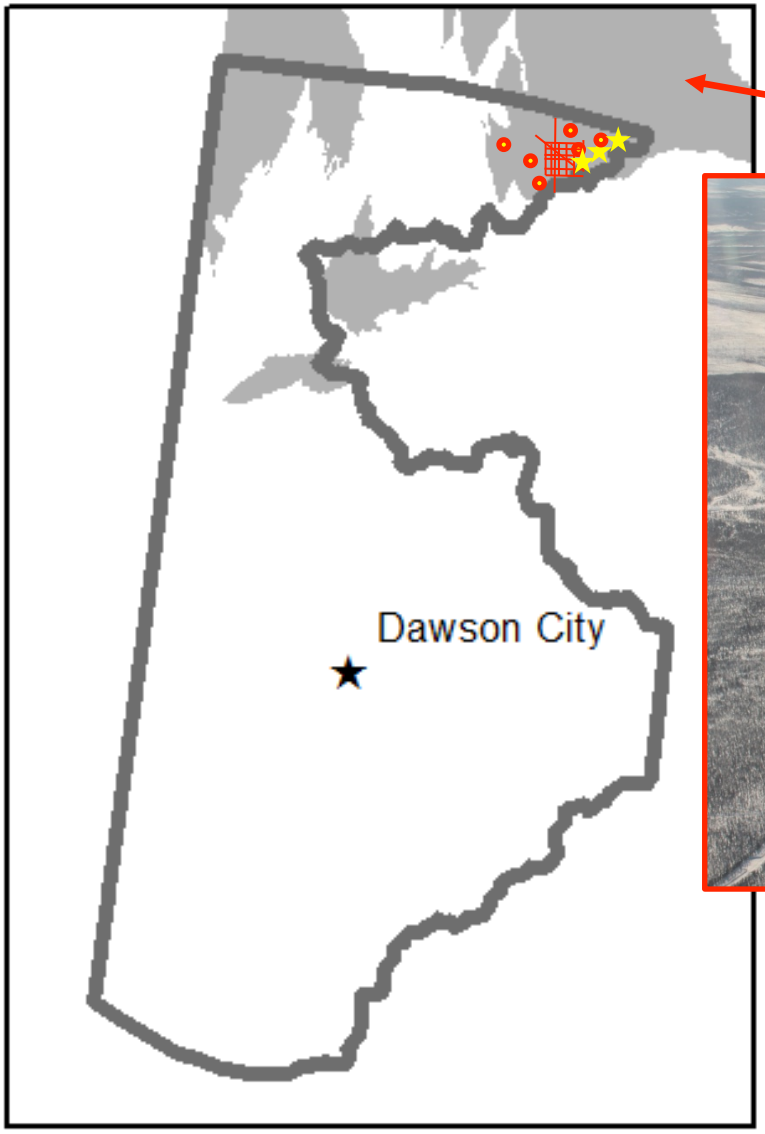
# High-growth scenario




Eagle Plain focus



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# Potential values for effects assessment

| ENVIRONMENTAL | CULTURAL | ECONOMIC |
|---|---|---|
| Caribou (Forty-mile, Hart and Clear Creek herds)<br>• focus on Forty-mile | Use landscape condition as a proxy for suitability for cultural activities ? | "Level of potential activity" |
| Moose | | |
| Specific ecological units or habitat types | | |


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# How to evaluate 'effects'?

- Compare future conditions to current conditions
  - Levels of surface disturbance and linear density in specific LMUs
  - Are there management concerns with these levels of disturbance/activity today?
- Examine potential effects on specific habitat types (broad ecosystems or habitat types/ suitability classes)


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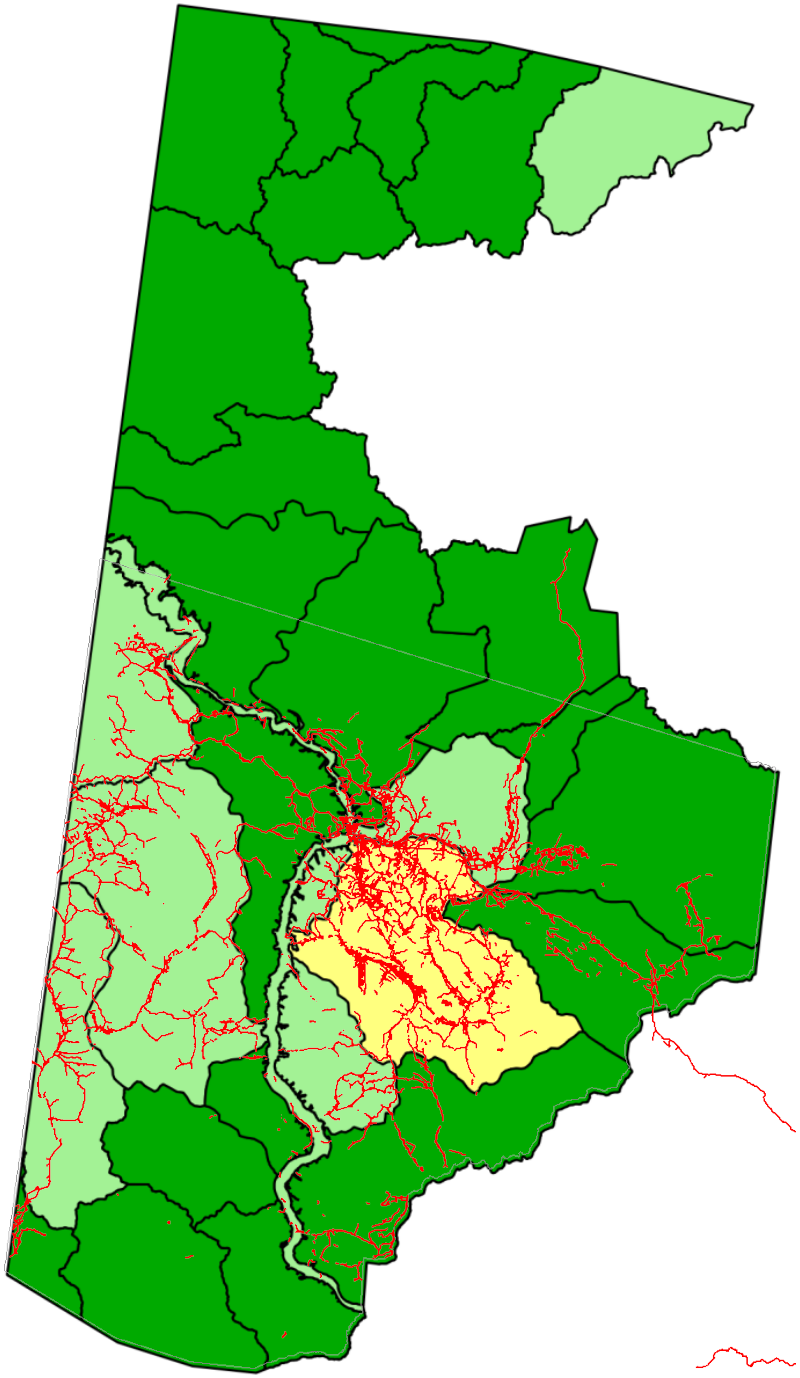
# Current Situation



## Linear Density

### Legend

Linear Density

- 0 - 0.2 km/km2
- 0.2 - 0.5 km/km2
- 0.5 - 1 km/km2
- 1- 1.5 km/km2
- 1.5 - 2 km/km2
- >2 km/km2



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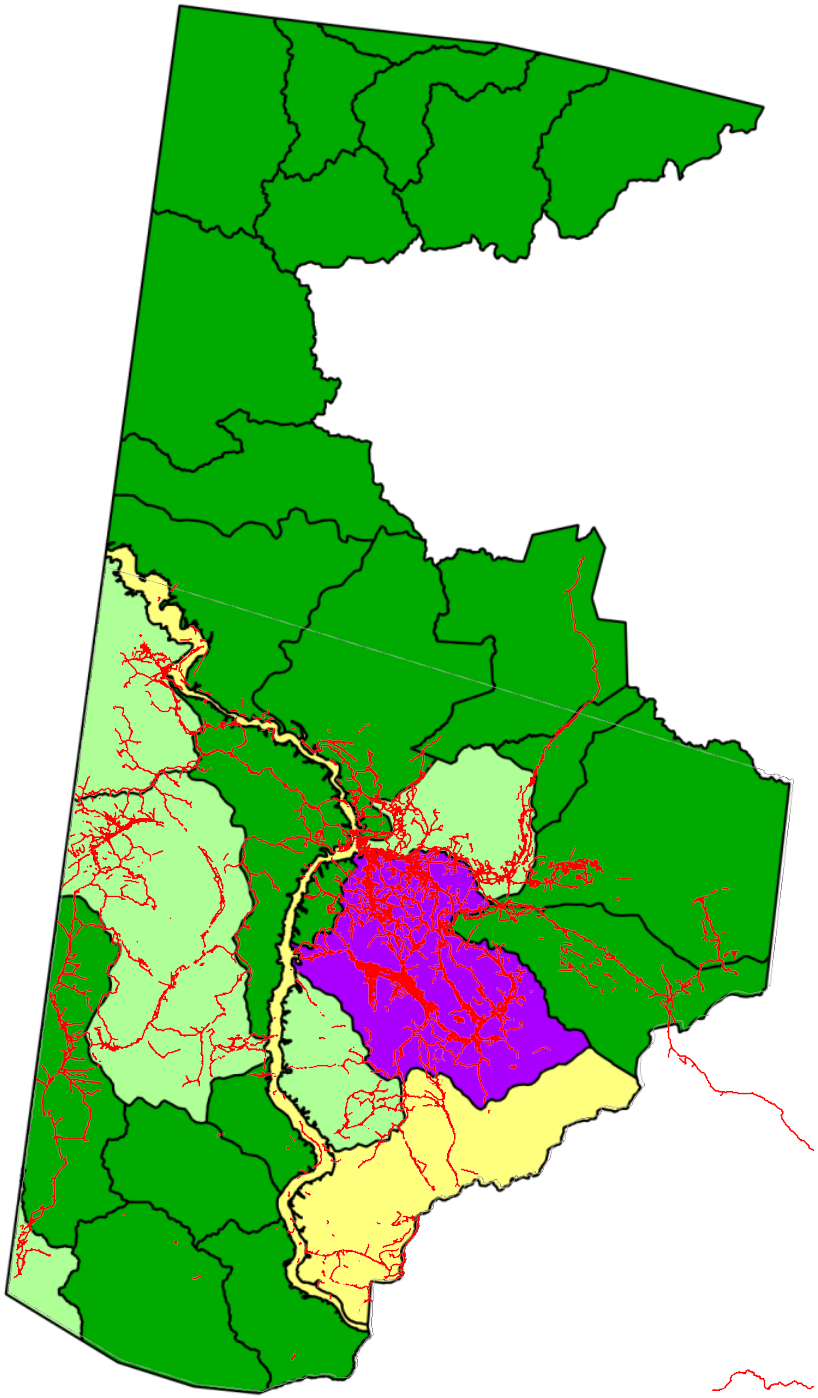
# Current Situation



## Surface Disturbance

### Legend

Surface Disturbance

- 0 - 0.2%
- 0.2 - 0.5%
- 0.5 - 1%
- 1 - 1.5%
- 1.5 - 2%
- 2 - 4%



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# Next Steps

- Final 'gut check' of scenarios with stakeholders.
- Model the land uses for 20-year period, based on the assumptions described.
- Calculate levels of potential disturbance within each LMU; compare to current.
- Evaluate what this might mean for identified values.
- Bring results to next meeting for discussion.





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# Spare slides below…

- xxx
- yyy



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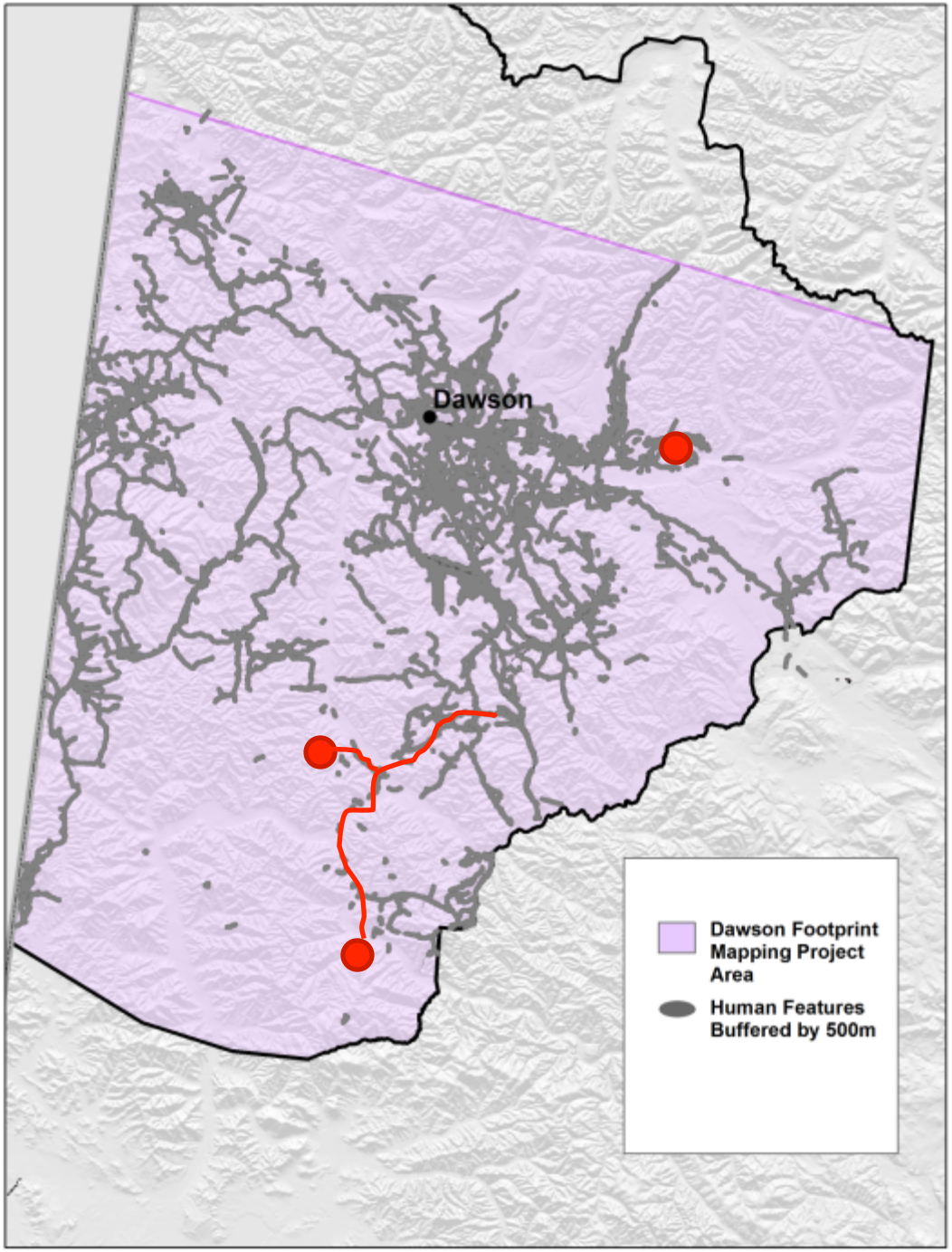
# Likely Outcomes

Scenarios:

- Maps and descriptions of high & low growth scenarios for each driving sector.



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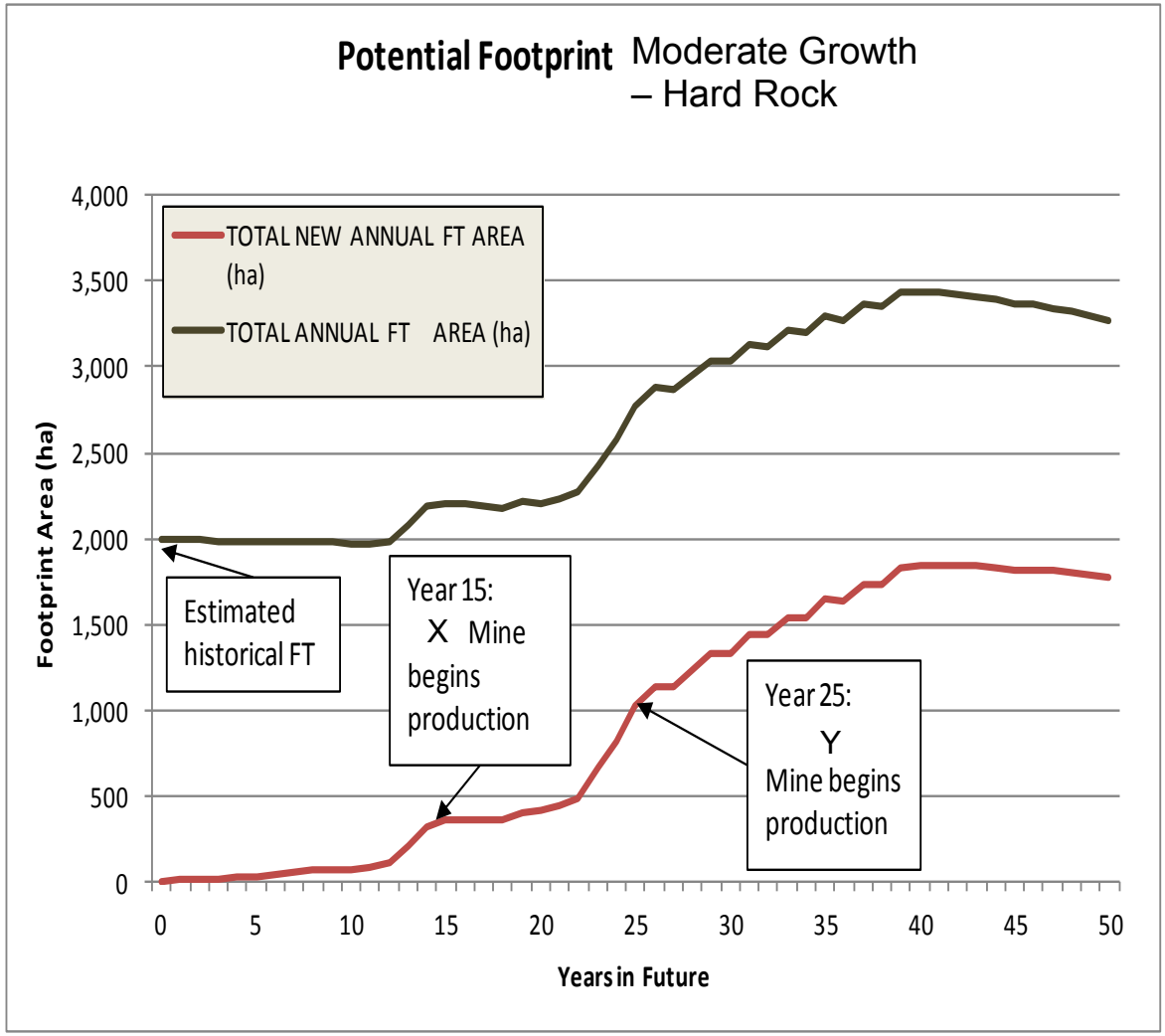




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# Likely Outcomes

CE "Packages":

- Surface Disturbance (%) and Linear Density critical levels ($km/km^2$):

| Package | IMA I | IMA II | IMA III | IMA IV |
|---|---|---|---|---|
| A | 0.1 | 0.2 | 0.5 | 1.0 |
| B | 0.2 | 0.4 | 1.0 | 2.0 |
| C | 0.5 | 1.0 | 2.5 | 5.0 |

(these numbers are for demonstration purposed only)



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# Likely Outcomes

## Risk Analysis for the CE "Packages":

Select Alternative: B

| | Objective | Evaluation Criteria | Units | A | B | C |
|---|---|---|---|---|---|---|
| 1 | Non-renewable resource potential | Placer Potential (high growth) | % | 75.00% | 100.00% | 150.00% |
| 2 | Non-renewable resource potential | Placer Potential (low growth) | % | 100.00% | 125.00% | 200.00% |
| 3 | Non-renewable resource potential | Mineral Potential (high growth) | % | 66.00% | 75.00% | 105.00% |
| 4 | Non-renewable resource potential | Mineral Potential (med growth) | % | 85.00% | 105.00% | 150.00% |
| 5 | Non-renewable resource potential | Mineral Potential (low growth) | % | 110.00% | 130.00% | 200.00% |
| 6 | Non-renewable resource potential | Oil & Gas (high growth) | % | 85.00% | 105.00% | 130.00% |
| 7 | Non-renewable resource potential | Oil& Gas (low growth) | % | 110.00% | 130.00% | 180.00% |
| 8 | Wildlife | Forty Mile Caribou Herd Good Habitat | % | 85.00% | 75.00% | 65.00% |
| 9 | Wildlife | Sheep Wildlife Key Areas | % | 90.00% | 80.00% | 70.00% |
| 10 | Heritage and cultural resources | Heritage Routes | % | 80.00% | 70.00% | 60.00% |
| 11 | Heritage and cultural resources | Tr'ondëk Hwëch'in merged heritage value | % | 80.00% | 70.00% | 60.00% |
| 12 | Renewable economy | Forestry (high growth) | % | 150.00% | 300.00% | 500.00% |
| 13 | Renewable economy | Forestry (low growth) | % | 300.00% | 400.00% | 700.00% |
| 14 | Wildlife | Boreal Moose cow & calf high value habitat | % | 75.00% | 85.00% | 90.00% |
| 15 | Renewable economy | High value recreation features | % | 85.00% | 75.00% | 65.00% |

Key

- Selected alternative
- Performance is significantly worse than the selected alternative
- Performance is significantly better than the selected alternative

(these numbers are for demonstration purposed only)


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# Discussion

# Ways to Differentiate the IMAs

"Prescriptive" = Escalating Regulation/Prescription

- IMA II would have more additional regulations, restrictions and/or prescriptions than III or IV
- E.g., mandatory Class I reporting, access restrictions, seasonal restrictions…
- Simpler
- Doesn't address CE problems
- Immediate and possibly unnecessary restrictions in some places



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# Ways to Differentiate the IMAs

"Flexibly Prescriptive" = **"Tiered"** Regulation/ Prescription (linked to CE levels)

- IMA II would have lower acceptable CE "levels" than III or IV
- Increased restrictions kick in only after cumulative effects have exceeds the "level" for the LMU.
- More complicated, but YG gaining experience
- CE indicators are a way to identify specific, measurable objectives while maintaining flexibility for regulators to exercise operational-level decision-making.
- CE indicators can 'define' the difference between zones (high level of activity, low level of activity).





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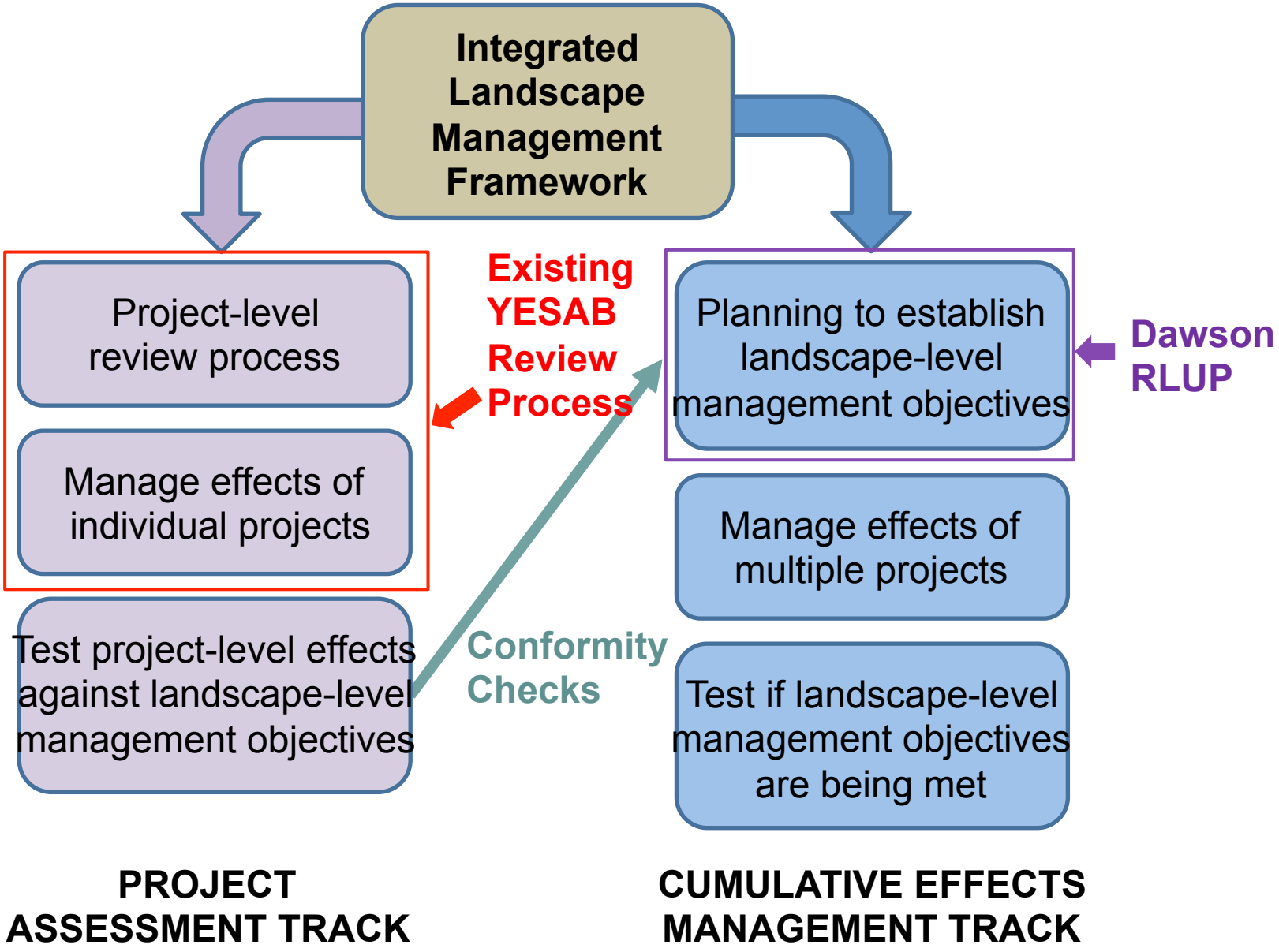




Slide adapted from S. Francis Consulting

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# Cumulative Effects Indicators

**There are many possible indicators:**

- Varies by species or value
- Ecological and socio-economic
- Habitat-based indicators
  - Amount of habitat or disturbance
- Population-based indicators
  - Population levels or aspects of that (e.g. trends, population levels, recruitment)



Slide adapted from S. Francis Consulting

# Cumulative Effects Indicators

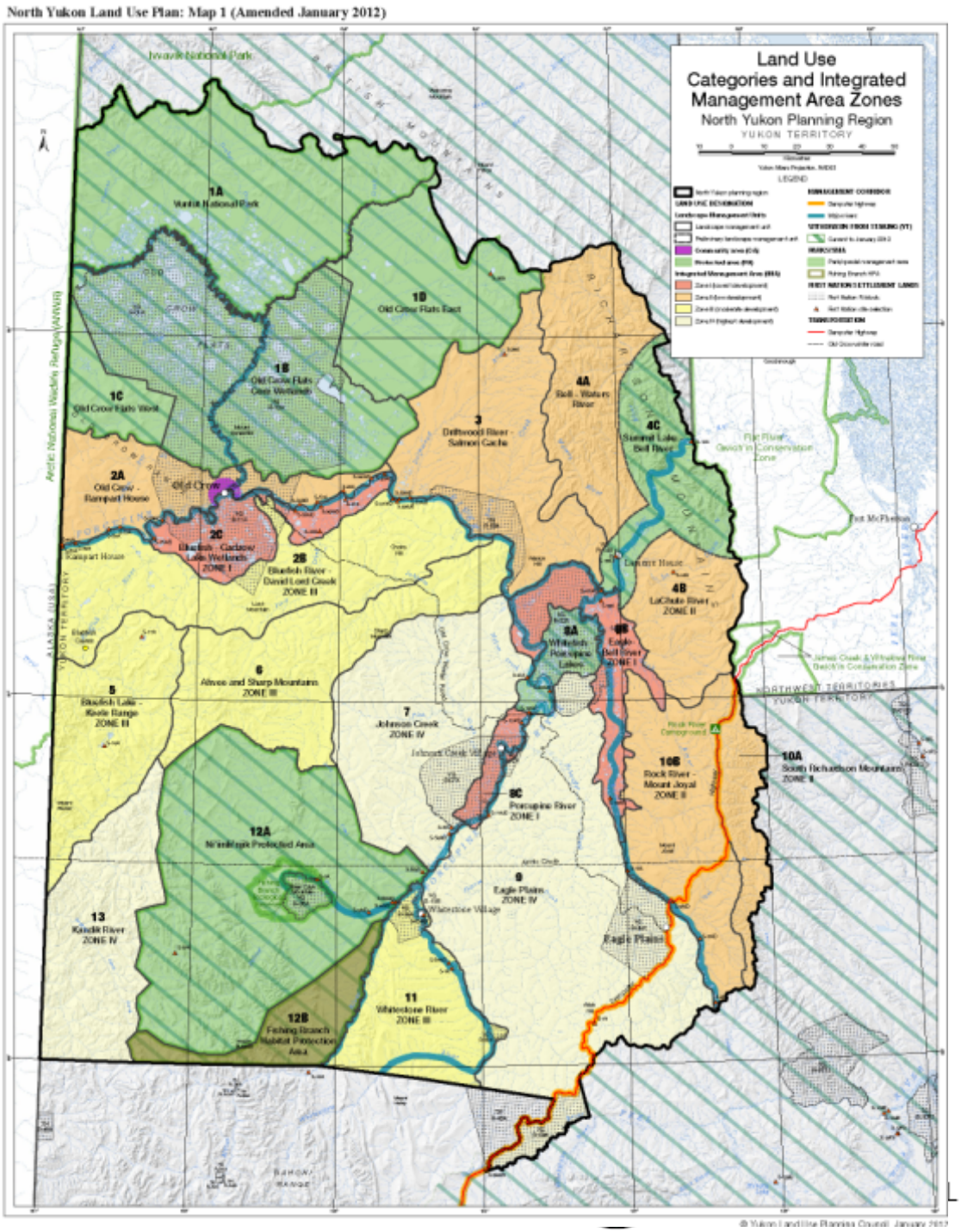
**Key Points:**

- Human feature mapping is the basis for most habitat-related indicators and approaches.
- Human features are tied to assessment and permitting regime.
- Population-related indicators are challenging and expensive to monitor.
- There may not be a clear, absolute link between habitat and population…but with increasing levels of habitat change come increasing risk of population change.

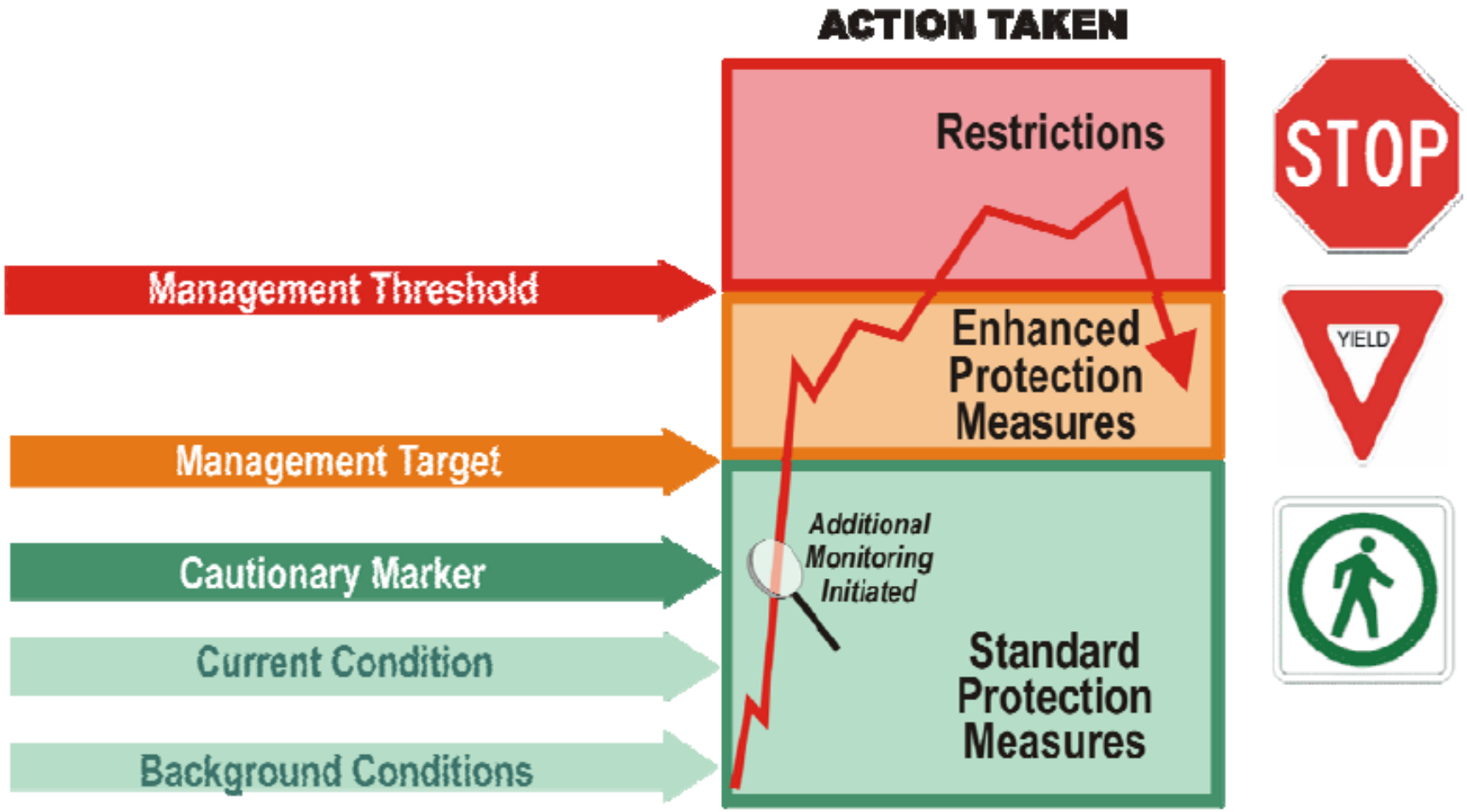


Slide adapted from S. Francis Consulting

- Indicators were developed by modeling oil and gas activity in Eagle Plain.
- Considered risk to caribou and moose, and socio-economic objectives
- Indicator levels were never intended to be used across all Yukon regions.

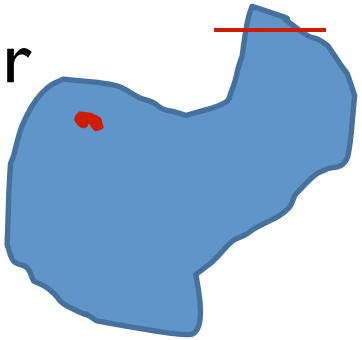


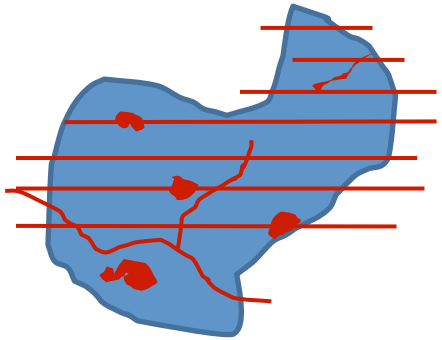
# Concept of Tiered 'thresholds'



# Cumulative Effects in the North Yukon

- Describe disturbance or development limits for each zone



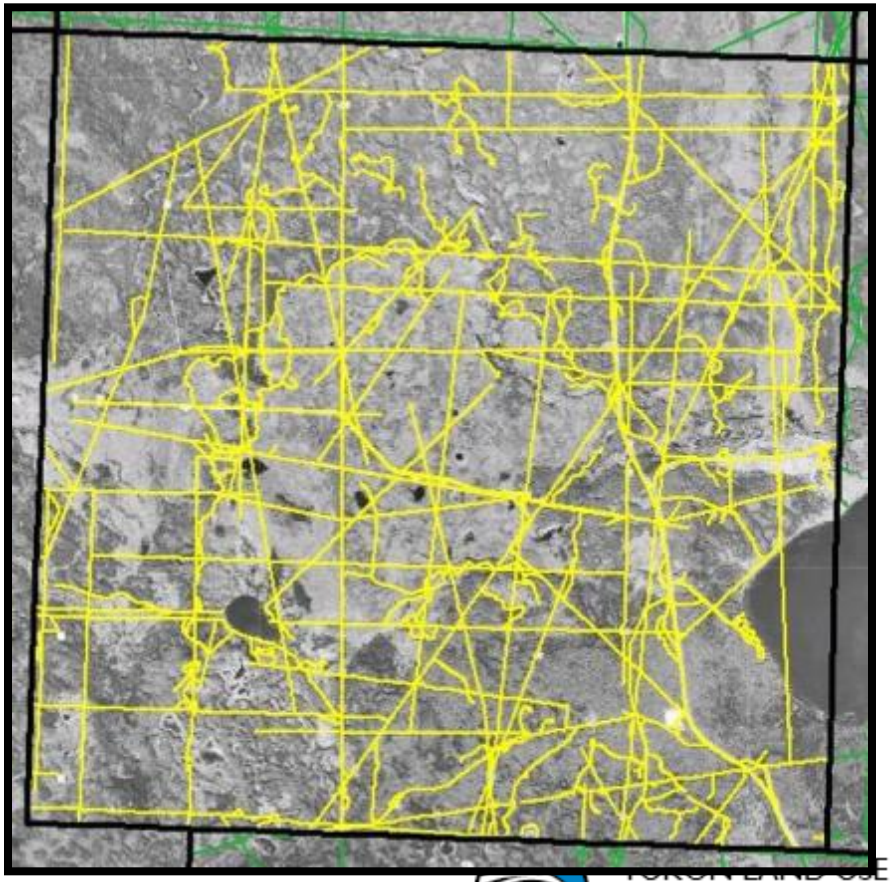


| IMA Zone | Management Intent | Cumulative Effects Indicators | Cautionary Level [1] | Critical Level |
|---|---|---|---|---|
| Zone I [2] | Lowest development | Surface disturbance | 0.075% | 0.1% |
| | | Linear density | 0.075 km/km$^2$ | 0.1 km/km$^2$ |
| Zone II | Low development | Surface disturbance | 0.15% | 0.2% |
| | | Linear density | 0.15 km/km$^2$ | 0.2 km/km$^2$ |
| Zone III | Moderate development | Surface disturbance | 0.375% | 0.5% |
| | | Linear density | 0.375 km/km$^2$ | 0.5 km/km$^2$ |
| Zone IV | Highest development | Surface disturbance | 0.75% | 1.0% |
| | | Linear density | 0.75 km/km$^2$ | 1.0 km/km$^2$ |

# Another linear density example:

1.5 km/km$^2$

4.0 km/km$^2$





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