Crown of the Continent Landscape Conservation Design
Leadership Team Meeting
Dec 8, 2022

Zoom recording including comments:
https://umontana.zoom.us/rec/share/YKW5oSN3ndVDCpAHq2scwEJvS1qSDvxept4Kv_HPkxsdDiv58RBThc8YfOeprcRZ.jCpJGVF_wQn_d0nq

Attendees:

- **Richard Klafki** - NCC
- **Connie Simmons** - Y2Y
- **Amy Katz** - Coordinating high divide LCD
- **Anne Carlson** - The Wilderness Society
- **Kelly Cooley** - SW Alberta, Invasive Species Conservation work; https://alus.ca/alus_community/alus-pincher-creek/
- **Linh Hoang** - USFS, chair of the CMP
- **Mike Durglo** - Department head of Tribal Historic Preservation office, CKST
- **Dawn LaFleur -** Vegetation Program Manager at Glacier National Park
- **Jamie Hanson** - Conservation Planner for USFWS
- **Constanza von der Pahlen** - Flathead Lakers, Flathead River to Lake Initiative
- LCD Analysis Team
    - Erin Sexton - Flathead Lake Biological Station, Science director
    - Phil Matson – CMP Database Manager
    - Danie Frevola - FLBS, Research Analyst
    - Bailie Eikill – USFWS, Biologist
    - Mary McFadzen - USFWS, Science Support & Information Design
    - Matt Heller - USFWS, GIS Data management
    - Sean Finn - USFWS Science Coordinator

Funding

- This is an effort that has been built on for many years - CMP has been working in this landscape for over 20 years - USFWS and CMP started working together in 2016 during the time of large landscape cooperatives
- USFWS: FY19 - $41,831, FY20 - $97,271; FY 21 - $25,000; FY 22 - $71,877
- The Wilderness Society: FY22 - $35,000; FY 21 - $15,000
- We applied for America the Beautiful 2022-2023 with CSKT as the lead:
    - We did not get the funding (requested $3 million)
    - Was a great way to plan for future years even though we did not get funded this round
    - In the meantime, we were counting on those funds - leadership team should be thinking creatively about what our options are for funding this work into the future

CMP Forum

- Indigenous models of stewardship and conservation in the Crown of the Continent

- March 13-17th; tentatively in Browning, MT
- Goals:
    - Relationship building between agencies and Tribes and First Nations
    - Highlight concrete examples of how to build better relationships/success stories
    - Share future plans/vision for Indigenous-led work

What is Landscape Conservation Design?

- Iterative, collaborative, holistic, and transparent
- Results in co-developed maps, analytical tools and strategies that enable stakeholders to achieve collective goals
- Goal: build a blueprint and road map for a resilient Crown of the continent
- Features
    - Ecological Features
    - Social, Cultural, and Economic features

Social, Cultural, and Economic Features

- Clean Water
    - Presence:
        - Rivers and Streams (headwaters are given 2x as much weight)
        - Lakes
        - Community watersheds (all or part of the drainage area that is upslope of the lowest point from which water is diverted for human consumption by a licensed waterworks.)
    - Cost
        - Road density (cars and ATVs)
        - Pollution from mining and agriculture - impaired waters
        - Septic Leachate pollution - housing density
        - Land ownership
- Full powerpoint here

Situation Analysis: Wolverine

- Presence: Where do lynx occur on the landscape?
    - Remote camera database
    - FWS critical habitat designation
    - Spring snow persistence
    - MTNHP lynx suitability model
- Threats: What on the landscape limits our ability to deliver lynx conservation?
    - Roads, snow cover, burn severity
- When you overlay presence and threats, you get a sense of **where** there are opportunities for lynx conservation
- % is top conservation opportunity areas
- Questions/comments:
    - In addition to question of where in the landscape are opportunities for conservation where threats (cost) are low - we might also ask where the threats

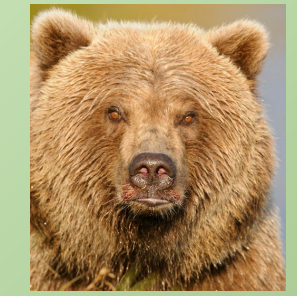
are high - is there a need to do conservation actions due .... e.g. connectivity, cultural, social values, etc.

Hopes and Expectations for 2023

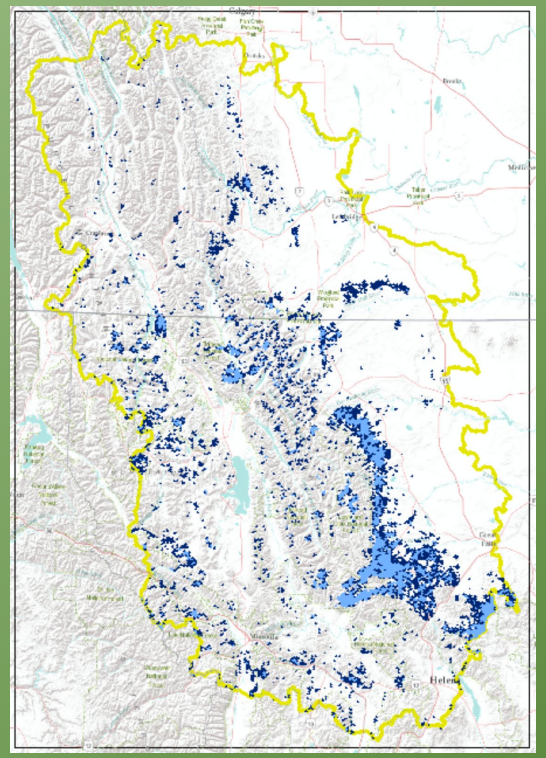
- Advance social, cultural, economic models
- Further engage subject matter experts through workshops!
    - Would we be including extraction industry in the workshops?
        - We are inclusive, holistic, and transparent - door is open - thus far, we have missed some sectors
- Explicitly incorporate climate change

Requests of leadership team

- Consider hosting a workshop for 8-10 people
    - Linh can start reserving rooms
    - Think about who could help with facilitating on the leadership team
- Assign or encourage subject matter experts to attend workshops
- Consider sharing any leads on funding that you have

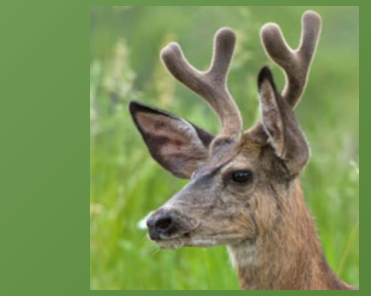


Crown LCD - Phase 2



Leadership Team call

8 December 2022



Today's Agenda

1. *Funding Update*
   -- America the Beautiful Challenge 2022-2023
2. *Crown Managers Partnership Forum*
3. *LCD: What and Why?*
4. *Social, Cultural and Economic Features*
5. *Phase 2 Ecological Feature Modeling*
6. *Discussion, Questions & Critique*
7. *Hopes & Expectations for 2023*

Funding Update

US Fish and Wildlife Service:

- *FY22 --- $71,877*
- *FY21 --- $25,000*
- *FY20 --- $97,271*
- *FY19 --- $41,831*

The Wilderness Society

- *FY22 --- $35,000*
- *FY21 --- $15,000*
  - "to provide support for Indigenous governments (CSKT, the Blood/ Kainai, Piegan and Blackfeet) to lead the identification of cultural priorities for the collaborative Landscape Conservation Design in the Crown of the Continent"

Total funds: $285,978
Total In-kind: ***Priceless***
(Leadership Team, Technical Team, Subcommittees, Experts)

- *America the Beautiful Challenge 2022-2023*

2023 Crown Managers Partnership Forum

Since 2001, the Crown Managers Partnership has hosted and met annually at a forum.

The forum is a workshop style event focused on a different conservation topic each year.

2023 Topic: Indigenous Models of Stewardship in the Crown
*Dates: March 13 – 16, 2023 **
*Location: Browning, MT **
More info: Forum webpage

** Tentative*

What is Landscape Conservation Design?

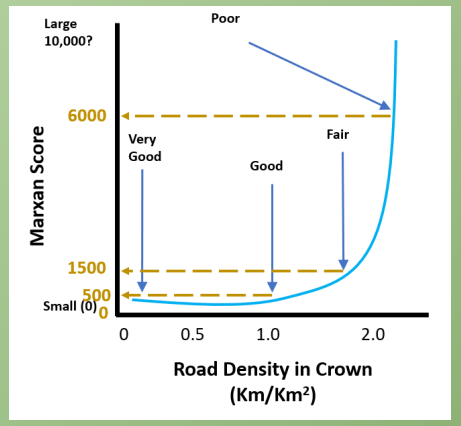
- *A partner-driven approach to achieve a sustainable, resilient landscape that meets the ecological and social needs of current and future generations*
- **iterative**
- **collaborative**
- **holistic, and**
- **transparent**
- *results in co-developed maps, analytical tools, and strategies that enable stakeholders to achieve collective landscape goals.*

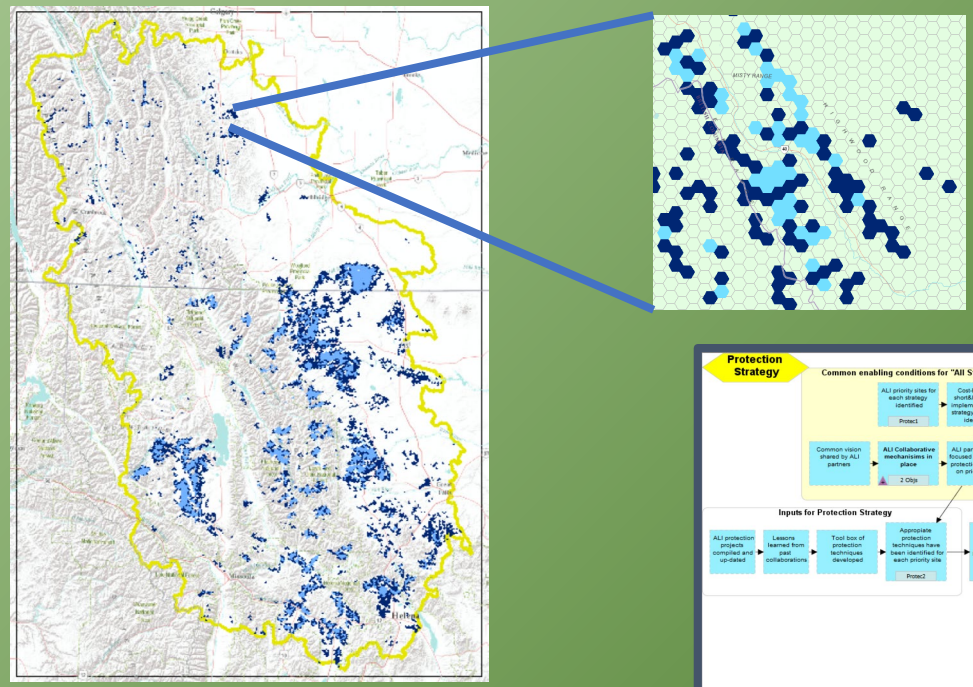
Phase 2:

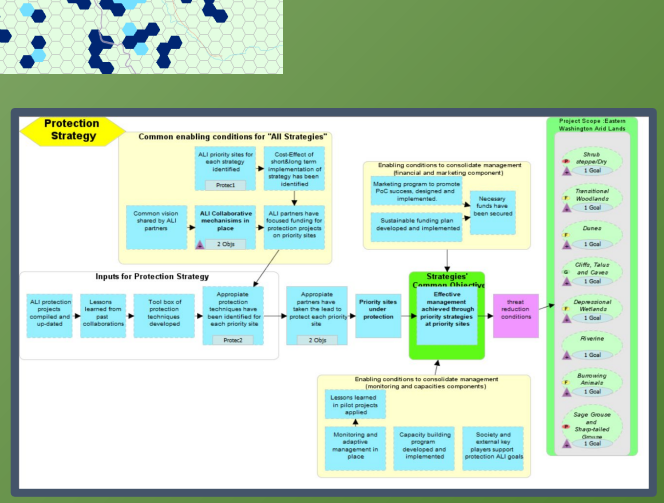
See: A Primer on Landscape Conservation Design

LCD in the Crown of the Continent

Goal: *Collaboratively build a **blueprint** and a **road map** for a socio-ecological resilient and sustainable Crown of the Continent Ecosystem of the future*







INITIATE 1
Initiate the LCD

CONVENE 2
Convene stakeholders & frame the LCD

ASSESS 3
Assess current & future desired conditions

SPATIAL DESIGN 4
Identify where functions & opportunities exist

STRATEGY DESIGN 5
Arrive at a design for decision making

LCD in the Crown of the Continent

Analysis Team

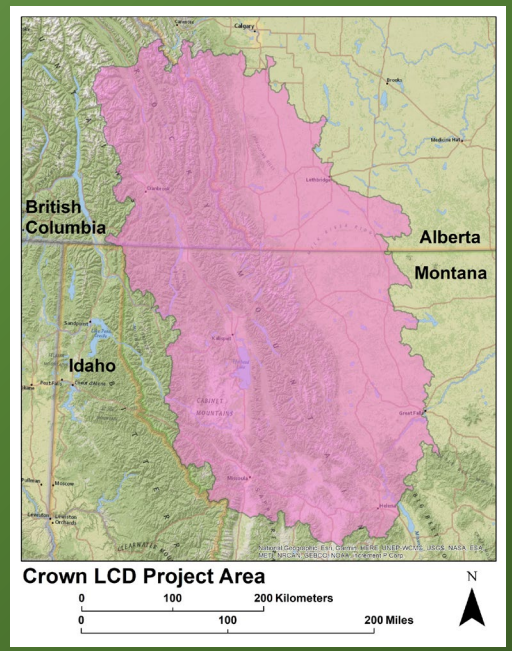
Natalie Poremba
Phil Matson
Erin Sexton
Danie Frivola
Bailie Eikill
Mary McFadzen
Aubin Douglas
Matt Heller
Sean Finn

~2019 – 2020

- *Crown Managers Partnership convenes*
- *Leadership Team forms (42 partners)*
- *Analysis Team and Technical Team assembled*

2020 – Present

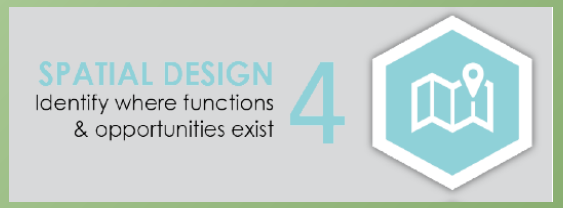
- *LCD Vision created*
- *Project Area selected*
- *Ecological Features selected*
- *63 Management Plans Reviewed*



Crown of the Continent LCD – Phase 1 & 2

Phase: **1** **2** **3**

2020 – present



2021 – present

2023 – beyond

- *Management Plan and Literature review*
- *Initiated Social, Cultural and Economic Team*
- *Drafted 15 conceptual models*
- *Assembled > 300 spatial data sets*
- *Surveyed 51 subject matter experts*

- *Refined conceptual models, quantified and spatialized*
- *Synthesized 90 "feature" data sets and >50 cost data sets*
- *Spatial Designs for 15 individual Ecological Features*

- *Iteration …*
- *Model refinement through Workshops*
- *Strategic Planning*

A Focus on the Features

CONVENE 2
Convene stakeholders & frame the LCD

Ecological Features:

- *Selected by the Leadership Team*
- *63 management plans assessed for documented priority landscape features and plan-identified threats and interactions*
- *Evaluated subset for status, data availability, monitoring potential*

Fine Features	Coarse Features
Whitebark Pine	Forest
Bull Trout	Grassland
Westslope Cutthroat	Shrubland
Mule Deer	Wetland
Elk	Riparian
Grizzly Bear	Aquatic Systems
Wolverine	Connectivity
Canada Lynx	

Social, Cultural and Economic Features:

- *Identified and explored by the SCE SubTeam*

Social, Cultural, Economic Team

Feature: Water Access		
Justification/Description/Considerations:		
Key Attributes	Measurable Indicators	Data & Sources
Water Quantity	Reservoir distribution; municipal-managed watersheds; input-output	aquifer records; distribution systems; precipitation trends; climate projections; USGS discharge measurements; CMP's High5 Needle Pine group has a community watersheds shapefile.
Water Quality	Reserve water quality; end pipe quality;	Agency (BOR, EPA) records; municipality records; well testing records
Access	Urban; ex-urban; unincorporated; distances & economics * Tribal rights & Pacts	Spatial data on population distribution; water delivery infrastructure
Public Attitudes		
Headwater Health		AB - in development WPAC Oldman watershed council - linear disturbance risk assessment -

Feature: Air Quality		
Justification/Description/Considerations:		
Key Attributes	Measurable Indicators	Data & Sources
Smoke Production	Fire frequency and size; fire distribution in relation to vulnerable population distribution; lifespan/mortality rates	NIFC, BAER, etc.
Prescribed Fire	Agency planning (vs. implementation?); Rx frequency, size, seasonality; Ag field burning (upstream … beyond CCE)	Agency records
Particulates	Drought trend/frequency/severity; aeolian erosion rates	Drought indices; bare ground; seasonal agricultural practices; post-fire rehab & effectiveness

A Focus on the Features

CONVENE 2
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Social, Cultural and Economic Features:

- *Identified and explored by the SCE SubTeam*

Crown LCD Phase 2

Inspirations:

- ***Systematic Conservation Planning*** *(Margules & Pressey 2000)*
- ***Conservation Planning*** *(Game and Groves 2016)*
- ***Nine Principles for Landscape Conservation Design*** *(Campelone et al. 2018)*

Tools:

- *Teamwork*
- *Knowledge*
- *Conservation Standards (Formerly known as the Open Standards for the Practice of Conservation)*
- *Marxan tools designed to help conservation decision makers find solutions*

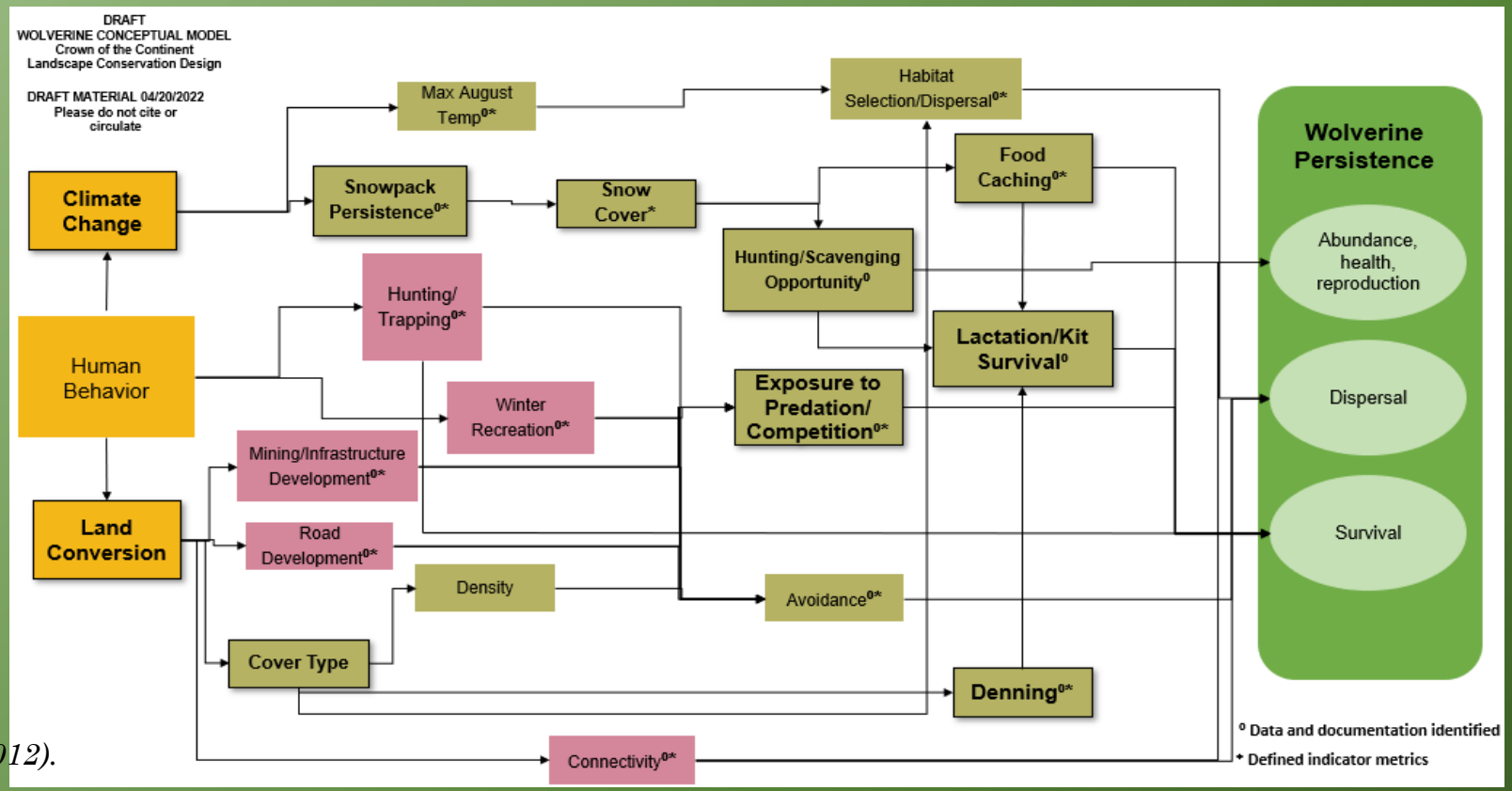
Situation Analysis
example: Wolverine

Conservation Standards

ASSESS 3
Assess current & future desired conditions

Fine Features	Coarse Features
Whitebark Pine	Forest
Bull Trout	Grassland
Westslope Cutthroat	Shrubland
Mule Deer	Wetland
Elk	Riparian
Grizzly Bear	Aquatic Systems
Wolverine	Connectivity
Canada Lynx	

Crown LCD Wolverine Conceptual Model



Citations:

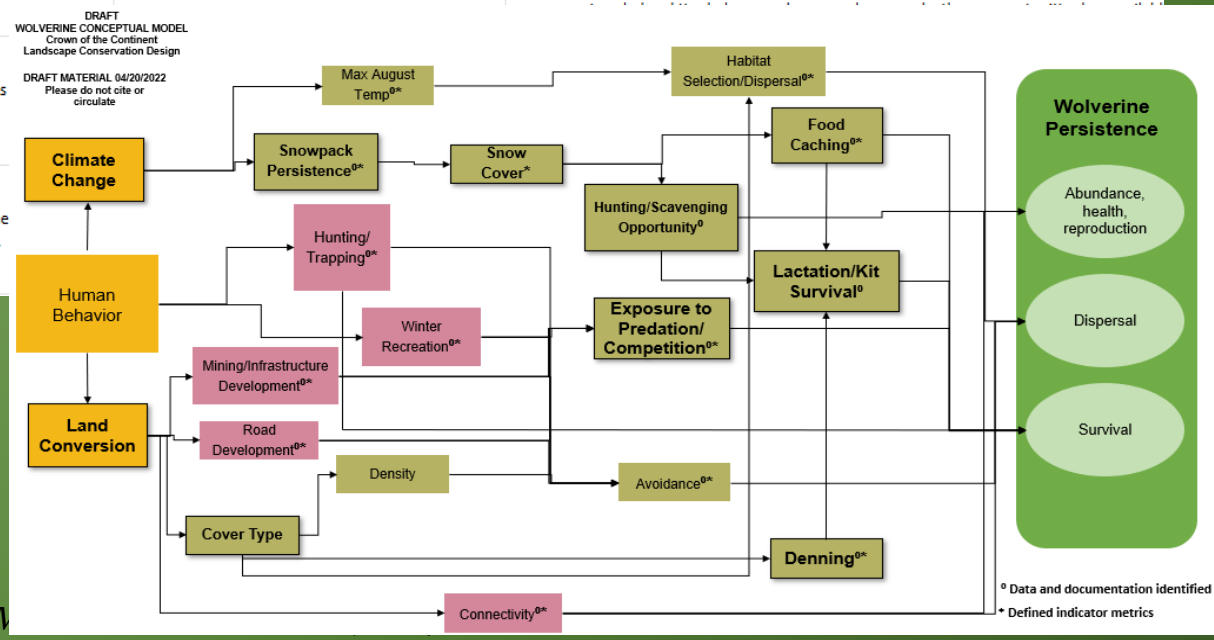
1. *Inman, R.M., Magoun, A. J., Persson, J., Mattisson, J. (2012).*
2. *Carroll, C., Noss, R.F. and Paquet, P.C. (2001)*
3. *Krebs, J., Lofroth, E. C., Parfitt, I. (2007)*
4. *Copeland, et al. (2010)*
5. *Rowland, M., et al. (2003).*
7. *Krebs, J., Lofroth, E., Copeland, J., Banci, V., Cooley, D., Golden, H., Magoun, A., Mulders, R., Shults, B. (2004).*

Situation Analysis

Wolverine

ASSESS 3
Assess current & future desired conditions

	A	B	C	D	E	F	G	H	I
1	Feature	Name and Affiliation/ Organization	Approximately how many years have you worked with the species/system?	What is your primary geography of interest?	Please describe your general perception of this feature conservation status in the Project Area	In your opinion, what is the single most critical threat to the long-term persistence and viability of this feature in the Crown ecosystem?	Please list 2-3 additional threats (in descending order, if appropriate) to the long-term persistence and viability of this feature in the Crown ecosystem.	Considering your answers for Questions 6 and 7 above, are you aware of spatial data that concisely describe or best approximate the key threat(s) you listed? If so, please briefly describe the data and provide a contact name or organization we should contact to acquire the data.	Please briefly critique the DRAFT Conceptual Model below. Do you see any critical aspect m Threat or Contributing Factor missing? Is some element in the model overstated (i.e., not rel this feature?)
45	Wolverine	Kevin McKelvey USFS Emeritus	25	Western NA	Apparently Secure	Climate change	Really, none.	Copeland et al. 2010, Inman et al. 2012, Aubry et al. in review	The model is very inclusive. Many of these are theoretical rather than current risks. For exam believe that housing or mining really represent a risk to wolverines at this t
46	Wolverine	Jason T Fisher, University of Victoria	18	AB, BC	Vulnerable	Human land-use development is the single greatest threat. This increases competition with coyotes and other mesocarnivores, depleting home ranges of resources. It increases	Climate change, with reduced snow cover. This exposes natal dens, and makes landscapes more useable by competing lowland mesocarnivores (coyotes). The next is hunting and trapping exploitation, at least on the Canadian side.	Human land-use is best described nin Alberta by the Alberta Biodiversity wall-to-wall human footprint inventory. https://abmi.ca/home/data-analytics/da-top/da-product-overview/Human-Footprint-Products/HF-inventory.html I don't know if BC has something similar. Landsat	Exposure to competitors is missing and this is a key element to wolverine pers
47	Wolverine	Rebecca Watters/ The Wolverine Foundation	13	MT, Crown	Vulnerable	Why only one? Threats work in tandem with each other. Climate change is the biggest overarching threat; trapping and habitat loss to energy development exacerbate this	trapping, recreation, development that reduces habitat and increases obstacles to dispersal	Rocky Mountain Research Station for climate-related habitat loss; Kim Heinemeyer at Round River Conservation Studies for recreation issues	- climate change/decreased snow cover will probably also lead to increased exposure to othe both the risk of increased conflict mortality, and also increased competition for food/decline type and duration also leads to insecure denning; early melt-out of snow likely puts the kits at to exposure to increased moisture - Wolverines, when they kill large ungulates, tend to do s
48	Wolverine	Rick Yates, U.S. Forest Service-Retired	10	MT	Vulnerable	Climate-change	Trapping/Hunting, Loss of Habitat, Loss Connectivity		
49	Wolverine	Garth Mowat	10	BC	Vulnerable	The decline in alpine habitats with climate change.	The loss of caribou as a key winter food; the due to human disturbance.		



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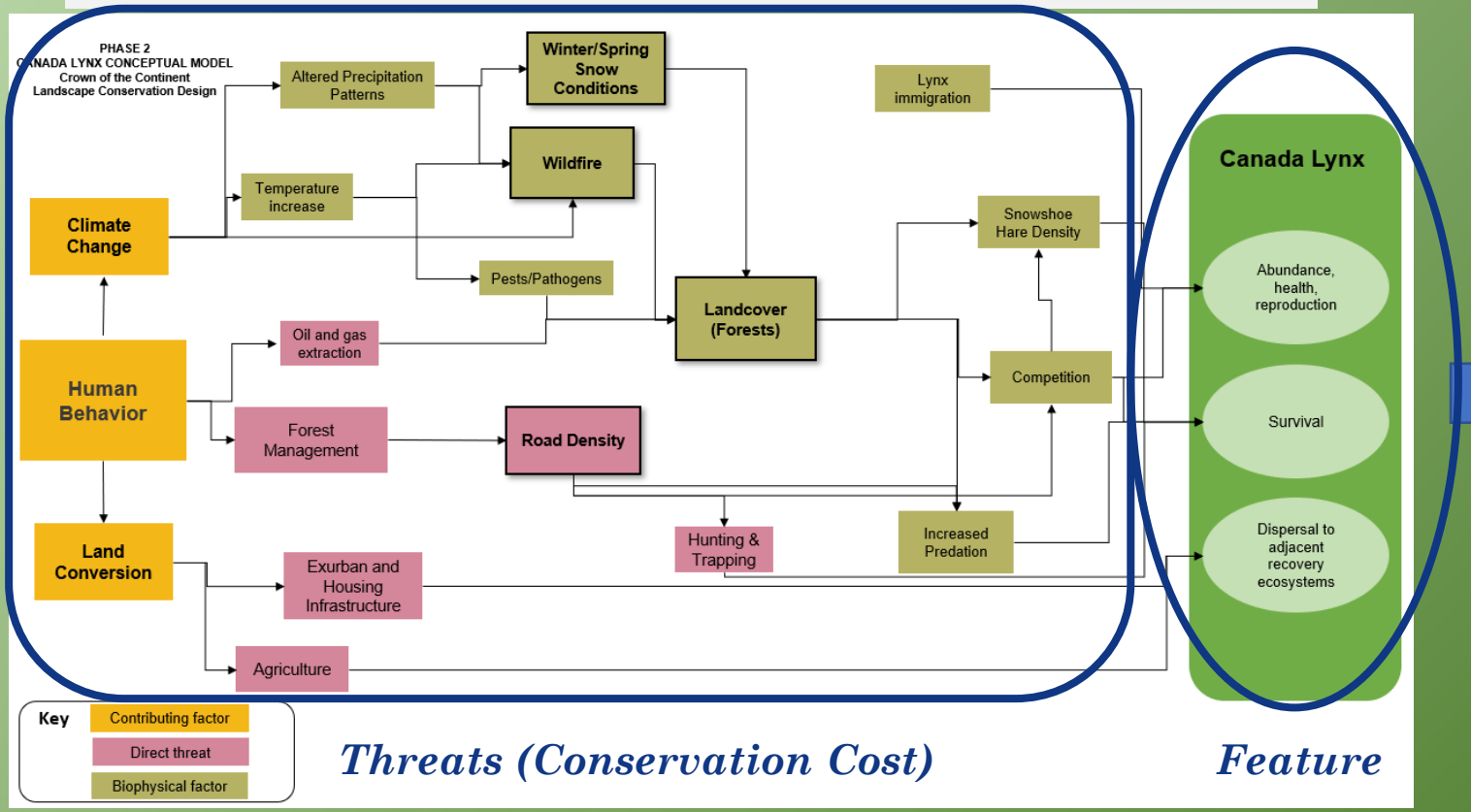
Concepts to Landscapes

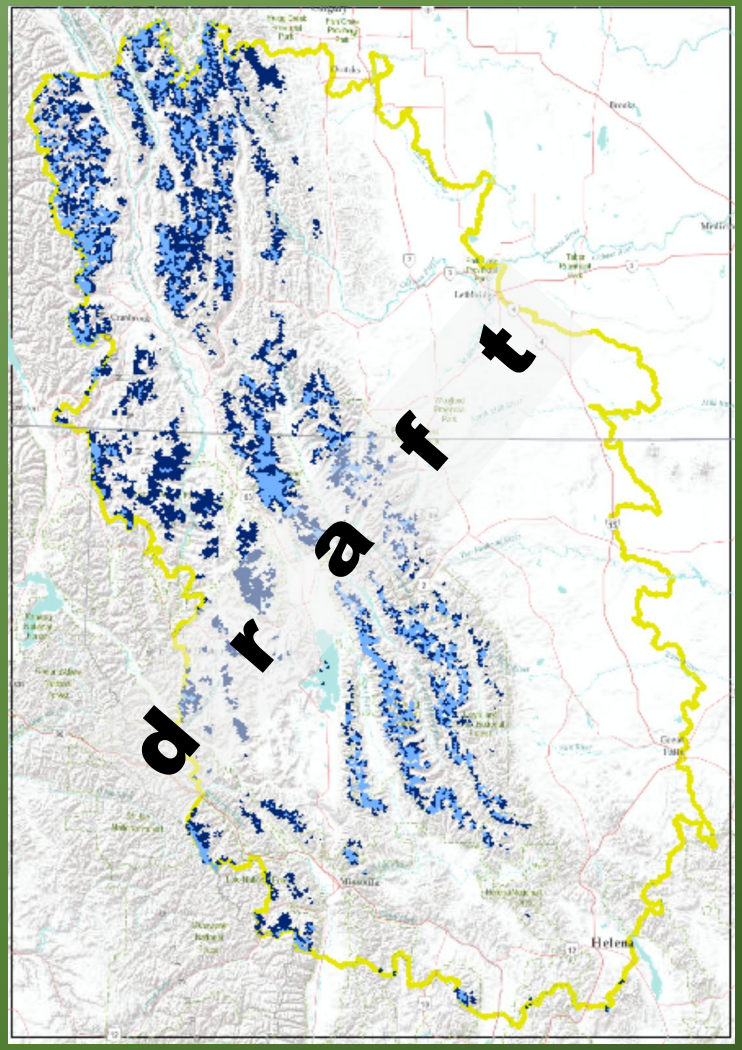
Canada Lynx

Conservation Standards

SPATIAL DESIGN
Identify where functions & opportunities exist
4

Crown LCD Canada Lynx Conceptual Model





Where are lynx currently?
What are the pressing threats to lynx and their habitat?
What influences our ability to deliver conservation to ensure Canada Lynx populations persist?

Canada Lynx

"feature" data development

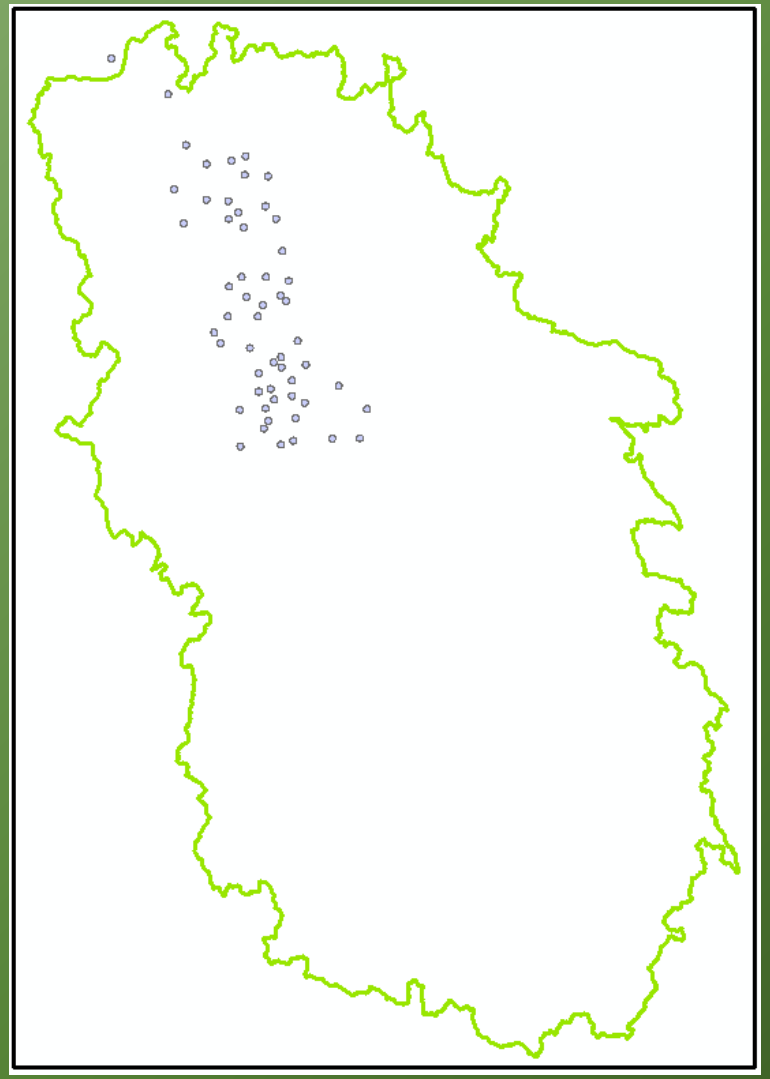
SPATIAL DESIGN
Identify where functions & opportunities exist
4

Feature ***Spatial Data***

Canada Lynx

- Abundance, health, reproduction
- Survival
- Dispersal to adjacent recovery ecosystems

Remote Camera Database

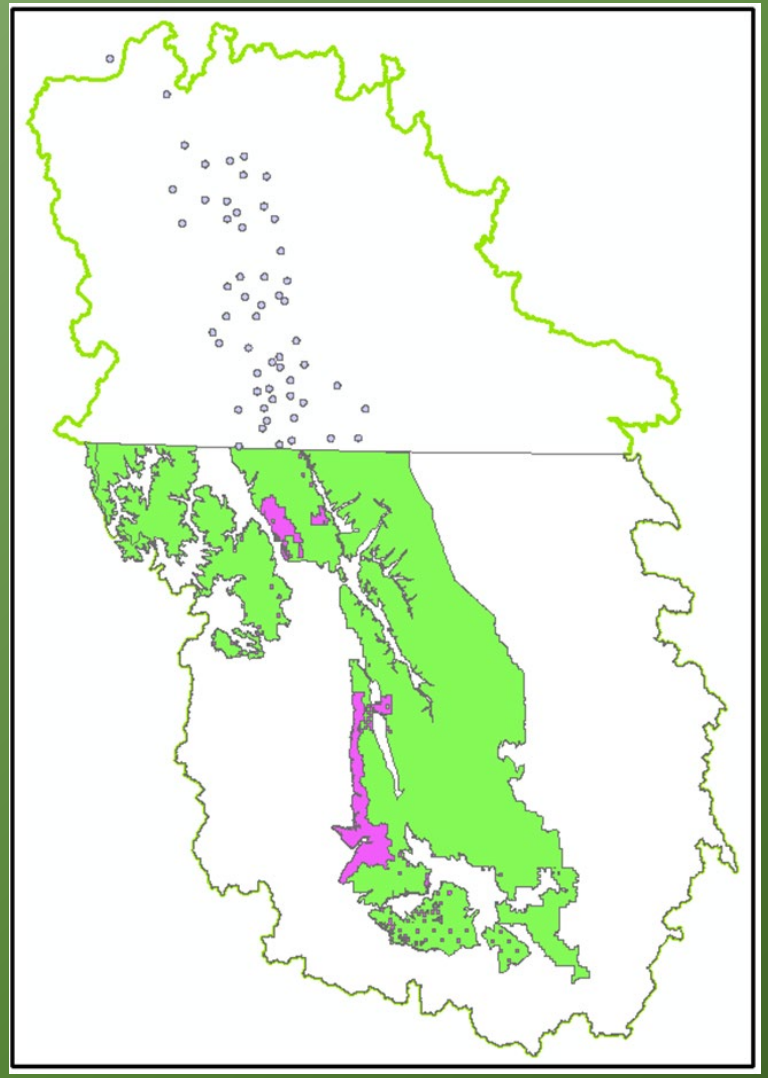


Canada Lynx

"feature" data development

SPATIAL DESIGN
Identify where functions & opportunities exist
4

Feature	Spatial Data
Canada Lynx	
Abundance, health, reproduction	*Remote Camera Database*
Survival	
Dispersal to adjacent recovery ecosystems	*FWS Critical Habitat Designation*

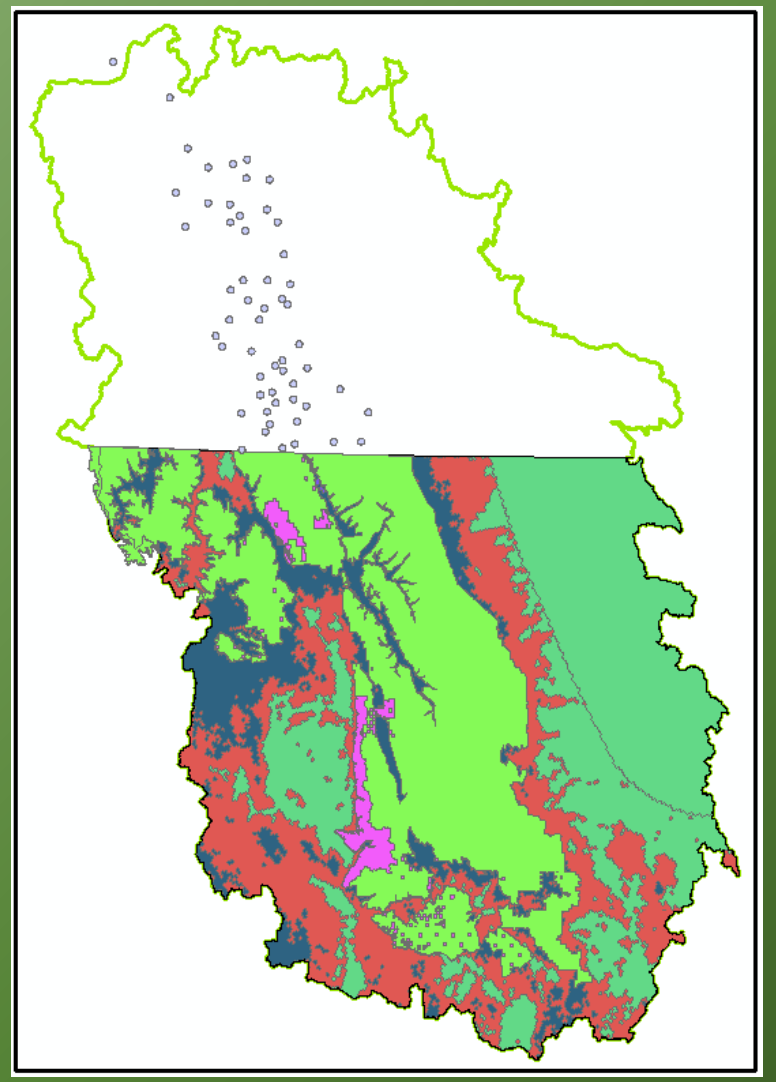


Canada Lynx

"feature" data development

SPATIAL DESIGN
Identify where functions & opportunities exist
4

Feature	*Spatial Data*
Canada Lynx	
Abundance, health, reproduction	*Remote Camera Database*
Survival	*MT NHP Lynx Suitability Model*
Dispersal to adjacent recovery ecosystems	*FWS Critical Habitat Designation*

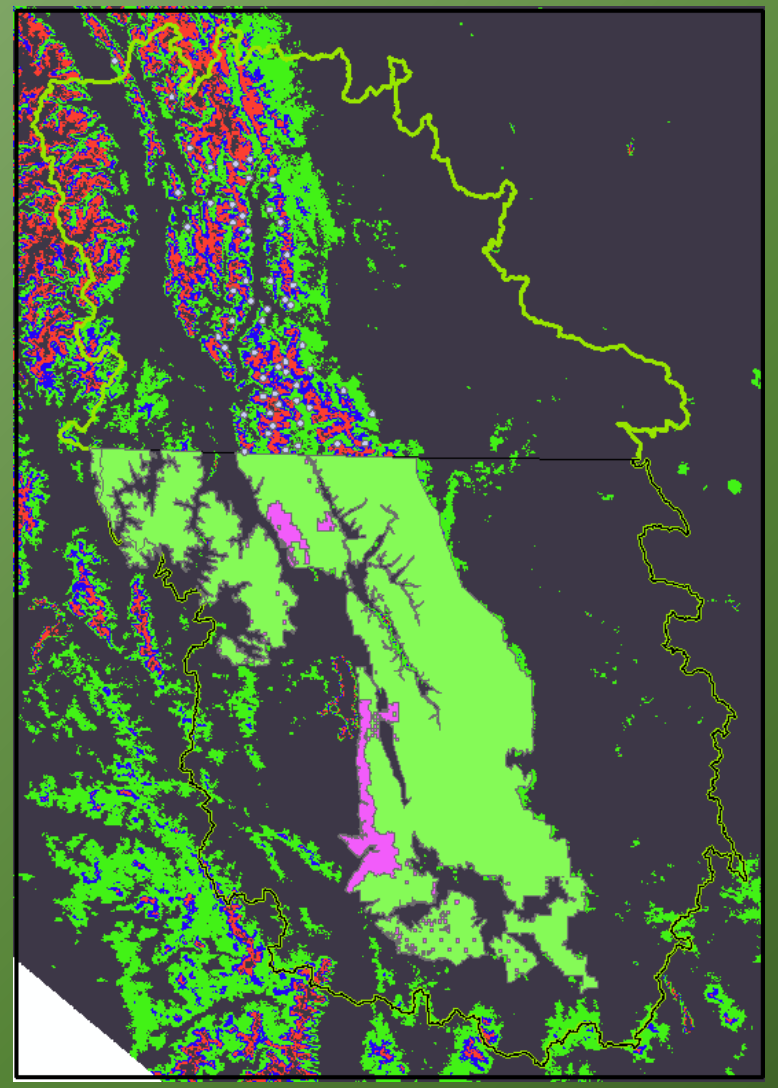


Canada Lynx

"feature" data development

SPATIAL DESIGN 4
Identify where functions & opportunities exist

Feature	*Spatial Data*
Canada Lynx	
Abundance, health, reproduction	*Remote Camera Database*
Survival	*MT NHP Lynx Suitability Model*
Dispersal to adjacent recovery ecosystems	*FWS Critical Habitat Designation*
	Spring Snow Persistence



Canada Lynx

"feature" data development

SPATIAL DESIGN
Identify where functions & opportunities exist
4

Feature	Spatial Data	Scoring
Canada Lynx		
Abundance, health, reproduction	*Remote Camera Database*	
Survival	*MT NHP Lynx Suitability Model*	
Dispersal to adjacent recovery ecosystems	*FWS Critical Habitat Designation*	
	Spring Snow Persistence	

Camera	Score
Detection	10,000
None	0

Suitability	Score
Unsuitable	0
Low	2,000
Moderate	5,000
High	10,000

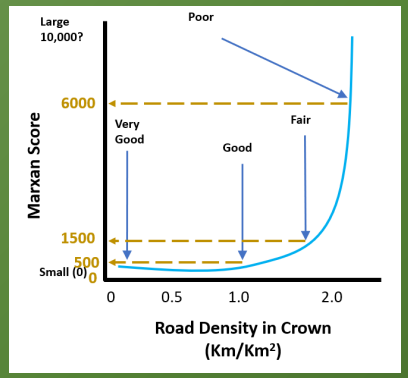
Habitat	Score
Critical	1,500
Not	0

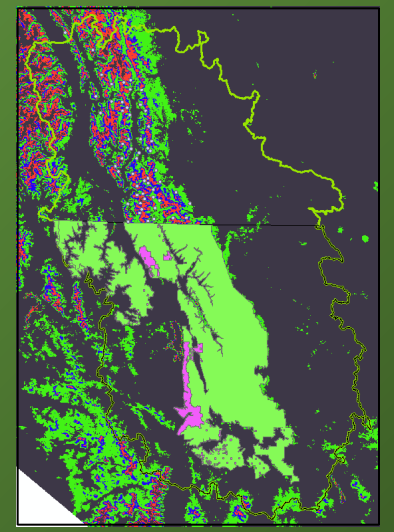
No Snow Years	Score
0	0
1-4	5,000
5-9	2,500
10-16	1,500
17	0

Scoring based on:

- *veracity of the data*
- *peer-reviewed research*
- *expert surveys*

Process fully documented and poised for Workshops & iteration





See: Marxan Best Practices Handbook

Marxan

Assumptions, Adjustments and Iterations

Crown Landscape Conservation Design Partners convene to deliberate, and address needed information and make collaborative knowledge-based decisions such as:

1. Do we have the best data?
2. How might we integrate the best data?
3. .
4. .
5. .

iterative

collaborative

holistic

transparent

…2023 Workshops!

Canada Lynx

a data-driven feature layer

SPATIAL DESIGN 4
Identify where functions & opportunities exist

Canada Lynx

- Abundance, health, reproduction
- Survival
- Dispersal to adjacent recovery ecosystems

Feature	*Spatial Data*	*Scoring*
	Remote Camera Database	
	MT NHP Lynx Suitability Model	
	FWS Critical Habitat Designation	
	Spring Snow Persistence	

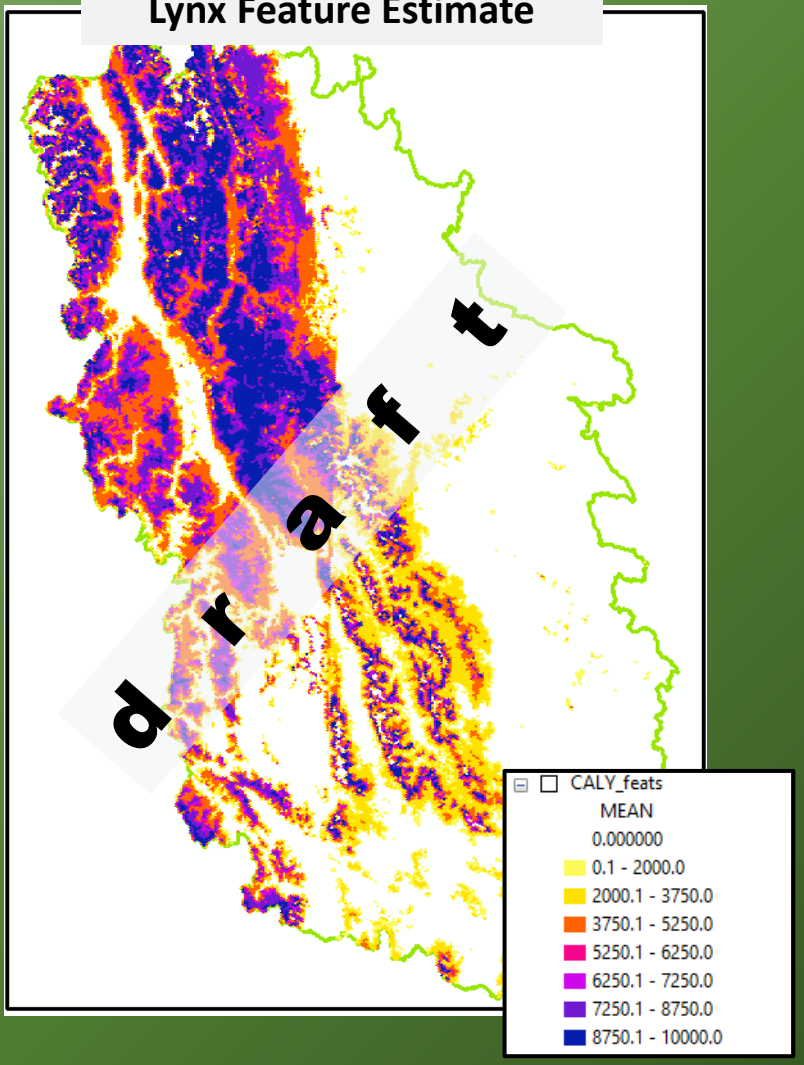
Camera	Score
Detection	10,000
None	0

Suitability	Score
Unsuitable	0
Low	2,000
Moderate	5,000
High	10,000

Habitat	Score
Critical	1,500
Not	0

Snow Years	Score
0	0
1-4	5,000
5-9	2,500
10-16	1,500
17	0

Crown LCD – Phase 2
Lynx Feature Estimate



Canada Lynx

quantifying threats to Lynx persistence

SPATIAL DESIGN
Identify where functions & opportunities exist
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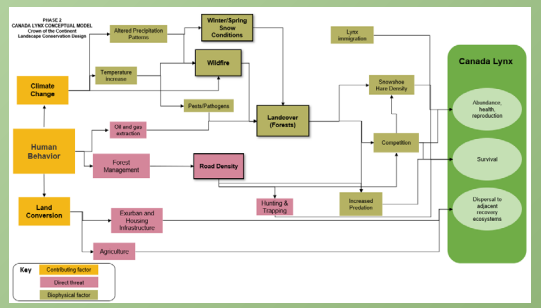


Costs (Threats)

Spatial Data

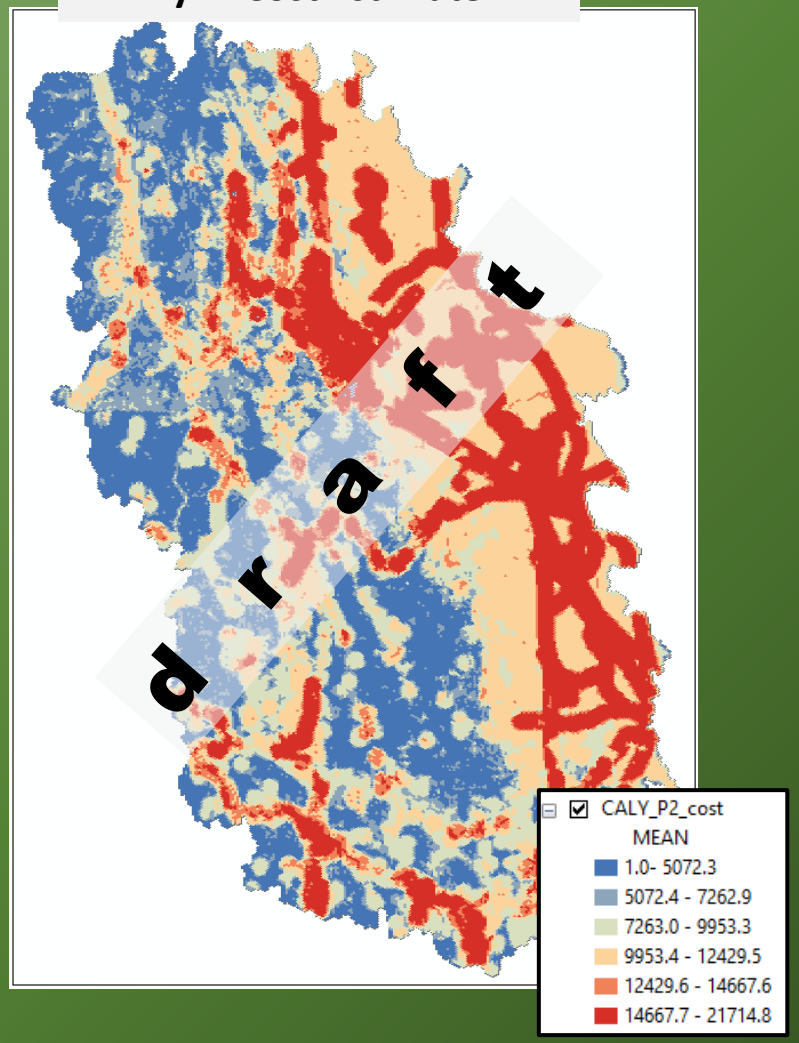
Winter/Spring Snow Conditions — *AB_Snow_layer*

Wildfire — *InteragencyFirePerimeterHistory (US)*
NFDB_Poly_202110707 (CAN)

Landcover (Forests) — *CMP_LCD_Landcover2017*
LCD_DEM_100m

Road Density — *All_Roads_Crown_LCD*

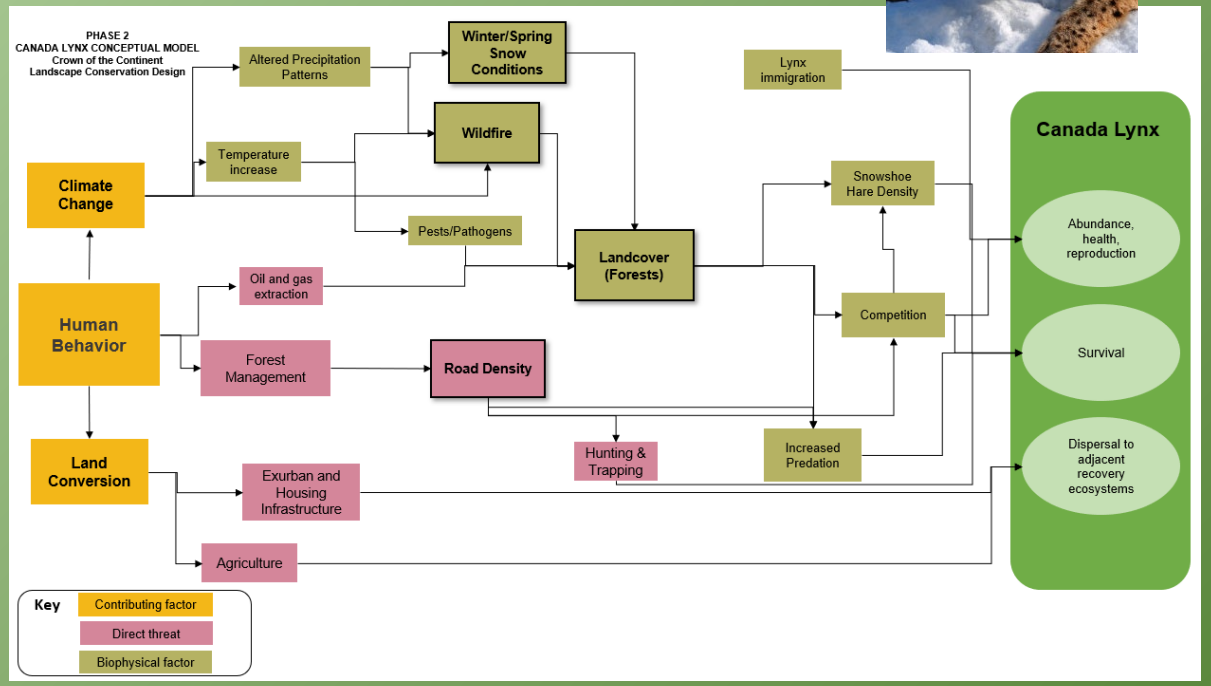
Crown LCD – Phase 2
Lynx Cost Estimate



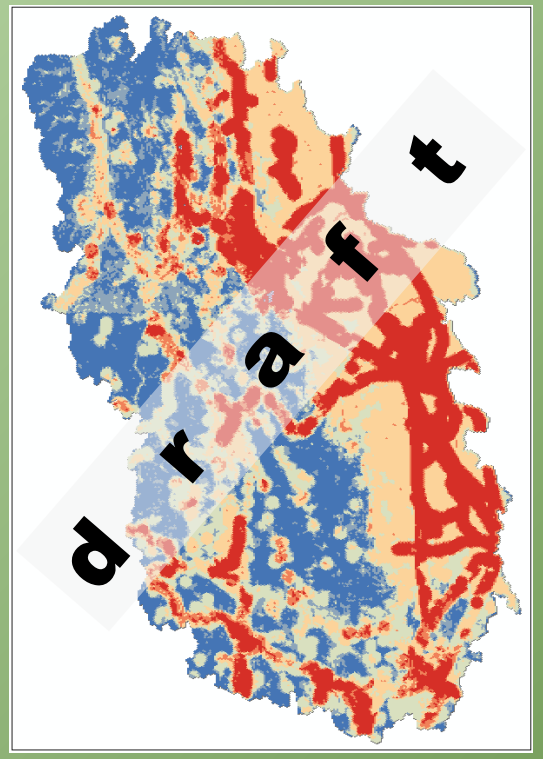
Canada Lynx

finding conservation opportunity

SPATIAL DESIGN 4
Identify where functions & opportunities exist



Crown LCD – Phase 2
Lynx Cost Estimate

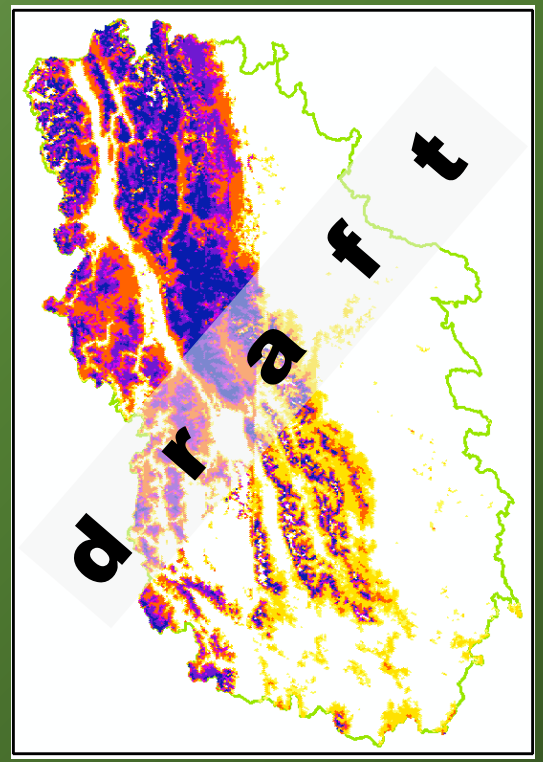


Can we find places good for [Lynx] where:

- *threats are also low?*
- *threats are manageable?*

In other words, ***can we find opportunities for lynx conservation?***

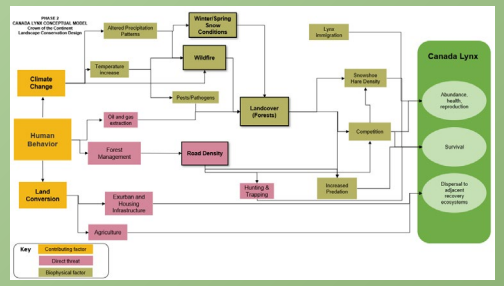
Crown LCD – Phase 2
Lynx Feature Estimate



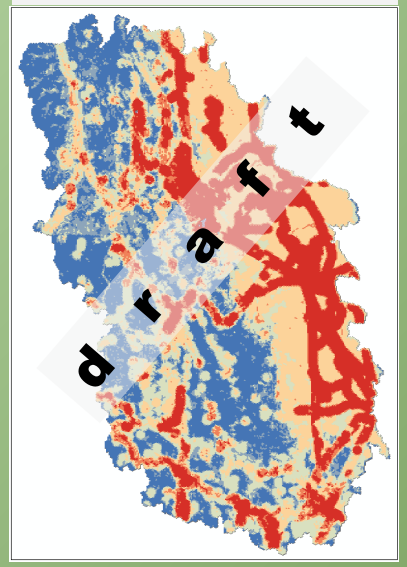
Canada Lynx

conservation opportunity

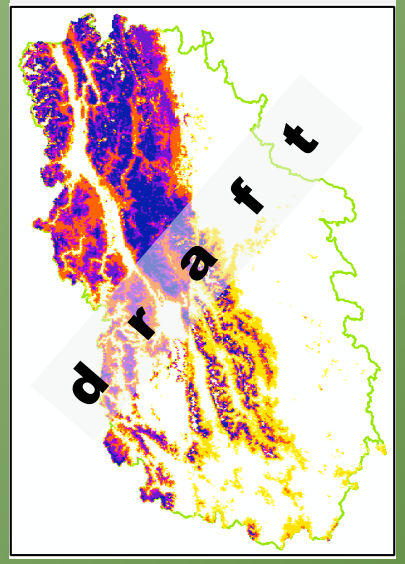
SPATIAL DESIGN
Identify where functions & opportunities exist
4



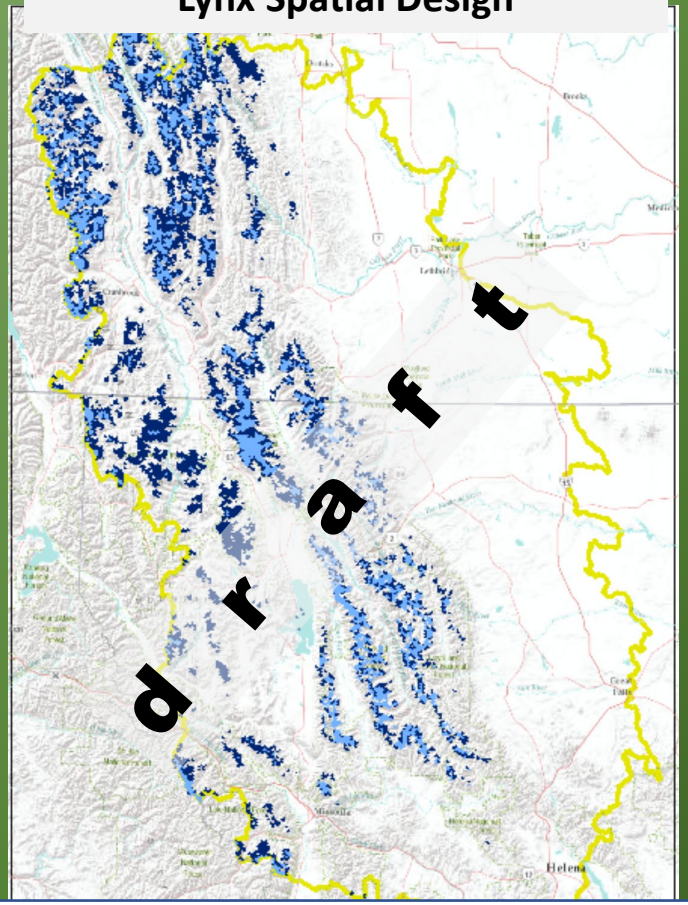
Crown LCD – Phase 2
Lynx Cost Estimate



Crown LCD – Phase 2
Lynx Feature Estimate



Crown LCD – Phase 2
Lynx Spatial Design



Retain 30% of current lynx opportunity

Retain 70% of current lynx opportunity

Marxan

Conservation Planning Software

Assumptions, Adjustments and Iterations

Crown Landscape Conservation Design Partners convene to deliberate, and address needed information and make collaborative knowledge-based decisions such as:

1. Do we have the best data?
2. How might we integrate the best data?
3. How much of a feature is needed to ensure conservation?
4. What other landscape factors come into play?
5. .

iterative

collaborative

holistic

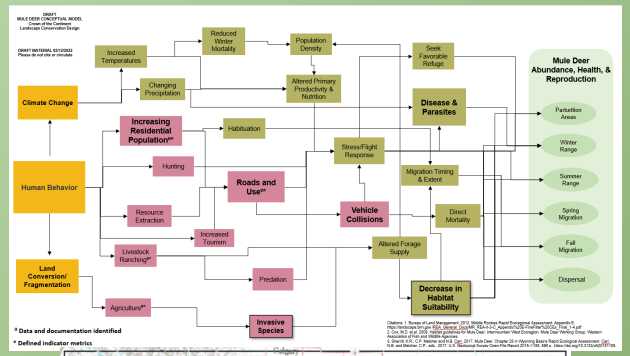
transparent

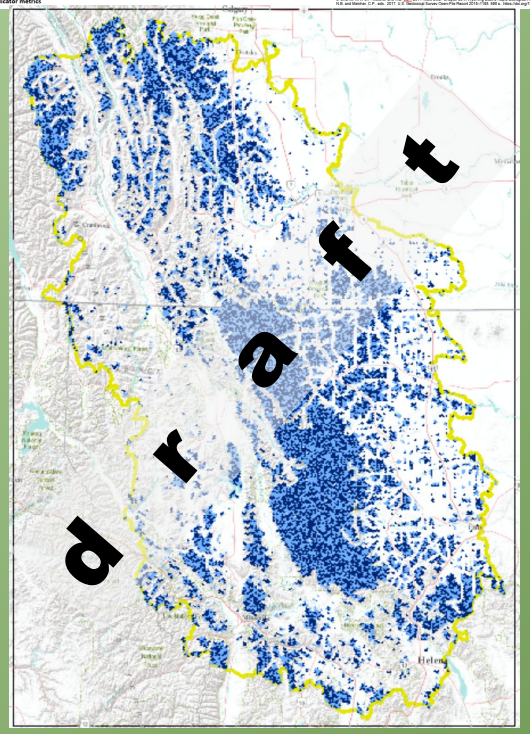
…2023 Workshops

Ecological Feature Spatial Designs

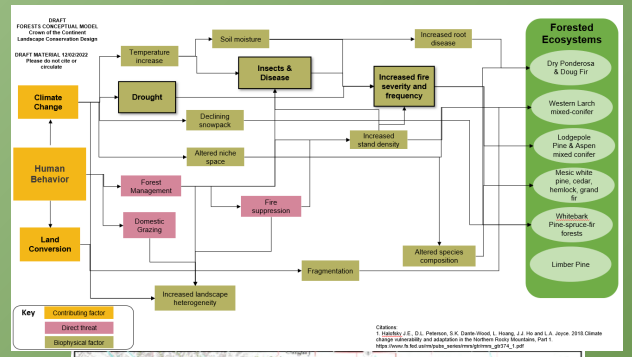
SPATIAL DESIGN
Identify where functions & opportunities exist
4

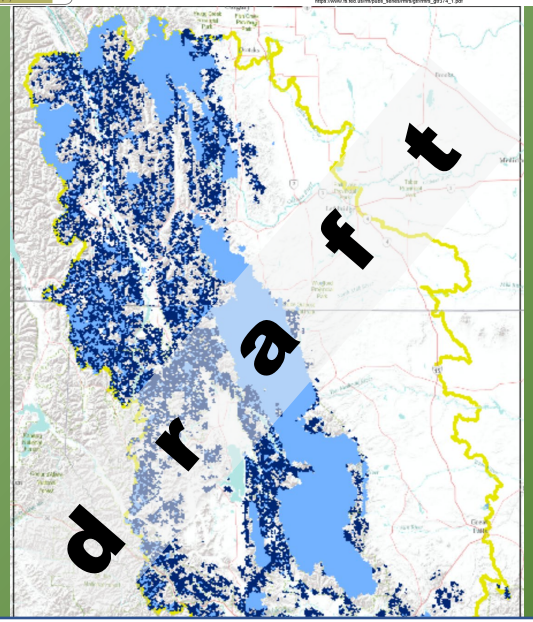
Elk



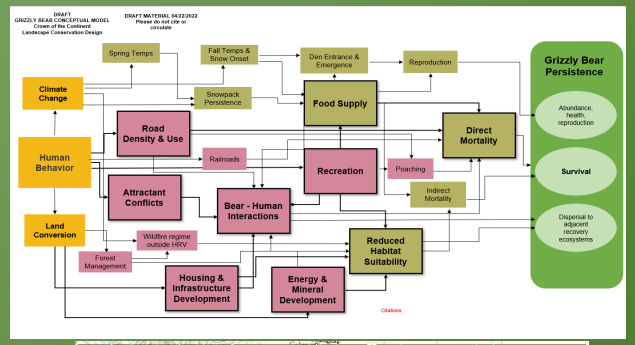


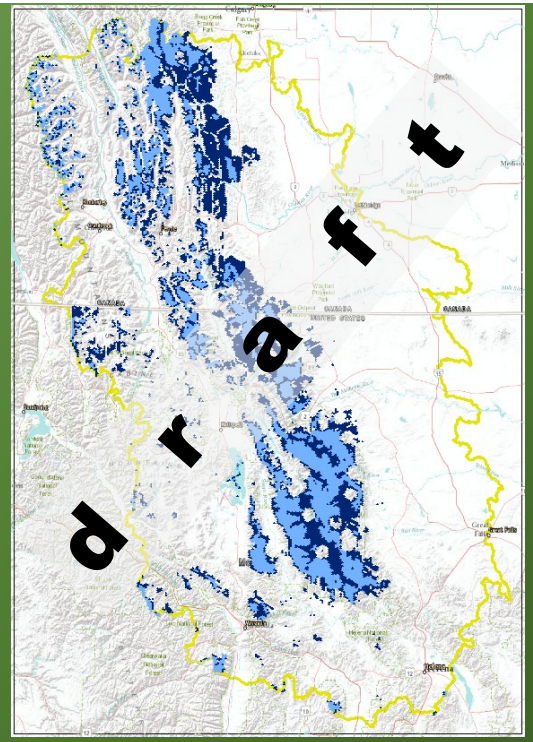
Forest





Grizzly Bear





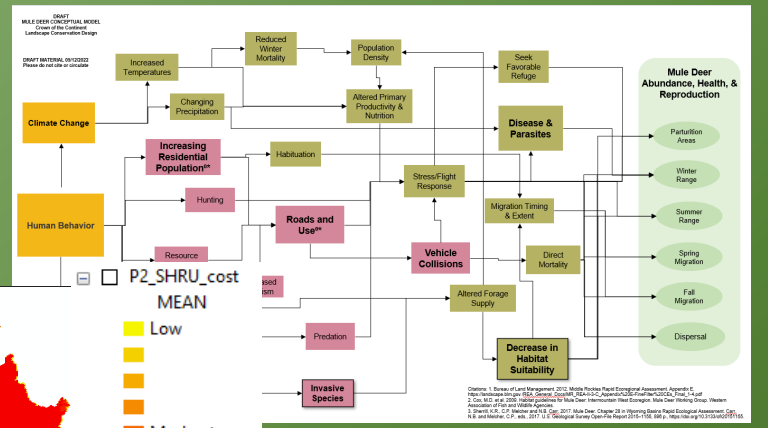
Retain 30% of current feature opportunity

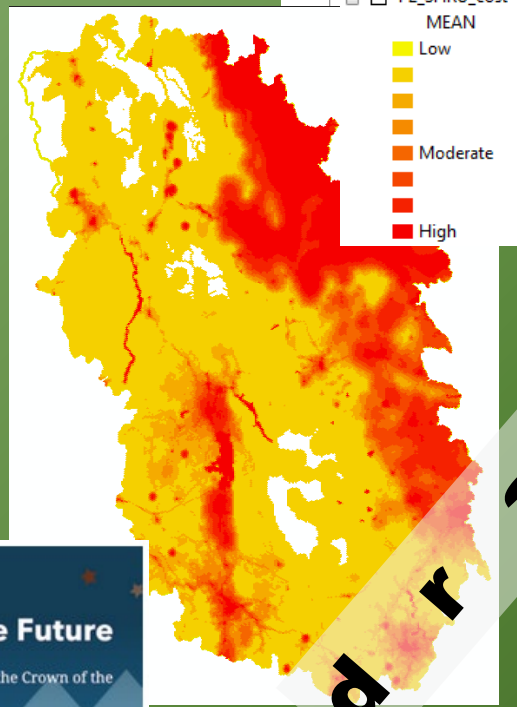
Retain 70% of current feature opportunity

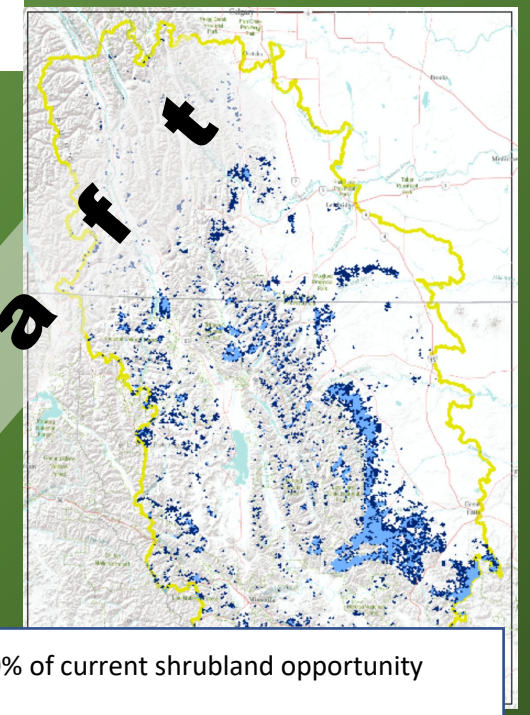
Phase 2 Products

STRATEGY DESIGN
Arrive at a design for decision making 5

- *Draft Social, Cultural, Economic conceptual models*
- *Ecological conceptual models*
- *Related spatial databases for ecological features*
- *Novel, synthetic feature-specific threat databases*
- *Spatial designs for ecological features*
- *Meticulously documented metadata with supporting expert contributions, tables and citations*
- ***A LARGE list of questions and decision adjustments***







And in the coming weeks

- *Draft Phase 2 Report for your review*
- *Website and StoryMap Updates*
- *2023 Workplan emphasizing Workshops*

Discussion, Questions, Critique

Hopes and Expectations for 2023

- *Advance quantify and spatialize the Social, Cultural, Economic models*
- *Further engage subject matter experts*
- *More deeply engage social and cultural contexts experts and data*
- *Advance integration of climate change*
- *Iterate, enhance and peer-review feature models*
- *Create a web-mapping platform and supporting resources to communicate designs*
- *Synthesize individual feature models into holistic Spatial Designs*
- *Get working on Strategic Designs*

Requests of Leadership Team for 2023

- ***Consider hosting a workshop.***
  - *entails providing a space to meet (~1.5 days) with room for 8-10 attendees*
  - *internet access and whiteboard/flipchart/wall space*
  - *preferably have lodging and services nearby*

- ***Assign or encourage subject matter experts on your staff to attend appropriate workshop(s)***

- ***Consider sharing any leads on funding you may have.***
  - *We have funds to support the Analysis Team through Fall of 2023*
  - *We are hoping to augment and extend that support*