

MANAGEMENT & RESTORATION CAPSTONE



WATS 5340 & 5350



JAY WILDE & BIRCH CREEK

Intro to your LTPBR Project

BIRCH CREEK INTRO – Part II

1. Restoration Project Reach
2. Restoration Project Goals & Objectives
3. What You'll Do
 1. Normally
 2. In a COVID-19 World...



The Birch Creek Watershed



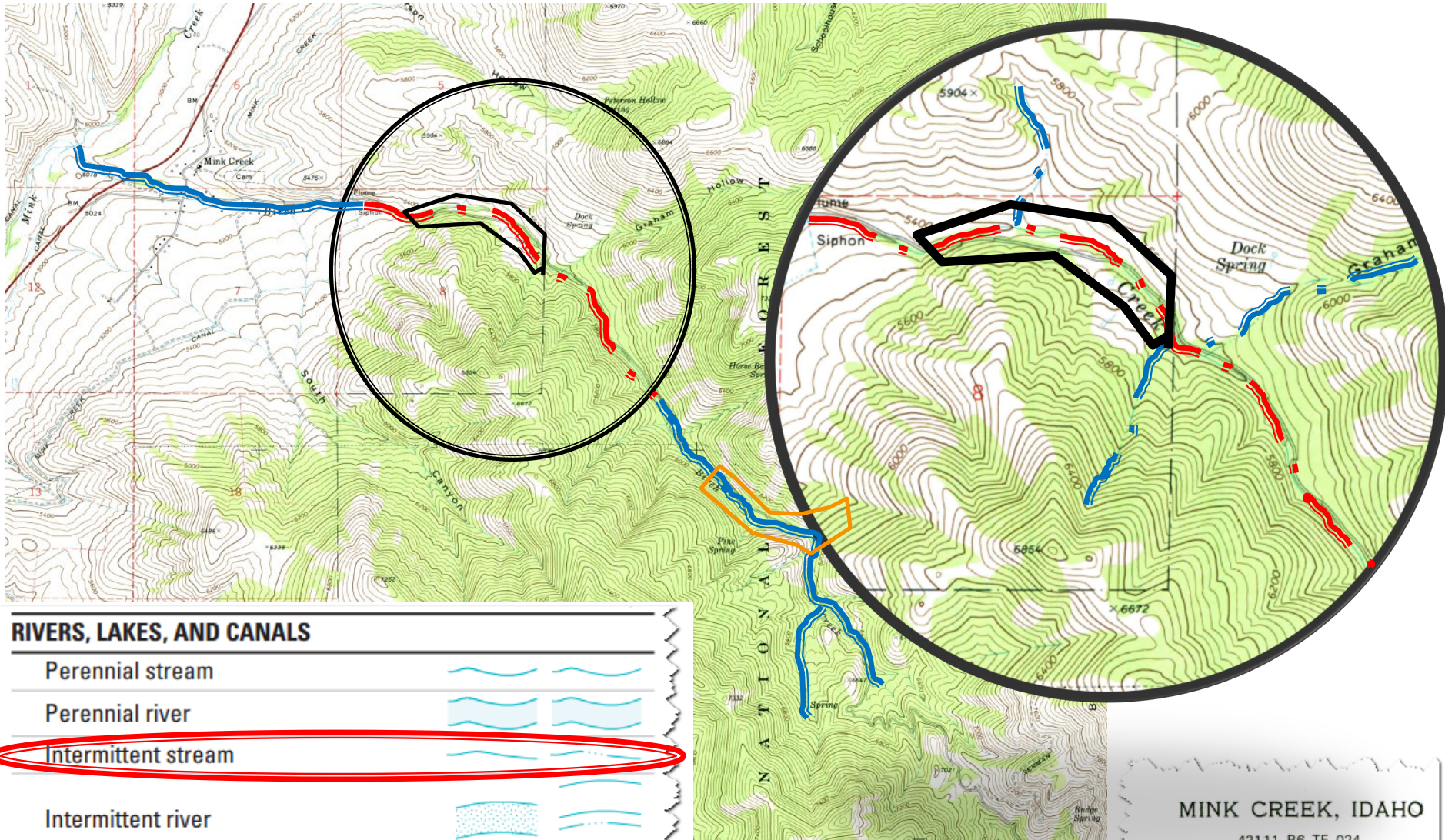
© 2017 Google
Image Landsat / Copernicus

Google Earth

Birch Creek



Your Project



RIVERS, LAKES, AND CANALS

Perennial stream



Perennial river



Intermittent stream



Intermittent river



Disappearing stream



Falls small



MINK CREEK, IDAHO

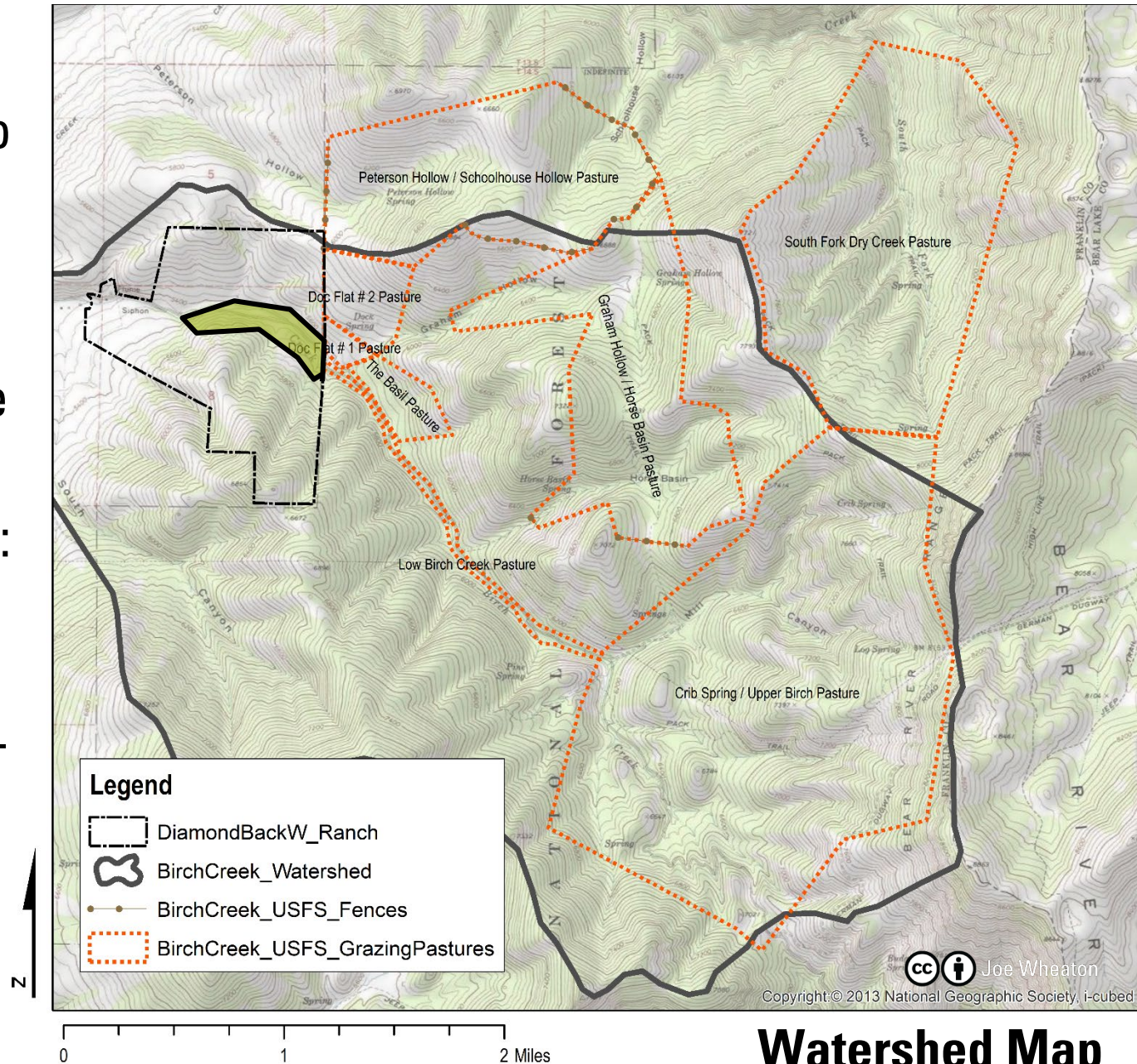
42111-B6-TF-024

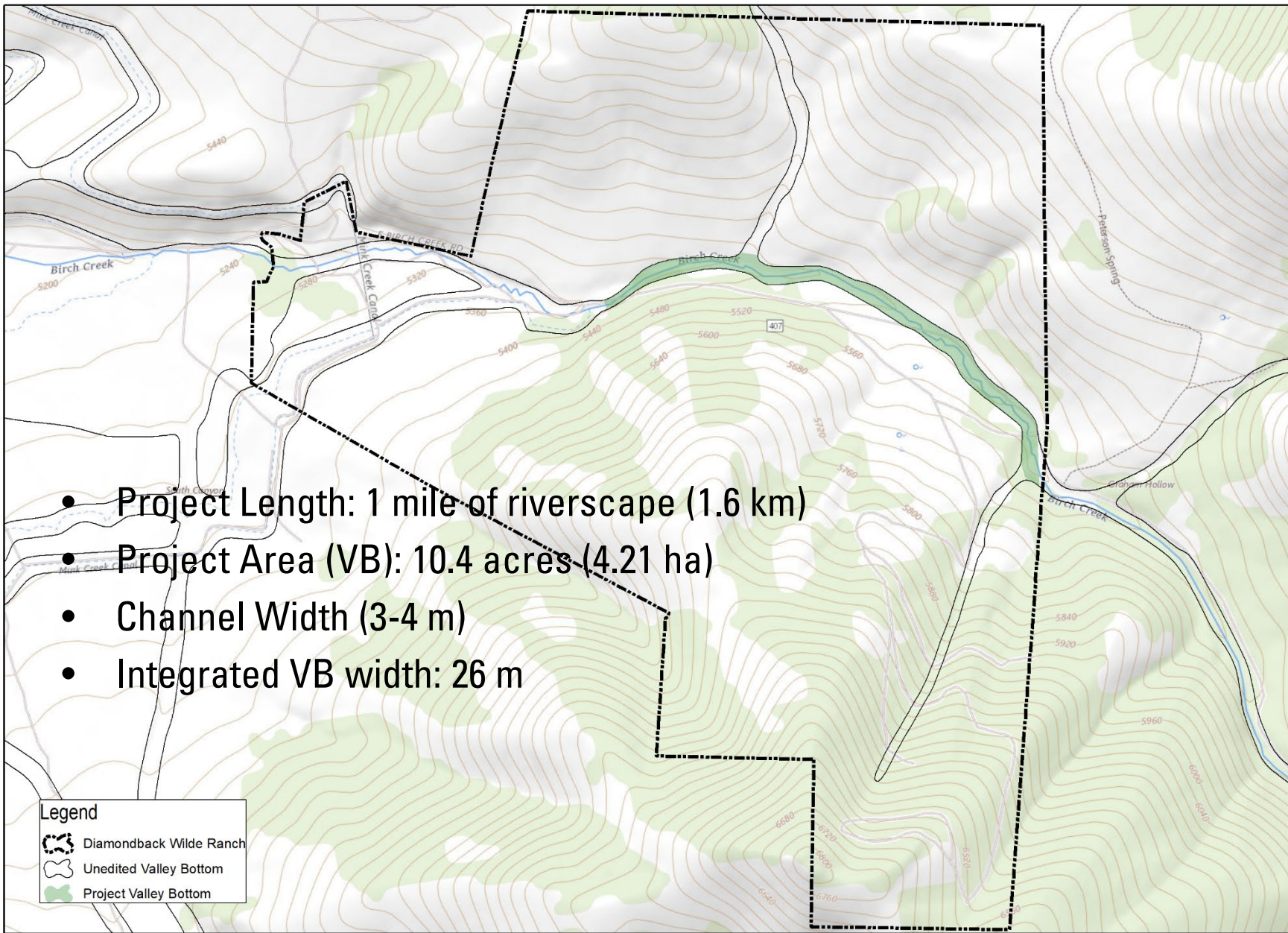
1969

PHOTOINSPECTED 1980
DMA 3668 II NW-SERIES V893

Jay's Ranching Operation & Your Project Reach

- We're @ USFS boundary down to second water crossing
- Project Length: 1 mile of riverscape (1.6 km)
- Project Area (VB): 10.4 acres (4.21 ha)
- Channel Width (3-4 m)
- Integrated VB width: 26 m





- Project Length: 1 mile of riverscape (1.6 km)
- Project Area (VB): 10.4 acres (4.21 ha)
- Channel Width (3-4 m)
- Integrated VB width: 26 m

Legend

- Diamondback Wilde Ranch
- Unedited Valley Bottom
- Project Valley Bottom

0 100 200 400 600 800 1,000 Meters

0 250 500 1,000 1,500 2,000 2,500 Feet

Context Map

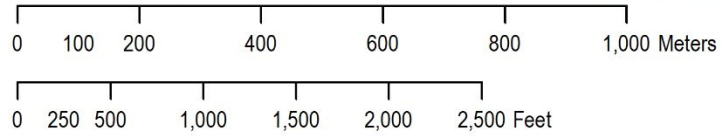


CC BY Joe Wheaton

Legend

- Diamondback Wilde Ranch
- Unedited Valley Bottom
- Project Valley Bottom

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, ICN, and the GIS User Community





Aerial Photo Map



CC BY Joe Wheaton

Legend

-  Diamondback Wilde Ranch
-  Unedited Valley Bottom

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 50 100 200 300 400 500 Meters

0 100 200 400 600 800 1,000 Feet

Aerial Photo – Project Area

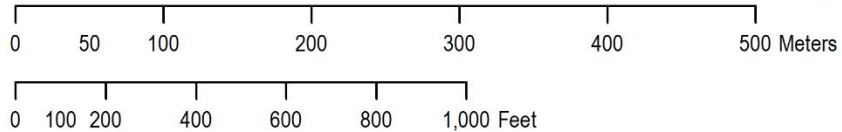
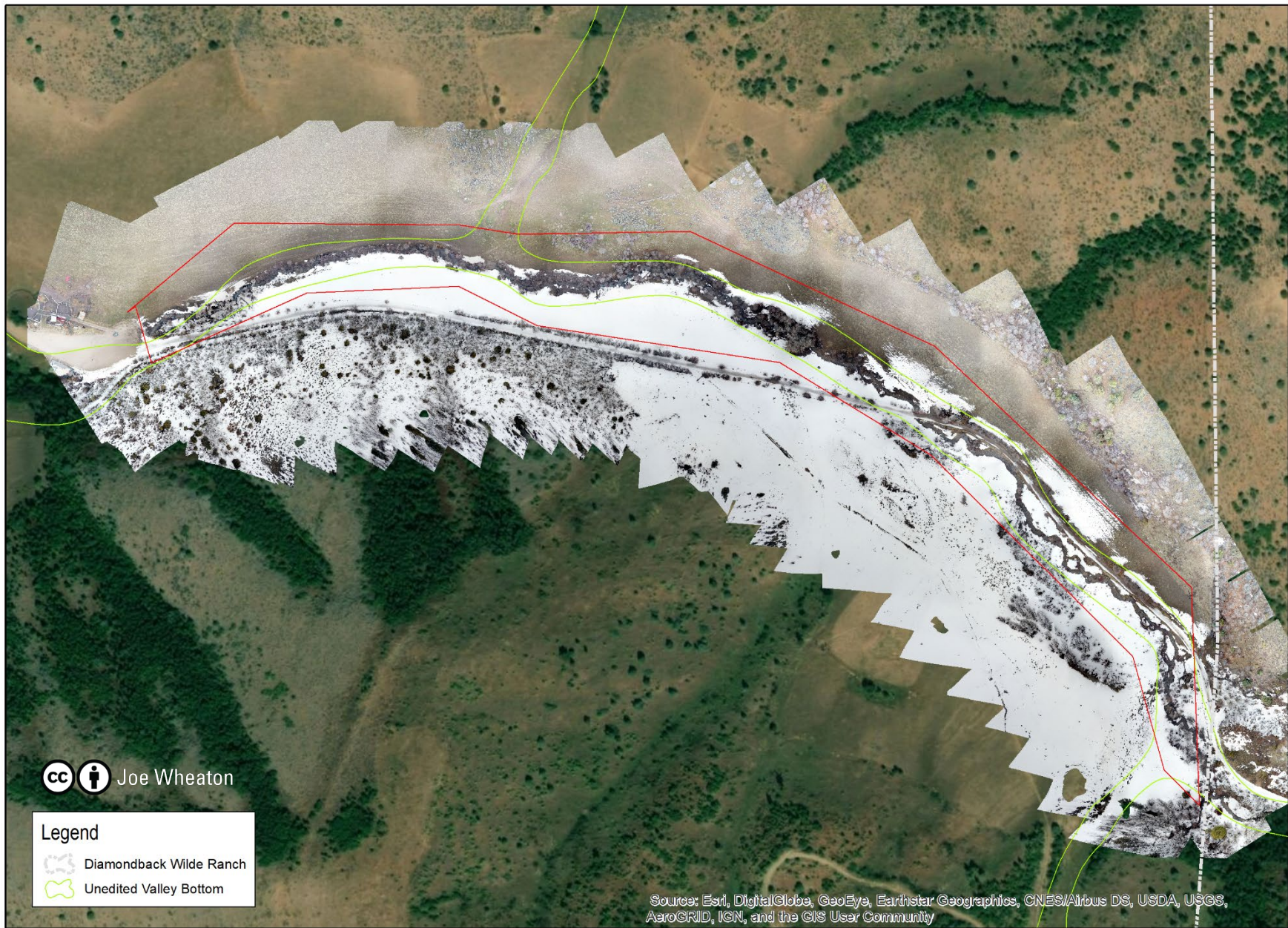
Fly Through – 5 Minutes

☰ YouTube

Search



Birch Creek 2020 - Project Reach



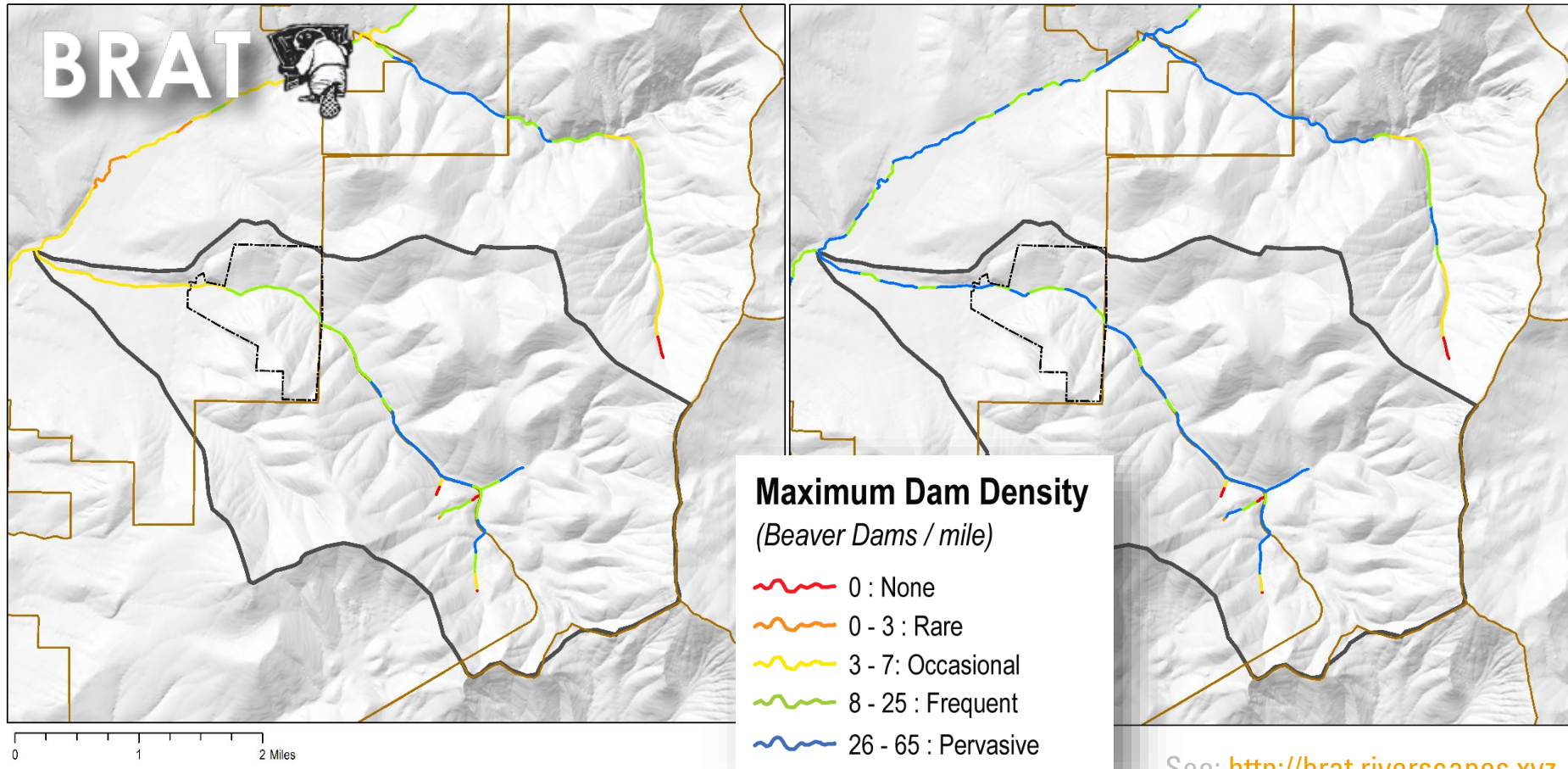
UAV Photo - Project Area

BRAT In Birch Creek – Good Habitat

Existing conditions vs. Historic Estimate

- Capacity of 90 dams
- 23 dams per mile

- Capacity of 125 dams
- 32 dams per mile



See: <http://brat.riverscapes.xyz>

BIRCH CREEK INTRO – Part II

1. Restoration Project Reach
2. Restoration Project Goals & Objectives
3. What You'll Do
 1. Normally
 2. In a COVID-19 World...



Birch Creek, Idaho – USFS Project Phase 1

Restoring Perennial Flow

Restoration Goal

- Restore perennial flow (or make less intermittent)

Setting

- Abundant forage for beaver
- Shallow water depth – high risk of predation
- Previously unsuccessful beaver translocation

Strategy

- Build BDAs to provide immediate habitat/refuge for beaver



Birch Creek, Idaho – Diamond Project Phase 2

Improving Riverscape Health

Restoration Goal(s)?

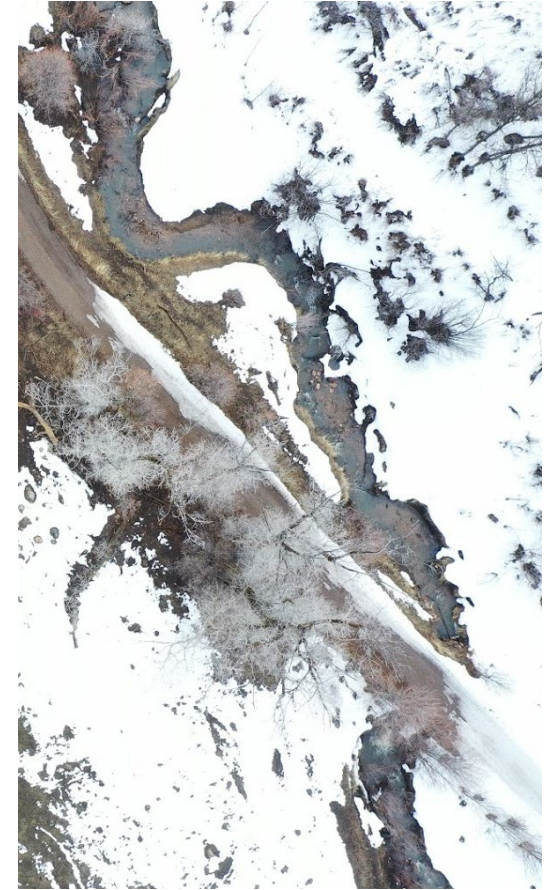
- Improving riverscape health
- Restore perennial flow (or make less intermittent)

Setting

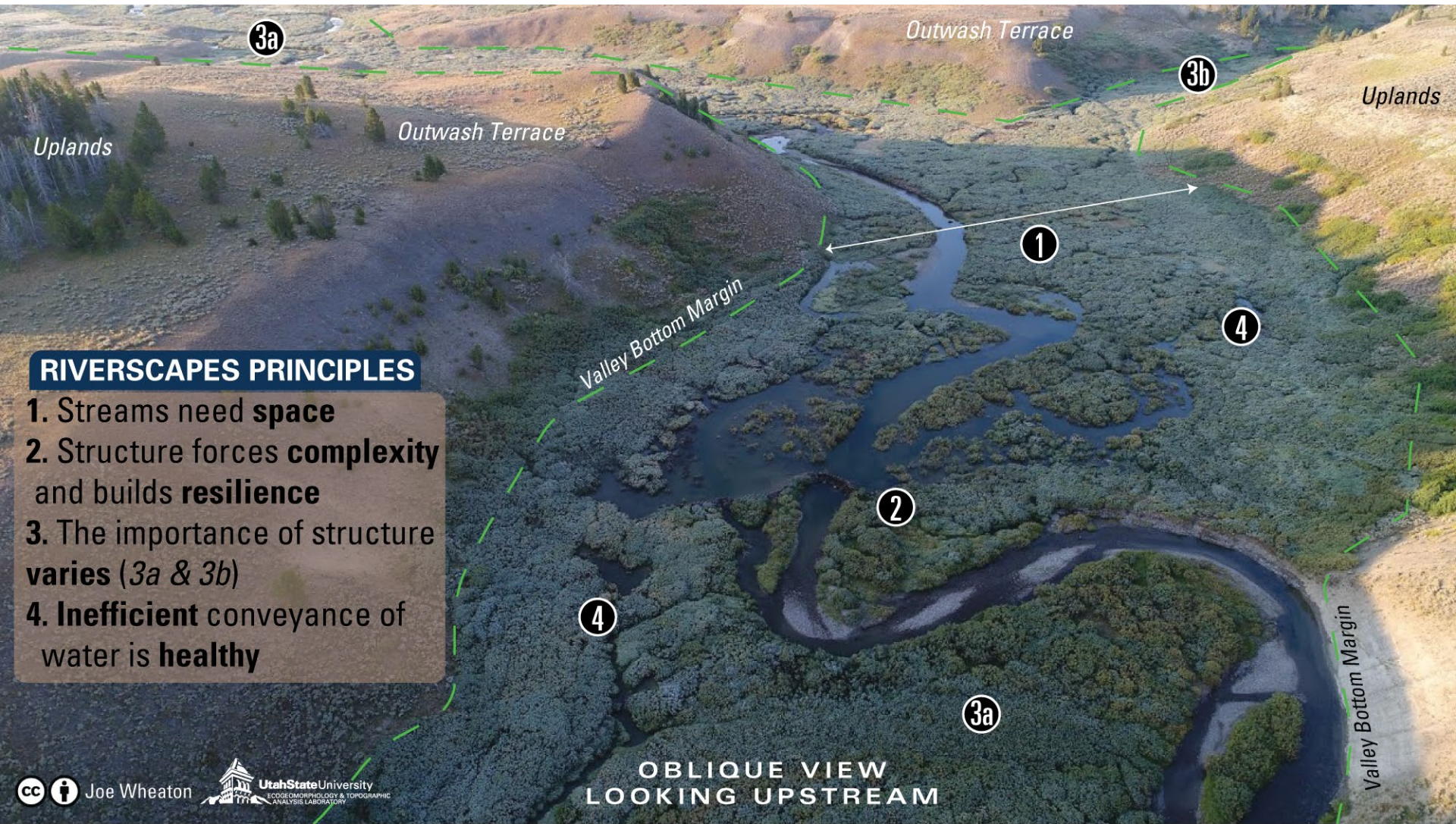
- Narrow Valley Bottom
- Incised and structurally starved in some areas
- Efficient conveyance

Strategies

- Use low-tech structures to force complexity, initiate recovery, decrease efficiency, improve resilience to drought, fire & flood



Review: Riverscapes Principles



RIVERSCAPES PRINCIPLES

1. Streams need **space**
2. Structure forces **complexity** and builds **resilience**
3. The importance of structure **varies** (3a & 3b)
4. **Inefficient** conveyance of water is **healthy**

OBLIQUE VIEW
LOOKING UPSTREAM

RESTORATION PRINCIPLES

5. It's okay to make a **mess**
6. Strength in **numbers**
7. Use **natural** building materials
8. Let the system **do the work**
9. **Self-sustaining** systems are the solution
10. **Defer decision making** to the system



BIRCH CREEK INTRO – Part II

1. Restoration Project Reach
2. Restoration Project Goals & Objectives
3. What You'll Do
 1. Normally
 2. In a COVID-19 World...



From Chapter 3 of your Manual

Chapter 3 - PLANNING FOR LOW-TECH PROCESS-BASED RESTORATION



PLANNING

Prepared by:
Stephen N. Bennett, Joseph M. Wheaton, Nicolaas Bouwes, Christopher E. Jordan, William W. Macfarlane, Jeremy D. Maestas, Elijah Portugal, and Scott M. Shahverdian

Recommended Citations:
Bennett, S.N., Wheaton, J.M., Bouwes, N., Jordan, C.E., Macfarlane, W.W., Maestas, J.D., Portugal, E. and Shahverdian, S.M., 2019. Chapter 3 – Planning for Low-Tech Process-Based Restoration. In: J.M. Wheaton, S.N. Bennett, N. Bouwes, J.D. Maestas and S.M. Shahverdian (Editors), Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Utah State University Restoration Consortium, Logan, Utah pp. 54.

 This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

IMPLICATIONS FOR PRACTICE

- Planning for low-tech process-based restoration is similar to planning for other forms of restoration.
- We adapt the Conservation Planning Process to show what aspects of the process are distinctive to low-tech process-based restoration. The Conservation Planning Process follows an adaptive management framework and has three phases: i) a Collection and Analysis Phase (focused on planning), ii) a Decision Support Phase (focused on design), and iii) an Application and Evaluation Phase (focused on implementation).
- For low-tech restoration, we pose four screening questions in the process to identify exit points where and if low-tech process-based restoration may not be appropriate.
- Out of the Collection and Analysis Phase, current conditions of the riverscape (valley bottom), constraints and recovery potential are identified to help frame appropriate and realistic treatments and targets in the design.
- Low-tech restoration to reverse structural starvation of riverscapes frequently takes more than one treatment (and design), and out of the design phase expectations are set for what progress towards long-term restoration goals will be made and how many treatments might be necessary.
- The implementation of a design involves an iteration between carrying out an individual treatment of structural additions and evaluation. Ultimately, it is assumed project goals will be met if the processes of wood accumulation and/or beaver dam activity make the transition from being mimicked and promoted by treatments to occurring on their own in a self-sustaining fashion. As such, the need for additional treatments

CHAPTER 3: PLANNING FOR LOW-TECH PROCESS-BASED RESTORATION 1 of 54



**LOW-TECH
PROCESS-BASED
RESTORATION**

OF

**RIVERSCAPES
DESIGN MANUAL**



Edited by: Joseph M. Wheaton, Stephen N. Bennett, Nicolaas Bouwes, Jeremy D. Maestas & Scott M. Shahverdian

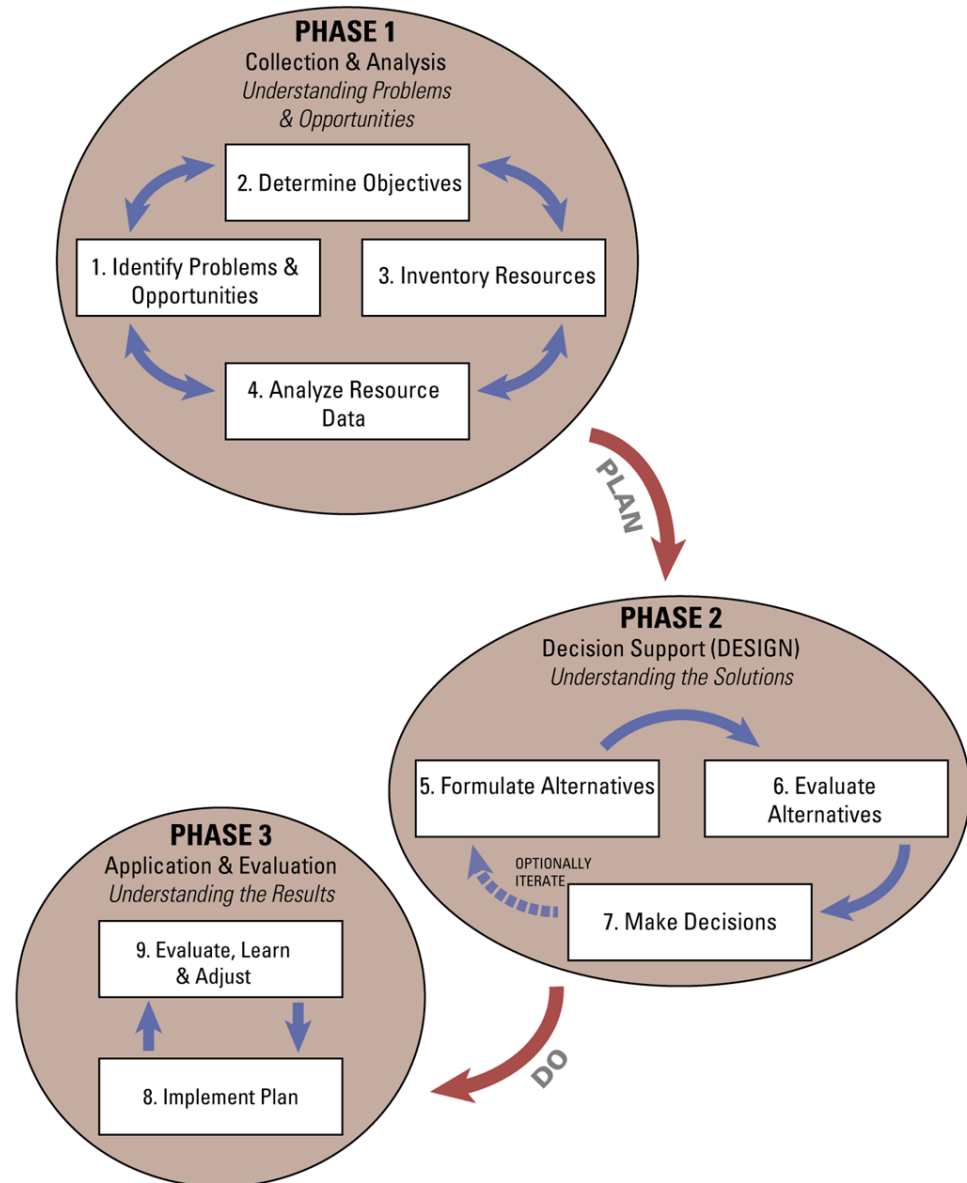


Bennett et al. (2019) – Chapter 3 LTPBR Manual

DOI: [10.13140/RG.2.2.15815.75680](https://doi.org/10.13140/RG.2.2.15815.75680)

Planning

- Standard NRCS CPP without adaptive management
- Presented as a linear process through three phases



Add Adaptive Management

Standard NRCS CPP
with Adaptive
Management:
i.e. evaluate &
adjust

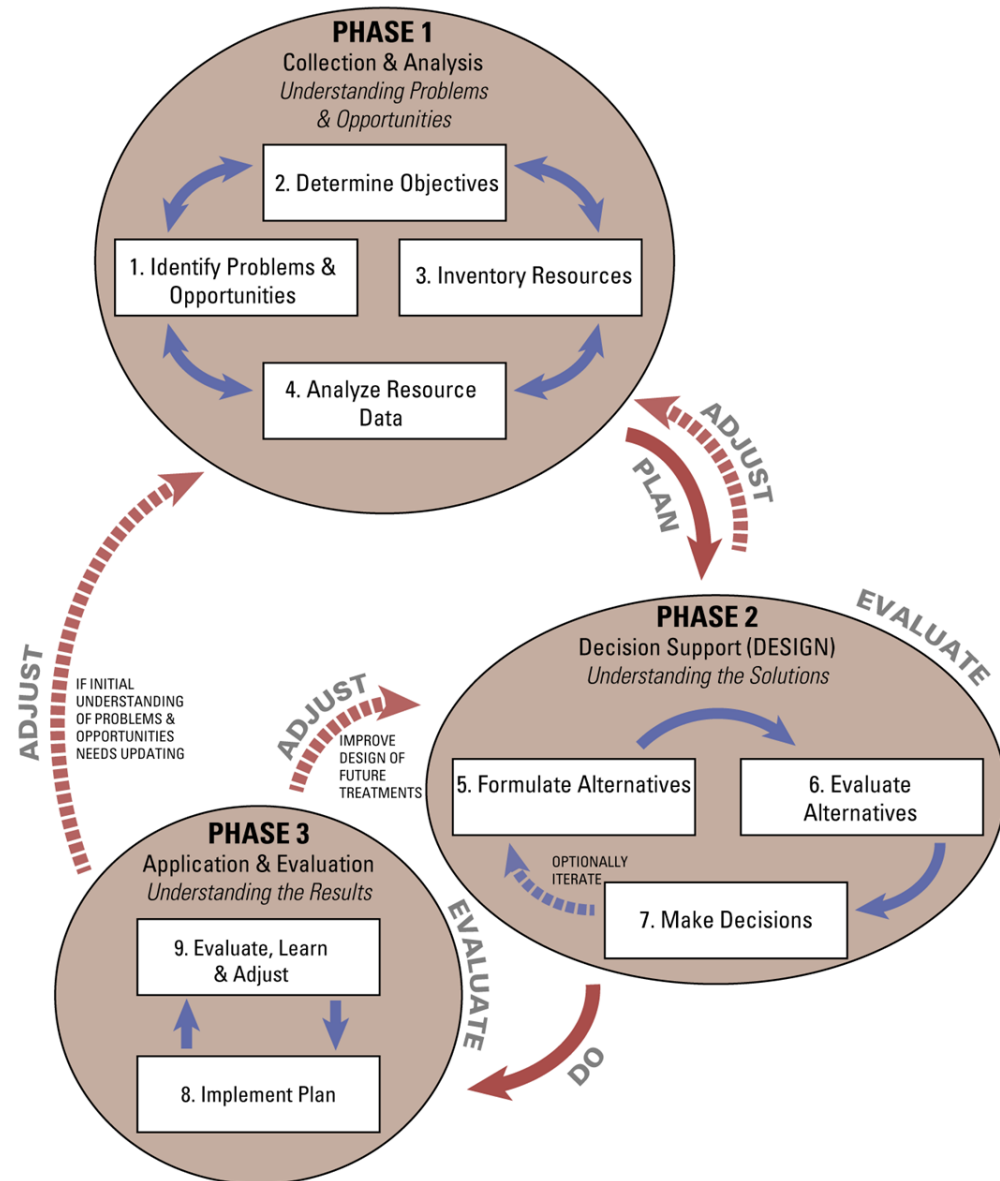
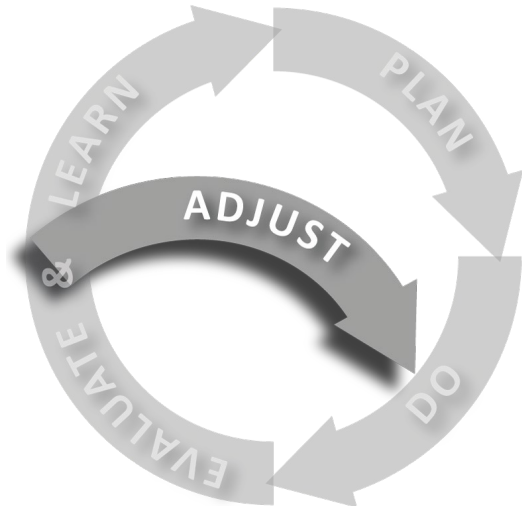


Figure 3.1 (p. 89) from Bennett et al. (2019)

BIRCH CREEK INTRO – Part II

1. Restoration Project Reach
2. Restoration Project Goals & Objectives
3. What You'll Do
 1. Normally
 2. In a COVID-19 World...



PHASE 1 with Low-Tech

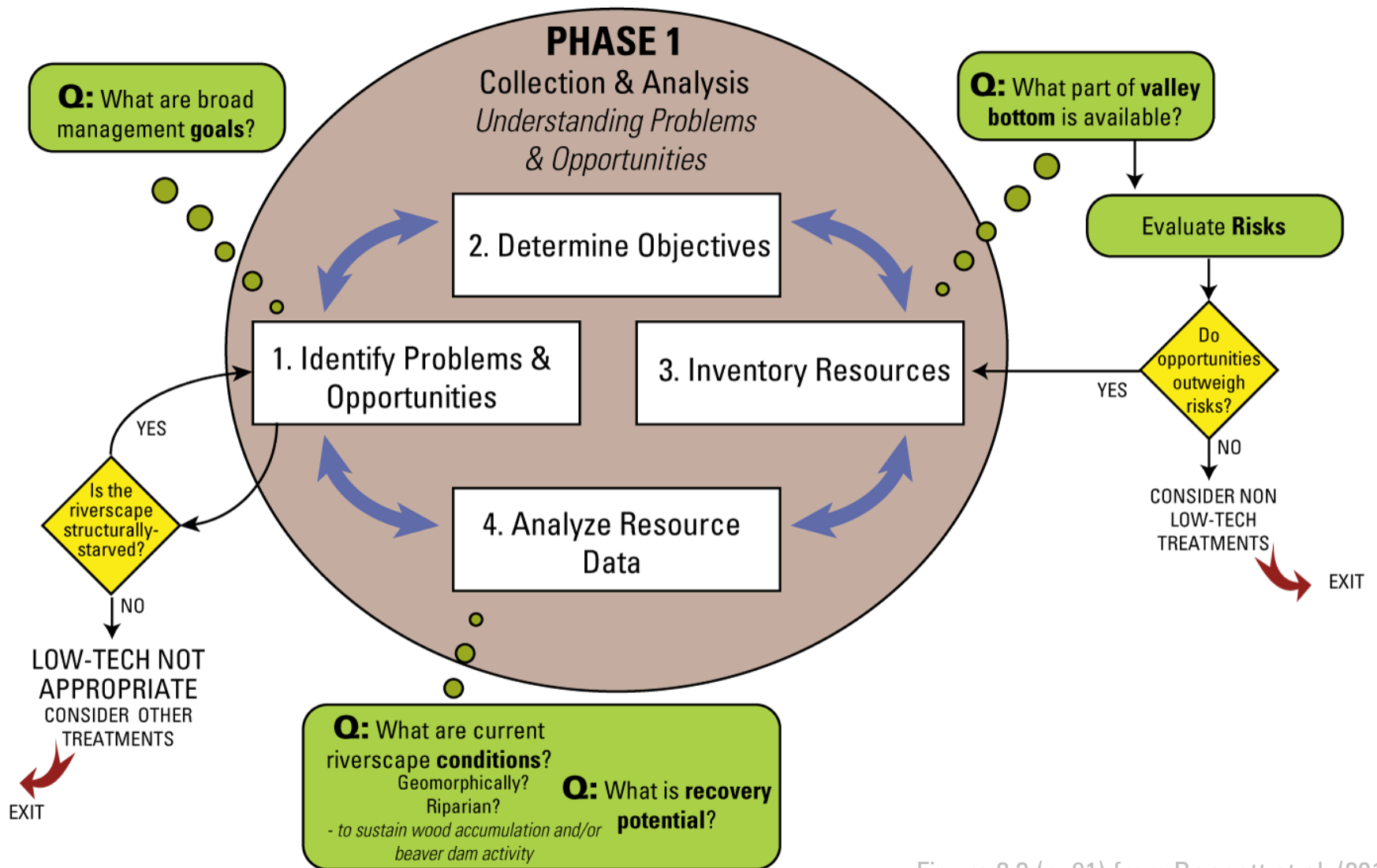


Figure 3.3 (p. 91) from Bennett et al. (2019)

PHASE 1 with Low-Tech

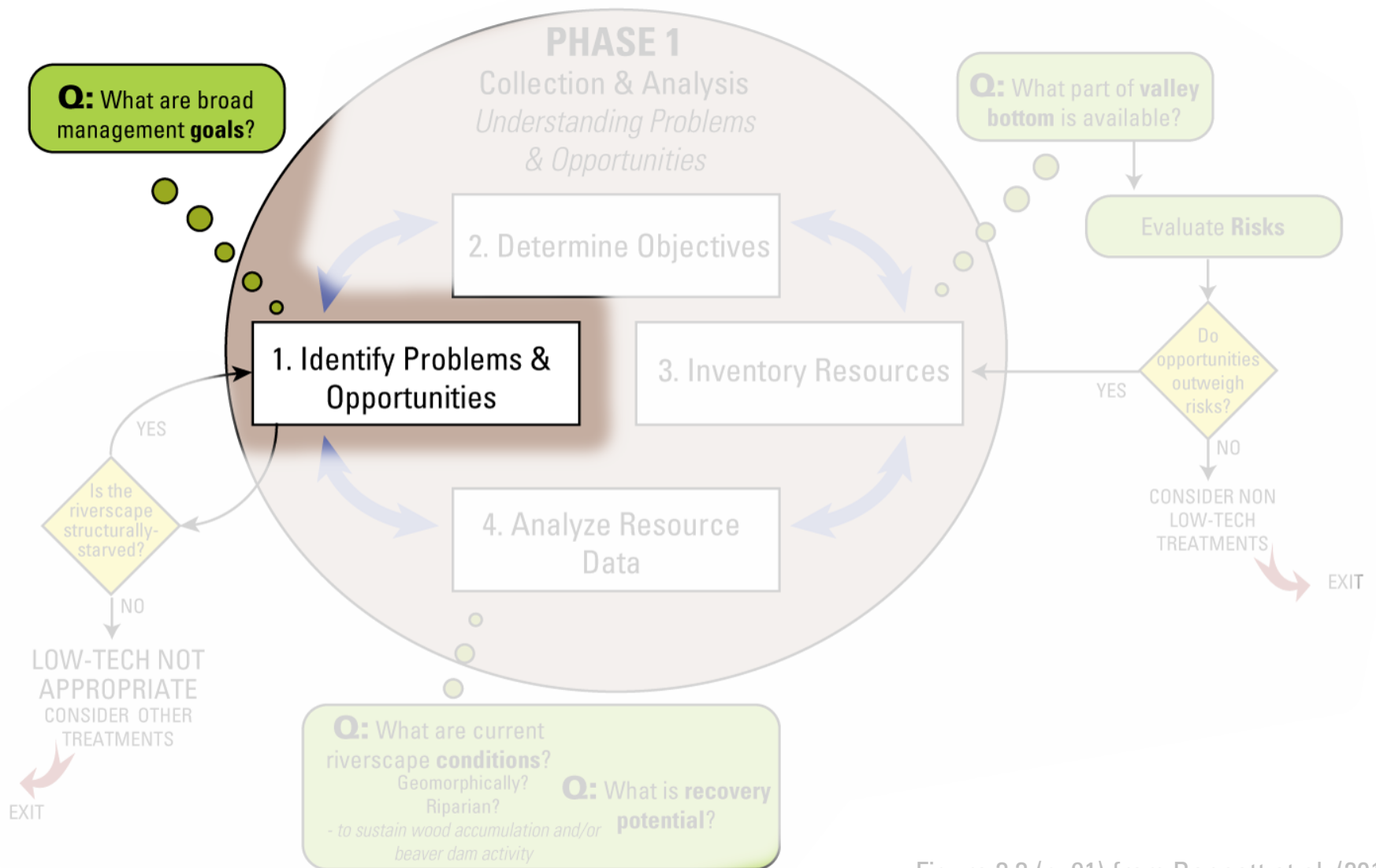


Figure 3.3 (p. 91) from Bennett et al. (2019)

PHASE 1 with Low-Tech

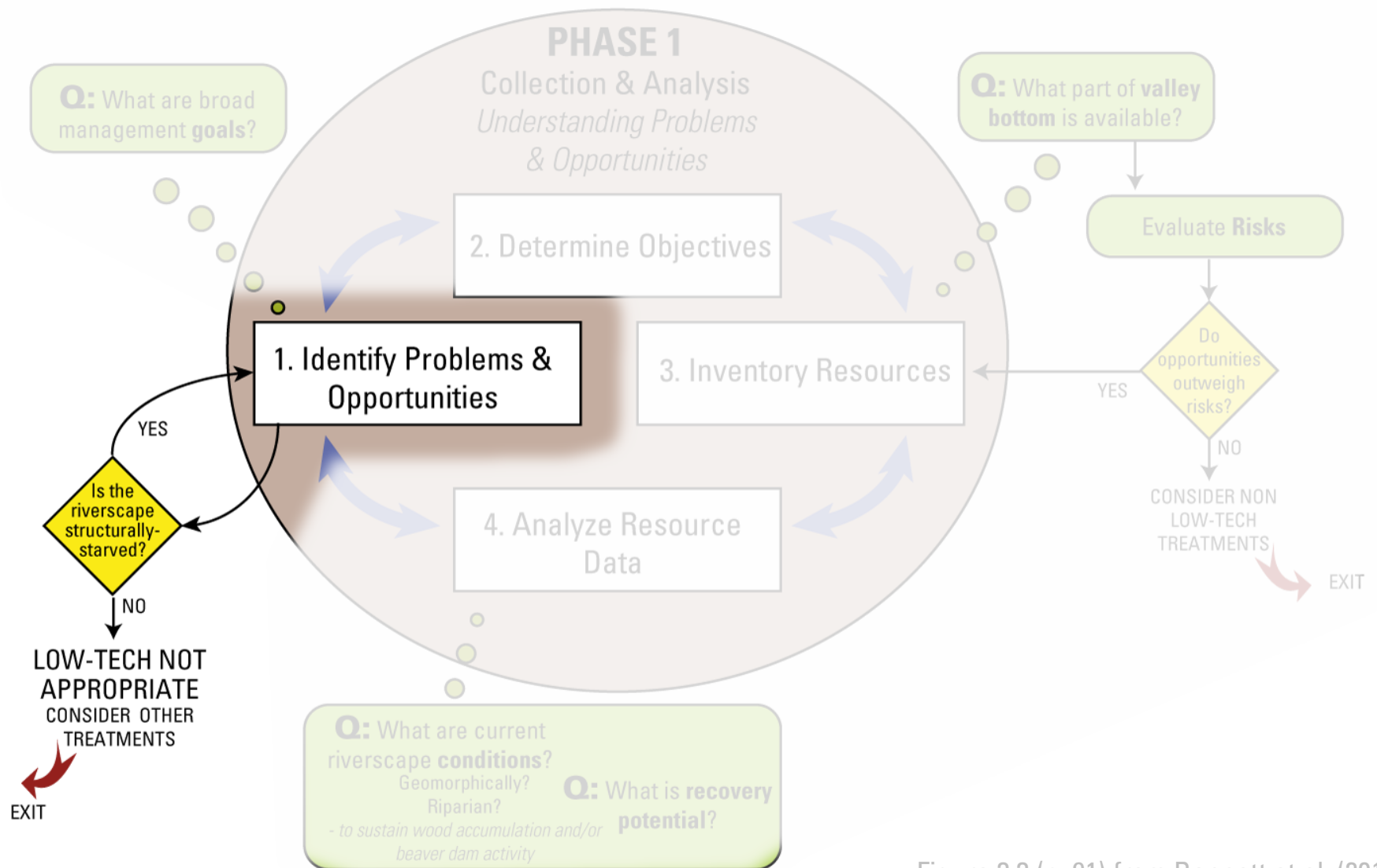
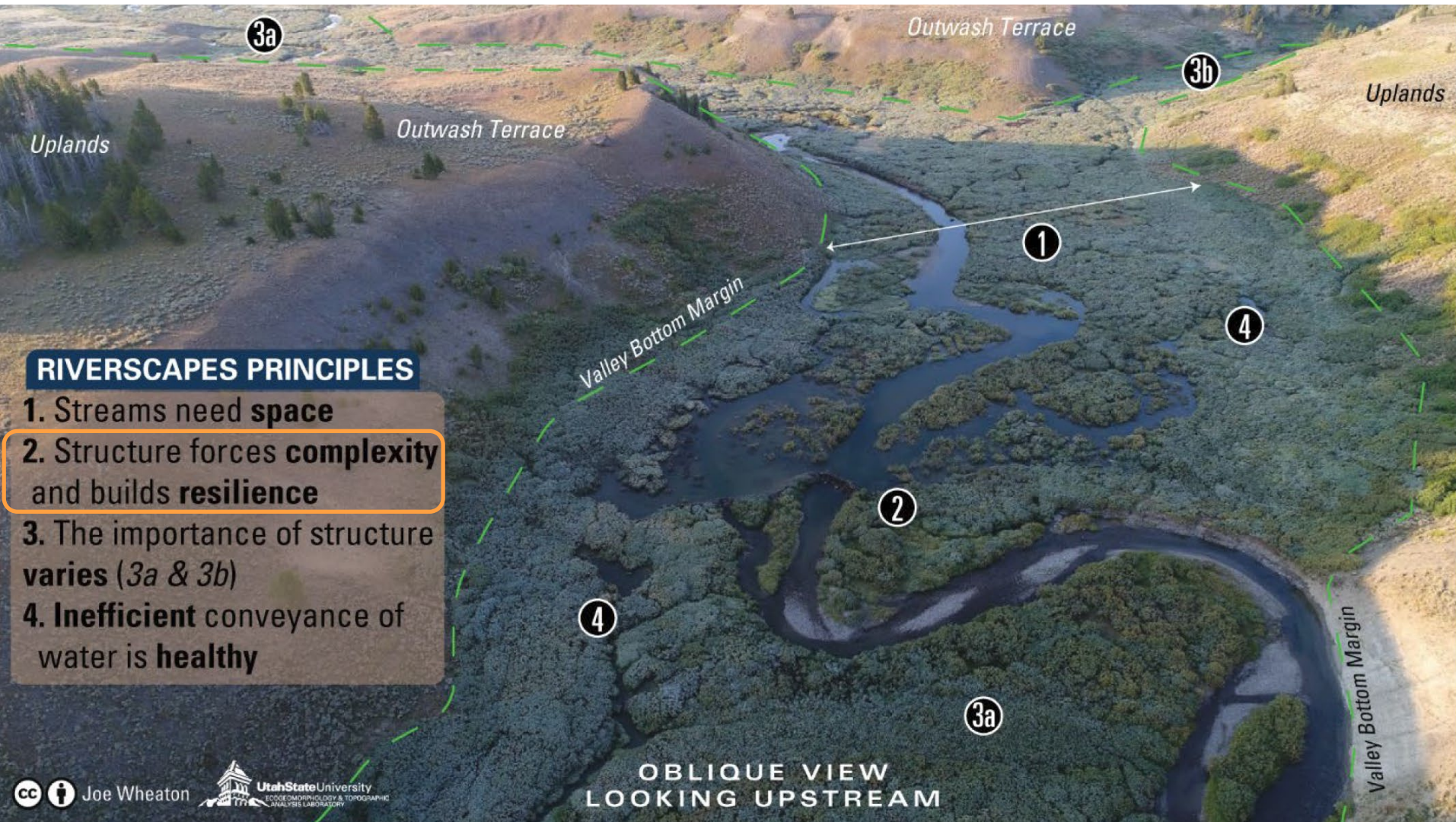


Figure 3.3 (p. 91) from Bennett et al. (2019)

RECALL, **Structure** drives complexity



From Figure 2.1 (p. 60) Wheaton et al. (2019)
Chapter 2 of LTPBR Manual

DOI: [10.13140/RG.2.2.19590.63049/1](https://doi.org/10.13140/RG.2.2.19590.63049/1)

Broad Goals? & Screening Question

Is the riverscape structurally-starved?

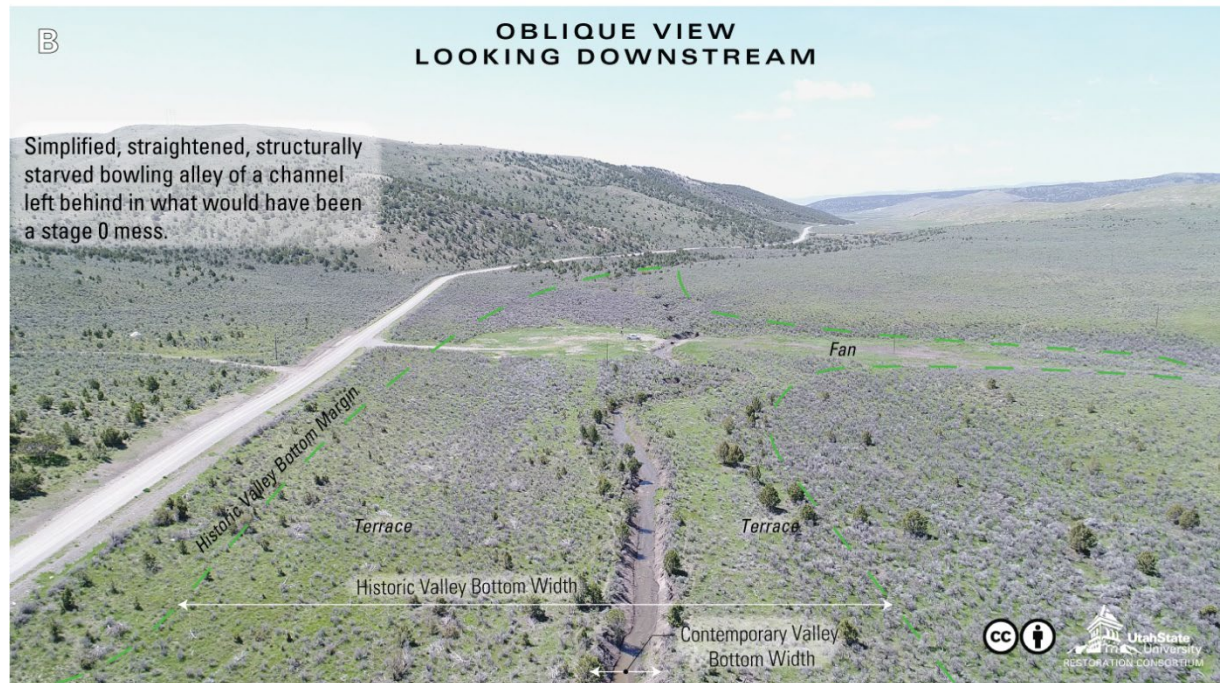
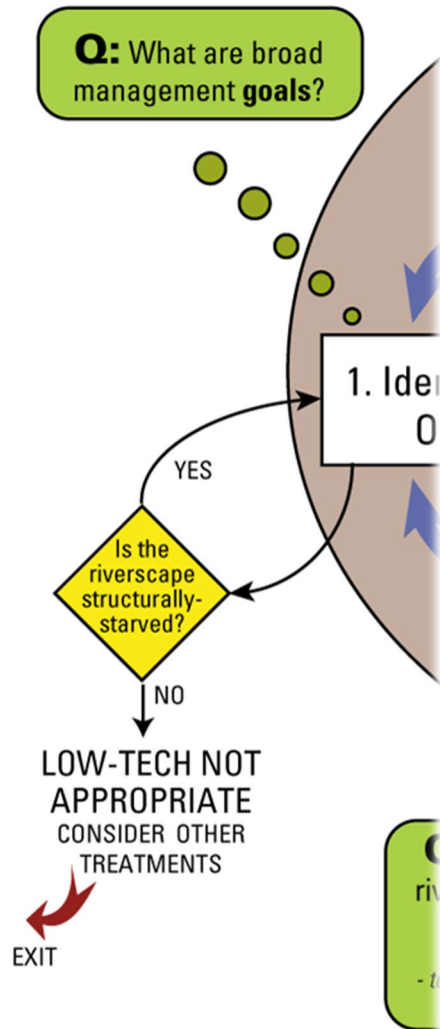


Figure 1.2 & 1.3 (p 31-32) of Shahverdian et al. (2019) - Chapter 1 LTPBR Manual

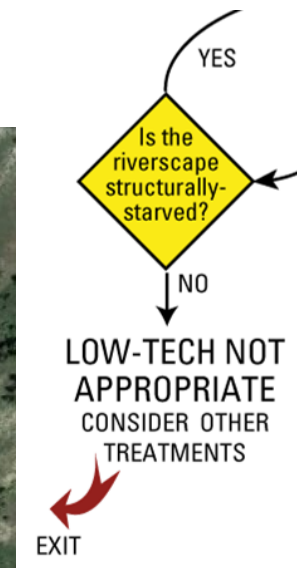
DOI: [10.13140/RG.2.2.14138.03529](https://doi.org/10.13140/RG.2.2.14138.03529)

Is this Riverscape Structurally-Starved?

- Starved of **wood accumulations**?
 - Number of wood accumulations relative to capacity?
- Starved of **beaver dams**?
 - Number of dams relative to capacity?

Look For:

- Evidence that woody veg should be present
- Current conditions limiting woody veg (invasive, grazing,



© 2018 Google

Google Earth

1994

Imagery Date: 6/21/2017 43°19'45.60" N 110°48'03.63" W elev 6283 ft eye alt 14910 ft

PHASE 1 with Low-Tech

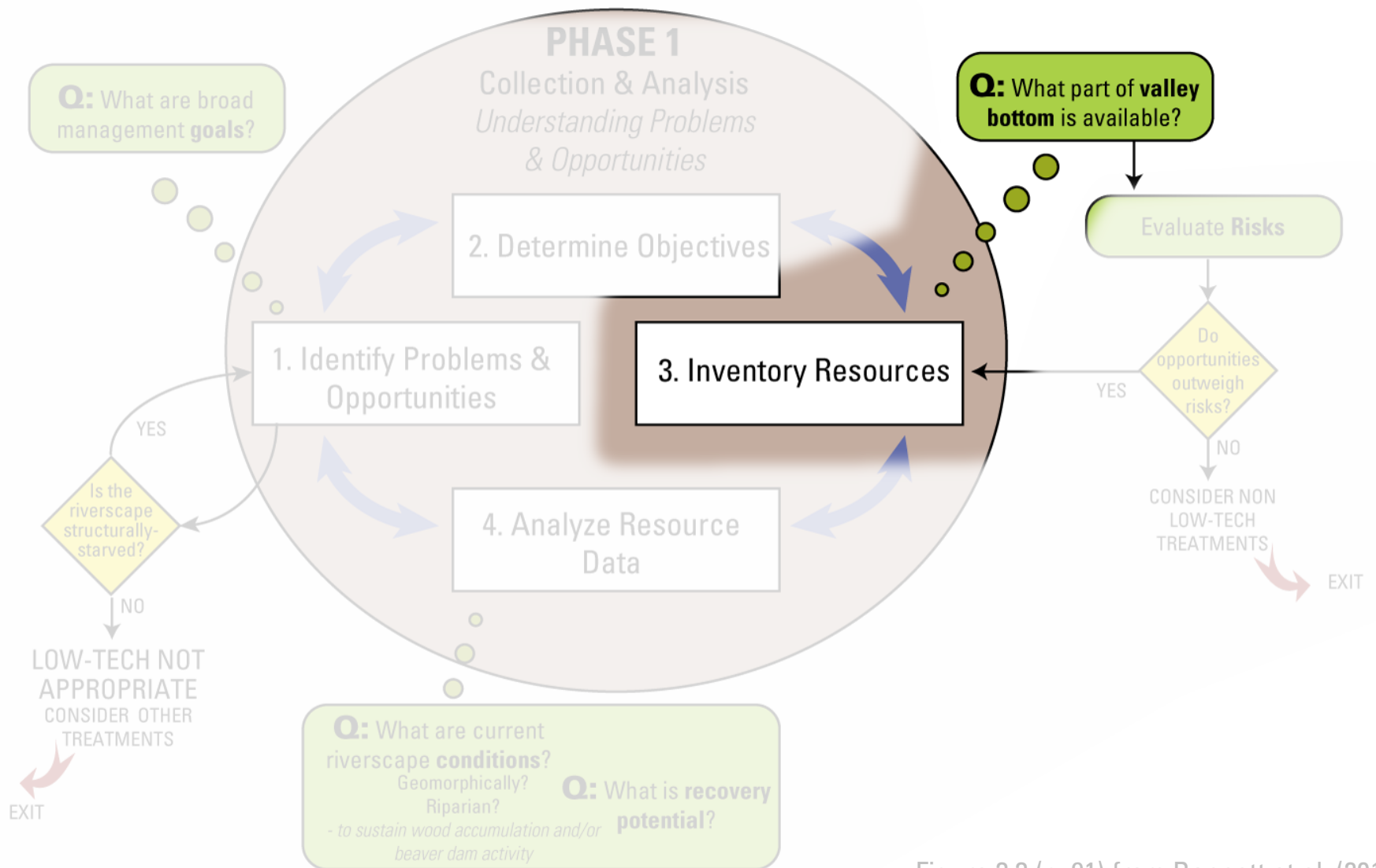


Figure 3.3 (p. 91) from Bennett et al. (2019)

When we come back from field...

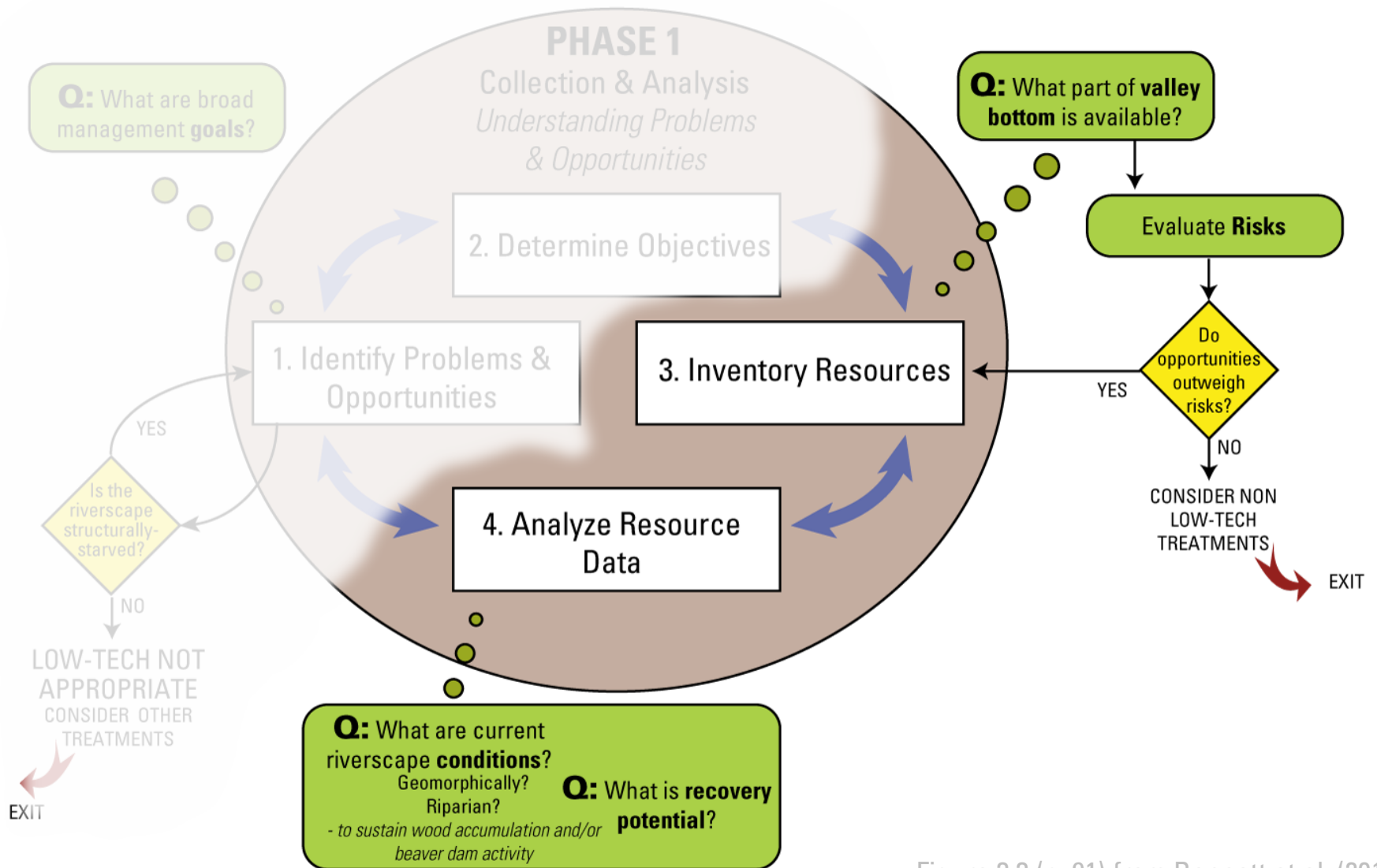
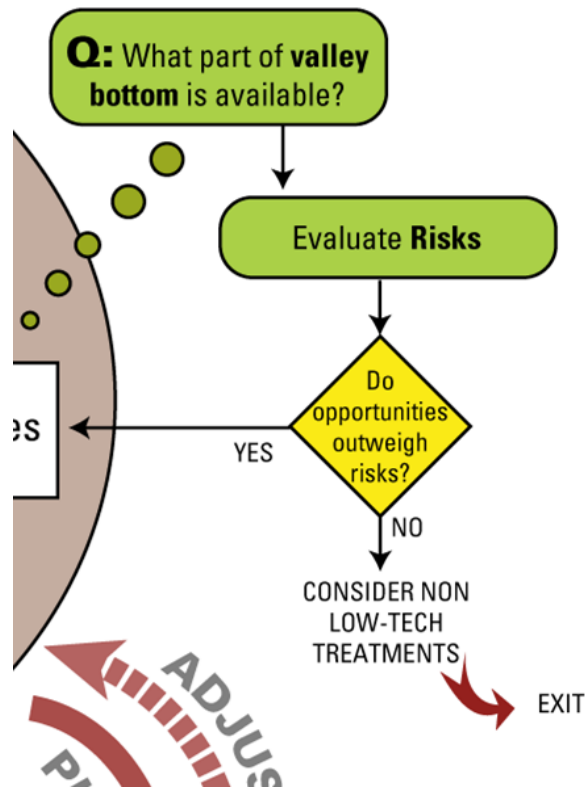


Figure 3.3 (p. 91) from Bennett et al. (2019)

Evaluate Risks



Risk Considerations Checklist for Low-Tech Stream and Meadow Restoration

Instructions

For each factor, select the characteristic that best describes the project site. If answers vary within project area, consider breaking site into multiple reaches and assessing each separately. This is not a comprehensive list, but rather, represents some basic considerations related to assessing potential risks to property, infrastructure, and public safety to discuss with the landowner/manager and stakeholders (green = lower risk, yellow = moderate risk, red = higher risk). For factors rating yellow or red, project planners may need to engage other technical specialists for additional review and analysis. Alternatives to mitigate or lower risks to acceptable levels should be evaluated in the planning process. In the notes, describe the situation and how risks are being reduced. In some cases, low-tech restoration approaches may not be appropriate based on constraints and risks.

+

Areas Adjacent to Riverscape Land Use	
Areas adjacent are in an undeveloped range or forest land setting	Green
Areas adjacent are in a crop, pasture, or hay land setting	Yellow
Areas adjacent are in a developed setting	Red
Valley Bottom Land Use (e.g., roads, bridges, culverts, buildings, diversions)	
Valley bottom and adjacent area (up and downstream) does not contain infrastructure of concern	Green
Valley bottom or adjacent area (up and downstream) contains some infrastructure, but would not be negatively impacted by processes of wood accumulation or beaver dam activity, or consequences of impact would be low	Yellow
Valley bottom or adjacent area (up and downstream) contains infrastructure that may be negatively impacted by low-tech structure failure and consequences would be unacceptable	Red
Stream Order & Wadeability	
1st through 3rd order wadeable stream	Green
3rd – 5th order wadeable stream	Yellow
5th order non-wadeable stream or greater	Red
Channel Change and Floodplain Reconnection	
Landowner/manager willing/able to give the stream space to adjust in the valley bottom and understands this may include lateral erosion, deposition, change of stream channel position, and inundation	Green
Landowner/manager willing/able to give the stream space to adjust in some portions of the valley bottom but not all of it	Yellow
Landowner/manager unwilling/unable to give the stream space to adjust in the valley bottom	Red
Willingness to allow processes of wood accumulation and/or beaver dam activity	
Landowner/manager willing/able to allow dynamic processes & no concerns with nearby landowner/managers.	Green
Landowner/manager willing/able to allow some processes (but maybe not all) and/or concerns of or with nearby landowner/managers	Yellow
Landowner/manager unwilling/unable to allow processes of wood accumulation and/or beaver dam activity	Red
Adaptive Management	
Landowner/manager understands multiple treatments through time may be needed and is committed to follow-up monitoring, maintenance, and adaptive management	Green
Landowner/manager understands multiple treatments through time may be needed but resources to do follow-up may limit the ability to adjust or correct problems	Yellow
Landowner/manager wants a single intervention; no monitoring, maintenance, or adaptive management will occur	Red
Notes:	

Appendix 3D (pp. 121-122) from Bennett et al. (2019)

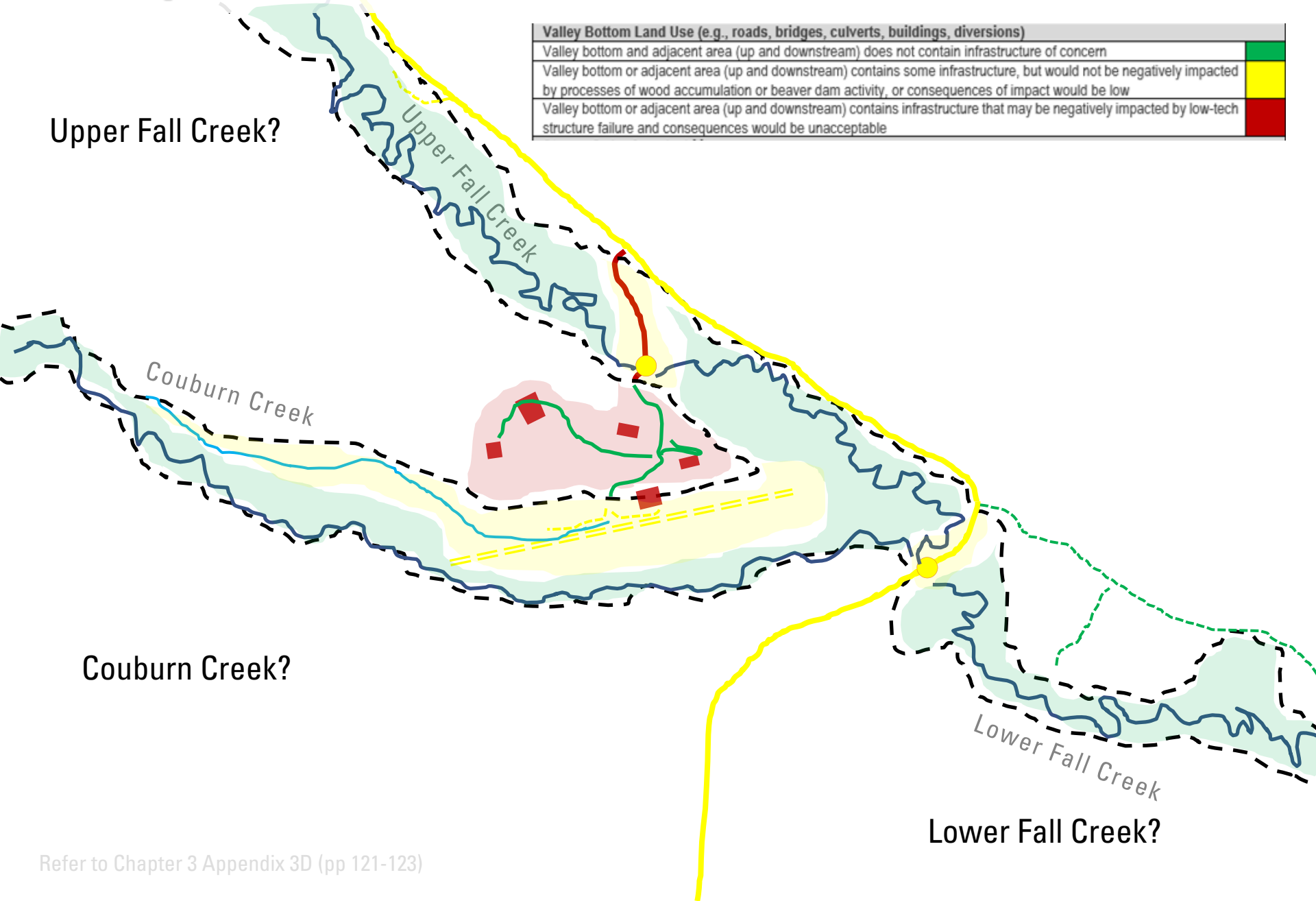
Chapter 3 LTPBR Manual

DOI: [10.13140/RG.2.2.15815.75680](https://doi.org/10.13140/RG.2.2.15815.75680)

Valley Bottom Land Use?

Valley Bottom Land Use (e.g., roads, bridges, culverts, buildings, diversions)	
Valley bottom and adjacent area (up and downstream) does not contain infrastructure of concern	Green
Valley bottom or adjacent area (up and downstream) contains some infrastructure, but would not be negatively impacted by processes of wood accumulation or beaver dam activity, or consequences of impact would be low	Yellow
Valley bottom or adjacent area (up and downstream) contains infrastructure that may be negatively impacted by low-tech structure failure and consequences would be unacceptable	Red

Upper Fall Creek?



Couburn Creek?

Lower Fall Creek?

Analyze Resource Data – Consider Conditions!

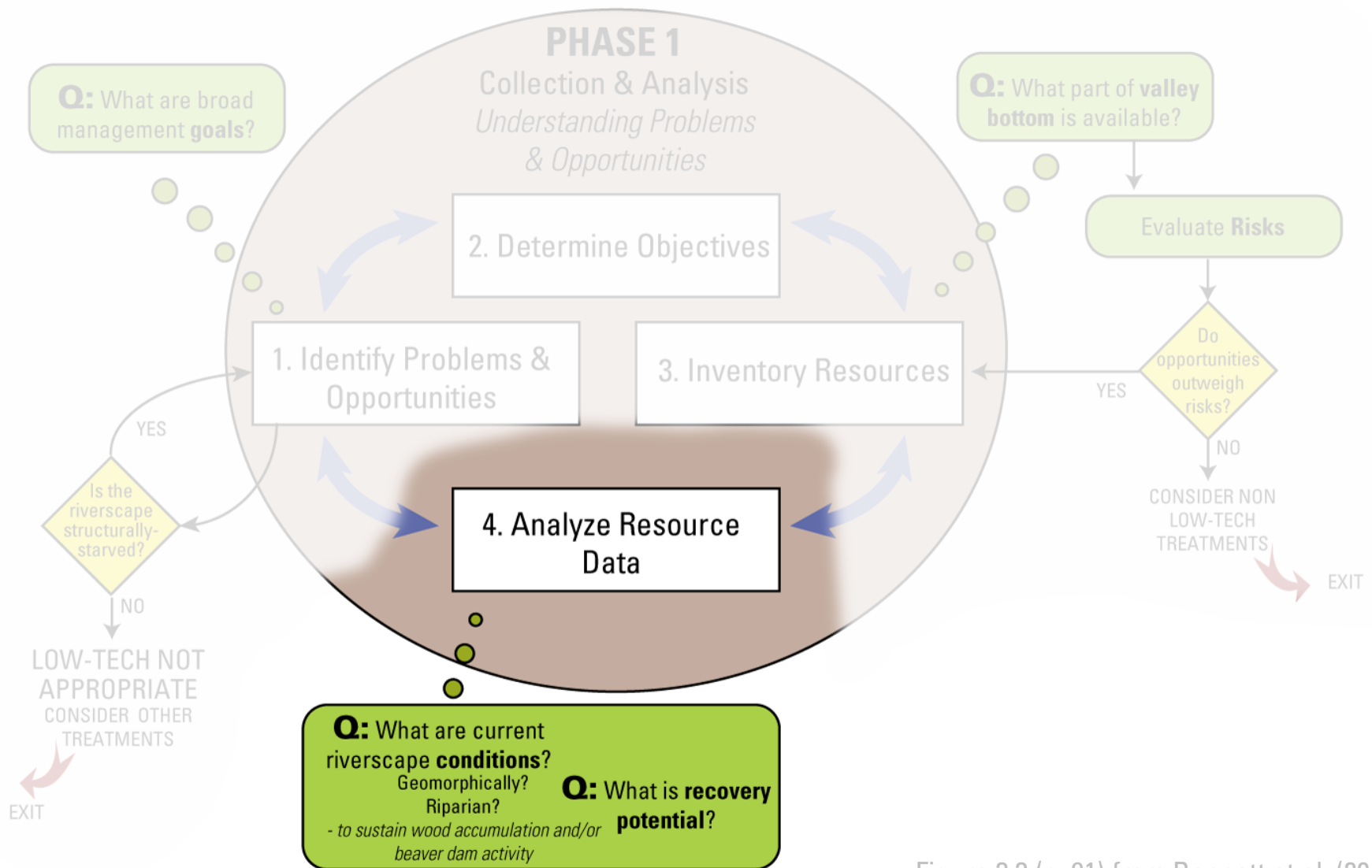
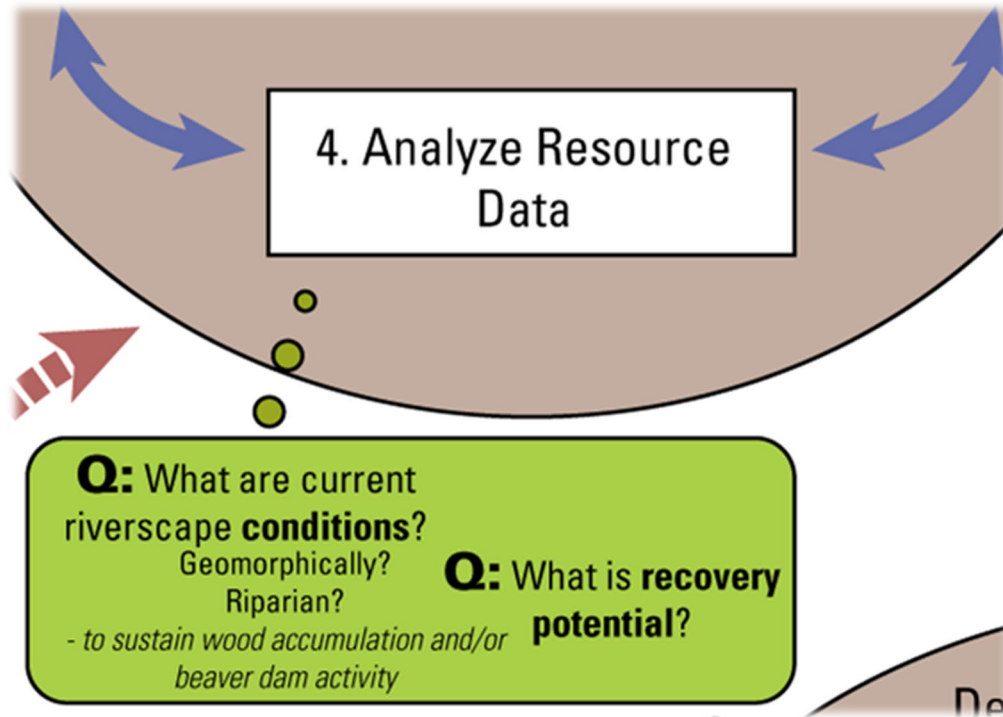


Figure 3.3 (p. 91) from Bennett et al. (2019)

– Chapter 3 LTPBR Manual

DOI: [10.13140/RG.2.2.15815.75680](https://doi.org/10.13140/RG.2.2.15815.75680)

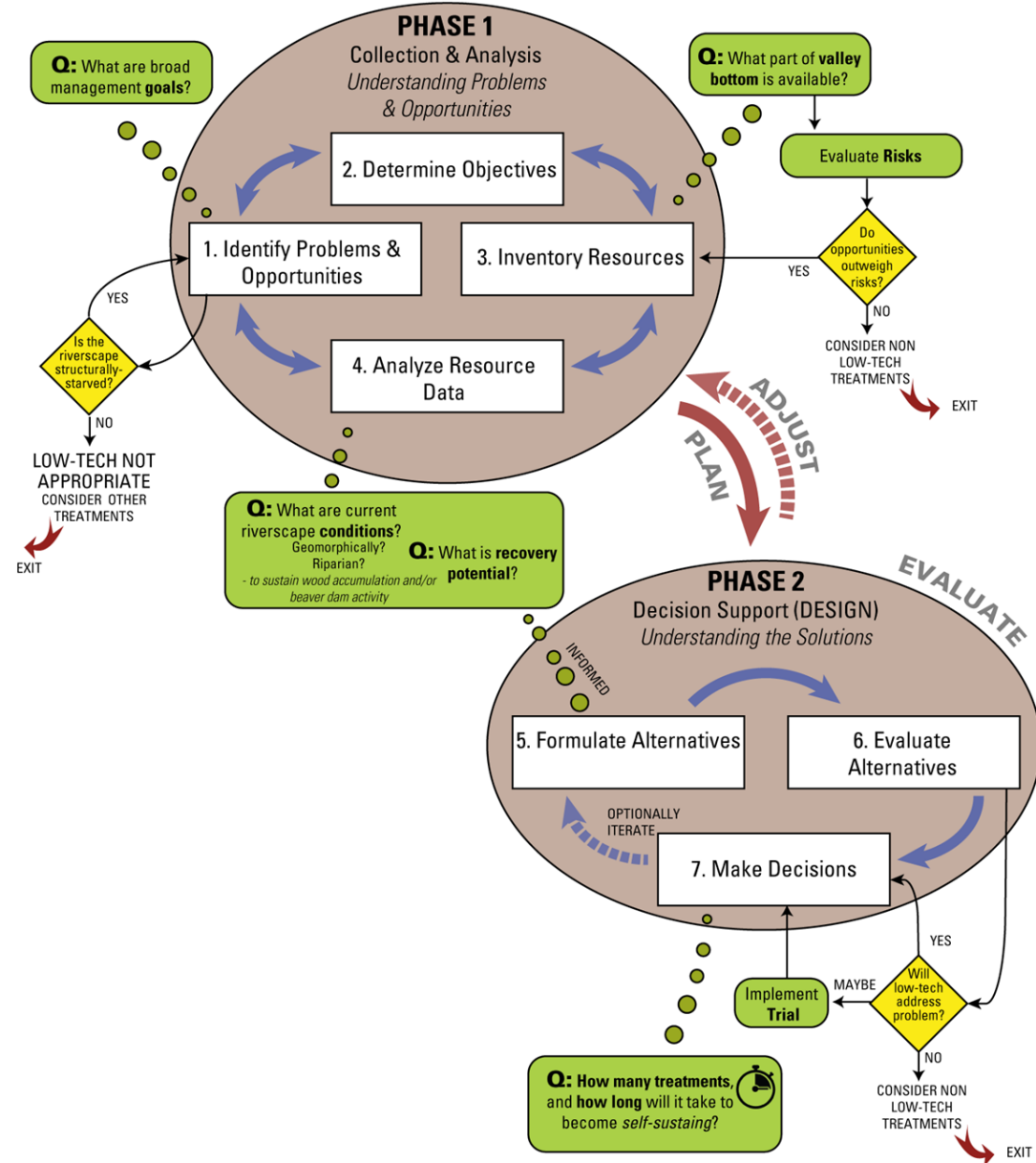
Current & Potential Conditions



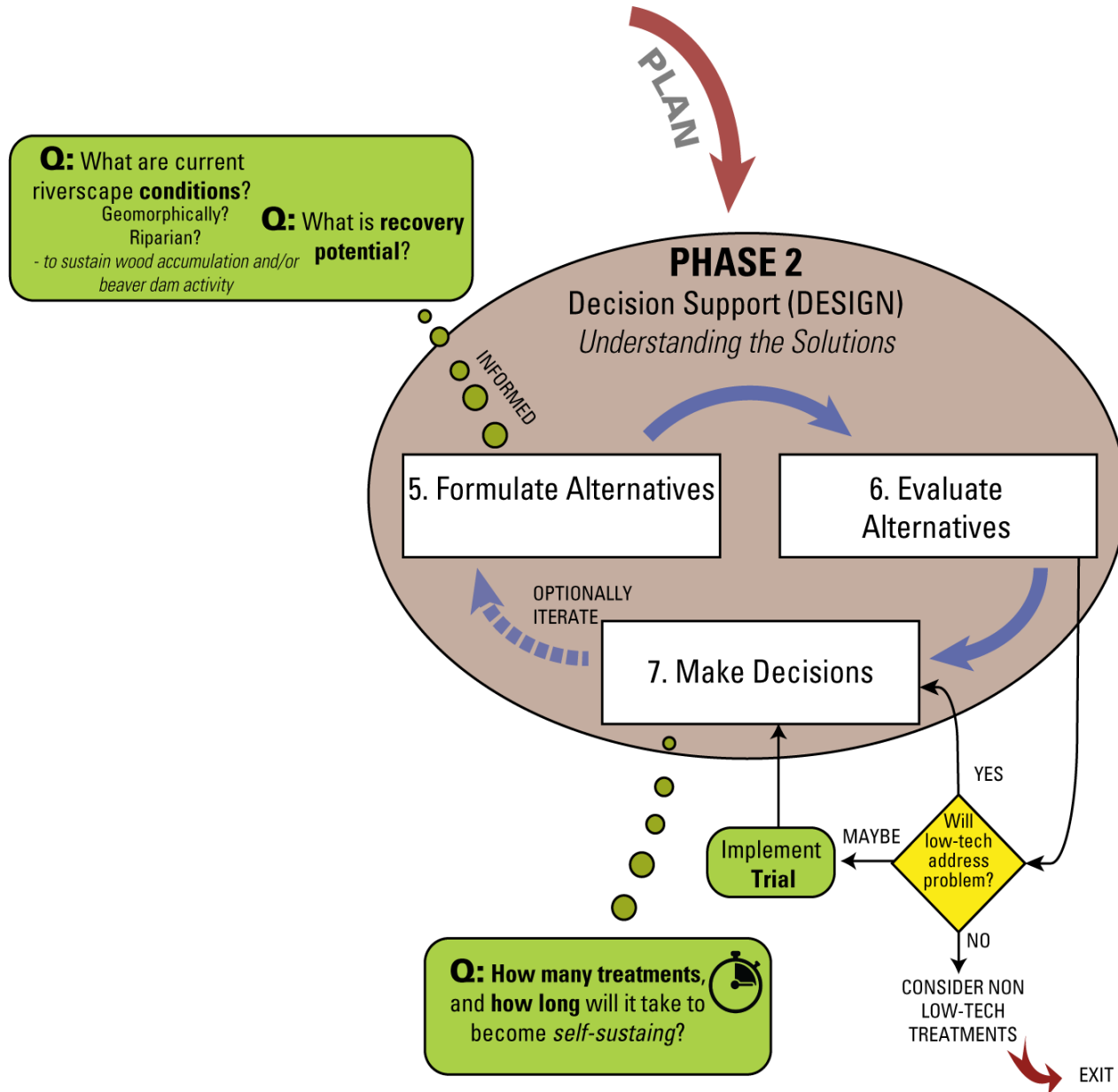
Therein, we focus on processes that can sustain wood accumulation and/or beaver dam activity

Phase 2 - Design

4. Formulate *design* alternatives
5. Evaluate *design* alternatives
6. Make decisions



Summary of Phase 2 with Low-Tech



- Potential **exit point**, based on likelihood of low-tech treatments to address problems.
- Consideration of **how many treatments** and **how long** it may take to achieve a self-sustaining state

Figure 3.13 from Bennett et al. (2019, p. 106)

On to Phase 3

- Fed from Design
- Number of treatments estimated in design

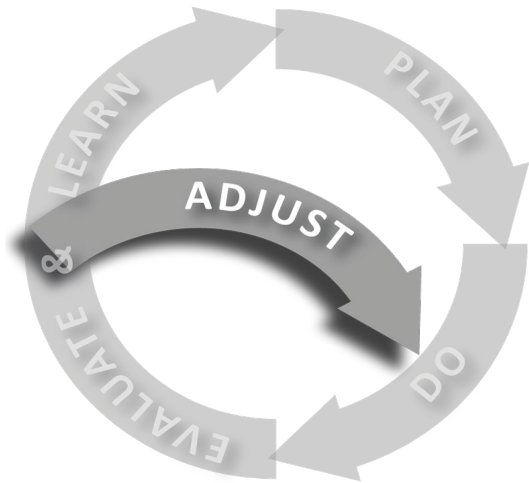
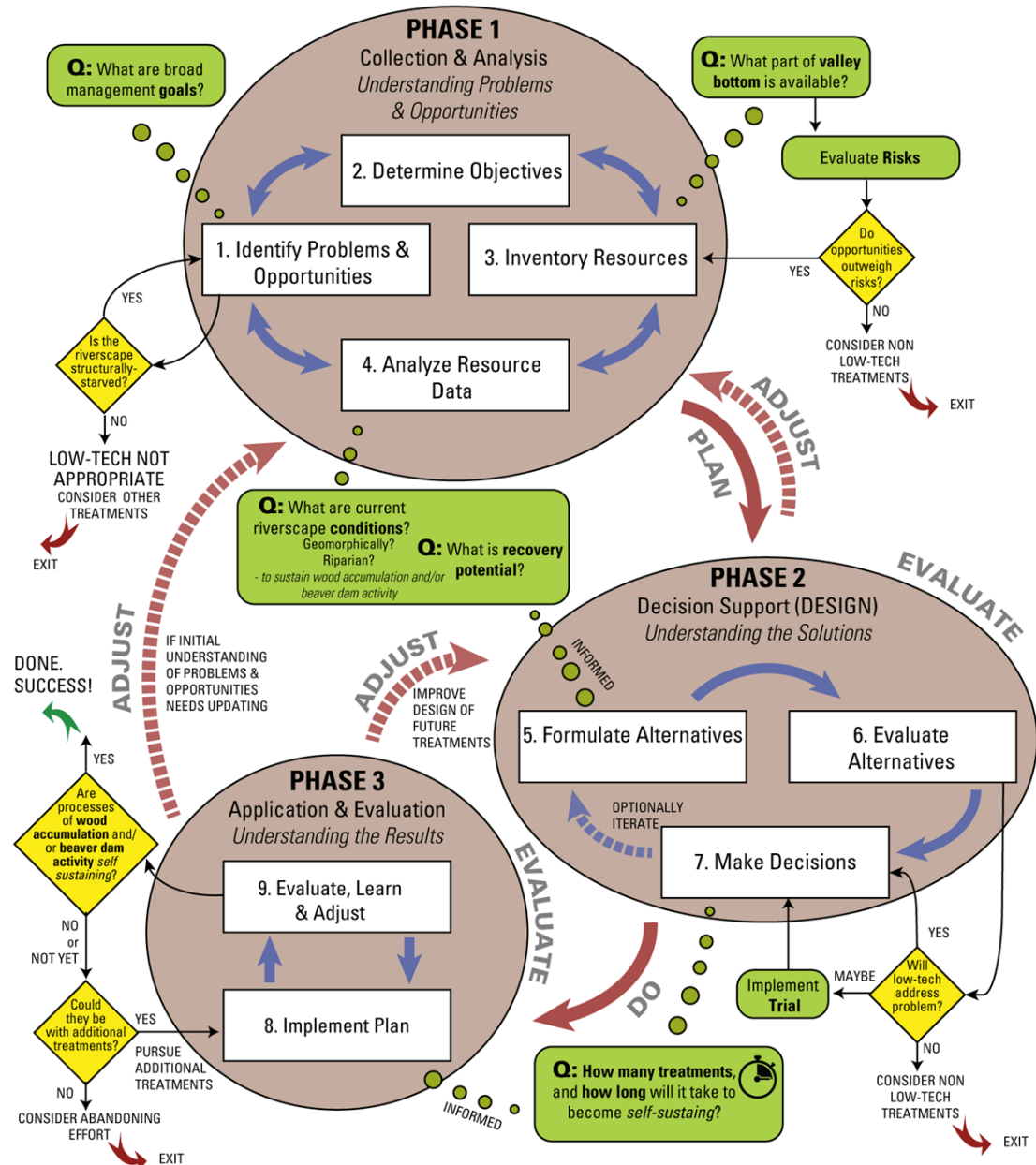
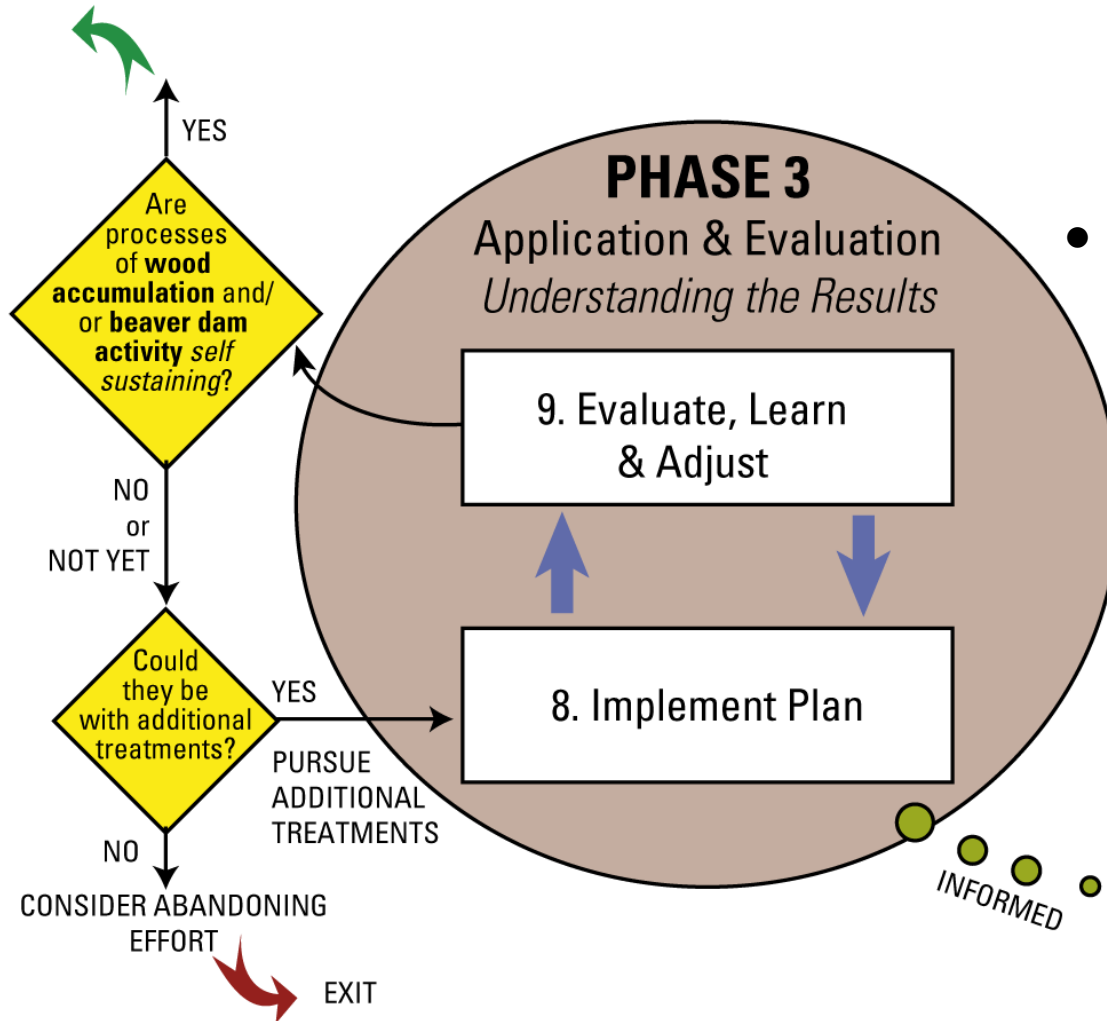


Figure 3.20 from Bennett et al. (2019, p 115)
Chapter 3 LTPBR Manual
DOI: [10.13140/RG.2.2.15815.75680](https://doi.org/10.13140/RG.2.2.15815.75680)



Phase 3 – Application & Evaluation

DONE.
SUCCESS!



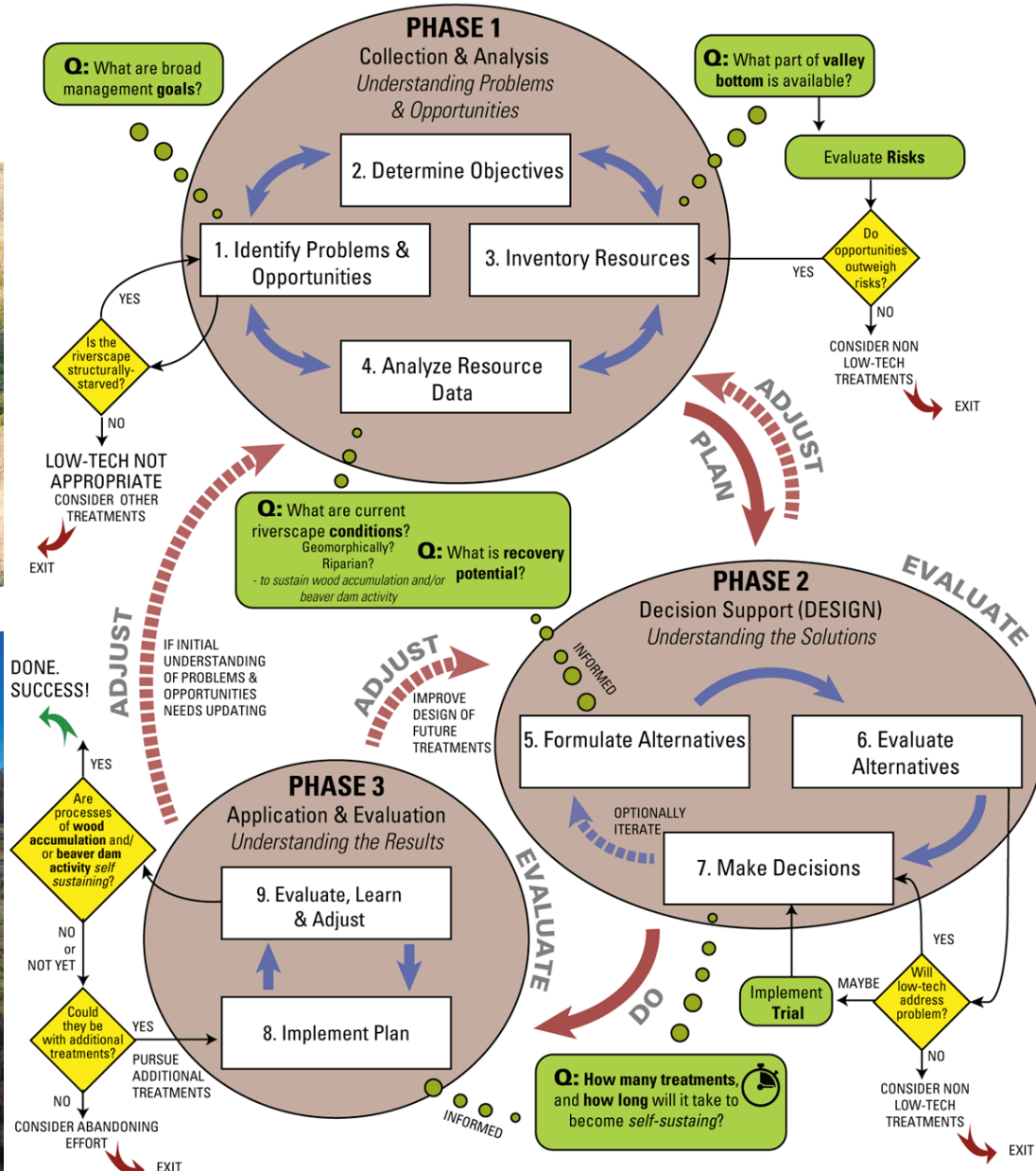
- Treatments are iterated through until processes of wood accumulation and/or beaver dam activity are self-sustaining (informed by Design stage estimates)
- Exit strategy (via successfully self-sustaining) or realizing that was an unrealistic goal



Q: How many treatments, and how long will it take to become self-sustaining?

Figure 3.14 from Bennett et al. (2019, p. 109)

How does modified CPP integrate principles?



BIRCH CREEK INTRO – Part II

1. Restoration Project Reach
2. Restoration Project Goals & Objectives
- 3. What You'll Do**
 1. Normally
 - 2. In a COVID-19 World...**



Phase 1 & 2

Plus Adaptive Management Plan

