



Upper Dolores River Stream Protection Working Group

Task Team Work Session 3 3 February 2020

Task Team members

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- ▶ Mary Hammer, SJNFS
- ▶ Clay Kampf, SJNFS
- ▶ Kelly A Palmer, SJNFS
- ▶ Ken Curtis, DWCD
- ▶ Mike Preston DWCD
- ▶ Frank Kugel SWCD
- ▶ Garrett Hanks, NTU
- ▶ Keith Hutcheson, DRA
- ▶ Raymond Rose, DRA
- ▶ Duncan Rose, DRA

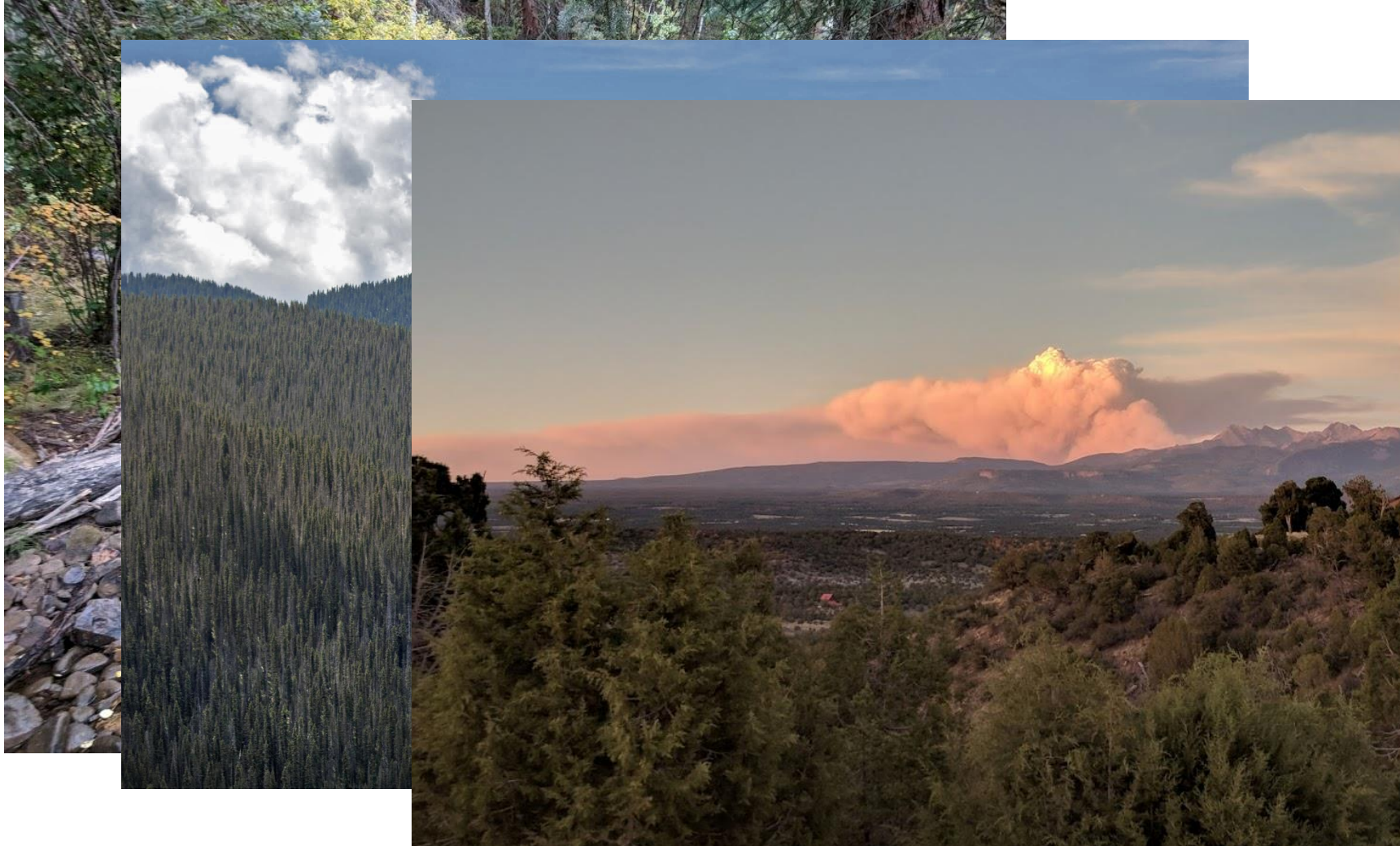


Today's Discussion Guide

▶ Session I

- ▶ Review Discussion Guide, introductions, quick review of charge to Task Team
- ▶ Setting the Stage: “Structure, Process, Substance”
 - ▶ Structure – envisioning a product - what is our “Deliverable”?
 - ▶ Process – how will we achieve the Deliverable?
 - ▶ Substance – what is in the Deliverable?
- ▶ Testing/Applying the Process
 - ▶ Procedural final-resolution: a “vulnerability/resilience” and “priority order” based “working draft” proposal presented for consideration (Jim/Clay/Garrett/Duncan)
- ▶ **Sessions 2 and 3(+): Development/finalization of Implementation Work Plan as needed (TBD)**
 - ▶ **Brief review, support material**
 - ▶ **Apply and test the match-stream-to-best-protection-tool(s) process to the Dolores main stem tributaries**
- ▶ Further sessions if and as needed
- ▶ Summarize, submit to full Working Group for consideration

Context: Historic Drought, Extensive Beetle Kill, More Wildfire – Our Forest Is Changing



Do Our Trout Streams Need Additional Protection?

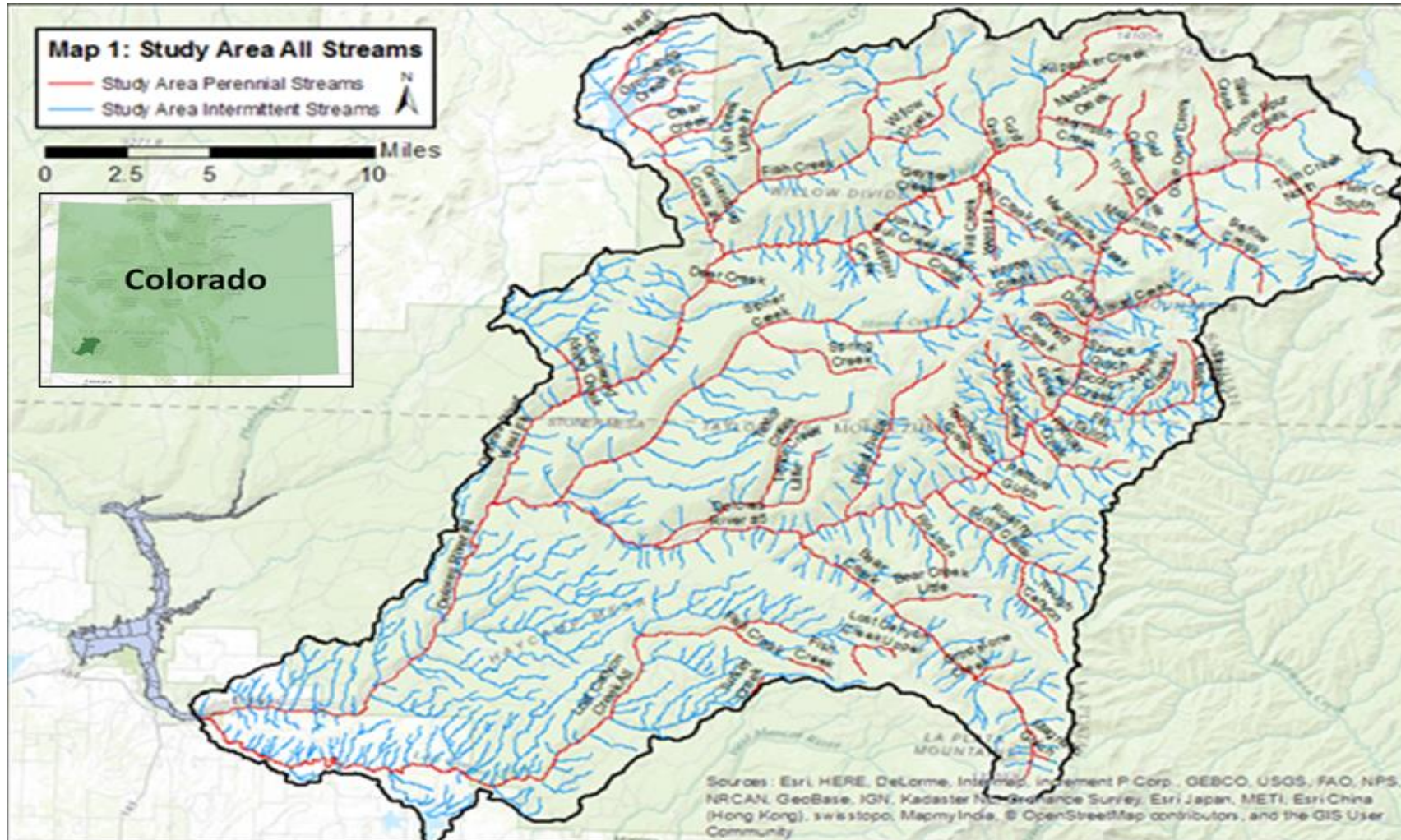
▶ **Core Questions**

- ▶ What trout streams in the Upper Dolores watershed (Study Area or SA) are most threatened by (which?) forces/disturbances (present and foreseeable future)?
- ▶ What additional protections, if any, for each stream, selected from a range of options, are best suited to mitigate those forces?

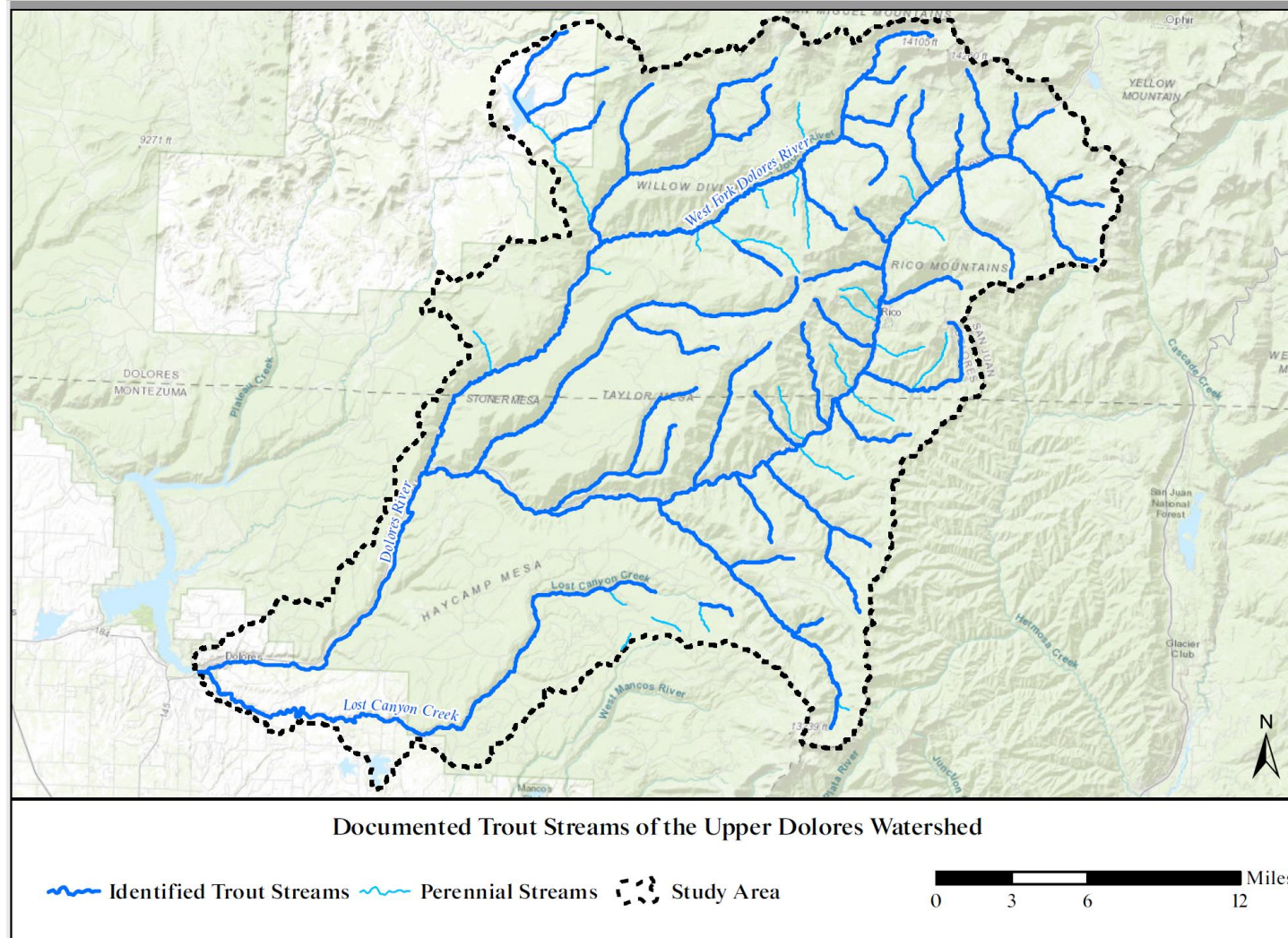
▶ **Anticipated Product**

- ▶ Primary deliverable: a table, with concise documentary text, that reflects for each of the estimated 44 targeted streams in the SA the following:
 - ▶ 1) an identification of the most feasible adaptive-management – based protection strategy (and general tactics) associated with each stream for which additional protection is desirable; and
 - ▶ 3) a determination of who has lead for each tool for a given stream, timeframe.

Our Study Area (“SA”)



Our 44 Trout Streams



Upper Dolores Stream Protection Framework

All streams known or feasibly-thought-to-have
“permanent” trout populations in upper Dolores

Decision Factors: Stream's Trout-habitat Resilience State

Type Trout?

CT Only

Wild only

Mixed w/wild

Resilience to de-watering

Drought

Diversion

Resilience to stream temp warming

Resilience to wildfire including
erosion/debris effects

Resilience to natural erosion

Resilience to flash flooding

Resilience to developmental/use
pressure

Working List of State, Federal and Local Stream Protection Tools

I. State Protection Mechanisms

- A. Colorado Instream Flow and Natural Lake Level Program
- B. Colorado Law and Intergovernmental Agreements
- C. Gold Medal Waters
- D. Outstanding Waters
- E. Stream Management Plans (SMPs)
- F. CPW/NFS - Fishing Regulations
- G. CPW/NFS - In/near/associated-stream intervention techniques

II. Federal Protection Mechanisms

- A. U.S. Forest Service ("USFS") Land Management Plans ("LMPs").
 - 1. Management Area Designations (MA 1, MA2, M3)
 - 2. Special Areas and Designations:
 - a. Area of Critical Environmental Concern
 - b. Wildlife Management Area
 - 2. Conservation Watershed Network for Native Fishes
- B. Wild and Scenic Rivers Act of 1968 ("WSR")
- C. Wilderness Designation: Wilderness Act of 1964 ("Wilderness Act")
- D. National Conservation Areas ("NCAs")
- E. Federal Research Areas
- F. Other Federal Legislation (special)
 - 1. (Rio Grande and North St. Vrain Creek)
 - 2. South Platte Protection Plan (WSR suitability determination held in abeyance).
 - 3. Rio Chama Management Plan

III. Other

- A. Conservation Easements
- B. County Land Use Codes
- C. Contractual Arrangements

Output Table:
Trout streams
with a
recommended
protection
strategy for
each stream
as needed

Key Aspects of all Candidate Tools

1. Getting the protection in place

- ▶ Who can initiate? How?
- ▶ What is the initiation process? How long?
- ▶ What/where is the authority to approve?

2. Managing the protection once it is in place

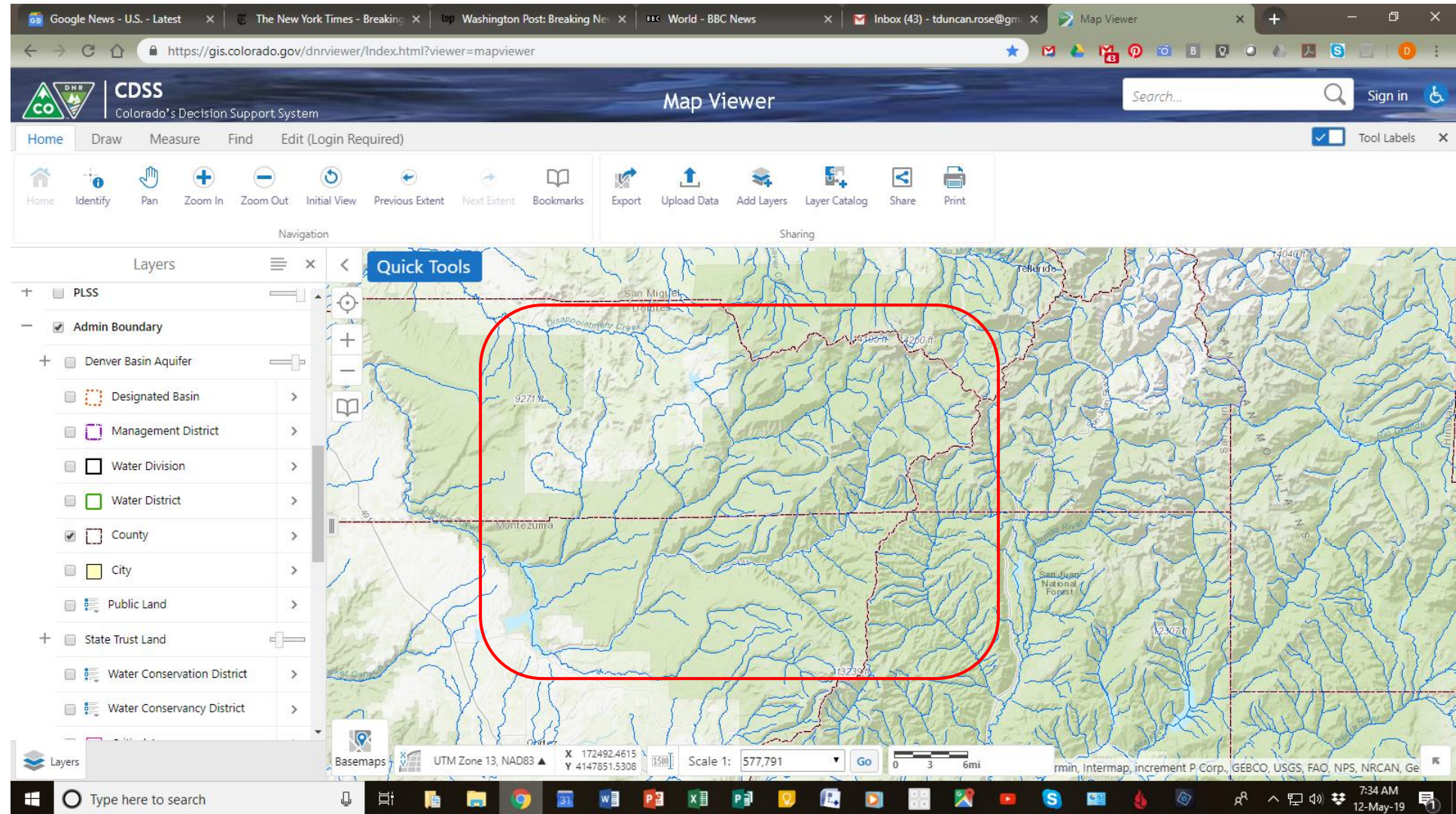
- ▶ Who/how is it managed if approved?

3. Enforcing the protection

- ▶ Who enforces and how?
- ▶ For each tool we are asking:

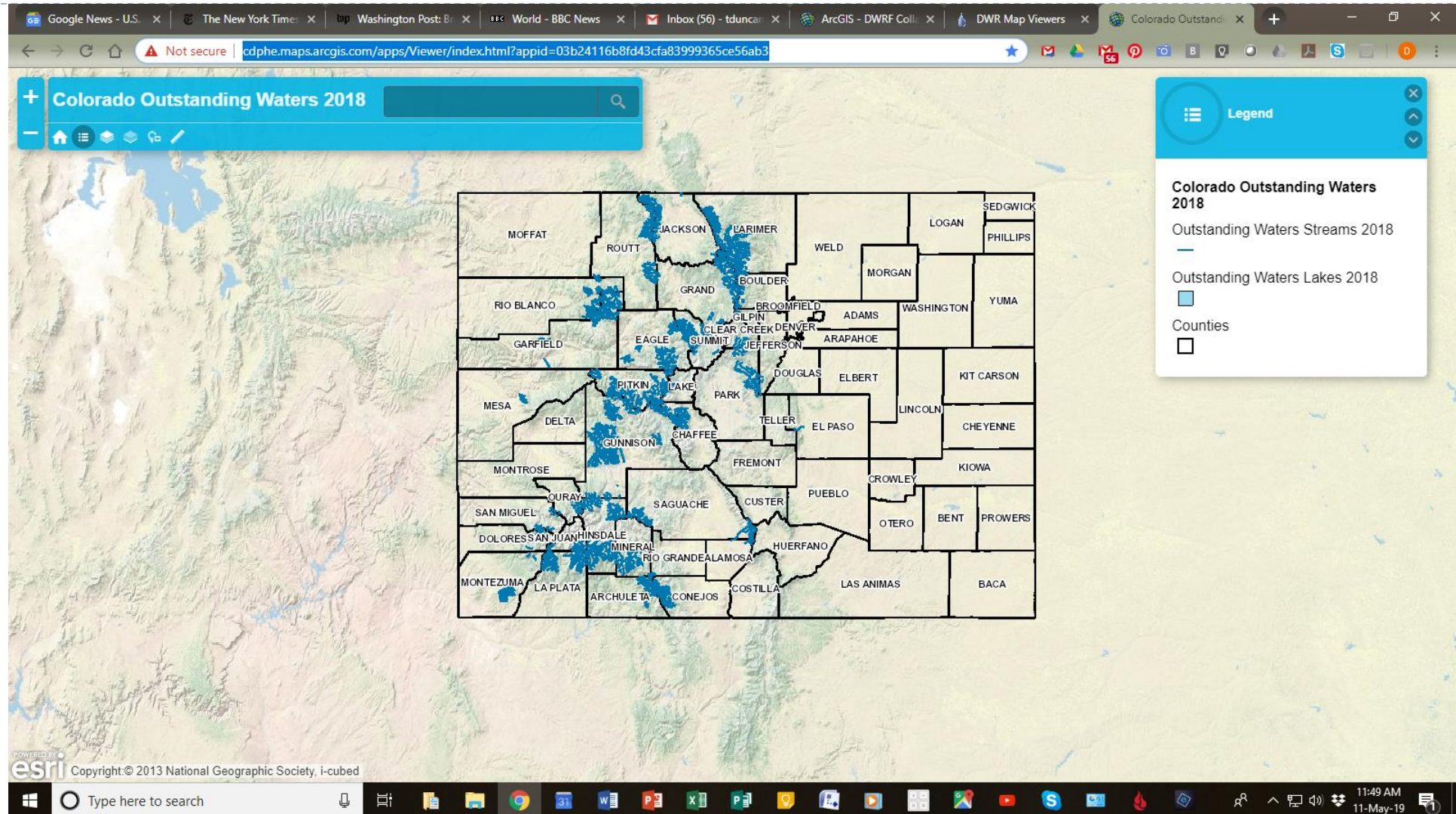
“In what circumstances is this tool most relevant?”

Colorado Decision Support System

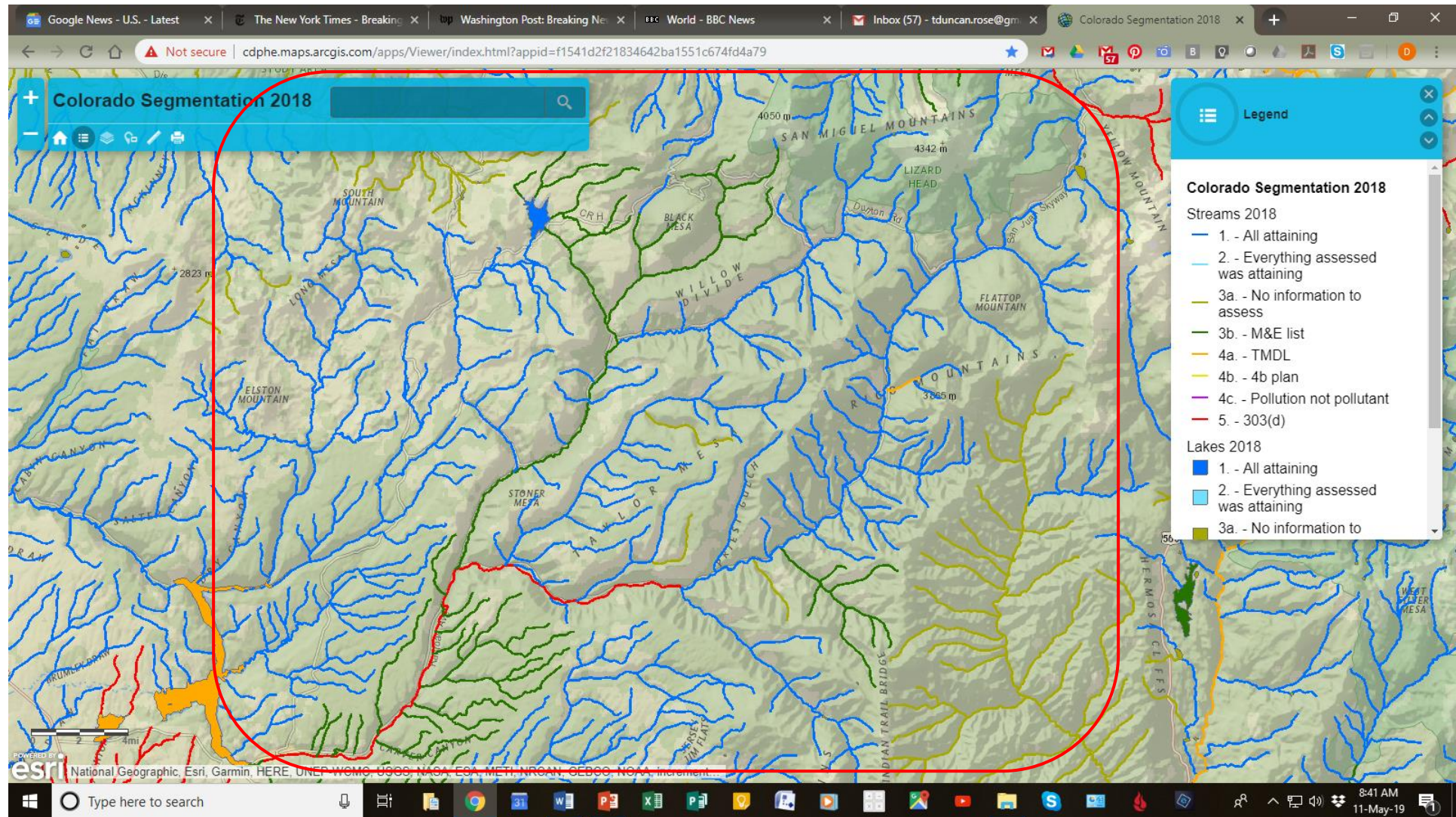


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Colorado Outstanding Waters 2018

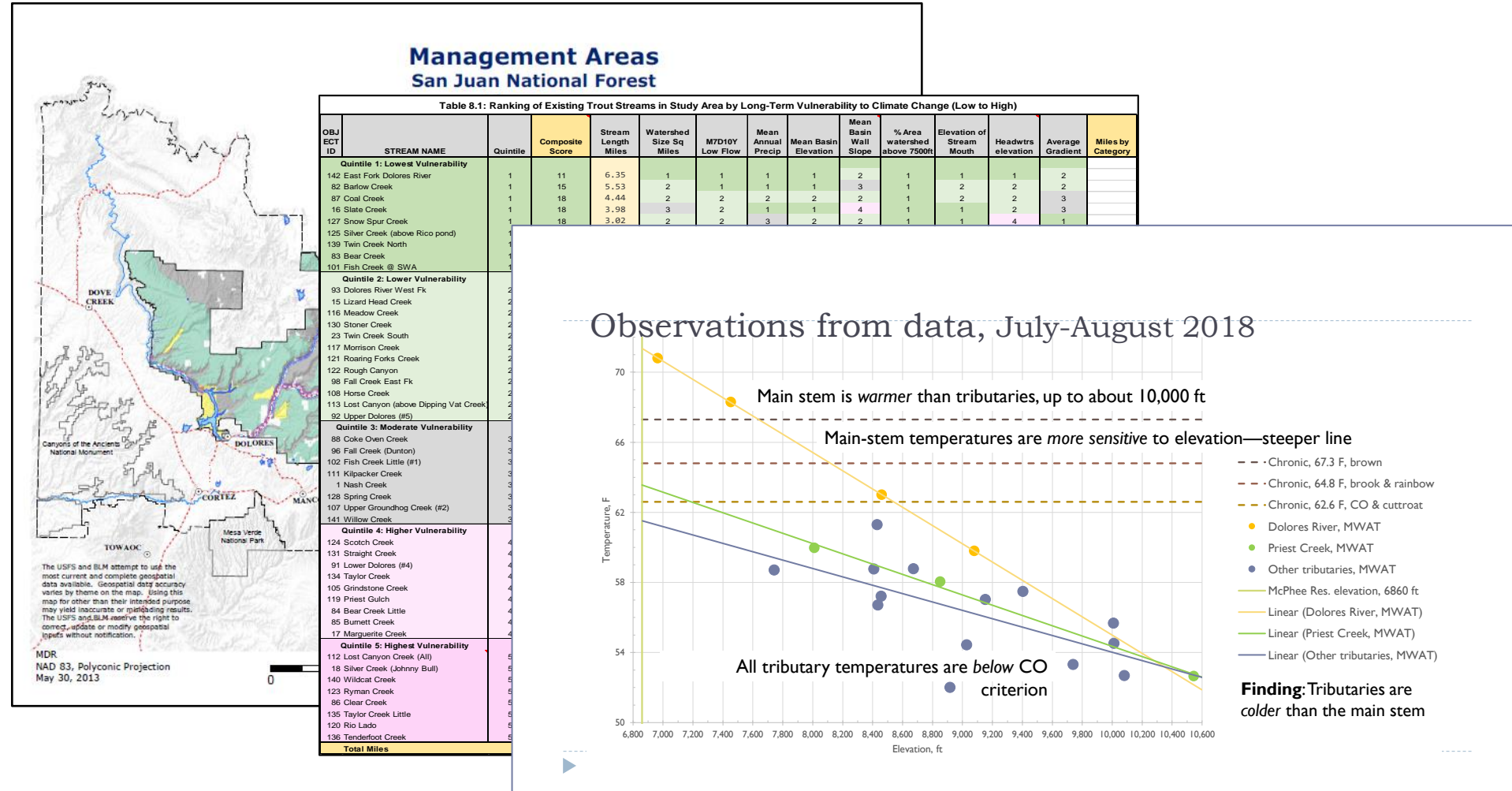


CDPHE Stream Segmentation Map



Contextual Docs/Data

- ▶ Land and Resource Management Plan
- ▶ Climate Change Vulnerability Study
- ▶ Stream Temperature Analysis



Linking Disturbance Type to Most Appropriate Tools

- ▶ Stream de-watering (natural, human)
 - ▶ LRMP, In-Stream Flow decree, in-stream/near-stream modifications
- ▶ Stream temperature increase
 - ▶ In-stream/near-stream modifications
- ▶ Wildfire, including triggered sedimentation/debris flow
 - ▶ Wildfire mitigation plan, in-stream/near stream modifications
- ▶ Non-wildfire induced erosion, sedimentation
 - ▶ In-stream/near-stream modifications
- ▶ Flash flooding wash-out
 - ▶ In-stream/near-stream modifications
- ▶ Human activity (development, over-fishing)
 - ▶ LRMP, Outstanding Waters designation, stream regulations

Emergent “Take-aways” from Sessions 1 & 2

- I. The current state of fisheries in the upper Dolores is excellent. Headwater meadows, bogs, fens and forests feed 42 streams which host about 300 miles of high quality trout waters. Proactive, professional management has considerably enhanced the quality of these fisheries.
- II. The same precipitation that feeds our fisheries provides critical soil moisture and flow to the agriculture and forestry industries, both of which are core components of our local economy, and to a substantial and economically expanding recreational industry.
- III. Western water law, Montezuma Valley Irrigation Company, existing diversions and decrees, and the Dolores Project/McPhee Reservoir are the link-pins to the use of these waters.
- IV. The challenges that are emerging in our fisheries are due to a substantially changing environmental context, largely attributable to climate change induced disturbances.
- V. None of these disturbances are new; what is changing is the *degree* of impact. These disturbances are projected to be increasingly persistent, more wide ranging, and more and more intense for many years to come.

Emergent “take-aways” from Sessions 1 & 2 (Page 2)

- VI. The major disturbances our fisheries face include:
 - 1. Stream de-watering (natural, human) due to drought and increasing temperatures;
 - 2. Stream temperature increases due to same;
 - 3. Increased wildfire, including triggered sedimentation/debris flow due to drought, beetle kill;
 - 4. Increased non-wildfire induced erosion and sedimentation due to increasingly extreme precipitation events; and
 - 5. Increased human activity (development, over-fishing) due to growth, expanding wealth.
- VII. While all trout streams are of concern to our effort, our core focus is on cutthroat populations. 34 streams in the upper Dolores are currently identified as hosting cutthroat populations.
- VIII. Managing to accommodate the emerging changes will require:
 - 1. An integration of top-down strategies and bottom-up tactics -- strategies which encompass overall emerging patterns of change, and
 - 2. Which integrate with existing SJNFS/CPW management plans and frameworks, but are implemented tactically at a stream by stream, and even reach by reach, level. A common overall working framework among Working Group organizations encourages efficiencies.

Getting Started: Suggested Approach – Tweaked

Top-down disturbance patterns (across Upper Dolores)

- ▶ **What are current and projected patterns of disturbance in the upper Dolores?**
 - ▶ Stream de-watering (natural, human);
 - ▶ Stream temperature increase
 - ▶ Wildfire, including triggered sedimentation/debris flow;
 - ▶ Non-wildfire induced erosion, sedimentation;
 - ▶ Flash flooding wash-out;
 - ▶ Human activity (development, over-fishing).
 - ▶ Other?

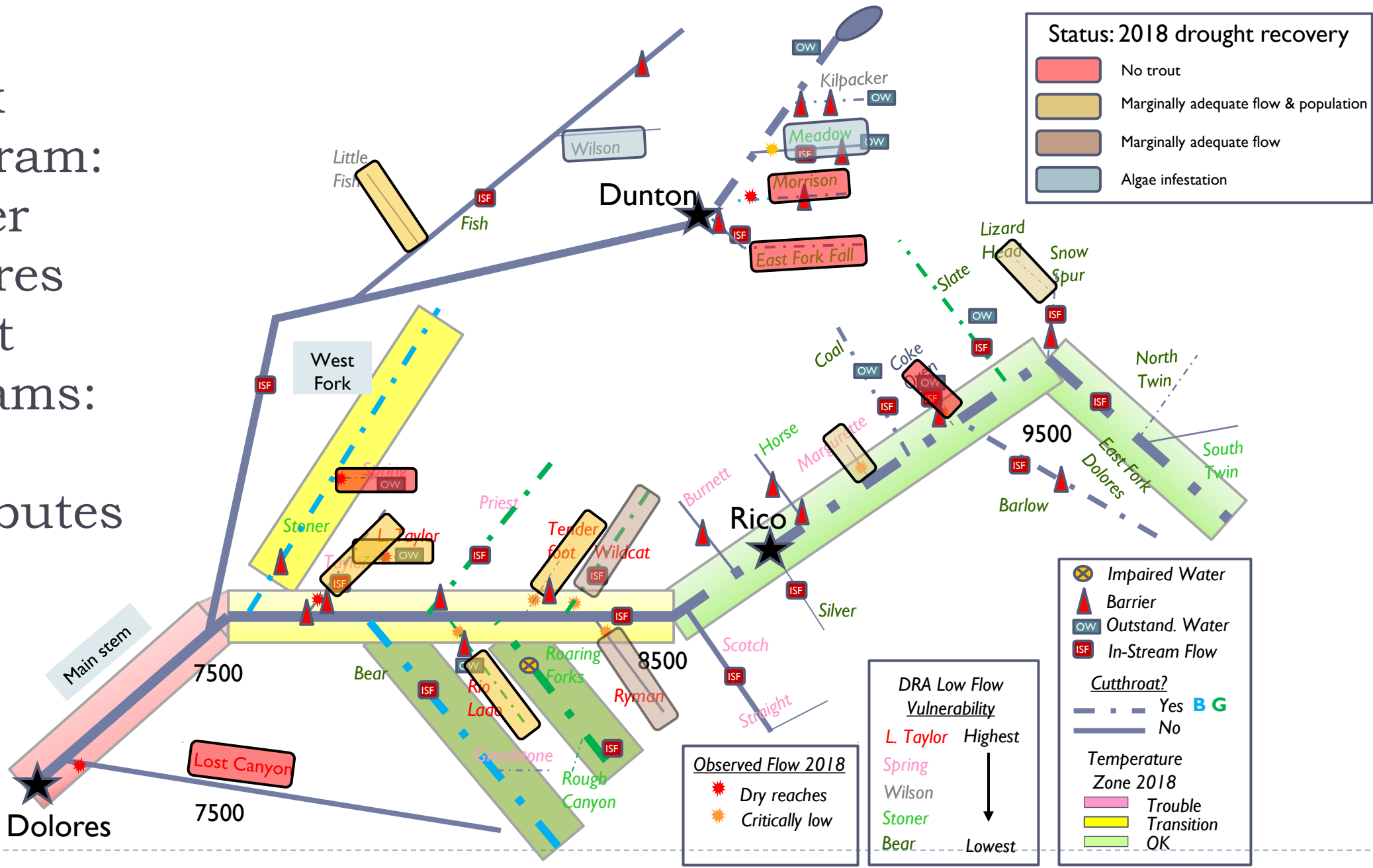


Priority-based stream-by-stream/watershed assessment

- ▶ Start with “priority” spreadsheet streams/watersheds
 - ▶ Summarize current state, key attributes.
 - ▶ Assess relevant disturbances likely to affect to mid, late century.
 - ▶ How does this fit with overall watershed level pattern of each disturbance?
 - ▶ What protection tool(s) fit?
- ▶ Rinse, repeat, move to next priority stream



Stick
Diagram:
Upper
Dolores
Trout
Streams:
All
Attributes



Today's Discussion Guide

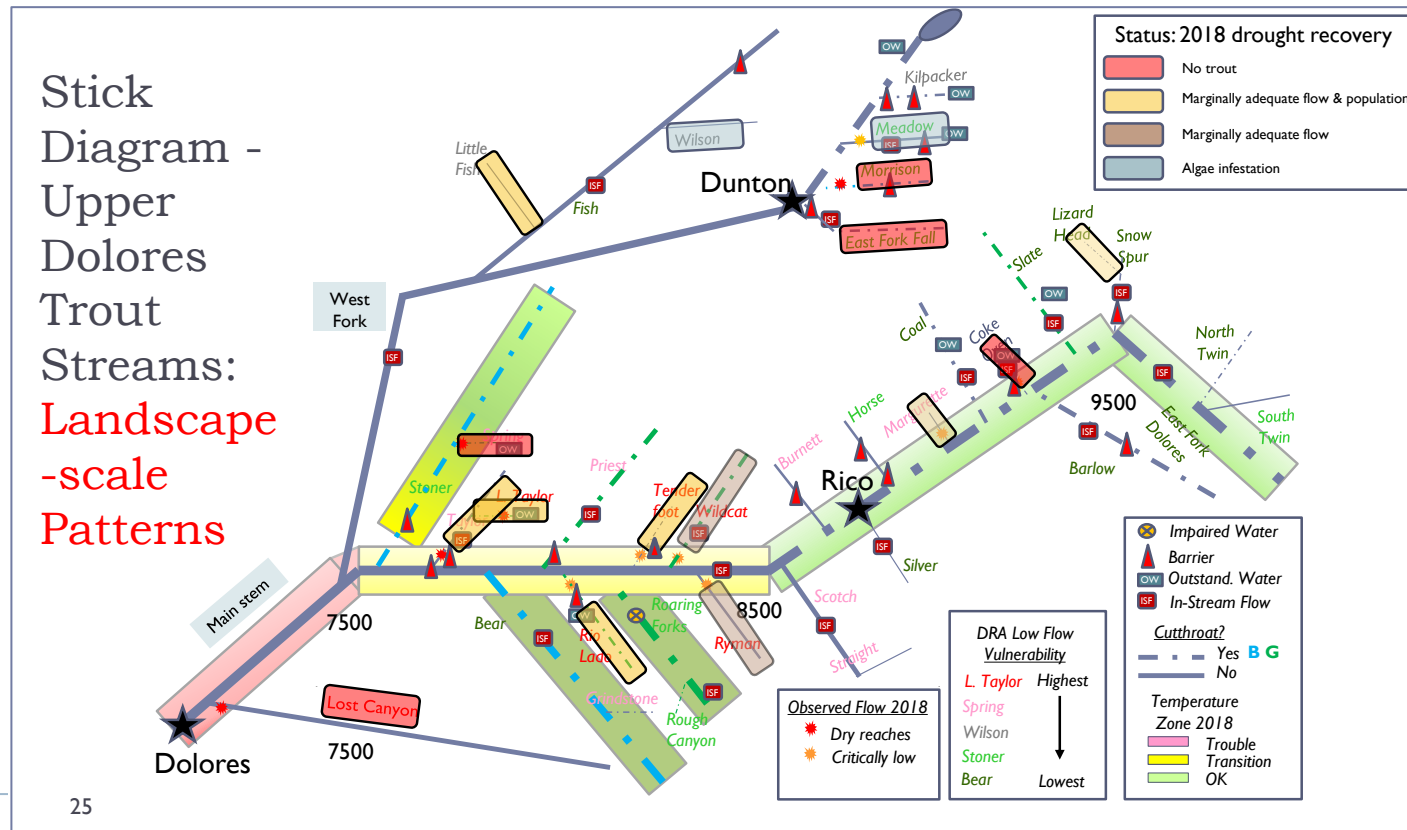
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Toward Action...

Toward action...

1. What general patterns have we seen?
2. Which streams/watersheds face the biggest challenges? The least?



Toward action...

- ✓ 1. What general patterns have we seen?
- ✓ 2. Which streams face the biggest challenges? The least?
3. Where are our priorities?
4. Which can we feasibly assist given our Tool Box?
5. What big picture landscape-scale strategies emerge?
6. What solution-set framework for moving forward?

STREAM NAME	Quintile	Trout			Current Protection			NN-Trout	Threats		Opportunities		Protection Tool Suggestion						
		Cutties?	Green?	Blue?	Rec	Out Wtr?	ISF?		Significant Diversion	Fire Risk	Off-Ramp?	Cutthroat Restoration Site?	ISF	OW	Fishing Regs	SJNF LMP	Other?		
Slate Creek	1	Y	Y			y*	y	N				N							
Roaring Forks Creek	2	Y	y				y	Y			Y	Y							
Stoner Creek	2	Y	Y					Y			Y	Y							
Rough Canyon	2	Y	y					Y				Y							
Spring Creek	3	Y	y			y		N				N							
Priest Gulch	4	Y	y				y	Y			Y	Y							
Rio Lado	5	Y	y			y		N				N							
Taylor Creek Little	5	Y	y			y		N				N							
Wildcat Creek	5	Y	y				y	Y				N							
Twin Creek North	1	Y		Y				Y				N							
East Fork Dolores River	1	Y		Y			?	Y				N							
Barlow Creek	1	Y					Y	Y			Y	Y							
Bear Creek	1	Y					Y	Y			Y	Y							
Coal Creek	1	Y				y*	y	?				Y							
Silver Creek (above Rico pond)	1	N					y	Y				N							
Fish Creek @ SWA	1	N					y	Y				?							
Snow Spur Creek																			
Twin Creek South																			
Morrison Creek																			
Upper Dolores (#5)																			
Dolores River West Fk																			
Lizard Head Creek																			
Meadow Creek	2	N				y*	y	Y				?							
Fall Creek East Fk	2	Y					y	N				N							
Horse Creek	2	N						Y				N							
Lost Canyon (above Dipping Vat Creek)																			
Coke Oven Creek																			
Fall Creek (Dunton)																			
Fish Creek Little (#1)																			
Kilpacker Creek																			
Nash Creek																			
Upper Groundhog Creek (#2)																			
Willow Creek																			
Scotch Creek																			
Grindstone Creek																			
Taylor Creek																			
Bear Creek Little																			
Burnett Creek	4	Y						Y				Y							
Lower Dolores (#4)	4	N						Y				N							
Marguerite Creek	4	Y						N				?							
Straight Creek	4	?						?				?							
Tenderfoot Creek	5	Y						N				?							
Clear Creek	5	?						?				?							
Lost Canyon Creek (All)	5	N						Y				N							
Ryman Creek	5	N						N				N							
* only that portion in Lizard Head WA																			

Jim’s Prioritization/’Values’ Spreadsheet

Where are “highest priority/value” streams/watersheds?

STREAM NAME	Flow Vulnerability Quintile	Cutties?	Green?	Blue?	Rec	Out Wtr?	ISF?	NN-Trout	Significant Diversion	Fire Risk	Habitat Resist/Resil Level	Off-Ramp?	Cutthroat Restoration Site?	ISF	OW	Fishing Regs	SJNF LMP	Other?	Notes
Slate Creek	1	Y	Y			y*	y	N			1		N						LRMP/Artificial Flies, C&R/LRMP
Roaring Forks Creek	2						y	Y			4	Y	Y						LRMP
Stoner Creek	2							Y	Y			Y							LRMP
Priest Gulch	4	Y	Y				y	Y			1	Y							LRMP/Artificial Flies, C&R/LRMP
Rough Canyon	2	Y	y					Y			2								LRMP/Artificial Flies, C&R/LRMP
Wildcat Creek	5	Y	y				y	Y			2								LRMP/Artificial Flies, C&R/LRMP
Spring Creek	3	Y	y			y		N			3		N						LRMP/Artificial Flies, C&R/LRMP
Rio Lado	5	Y	y			y		N			3		N						LRMP/Artificial Flies, C&R/LRMP
Taylor Creek Little	5	Y	y			y		N			3		N						LRMP/Artificial Flies, C&R/LRMP
Twin Creek North	1	Y		Y				Y			1		N						LRMP
East Fork Dolores River	1	Y		Y			Y	Y			1		N						LRMP/Artificial Flies, C&R/LRMP
Twin Creek South	2	Y		Y				?			1		N						LRMP
Morrison Creek	2	Y		Y				N											
Coal Creek	1	Y				y*	y	Y											
Barlow Creek	1	Y					y	Y											
Bear Creek	1	Y					y	Y											
Snow Spur Creek	1	Y					y	Y	Y										
Upper Dolores (#5)	2	Y						Y											
Dolores River West Fk	2	Y				y*	y	Y											
Lizard Head Creek	2	Y						Y											
Coke Oven Creek	3					y*	y	N											
Kilpacker Creek	3	Y				y*		N											
Scotch Creek	4	Y					y	Y											
Lost Canyon (above Dipping Vat Creek)	2	Y									2		?						
Nash Creek	3	Y									3		N						
Upper Groundhog Creek (#2)	3	Y									3		?						
Marguerite Creek	4	Y									2		?						
Taylor Creek	4	Y									2	Y	N						
Burnett Creek	4	Y									2		Y						
Fall Creek East Fk	2	Y									3		N						
Fall Creek (Dunton)	3	Y						Y			3		?						
Bear Creek Little	4	Y						N			3		?						LRMP
Grindstone Creek	4	Y						Y			3		?						LRMP
Tenderfoot Creek	5	Y						N			3		?						
Fish Creek @ SWA	1	N					y	Y	Y		1		?						LRMP
Silver Creek (above Rico pond)	1	N					y	Y			2		N						
Meadow Creek	2	N				y*	y	Y			2		?						LRMP
Horse Creek	2	N						Y			3		N						
Lower Dolores (#4)	4	N						Y	Y		3		N						
Ryman Creek	5	N						N			3		N						
Lost Canyon Creek (All)	5	N						Y	Y		3		N						
Willow Creek	3	?				y*		?			2		?						
Fish Creek Little (#1)	3	?					N	Y			2		?						LRMP
Straight Creek	4	?						?			3		?						
Clear Creek	5	?						?			3		?						

* only that portion in Lizard Head WA

Green
Lineage

Blue

Cutties
No-DNA

Wild

Unknown

DRA/TU

Level of resistance/resilience:

1 Through end of century (stronghold - most resilient)

2 Dissipate between mid to end of century

3. Dissipate before or around mid century (least resilient)

TDR III:
1 Through end of century (stronghold - most resilient)
2 Dissipate between mid to end of century
3. Dissipate before or around mid century (least resilient)

A DRA/TU Proposal (*Discussion Draft Only*)

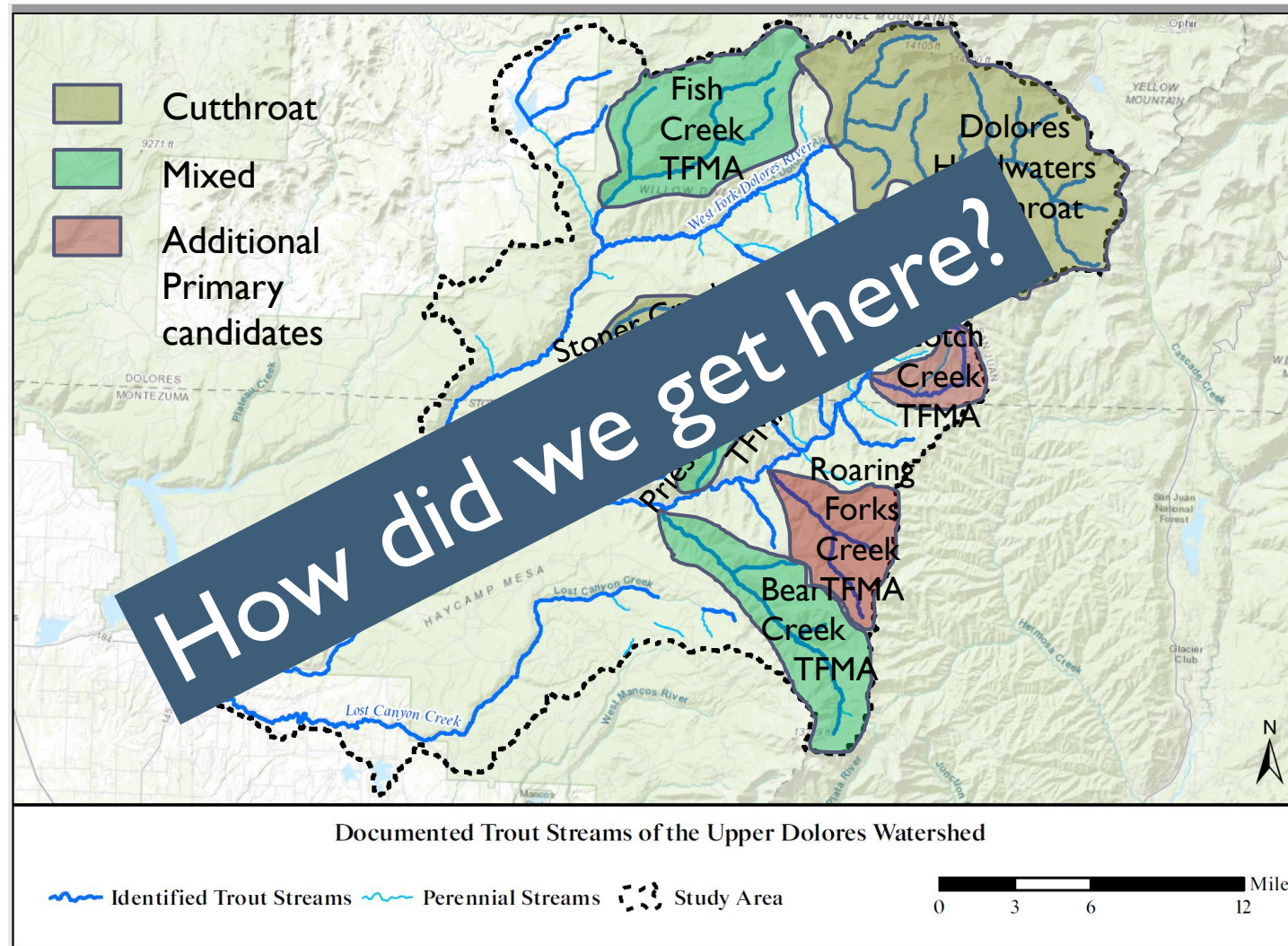
Duncan, Matt and Garrett

Underlying premises, “value propositions”

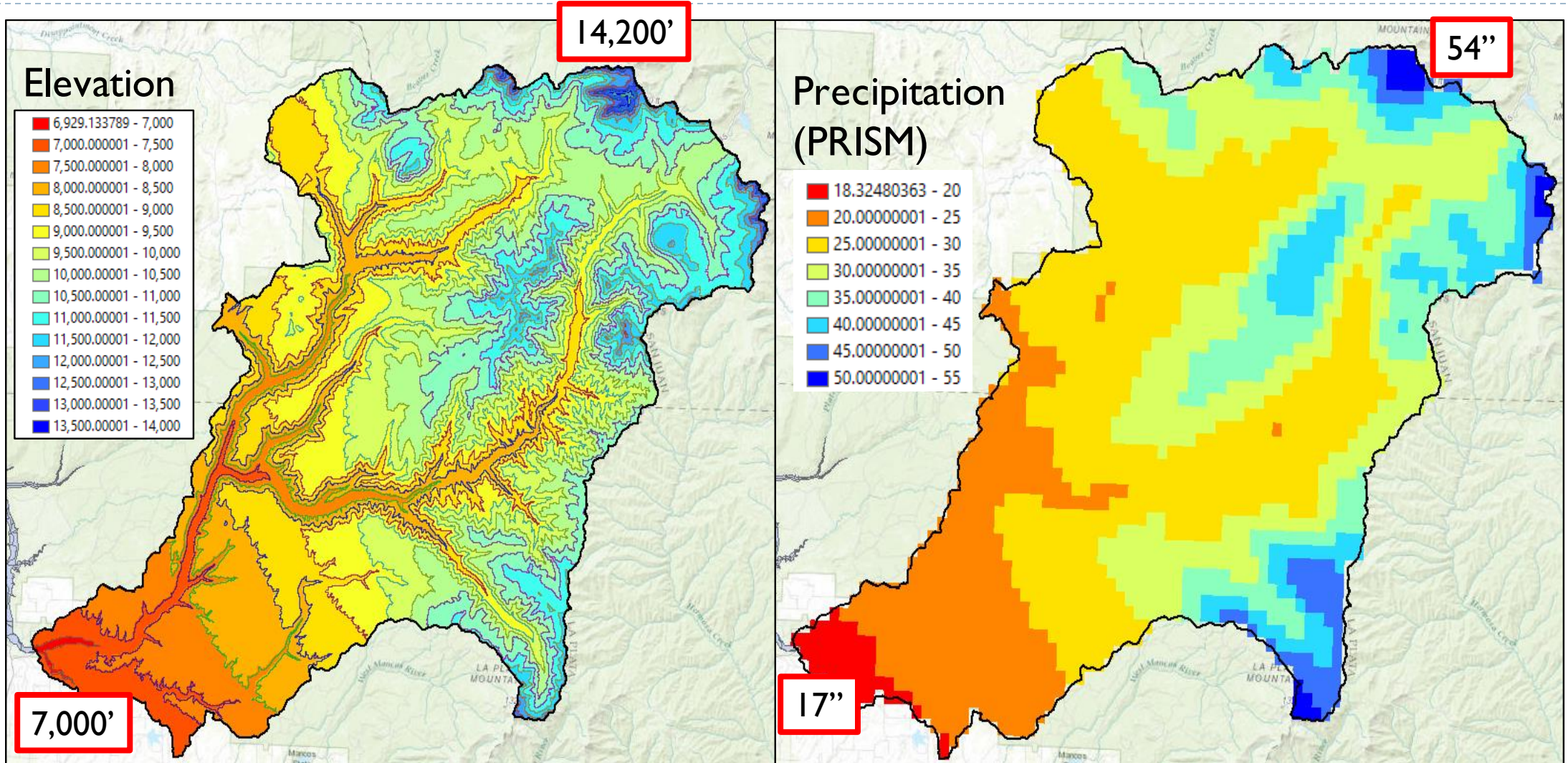
- ▶ Resistance/resilience to climate change has substantial management investment value (which, what, when).
 - ▶ Our forests/watersheds/habitats are transitioning as our climate changes. **What they were then or are now is not what they will likely be.**
 - ▶ “Transition” should be a significant context in management/investment decision-making.
 - ▶ The engines driving transition, while not precisely modeled, are huge, inevitable, persistent, relentless.
 - ▶ Certain streams/habitats will dissipate over the 21st century relative to individual resistance/resilience capacity.
 - ▶ Management resources and funding for change-oriented mitigation are and will be substantially limited; need/demand for such will increasingly rise.
 - ▶ **Generally speaking, the longer a given habitat is likely to be persistent, the higher the long-term value.**
 - ▶ Streams/watersheds can be systematically, even if roughly, grouped according to projected resistance/resilience capability.
 - ▶ From a business perspective, **investment level should just match expected remaining life (triage, avoid over investing).**
- ▶ While all trout habitat is highly valued, species/lineage has value in the following order:
 - ▶ Green lineage cutthroat
 - ▶ Blue lineage cutthroat
 - ▶ Undetermined lineage cutthroat
 - ▶ Wild
 - ▶ Unknown

Discussion draft: “Think big, act locally”

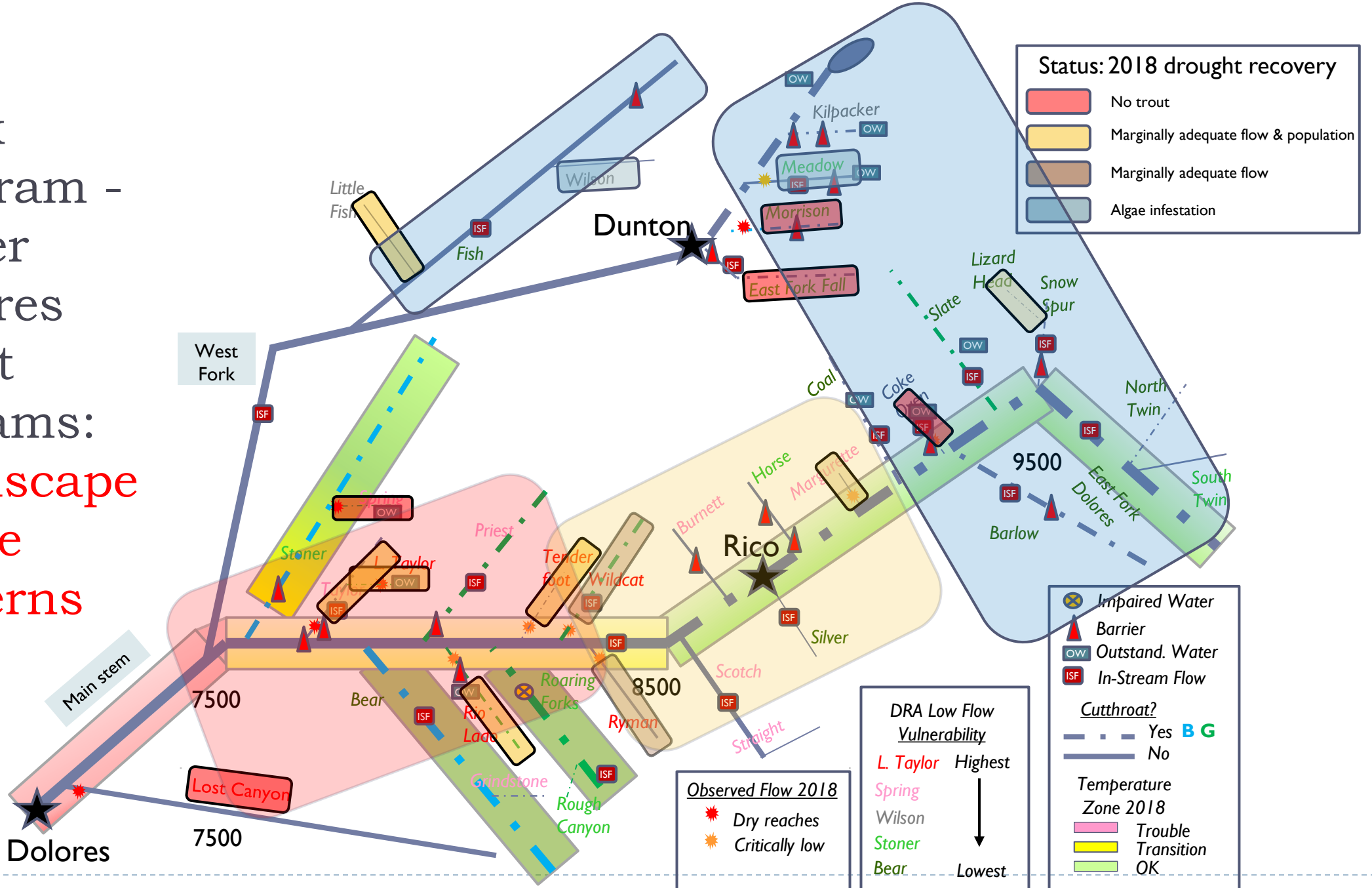
Level 1 Priority “Trout Fisheries Management Areas”



Elevation = More precipitation, cooler temps

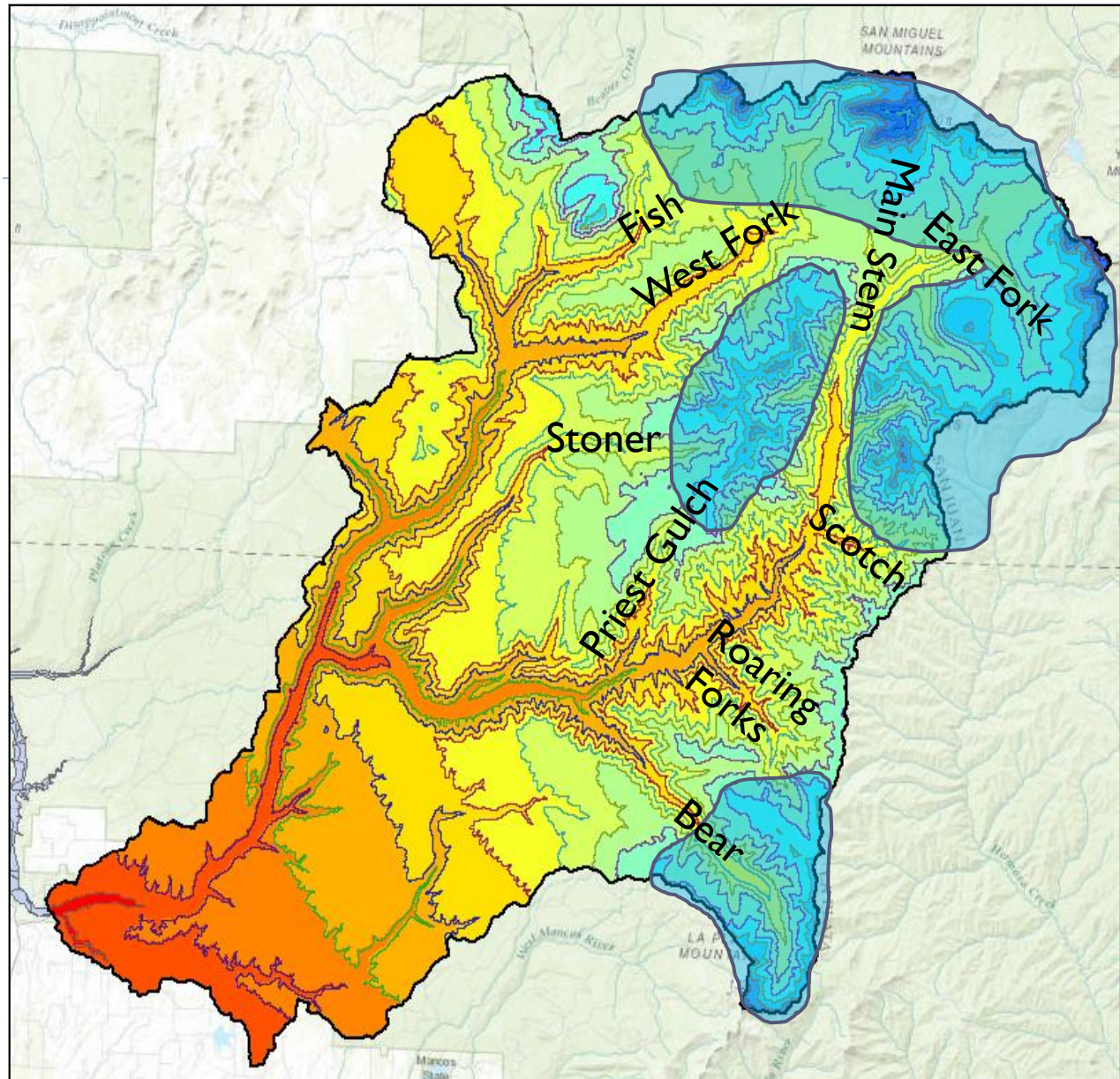


Stick Diagram - Upper Dolores Trout Streams: Landscape -scale Patterns



Core ideas applied

- ▶ **Hard reality:** It is likely that not all streams/habitat will survive to the end of the century.
- ▶ Action/investment should be conditioned by expected vulnerability to long-term disturbances.
- ▶ Long-term action/investment should be focused on
 - ▶ 1. streams whose headwaters reach to high elevations, and
 - ▶ 2. streams supported by large watersheds that are, ideally, at high elevation.
- ▶ Action/investment levels (strategic, routine) should just match expected life/vulnerability.



Transition zones (zones transition over time frame)

▶ **Lost zone**

- ▶ Minimal capital investment if any; maintenance investment only, if any, until clear that dissipation is “permanent” (“Letting go”)

▶ **Threatened zone**

- ▶ Focus on resilience treatments at levels relative to expected dissipation “date”
- ▶ Future-suitable species introduction for testing? (“Extend, resist, then let go”)

▶ **Persistent zone**

- ▶ Long-term investment (capital and maintenance) in both resistance and resilience (“Sustain, strengthen”)

▶ **Emergent zone**

- ▶ Focus on resilience treatments at levels relative to expected dissipation “date”
- ▶ Set up monitoring/research to assess threshold limits (“Test, learn”)

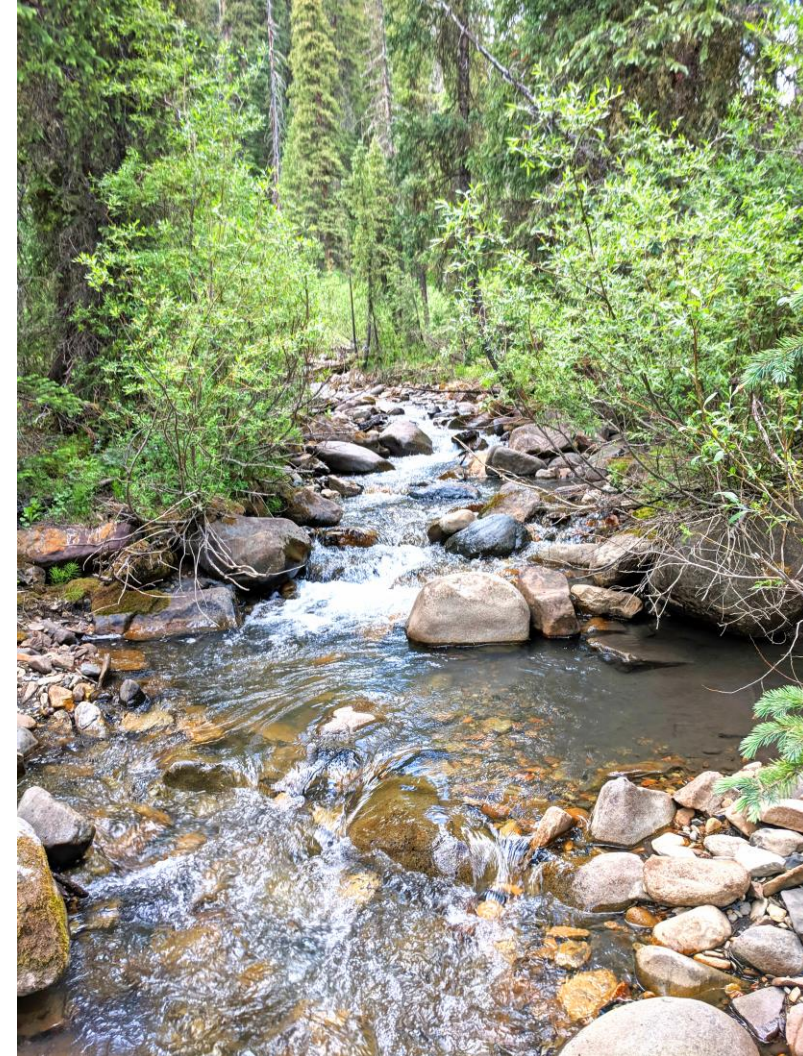
Broad strategy: Two-staged action steps

1. Shorter Term

- ▶ Create three “Investment Priority Levels” based on resistance/resilience to anticipated climate change disturbances (stronghold characteristics).
- ▶ Create “**Informal**” “trout fisheries management areas”(TFMAs) (cross-organizational “close-coordination” areas) based on Investment Priority Level designation:
 - ▶ Streams with long-term stronghold attributes
 - Large-area watersheds, especially at elevation
 - High elevation headwaters
 - ▶ And with special focus on cutthroat populations
- ▶ Target investment (money, resources) by Investment Priority Levels
 - ▶ In-Stream Flow Designation
 - ▶ Outstanding Waters Designation
 - ▶ Fishing regulations (catch & release, artificial lures/flyes, closed-stream techniques)
 - ▶ In/near-stream modifications (enhanced low-flow-refugia pockets, off-ramp/barrier configurations)
 - ▶ Water conservation type best practices targeting fens, bogs, wetlands, beaver/beaver-analog,

▶ 2. Longer Term

- ▶ Formalize/embed TFMAs in SJNFS Land Resource Mgt Plan
- ▶ National Conservation Area?
- ▶ Conservation Watershed Network for Native Fishes?



Investment Priority Levels by stream and cutthroat type

STREAM NAME	Habitat Resist/Resil Level
Slate Creek	1
Roaring Forks Creek	1
Stoner Creek	1
Priest Gulch	1
Twin Creek North	1
East Fork Dolores River	1
Twin Creek South	1
Coal Creek	1
Barlow Creek	1
Bear Creek	1
Snow Spur Creek	1
Upper Dolores (#5)	1
Dolores River West Fk	1
Lizard Head Creek	1
Kilpacker Creek	1
Scotch Creek	1
Fish Creek @ SWA	1

Rough Canyon	2
Wildcat Creek	2
Lost Canyon (above Dipping Vat Creek)	2
Arguerite Creek	2
...	2
Silver Creek (Pico pond)	2
Meadow Creek	2
Horse Creek	2
Willow Creek	2
Fish Creek Little (#1)	2
Spring Creek	3
Rio Lado	3
Taylor Creek Little	3
Morrison Creek	3
Burnett Creek	3
Coke Oven Creek	3
Nash Creek	3
Upper Groundhog Creek (#2)	3
Fall Creek East Fk	3
Fall Creek (Dunton)	3
Bear Creek Little	3
Grindstone Creek	3
Tenderfoot Creek	3
Lower Dolores (#4)	3
Ryman Creek	3
Lost Canyon Creek (All)	3
Straight Creek	3
Clear Creek	3

Column 1

	Green lineage
	Blue line box
	Unknown lineage
	Wild
	Unknown

Column 2. Habitat Resistance/Resilience Levels:

1. Will likely persist through end of century (2100) (strongholds - most resilient)
2. Will likely dissipate between mid to end of century (2050 – 2100)
3. Will likely dissipate before or around mid century (2040 – 2060) (least resilient)



Priority for action/investment-ranking (“Stream/watershed Value” based)

▶ **Level 1A:** Long-Range, stronghold fisheries management areas :

- ▶ Through end of century (cutthroat strongholds - most resilient)
- ▶ Dolores Headwaters Cutthroat Fisheries Management Area
 - ▶ Composite watershed area made up of
 - From Coal Creek confluence up on main stem **plus**
 - From Morrison creek confluence up on West Fork
 - ▶ Outstanding Waters
 - ▶ Cutthroat restoration?
- ▶ Bear Creek Watershed Trout Fisheries Management Area
 - ▶ Thermal off ramp
 - ▶ Cutthroat barrier
 - ▶ Outstanding Waters
- ▶ Stoner Creek Watershed (TFMA)
 - ▶ Thermal off-ramp
 - ▶ Cutthroat barrier
 - ▶ In-Stream-Flow
 - ▶ Outstanding Waters

▶ **Level 1B:** Wild Trout Stronghold streams/watersheds

- ▶ Fish Creek Watershed TFMA
 - ▶ Cutthroat restoration
- ▶ Priest Creek Watershed TFMA
 - ▶ Thermal off-ramp
 - ▶ Cutthroat barrier
 - ▶ Outstanding Waters

- ▶ Roaring Forks Creek – Needs quality assessment
- ▶ Scotch Creek

▶ **Level 2:** Mid-Range Watersheds

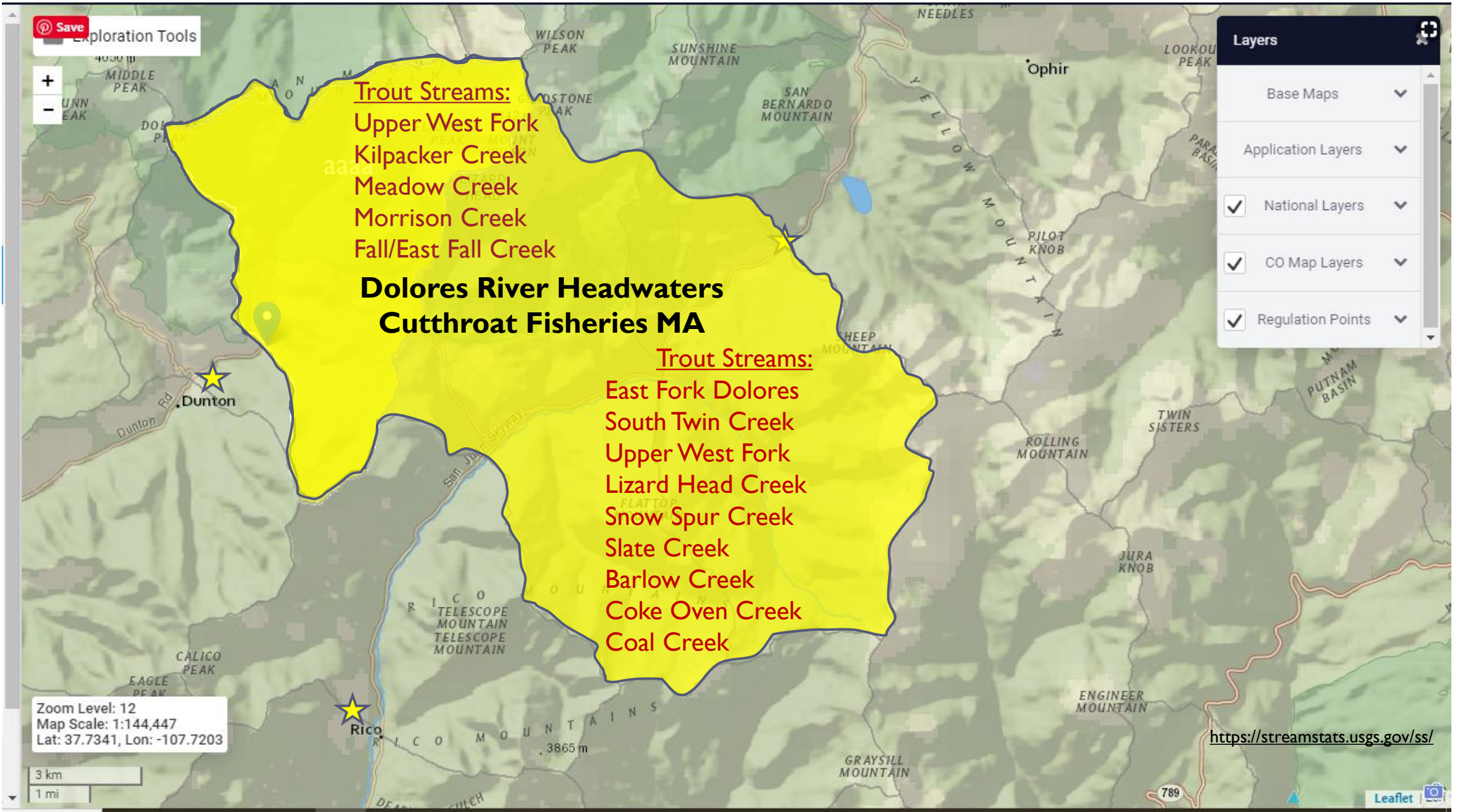
- ▶ Dissipate between mid to end of century
 - ▶ Wildcat Creek
 - ▶ Taylor (Examples)
 - ▶ Tenderfoot
 - ▶ Rio Lado

▶ **Level 3:** Shorter-Range Watersheds

- ▶ Dissipate before or around mid century (least resilient)
 - ▶ Little Taylor Morrison (Examples)
 - ▶ Spring Creek East Fall Creek

Key Strategies

- Fire modeling: High Value Resources & Assets
- Fishing regulations (catch & release, artificial lures/fly, stream-following techniques)
- In/near-stream modifications (enhanced low-flow-refugia pockets, off-ramp/barrier configurations)
- Water conservation type best practices focused on fens, bogs, wetlands, beaver/beaver-analog, etc.



Save Exploration Tools

+
-
UNN
PEAK

Trout Streams:
Upper West Fork
Kilpacker Creek
Meadow Creek
Morrison Creek
Fall/East Fall Creek

**Dolores River Headwaters
Cutthroat Fisheries MA**

Trout Streams:
East Fork Dolores
South Twin Creek
Upper West Fork
Lizard Head Creek
Snow Spur Creek
Slate Creek
Barlow Creek
Coke Oven Creek
Coal Creek

Layers

Base Maps

Application Layers

☒ National Layers

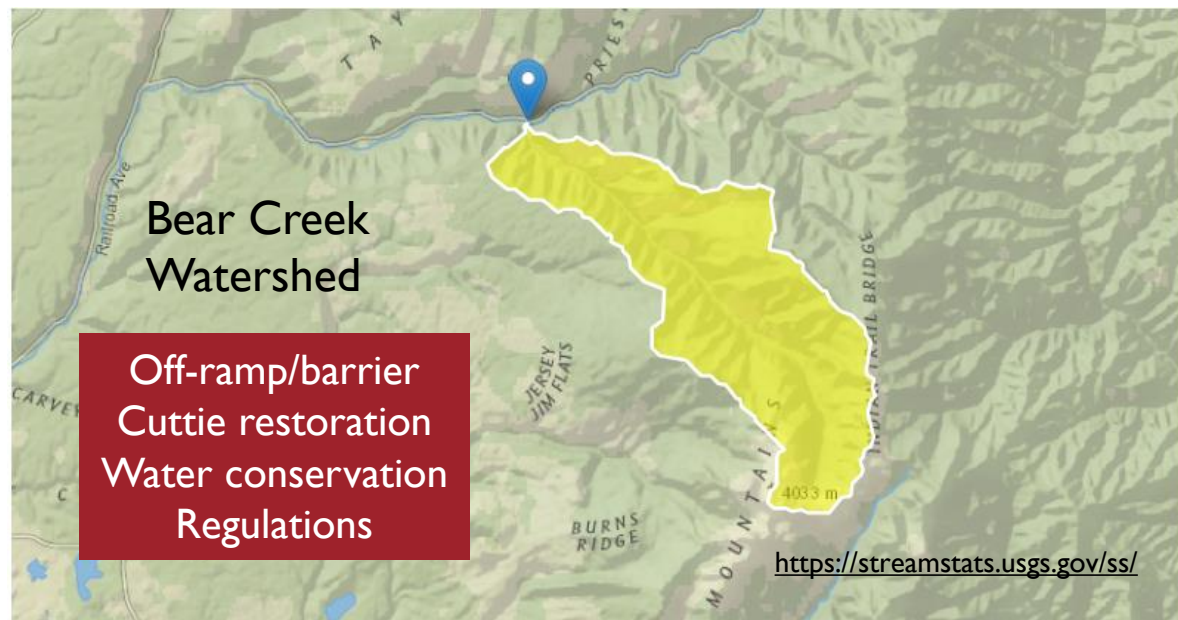
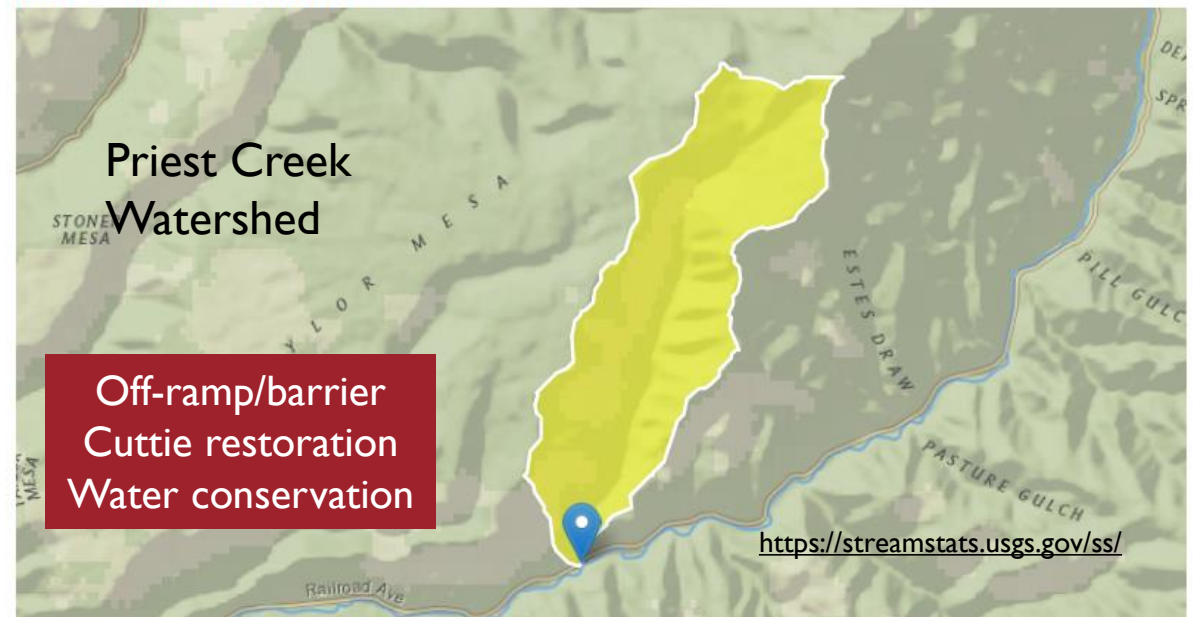
☒ CO Map Layers

☒ Regulation Points

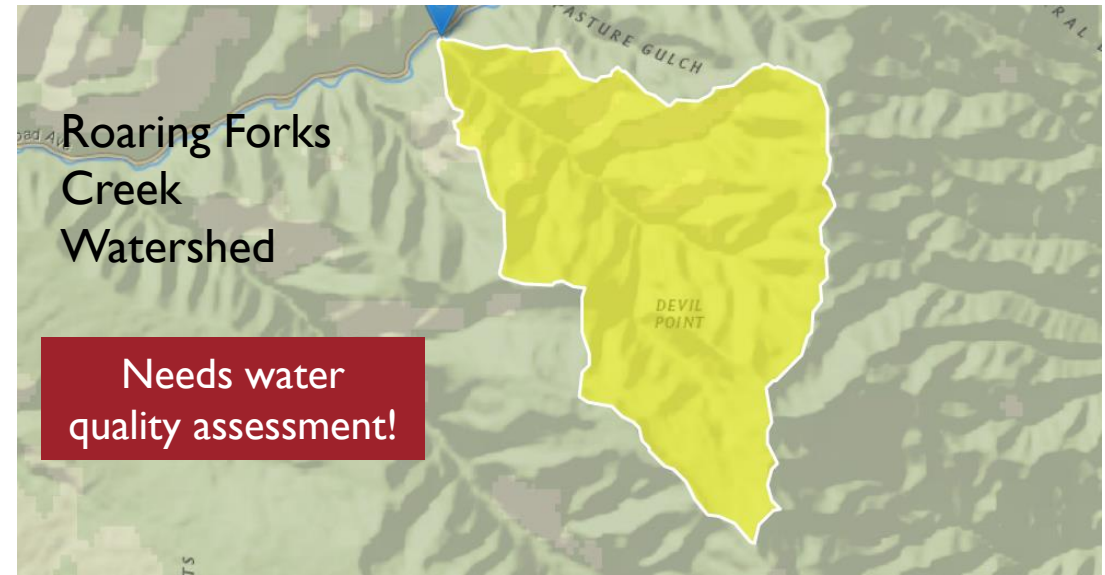
Zoom Level: 12
Map Scale: 1:144,447
Lat: 37.7341, Lon: -107.7203

3 km
1 mi

<https://streamstats.usgs.gov/ss/>



Additional Level 1 candidates – not quite as robust



Proposed short-term action

▶ In-Stream-Flow candidates:

▶ Under consideration (new!)

- ▶ Little Taylor
- ▶ Tenderfoot
- ▶ Wildcat
- ▶ Ryman
- ▶ Marguerite

▶ Stoner

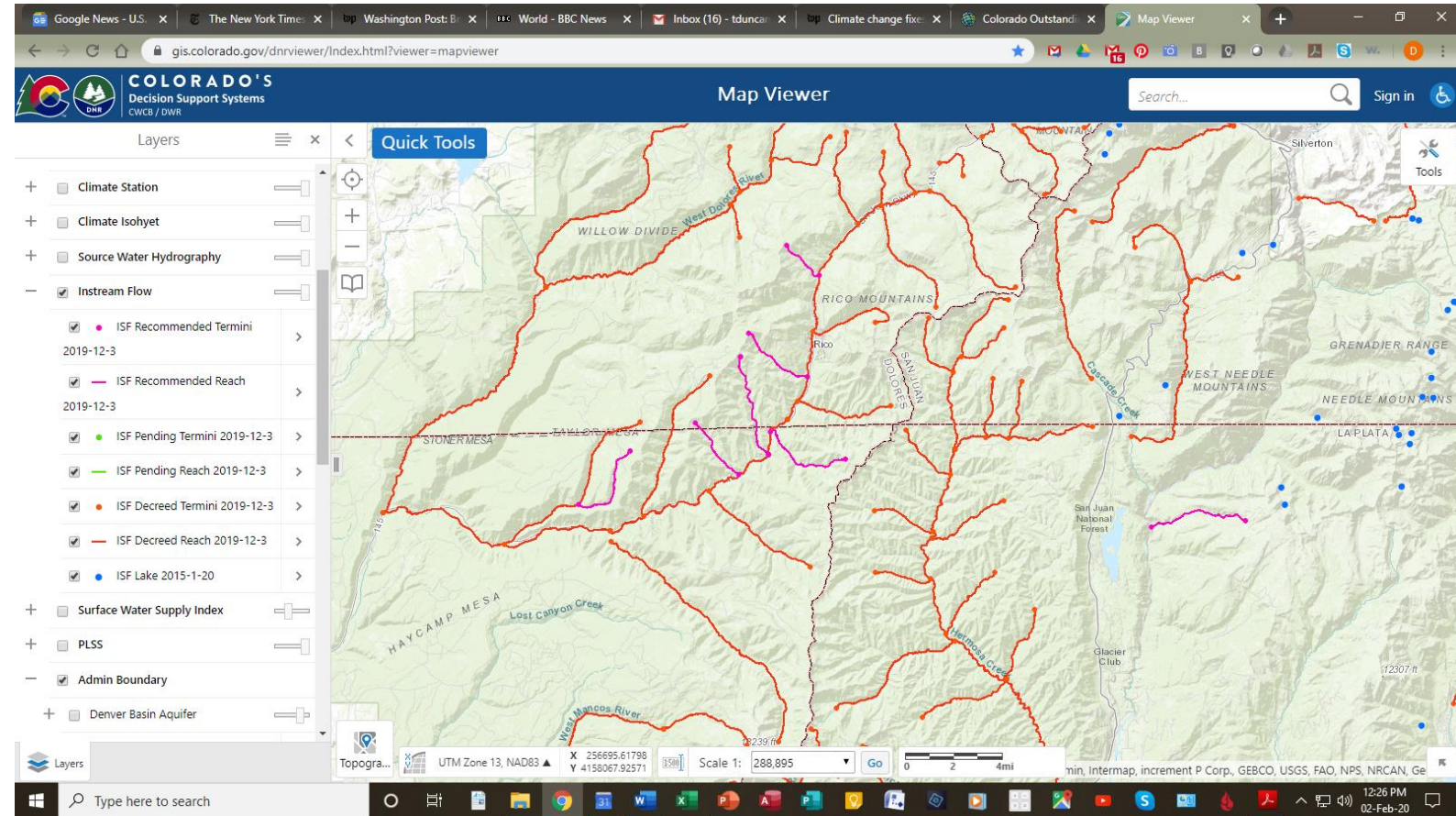
▶ Outstanding Waters candidates:

▶ Extend to confluence with Dolores

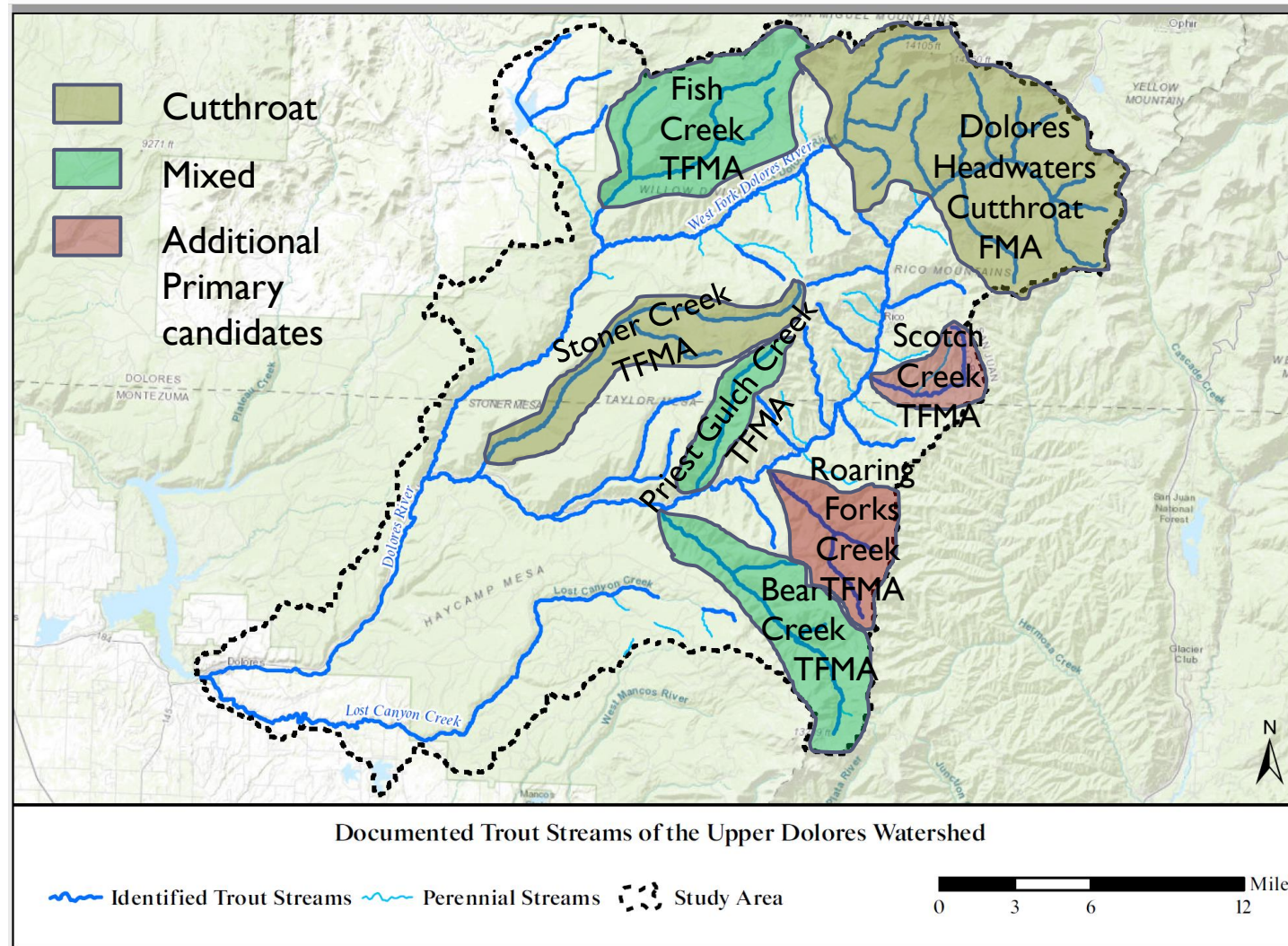
- ▶ Slate Creek
- ▶ Coke Oven
- ▶ Coal Creek

▶ New

- ▶ East Fork Dolores
- ▶ Snow Spur
- ▶ Wildcat

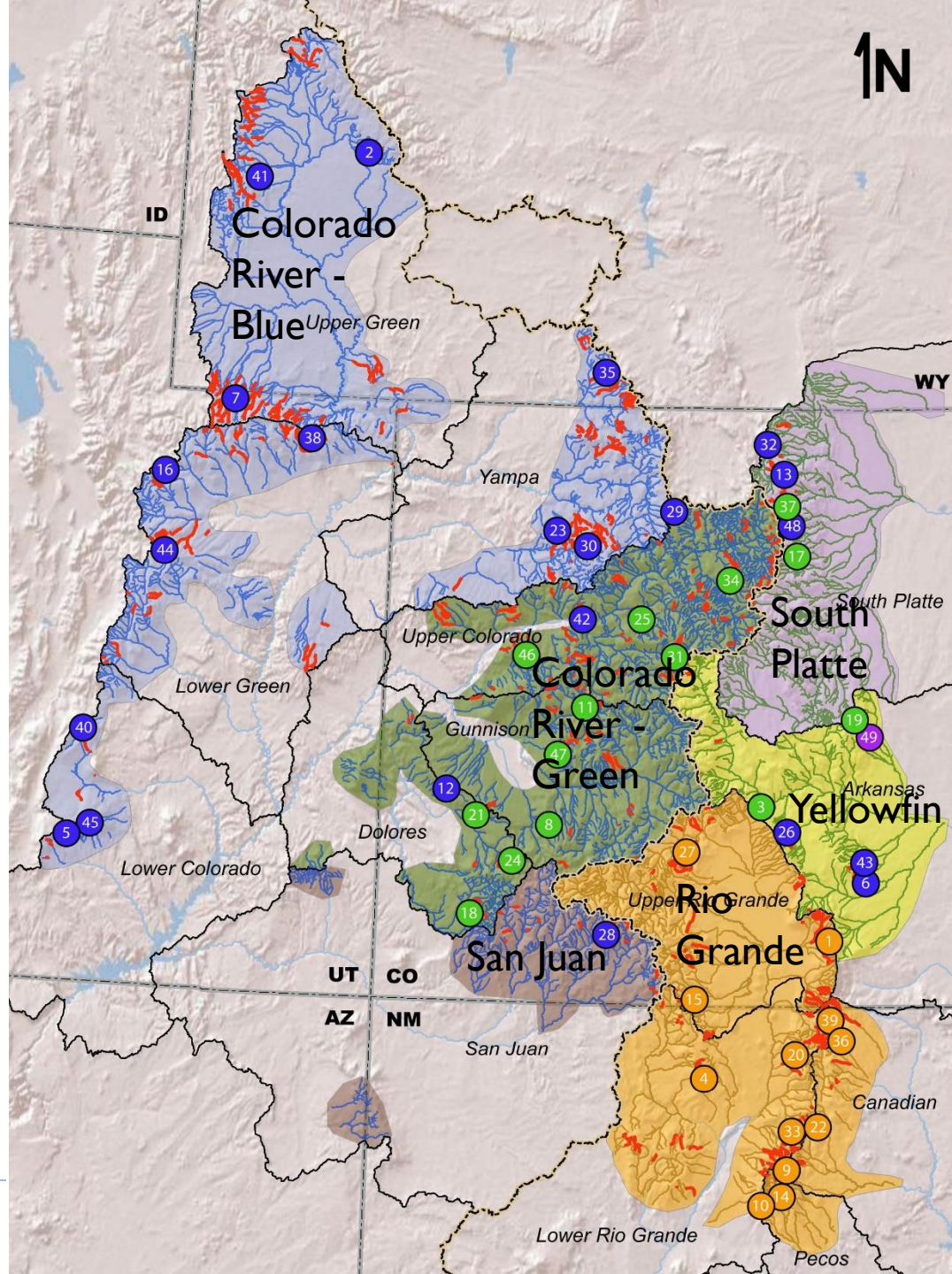


Discussion draft: Landscape-scale “big picture” Level 1 priority “Fisheries Management Areas”





Discussion!



Historic Distribution of Cutthroat lineages

Study area map and sampling sites. Fourteen hydrologic units (fourth-level hydrologic unit codes) from five western states that comprise the estimated historical range of Colorado River Cutthroat Trout (CRCT; blue labeled streams), Greenback Cutthroat Trout (green streams), and Rio Grande Cutthroat Trout (RGCT; orange streams) are named in italics. Ranges are based on estimates of downstream limits of cool water likely to support Cutthroat Trout rather than simply outlining drainage basins (e.g., Behnke 1992).

Current conservation populations from which our study populations were randomly drawn are highlighted in red.

The historical ranges of various lineages (Metcalf et al. 2012) are represented by shading: the CRCT-Blue Lineage (Yampa, upper Green, lower Green, and lower Colorado River geographic management units [GMUs]) is shaded blue; the CRCT-Green Lineage (upper Colorado, Gunnison, and Dolores River drainage GMUs) is shaded green; the San Juan River drainage (and GMU) is shaded brown; the RGCT (upper and lower Rio Grande, Pecos River, and Canadian River GMUs) is shaded orange; the Yellowfin Cutthroat Trout (Arkansas River GMU) is shaded yellow; and the South Platte River native Cutthroat Trout lineage (South Platte River GMU) is shaded purple.

The lineage of each population sampled in the study (dots) defined by mitochondrial NADH dehydrogenase subunit 2 phylogenies are colored per the lineage ranges, and the number in each dot represents a stream sampled in this study (stream numbers are defined in Table 1).

<https://afspubs.onlinelibrary.wiley.com/doi/10.1002/tafs.10145>

Working List of State, Federal and Local Stream Protection Tools

▶ **I. State Protection Mechanisms**

- ▶ **A. Colorado Instream Flow Program**
- ▶ B. Colorado Law and Intergovernmental Agreements
- ▶ C. Gold Medal Waters
- ▶ **D. Outstanding Waters**
- ▶ **E. Stream Management Plans (SMPs)**
- ▶ **F. CPW/NFS - Fishing Regulations**
- ▶ **G. CPW/NFS - In/near/associated-stream intervention techniques**

▶ **II. Federal Protection Mechanisms**

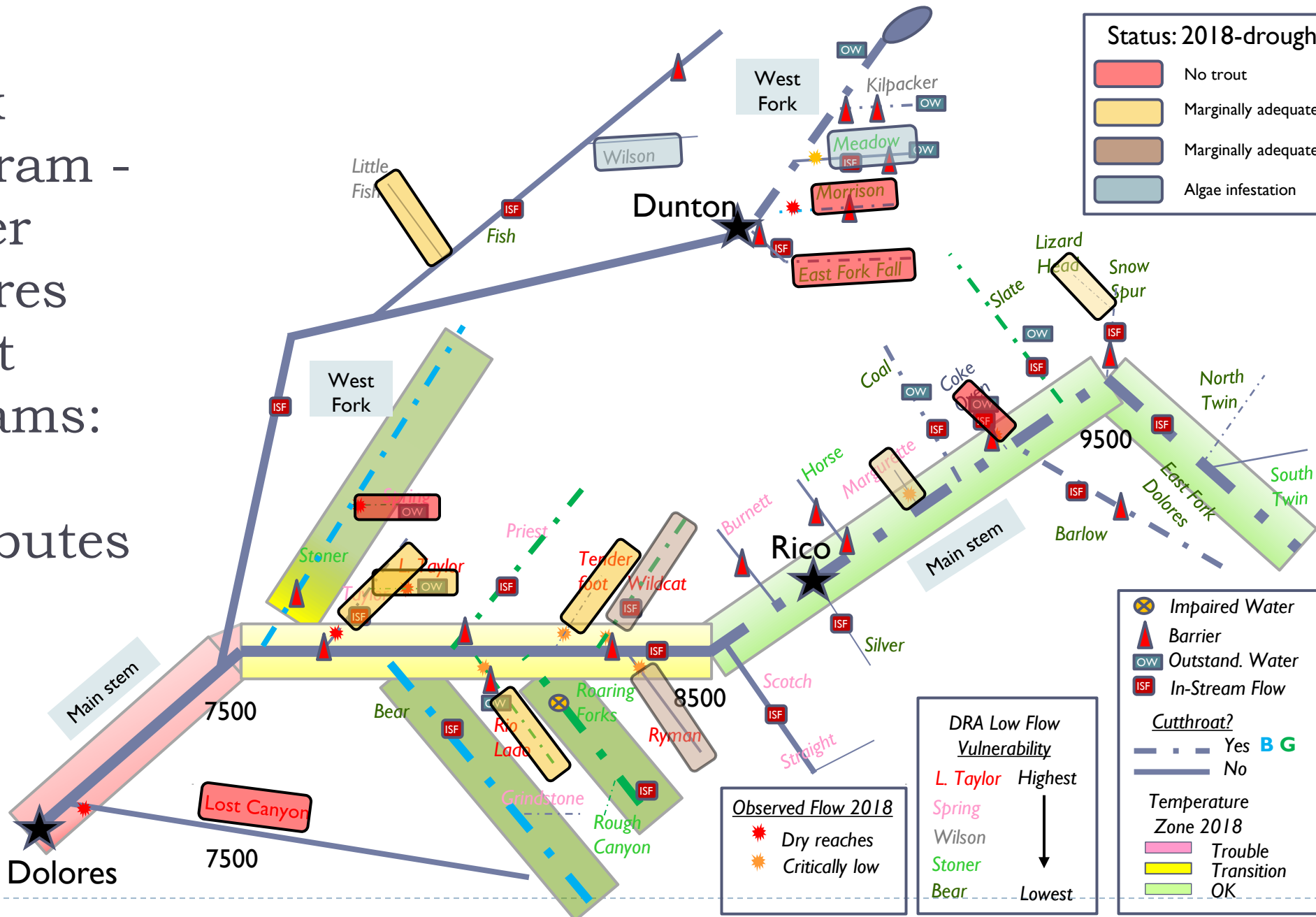
- ▶ **A. U.S. Forest Service ("USFS") Land Management Plans ("LMPs").**
 - ▶ **1. Management Area Designations (MA 1, MA2, M3)**
 - ▶ **2. Special Areas and Designations:**
 - ▶ **a. Area of Critical Environmental Concern**
 - ▶ **b. Wildlife Management Area**
 - ▶ **2. Conservation Watershed Network for Native Fishes**

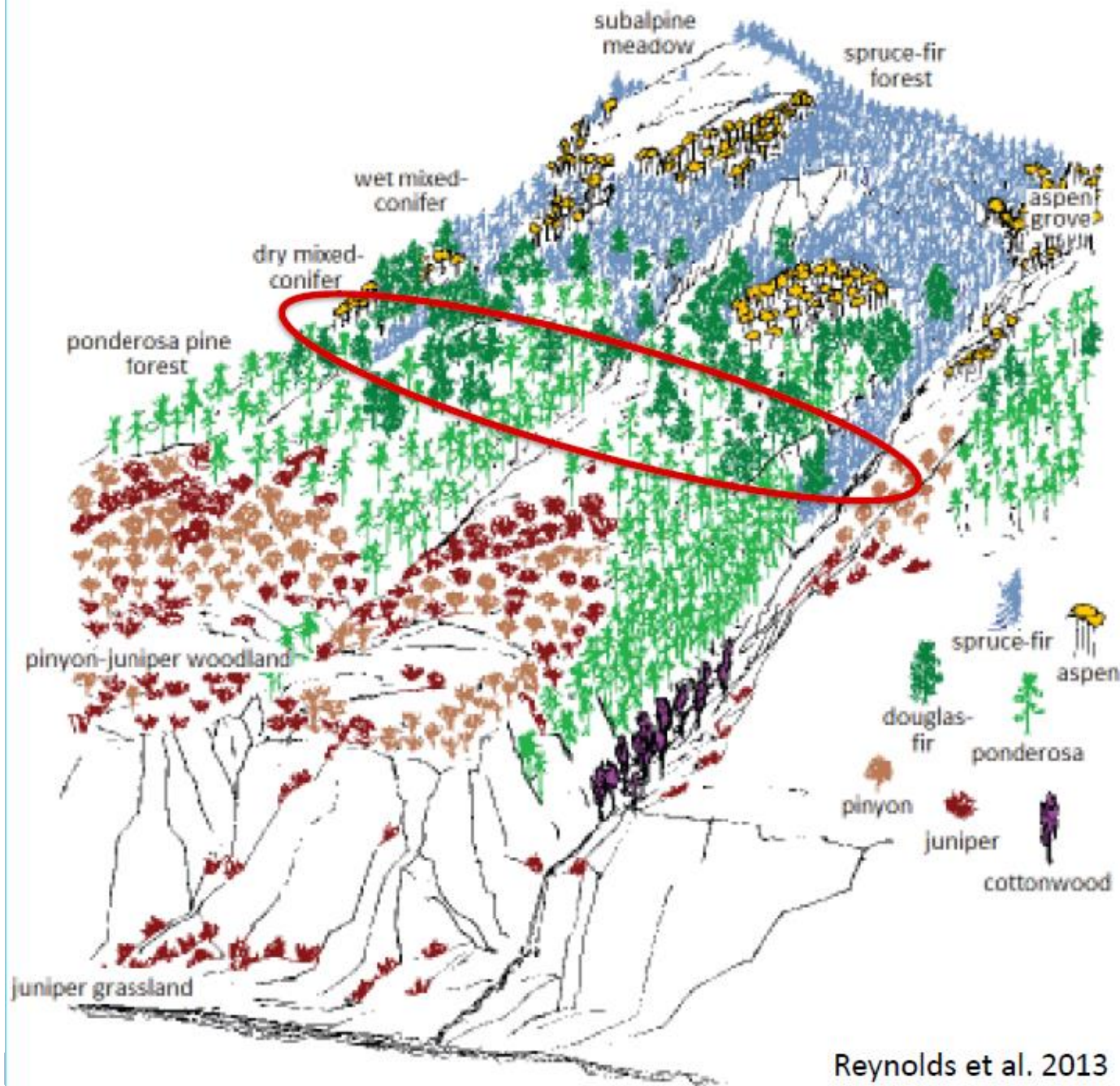
- ▶ **B. Wild and Scenic Rivers Act of 1968 ("WSR")**
- ▶ **C. Wilderness Designation: Wilderness Act of 1964 ("Wilderness Act")**
- ▶ **D. National Conservation Areas ("NCAs")**
- ▶ **E. Federal Research Areas**
- ▶ **F. Other Federal Legislation (special)**
 - ▶ **1. (Rio Grande and North St. Vrain Creek)**
 - ▶ **2. South Platte Protection Plan (WSR suitability determination held in abeyance).**
 - ▶ **3. Rio Chama Management Plan**

▶ **III. Local/Other**

- ▶ **A. Conservation Easements**
- ▶ **B. County Land Use Codes**
- ▶ **C. Contractual Arrangements**

Stick
Diagram -
Upper
Dolores
Trout
Streams:
All
Attributes





Clues to where
moisture is:
forest types
follow
precipitation/
soil moisture

Life History Strategy	Behavior	Migration Distances	Example
Anadromous	Born in freshwater, travel to ocean to feed and grow, return to freshwater to spawn	$\leq 1,000$'s of miles	Salmon; Steelhead trout
Catadromous	Born in the ocean, travel into freshwater to feed and grow, return to the ocean to spawn	$\leq 1,000$'s of miles	American eel
Fluvial	Born in tributaries, travel to larger habitats in mainstem rivers to feed and grow, return to tributaries to spawn	≤ 100 's of miles	Many subspecies of inland cutthroat trout; bull trout
Adfluvial	Born in tributaries, travel to lakes to feed and grow, return to tributaries to spawn	≤ 100 's of miles	Pyramid Lake Lahontan cutthroat trout; Flathead Lake bull trout
Resident	Born in tributaries, feed and grow in tributaries, spawn in tributaries	≤ 10 's of miles	Present day populations of greenback cutthroat trout and California golden trout

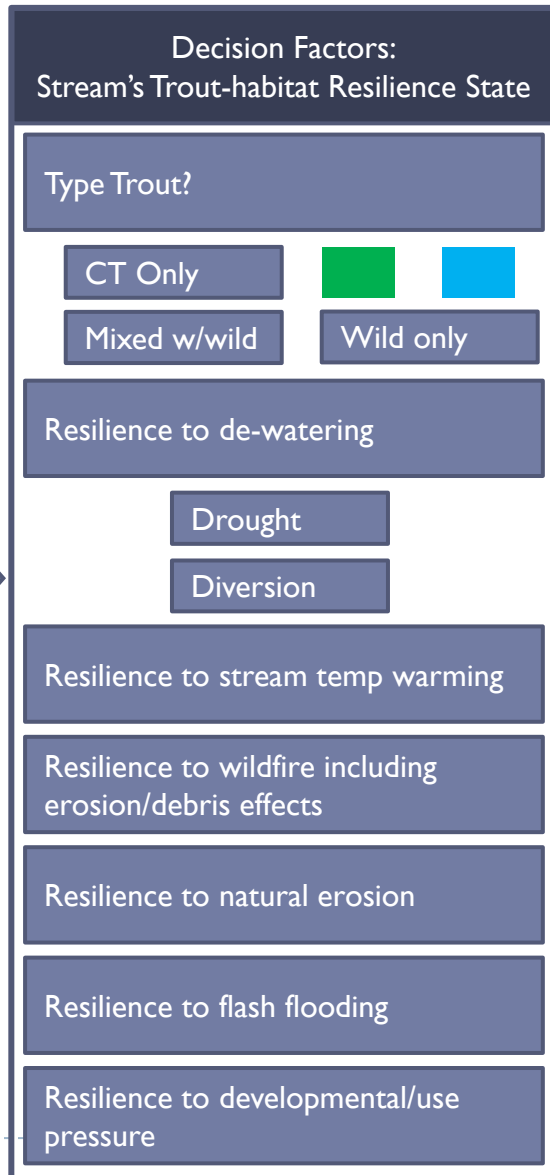
A Guide to Native Trout Restoration: Science to Protect and Restore Coldwater Fishes and their Habitats

Trout Unlimited,
Arlington,
Virginia
April 2006



Upper Dolores Stream Protection Framework

All streams known or feasibly-thought-to-have
“permanent” trout populations in upper Dolores



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III. Other

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- B. County Land Use Codes
- C. Contractual Arrangements

Output Table:
Trout streams
with
recommended
protection
strategy for
each stream