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Brown trout in Glen Canyon: Insights from two expert elicitation surveys

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Why a survey?

- Lots of talk about brown trout
- Little data

- Identify broad patterns of consensus?
- Inform management priorities?

- Actually 2 surveys:
  - Initial questions, then focused follow-up

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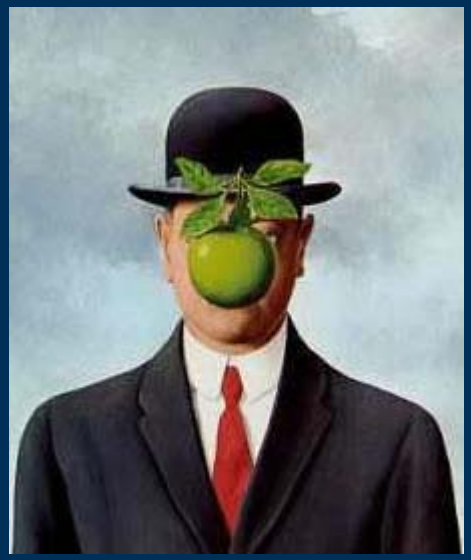
Kennedy 2013

Who took the survey?

- Can’t say for sure (totally anonymous)
- Invited list included scientists and managers included in brown trout email threads and fish cooperators meeting
- Survey 1: 14 respondents
- Survey 2: 13 respondents



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Survey 1 Themes

1: Are brown trout a problem?

2: How did they become a problem?

3: What can we do about it?

Goal is to look for some expert consensus

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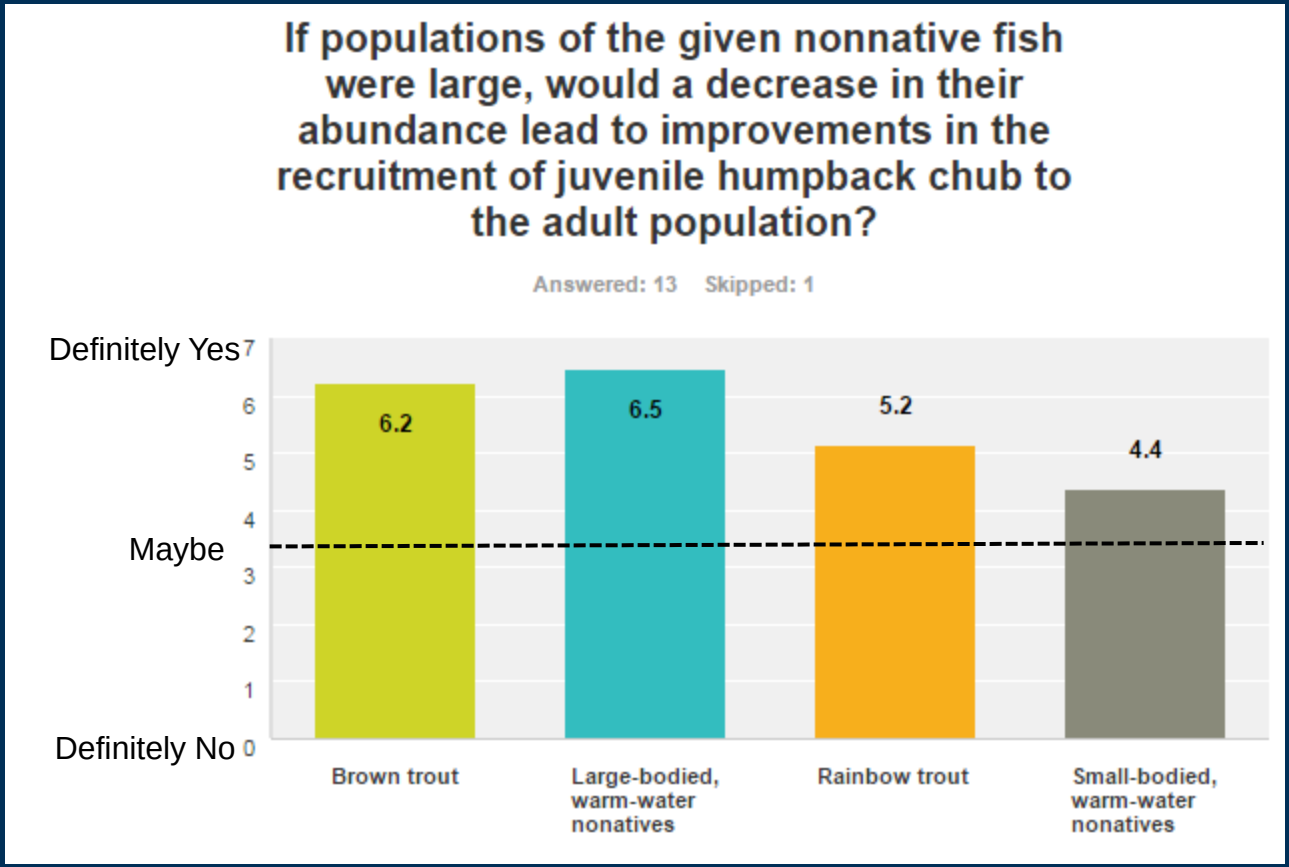

Representative comments:

- **"Although rainbow and brown trout are both piscivorous, if populations of both species reached equal numbers, I would expect brown trout to have the most detrimental effect on chub populations given their behavior in other systems."**
- **"Warmwater centrarchids and other large bodied non natives comprise the biggest threat of the NNF. Rainbow trout are less of a threat, although brown trout, because of their high level of piscivory are likely worse."**
- **"Rainbow in the Little Colorado area are a threat, but should not be much of one in the upper reaches. Brown trout are going to eat other fish wherever they are and could quickly replace the Lees Ferry RBT. "**
- **"I think brown trout are a far greater threat to native fishes than rainbow trout or green sunfish."**

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1: Are brown trout a problem?

Resounding Yes.

- **A little less of a concern than smallmouth bass**

- **Definitely more than RBT or green sunfish**

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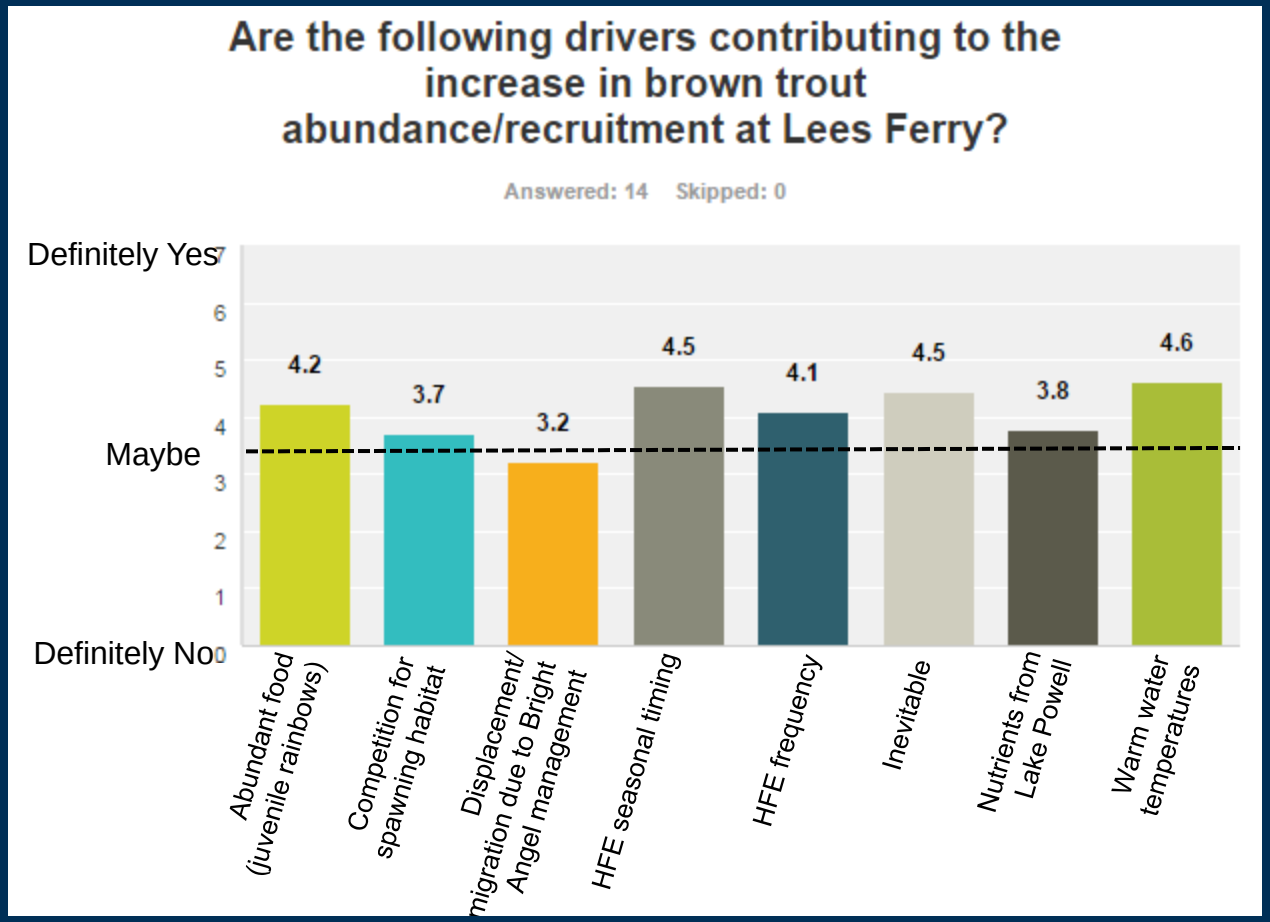

Representative comments:

- **"All of these factors, or many of them, likely contribute to the recent increases. We must all remember it's not just one true answer...it is the interaction of many factors."**
- **"I don't think that anyone really knows why a particular NNF can exist at low levels in a particular river for a long period, and then increase dramatically in numbers. It happens pretty regularly. Maybe conditions just sort of come together to support the NNF."**
- **"The only plausible explanations I've heard for recent recruitment increases at Lees Ferry are the seasonal timing of HFEs and warmer water temperatures."**
- **" I think it might be a combination of frequent high flow experiments in the fall, timed with a decline of rainbow trout, particularly the spawners that were part 2008 and 2011 cohorts. "**

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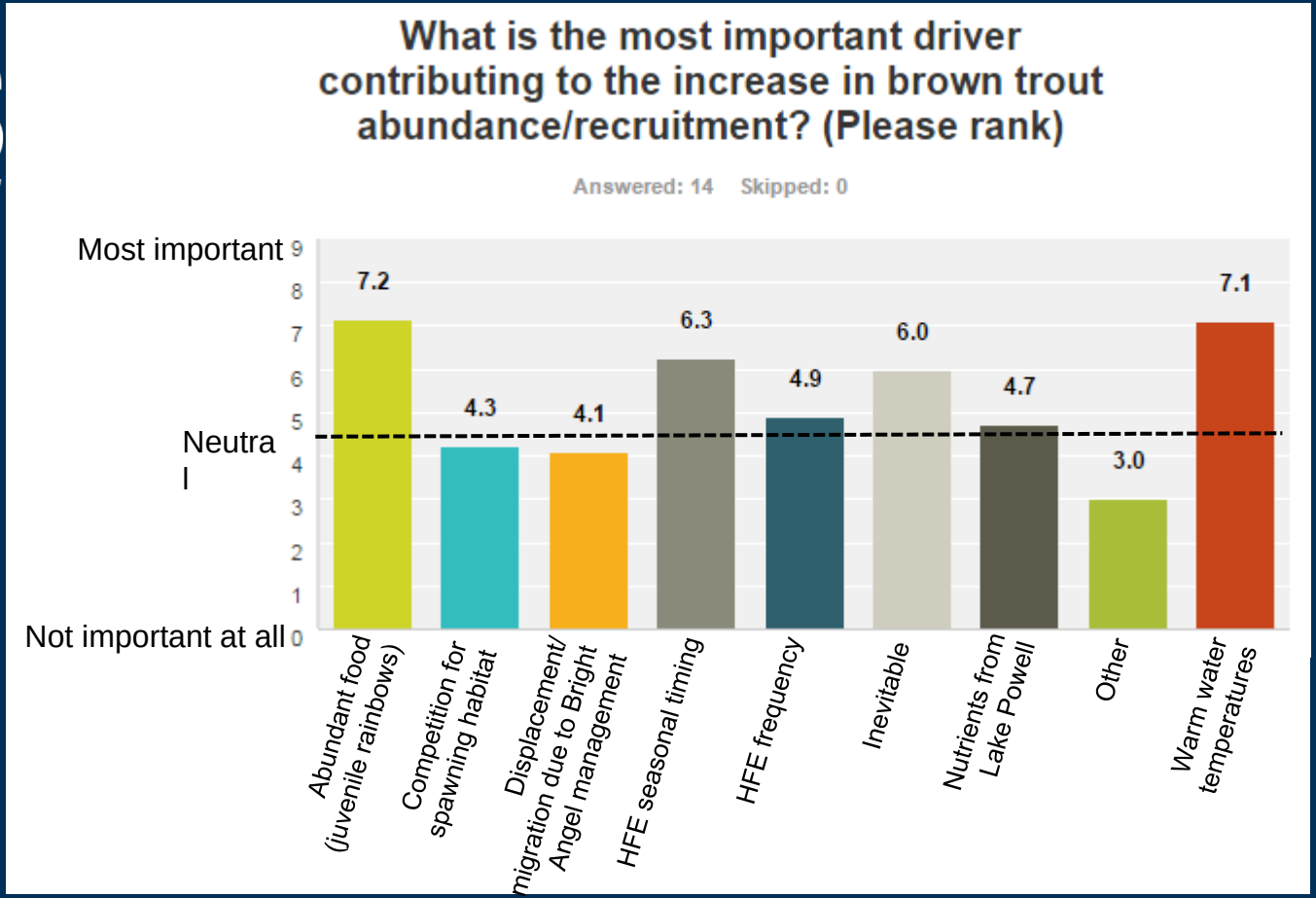

Representative comments:

- **"I think the list of potential influences is a good one."**
- **"The only two plausible answers in my opinion are seasonal timing of HFEs and warm water temperatures. It was inevitable (i.e., there is no root cause that we can target for mitigation) is more plausible than these other drivers in my opinion."**
- **"There is no one important driver, it is a combination of factors that has resulted in an increased recruitment of Brown Trout."**

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2: How did BNT become a problem?

- **Many comments highlighting confluence of factors (warm water, lots of fall HFEs, RBT numbers…)**
- **No consensus on a “silver bullet”, single issue**

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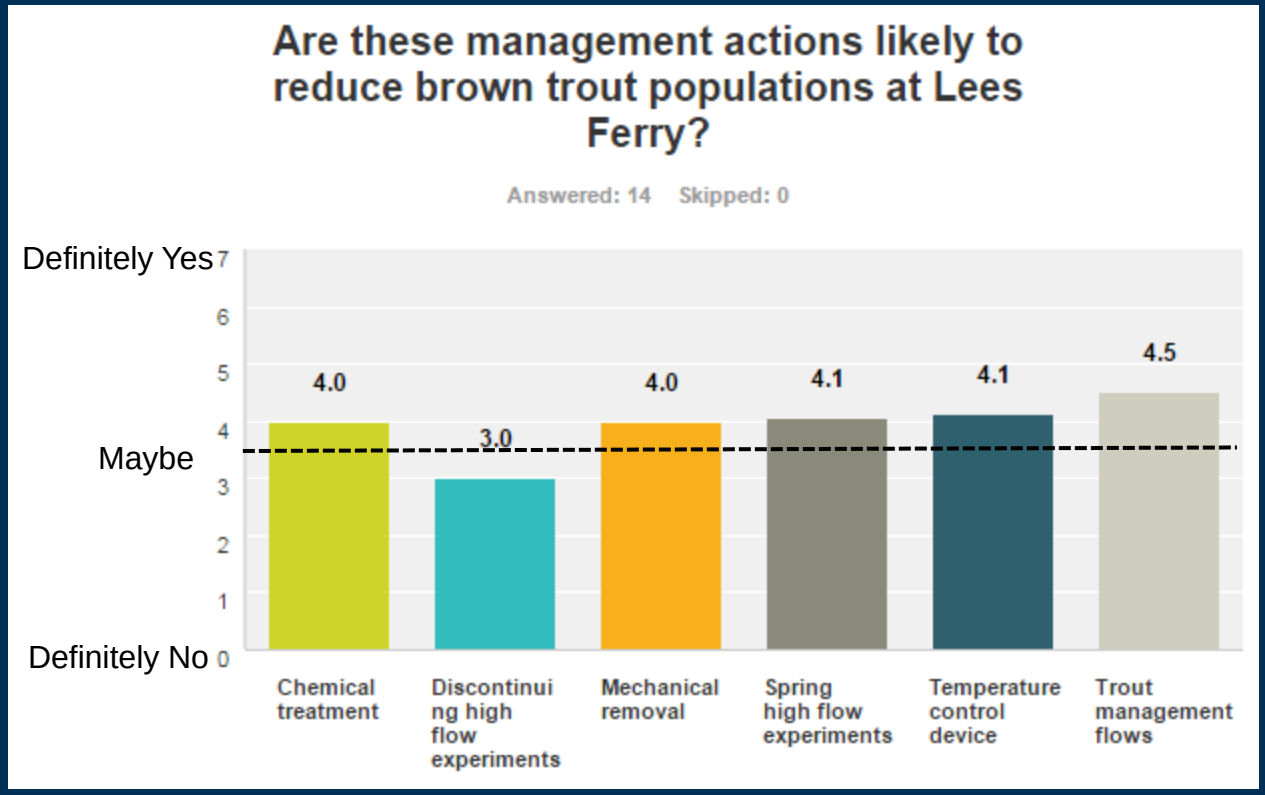

Representative comments:

- **"Trout management flows may have an effect via stranding, but I think more research would need to be done to assess this potential management alternative."**
- **"While not really confident with any of this, I think that if we can create an environment that favors rainbow trout (ex. spring high flows to increase recruitment) and minimize brown trout reproduction (fall trout management flow and/or mechanical removal?) we might be able to continue to keep brown trout at bay."**
- **"Would have to be a very large and focused mechanical removal effort targeting spawners and eggs."**
- **"A temp control device to cool the water might impact brown trout negatively."**
- **"I think chemical treatment of the entire Lees Ferry reach is capable of reducing brown trout populations there, but I answered NO to this question because the collateral damage to the rainbow trout fishery would be extensive and likely unacceptable"**

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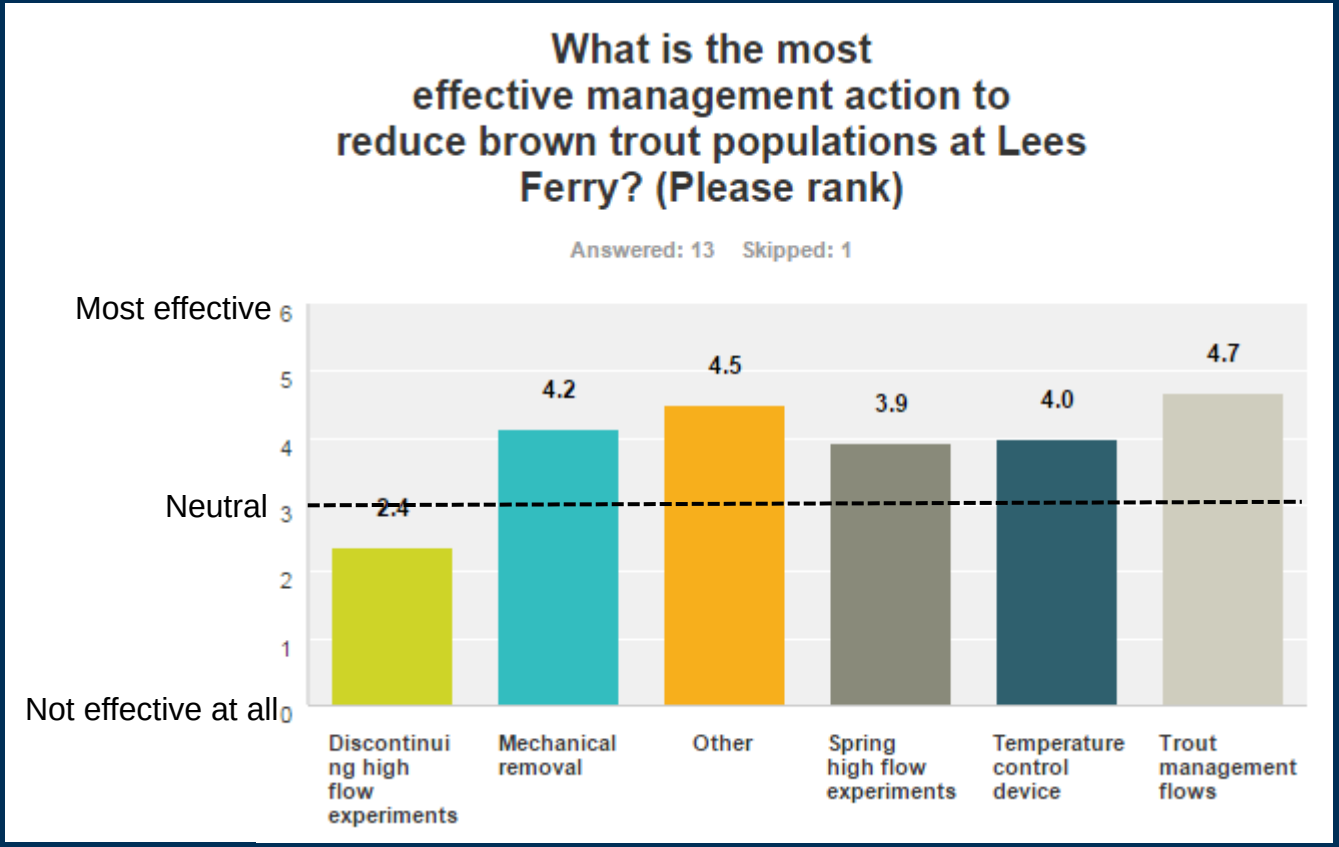

Representative comments:

- **"The range of choices seems to cover potential options well, but only mechanical removal is immediately available to us."**
- **"I think its worth considering temperature."**
- **"I think we need to consider mechanical removal by disrupting redds in the fall."**
- **"I don't think there is an effective management action for Brown Trout in Lees Ferry."**
- **"There are few removal efforts in similar systems that have produced the desired results, although this isn't to say that they wouldn't have the desired effect, but more likely points to the inefficiency of removal efforts in large western complex rivers."**
- **"Increased turbidity would likely be a very efficient method for controlling site predators like Brown Trout and Green Sunfish. It seems ridiculous to have a surplus of sediment on one side of the concrete border and a deficit on the other."**

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3: What can we do about it?

- **High uncertainty surrounding TCDs, TMFs, and other new actions, but cautious interest.**
- **Mechanical removal has interest, but with many caveats.**
  (very intensive effort, targeted toward fall reds, possibly in concert with flow options)
- **Few “outside the box” solutions proposed**

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Survey 2 Theme

What management actions would be effective?

Have we moved toward consensus after intensive discussions?

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Survey 2 respondents

- 11 research scientists/fisheries biologists
- 2 resource managers

- 75% took Survey 1 as well (3 newcomers)

- “Have your opinions changed?”
  - Most said “no”

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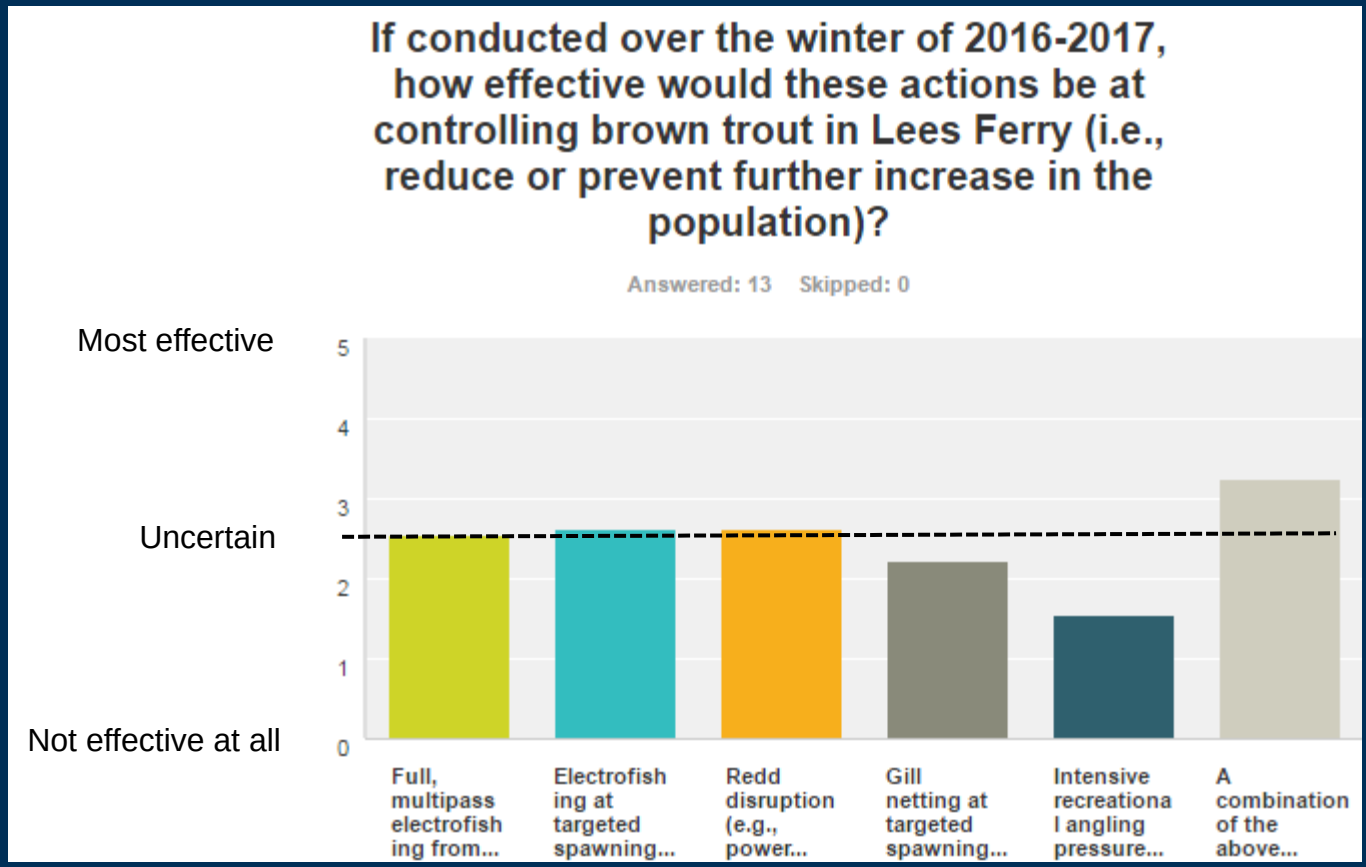

Representative comments:

- **“**A multi-pronged approach is likely the only way to have some effect on brown trout abundance.”
- “Even with all of those combined methods it seems like you could expect limited success.”
- **“**Electrofishing has not been successful in other programs and is very expensive. It may just cause a compensatory response and more problems later.”
- **“**It is naive to think that a single year effort will alter the population trajectory. And even if the action had a desired effect it would be short lived without a long-term commitment in maintaining the BNT population at desired target levels.”

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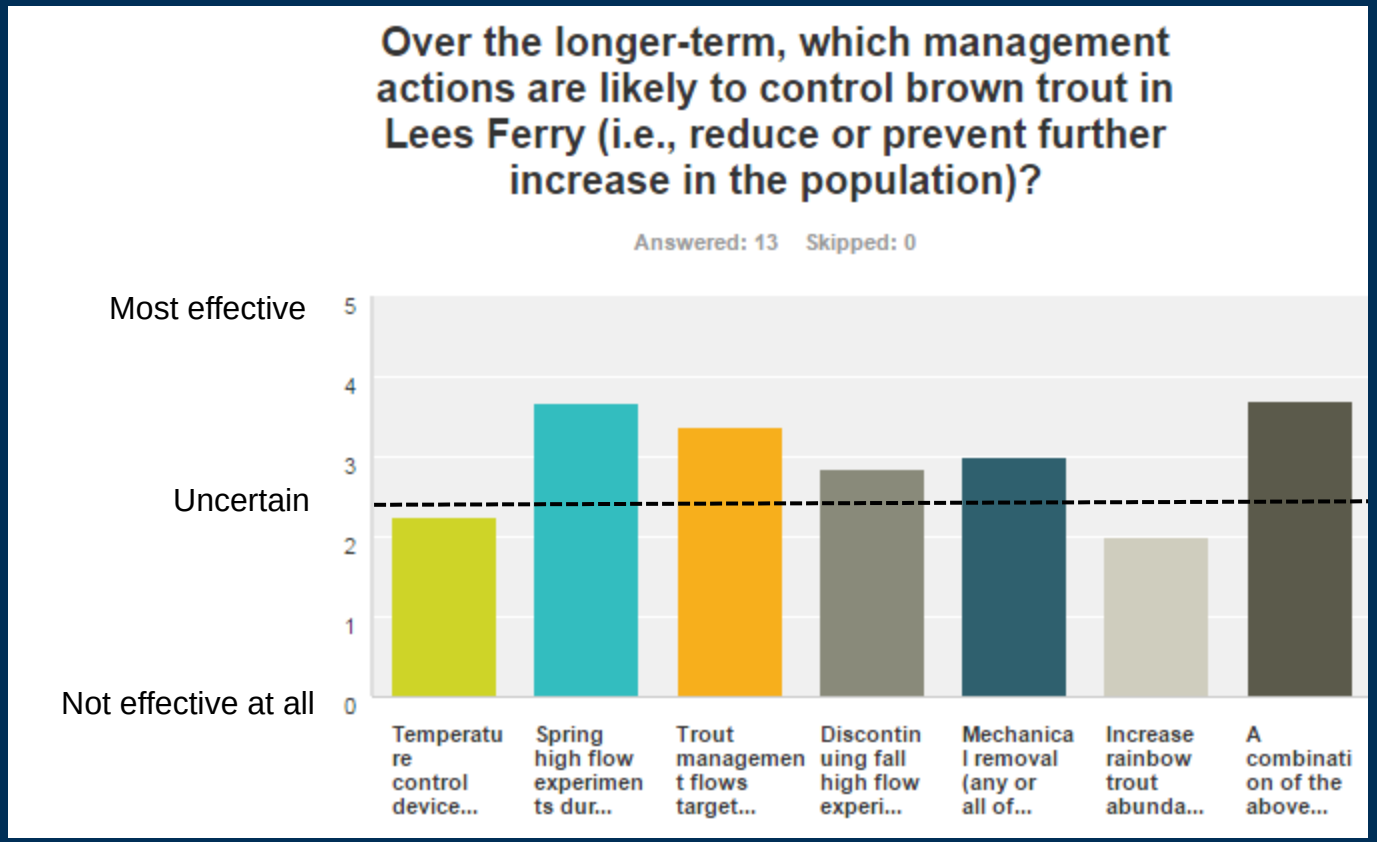

Representative comments:

- **“**Flow related management tools in combination with other methods may be more effective than non-flow tools alone**.”**
- “This remains uncertain and therefore requires long-term planning and experimentation.”

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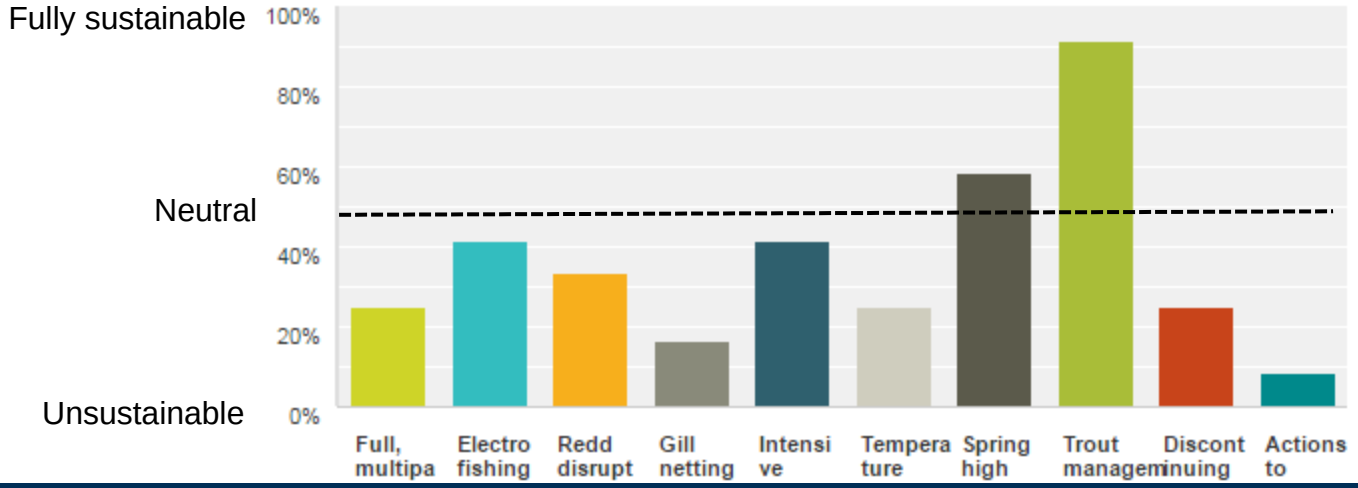
Assuming they are effective, which options are likely to be sustainable long-term (over multiple years)? Please consider likely costs, personnel and equipment needs, visitor experience and safety, concerns raised by Traditionally Associated Indian Tribes and other stakeholders, future fisheries trends, impacts to other resources (cultural resources, native fish, vegetation, wildlife, sediment, vegetation), etc. when answering.

Answered: 12 Skipped: 1



Representative comments:

- Changes to the physical environment (flow, temperature) to control brown trout populations is likely to be a more effective long-term solution to brown trout removal than other mechanical options.
- **“**Spring high flow and trout management flows seem the most likely to limit food and spawning success and thus suppress populations in the long run.”
- “Who knows without doing it.”

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Survey 2 summary

- Skepticism that mechanical removal will be effective, especially without flows.
- Consensus that some flows (alone or in combination) are best option.
- Any action needs study, planning, and goals.
- Need to be prepared for the long-term.

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