

GYCC-Fisheries Subcommittee Project Checklist

1 State your project goals. Next, work through the following questions and then move to Section 2.

- 1) How has project planning considered climate change impacts?
- 2) Are goals specific enough to implement monitoring and track management actions over time?
- 3) Is the goal informed by current watershed, genetics, distribution, and nonnative fish data?
- 4) Are goals time-bound? e.g., 5yrs, 10yrs, 20yrs

2 Score your project: With your project in mind, read through the following section questions below and award a score of 1, 2, or 3 to each section. Next, total the three sections. Use this total score in Section 3 and again in Section 4 to expand project planning by considering climate-based management goals and action strategies.

<p>Fisheries:</p> <ul style="list-style-type: none"> ○ Health of native stock (lineage assessment, genetic variability)? ○ Proximity of non-natives and potential genetic introgression? ○ Connected to other populations? ○ Is genetic stock thermally flexible? ○ Is population fluvial or adfluvial? ○ Has pathology been evaluated? ○ AIS a current influence or expected to be low, medium, high risk? ○ Will angling pressure threaten populations during higher stream temperatures? ○ Are anglers a threat to accelerating non-native/pathogen presence? ○ Is the public supportive of the project/fish management goals? 	<p>Habitat/Temps/Flow/Connectivity:</p> <ul style="list-style-type: none"> ○ What is the condition of the habitat? ○ Can habitat be improved and how? ○ Is grazing pressure an issue and will that increase? ○ Are specific reaches more suitable for conservation (e.g., spring fed)? ○ Will gradient become a barrier under very low flows? Will fish stranding occur? ○ Ecosystem processes functional? ○ Thermal refuges available? ○ Are culverts and passage structures expected to remain adequate? ○ Are beavers present/reintroduced? ○ Are cold water tributaries connected/passable in the project area? ○ Can cold water inputs be enhanced? ○ What threats will occur from wildfire? 	<p>Climate Change/Model Predictions:</p> <ul style="list-style-type: none"> ○ How does flow permanence change in available climate modelling? ○ Will the snow:rain ratio change? ○ Will riparian vegetation communities change? Consider wildfire risk. ○ Will substrate shift with changing terrestrial influences and vegetation communities? Consider fire frequency. ○ Will aquatic habitat be affected by changing terrestrial habitat? (e.g., debris flows) ○ Will water use compound climate change? ○ Will temperature profile shift from historic? ○ Will the combination of invasive species expansion, warming stream temperatures, and extreme low flows limit habitat suitability for life stages of target species?
<p>Fisheries likely to:</p> <p>3. Persist at current abundance. No known immediate threat of invasive species</p> <p>2. Non-native invasion possible but currently no invasive presence observed</p> <p>1. Native fish gone, non-native dominated, or extensive introgression identified in population</p>	<p>Habitat likely to:</p> <p>3. Remain or become suitable</p> <p>2. Expected to marginally decline</p> <p>1. Remain or become unsuitable</p>	<p>Climate influence likely to:</p> <p>3. Flow to remain stable, normal spawning season, and thermal resiliency identified</p> <p>2. Severe flow events and geofluvial shifts possible, spawning season potentially shifted</p> <p>1. Severe flow events likely, compounded by drought, water use, and invasives.</p>

3 Climate Management Goals: Consider the listed climate-based goals or provide your own on the worksheet.

<p>Section 2 score: 7 – 9 points</p> <ul style="list-style-type: none"> ○ Protect climate refugia ○ Protect existing habitat connectivity and monitor passage. ○ Expand/refound populations; consider genetic introduction of neighboring isolated populations. ○ Education campaigns for areas of high conservation value to reduce threat of nonnative invasion. ○ Public affairs outreach summaries ○ Technology storyboarding ○ Plan non-native control strategy if detection occurs. 	<p>Section 2 score: 5 – 7 points</p> <ul style="list-style-type: none"> ○ Reduce stream temperature fluctuation ○ Reduce base flow decreases ○ Reduce peak flow increases ○ Minimize adverse influence from wildfire through riparian adjacent fuels reduction ○ Increase natural water storage ○ Protect existing interconnected aquatic habitat ○ Prevent non-native invasion ○ Reduce or eliminate diversion influence and entrainment ○ Increase AIS awareness, install wash stations ○ Establish and enhance native riparian vegetation 	<p>Section 2 score: 4 points or less</p> <ul style="list-style-type: none"> ○ Reduce uncertainty through research ○ Consider alteration of fishery will occur due to increasing frequency of invasive species interactions and droughts. ○ Identify potential beaver reintroductions ○ Plan monitoring goals to best track fishery impacts over time. ○ Monitor nonnative threats to adjacent connected habitats that might lead to further invasive spread. ○ Analyze road networks adjacent to invaded watersheds to consider invasive relocation/introduction risks.
---	---	--

4 Climate Action Strategies: Consider listed management strategies or provide your own on the worksheet.

<p>Section 2 score: 7 – 9 points</p> <ul style="list-style-type: none"> ○ Consider climate mitigation or passage improvement measures that can increase project area. ○ Long term eDNA non-native/AIS monitoring implementation ○ Expand partnerships with public and water rights owners/users ○ Expansion of signage to communicate value of project region on the ground. ○ Monitor barriers for effectiveness over time/changing conditions. 	<p>Section 2 score: 5 – 7 points</p> <ul style="list-style-type: none"> ○ Reduce peak flows using beaver analogs ○ Consider process-based restoration techniques to improve floodplain connectivity and moderate stream temperatures. ○ Examine potential for invasive expansion into project area from adjacent invaded regions. ○ Consider angling closures at a thermal threshold, catch-kill regulations of nonnatives. ○ Identify water diversion structures that can be improved. ○ Consider grazing exclosures where sensitive spawning habitats may be impacted 	<p>Section 2 score: 4 points or less</p> <ul style="list-style-type: none"> ○ Reduce peak flows/enhance base flows using beaver analog structures. ○ Relocate remaining conservation stocks/genetics to suitable habitats. ○ Investigate water use improvements ○ Incorporate public awareness or check stations for invasive species presence. ○ Evaluate potential for a watershed to be a source population for invasive species transport or pathogen vector. ○ Expect potentially severe drought, fire, and subsequent flood disturbance(s).
--	--	--

Modified from: Nelson, R., Cross, M., Hansen, L., Taber, G. *A three-step decision framework for climate adaptation: Selecting climate informed conservation goals and strategies for native salmonids in the northern US Rockies.*

GYCC-Fisheries Subcommittee Project Checklist Provisional Worksheet

1

Project goals:

- 1)
- 2)
- 3)
- 4)

2

Score your project: Using the checklist, and after reading through each section, which questions are most relevant to your project? The intent of the question list is to guide brainstorming and promote a framework of climate smart project design. You can have your own questions and list them. Circle a score below, then total.

Fisheries: **Habitat/Temps/Flow/Connectivity:** **Climate Change/Model Predictions:**

Circle score: 1 2 3

1 2 3

1 2 3

TOTAL:

3

Climate Management Goals: Which goals are most applicable? What project goals of yours can be expanded to include climate consideration? Read through each point category on the checklist as strategies can still apply across many projects.

Section 2 score: 7 – 9 points	Section 2 score: 5 – 7 points	Section 2 score: 4 points or less

4

Climate Action Strategies: What management strategies are best suited for project planning? Are there climate management strategies not listed that can be helpful to improve the likelihood of your specific project success?

Section 2 score: 7 – 9 points	Section 2 score: 5 – 7 points	Section 2 score: 4 points or less

Modified from: Nelson, R., Cross, M., Hansen, L., Taber, G. A three-step decision framework for climate adaptation: Selecting climate informed conservation goals and strategies for native salmonids in the northern US Rockies.