Dear Colorado Parks and Wildlife Commission,

The City of Fort Collins ("Fort Collins") respectfully submits the following comments on the proposed *Fish and Wildlife Mitigation and Enhancement Plan (Applicant Proposal)*, dated June 9, 2017 ("Plan") for Northern Water's proposed Northern Integrated Supply Project ("NISP"). Fort Collins appreciates the public comment opportunity provided by the Colorado Parks and Wildlife Commission ("CPW") and the Colorado Water Conservation Board ("CWCB"). There are two parts to this comment letter: Concerns and Key Recommendations, and Technical Comments.

In 2015, Fort Collins City Council adopted a position regarding NISP in Resolution No. 2015-082. The resolution states that NISP would be harmful to Fort Collins and states "City Council cannot support NISP as it is currently described and proposed..." In 2017, Fort Collins City Council adopted Resolution 2017-024 authorizing the City Manager and his designees to meet on a regular basis with Northern Water to discuss and explore Fort Collins' interests in order to ascertain whether those interests can be met pursuant to the terms of the resolution. To date, while several amicable meetings have occurred, Fort Collins and Northern Water have not reached any new understandings or agreements. While this comment letter implicitly assumes that NISP will be permitted and constructed by recommending various changes to NISP and its operations, nothing in this letter should be interpreted to be a change of Fort Collins' position regarding NISP.

Fort Collins' Concerns and Key Recommendations

It is Fort Collins' understanding that CPW collaborated with Northern Water to help create certain elements of the Plan. CPW and Northern are to be commended for the many positive elements contained in the Plan. They include the refined conveyance operations that provide base flows, fish passage on multiple structures, ramping of Hansen Canal deliveries, and the inclusion of monitoring, adaptive management, and – very importantly - peak flow concepts and strategies.

Despite these positive elements, Fort Collins remains highly concerned about the negative impacts on fish and wildlife resources that will result from the system-wide changes that NISP will cause to the Cache la Poudre River ("Poudre River"). Fort Collins expects various negative impacts to occur even with implementation of the Plan. Thus, if NISP is permitted and constructed, Fort Collins urges CPW and the CWCB to revise the Plan as set forth in this comment letter. The comments are designed to help better mitigate NISP impacts in a manner that remains economically reasonable and maintains a balance between the development of the state's water resources and the protection of the state's fish and wildlife resources.

Fort Collins' key concerns and suggestions for improvement of the Plan center on seven themes. They are summarized below along with a brief description of Fort Collins' key recommendations. Fort Collins looks forward to continuing its dialogue with CPW, the CWCB,

Northern Water, and others interested in bettering the Poudre River and its fish and wildlife resources.

1. Peak Flows. The Plan proposes a peak flow operations program; however, the program will not accomplish the goals described by the statute (C.R.S. §37-60-122.2) for three fundamental reasons. First, while the Plan aspires to support habitat needs for spawning fish, it does not consider other basic needs for fish and wildlife resources. Without a peak flow strategy adequate to support the food base, which requires diverse in-channel habitats and shading from a functional riparian zone, the Plan will fail to mitigate impacts to fish and wildlife. Second, the definition presented for "flushing flows," to provide for surface cleaning of the riffles, is not applicable to the Poudre River where gravels are settled within the riverbed matrix, not above it (see peak flow technical comment #1, below). The proposed flushing flows prescribed in the Plan to "clean the surface" will be insufficient to flush gravels. Third, the technical report (Anderson, 2017) uses an unconventional approach for determining an adequate flushing flow regime (see technical comments, below). Based on these observations, the peak flow operations program proposed by the Plan will not accomplish the Plan's stated objective of providing spawning habitat for fish.

   A proposed solution to the shortcomings of the Plan's peak flow strategy is to adopt and implement a modified peak flow strategy to ensure at a minimum an annual 3-day peak flow bypass. That is, the Peak Flow Operations Program would be modified as an annual Tier 1 event, which would more closely approximate the current peak flow regime than the proposed tiered approach. Furthermore, the modified approach would be easier to manage and provide more predictability than the tiered approach. Associated curtailment and increases of NISP's diversions should change the flows no more than 500 cubic feet per second ("cfs") over a 24-hour period. This will help ensure public safety and mitigate desiccation of riparian habitat. Even with this strategy in place, NISP will diminish the ascending and descending limbs of the hydrograph and negatively affect riverine and riparian habitat. This approach has several advantages. It more closely approximates the current flushing flow regime than the tiered approach proposed in the Plan, and it is relatively easy to manage. While the annual 3-day bypass could affect NISP's yield, Fort Collins calculates the impact would be less than 5%, and that could be lowered through various management actions.

   Please note that under separate cover letter, Fort Collins will be providing technical comments on the Anderson report to the U.S. Army Corps of Engineers, CPW, and the Environmental Protection Agency (all three agencies apparently were consulted in the process of developing the Plan's peak flow mitigation strategy).

2. Water Quality. NISP is likely to have impacts to water quality and thus to fish and wildlife resources. While the Plan proposes some water quality mitigation measures, the measures were developed in the absence of a quantitative water quality impacts analysis (the State of Colorado water quality 401 certification currently under

development as a part of the final environmental impact statement ("EIS"). Fort Collins recommends withholding approval of the Plan until the final EIS and final water quality impacts analysis are made publicly available so that the Commission can ascertain whether mitigation measures will adequately prevent water quality impacts to fish and wildlife.

3. Mitigation, Restoration, Channel Improvements, and Conveyance. The Plan proposes a number of mitigation and enhancement measures. The mitigation measures are designed to address the unavoidable impacts of NISP. In general, Fort Collins believes that these measures are inadequate to mitigate the system-wide extent of NISP's impacts and should be substantially improved (such as impacts to the ascending and descending limbs of the hodograph). While the impacts of NISP will occur throughout the river corridor from the canyon mouth to the confluence with the South Platte River, the restoration and proposed channel improvements are limited to short sections of river. Fort Collins believes that this portion of the Plan could be greatly enhanced by developing more mitigation projects throughout the river corridor, including specific locations in and upstream of Fort Collins.

   The primary focus for restoration should be on improving river-floodplain connectivity, which has ecological and flood attenuation benefits (see technical comments below on channel conveyance). The Plan is confusing in that it proposes restoration elements to mitigate for additional sedimentation and channel contraction, while at the same time asserting that there will be no additional aggradation upstream of I-25. *See* Plan at A12.

   Upstream mitigation could include reconnection of the river to its floodplain that might mitigate potential flood conditions in Fort Collins (see comments below on channel conveyance). The Plan's proposed budget for mitigation is $2.8 million (page 87). In the experience of Fort Collins, this will not be enough to achieve the Plan's objectives or enhancements to those objectives. Based on Poudre restoration projects the City has undertaking or is contemplating, a more reasonable number would be in the neighborhood of $12 million.

   Fort Collins also recommends that the enhancement budget increase from $5 million to $10 million. Again, this is based on the Poudre River restoration experience of Fort Collins; in short, to work at scale, a more robust budget will be needed.

   The ability of the Poudre River to convey flood flows from its watershed is not a topic directly considered by the Plan. Nevertheless, a river that is able to convey flood flows and minimize risk to human health and safety is a river that also protects the integrity of fish and wildlife habitat. The devastating human and wildlife impacts of the 2013 floods on Front Range rivers are instructive examples. Fort Collins has numerous foundational concerns about the definitions and analytical approach under which flushing flows were developed.

The Plan notes that channel maintenance flows – which are relevant to flood mitigation – are not an objective. Fort Collins is concerned that long-term channel capacity, and thus flood flow conveyance capacity, will be reduced through aggradation of sediment within the channel and vegetation encroachment into the existing channel. The alternative 3-day annual bypass flow proposed by Fort Collins would address some of these concerns. The adaptive management and monitoring program could then analyze long-term channel conveyance impacts with the 3-day annual bypass in place.

4. Adaptive Management and Long-Term Monitoring. Fort Collins welcomes the adaptive management concept included in the Enhancement portion of the Plan, as it will provide opportunities to monitor various fish and wildlife mitigation actions and to adjust them over time. Even though NISP is designed to provide water in perpetuity, the Plan proposes that CPW and Northern lead the adaptive management committee and fund its activities for a mere 20 years. Fort Collins recommends that an independent and collaborative monitoring program be established that includes local stakeholders and further recommends that funding for adaptive management be extended from 20 years to at least a 50-year period (which aligns with the water planning and supply framework of NISP).

   Furthermore, Fort Collins recommends that the adaptive management plan include specific performance standards and associated "triggers" for action to ensure river health. The State of the Poudre (Fort Collins, 2017) provides both a framework and underlying details for developing performance thresholds and triggers that are based on a comprehensive and functional approach to sustaining river health. Fort Collins would welcome the opportunity to discuss and develop this approach with Northern Water. Lastly, Fort Collins recommends that the adaptive management and monitoring program be funded at $100,000 a year instead of $50,000. In the experience of Fort Collins, $50,000 will not be adequate to the broad set of monitoring tasks.

5. Uncertainties Regarding Agreements. Agreements with various third-party entities and persons need to be completed for the Plan to operate as contemplated to mitigate NISP's impacts on fish and wildlife resources. However, the Plan fails to identify completed and certain agreements, and there are numerous assumptions throughout the Plan concerning agreements with third parties. It is unclear whether these agreements can realistically be completed due to various uncertainties, such as whether third parties are willing, whether the costs for such needed agreements can be met by Northern Water, and whether the legal and regulatory challenges can be adequately addressed for Northern Water and the third parties. Fort Collins appreciates that Northern Water and CPW have good intentions. CPW should withhold approval of the Plan until crucial agreements are completed (for example bypass agreements with ditch companies for the conveyance refinement).

6. Mitigation and Enhancement Costs. Fort Collins recommends increased spending on mitigation, enhancement, and monitoring provisions by no less than $18.2 million (an additional $9.2 million for mitigation; $5 million for enhancements; $4 million for monitoring). The original NISP budget is $857 million (page 9 of the Plan). Though the mitigation and enhancement costs are represented in several different ways in the Plan, the overall costs mitigation and enhancement costs are described as $59 million (please note that Fort Collins would not describe some of the items in the Plan as mitigation or enhancement, for example the multiple outlet release structure at Glade Reservoir). An extra $18.2 million would be sum of $77.2 million and would represent ~9% of the original NISP budget (an increase of ~2%).

   The proposal to increase the budget for these items is reasonable, practicable, and achievable for a project with the scale and impact of NISP and commensurate with the cost of mitigation on other major Front Range water projects (e.g., the Gross Reservoir Expansion Project and the Chatfield Reservoir Reallocation Project). The total cost of each NISP acre-foot of water at full build out would be negligibly affected and each NISP acre-foot of water would still only be approximately one-half the current cost of an acre-foot of firm yield from the Colorado Big Thompson Project.

7. Big Game Habitat. While these comments generally are restricted to those elements of the Plan that directly pertain to Fort Collins and its boundaries, Fort Collins wishes to express its support for additional big game habitat protection on the west side of the proposed Glade Reservoir. An approximately 5,000-acre State Land Board ("SLB") parcel will adjoin the west side of Glade; to the west, the SLB parcel is bounded by Gateway Natural Area, owned and managed by Fort Collins, as well as water and land managed by the City of Greeley, and then United States Forest Service property. The SLB parcel currently is leased by CPW for hunting and fishing access and it provides a crucial buffer to federal lands to the west as well as providing high quality big game winter range. This range will be even more important should Glade Reservoir be constructed and fragment big game habitat, especially critical winter range. Fort Collins recommends a partnership – that could include Fort Collins – to conserve the SLB parcel in perpetuity for it wildlife and associated recreation values.

The essence of the concerns and recommendations Fort Collins' presents in this comment letter can be distilled to the observation that the Poudre River post-NISP, even with the Plan, will not have adequate flows to ensure the long-term health of fish and wildlife resources nor channel maintenance and flood conveyance.

The State of the River Report (SOPR, Fort Collins, 2017), a recently completed integrated river health assessment found that the Poudre warranted an overall grade of "C" for the study reach from approximately Gateway Natural Area to I-25 (http://www.fcgov.com/poudrereportcard/).

Fort Collins' goal, which supports the fish and wildlife goals of the State, is to improve the current grade; however, without implementing at a minimum the provisions recommended in this letter, it is not likely the Poudre River will be able to maintain or improve the grade.

Technical Comments of the City of Fort Collins on the *Fish and Wildlife Mitigation and Enhancement Plan (Applicant Proposal)*, dated June 9, 2017 for Northern Water's proposed Northern Integrated Supply Project

FORT COLLINS' TECHNICAL COMMENTS REGARDING PEAK FLOWS

Peak Flows Technical Comment 1:

Anderson Report Statement: *Flushing Flows: Flows that flush or move sediments (sands and gravels) resting on top of the coarse bed material matrix (or armor layer) in riffles. Flushing flows allow for surface cleaning of riffles necessary to support ecological function of the river channel. The objective of the flushing flows is to maintain spawning habitat for fish.* (Anderson 2017 page 1)

Note that flushing flows defined above and evaluated in this report are different from threshold flows identified and discussed in the NISP Supplemental Draft Environmental Impact Statement (SDEIS) Stream Morphology and Sediment Transport Baseline Report (Baseline Report) (ACE 2013). The Baseline Report includes an assessment of two threshold flows that involve movement of the coarse bed material matrix (or armor layer) comprised of very coarse gravels and cobbles. The first threshold flow indicates when there is slight movement or vibration of the coarse armor layer material allowing for finer sediments to be released from the interstices of matrix. These flows are referred to as 'Flushing Flows' in the Baseline Report … but have subsequently been re-labeled and are now referred to as 'Channel Maintenance Flows' for all future work. (Anderson 2017 page 1)

Spawning gravels for brown trout range in size from 3 mm to 100 mm…"Class A" spawning gravels, which are most optimal, range in size from 10mm to 70mm… (Anderson 2017 page 8)

Comment: The new definition for flushing flows is not applicable to the Poudre River. Flows prescription based on this definition and its supporting analyses will be ineffective at achieving the objective of maintaining spawning habitat for fish.

In the vast majority of riffles along the Poudre River, gravels up to 64mm do not sit on top of a coarse armor layer. Rather, the smaller gravels sit among and within the larger bed material and help make-up the bed material matrix. The newly-proposed definition of "flushing flows" is thus incompatible with the Poudre River bed.

The following photos show the riverbed above, in, and downstream of downtown Fort Collins. The river bottom is a matrix of grain sizes and gravels sit within the armor layer matrix, not above it.

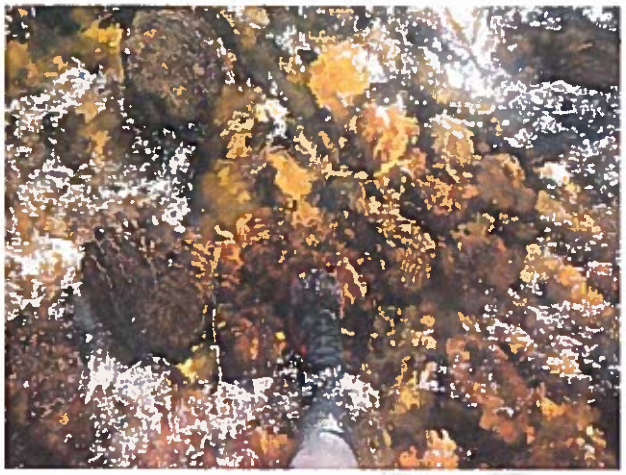

Figure 1 - Riffle downstream of the Greeley Filter Plant.

Figure 2 - Riffle just upstream of Mulberry Wastewater Treatment Plant

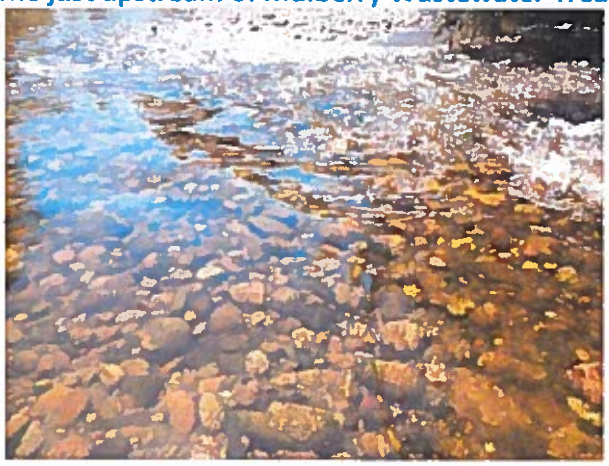

Figure 3 - Riffle Downstream of Timberline Road

To be effective in meeting the agencies' objective, the bed material matrix must be mobilized to flush the finer sediments that have settled in and behind the larger materials, as defined above. The standard approach within the discipline of geomorphology is to calculate and work to

mobilize the median-sized riverbed material, referred to as the "d50" (ASCE, 1992; Milhous, 2000, 2003). Mobilization of the d50 accomplishes numerous functions including: algae scour/disturbance, sand/fine sediment flushing, limiting encroaching vegetation and armor breakup/full transport of bedload" (Shanahan et al., 2014).

To summarize, the newly-assigned term "channel maintenance flows" – and not the newly-defined "flushing flows" – defines the flows necessary to move the bed material matrix and release finer material from the matrix. This is the function needed to maintain spawning habitat on the Poudre River and should be calculated with the d50.

Recommendation: To meet CPW's goal of flushing gravels for spawning habitat on the Poudre River, Fort Collins recommends that the agencies use the original definition of "flushing flows" – not the new definition in Anderson 2017 – and then develop mitigation strategies to achieve this objective (such as the flow bypass proposal outlined in comment 1d).

Peak Flows Technical Comment 2:

Anderson Report Statement: *Flushing Flows: Flows that flush or move sediments (sands and gravels) resting on top of the coarse bed material matrix (or armor layer) in riffles. Flushing flows allow for surface cleaning of riffles necessary to support ecological function of the river channel. The objective of the flushing flows is to maintain spawning habitat for fish.* (Anderson 2017 page 1)

Comment: The objective of supporting ecological function of the river channel is a broad goal and Fort Collins agrees that it is within the scope of C.R.S. §37-60-122.2 and the mandate to protect fish and wildlife resources. However, the statement that flushing flows is limited to the needs for spawning fish instead suggests that the Plan's proposed scope is much narrower. Fort Collins does not understand why this Plan, which is intended to support fish and wildlife resources, has presented an overly narrow objective. To meet the Plan's goal of sustaining a healthy fishery, three other objectives must be included:

1. The food base for fishes (aquatic insects) requires clean interstitial spaces.
2. A diversity of in-channel habitats (pools, riffles, runs) requires full mobility of the riverbed.
3. A self-sustaining and functional riparian zone provides shading critical additions to the food base form terrestrial inputs and requires hydrology appropriate to support riparian process.

In addition, to meet the objective to protect fish and wildlife resources set forth in C.R.S. §37-60-122.2, a mosaic of healthy riparian habitats is needed which is met through management of both the volume and duration of peak flows. Other mitigation measures proposed in the Plan, such as the proposal to retrofit diversion dams with fish passage, have little value if these baseline ecological objectives are not achieved.

Recommendation: Set objectives around the full suite of needs for fish and the habitat needs for obligate riparian wildlife. Develop mitigation strategies that support an ecologically functional riverbed and functional self-sustaining riparian zone (such as the flow by pass proposal outlined in comment 1d).

Peak Flows Technical Comment 3:

Anderson Report Statement: *Very coarse gravels (64mm) show a flushing flow range of 1,667 cfs to 2,873 cfs in the Laporte reaches and 3,729 cfs to 6,817 cfs within the Fort Collins and Timnath reaches. It should be noted that the d16 of the coarse armor layer in the Fort Collins and Timnath reaches, from the Larimer and Weld Canal to I-25, includes both coarse gravel and very coarse gravel.* (Anderson report page 8)

Based on the results of the initiation of motion analysis, the agency representatives agreed that the flows to flush coarse and very coarse gravels, having a maximum flow magnitude of 2,800 cfs, would optimize benefit to aquatic species in the study area..... (Anderson report page 45)

Comment: The conclusion of the agency representatives appears to not be supported by the Anderson report or independent analysis. According to the Anderson report, flushing of coarse gravel (32mm) and very coarse gravel (64mm) through Fort Collins occurs at flows between 3,729 cfs - 6,817 cfs. However, these higher flow values are disregarded though the adoption of the recommended 2,800 cfs flow rate, even though the report clearly defines Class A spawning gravels as 10-70mm.

It also appears that the Anderson report relies on unestablished assumptions regarding gravel size. It appears that the "coarse armor layer" (which is not part of the flushing analysis) is defined in the Anderson report as anything equal to or greater than the d16 grain size at each riffle. The term "d16" refers to the particle size that is larger than 16 percent of the total distribution of grain sizes. It does not indicate a specific grain size and could range widely depending on the type of river and specific location. Fort Collins is unaware of any basis for defining the coarse armor layer based on this threshold of d16. Further explanation with references from peer-reviewed journal articles is needed to back up this approach whereby all grain sizes greater than the d16 are dismissed.

The peak flow strategy at the mouth of the canyon calls for 2800 cfs at Tier 2 (20% of the time) and no bypass for Tier 3 (35% of the time). Neither Tier would flush gravels through Fort Collins because flows downstream in Fort Collins are equal at best and lower most days for downstream reaches and Tier 3 occurs at lower flows in any case. Tiers 2 and 3 occur approximately 60% of the time and would not achieve flushing flows to flush gravels to maintain spawning habitat through Fort Collins according to the initiation of motion analysis presented in the Anderson report.

Fort Collins independently studied the flows needed to mobilize the riverbed near College Avenue (City of Fort Collins, 2014). This effort concluded that a flow of 3,300 cfs is needed for a

duration of three days and optimally would need to occur on average every three years to support life cycle needs for spawning fish. Under today's pre-NISP conditions (based on the full record of Lincoln gage data), this flow is occurring every 4.6 years. While this value is based on a single study reach (between Shields and College Avenue), it was developed to mobilize the d50.

Recommendation: To meet CPW's goal of flushing gravels for spawning habitat on the Poudre River, Fort Collins recommends mitigation strategies that achieve flows that the incipient motion analyses indicates are necessary (such as the flow bypass proposal outlined in the following Peak Flows Technical Comment 4.

Peak Flows Technical Comment 4:

Plan Statement: *Simulated peak flow operations show that the program would substantially improve peak flow characteristics at the Canyon Gage (Colorado Division of Water Resources ID CLAFTCCO) from unmitigated NISP operations.* (Page 47)

Comment: Fort Collins applauds the Plan's efforts to reduce NISP's significant adverse impacts to peak flows on the Poudre River. Although the peak flow operations program represents an improvement over past NISP proposals, as noted in the previous three technical comments, it does not achieve CPW's stated goal of supporting ecological function of the river channel and maintaining fish spawning habitat.

Recommendation: Fort Collins recommends that the Plan be revised and eliminate the tier-based system for peak flows and be restructured to curtail all diversions for a minimum period of 3 days (72 hours) every year coinciding with the peak flow period.

Full curtailment is the only method that increases the likelihood of achieving the volumetric range of flows with optimal frequency that is needed to support spawning fish populations. It reduces the burden on Northern Water to provide and administer channel maintenance flows on a specific frequency at specific locations. It also eliminates the expectation that Northern Water could control other factors (such as interannual climate variability). Essentially, for a minimum of three days, current peak flow conditions would persist regardless of NISP's operations or Glade Reservoir's storage level.

Fort Collins acknowledges that a full, annual bypass may reduce the NISP's yield. However, Fort Collins predicts this yield reduction will be small (less than 5%), and could be further reduced through various water sharing operations or cooperative agreements. Fort Collins encourages further conversations on these options.

Peak Flows Technical Comment 5:

Plan Statement: *The operations described for this program would apply once Glade Reservoir has been filled and is no longer under any type of initial fill conditions (which limit the rate at*

which the reservoir can be initially filled). For the interim period, it is likely that NISP effects on peak flows will be minimal as the rate of fill will be substantially reduced from maximum project operations. (Page 50)

Comment: Fort Collins is concerned about changes and impacts during the filling period yet there is no flow analysis for this period in the Plan. The impacts of a filling period as described could potentially follow or be followed by a multi-year drought. This flow pattern could permanently alter the trajectory and functionality of the system due to an extensive (decadal) period during which flushing flow needs are not met which in turn will increase the armoring (by increasing the D50) and raise future flow values required to move the bed.

Recommendation: The Plan should specify the maximum diversion and duration rate during the initial fill period so that impacts during this interim period can be ascertained. Flushing flow commitment, such as a peak flow by-pass should be implemented during the filling period.

FORT COLLINS' TECHNICAL COMMENTS REGARDING WATER QUALITY

Water Quality Technical Comment 1:

Comment: NISP is likely to have impacts to water quality and thus to fish and wildlife resources. While the Plan proposes some water quality mitigation measures, the measures were developed in the absence of a quantitative water quality impacts analysis (the State of Colorado water quality 401 certification currently under development as a part of the Final Environmental Impact Statement).

Recommendation: Fort Collins' recommends not finalizing the Plan until the Final EIS and final water quantitative water quality model and impacts analysis are available.

Water Quality Technical Comment 2:

Comment: The Plan describes monitoring and adaptive management as the tools/strategies to address water quality impacts. Fort Collins finds this overly general approach troubling given that no quantitative information about the water quality impacts has been made available for evaluation.

Fort Collins believes that in order to evaluate the efficacy of an adaptive management program to protect against the many potential water quality impacts, three concepts are critical:

1) Ability to identify expected impacts
2) Establishment of clearly defined triggers for actionable items
3) Adequate program funding

The first two criteria are not met by this proposed Plan based on the lack of the analysis associated with the 401-water quality certification, and the third should be determined based on the likelihood of the impacts that qualify for action.

Recommendation: Fort Collins recommends, that this mitigation plan not be approved until the 401 analysis is released and the information can be used to better define expected impacts and defined related thresholds for action.

Water Quality Technical Comment 3:

FWMEP Statement: *The [Munroe] exchange .....has been replaced with a new pipeline directly from Glade to PV Pipeline (for FCLWD) and new pipeline from Glade to SCFP (for Eaton, Severance and Windsor). This avoids streamflow depletions in Poudre River streamflow between Munroe Canal diversion and the Glade Reservoir release point.* (Page 36)

Comment: The proposed operation of Glade Reservoir to the Pleasant Valley Pipeline ("PVP") for the Fort Collins-Loveland Water District deliveries presents the possibility of degraded water quality being delivered to the Fort Collins Water Treatment Facility. Such degraded water quality require additional expenditures for treatment that may be unacceptable to Fort Collins. This concern was addressed in the Fort Collins' comments submitted for the SDEIS.

Fort Collins maintains the right to exercise the terms of Paragraph 3.a of the Allotment Contract for Capacity in the Pleasant Valley Pipeline, dated February 28, 2003, which provides that Fort Collins (and others) must each give their specific approval allow the PVP to be used to deliver water from Glade Reservoir in the PVP. Therefore, the proposed pipeline and mitigation of low flows in the river is not a *certain* avoidance measure, but rather represents a *proposed* avoidance strategy for streamflow depletion impacts, and should be identified and addressed as such.

FORT COLLINS' TECHNICAL COMMENTS REGARDING MITIGATION, RESTORATION, CHANNEL IMPROVEMENTS, AND CONVEYANCE ("CORRIDOR")

Corridor Technical Comment 1:

Comment: Concerns and goals for riparian dependent wildlife and increased flood risk to the Fort Collins are closely related and addressed together in this section of the technical comments. Fort Collins' primary observation on these sections of the Plan (5.3.1.1 -5.3.1.3) is that the piecemeal and spatially limited proposals for restoration and in-channel improvements are inadequate for the type and scale of impacts from NISP.

Fort Collins owns more than two-thirds of the floodplain within the city limits. Fort Collins' landscape level goal for riparian wildlife is to support a continuous mosaic of self-sustaining habitats along the Poudre River.

The interplay between flows and geomorphology (topography specifically) drives the potential for this desired habitat complexity. Flows that spill beyond the bank (i.e. above "bankfull") are

the primary driver for riparian habitats. Bankfull flows will be reduced with NISP. The Plan, and in particular the Peak Flow Bypass Program, does not mitigate this loss.

Attenuating and safely conveying floodwaters is a high priority for Fort Collins. Regardless of whether NISP is built, the Poudre River will continue to see extreme flood events. Flushing and channel maintenance flows (as defined by the U.S. Army Corps of Engineers in the SDEIS, not the recent Anderson report) influence conveyance capacity by mobilizing and scouring the riverbed and undercutting encroaching vegetation. The failure to mitigate the loss of these channel maintenance flows in the Plan will lead over time to a natural adjustment (downsizing) by the river. This will displace flows normally in the channel to the floodplain and increase flood risk.

The Plan does not mitigate the NISP-associated reduction in the 5-year flows. Without peak flow mitigation there will be a 20 to 30% reduction in the width of the 5-year floodplain (Fort Collins' comments on the 2015 SDEIS). A site-specific example would occur just downstream of Lemay Avenue where the 5-year floodplain currently extends far into the riparian zone. With NISP, the 5-year flow will not overbank at all in this location. Discrete and far-flung site-based restoration is not sufficient to mitigate system-wide loss of riparian habitats.

Two flow-based strategies can help mitigate both impacts to riparian habitats and channel conveyance. First, a complete 3-day bypass, as previously described, would provide the system with a range of peak flows. The frequency and magnitude of channel maintenance, flushing, and 5-year flows would all remain the same as today. Second, consideration must be given to mitigating the ascending and descending limbs. The magnitude and duration of the limbs, or "the area under the curve" directly influences the probability the river will receive flows that are effective at sustaining flushing and channel maintenance functions and sustain a mosaic of riparian and wetlands habitats for wildlife.

If NISP is to be built without mitigation for channel maintenance flows and without longer duration flows (without mitigation of the ascending and descending limbs), the proper type of and necessary mitigation would be large-scale improvements to floodplain connectivity. This would enable future higher and extreme flow events to spill onto the floodplain to drop sediment and slow and attenuate (absorb) floodwaters. This would mitigate the increased flood risk NISP poses to Fort Collins. Large-scale restoration of river- floodplain connectivity also would provide underlying processes necessary for riparian habitats to sustain and regenerate wildlife habitat.

Recommendation: To mitigate for the narrowing of riparian habitats and increased flood-risk risk Fort Collins recommends the following:

1. A 3-day peak bypass that provides the current range of channel maintenance and flushing flows;

2. Initiate a discussion with Fort Collins, Northern Water; and CPW to discuss mitigation solutions/strategies with Northern Water and CPW to address the flow reductions associated with the ascending and descending limbs; and
3. Implement projects to reconnect the river to its floodplain on a large scale.

Like the Plan, the State of the Poudre (SOPR, Fort Collins, 2017) identifies river reaches and identifies those reaches with the greatest need for increased for restoration of floodplain connectivity. Fort Collins recommends that the Plan focus its floodplain restoration efforts in these areas.

Zone	Canyon			Rural			Urban							Plains				
Reach	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Floodplain Extent	78	82	85	74	65	85	62	61	87	50	67	73	70	77	50	98	82	71

The following Poudre River reaches were identified in the SOPR as receiving grades of D or F:

5. County Road 54 to Rist Canyon Road
7. Just below Overland Trail to Larimer Weld Canal
8. Larimer Weld Canal to Shields Street
15. Prospect Road to Fossil Creek Reservoir Inlet Diversion

The following Poudre River reaches were identified in the SOPR as receiving grades of C-:

4. Greeley Diversion to County Road 54
13. Timnath Reservoir Inlet Canal to Timberline Road
18. Rail Road Bridge to Interstate-25

Corridor Technical Comment 2:

Plan Statement: *As part of compensatory mitigation for resource effects throughout the Poudre River, Northern Water would implement improvements in the stream channel at two locations of slightly more than one mile each in affected reaches of the Poudre River. Initially, Northern Water has identified the following reaches for these improvements*

- *Approximately 1.2 miles within a 2.1-mile reach of the Poudre between PVC and the Hansen Supply Canal inflows (Figure 20)*
- *Approximately 1.2 miles of stream in the Watson Lake area (Figure 21)*

Key components of a stream habitat improvement project would likely include constructing in-channel structures made of natural materials to create riffles and pools with a defined low-flow channel which would increase channel depth, especially during low-flows; reconnecting the channel to the floodplain and old oxbows; encouraging regeneration of native vegetation; and, removing areas of non-native vegetation. (Page 57)

Improvements in existing riparian vegetation would be incorporated as part of the stream channel habitat and improvement reaches that are described above. Additionally, Northern Water has identified additional areas in which to improve existing riparian vegetation. Riparian vegetation improvements would directly mitigate impacts on riparian vegetation resources, impacts of reduced peak flows, and would also mitigate effects on water temperature in certain reaches. Areas under consideration include the following:

- *City of Fort Collins (10 acres)*
- *Frank State Wildlife Area (34 acres)*
- *Eastman Park Area (14 acres)*
- *Adjacent to all channel improvement reaches (54 acres)*

Riparian vegetation mitigation through Fort Collins will be coordinated with current planning efforts by the City, including its Poudre River Downtown Master Plan. The Poudre River Downtown Master Plan includes much of the nearly 5-mile reach of Segment B, in which approximately 10 acres of riparian vegetation may be affected by NISP. (Page 60)

Comment: In addition to the overview comment presented above, Fort Collins has four specific and separate comments on these statements from the Plan:

1. The Plan does not provide any quantitative foundation for the proposal to conduct 2.4 miles of stream channel improvements as the appropriate scale for the magnitude of impacts from NISP flow reductions. A possible approach is to mitigate at a minimum of a 1/10 ratio. Since the impacts occur on approximately 50 river miles, 5 miles of stream would need to be improved.
2. It is unclear if "areas under consideration" implies a firm commitment. The relationship between 54 acres adjacent to all channel improvement reaches and the 2.4 miles of proposed channel improvements is not clear.
3. The Plan states there will be 10 acres of riparian vegetation affected by NISP. The NISP SDEIS states there will be 10 acres of wetlands affected in reach B. There is a major difference between wetlands and riparian areas and the scale of impacts to riparian areas will be much greater.
4. Fort Collins agrees with many of the objectives listed for these projects, however many may not be possible or needed in the two identified. For example *reconnecting the channel to the floodplain and old oxbows* is not possible in the Watson lake reach, and is not needed for the sub-reach from Pleasant Valley Canal to the Greeley diversion. According to the State of the Poudre results, the floodplain extent score for the sub-reach from the Pleasant Valley Canal to the Greeley diversion is an 85 (B). Similarly, within the proposed upstream reach there are many areas (polygons) where the "Vegetation Structure" score is already a B or A grade. From the Greeley diversion downstream for a half mile the "River Form" score also is a "B." The bottom line is that more rigorous site selection would help ensure that the Plan's restoration objectives are met.

Corridor Technical Comment 3:

Plan Statement: *With additional depletions from NISP within this reach, it is possible that there would be increased temperature standard excursions. Downstream of the Hansen Supply Canal inflows, temperature standard excursions are less problematic because Hansen Supply Canal inflows cool downstream river water. Channel improvements in this reach would seek to narrow and deepen the current channel to be more consistent with current and future low-flow conditions and increase riparian vegetation, including larger plains cottonwoods that would shade the river channel. The effectiveness of these proposed improvements to cool water temperature would be assessed during the detailed water quality modeling.* (Pages 59-60)

Comment: Changes to stream temperature from NISP will be immediate. While cottonwoods can provide shading, an immediate strategy will be necessary since large cottonwoods take a minimum of 30 years to develop into "large cottonwoods for shading."

FORT COLLINS' TECHNICAL COMMENTS REGARDING ADAPTIVE MANAGEMENT, CHANNEL IMPROVEMENT PLAN, ASSOCIATED ROLES, AND DECISION SPACE ("MANAGEMENT")

Management Technical Comment 1:

FWMEP Statement: *Northern Water and CPW will jointly lead the Poudre River Adaptive Management Program committee. It is envisioned that Northern Water and CPW will develop an MOU... As the lead agencies, Northern Water and CPW would provide final concurrence on any actions to be implemented under the program.* (Page 90)

Comment: As a natural resource, the health of the Poudre River primarily affects local communities and agencies. Thus, the adaptive management and monitoring programs described in the Plan should be co-led by local government agencies, coalitions, and academic institutions, not just CPW and Northern Wtaer. In addition, concurrence must not be under the sole control of Northern Water and CPW. The monitoring process should entail at least some level of independence from Northern Water. Otherwise, Northern Water will be in the untenable position of policing itself with respect to potential long-term impacts that affect local communities.

Management Technical Comment 2:

Plan Statement: *Development and implementation of the plan would require data collection, which has already begun through the EIS process, and would continue by Northern Water through the duration of the program.* (Page 91)

Goals of the stream channel and habitat improvement plan would include:
- *Collect additional data, perform a river corridor inventory, and document current conditions.*
- *Develop baseline geomorphic conditions for use in the Adaptive Management Plan.*

• *Develop a river-wide master plan and prioritization for maintaining and improving the following river functions:*
  - *o Irrigation and municipal water supply diversions;*
  - *o Channel and overbank capacity and connectivity;*
  - *o Aquatic habitat and species;*
  - *o Riparian habitat and wildlife species;*
  - *o Flood risk to land and infrastructure;*
  - *o Recreation.*

• *Develop a long-term monitoring and maintenance plan.* (Channel Improvement Plan, page 96)

Comment: Fort Collins recommends that the Channel Improvement Plan and the Adaptive Management Plan be developed within existing monitoring and assessment frameworks. Projects such as The State of the Poudre Assessment (2017), the Coalition for the Poudre River Watershed's Watershed Resilience Plan (2016), the Lower Poudre Monitoring Alliance, and the forthcoming Lower Poudre Sediment & Master Plan all take an integrated and functions-based approach to Poudre River health.

Management Technical Comment 3:

Comment: According to guidance produced by the Department of the Interior Monitoring adaptive management program (https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/Chapter1.pdf):

> *Management of problems ... increasingly involves a systems approach with explicit and agreed upon objectives, management alternatives, and analytical approaches that can identify the most appropriate management strategies* (page 3). *Adaptive management is a structured approach to decision making that emphasizes accountability and explicitness in decision making* (chapter 1, page 4).

The Plan has postponed the development of well-defined, measureable project objectives, accountability and adaptive management triggers. The simple action of including a proposal for adaptive management does not assure the generic goals set forth in the Plan will be met.

When initial objectives are not established, an adaptive management plan cannot provide direction on how best to re-direct efforts to meet the objective in question. Both monitoring and adaptive management should be grounded in best available science appropriate to meet monitoring objectives and define objectives through thresholds and measureable outcomes. Thus, prior to acceptance of this Plan (and the Record of Decision for the 404 permit) explicit flood conveyance, water quality and ecosystem based objectives and a structure for decision-making should be determined.

Management Technical Comment 4:

Plan Statement: *The Poudre River Adaptive Management Program will run for a period of 20 years following the initiation of filling Glade Reservoir, 10 years following full buildout operations (defined as the consistent delivery of full or nearly full NISP yield to a majority of the NISP participants for a period of 5 years), or until the funds set aside for the program are exhausted, whichever comes first.* (Page 92)

Comment: NISP impacts will occur in perpetuity yet the adaptive management program as proposed will stop in 20 years following the initial fill period. This is a very short time frame from the perspective of various geomorphic and ecological cycles. Fort Collins recommends that a collaborative, independent monitoring program be established that includes local stakeholders and further recommends that funding for adaptive management be extended to at least a 50-year period.

Management Technical Comment 5:

Plan Statement: *Mitigation and enhancement measures enacted through this program may include, but are not limited to, the following:*

- *Accelerate establishment of channel forming by managing in-channel or riparian vegetation;*
- *Place structures to direct sediment to selected aggradation zones;*
- *Install check structures or weirs to control the inundation of riparian vegetation;*
- *Dredge or otherwise remove sediment from the channel mechanically;* (page 91)

Comment: Some adaptive management strategies and actions outlined in Plan are unclear and/or would potentially have negative impacts on river health, function, and resiliency. As noted above, there is no description provided as to how the proposed actions will have a positive impact on watershed-scale disturbance.

- Accelerate establishment of channel forming by managing in-channel or riparian vegetation;
Further clarification is needed to be able to understand this proposal.

- Place structures to direct sediment to selected aggradation zones;
This concept is unclear and as Fort Collins interprets it, it is not a common practice. It is unclear how the location of these zones will be selected since depositional zones are not static. Also, according to the Plan deposition will not increase under NISP, so theoretically, managing sediment is not necessary.

-Install check structures or weirs to control the inundation of riparian vegetation;
It is unclear if the objective here is to create backwater areas to drown out encroaching vegetation or to inundate and therefore maintain necessary wetted pattern to support the existing riparian zone. The use of weirs or check structures creates hard-points in the river

which reduces the river's ability to adjust and recover from larger flood events. The costly vulnerability of these types of structures to large floods was evident after the floods of 2013. The State of the Poudre revealed the lowest (failing) scores for geomorphology metrics for reaches immediately upstream of diversion structures, indicating there are very poor habitat conditions for aquatic insects and spawning fish because the riverbed is clogged with fine sediment. So this proposal is undesirable as it would create in uniform glide habitat, decreased habitat complexity for fish, and continuous sediment deposition for the affected local area upstream.

- Dredge or otherwise remove sediment from the channel mechanically;
Dredging sediment mechanically from the river is not an acceptable mitigation approach as it will result in considerable harm to fish and wildlife resources. The SDEIS asserts there will be no additional aggradation upstream of I-25 despite the underlying data showing there will be (see Fort Collins's 2015 comments to the SDEIS). To propose dredging sediment is necessary implies there is a significant departure is the perception of impacts between the SDEIS and Northern. This particular issue is very important to Fort Collins and we hope to see greater consistency between underlying data and conclusions on impacts in both this Plan and the final EIS.

FORT COLLINS' TECHNICAL COMMENTS REGARDING UNCERTAINTIES REGARDING AGREEMENTS ("AGREEMENTS")

Agreements Technical Comment 1:

Plan Statement: *If during actual operations, administration of water rights on the river results in the flow commitments not reaching the targeted flows or reaches (i.e. operations by others result in the bypassed or released flows not remaining in the river through the intended reach), Northern Water would cease operation of the flow commitment and seek administrative and legal solutions to ensure that these operations would result in the intended flows being met.* (Page 35).

Bypassed flow will not be diverted by another upstream or downstream water right...Bypassed flow will not count against Glade fill. (Table 6, Page 46)

Comment: The PLAN acknowledges that flows that are intended to be bypassed or released to achieve low flow enhancements or peaking flows may not be able to achieve their intended goals.

Recommendation: The Plan should describe how bypassed flows will be protected from subsequent diversion by other water right holders and how bypassed flows will be accounted. Without this information, the future viability and operation of the program is uncertain and there is no guarantee that bypassed flows will be maintained in the river.

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