RECLAMATION

Managing Water in the West

Reclamation Response to Comments and Recommendations in: *Peer Review Report on Draft Transbasin Effects Technical Report (2012)*

Northwest Area Water Supply Project Supplemental Environmental Impact Statement

U.S. Department of the Interior
Bureau of Reclamation

May 2013

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Reclamation Response to Comments and Recommendations in*: Peer Review Report on Draft Transbasin Effects Technical Report (2012)*

Prepared May 2013

Peer Review Topics/Comments	Responses/Actions Taken
Dr. Paul Bowser, Cornell University-Comment 1 (PB-1): Far more than the 28 species fish listed on the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) Viral Hemorrhagic Septicemia Virus (VHSV) Federal Order are susceptible to this virus. Suggest adding "Common Carp" and "Fathead Minnow" to tables presenting Potential Ecological Receptors and adding following text to discussion of this virus in the Life History and Distribution section: "*VHSV is a serious viral pathogen that can infect a wide variety of freshwater and marine fish species. There are currently 28 species of freshwater fish found in the Great Lakes basin that are regulated by the VHSV Federal Order (USDA 2009).*"	Suggested text along with the following supporting sentence incorporated into the VHSV discussion in the Life History Characteristics and Distribution section of the technical report (page 14): "*However, there are far more species of fish that are susceptible to infection with this pathogen.*"
PB-2: Information regarding VHSV genotype diversity presented in the text is outdated and possibly incorrect. Three publications provided to support the information in the following suggested text: "*While there are 4 major genotypes of VHSV on a worldwide basis, there is currently one genotype of VHSV (VHSV Genotype IVb) found in the Great Lakes Basin. However, recent studies have found isolates of VHSV with slight genetic variations (Thompson et al. 2011, Cornwell et al. 2012).*"	Suggested text revision incorporated into VHSV discussion in Life History Characteristics and Distribution section of the technical report (page 14).
PB-3: The virus was actually detected in a sample that was collected in 2003, but the isolate was not identified as VHSV until 2005. Suggest using following text: "*VHSV was first detected in the Great Lakes basin in a sample that was collected in 2003. While it is not known when the virus entered the Great Lakes ecosystem, it is likely that it was present for several years before that initial isolation.*"	Suggested text revision incorporated into VHSV discussion in Life History Characteristics and Distribution section of the technical report (page 15).
PB-4: Suggest the following text be added to the discussion of Bacterial Kidney Disease (BKD) in the Life History Characteristics and Distribution section: "*There appears to be a correlation between clinical BKD and locations where soft water conditions are common.*"	This apparent correlation was included in the discussion of the distribution of *Renibacterium salmoninarum*, the causative agent of BKD in the Life History Characteristics and Distribution section (page 16).

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PB-5: The following sentence should be deleted from the text as it is not applicable to the discussion and does not contribute to the discussion of *Edwardsiella* bacterial pathogens. "*Infected fish can be treated with antibiotics in their feed, but aquatic based treatments for individuals in rearing facilities are not available (Bullock and Herman 1985).*"	Sentence deleted from the discussion of *Edwardsiella* spp. in the Life History Characteristics and Distribution section of the technical report (page 17), as suggested.
PB-6: The following sentence does not appear to contribute to the discussion of Aquaculture Facilities in the Biota Transfer Pathways section. Also, rainbow trout and pink salmon are native to some parts of North America. "*Escapes from various aquaculture facilities in the U.S. have resulted in the introduction of non-native fish such as rainbow trout and pink salmon (Oncorhynchus gorbuscha), as well as associated pathogens with the potential to negatively impact native fish such as the brook trout of eastern North America (LSWG 2009).*"	Sentence deleted from Aquaculture Facilities subsection (page 45) as suggested.
PB-7: Table 2 - Potential Ecological Receptors of Concern in the Hudson Bay Basin: "in the column labeled 'Susceptible to aquatic invasive species (AIS) Evaluated': For Common Carp: add VHSV" (supporting reference provided).	VHSV added as a potential threat to the Common carp in Table 2 (page 52).
PB-8: Table 2 – Potential Ecological Receptors of Concern in the Hudson Bay Basin: "in the column labeled 'Susceptible to AIS Evaluated': For Fathead Minnow: add VHSV" (two supporting references provided).	VHSV added as a potential threat to Fathead Minnow in Table 2 (page 52).
PB-9: Table 2 - "For this entry in the table, just list *Flavobacterium columnare*."	*Flavobacterium columnare* is now used throughout text and tables of the technical report (and elsewhere in the Supplemental EIS) to reflect current scientific nomenclature of this bacterium. However, columnaris disease was maintained in Table 2 (page 52) to be consistent with the naming convention for other diseases and infections.
PB-10: The following sentence appears to indicate the mortality for a single event. Did the mortality of 1,500 carp occur in one event, in one state, in the US, in the world? Suggest that it be clarified or deleted. "*Mortality caused by Spring Viremia of Carp Virus (SVCV) affected 1,500 carp in 2002 (Cipriano et al. 2011).*"	Additional information was added to the discussion of SVCV in the Environmental Consequences section (page 81) to clarify the location and timing of the mortality event in question as follows: "*In 1989, carp deaths were attributed to the virus in Wisconsin; and in 2002, an SVCV outbreak in Cedar Lake, Wisconsin led to the death of more than 1,500 carp (Cipriano et al. 2011).*"

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PB-11: This sentence in the description of Viral Hemorrhagic Septicemia (VHS) is not clear and should be replaced with the following: "*When fish kills occur during the spring, large amounts of virus are released into the water as dead fish decompose.*"	Suggested revised text was added to the discussion of VHS in the Life History Characteristics and Distribution section of the technical report (page 81).
PB-12: The following sentence in the Environmental Consequences section (discussion of potential environmental consequences from viruses) should be deleted as there is no evidence currently available that documents strain variation of VHSV in the Great Lakes Basin: "*VHS, in particular, has had severe impacts in the Great Lakes because it consists of several 3171 strains of varying virulence and is non-host specific (ISU 2007c).*"	See response to Comment PB-2 above. Sentence was modified in the Environmental Consequences section of the technical report (page 90) as follows: "*VHS, in particular, has caused severe impacts in the Great Lakes due to its potential to cause mortality to a variety of host species (ISU 2007c).*"
PB-13: Recommend providing the virus family (e.g., Rhabdoviridae for Infectious Hematopoietic Necrosis Virus [IHNV]) for all viral pathogens presented in Table ES-1, Table 1, and described in the technical report.	Genus *Novirhabdovirus* has now replaced family Rhabdoviridae in Table ES-1 (page ES-4), Table 1 (page 9), and text within Life History Characteristics and Distribution section (pages 12) of the technical report. The genus name for the viral cause of IHNV was not identified during the initial literature review, therefore family Rhabdoviridae was previously used.
PB-14: "Hemorrhaged spots" should be changed to "hemorrhagic spots" in the discussion of Enteric Redmouth Disease (ERM) in the Life History Characteristics and Distribution section.	Text revised in the Life History Characteristics and Distribution section (page 17) as suggested.
PB-15: Second mention of "potassium permanganate" in the description of *Ichthyophthirius multifilis* in the Life History Characteristics and Distribution section should be deleted.	Text revised in the Life History Characteristics and Distribution section (page 31) as suggested.
PB-16: Delete 'in' after *"…Mississippi River following major*" from the second sentence of paragraph two in the discussion of Weather-related Phenomena in the Biota Transfer section.	Text revised as suggested (page 48).
PB-17: "*Salmoninarum*" should not be capitalized in *Renibacterium* sa*lmoninarum* in the discussion of risk posed by bacteria in the Risk Assessment section (Page 72: Line 2543).	Text revised as suggested (page 75).
PB-18: "Lake St. Clair" should not end in an "e" in the last sentence of the description of *Polypodium hydriforme* in the Risk Assessment section.	Text revised as suggested (page 84).
PB-19: The correct scientific name for the bacterium that causes columnaris disease is *Flavobacterium columnare*. This should be reflected throughout tables and text of the technical report.	*Flavobacterium columnare* is now used throughout text and tables of the technical report (and elsewhere in the Supplemental EIS) to reflect current scientific nomenclature of this bacterium. However, columnaris disease was maintained in Table 2 (page 52) to be consistent with the naming convention for other diseases and infections.

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Dr. Nicholas Friedenberg, Applied Biomathematics (NF-1): The technical report should include quantitative results of previous studies.	Quantitative results from previous risk studies conducted for the Project have been summarized in the Previous Risk Studies subsection (beginning on page 2) of the Introduction and Background section of the technical report.
NF-2: The technical report could have taken a quantitative rather than qualitative approach to risk analysis.	Text describing the selection of a qualitative risk approach has been added to the Current Risk Study description (page 10) in the Introduction and Background section of the technical report. The distribution information in the Hudson Bay basin and adjacent basins gathered for several AIS is useful to the risk and consequence assessment. However, the lack of comprehensive survey data and unknown concentrations of AIS precluded the employment of a quantitative risk analysis. Concentrations, or ranges of concentrations of AIS in basins adjacent to the HBB would be vital input parameters for a quantitative analysis: "*The current known North American distribution of these AIS, especially within the MRB, HBB, and adjacent drainage basins was further documented and is an important component of the current risk analysis. Attachment 1 contains AIS distribution maps that are referenced throughout the technical report. These hydrologic basins are extremely large "open" systems and even the most extensive sampling programs would not deliver finite presence/absence and concentration information for AIS. In addition, the abundance of microorganisms in surface water may fluctuate seasonally and in response to environmental changes. Ultimately, these are not static or constant measurements. Definitive concentrations of AIS in drainage basins adjacent to the HBB are not available, which would be a vital input parameter for a quantitative analysis. Qualitative and quantitative risk assessment methodologies, available information, and data gaps were reviewed, and a qualitative assessment was selected as the best approach to evaluate the risk and consequences of AIS transfer (Section: Uncertainty).*" An exhaustive survey of the HBB and surrounding basins would be cost prohibitive and require several years of data collection. Even the most aggressive studies would not eliminate the uncertainty surrounding the presence and absence of aquatic invasive species. It would not be possible to accurately characterize the microbial community contained in the surface waters and sediments of large hydrologic basins.

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NF-2 (continued):	A qualitative risk approach was selected as the best method following a thorough review of available information, risk assessment methodologies, data gaps, and the development of a Project plan of study, which was approved by experts in the following Cooperating Agencies: City of Minot, Garrison Diversion Water Conservancy District, North Dakota State Water Commission, U.S. Army Corps of Engineers, and U.S. EPA. It should also be noted here that the most extensive biota surveying effort conducted to date in the HBB supported the Devils Lake – Red River Basin Fish Parasite and Pathogen Project (Bensley et al 2011). Despite the costs and extensive field surveying efforts associated with this study, the International Joint Commission selected a qualitative approach as the preferred method for evaluating risk. See the Uncertainty section (beginning on page 54) for additional details.
NF-3: The technical report does not consider variability and uncertainty in efficacy of water treatment methods… While treatment alternatives now include methods that help to reduce turbidity before chlorination, it is hard to imagine that some environmental variation in turbidity is not inherited by the treatment plant at the point of chlorination.	Text has been added to the Biota Treatment Associated with Water Supply Alternatives section (see Chlorination/UV Inactivation subsection; pages 63-64) that discusses the efficacy of chlorination and ultraviolet irradiation (UV) in surface water with ranges of turbidity, including those typical of intake water at Lake Sakakawea. The Snake Creek Pumping Station is located more than 100 miles from the reservoir headwaters; therefore it is likely not subject to significant inflow-related changes in turbidity. Based on the results of a 2006-2007 pilot study (MWH and Houston Engineering, Inc. 2007) conducted at Snake Creek, turbidity of source water should not limit the efficacy of UV disinfection. Furthermore, the UV dose proposed in the NAWS Final EIS (Reclamation 2008), and further considered in the current Supplemental EIS, is higher than what is typically employed to inactivate chlorine-resistant organisms in treatment plants (USEPA 2006).
NF-4: System components including warning systems and control valves could be correlated or dependent.	There is a strong case that these systems and components are operationally independent (Max Biota water treatment plant (WTP), pipeline to Minot, and Minot WTP are not correlated). Therefore, a significant failure of one system or component would not translate to a comprehensive system failure. Engineering controls and mitigation measures are described elsewhere in the Supplemental EIS. Text has been added to the discussion of the Project in the Risk Assessment section (see Risk of Biota Transfer from the Project subsection; page 72):

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NF-4 (continued):	"*The geographically-separated components of the proposed water transmission and treatment system would collectively work to reduce risks of interbasin transfer of AIS. Simultaneous failures at the Biota WTP and the main transmission pipeline or Minot WTP would be required for a release of untreated or undertreated water into a contributing drainage in the HBB. Potential failures of these components would likely be independent and uncorrelated. For example, equipment malfunction or power outage at the Biota WTP would not affect the integrity of the transmission pipeline or the operation of the Minot WTP. With multiple independent barriers in the proposed system, risk of release of Missouri River water would be low.* *Further, the probability of an organism introduced to a subsurface soil (e.g., from a ruptured transmission pipeline) 'migrating' through a contributing region to the HBB, finding an appropriate host organism, successfully establishing itself in an ecosystem, and causing adverse effects to ecological receptors is also extremely low.*" In addition, text has been added to the introduction of the Biota Treatment Associated with Water Supply Alternatives section (page 57) as follows: "*The water supply alternatives and associated biota treatment options described below are proposed for the Supplemental EIS. The Supplemental EIS also contains a discussion of the appropriate response plans and monitoring efforts for the water supply alternatives and the biota water treatment plant options.*"
NF-5: From a precautionary perspective, it is sufficient to assume that the consequences will be "bad" or "undesirable" and will lead to irreversible alteration of ecosystem services.	AIS establishments may not always lead to adverse or deleterious impacts. However, the *Transbasin Effects Analysis* employed a conservative approach by assuming that AIS establishment would result in negative potential impacts. This has been addressed in the discussion of potential population-level impacts in the Executive Summary (page ES-9) and the Environmental Consequences section (see Potential Environmental Consequences in the Hudson Bay Basin subsection; page 89). Text added to both sections as follows: "*In some cases, the introduction of novel sp ecies may even drive an ecosystem to higher production and diversity (Rosenzweig 2001; Sax and Gaines 2003; Rand and Louda 2012). However, this study employed a conservative approach by assuming that AIS establishment would more likely result in negative impacts in the HBB.*"
NF-6: A sensitivity analysis to demonstrate risk of biota transfer as function of concentration and susceptibility to treatment for general classes of biota of concern would be an elegant and defensible companion to the extended list of specific biota included in the report.	The concentrations of fish parasites and pathogens in Project source water are not known. In addition, there is little known regarding the concentrations of AIS in adjacent basins and potential biota transfer vectors (e.g., birds, mammals, boat hulls, etc.).

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NF-6 (continued):	The concentrations of these microorganisms in surface water are extremely low, so even extensive surveying would not necessarily lead to reliable abundance measurements. Furthermore, the abundance of microorganisms in surface water may fluctuate seasonally and in response to environmental changes. For these reasons, any concentration values (or ranges of values) used as input data in a sensitivity analysis would be arbitrary. The susceptibility of AIS to biota treatment options could be inferred based on Safe Drinking Water Act regulations, but that is only a partial analysis if we are limiting the discussion to the Biota WTP operations. The efficacy of treatment at both the Max biota WTP and Minot WTP is important, as is the "efficacy" of soil inactivation of waterborne AIS (see Fate and Transport subsection in the Biota Transfer section of the technical report; pages 49-51). All of this information would not result in a reliable quantification of risk. Another critical and potentially limiting variable in terms of AIS establishment in the Hudson Bay basin is the probability of pathogens and parasites locating a suitable host and establishing a viable population. All of the unknowns would lead to a highly speculative analysis.
NF-7: The summary of the TetrES Technical Report should include the assertion that the efficacy of chlorination was overestimated in the CRA.	It is not appropriate to include this assertion in the TetrES report summary in the Previous Risk Studies section (page 3). Biota treatment options are being reevaluated during the Supplemental EIS process and this opinion is not a relevant detail that warrants discussion.
NF-8: Population declines of threatened, endangered, and recovering species in the HBB should be included as a Candidate Assessment Endpoint.	"Population declines of threatened, endangered, and recovering species in the Hudson Bay basin" was added as a third "Candidate Assessment Endpoint" in the Biota Transfer section (page 53) of the technical report.
NF-9: The technical report (Uncertainty section) states that there is uncertainty regarding whether individual mortality and reduced fertility actually leads to recruitment loss and declines in populations. Conservative methods for estimating risk to populations in the absence of information about density dependence are long-established (see Ginzburg et al 1990).	Potential impacts (e.g., infection, mortality, and reduced fertility) to receptor individuals could not be accurately predicted during the *Transbasin Effects Analysis*. Little is known about how introductions of fish parasites and pathogens can affect aquatic systems at the individual and population level. Since potential effects to individual organisms could not be estimated or predicted, population-level risk estimates using conservative methods were not appropriate to the discussion of uncertainty in the technical report. The analysis researched historical impacts from AIS and similar organisms in other habitats. The available information did not lend itself to support extrapolative estimations of potential environmental consequences. Regardless of the existence of these conservative methods, uncertainty still exists when evaluating population-level effects associated with disease as described by Peeler and Taylor (2011).

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NF-10: The transfer of biota is here (and throughout the technical report) described as a result of an episodic failure of treatment systems. However, it is more likely to be the result of variation in a constant, chronic failure to inactivate/physically exclude AIS. This is perhaps a semantic or rhetorical distinction, but an important one given the technical report's largely qualitative description of risk.	Refer to the response to Comment NF-3 regarding the discussion of chlorination and ultraviolet irradiation (UV) efficacy in surface water with ranges of turbidity, including those typical of intake water at Lake Sakakawea. Water parameters including turbidity would be monitored to ensure efficacy of system components including UV (page 65). In addition, supporting text regarding the lack of concern of flooding to system infrastructure including the Snake Creek Pumping Plant, Biota WTP at Max, transmission pipeline, and the Minot WTP has been added to the discussion of the Project in the Risk Assessment section (see Risk of Biota Transfer from the Project subsection; page 72). The SEIS will include a discussion of operational plans as appropriate for the different water treatment systems, as well as a discussion in the Adaptive Management section regarding how this approach will address changes that could occur in the future.
NF-11: The uncertainty regarding the impact of any adverse condition on a population largely hinges on that population's capacity for compensatory growth. References provided (Ginzburg et al 1990; Rose et al. 2001) for conservative assumptions and methods to estimate impacts at the population level (reviewer addressing third paragraph under discussion of Invasive Fish Pathogens and Parasites in the Environmental Consequences section).	See response to Comment NF-9. The suggested references do offer insight into compensatory growth of populations, as well as density dependence mechanisms. According to Rose et al (2001), empirical evidence for compensatory effects can be observed during "long-term and manipulative studies" of fish populations. Computer modeling has also been used to demonstrate the mechanics of compensation. These models require extensive databases (data for specific fish populations) to conduct simulations for evaluating the major factors that can result in compensation of a fish population (Rose et al. 2010). These methods are beyond the scope of this qualitative risk and consequence analysis. There are countless variables that can affect the successful establishment of fish pathogens and parasites in aquatic systems. An infection of an individual fish does not guarantee an outbreak of a disease. Further, an outbreak could be isolated or widespread throughout a population or aquatic system; however, it is unclear how populations may ultimately be affected. Large mortality events can occur but it is almost impossible to predict the impacts on populations. Declines can occur as a result of disease and some fish species may have greater propensities to recover. For this analysis, it is appropriate to state that there is still uncertainly regarding how disease or infection can influence changes at the population level.

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NF-12: The idea that there is such thing as a 'new niche' is somewhat controversial. The example given here, a change in the rank abundance of competitors, does not require that a new niche is created…" Suggest the following text for the Potential Environmental Consequences in the Hudson Bay Basin discussion in the Environmental Consequences section (Page 87: Line 3151-3154): *"A common effect of aquatic invasions, and disturbances of ecosystems in general, is to alter the relative abundance or rank dominance of species."*	Suggested text added to the Environmental Consequences section (page 90).
NF-13: The conclusion that transfer of AIS is unlikely because it requires a cascade of events implies that such events are independent. Consideration of correlation or, more severely, dependence among the events required to transfer AIS would increase the assessment of risk.	The analysis initially considered the possibility that these events could be independent, correlated, or dependent. For the reasons described in the response to comment NF-4 and in the technical report, it is strongly believed that the system components are independent, as would be any potential events that could occur within each component. Any failure within the system would result in no moving water through the transmission pipeline, or no transfer. Engineering controls will be discussed in the Supplemental EIS. See response to comment NF-4 for further elaboration.
NF-14: Inclusion of a quantitative risk analysis would improve the technical report. Failure or chronic variance in the efficacy of the discrete systems discussed in the technical report should be considered in a framework that includes possible correlation or dependency among systems. Risk relative to non-project pathways may not be informative given that the identity of future AIS is unknown. The technical report should therefore include and discuss absolute risks.	See response to comment NF-2 above regarding the selection of a qualitative approach to evaluate the risk and consequences of biota transfer to the Hudson Bay basin. Cascading malfunctions leading to absolute biota treatment/physical retention failure is avoidable. There is a strong case that these systems and components are operationally independent (Max Biota WTP, pipeline to Minot, and Minot WTP are not correlated; see response to Comments NF-4 and NF-13 regarding operational independence and responses to Comments NF-4 and NF-10 regarding treatment efficacy). Reclamation's environmental commitments, engineering controls, and mitigation options were described in the NAWS Final EIS (Reclamation 2008) and will be visited again in the context of this Supplemental EIS. Non-Project pathways are essential to the discussion of total risk of AIS introductions to the Hudson Bay basin. NEPA requires the evaluation of "no project" as part of the EIS process, which would include current conditions such as the risk posed by non-Project biota transfer pathways.

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Dr. Jörg E. Drewes, Colorado School of Mines, (JD-1): "Certain treatment plant components could fail. Detailed information regarding proposed procedures to mitigate any of these failures is not described in the draft technical report or supplemental information. It is highly recommended that following a Hazard Analysis and Critical Control Point (HACCP) assessment detailed response plans are developed for the final treatment plant design of the Biota WTP."	The water supply alternatives and associated biota treatment options described in the technical report (Biota Treatment Associated with Water Supply Alternatives section; pages 57) are currently proposed in the current Supplemental EIS. As stated in the response to comment NF-4: *"The water supply alternatives and associated biota treatment options described below are proposed for the Supplemental EIS. The Supplemental EIS also contains a discussion of the appropriate response plans and monitoring efforts for the water supply alternatives and the biota water treatment plant options."*
JD-2: "Chlorination/UV Inactivation" should be replaced with "Chlorination/UV Irradiation."	"UV Inactivation" terminology was used as a descriptor of the treatment option being discussed (i.e., inactivation of AIS by UV). Change in terminology is not appropriate as it is consistent with other sections and appendices of the Supplemental EIS.

References

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