**Methods of integration**

**October 2, 2011**

This project was initiated by a class field trip to the Lapwai Creek Watershed on Oct. 2. The objective was to give students an introduction to watershed, as well as insight into some of the disciplines involved in the issues we have been asked to address. This represented the first step to interdisciplinary adequacy, helping students achieve “a basic feel of [the various disciplines] and a basic understanding of how [they] approach[] the problem.”[[1]](#footnote-1)

The trip, which included students from two other University of Idaho College of Natural Resources classes, was guided by Dr. Brian Kennedy, of CNR’s department for Fish and Wildlife Resources, along with Water Resources 506 professors Dr. Jan Boll and Barbara Cosens. The field trip started at Spalding, where Lapwai Creek cuts through the Nez Perce National Historical Park, about one-quarter mile upstream of its confluence with the Clearwater River. Dr. Kennedy gave a brief overview of the watershed as well as an historic backdrop.

From there the group traveled approximately five miles south to a field-study site on Lapwai Creek located between the towns of Lapwai and Sweetwater. The group observed UI fisheries students conducting surveys of juvenile steelhead located in an approximately 100-yard stretch of Lapwai Creek. The graduate students displayed their various methods—capturing and isolating the fish, flushing their digestive contents, implanting a microchip for tracking purposes, and returning the fish to the stream. Students also examined the geological, ecological, and biological contours of Lapwai Creek, viewing alluvial deposits in cut banks of the stream, habitat in the floodplain, and aquatic life in the streambed.

The last stop was at the Bureau of Reclamation/Lewiston Orchards Irrigation District diversion site, located approximately 10 miles south on Sweetwater Creek, a tributary of Lapwai Creek. The nearly century-old diversion, a concrete structure spanning Sweetwater Creek, feeds a gravity-flow system that is the primary source for one of LOID’s three reservoirs, Mann Lake. Prof. Kennedy explained how the diversion, which was built without fish passage, had eliminated a significant portion of the watershed’s steelhead habitat while affecting both streamflow and water temperature.

**October 17, 2011**

This meeting was organized after Audrey created a doodle poll and emailed the group, asking each person to select acceptable times. In this email, Audrey also reminded the group of the purpose for this meeting. She wrote, “[a]s a reminder, in this meeting we are planning to talk about our backgrounds and how we see them fitting into this project; what disciplines could be involved in the problem and then which ones we will use in our analysis; and if we want/have time we could address things like a conceptual map, an integrating question, ground rules, etc.”

At this second meeting, we reviewed the agenda we developed in the last meeting and set goals that we wanted to accomplish by the end of the meeting.

First, we agreed we agreed to utilize a system of filing shared documents. Based on our previous experiences with various programs, we decided to use Wikispaces; Chris agreed to set up a group page. People noted that the updated history feature is useful because new versions are saved and old versions are archived. Because this archiving is a built-in feature, we hoped we would be able to track the process of our project as it became interdisciplinary.

We also discussed the need to utilize legal Bluebook citations in this paper. Jim and Allison, the two law students in the group, agreed to create a “cheat-sheet” of Bluebook citations.

We then discussed how often we would like to meet and how we would like to structure these meetings.

After covering these administrative topics, we each took a few minutes to discuss our individual backgrounds, interests, and research. Not surprisingly, we all shared an interest and background in natural resource management. Additionally, many of us have backgrounds in or are interested in cultural and sociological history, hydrology, fisheries, and jurisdictional issues.

Once we considered our own disciplinary make-up, we brainstormed disciplines applicable to the Lapwai Creek Watershed issue and then each person identified which disciplines he or she had interest in working on. Ultimately, we determined that Chris would focus on the project from a historical perspective, Jim on Native American law, Allison on jurisdictional and land use planning, Ryan on hydrology, and Audrey on fisheries.

Once we determined which disciplines we wanted to use, we considered how to narrow the scope of our issue. We discussed the use of integrating questions as means of narrowing the issue. Some members had previously used integrating questions after deciding which disciplines to use, while others used integrating questions as a means of narrowing group focus and determining which disciplines to use. Because we already had identified the disciplines of interest, we decided to use integrating questions as a tool for narrowing the group’s focus. Each person agreed to come to the next meeting with an integrating question.[[2]](#footnote-2)

Once we decided to come prepared with integrating questions to the next meeting, we discussed the group’s goals for scheduling work tasks. We decided to develop internal deadlines for rough draft and editing schedules, but decided to make an official schedule at a later date.

**Week of October 24, 2011**

At the group meeting during the previous week, a mutually agreed-upon time for the next meeting was set for Monday, Oct. 24. Various members of the group, however, missed this meeting without notification sent to the others. This presented the possibility of conflict but, more importantly, the opportunity for the group to overcome it. Since we had already established open lines of communication, the members that were present at the meeting called the absence to the attention of the others. Absent group members apologized and suggested a new meeting time for the next day, which was accepted by all and that meeting was held. During that meeting, ground rules were re-established and the group was strengthened. Conflict was avoided because we followed the guidelines set by Prof. Maureen Laflin in her lecture to the WR 506 class on group dynamics and how to effectively manage conflict .[[3]](#footnote-3)

The eventual meeting also proved fruitful in furthering our progress on the assignment. Each group member brought what he or she thought to be an integrating question representative of the Lapwai Creek Watershed problem. The integrating questions were read aloud and discussed. In merging the common themes, ideas and disciplines, we came up with the following: How do historical and legal issues result in water and habit quality issues for steelhead populations? This question clearly and concisely defines the problem; it is narrow enough in scope for the purposes of our project; and it establishes the importance of this problem.[[4]](#footnote-4)

We chose to begin this process by writing individual integrating questions so that each group member could highlight what he or she thought were the most important aspects of the problem. The integration process allowed us to discuss the pros and cons of each question, eliminate disciplinary bias, and create what we all agreed would be the focus of our group project.[[5]](#footnote-5) The establishment of an integrating question was essential in narrowing the scope of the problem as the Lapwai Creek Watershed is extremely complex and could potentially include many disciplines. Using the integrating question, each of us identified what topic within the scope of the question we would focus on, and we set a goal for the next week of researching our respective disciplines as they pertain to the problem.

**Week of October 31, 2011**

In the week prior we drafted an integrated question that helped us to create a common ground among the disciplines that we selected. On Nov. 1 we met to readdress the broad question we had posed and start the process of “integrating insights in order to create an interdisciplinary understanding” (Repko, p. ). With common ground discovered, we were able to create linkages between the disciplines and began to gain a comprehensive understanding of the problem. It became evident that by combining the insights from each discipline we would be able to yield a better explanation of the problem and create possible solutions to it. The subjects that we choose to address and assign to group members were as follows:

1. How social and cultural history has contributed modern social and cultural conditions (Chris).
2. How the legal history of the watershed has developed a mosaic of jurisdictional issues (Jim).
3. What are the modern legal trends in the watershed (introduce the FEMA lawsuit) and the challenges and opportunities for adaptive governance (Allison).
4. How have the decisions of the modern legal trends contributed to land use change causing destruction of flood plain connectivity and channelization within the watershed (Ryan).
5. What are the habitat requirements of steelhead an how have modern legal decisions and land use change affected the species (Audrey).

Each member would research and write up to to two pages on his or her respective topic. Then we would meet again and merge the sections, creating an interdisciplinary understanding. At that time we would discuss possible solutions each of us had contemplated while writing or researching. We discussed how the solutions could either be physical or process-based.

With the individual sections of the report outlined, it was decided that we should establish a time line in order to meet our deadline. The time line was as follows: **Or can be placed in Appendix.**

|  |  |
| --- | --- |
| **Date** | **Tasks** |
| 11/8 | 1) Individual outlines due.  2) Find common ground and continue integrating the sections. |
| 11/10 | 1) Bluebook examples due.  2) Outline methods section, and assign sections to group members.  3) Start discussing possible solutions. |
| 11/15 | 1) Merge the methods section into a comprehensive whole. |
| 11/17 | 1) Individual sections for the paper written up.  2) Discuss what points we want to touch on in our presentation. |
| 11/19-27 **Fall Break** | 1) Round robin editing |
| 11/28 | 1) Monday in Morrill Hall to create presentation |
| 11/29 | **Final Draft Due** |

In this meeting we also discussed the interdisciplinary question that we had posed the week before. We felt that the question was sufficient for the time being but were open to narrowing it down to a question that could be answered more readily once we had completed our writing and research.

**Week of November 7, 2011**

The development of the concept map during the latter half of our research project was a successful attempt to visually represent salmonid habitat segmentation in the Lapwai Creek drainage, the stakeholders, and opportunities for solution in the decision space. The concept map itself is a way to visually represent the structure of inquiry, specifically within the Lapwai Creek drainage’s socio-ecologic segmentation the concept model highlights the circuital nature of the current managerial system. The concept map, although created after our integrating questions and individual outlines, still provided us with a reinforcement of our findings and solutions. Being able to represent an issue in mixed-media is a functional and needed part of the solution-equation. It was a valuable experience for our group. [Heemskerk]

During the making of the conceptual map Dr. Boll visited our work group. He shed light on our conceptual design by framing it as more of a conceptual map rather than a concept model; a model in this instance was a graphical representation of fact rather than a geographic representation of an issue. This led us to realize that this conceptual map was different than our respective groups’ maps from the previous course exercise. Lapwai Creek’s issues are more multi-disciplinary, relying not only on segmented habitat but also on a fractured policy-space unlike that found with the declining Palouse Aquifers. In comparison to the aquifers, which present a relatively straight-forward problem for local stakeholders, the Lapwai Creek quandary is complicated by tribal influence, history, and precedent, and consequently requires an interdisciplinary approach.

**Cultural and socio-economical issues**

The segmented, multi-jurisdictional, and complex checkerboarded socio-ecological habitat of Lapwai Creek, Idaho is due in large part to the historical precedents that lay the foundation for problems and decisions for contemporary Salmonid protection.  Salmon and Steelhead still use this tributary to the Clearwater River as spawning grounds in the Spring and Fall.  However the heavy modification and channelization of Lapwai Creek, and the absence of some natural floodplains, makes the difficulty for returning Salmon even more challenging in the modified riverways of the Pacific Northwest.  The stakeholder/managerial decision-space, so crucial for the management of anadramous fish, is occupied by regional stakeholders that bring to the table their own precedent, views, and previous experience making the Lapwai issue so challenging. However, the ability to find compromise and progress the decision-space can be better achieved through managerial practices like adaptive governance or the ability to understand, expect, and work alongside flux in a system of management.  The Lapwai Creek Watershed’s checkerboarded socio-ecologic decision space is a challenging but digestible problem that will take interdisciplinary thought and an adaptive methodology of understanding in order to find better outcomes for the diverse stakeholders with their histories of precedent.

The largest stakeholders in the watershed are the Nez Perce Tribe, Lewiston Orchards Irrigation District, the Bureau of Reclamation, private landowners, as well as smaller stakeholders like municipalities, FEMA, USFWS, etc.  There are many hands in the same issue in regards to the Lapwai Creek Drainage.  Each stakeholder comes into this discussion with their own set of resource-problems and history.  For example the traditional stewards of this resource were, and are still a major player in the decision-space, the indigenous Nimipuu or known know as the Nez Perce Tribe.  The tribe, with its headquarters in Lapwai along the banks of the Creek, plays a central role in the use of their lands, fisheries resources, and provides the framework from where many of the checkerboarding in the drainage stems from.  The Tribe has a storied history of treaties and compromises with stakeholders that have often been taken back what precedent had been set thereby creating a fragmented and weak system of management.

The Tribe’s original treaty with the US Government in 1855, a very early treaty for the West, essentially divided the Nez Perce from ‘treaty’ and ‘non-treaty’ tribal affiliances, a affiliation contemporary tribal members still note.  From this motion ‘treaty’ Nez Perce were sent to the reservation at Lapwai while the ‘non-treaty’ Nez Perce culminated in the 1877 War with the US Government. After being sent to reservations the US Government began to institute various legislations to set about the assimilation of the Indian and open up land for non-native settlement.  The Dawes Act of 1887 was originally intended to ‘prove-up’ unused reservation lands by allotting parcels to individual families thereby taking open land for natives and reorganizing it to private property. From this system of fragmentization often times non-Indian ownership of lands would be the fastest outcome of the Dawes Act.  This process segmented habitat, further marginalized Indians, and set a historical precedent we’ve found as a cornerstone to contemporary issues in the Lapwai Creek watershed.

From this original habitat, both the social and ecological, we’ve checkerboarded our understanding of the entire system into the socially constructed and physically altered water system today.  From this point our dominant system of governance applies managerial oversight to the resource issue with this segmentation bas in inherent part of the decision-space.  Further issues like the Bureau of Reclamation channelization, Lewiston Orchards Irrigation District (LOID) reclamation, and floodplain encroachment has caused issues for Salmon and Steelhead management, habitat, and our methods for finding best outcomes.

Through all this complexity and challenge in the Lapwai drainage we are also given an opportunity to set our own precedent for success.  Using interdisciplinary techniques and tactics in our understanding of resource issues will lend us a more storied background to take to the decision-space.  Adaptive governance in our managerial system allows for natural flux in our often static systems of management.  Being dynamic and pragmatic in our understanding of precedent in our socio-ecological systems of management, governance, and ecological knowledge will lead us to a better set of outcomes.  Examples like the Lapwai Creek watershed and its issues related to Salmonid and Steelhead resource problems could potentially provide us a template for future outcomes in larger systems among the heavily modified riverways of the Pacific Northwest.

**Applicable Native American Law**

The Lapwai Creek Watershed lies entirely within the Nez Perce Reservation, which was established in 1855 when tribal leaders signed a treaty that ceded to the federal government all but approximately 7.5 million acres of the tribe’s vast aboriginal homeland.[[6]](#footnote-6) The subsequent discovery of gold on those lands prompted the government to negotiate a new treaty with the tribe, which in 1863 reduced the reservation to its current size of approximately 770,000 acres.[[7]](#footnote-7) But that merely established the reservation’s exterior borders; ownership within that perimeter would be significantly altered in response to the Dawes Act.[[8]](#footnote-8) The 1887 legislation called for the allotment of reservation land to tribal members in parcels ranging from 320 to 80 acres, and for the government to purchase non-allotted land and make it available for non-Indian settlement.[[9]](#footnote-9) This was reflected in the Nez Perce Agreement of 1893, and led to what is commonly referred to as checkerboard land ownership within the reservation. As a result, only 112,300 acres, or 14.6 percent of the land within the reservation boundaries, are held in trust status for the tribe or its members.[[10]](#footnote-10)

Segmented ownership within a reservation creates questions as to whether jurisdiction falls to the tribe or a state instrument—be it a county, a city, or an agency of the state itself. As statutorily defined, Indian Country involves “(a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government,” which includes property held in trust.”[[11]](#footnote-11) This gives rise to the issue of diminishment: Is a tribe’s sovereign power over the land within its reservation boundaries reduced by non-tribal ownership? In *Solem v. Barlett,* the Supreme Court held this must be determined by assessing congressional intent.[[12]](#footnote-12)

As a doctrinal matter, the States have jurisdiction over unallotted opened lands if the applicable surplus land Act freed that land of its reservation status and thereby diminished the reservation boundaries. On the other hand, federal, state, and tribal authorities share jurisdiction over these lands if the relevant surplus land Act did not diminish the existing Indian reservation.”[[13]](#footnote-13)

According to the Ninth Circuit Court of Appeals, the Nez Perce Reservation falls under the latter circumstance. In *United States v. Webb,*[[14]](#footnote-14) the Ninth Circuit found no evidence of congressional intent to diminish the reservation, deciding that “[a]s long as retention of the 1863 reservation boundaries is consistent with the terms of the 1893 Agreement, there is no diminishment or disestablishment.”[[15]](#footnote-15)

Yet while the *Webb* ruling appears to strengthen the Nez Perce Tribe’s position in regard to Lapwai Creek Watershed management, the Supreme Court’s opinion in *Brendale v. Confederated Bands & Tribes of Yakima Indian Nation*[[16]](#footnote-16)marginalizes it. The Court held that tribal authority over non-Indian property owners could be exerted only when activity on fee land within a reservation’s boundaries threatened “the political integrity, economic security, or the health and welfare of the tribe.”[[17]](#footnote-17) So unless some materially adverse effect can be shown, the Nez Perce Tribe holds no sway over zoning decisions exercised by the three counties in which the watershed is located, or the three municipalities found within it.[[18]](#footnote-18)

**Adaptive governance**

Watersheds are not confined by political boundaries. Despite this reality, management decisions are made by entities with piecemeal control over the watershed as a whole. Additionally, decisions made by one governmental entity may affect the management plan of another. Indeed, in a watershed like Lapwai Creek, where multiple governments assert jurisdiction, management becomes challenging for several reasons. Not only is there uncertainty about which government even has authority to take action, uncertainty also surrounds the effects of one government’s management plan on those of other entities.

Adaptive governance provides a means of addressing these challenges and managing water resources in the face of uncertainty. The goal of this adaptive governance is to incorporate resilience into management schemes. “Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks . . . .”[[19]](#footnote-19) Adaptive governance achieves resiliency by making management changes in incremental steps and then monitoring the results. These results are incorporated into the next round of incremental management changes. Additionally, adaptive governance also involves management across jurisdictional and agency boundaries.

The complex jurisdictional situation in the Lapwai Creek Watershed presents challenges to adaptive governance because the presence of multiple governments asserting jurisdiction can result in missed monitoring opportunities and a lack of authority to implement management changes. Here, in the Lapwai Creek Watershed, tribal, state and local, and federal governments all have jurisdiction of different areas. If the agencies from these various governments fail to communicate data gathered from monitoring, each agency will lack an understanding of the actual effects of its management changes. Additionally, because each entity has authority over different areas, the authority to implement management plans within the watershed may be varied. In a watershed like Lapwai Creek, where multiple governments assert jurisdiction, an agency may lack the authority to actually implement management plans in response to changing data. This inability to implement plans results in inaction.

For example, in Lapwai Creek, the federal government has acted in ways that affect the watershed as a whole. Under the Endangered Species Act, the Federal government listed “five Snake River salmon and steelhead runs . . . as either threatened or endangered.”[[20]](#footnote-20) Later, pursuant to the Act, the National Marine Fisheries Service ( NMFS) designated Lapwai Creek, Sweetwater Creek, and Webb creek as critical steelhead habitat.[[21]](#footnote-21) Additionally, FEMA implements a floodplain management plan that encourages development within a floodplain. Without agency interaction, the only means to remedy this situation is through lawsuits. For instance, in *National Wildlife Federation v. Federal Emergency Management Agency*, NWF challenged FEMA’s management plan in the Puget Sound on the grounds that issuing flood insurance without meeting consultation requirements violated the ESA because it jeopardized Chinook salmon. While local or tribal governments may recognize the problems created by this scheme, they are powerless to address them.

The complex jurisdictional situation in the Lapwai Creek Watershed, however, can be utilized in a positive way by recognizing how it enhances opportunities for adaptive governance. The presence of multiple governments asserting jurisdiction provides more opportunities for shared knowledge and for increased collaboration. When multiple agencies monitor and then share information about a watershed, each managing entity benefits from increased information. This can result in more sophisticated management changes. Ultimately, the results of these changes are monitored by multiple agencies, culminating in more responsive adaptive management. Additionally, when agencies collaborate on management implementation strategies, they create a more resilient management structure. By allocating resources from multiple agencies to a management plan, the implementation is not dependent on any one agency. The presence of multiple agencies helps ensure that the agencies most capable of implementing plans do so and that more than one agency addresses implementation.

In assessments of the Lapwai Creek community, interviewees have expressed their interest in such adaptive management schemes. “According to many of the interviewees, counties and the Nez Perce Tribe have not traditionally partnered on these issues, but several stakeholders, including county government representatives, expressed interest in seeing stronger working relationships.”[[22]](#footnote-22)

**Hydrology and fisheries habitat**

In *FEMA v. NWF*, NWF argued that the National Flood Insurance Program (NFIP), as currently implemented by FEMA, could result in increased development in flood-prone areas with consequent impairment of floodplain functions of salmon bearing waters*.* A Biological Opinion filed by NMFS following the *NWF v. FEMA* decision further supports this argument. NMFS concluded that the implementation of NFIP is likely to jeopardize the continued existence of the following anadromous populations: Puget Sound Chinook salmon, Hood Canal summer-chum salmon, and Puget Sound steelhead (National Marine Fisheries Service p.142, 2008). Similar issues have appeared in the Lapwai Creek Watershed, presenting the same set of problems for the steelhead *(Oncorhynchus mykiss)* populations that reside there.

*Oncorhynchus mykiss* is an historic steelhead trout population that has important cultural significance to the Nez Perce Tribe. The species is federally listed as part of the Snake River Basin Steelhead distinct population segment (DPS) with Lapwai Creek designated as critical habitat (Richardson and Rasumussen p.iii, p.17, 2007). The management and protection of *O. mykiss* in the Lapwai Creek basin cannot be based solely on the identification and fulfillment of the specific hydrological and biological requirements of the fish since there are legal, jurisdictional, and social background issues that affect decision-making within the watershed. The legal and jurisdictional complexities within the Lapwai Creek Watershed have direct impacts on the habitat provided within the stream network, thus affecting the viability of the local *O. mykiss* population. As mentioned above, the overlapping jurisdiction between the Nez Perce Tribe and Nez Perce County requires integrated management of the watershed and the fishery through adaptive governance (Cosens and Williams p.6, 2011). To further complicate management, NMFS is the agency that oversees steelhead, an anadromous species, rather than the U.S. Fish and Wildlife Service. These human-based complexities need to be overcome in order to properly protect the steelhead population in Lapwai Creek.

The human-based complexities make up just one page in the book of complex issues that is the Lapawi Creek Watershed. The watershed drains an area of 174,600 acres and is comprised of the Lapwai Creek, which flows from upland areas dominated by dry land agriculture, while grazing and logging activities are prevalent throughout the headwaters and canyons (Richardson &Rasmussen p.25, 2007). The Lapawai Creek mainstem is fed by the tributaries of Mission, Sweetwater, Webb, and Tom Beall creeks (Richardson &Rasmussen p.23, 2007).

Alterations to the landscape have created problems with water quality, quantitatively affecting the native and migratory steelhead populations. For example, paved, gravel, and dirt roads constrict many miles of stream throughout the drainages and create numerous fish passage barriers at locations where stream channels are crossed (Richardson & Rasmussen, 2007). Irrigation diversion structures such as the LOID canal removes water from Sweetwater and Webb creeks. Water reduction can have significant impacts on many abiotic factors (temperature, oxygen, sediment load), in turn altering the structure and function of stream biotic communities (Hartsen, 2010). The alterations to the landscape, and various land uses provides a unique set of circumstances, which contributes to highly degraded aquatic conditions throughout the watershed (Richardson & Rasmussen, 2007).

Another alteration to the landscape that specifically affects steelhead habitat is the development of floodplains. Floodplains are important for steelhead populations because they function as refuge areas with lower velocities during periods of flooding and provide nutrient and sediment exchanges that are essential to the species (National Marine Fisheries Service, 2008). It could be deduced that if there is no connection to the floodplain, the fish species that rely on these areas can lose access to these types of refuge and may not survive a large flood event (Williams, p.115, 2011).

The NIFP implemented by FEMA has disrupted flood plain connectivity in many ways, but we will touch on just two here. First, communities that participate in the NFIP must comply with the NFIP’s minimum floodplain management criteria, which permit development in the floodplain as long as structures are placed on fill or stem walls at or above the base flood elevation, or BFE (National Marine Fisheries Service, 2008). This is the water surface elevation associated with a 100-year flood. Filling or building stem walls one foot above the BFE will destroy any existing flood plain connectivity and encroaches on the existing stream channel. The encroachment will increase stream velocities and volumes. In turn, the refuge that was once present will be fragmented or destroyed.

Second, if levees are constructed to mitigate flood damage, FEMA will not include these areas in the mapping process, or require the purchase of flood insurance—the theory being that the levees will protect any development in these areas from floods. Levees diminish floodplain storage of water during floods, and confine the flows within a walled channel, pushing the flooding farther downstream and adding pressure to extend the levee flood (NMFS 2008). This increases stream flow velocities in the channel, sediment loads, and erosions rates.

In 2007, a significant effort was made toward inter-agency collaboration through the joint writing of the Lapwai Creek Watershed Ecological Restoration Study (LCWERS) by the Nez Perce Tribe Department of Fisheries Resources Management, Watershed Division and the Nez Perce Soil and Water Conservation District. This is an important step toward adaptive governance that could lead to better protection of *O. mykiss*. Five primary factors that affect the ability to maintain a viable population of *O. mykiss* in the Lapwai Creek Watershed were identified in this document: “high summer instream temperatures, excessive sedimentation, loss or disturbance of riparian habitats, changes in vegetative structure, and alteration of environmental processes” (Richardson and Rasumussen p.6, 2007). These factors are intertwined and linked to habitat alteration through land use changes and other human-induced modifications that affect streams. Through reversing the social and management actions that have caused those habitat alterations, there is the potential for restoration within the watershed with respect to each of the factors outlined above. LCWERS recommends that restoration activities primarily focus on (1) watersheds of high fish density and (2) the reconnection of presently disconnected high quality fish habitat to habitat where fish are currently present (p. 45).

Reducing the amount of withdrawals from the stream will increase flow and have a positive effect on temperature regime, depth of the stream, and creation of areas of refuge such as pools and riffles because the added water will create a wider, more diverse stream profile (Prof. Brian Kennedy, lecture Oct. 13, 2011). Decreasing the sediment load in the stream will create better habitat for *O. mykiss* through reducing turbidity, increasing dissolved oxygen levels, and enhancing macroinvertebrate production (Bjornn and Reisner p. 85, 1991; Richardson and Rasumussen p.21, 2007). Decreased sediment load can be achieved through implementing best management practices in agricultural fields and the restoration of vegetation to the riparian zones to reduce erosion. Vegetated riparian zones will also aid in lowering water temperatures while providing a source of large woody debris to the stream, therefore increasing habitat diversity. All of these restoration options will also provide better spawning habitat.

1. Allen F. Repko, Research: Process and Theory 43 (2008). [↑](#footnote-ref-1)
2. *Id.* at ???? [↑](#footnote-ref-2)
3. Maureen Laflin, Lecture entitled “Team Building—Cultivating Cooperation, Collaboration and Communication (Aug. 30, 2011) [↑](#footnote-ref-3)
4. Repko, *supra* note 1, at 147. [↑](#footnote-ref-4)
5. *Id.* at 145. [↑](#footnote-ref-5)
6. Idaho Indian Tribes Project, http://www.idahogenealogy.com/indian/nez\_perce\_indian\_reservation.htm (last visited Nov. 19, 2011). [↑](#footnote-ref-6)
7. *Id.*Subtle amendments requested by the tribe led to a third treaty, which was signed in 1868. This did not alter the reservation boundaries established by the 1863 treaty. [↑](#footnote-ref-7)
8. 25 U.S.C.A. § 331 (repealed 1934). Also known as the General Allotment Act. [↑](#footnote-ref-8)
9. *Id.* [↑](#footnote-ref-9)
10. The Updated 2009 Economic Impact Analysies (sic) of the Nez Perce Tribe, http://www.nezperce.org/official/PDF/Updated2009EcominicImpactAnalysisBrochure.pdf. [↑](#footnote-ref-10)
11. 18 U.S.C.A. § 1151 (West 2011). [↑](#footnote-ref-11)
12. Solem v. Barlett, 465 U.S. 463, 470 (1984) (Court applied a three-tiered analysis in determining if Congress had intended to diminish a reservation through distribution of surplus lands). [↑](#footnote-ref-12)
13. *Id.* at 467. [↑](#footnote-ref-13)
14. United States v. Webb, 219 F.3d 1127 (9th Cir. 2000). [↑](#footnote-ref-14)
15. *Id.* at 1135. [↑](#footnote-ref-15)
16. Brendale v. Confederated Bands & Tribes of Yakima Indian Nation, 492 U.S. 408 (1989). [↑](#footnote-ref-16)
17. *Id.* at 431. [↑](#footnote-ref-17)
18. The Lapwai Creek Watershed lies primarily in Nez Perce County but also reaches into Idaho and Lewis counties. In addition to the cities of Lapwai, Culdesac and Sweetwater, the watershed also includes the unincorporated communities of Spalding, Sweetwater, Reubens, and Slickpoo. [↑](#footnote-ref-18)
19. Walker et al. 2004. [↑](#footnote-ref-19)
20. Situational assessment, page 4. [↑](#footnote-ref-20)
21. Situational assessment, page 4. [↑](#footnote-ref-21)
22. Situational assessment, page 8 [↑](#footnote-ref-22)