

Salmon Habitat - Investment Portfolio

PREPARED BY _____



PREPARED FOR _____



Salmon Habitat – Investment Portfolio

Date

2017-04-04

Version

Final 1.0

Suggested Citation

Kocian, M., Flores, L., Cousins, K., Cutler, N. 2017. Salmon Habitat – Investment Portfolio. Earth Economics, Tacoma, WA.

Acknowledgments

Earth Economics would like to thank the Gordon and Betty Moore Foundation; Frankie Barker of the Mat-Su Borough; Kim Solien of the Great Land Trust; Corrine Smith and Jim Depasquale of The Nature Conservancy; Franklin Dekker and Neil Stichert of the U.S. Fish and Wildlife Service for their project direction and feedback, generous information and general support of the project. In addition, we would like to thank the Earth Economics Board of Directors for their ongoing support and organizational leadership.

Introduction

This is a guide for prioritizing and funding two pilot programs within MatSu2050's Salmon Habitat program area: Restoring Fish Passage at Culverts and Protecting Priority Salmon Habitat. Each program is described in terms of the scope of work, the organizations involved in local efforts, a timeline, budgetary considerations, and detailed discussions of the factors key to determining the most viable and appropriate funding mechanisms. Detailed explanations of several funding mechanisms and the criteria we considered in making these recommendations follows.

This portfolio demonstrates the wide variety of investment solutions that are available to make funding Mat-Su Borough (MSB) community priorities not only possible, but also fiscally sustainable. By connecting specific pilot program goals to funding mechanisms that are congruent both in terms of geographical scope and the distribution of beneficiaries, it will help to ensure that the process of prioritizing and financing these programs remains transparent and engaging to stakeholders.

The Mat-Su Valley: Changing Landscape and Community Values

The Mat-Su has changed dramatically in the past few decades. Since 1970, the borough has grown from fewer than 7,000 residents to over 100,000; in the past fifteen years alone, the population grew 59 percent (US Census 2015). Local groups are becoming concerned about what such growth might mean for the borough's future. Several have been coordinating their efforts via Mat-Su2050, a loose coalition that includes: Great Land Trust, Alaska Farmland Trust, Mat-Su Trails and Parks Foundation, the Mat-Su Borough government, The Nature Conservancy, and Earth Economics. The central aim of MatSu2050 is to make the case for conservation of salmon habitat, farmland, trails, and open space as the borough grows and develops. These efforts have included extensive mapping of the Mat-Su Basin's natural assets, public opinion surveys and focus groups, and several efforts to estimate the value of the Mat-Su's rich natural environment for the basin's residents, including willingness to pay for maintaining these amenities, the economic value of commercial and recreational salmon fishing, and the indirect contribution of ecosystem services to the borough's economy.

Ecosystem services valuations are a principal means by which Earth Economics attributes value to natural spaces. Ecosystem services are the benefits people receive from functioning systems in the natural environment. Clean air, clean water, food, timber and other forest products, a comfortable climate, and flood risk reduction are all examples of beneficial ecosystem services. Landscapes – and the plants and wildlife they support – are valuable community assets.

In 2013, Earth Economics identified the natural benefits (ecosystem services) associated with nine major land cover types in the Mat-Su Basin, including: carbon sequestration, food security, water filtration, water storage and supply, nutrient cycling, soil formation, soil erosion control, wildlife habitat, pollination, biological control, and aesthetic and recreational values. These services were assigned dollar values using benefit transfer methodology, a common analytical approach that involves applying values from primary studies of other locations with similar ecosystems. The source studies use a variety of techniques to estimate value, such as market pricing, cost avoidance, travel cost, and contingent valuation. The contribution of all direct and

indirect inputs of natural capital in the Mat-Su Basin was estimated to be at least \$35 billion per year (Kocian et al. 2013). Over 100 years, this translates to a community asset with a value of \$1 trillion dollars – directly benefitting local and regional economies, but also supporting the global economy.

To determine which priorities have the greatest public support, Tobias Schwoerer from the University of Alaska Anchorage’s Institute of Social and Economic Research surveyed local residents. That study concluded that Mat-Su residents are most concerned with preserving salmon habitat, ensuring access to outdoor recreation, and maintaining viable farmland. Accordingly, MatSu2050 has adopted these issues as their three main program areas. This portfolio discusses options for funding the first priority, preserving salmon habitat. Financing options for ensuring access to outdoor recreation and maintaining viable farmland will be addressed in later documents.

Land Ownership in the Mat-Su Borough

Nearly two-thirds of Mat-Su lands are owned by the Alaska State Government. This includes lands managed for their recreational and environmental value as state parks, game refuges, and rivers, but most state lands are not actively managed. The Federal Government owns nearly a third of the borough, with Denali National Park in the north the most significant unit (see

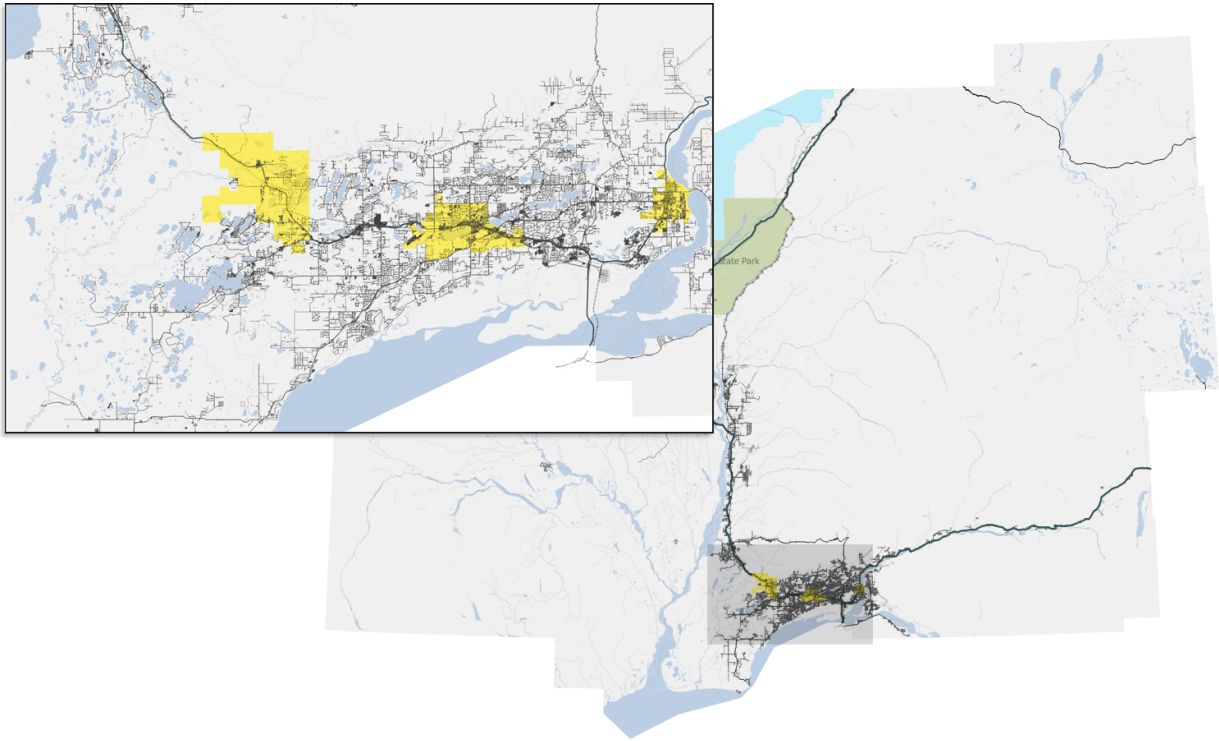
Table 1, from Mat-Su Basin Salmon Habitat Partnership 2013).

Table 1: Land Ownership in the Mat-Su Basin

Landowner	Proportion of Borough
State of Alaska	63%
Federal Government	30%
Private	4%
Mat-Su Borough Government	1%
Native Corporations	1%
Mental Health Land Trust	<1%
University of Alaska, Anchorage	<1%
Local Cities	<1%

The Mat-Su Borough government, local communities, Native Alaskan corporations, and private landowners control less than seven percent of the basin. Most residents live in small communities along major transportation corridors (the Parks and Glenn highways); two of the borough’s three incorporated cities are positioned near the intersection of these highways. Despite rapid and sustained population growth over the past several decades, most of the borough remains uninhabited and undeveloped (see Figure 1).

Figure 1: Impervious Surfaces within the MSB



Funding Mechanisms

Funding mechanisms are principally designed to provide revenue to support publicly shared goods and services (including natural capital), but may also include incentives or disincentives to influence behaviors that impact those community assets. They can be public, private, or a mix of both. They may involve introducing additional information into market transactions (e.g., the scarcity of a good or service, or impacts on natural capital) to ensure that prices more accurately reflect the full costs and benefits of a good or service. When identifying funding mechanisms for a given ecosystem service, it is critical to understand the social and political contexts, especially any factors leading to inefficiency, risk, or depletion of the underlying resource. This includes consumer behavior, market preferences, the regulatory environment, industry structures, and other factors.

























Types of Funding Mechanisms

There are many types, structures, and policy designs available to fund ecosystem services. These mechanisms can take the form of charges, subsidies, new markets, reallocation programs, or new institutional entities or arrangements. They may vary based on a variety of factors, including: the specific ecosystem service in question; existing and proposed funding sources; the parties responsible for managing the resource and/or implementing the funding mechanism; the direct and indirect beneficiaries; and the direct and indirect causes of ecosystem service degradation, et al. A funding mechanism may be voluntary or compulsory, be implemented by the private or public sector, exist as a standalone program or in combination with regulatory standards, or take the form of a fee or tax, tradable permits, subsidies, or so-called “market friction reduction” tools. The latter attempt to influence markets to support

productive ecosystems, establishing liability or insurance requirements (e.g., mitigation bonds), or other forms of integrating relevant information into decisions which impact the production of ecosystem services (Jack et al. 2008).

Table 1 presents common funding mechanisms, identified by three sectors: public (governmental), commercial, and civic (non-governmental and non-profit). These are responsible for implementation or serve as the primary sources of funding.

Table 1. Examples of Funding Mechanisms and Common Implementing Authorities

Mechanisms	Examples	Public	Commercial	Civic
Taxes	Salmon enhancement tax, excise taxes, property taxes, tax exemptions			
Fees and charges	Fishing or hunting license fees, watershed protection fees by utilities			
Subsidies and grants	Renewable energy start-up grants			
Market creation	General institutional setting governing schemes such as tradable emission permits			
Tradable emission permits	Carbon markets			
Transferable development rights (TDRs)	Wetland preservation TDR			
Mitigation banking	Wetland mitigation banking			
Conservation easements	Preservation easements			
Revolving loan funds	Clean water state revolving funds			
Special purpose districts	Soil and water conservation districts, watershed investment districts			
Insurance premiums	Higher premiums for high risk development			
Corporate voluntary give back fund	Oil and gas corporation contributions			
Green bonds	Utility bonds			

Taxes

Taxes are means of pooling funds for goods and services (e.g., garbage collection, sewer maintenance, education) that are generally non-exclusive and non-rivalrous – that is, goods or services which most or all residents are allowed (or required) to use, but which are usually not diminished through use. Because these public goods are often under-provided by markets, public funding plays an important role in ensuring that public goals (e.g., health, education) are

met. Taxes may also provide incentives to encourage or discourage behaviors that may impact the supply or demand of a given good or service. They are usually formulated as a percentage of consumption (e.g., sales taxes) or value (e.g., property taxes), although these rates may be adjusted based on income or other criteria (e.g., retirement or veteran status). Taxing authority – including limits on what may or may not be taxed – often varies by jurisdiction.

Sales Tax: A sales tax is a form of consumption tax imposed on the retail sale of goods and services. Conventional sales taxes are levied at the point of sale as a percentage of cost collected by retailers and passed on to government agencies.

Excise Tax: An excise tax is an indirect tax imposed on the producer or retailers of specific goods or services rather than end-consumers. Federal and state excise taxes are common for fuel, alcohol, and tobacco, as well as commercial vehicles and some sporting goods. Severance taxes are a type of excise tax levied on specific actions, such as the removal of natural resources.

Value-Added Tax: A value-added tax (VAT) is an alternative form of consumption tax through which a percentage of the value of a good or service is collected at each point of exchange throughout a supply chain. Suppliers, manufacturers, distributors, and retailers all document the VAT paid, passing these revenues on to government agencies.

Property Tax: Property taxes are typically assessed on a percentage of the market value of a parcel of land, combined with the structures built upon it (typically known as a “mil rate”). Rates and taxable property types vary, but are usually established and assessed by local or municipal governments and used to pay for local capital projects (e.g., road maintenance, public facilities).

Bed Tax: Bed taxes are assessed on temporary accommodations (e.g., hotel rooms), often as a percentage of the rental price. Bed taxes are usually collected by county, city, or other local governments, which also define the relevant accommodations and length of stay requiring tax payments.

Payment in Lieu of Taxes (PILT): Since 1976, the federal government has compensated local governments (usually at the county level) to offset revenue losses for non-taxable federal lands within their boundaries (US Department of the Interior 2016). Annual payments are calculated based on total federally administered acres, modified by local population and federal payments in the year prior, and then adjusted for inflation. Federal lands are just over 19 percent of the Mat-Su’s total area, contributing approximately \$3.4 million to the Borough’s coffers each year, or \$1.14 per acre (US Department of the Interior n.d.).

Fees

Fees and charges are similar to taxes, except that they are not exclusively implemented by public authorities and are often flat or graduated rates rather than direct percentages of value. They are generally tied directly to the particular good or service provided – levied, collected, and allocated to fund projects or programs which address a given issue, including environmental mitigation. Fee-based mechanisms may in some cases require establishing “special districts” through public legislation.

Recreation Fee: Recreation fees are imposed at the entry to recreation areas (e.g., trail heads, park access gates), which may be ecologically or otherwise sensitive, and for which high demand may cause significant impacts. Fees may be levied for daily use or on an annual basis,

on individuals, groups, or per vehicle. Recreation fee revenues are often tied to specific programs that benefit the fee area.

Utility Fee: Utility fees are levied based on the recognition that some resources (e.g., water) are reliant on healthy and intact natural capital (e.g., watersheds and riparian zones). Utilities paying for watershed protection and similar efforts will often charge a flat fee in addition to consumer utility rates.

Impact Fee: Impact fees are imposed when an action may create significant off-site costs or risks (e.g., expansion of utility infrastructure, water quality impacts). Such fees are common for new real estate development, allowing taxing authorities to tie incremental mitigation costs to the growth of developed areas, rather than broadly increasing other taxes (e.g., property taxes).

Market-based

Transferable Development Rights: Transferable development rights (TDRs) are voluntary mechanisms designed to shift development incentives away from ecologically or otherwise sensitive areas (e.g., wetlands) to lower-impact locations. Areas identified for protection are known as "sending" zones, while areas suitable for increased development are "receiving" zones. TDRs to develop a parcel in a "receiving" zone may be traded for the protection of another parcel in a "sending" zone.

Mitigation Banking: Mitigation banking allows negative impacts to some ecosystems to be "offset" by investments in the preservation, enhancement, restoration, or creation (PERC) of nearby critical habitat (e.g., wetlands or riparian areas). Section 404 of the Clean Water Act requires a permit before discharging dredge or fill material into U.S. waters, but the law allows such discharges to be mitigated through the purchase of credits from approved mitigation banks.

Tradable Emissions Permits: Specialized markets may be established to limit negative impacts associated with some behaviors or technologies (e.g., carbon emissions). These systems function by capping total allowable externalities and then allowing unit-based permits to be traded from one entity to another – those who lower their impacts (e.g., reducing demand or improving efficiency) benefit by selling excess permits to others who require additional permits. In this way, markets for externalities (e.g., adding a "price" to pollution) create incentives to reduce impacts, rewarding responsible stewardship and innovation without dictating specific actions or technologies.

Corporate Partnership: Private companies may partner with communities to fund specific programs that benefit the public (e.g., sponsorship of wetland restoration). In return, these companies may receive tax relief, free advertising, positive publicity, or other benefits.

Easements (Temporary or Permanent): Easements are rights (or limitations) on parcels of land not possessed by the holders. Market-based easements are legally binding contracts to limit certain land-uses (e.g., development, timber harvest) permanently, or for explicitly defined periods of time (e.g., easements prohibiting the cutting of riparian forests for 20 years, such as Oregon's Voluntary Incentive Program).

Selecting “Best Fit” Funding Mechanisms

Earth Economics has been working in the Mat-Su Borough since 2011. In collaboration with other MatSu2050 members, we assessed multiple funding mechanisms for their capacity to achieve conservation goals while remaining true to the Mat-Su Borough’s unique social, economic, and political values. All proposed funding mechanisms were assessed based on their ability to satisfy six criteria: fairness, equity, social and political viability, appropriate scale, low transaction costs, and low opportunity costs.

Fairness: To be considered fair, a mechanism had to closely match incentives and disincentives to actors and behaviors that present a risk to pilot program objectives (e.g., runoff leading to diminished water quality) or to those considered to benefit most directly from a program’s success (e.g., local recreational or subsistence fishing).

Equity: Preferable funding mechanisms could not be seen as burdensome or regressive – that is, they would not impose excessive or undue costs, with special concern for those of limited means, including fixed incomes.

Social and Political Viability: Viable funding mechanisms must largely align with the sensibilities of the individuals and institutions affected to receive the support necessary for success. Ideally, differences of opinion towards project goals, funding strategies, or means of implementation are minimal.

Appropriate Scale: Each funding mechanism had to be scaled appropriately, that is, considered capable of meeting the funding needs of specific MatSu2050 pilot program goals.

Low Transaction Costs: Transaction costs are a form of overhead, or costs not directly related to the value of a good or service, such as the effort needed to understand a funding mechanism sufficiently well to participate. To ensure that new funds would be directed towards pilot program objectives, mechanisms that minimize transaction costs are preferred.

Low Opportunity Costs: Opportunity costs are the value of other “foregone” alternatives. To be successful, a funding approach needs to be considered valuable relative to other choices. Opportunity costs may be temporary (e.g., limited-period easements) or permanent (e.g., perpetual easements).

Based on these criteria and further conversations with MatSu2050 partners, Earth Economics focused on five funding mechanisms: federal grants, development impact fees, excise taxes, transferable development rights, and voluntary incentive programs. These have been matched to two MatSu2050 programs to preserve salmon habitat, described in detail below.

Program 1: Restoring Fish Passage at Culverts

In 2016, the US Fish & Wildlife Service (USFWS) completed a study of culverts on road and railways in the Mat-Su (Dekker et al 2016). Of 573 sites, 476 (83 percent) were on salmon-bearing streams, 287 of which (60 percent of all culverts on salmon streams) were considered barriers to salmon migration, blocking access to 455 miles of habitat. Of these, just 55 barriers blocked 75 percent of the total miles of upstream habitat; these were chosen for detailed benefit-cost analyses. The results revealed that replacing just 15 barriers with the highest benefit-cost ratio would open 184.5 miles of habitat at a cost of \$4.8 million – an average cost of a little more than \$26 thousand per mile, or \$320 thousand per barrier. For contrast, \$10 to

17.9 million was spent to repair 105 barriers between 2000 and 2015. The cost of replacing all 55 salmon barriers would be \$23 million, while replacing all remaining barriers within the Mat-Su is estimated at \$66.9 million (Dekker et al. 2016, p 8).

The Mat-Su Salmon Partnership has proposed to lead efforts to restore fish passages at Department of Transportation (DOT) road culverts throughout the borough, with an estimated budget of \$2 million per year over the course of five years. According to USFWS data, this could support replacing as many as 29 culverts¹, opening up over 193 miles of salmon habitat (Dekker et al. 2016, Appendix B, Table B3). Funding sources are known to exist (e.g., federal grants), but no other funding mechanisms are currently in place. We believe efforts to expand funding options could be spearheaded by partners such as the Mat-Su Salmon Partnership, the Mat-Su Borough, US Fish & Wildlife, Alaska Department of Fish and Game, soil and water conservation districts, and Chickaloon Village Traditional Council. In all cases, a long-term strategic partnership with DOT needs to be developed for them to be an active partner in this initiative.

¹ Variability in both replacement costs and upstream miles (habitat reopened through replacement) means that some culverts may have high benefit-cost ratios, but also high costs. The 28th most “efficient” (i.e., high benefit-cost ratio) culvert replacement (a Big Lake Road crossing of Lucille Creek) would open up 16.4 miles of upstream habitat, but at a cost of \$2 million – pushing the budget to \$11.09 million. Accordingly, we omitted this culvert in the calculations in Table 1. Had we included the Big Lake Road culvert, over 203 total miles of habitat would be reopened. However, the overall cost per mile would rise from \$51.4K/mile to \$54.5K/mile.

Figure 2: Culverts Currently Blocking Passage on Salmon-Bearing Streams

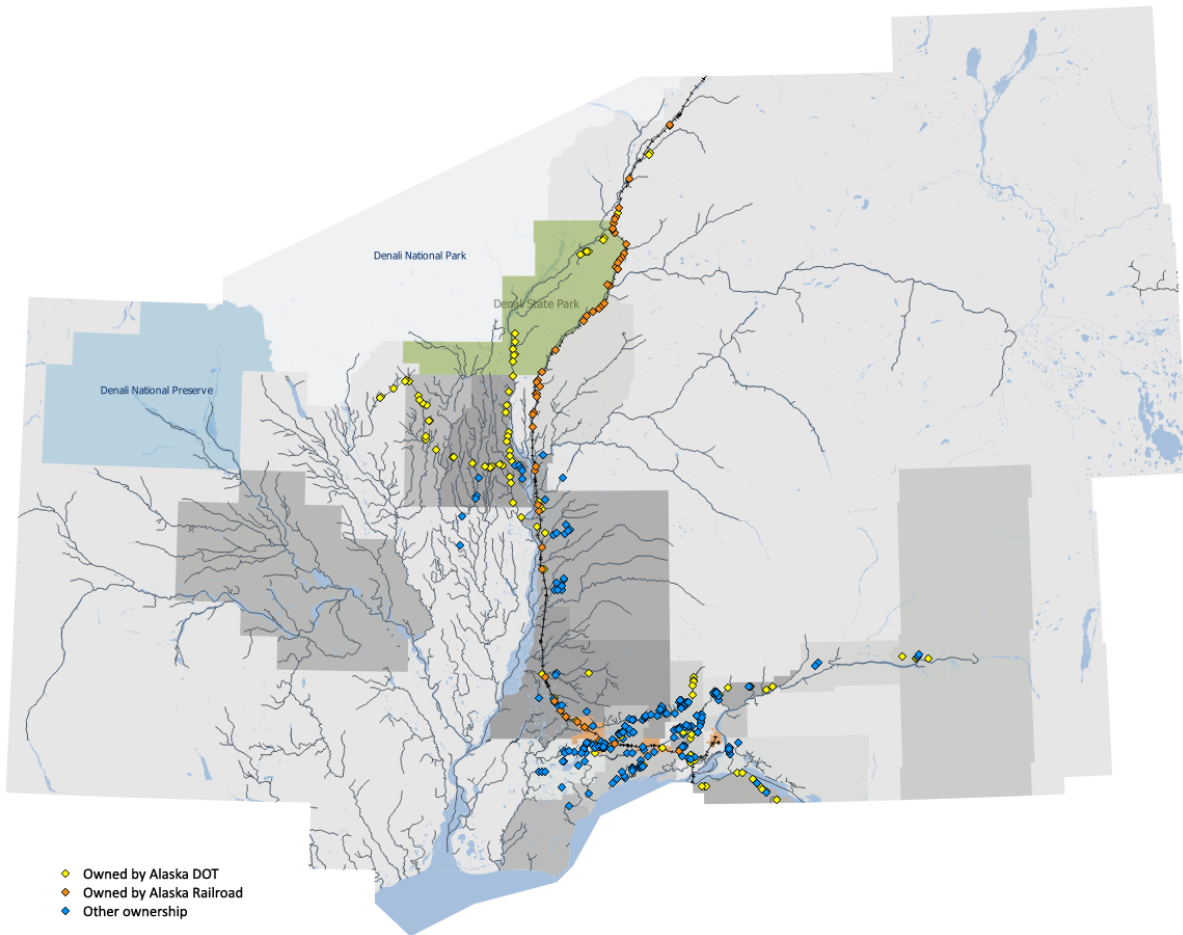


Table 2: Culverts on Salmon-Bearing Streams within the Mat-Su Borough

Ownership	All Culverts	Replaced (2000-15)	Remaining Culverts	Replaceable for less than \$10M	Cost
AK DOT	122	10	112 culverts (372.6 mi)	29 culverts (193.5 mi)	\$9.9M
MSB	157	77	80 culverts (325.9 mi)	74 culverts (65.7 mi)	\$9.9M
AK RR	55	2	53 culverts (58.2 mi)	34 culverts (52.5 mi)	\$10 M
Private	42	15	27 culverts (104.5 mi)	all 27 culverts (47.8 mi)	\$3.5M
Houston	8	0	8 culverts (6.4 mi)	all 8 culverts (6.4 mi)	\$826K
UAA	4	0	4 culverts (1.5 mi)	all 4 culverts (1.5 mi)	\$309K
Wasilla	2	0	2 culverts (2.1 mi)	all 2 culverts (2.1 mi)	\$476K
AK DNR	1	0	1 culvert (1.7 mi)	1 culvert (1.7 mi)	\$173K
DNR	1	1			

Funding Opportunities for Fish Friendly Culverts

After preliminary research and conversations with Mat-Su community stakeholders, we believe two funding mechanisms could generate sufficient funds to successfully complete Program 1: Restoring Fish Passage at Culverts.

FEMA Hazard Mitigation Assistance Grants

Replacing poorly designed or damaged stream crossings can be expected to have additional benefits. Culverts commonly used to replace existing barriers are designed to resist a 100-year flood – reducing road repair costs and keeping roads open. During the 2012 flood, the railroad line and 40 roads across the lower half of the borough became impassable, many after culverts were washed out or clogged with debris, worsening the flooding (Andrews 2013). Emergency services had to be diverted to remove clogs before more roads and neighborhoods flooded, but some communities were still cut off and their water sources were contaminated, leading the governor to declare the area a disaster in order to mobilize additional resources to support displaced families and businesses (Mauer et al. 2012). The rail line along the Susitna River (a critical freight corridor between Fairbanks and Anchorage) was disrupted for more than a week; the total cost to repair the line was estimated to be as high as \$2 million (Joling 2012). A benefit-cost analysis (BCA) that includes additional values such as flood-risk reduction, water storage capacity, transportation infrastructure, et al., would expand on the value of culvert improvements to salmon habitat and the community, and would likely attract additional funding opportunities (e.g., US DOT).

Since the 2012 flood, the Strategic Alliance for Risk Reduction, a Federal Emergency Management Agency (FEMA) program, has worked with local Mat-Su Borough stakeholders to identify disaster risks – especially flooding – and to prioritize risk mitigation projects. Community members have flagged multiple culverts for replacement or repair, as they were prone to blockages, flooding, and wash-out (STARR 2014). FEMA offers several grant programs to mitigate flooding hazards, including preventative measures, such as improvements to water passage infrastructure. Depending on the program, private citizens and businesses may apply for assistance through state agencies, local governments, or federally recognized tribes – or those organizations may apply directly. Since ownership of these culverts is diverse (e.g., local governments and the Borough itself, the Alaska Department of Transportation, the railroad, and other private owners), a broadly collaborative effort is likely a necessity. Among other mitigation and planning strategies, FEMA offers funds to improve stormwater drainage capacity, including widening culverts and stream restoration (FEMA 2013), both features consistent with improving salmon passage and habitat.

Recent changes to FEMA policy have made federal funding for restoration projects more accessible. Directive FP-108-024-01 (Miller 2013, issued June 1st) allows natural floodplain protection to be valued in FEMA's Benefit-Cost Analysis Toolkit, provided a conventional benefit-cost analysis (BCA) meets a threshold benefit-to-cost ratio of 0.75 or higher. The Toolkit is used to evaluate Pre-Disaster and Hazard Mitigation projects. The ability to include the value of ecosystem functions makes projects such as upgrading culverts for human and environmental benefits much more likely to surpass the funding eligibility threshold ratio of 1.0. Furthermore, an additional FEMA policy memorandum (Grimm 2016, issued May 12th) stated that ecosystem service values can be applied to all project types, including drought and fire mitigation. This memo also states that FEMA funds can be used for floodplain and stream restoration to mitigate the effects of drought, wildfire, subsidence, and flood, including actions such as reforestation, soil stabilization, and flood diversion. If the actions listed cost under \$5,250 per acre, they are immediately considered cost-effective and no BCA is required.

For this reason, we believe FEMA grants are a desirable option for securing funds to replace culverts in the Mat-Su Basin. FEMA empowers the State (AK DOT and AK Railroad), the Borough and Tribal Corporations to submit applications for Pre-Disaster and Hazard Mitigation Grants. The FEMA grant application process is fair, based on objective criteria intended to focus efforts on those projects where the benefit-cost ratio is the highest, and where clear links can be made between risks and proposed mitigation efforts. As a federally funded program, FEMA Hazard Mitigation Assistance (HMA) grants are also equitable, as mitigation costs are spread across all U.S. taxpayers, rather than Mat-Su landowners.

FEMA grants are also socially and politically viable, since the Borough already has the necessary systems in place to receive and distribute these funds. A conventional BCA of the economic benefits of culverts to communities and property owners would be critical to including the value of salmon habitat, but most of the necessary data already exists. Ongoing transaction costs within the borough should be relatively low, given that FEMA is already working with local stakeholders to identify flood risks. Although opportunity costs must be considered against other risks and mitigation efforts, FEMA funding is designed to be used for restoration projects benefiting local residents and ecosystems.

Development Impact Fees

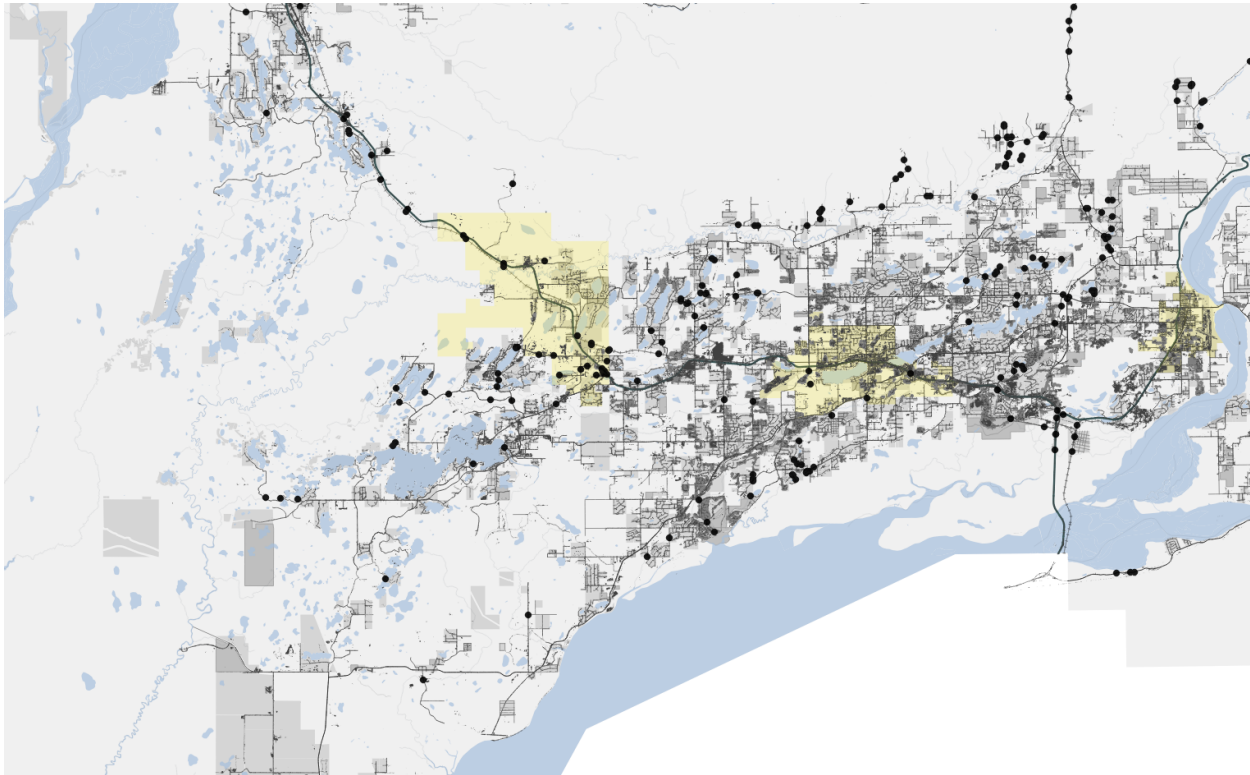
Another, albeit more challenging, source of potential funding would be to introduce impact fees for projects that could be expected to negatively affect salmon habitat. Impact fees are one-time costs imposed on new development that are intended to compensate for the additional costs associated with development. It is generally accepted that impact fees must satisfy the “rational nexus” test – namely, that ongoing growth clearly increases demand (or impacts), that fees are proportional to those additional costs, and that efforts to address these impacts benefit those who pay such fees. Although impact fees are a relatively new instrument (dating to the 1970s), there are over 1,000 such programs in the U.S., with the greatest rate of adoption occurring in rapidly growing communities (Burge 2012).

However, fees and taxes are not broadly embraced within the Mat-Su, and those that do exist are generally minimal – in FY2015, infrastructure fees generated just over \$86,000 for the Borough overall. Despite the significance of the 2012 flood, the Talkeetna Flood Control Tax (a property tax dedicated to flood mitigation measures) brought in just \$17,400 in FY2015. This reluctance towards taxation is echoed in public opinion research. In 2004, local consulting firm Land Design North (LDN) surveyed local residents in Butte, an unincorporated farming community southeast of Palmer. Growth in Butte has been rapid enough that locals are concerned about the loss of farmland, open space, and general environmental degradation. At the same time, there is little agreement as to how best to address these concerns – those interviewed by LDN expressed little support for increased taxes, zoning, or impact fees (LDN 2014).

While impact fees are not currently implemented in the borough (MSB Planning and Land Use Department 2005), many of the elements necessary to implement impact fees are already present. The Borough has an extensive fee-based permitting system that includes land use activities, with regulations in place to influence land use and subdivision development. Moreover, communities throughout the borough have developed comprehensive plans to establish common goals and policies to guide development (www.matsugov.us/plans). Given

that developers already need architectural and site plans, this suggests that any additional transaction costs required to implement impact fees would be minimal.

Figure 3: Developed Land and Subdivisions in the Lower MSB, with Non-Compliant Culverts



To the degree that expansion of development occurs where culverts currently block salmon habitat (see Figure 3), impact fees could be considered a fair means of assigning financial responsibility (i.e., “polluter pays”). Since such costs would be internalized real estate prices, they have the potential to depress the market for new homes. However, this seems unlikely, as Table 3 demonstrates. Even if all \$1 million annual program costs were borne solely by new construction projects, the cost per acre would likely range from \$387 to \$1,439 per acre. Average home values in the more populated region of the borough currently fall between \$217 thousand and \$253 thousand (Zillow 2016). If the average lot size were ten acres, funding the easement program solely on new construction could be expected to add between 1.28 and 1.48 percent to the cost of a home – this seems neither burdensome nor likely to present significant opportunity costs, given that median home prices in Anchorage are \$61 to \$71 more *per square foot*.

Table 3: Subdivisions within MSB, 2011-2015

Year	All new subdivisions	New subdivisions with covenants	Cost per acre, all subdivisions	Cost per acre, with covenants
2011	1,737 acres	402 acres	\$576	\$2,488
2012	2,493 acres	521 acres	\$401	\$1,918
2013	2,666 acres	1,327 acres	\$375	\$754

2014	3,819 acres	1,251 acres	\$262	\$799
2015	3,095 acres	808 acres	\$323	\$1,237
Average	2,762 acres	862 acres	\$387	\$1,439

Additional strategies could include working with AK DOT and ADFG to identify culverts which could be replaced electively either as conservation projects or as maintenance during planned road upgrades. These sites would then need to be incorporated into the AK DOT Statewide Transportation Improvement Plan. Where matching funds could be secured, Federal Highway Administration funding could potentially be requested to improve those sites.

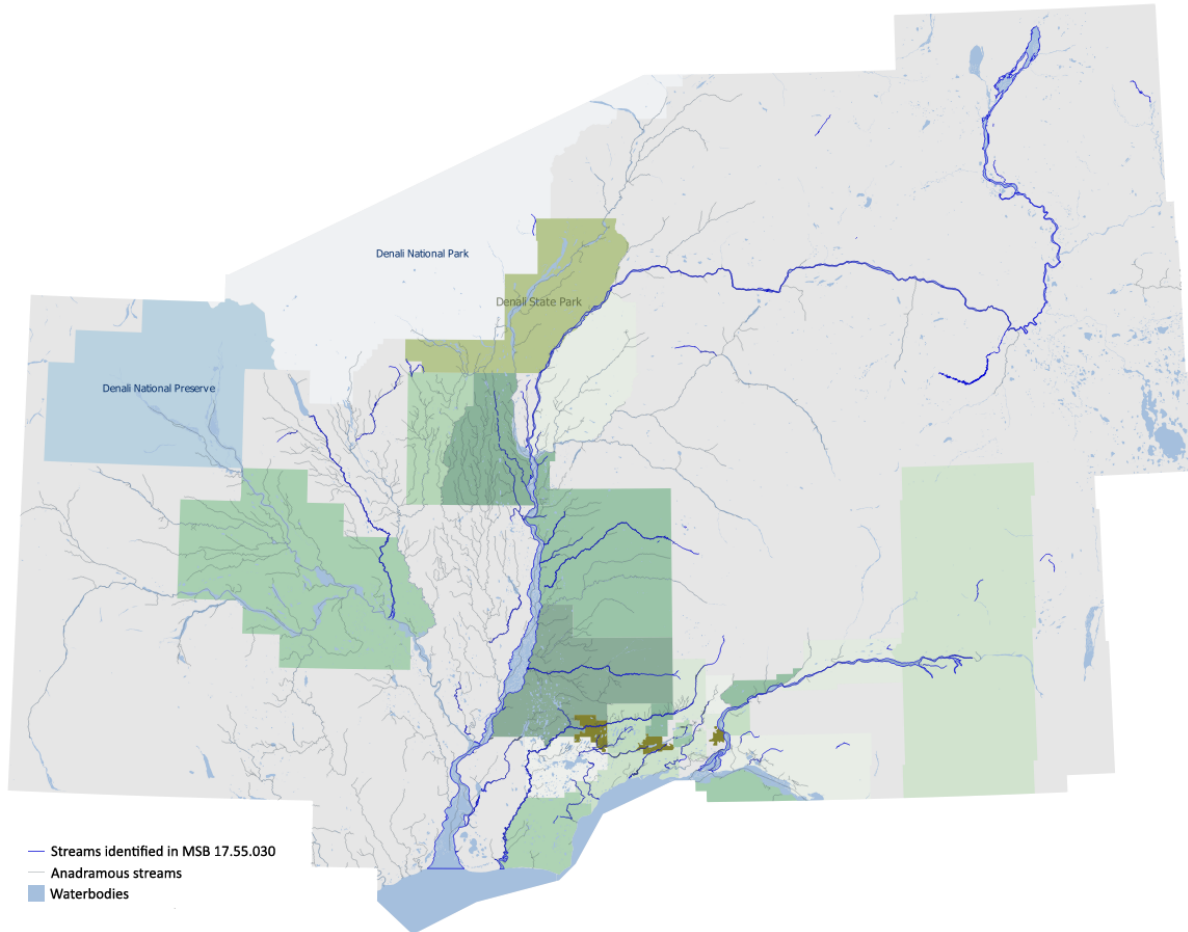
Program 2: Protecting Priority Salmon Habitat

The Borough’s current code on setback and screening easements limits placement of buildings² to a minimum of 75 feet from the high water mark of any water body (MSB Code 17.55.020A), grandfathering structures built before 1987 (MSB Code 17.55.020C). Amendments to this code are currently under consideration (MSB pending Code 16-051). Potential amendments would specify buffers for 26 anadromous water bodies (see Figure 4), allowing construction of private residences or recreational facilities within 50 feet of the high water mark and within 100 feet for multi-family, commercial, and industrial development. The amendments introduce controls on other forms of land use as well, limiting removal of native vegetation to ten percent of the surface area. Land grading would be similarly limited to ten percent, and debris storage (including snow and yard waste) would be prohibited within buffers. At this moment, the relationship of these amendments to existing setback rules is unclear. Accordingly, their overall effect on salmon habitat – and efforts to protect such habitat – is also unclear.

The Mat-Su Salmon Habitat Partnership has a goal of conserving ten percent of the Mat-Su’s priority salmon habitat (Objective 2.2 of the 2013 Strategic Action Plan). Conservation easements are one common – and voluntary – means of implementing protection within riparian corridors. Easements are binding legal agreements that limit land use as a means of safeguarding conservation values. Landowners retain ownership while ceding the right to develop protected sections of their land. Such easements are typically used by land trusts or government agencies as a means to partly limit or structure development without assuming full ownership of properties of concern.

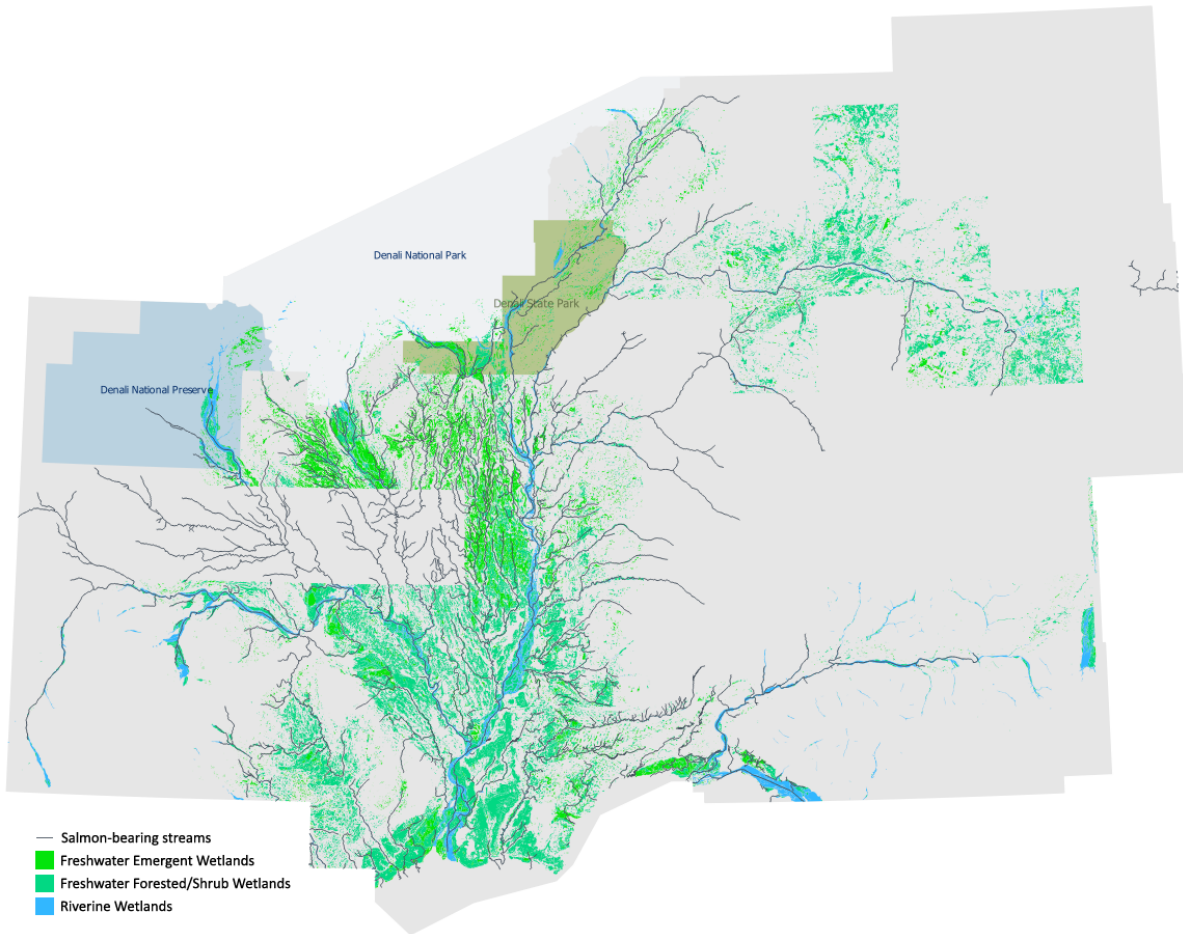
² Allowances are made for docks, piers, marinas, boathouses, and aircraft hangers, provided these are not inhabited or used for sanitation or fuel storage (MSB code 17.55.020B).

Figure 4: MSB 17.55.030 Proposed Riparian Setbacks



The Great Land Trust (GLT) is a leader in the use of conservation easements, with over 6,800 protected acres in the lower, more heavily populated region of the borough. These lands protect estuaries, stream corridors, and other landscapes that provide a number of valuable services, including habitat for fish and wildlife. GLT plans to conserve about 1,000 additional acres of riparian areas in the near future, but hopes to conserve from 4,000 to 10,000 acres over the coming decade. They estimate that expansion of their easement program would cost between \$400,000 and \$1 million per year – an average cost of \$1,000 per acre.

Figure 5: Freshwater Wetlands and Salmon-Bearing Streams



Funding Opportunities for Conservation Easements

IRS tax code

There are conservation easements in the Mat-Su Basin owing to the IRS tax code, which allows landowners to deduct the value of donated land (or easement rights) from their federal income tax. To be eligible, lands must preserve natural habitat of fish, wildlife, or plants³. The value of the contribution must be determined by a qualified appraiser, using one of the fair market value (FMV) methods accepted by the IRS (IRS 2012). Conservation easement donors can carry over unused exemptions for five years⁴. This program is available to both individual and corporate tax payers (including tribal corporations).

³ Other eligible conservation easements include those which preserve land for outdoor recreation for the general public, preservation of open space (including farmlands and forested areas), and those protecting historically important land or buildings (see IRC § 170(h)(4)(A).

⁴ Between 2005 and 2011, taxpayers were allowed to carry over unused exemptions for up to fifteen years (see IRC § 170(b)(1)(E)(ii) and IRC § 170(b)(2)(B)(ii).

Since the IRS Conservation Easement program is voluntary, it is fair; given that participants are compensated for electing not to develop their property, it is also equitable. The voluntary nature of the program makes it more socially and politically viable. Since use of the IRS Conservation Easement program has significant opportunity for growth, many more Mat-Su landowners could volunteer to conserve salmon habitat. Although landowners would incur appraisal costs prior to approval, the incremental transaction costs are still likely to be relatively low, since landowners are already required to file tax returns, and the processes and institutions necessary for this are already well-developed. Opportunity costs must be measured by each landowner, weighing the relative value of an immediate reduced tax liability against the income possible from future development on lands bound by conservation easements. We can envision a successful model where outreach to landowners is coupled with assistance in documenting and valuing the contribution of easements intended to protect salmon habitat.

Excise tax

The federal government has levied an excise tax on sports-fishing equipment⁵ since 1941. Since 1950, those funds have gone to the US Sports-Fish Restoration Program, helping to protect and promote recreational fishing, including habitat protection, conservation, and landowner incentives. By almost any measure, the program has been wildly successful – recreational fishing stocks which were in decline have rebounded, as has the sports fishing industry. The estimated return on investment (ROI) for the excise tax program ranges from 1,459 percent (2001) to 2,643 percent (1980). For 2006, the most recent year analyzed, the ROI was 1,911 percent (Andrew Loftus Consulting et al 2011). It is important to note that these analyses focused solely on the impact of the federal excise tax on primary market expenditures – the actual contribution, including secondary and induced spending, as well as the value of habitat improvements and conservation to improved ecosystem function, is likely to be far higher.

State-levied excise taxes are common in Alaska, applied to cruise ships (\$34.50 per passenger) and short-term vehicle rentals (three percent for recreational vehicles, ten percent for passenger vehicles). Section 1, Article X of the Alaska Constitution also gives broad authority to boroughs and municipalities to levy taxes, including excise and severance taxes. Several Alaskan boroughs currently apply severance taxes for natural resource extraction within their boundaries, including Aleutians East, Denali, Kodiak Island, and Yakutat. This right has been upheld in court (Bragg and Fannon vs. MSB, 2008), which further clarified that excise taxes do not require voter ratification (DCCED 2016).

A 2009 study by the Institute of Social and Economic Research (ISER) determined that recreational fishers spent between \$63 and \$163 million dollars in the Mat-Su that year (Colt et al 2009). More recently, ISER determined that sports fishing supports 900 to 1,900 jobs within the Mat-Su Basin, with earnings of \$31 to \$64 million (Schworer et al 2015). Provided that the goods or services most directly tied to recreational salmon fishing in the Mat-Su Basin can be properly defined, an excise tax of just one percent has the potential to fund significant

⁵ Equipment subject to the federal excise tax include: fishing rods, reels, and related components, tackle and other supplies (e.g, stringers, creels, gaff hooks), as well as resale of some types of equipment (Andrew Loftus Consulting et al 2011).

improvements in habitat protection. As such, it would seem more than sufficient in scale to fund ongoing habitat conservation efforts.

We believe that a minimal excise tax levied on recreational salmon fishing equipment or services is an equitable choice of funding mechanism. In 2007, Alaskans spent an average of \$126 to \$517 per day while fishing; nonresidents spent from \$344 to \$602 – one percent of even the highest of these estimates would be a minor cost. Connecting funding for conservation of the habitat critical to the health of the salmon runs is not only fair (pay to play), but may also generate a virtuous circle – as more habitat is protected, salmon populations thrive, leading to more interest in recreational fishing within the Mat-Su Basin. While the effort to define the goods or services that would be subject to an excise tax is not inconsequential, the Borough already levies bed taxes and a tobacco tax (both excise taxes); moreover, there are municipal sales taxes in Palmer and Wasilla. Accordingly, we feel that an excise tax would have relatively low transaction costs, and that it has already passed several barriers to social and political viability. As for opportunity costs, salmon runs in the Mat-Su Basin are among the largest in the state. Between 100 and 200 thousand King Salmon return to the Susitna River each year (ADFG 2008). Chinook caught in the Susitna River are significantly above the average weight for Chinook caught elsewhere in the state (ADFG 2015). For anglers who love catching big salmon, there is no better place than the Mat-Su Basin.

Voluntary Incentive Programs

Voluntary incentive programs provide incentives to landowners to practice responsible stewardship, with regular compensation for their ongoing participation (typical program periods may be 10 to 20 years). As such, they have the effect of being “temporary easements”, or non-permanent limitations of land use. Their voluntary and non-permanent character often makes them appealing to landowners, presenting new opportunities for the protection of local landscapes. Landowners may also benefit by (temporarily) lower assessment values, reducing property tax liability while still maintaining the long-term economic value of their property.

In Eugene, Oregon, a local water utility is piloting an incentive program called the “Pure Water Partnership” (PWP), which aims to protect water quality through ongoing support for responsible stewardship of upstream riparian areas (Robertson 2014). As an incentive-based approach to source water protection, the PWP provides an attractive alternative to additional land use regulation. Acknowledging the value of healthy riparian areas, the PWP seeks to reward landowners for management practices that benefit water quality. These rewards include financial incentives such as cash payments or vouchers for in-kind services such as landscape plans or riparian area plantings. Funds will come from a conservation surcharge for utility ratepayers, which will be exclusively used for offering participating landowners “dividends” for preserving habitat that provides water quality benefits.

While the effort required to establish a voluntary incentive program in the Mat-Su is considerable, these programs might be seen as more palatable by both landowners and rate-payers. Where the PWP focuses on protecting water quality for human consumption, a similar system could be developed for sewage treatment utilities within the borough. As the borough’s population continues to rapidly expand, the potential for human waste to contaminate surface waters is likely to increase, especially during flood events. In this way, connecting sewer utility fees to protection of salmon habitat could be considered fair. Because the land use limitations

assumed by landowners under a voluntary incentive program are not permanent, compensation is generally lower – translating into lower fees, as well. The PWP has estimated that a fee of as little as \$1 to \$3 per month could be sufficient to fund a significant portion of their activities and would be considered equitable by rate payers (EWEB etal 2015).

One substantial challenge to the viability of implementing a voluntary incentive program in the Mat-Su is the lack of a centralized sewer utility – any effort to develop such an incentive program would likely be localized. Whether or not a utility could find a price point that is both acceptable to rate payers and sufficient to cover habitat protection costs would be conditioned by a number of factors - technical, social, and economic. Because utilities in the Mat-Su are still relatively small, their costs are higher relative to larger-scale systems. As the Borough’s population continues to expand, we would expect the most affected utilities to upgrade and expand. As this occurs, some of those cost-savings might be dedicated to habitat protection.

While substantial effort would be required to establish and monitor a voluntary incentive program anywhere within the borough, we would expect transaction costs to otherwise remain low, as utilities already have well-developed systems for charging rate-payers, and the Borough itself maintains detailed landownership records. The temporary nature of the limits associated with participation in a voluntary incentive program mean that opportunity costs are low for landowners; for utility consumers, we believe the relatively lower cost of home ownership within the borough (see Development Impact Fees, above) holds true here – the Mat-Su Basin would remain a much less-expensive option.

CONCLUSION

While the current social and political climate in the Mat-Su Borough is generally resistant to local public financing of conservation efforts, this may be slowly shifting. The success of the Recreation Bond (which included \$2 million for trail maintenance in the borough) in this October’s municipal elections – even in the face of declining public revenues and the resulting cutbacks – suggests that borough residents are willing to invest in improvements in environmental quality and natural amenities. The state’s current fiscal position has also made Alaskan politicians more interested in federal support. Accordingly, we believe that the FEMA Pre-Distaster Mitigation Grants present the best opportunity for funding culverts that block salmon passage and recommend pursuing that opportunity without delay. That said, rapid growth near the confluence of the Parks and Glenn highways, and the resulting pressure on the borough’s cities and unincorporated areas – especially from larger, multi-unit developments – is likely to lead to increased support for impact fees. Since many of the culverts that still block salmon passage are located in and around this higher-density region, culvert replacement and improvement may become a normal part of expanding services to new development in the borough.

Similarly, protecting salmon habitat in the borough is likely to depend on both public and private means. The proposed stream setback ordinance may be the easiest means of protecting stream habitat, but approval by the borough’s government is still pending. Even if the ordinance were approved, there is the possibility (even likelihood) of law suits and compensation claims. The cost to resolve these factors must be included in any assessment of the cost of regulating habitat protections. For this reason, we recommend promoting the

availability of federal tax incentives for donated development rights of property deemed to be important salmon habitat. Such efforts may be even more successful when paired with technical and legal assistance for interested landowners.

Introducing an industry-specific excise tax – one focused on the recreational salmon fishing industry – is another, albeit more challenging alternative. While industry-based funding is not without precedent in Alaska, establishing such a system would require significant effort and substantial support from within the recreational fishing industry. As with similar efforts elsewhere in the state, support may be earned by spending some excise tax funds on advertising and promotion, and some on habitat conservation. Developing such a program in the borough would require additional funding, outreach, and time.

The same could be said of introducing a voluntary incentive program – significant effort would be required to gauge interest and identify both funders and landowners. Since temporary easements are not currently eligible for federal tax incentives, the appeal of this approach – despite its voluntary nature – is likely to be somewhat less.

Overall, we believe there are real, substantial opportunities for funding salmon culvert replacement and salmon habitat protections in the Mat-Su Borough. The most viable are tied to federal funding and incentives, with participation by the state or borough government, as well as local landowners. This presents the possibility of a “win-win” situation, where the short-term and longer-term interests of the borough’s residence coincide, benefitting the salmon populations so important to the borough culturally and economically.

REFERENCES

- ADFG, 2008. Matanuska - Susitna Valley and West Cook Inlet King Salmon, Northern Cook Inlet Recreational Fishing Series. Alaska Department of Fish and Game, Southcentral Region, Anchorage, AK. www.adfg.alaska.gov/static-sf/Region2/pdfpubs/MatSuKingSalmon.pdf
- ADFG, 2015. Community Subsistence Information System (CSIS Data). Alaska Department of Fish and Game, Division of Subsistence, Anchorage, AK. www.adfg.alaska.gov/sb/CSIS
- American Planning Association, 1997. APA Policy Guide on Impact Fees. www.planning.org/policy/guides/adopted/impactfees.htm (accessed 8.11.16).
- Andrew Loftus Consulting, Southwick Associates, Inc, 2011. Financial Returns to Businesses from the Federal Aid in Sport Fish Restoration Program. Multistate Conservation Grant Program, Annapolis, MD. www.fishwildlife.org/files/SportFish-Restoration-ROI-Report_2011.pdf
- Andrews, L., 2013. Still soaked from last year's floods, Mat-Su resident watch flooding. Alaska Dispatch News. www.adn.com/alaska-news/article/mat-su-borough-still-dealing-last-years-floods/2013/05/15
- Burge, G.S., 2012. The Capitalization Effects of Development Impact Fees: Commercial and Residential Land Values (Working Paper No. WP12GB1). Lincoln Institute of Land Policy, Cambridge, MA. www.lincolninstitute.edu/pubs/2134_The-Capitalization-Effects-of-Development-Impact-Fees-Commercial-and-Residential-Land-Values
- Colt, S., Schwörer, T., 2009. Economic Importance of Sportfishing in the Matanuska-Susitna Borough. Institute of Social and Economic Research, University of Alaska Anchorage. www.iser.uaa.alaska.edu/Publications/matsu_sportfish_final_31aug2009.pdf
- DCCED, 2016. Alaska Taxable 2015: Municipal Taxation - Rates and Policies, Full Value Determination, Population and G.O. Bonded Debt (No. LV). Department of Commerce, Community, and Economic Development, Juneau, AK. www.commerce.alaska.gov/web/Portals/4/pub/OSA/2015-Full.pdf
- Dekker, F., Rice, W., 2016. Salmon Passage Restoration Cost-Benefit Prioritization for the Matanuska-Susitna Basin, Alaska (Technical Report No. 108), Alaska Fisheries Technical Report. US Fish and Wildlife Service, Anchorage, AK. www.fws.gov/alaska/fisheries/fish/Technical_Reports/t_2016_108.pdf
- EWEB, McKenzie Collaborative, 2015. McKenzie Watershed Voluntary Incentives Program Pilot Project: A report to the Oregon Watershed Enhancement Board. Eugene Water and Electric Board, Eugene, OR. www.eweb.org/public/documents/water/VIP_OWEBreport.pdf
- FEMA, 2013. Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (No. 01024.13). Federal Emergency Management Agency (FEMA), Washington, DC. www.fema.gov/media-library/assets/documents/30627
- Great Land Trust, 2014. A Prioritization of Important Salmon Spawning, Rearing, and Overwintering Habitat in the Matanuska-Susitna Borough. Great Land Trust, Anchorage, AK. http://greatlandtrust.org/wp-content/uploads/2014/10/A-Prioritization-of-Salmon-Habitat-in-the-MSB-2014-4_17_14.pdf
- Grimm, M. 2016. Benefit Cost Analysis Tools for Drought, Ecosystem Services, and Post-Wildfire Mitigation for Hazard Mitigation Assistance. FEMA. Assistant Administrator for Mitigation. [www.fema.gov/media-library-data/1464899521902-b2d31bbf89cc089c3cd43851a33d4aee/PolicyClarification_BCA\(Drought-EcosystemServices-Wildfire\)_508.pdf](http://www.fema.gov/media-library-data/1464899521902-b2d31bbf89cc089c3cd43851a33d4aee/PolicyClarification_BCA(Drought-EcosystemServices-Wildfire)_508.pdf)

- Jack, B.K., Kousky, C., Sims, K.R.E., 2008. Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. *Proc Natl Acad Sci U S A* 105, 9465–9470. doi:10.1073/pnas.0705503104
- Joling, D., 2012. Railroad: Flood damage, lost revenue may top \$1M. *Juneau Empire*. <http://juneauempire.com/state/2012-09-25/railroad-flood-damage-lost-revenue-may-top-1m>
- Kocian, M., Batker, D., Fletcher, A., 2013. The Natural Economy of Alaska’s Matanuska-Susitna Basin: An Ecosystem Service Valuation Analysis. *Earth Economics*, Tacoma, WA. www.eartheconomics.org
- Mat-Su Basin Salmon Habitat Partnership, 2013. Conserving Salmon Habitat in the Mat-Su Basin (Strategic Action Plan). www.matsusalmon.org/wp-content/uploads/2013/02/MatSu-Salmon-Strategic-Action-Plan-2013UPDATE_DRAFT.pdf
- Mauer, R., Grove, C., 2012. Floodwaters recede in Talkeetna. *Alaska Dispatch News*. www.adn.com/alaska-news/article/floodwaters-recede-talkeetna/2012/09/22
- Federal Emergency Management Agency [FEMA], 2013. FEMA Mitigation Policy- FP-108-024-01: Consideration of Environmental Benefits in the Evaluation of Acquisition Projects under the Hazard Mitigation Assistance (HMA) Programs. Federal Emergency Management Agency, Washington, DC. www.fema.gov/media-library-data/20130726-1920-25045-4319/environmental_benefits_policy_june_18_2013_mitigation_policy_fp_108_024_01.pdf
- Robertson, L., 2014. EWEB aims to prevent West Virginia-style water disaster. *Register-Guard*. www.eweb.org/public/documents/water/RG011814.pdf
- Schwörer, T., Holen, D., Jones, B., Tanaka, C., Albert, D., 2015. The Economic Geography of Salmon: a conceptual framework and preliminary characterization of the spatial distribution of economic values associated with salmon in the Mat-Su Basin, Alaska. UAA Institute of Social and Economic Research, Anchorage, AK. www.matsusalmon.org/what-we-do/science-symposium/2015-symposium
- STARR, 2014. Discovery Report: FEMA Region X - Matanuska-Susitna Borough, Alaska (Discovery Report). FEMA. www.commerce.alaska.gov/web/dcra/PlanningLandManagement/RiskMAP/Matanuska-SusitnaBoroughRiskMAPStudy.aspx
- US Census Bureau, 2015. 2010-2014 American Community Survey 5-Year Estimates, American Community Survey. US Census Bureau, Washington, DC. <http://factfinder.census.gov>
- US Department of the Interior, 2016. Payments in Lieu of Taxes. URL www.doi.gov/pilt (accessed 8.15.16).
- US Department of the Interior, n.d. Payments by State/County. Payment in Lieu of Taxes. URL www.nbc.gov/pilt/counties.cfm (accessed 8.16.16).
- Walls, K., McConnell, V. 2007. Transfer of Development Rights in US Communities: Evaluating Program Design, Implementation and Outcomes. Resources for the Future. Washington DC. www.rff.org/files/sharepoint/WorkImages/Download/Walls_McConnell_Sep_07_TDR_Report.pdf
- Zillow, 2016. Data. Zillow Research. www.zillow.com/research/data (accessed 8.24.16).

Appendix

Table 4: Financing Mechanisms - Goodness of Fit Matrix

	MECHANISM	FAIRNESS	EQUITY	VIABILITY	SCALE	TRANSACTION	OPPORTUNITY
Intergovernmental transfers	Subsidies and Grants	✓	✓	✓	✓	✓	✓
Taxes	Sales tax	○	✗	○	✓	✓	✓
	Excise tax	✓	✓	○	✓	○	✓
	Value-Added Tax (VAT)	○	○	○	✓	✗	○
	Property tax	○	○	○	✓	✓	✓
	Bed tax	○	○	○	○	✓	✓
	Payment in Lieu of Taxes (PILT)	✓	✓	○	○	✓	✓
	Special Purpose Districts	○	○	✓	○	✓	○
	Income tax	✗	○	✗	✓	✓	✓
	Deductions, rebates	✓	✓	✓	○	✓	✓
Fees and charges	Recreation fee	✓	✓	○	○	○	✓
	Utility fee	○	○	○	○	✓	✓
	Impact fee	✓	✓	✓	✓	✓	✓
Market-Driven	Transferable Development Rights (TDRs)	✓	✓	✗	○	○	○
	Mitigation banking	✓	✓	○	○	○	○
	Tradable Emission Permits	○	○	○	○	✓	✓
	Voluntary Incentive Programs	✓	✓	○	○	○	✓
	Insurance Premiums	✓	✓	✗	○	✗	✓
	Corporate Voluntary Give Back Fund	✓	✓	✗	○	✓	✓
	Green bonds	✓	✓	○	○	✗	○

KEY: (✓) Likely meets criteria; (○) May meet criteria; (✗) Unlikely to meet criteria