

Riparian Incentive Programs

Opportunities for Washington State



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Acronyms

BMP	Best Management Practice
CDFFP	California Department of Forestry and Fire Protection
CREP	Conservation Reserve Enhancement Program
DNR	Department of Natural Resources
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EQIP	Environmental Quality Incentives Program
EWEB	Eugene Water and Electric Board
FREP	Forestry Riparian Easement Program
FSA	Forest Service Agency
MDA	Maryland Department of Agriculture
NASEM	National Academies of Sciences, Engineering, and Medicine
NRCS	Natural Resources Conservation Service
NRI	Natural Resource Investments
NYDEC	New York State Department of Environmental Conservation
PBRS	Public Benefit Rating System
OCC	Oklahoma Conservation Commission
SRF	Salmon Recovery Funding
TDR	Transfer Development Rights
TMDL	Total Maximum Daily Loads
USDA	US Department of Agriculture
USFS	US Forest Service
VDCR	Virginia Department of Conservation and Recreation
VIP	Voluntary Incentive Program
VSP	Voluntary Stewardship Program
WAC	Watershed Agricultural Council
WCC	Washington (State) Conservation Commission
WDFW	Washington State Department of Fish and Wildlife
WDOE	Washington State Department of Ecology
WDOR	Washington Department of Revenue
WQC	Water Quality Combined
WRCO	Washington Recreation and Conservation Office
WWRP	Washington Wildlife and Recreation Program

Purpose

The Washington State Conservation Commission's (SCC) Science Hub is interested in gaining a deeper understanding of the state of the science on economics and riparian buffers. Elucidating methods used to quantify the proper level of incentives for private landowners to apply best management practices in riparian areas on private land is of particular interest.

Earth Economics conducted a review of riparian buffer incentive programs to identify successes, challenges, costs, and benefits associated with different approaches to riparian incentives. The review focuses on flagship programs that have relevance to the context in Washington. Insights gained from the review are outlined in this report and include recommendations for key elements that have potential applications to Washington State.

Future work to extend this initial synthesis could include: (i) Ecosystem Services Valuation (ESV) of riparian zones within pilot watersheds in Washington, (ii) assessing the impact of agricultural conservation practices on ESVs within the pilot watersheds, (iii) mapping the flow of ecosystem benefits (e.g., including impacts to underserved communities), and (iv) developing further recommendations for proper levels of incentives to encourage adoption of a suite of conservation practices by private landowners.

1 Introduction

1.1 Why riparian area buffers are important

As transitional lands linking terrestrial and aquatic habitat, healthy riparian areas can produce a broad range of benefits, filtering nutrients and materials from surface and subsurface flows, reduced inland and downstream flooding, providing fish and wildlife habitat, recreational opportunities, aesthetic benefits, and more. Areas adjacent to streams, lakes, or wetlands used in agricultural, rangeland, forestry, suburban, or urban settings are known as buffers (USFS, 2024a) and can serve to promote these healthy riparian functions. Buffers often include planted trees, shrubs, grasses or forbs that provide habitat (Parker et al., 2015). They can help with salmon recovery (WDFW, 2024) and as easements, can be highly valued (Industrial Economics, 2022). Although riparian buffers incur restoration and management costs, these are significantly lower than the avoided downstream infrastructure and treatment costs brought by healthy riparian zones (Edmonds et al., 2013). Reducing agricultural or industrial runoff lowers treatment costs for downstream utilities and their ratepayers (Gartner et al., 2013); in fact, riparian buffers are one of the most cost-effective ways to ensure water quality (Musengezi et al., 2012; NASEM, 2020). Of course, many landowners and communities installing buffers safeguard rivers for cultural, ethical and altruistic motives (Gardner et al., 2013; Blue River Foundation, 2019).

1.2 The necessity and challenges of better riparian stewardship

At the same time, establishing riparian buffers usually requires changes to land use practices. Implementation can be challenging for farmers and forest landowners with limited resources, both financial and technical (Klapproth and Johnson, 2009). The general public—landowners in particular—tends to be more in favor of incentives than regulation as vehicles for change (Rissman et al., 2018). A strong pull is needed to conserve land as buffers, especially as development pressures are ubiquitous, particularly near expanding urbanized areas (Edmonds et al., 2013). For many incentive programs, the modest level of financial support is insufficient to mitigate land conversion. Indeed, significant financial investment may be needed to compensate landowners for establishing buffers (Gordon et al., 2009). Some landowners may avoid establishing buffers simply if they do not believe their neighbors will follow

suit (ibid). The complexity of environmental and land use regulation and tax policies may also play a role in discouraging landowners (WCC, 2024). Finally, depending on context, the scale of *need* for better riparian land use can dwarf the available resources, both financial and technical (Basil et al., 2021). Yet to ensure long-term ecological outcomes, incentive programs must be structured in a way where they are not merely financial, but reinforce wider ethical, altruistic, and civic values (Gartner et al., 2013).

2 Fundamentals

For the purposes of this report, we have broadly defined riparian area to be those lands immediately adjacent to surface waters, including wetlands, forests, pastures, agriculture, and other landcovers (see Rentze et al., 2020). We leave more precise definitions (e.g. areas within 100-year floodplains) to the agencies and institutions engaged in promoting responsible riparian management. Riparian buffers are zones where certain practices are encouraged (or restricted) to reduce impacts from upslope activities (e.g. agricultural runoff), inland flood impacts, and disturbance within the buffer areas themselves (EPA, 2021; MacFarland et al., 2017). Protecting, restoring, or establishing riparian buffers is seen as a cost-effective means to intercept sediment, nutrients, and other materials in both surface and subsurface water flows before they reach surface waters (Phillips, 1989). The root systems of vegetated buffers may also reduce bank erosion from wave action. Forested buffers offer the additional benefit of shading waters near stream banks to reduce water temperatures, critical to many aquatic species (NAC, 2012).

Buffers can be designed for a range of objectives. Public agencies may be more focused on water quality, limiting sedimentation, or protecting fish and wildlife. Landowners may want to improve wildlife habitat, reduce erosion, mitigate flooding, or enhance their property's aesthetics, though private landowners are more likely to focus on practices producing on-site benefits. With careful design and management, forested buffers can continue to provide timber, fuel, and other non-timber products, diversifying landowner income sources, while promoting greater biodiversity (MacFarland et al., 2017).

The broadly distributed nature of riparian lands leads them to be characterized as *nonpoint sources*—introducing challenges of monitoring and management that may be more easily resolved for more concentrated, *single-point sources*. Agricultural lands are the largest nonpoint source in the United States (Campbell et al., 2011). In part due to their inherent complexity (with a high diversity of ownership and management), as well as social, cultural, and legal factors, federal regulation of nonpoint sources—especially riparian areas—is relatively limited. The Clean Water Act (1972) and Washington's Water Pollution Control Act (1945) focused primarily on point sources; nonpoint sources remain a significant challenge for meeting state and federal water quality standards (Rau et al., 2015). The Clean Water Act primarily address nonpoint sources by requiring state agencies to develop water quality standards, identify impaired waters and define compliance standards (e.g. Total Maximum Daily Loads), and develop state programs to address nonpoint sources, providing both financial and technical resources towards those ends. In Washington State, the Department of Ecology is ultimately responsible for setting water quality standards and ensuring that they are met (ibid).

3 Incentive Programs: a Framework

A common metaphor for the distinction between incentives and regulatory approaches is “carrots versus sticks.” Incentives are intended to encourage innovation, participation, cooperation, or simply compliance in exchange for some form of benefit (i.e. carrot). Although self-interest may not be the main factor driving activities which produce benefits beyond property boundaries, there is generally stronger support for policies which reward good behavior, instead of penalties (Rissman et al., 2018). Of course, some approaches combine both incentives and controls, such as water quality trading.

Direct subsidies are, by far, the most common incentive mechanism. Because grants do not require landowners or other entities to assume all implementation costs, they are also more popular among participants. Loans are less common than grants, and presumably engender less support. However, given that the lifetime cost of grant programs may limit their scale (and long-term viability), there may be value in including loan programs in incentive program design.

Forestlands in Washington State are subject to the highest taxes in the country (Gordon et al., 2009), although privately held forests (voluntarily) enrolled as “Designated Forest Lands” are assessed at lower rates. Programs that include tax incentives may be appealing to landowners, although the details likely matter—where such benefits require permanent limits (e.g. permanent easements), landowner support may be more limited.

In the past few decades, market-based credit trading schemes have become an increasingly common approach to addressing a range of environmental issues, especially pollution. Dozens of water quality trading schemes have been developed nationwide, with varying degrees of sophistication and success (Musengezi et al., 2012). These include multiple wetland mitigation banks across Washington State. Part of the appeal of market-based, payment-for-service approaches is that they tend to deliver greater improvements at lower cost, and have significant support from the US Environmental Protection Agency (US EPA, 2003). At the same time, trading schemes can be complex, with significant operational costs (Abdalla et al., 2007), although the latter is often offset by overall efficiency gains. Successful trading systems focus on establishing and maintaining trust that credits represent meaningful benefits, and that those implementing environmental controls (aka “sending sites”) are appropriately compensated for their efforts.

Cost-sharing programs—usually where costs are compensated following implementation—are also very common features of riparian incentive programs (Gordon et al., 2009; Wisconsin DNR, 2020; FSA, 2022; VDCR, 2022; NRCS, 2024; WCC, 2024; OCC, 2024). While they may be more scalable than grant programs (since public obligations are only a portion of implementation costs), they may have higher reporting and monitoring costs. Also, the documentation requirements may impose a relatively greater burden on smaller-scale landowners (at least on a per-acre basis).

Easements compensate landowners for voluntarily restricting land use. They can be permanent or temporary, with the latter typically designed as multi-year contracts. Many market-based trading schemes include an easement element. Some landowners may be more comfortable entering into temporary easements, as these allow them greater flexibility in the future and are often seen to have less impact on property values. The potential to generate periodic income with repeated temporary easement agreements may also have appeal.

Some landowners supportive of larger programmatic goals may lack the expertise to develop and implement riparian protections. To support landowners and promote project effectiveness, many programs include a technical assistance component. As an enabling element, technical assistance may be considered a relatively weak form of incentive—critical, but often insufficient to drive large-scale change, without additional supporting incentives.

Table 1: Riparian Incentive Mechanisms

Mechanism	Political Factors	Pragmatic Factors	Stakeholder Factors
Grants, loans	Budget priorities	Sustaining funding over time	Direct payments tend to be more appealing to landowners

Mechanism	Political Factors	Pragmatic Factors	Stakeholder Factors
Tax breaks	WA has a high forestland tax burden	DFL status may contradict long-term riparian protection	Deferred benefit, may not fully offset costs
Payment for Service (e.g. Water Quality Trading)	Federal support and examples in other states; WDOE assessing feasibility within WA state	Complex regulatory processes, rigorous monitoring to build trust, maintaining and operating trading system	Diversifying income sources; framing may have equity implications (e.g. upstream-downstream benefits and burdens)
Cost-sharing	More “acceptable” subsidies	May have higher reporting and monitoring costs relative to grants	Paperwork requirements can be substantial, especially for smaller participants
Easements (permanent)	Permanence may be seen as regulatory in nature	Higher initial costs	Landowners may avoid permanent commitments
Easements (temporary leases)	More acceptable, as allows for future policy shifts	Improvements are impermanent	Long-term flexibility may appeal to landowners
Technical assistance	Can build on existing institutions	Critical, but insufficient	Individual priorities, knowledge

4 Flagship Programs Beyond Washington State

4.1 NYC: Securing watershed health to provide drinking water to millions

Facing \$6 billion in construction costs and \$300 million in annual costs to build and operate a new filtration plant, the City of New York developed the Watershed Protection Program in 1997 to provide financial incentives to upstate farmers and forest landowners (NASSEM, 2020). It invested \$2 billion in conservation easements, riparian restoration, and fee-simple land purchases to protect over a third of its watershed (Parker et al., 2013), with an end goal of reliably supplying drinking water to millions. The program included a variety of mechanisms and engagement approaches to support communities in implementing best management practices, while ensuring sustained community involvement and stewardship. It includes three sub-programs with components of establishing riparian buffers: the Watershed Agricultural Program (WAP), the Stream Management Program (SMP) and the Forestry Watershed Program (FWP).

Although focused primarily on reducing pollution, the WAP demonstrated the importance of relationship-building with landowners. Alongside CREP payment structures (renting land and cost-sharing with farmers who establish or restore riparian buffers), the WAP Council worked directly landowners to draft management plans and conduct inspections, continuously ensuring that landowners were satisfied at each step. A key performance metric was landowner re-enrollment in the CREP, through which the Council could continuously monitor how landowners willingness or ability to sustain engagement in the program.

Secondly, the SMP funded 230 riparian buffer projects, out of a total of 376 stream management projects. Among these, the *Catskill Streams Buffer Initiative* was exemplary for its collaborative approach in bringing together Soil and Water Conservation Districts with private landowners. In addition to outreach, training and recruitment efforts, a key success factor was providing tools and guidance to landowners to design buffers.

Lastly, the FWP helped to administer a range of tools for private forest landowners to protect water quality and conserve forest land, reducing harvest activities immediately adjacent to streams. The FWP

was a broad effort, including financial incentives, educational workshops, and both state and federal programs, including federally funded social and economic viability programs. The owners of forestlands were targeted due to their outsized role in mitigating water quality impacts. They were reimbursed for the time and materials necessary to implement BMPs, based on a fee schedule and field inspections.

Farm or forest owners enrolled in either of the Watershed Agricultural Council (WAC) conservation easement programs were also required to work with the FWP (NASEM, 2020). In fact, one of the overarching successes of the NYC experience was ensuring each program reinforced the other.

4.2 Oregon: linking downstream customers and upstream landowners

The McKenzie River Watershed in Western Oregon is the source of drinking water for residents of Eugene and Springfield. Hundreds of structures have been built alongside the waterway within the last half-century, leading to increased nutrient and pesticide runoff, impervious surfaces, contamination from septic systems and the loss of riparian vegetation (Parker et al., 2015). In 2012, Earth Economics conducted an economic valuation study of the McKenzie Basin, estimating the total value of all its ecosystem services to equal between \$248 million and \$2.4 billion (Schmidt and Batker, 2012). Shortly after, the Eugene Water and Electric Board (EWEB) developed the Voluntary Incentives Program (VIP) pilot to compensate landowners who maintain healthy riparian forests. Incentives included cash payments and vouchers for in-kind services (e.g. landscape planning, riparian plantings); the program supported riparian vegetation management, education, restoration, and building trust with landowners.

Surveys gaged the level of support among both ratepayers and landowners for watershed protection and found that 80% of ratepayers indicated that they were supportive, expressing a willingness to pay up to \$1/month in fees, though less than half of landowners in the watershed were interested in participating in a voluntary conservation program. Landowner support tended to be higher for programs focused on water quality and habitat protection, as opposed to habitat restoration or carbon storage and sequestration.

With a high level of coordination between agencies, the VIP offered three action pathways to landowners (protection, restoration, or a mix of both) while minimizing administrative costs. Continuous communication with landowners ensured that the program committees understood their motivations for participation, as well as their future land use goals (Parker et al., 2013). Trust with landowners was strengthened by emphasizing accessible terminology, respecting personal data and privacy, engaging participants personally, and ensuring that program expectations were fully understood. By offering alternative pathways for participation, the program committees emphasized inclusivity and flexibility.

The pilot revealed several lessons about motivating and retaining landowners participation: 1) landowners with stronger connections to the watershed were more willing to participate; 2) of the implementing organizations, landowners trusted EWEB and the local non-profits most of all; 3) landowners wanted more information before deciding to participate; 4) landowners generally prefer shorter contract lengths (less than 10 years); and 5) support for the program was tied to payments to landowners and the reasonableness of fees for customers (Bennett et al., 2014).

4.3 Successful water quality trading systems

The primary federal tool for regulating water quality is the Clean Water Act (CWA). The US EPA delegates responsibility for specific water quality standards to states, who define Total Maximum Daily Load (TMDL) limits for a range of pollutants, including excessive temperatures. While the CWA is largely limited to regulating point sources, since the early 1990s, it has supported emissions trading systems that allow nonpoint source reduction credits to be transferred to point sources with higher compliance costs (US

EPA, 2011). Trading can be achieved through a variety of market mechanisms: exchanges, clearinghouses, direct contracts, and sole-source offsets (e.g. wetland banking). Because riparian management is often more of the most cost-effective ways of improving water quality, trading offers considerable potential to fund riparian improvements. However, trading schemes involving nonpoint sources represent a relatively small share of all market-based approaches.

Musengezi et al (2012) assessed multiple emissions trading systems, focused on identifying factors common to program successes and failures. Because much of the benefits of riparian stewardship accrue to downstream residents and utilities, farmers and ranchers have less incentive to improve water quality, and market-based instruments are designed to remedy this imbalance, at least in part. Trading also allows landowners to diversify their income sources within riparian zones.

These emissions trading schemes combine elements of both sticks and carrots—TMDLs serve as a regulatory pressure for point sources, who then produce incentives for nonpoint reductions (i.e. purchasing credits from landowners). Most focus on reducing nonpoint nutrient pollution (primarily nitrogen and phosphorus), although some address TMDLs for temperature, sediment, and dissolved oxygen. The savings can be considerable—the Clean Water Services project (Tualatin River, Oregon) saved water utilities \$42 million in stream cooling costs during its first five years. Some benefits can be expected to increase over time, as restoration projects (especially those involving planting trees within riparian zones) only produce their full benefits over time, sometimes as much as two decades after initial implementation.

The voluntary nature of nonpoint source reductions has led some programs to adopt higher standards, to ensure that water quality improvements are achieved (Rahr Malting Company Trading Company, Minnesota). The ability to “shift” emissions from one location to another is another concern—for the Long Island Sound Nitrogen Credit Exchange (Connecticut), regulators applied distance multipliers to offsets, so that nonpoint reductions nearer to credit-purchasing utilities count for a larger reduction than those more-distant. This approach retains flexibility for program participants, while still protecting local water quality (Musengezi et al., 2012).

Overall, the more-effective partnerships engaged stakeholders in the early stages of developing a water trading program—including regulators, potential buyers, ranchers, credit brokers, and verification agents. Because nonpoint sources tend to be (by definition) more-dispersed, participation costs can be reduced through the formation of consortiums. The effort required to understand program features, identify trading partners, and report implementation or performance can all discourage participation. Consortiums can help to streamline seller search and reporting processes. Third-party brokers and credit registries can also help to reduce such costs, by pooling credits across landowners to create a single point of contact for buyers.

5 Washington State Programs

5.1 Overview of Voluntary Incentive Programs

A recent report evaluated the effectiveness of voluntary incentive programs in Washington State for riparian habitat protection and restoration (Industrial Economics, 2022a). Through extensive outreach and interviews with State agencies, it assessed 24 programs that provide incentives, grants, or loans, 19 programs providing technical assistance, and three which fund riparian easements. The analysis showed that the Conservation Reserve Enhancement Program (CREP) and the Natural Resource Investments (NRI) have been the most impactful in terms of riparian buffers installed and managed. Basil et al (2021) found that program practitioners have the strongest knowledge of the Transferable Development Rights (TDRs),

the Voluntary Stewardship Program (VSP), the Public Benefit Rating System (PBRS), and state Recreation and Conservation Grants.

Key challenges and gaps include limited financing for project administration, implementation, and monitoring. For instance, Conservation Districts have lacked the resources necessary to verify compliance with grant requirements. The limited pool of funding sometimes forces Districts to compete where cooperation might yield better results. It also means that landowners sometimes find it difficult to encounter information on riparian programs. Related administrative issues include landowners having to face long waiting lists when wishing to enroll in technical assistance or easement programs. Finally, landowners often perceive buffer requirements as “too rigid,” preferring more flexible participation criteria.

The authors offer several recommendations, including increasing resources available to agencies. Because riparian restoration projects can take years (or decades) to mature, long-term monitoring remains key to assessing effectiveness and continuously improving restoration or conservation efforts. Given the longer timelines, programs should also develop contingency plans to allow for programmatic or budget changes. Many riparian projects share similar features; coordinating proposal review could reduce competition and lead to higher acceptance rates overall. Finally, they suggest that a central data repository be established to support efforts to better understand the effectiveness of best-practices and program limitations (ibid).

Basil et al (2021) similarly assessed barriers in Washington incentive programs by interviewing both county-level land-use planning and permitting staff and private landowners. They found that staff were hesitant to propose incentive programs, as landowners often perceive compliance rules as additional regulatory burdens. From their side, landowners expressed the wish for larger incentives and technical support prior to the implementation of a program. Additionally, many are unaware of how their own actions contribute to ecosystem protection and restoration, and wish to better understand the role they can serve. Earlier and better communication are needed to change the common perception that requirements for riparian incentive programs are just regulations by another name.

Table 2: Washington State Riparian Incentive Program Features

Program	Direct Payments	Loans	Tax Breaks	Cost-Sharing	Easements	Technical Assistance	Features
Conservation Reserve Enhancement Program (CREP)	●						Full implementation costs, maintenance costs for 5 years, rent for restored lands for 10-15 years
Estuary and Salmon Restoration Program (ESRP)	●						Grants (\$30K–\$150K)
Forestry Riparian Easement Program (FREP)	●						Compensation of 90% of foregone timber value within riparian buffers
Land and Water Conservation Fund (LWCF)	●						Grants (\$200K–\$2M)
Natural Resource Investments (NRI)	●					●	Grants and technical assistance for projects to improve water quality
Public Benefit Rating System (PBRS)			●				Reduced property taxes for open space
Riparian Grant Program	●			●		●	Technical assistance, cost-sharing (including maintenance), tiered incentives (grants)
Rivers and Habitat Open Space Program (WAC 222-23)					●		Permanent conservation easements
Salmon Recovery and Puget Sound Acquisition and Restoration	●			●			Grants >\$5K (design-only proposals limited to \$350K), 15% match
Salmon Recovery Funding (SRF)				●			Cost-sharing for landowner-implemented projects
TDR Exchange					●		Transferable Development Rights (permanent conservation easements)
Voluntary Stewardship Program (VSP)				●		●	Cost-sharing and technical assistance
Washington Wildlife and Recreation Program (WWRP)	○				●		Grants (≤\$500K) to support purchase of permanent or temporary conservation easements
Water Quality Combined (WQC) funding program	●	●					Grants and loans

● Central program feature

○ Enabling feature

5.2 Conservation Reserve Enhancement Program (CREP)

The CREP is a joint federal-state program funded by the USDA's Farm Services Agency (FSA), administered in Washington state by the State Conservation Commission (SCC). Landowners voluntarily enroll lands located near salmon bearing streams, planting native vegetation to lower stream temperatures and filter run-off (Rau, 2015; Industrial Economics 2022a). Participants are reimbursed for a portion of the costs to establish and maintain buffers (FSA, 2021).

CREP has been hailed as one of Washington State's most successful riparian buffer programs, with 900 miles of stream buffers planted since the program's inception and over 13,500 acres currently enrolled (Rentz et al., 2020). The program enjoys steady new enrollment, with additional habitat improvements each year. The CREP has also been found to effectively kickstart and complement city-led programs (NASEM, 2020). The widespread adoption of the program is seen as a useful guide for other incentive programs, such as those targeting carbon sequestration and storage (Rabotyagov et al., 2021).

Several best practices have been identified for the CREP, including specialized riparian technical staff, high federal standards, oversight by three separate agencies (FSA, SCC, and NRCS), a five-year funding provision for control of invasive plants and drought mitigation, and a robust monitoring capacity (Smith, 2012). However, Industrial Economics (2022a) reports several opportunities for improvement. These include: offsetting foregone profits for farmers who removing lands from production; greater contract flexibility; and reducing administrative burdens both on landowners and agencies. Additional program funding is considered necessary to improve landowner education and outreach.

5.3 Natural Resource Investments (NRI)

The NRI is a cost-share program for landowners who voluntarily implement best management practices to advance natural resource objectives, including salmon recovery, climate resilience and water quality (Industrial Economics, 2022b). The program supports and guides Conservation Districts in planning and implementation, encouraging efficiency by working with landowner groups, identifying synergies between TMDL plans, salmon recovery projects, and local resource plans (WCC, 2023). The program offers support for planning, project design, engineering, permitting, project management, administration, and oversight and reporting. From 2019–2021, the program disbursed \$3.5 million to plant 25,118 trees and shrubs and protect 25,561 feet of stream (Industrial Economics, 2022b).

Unfortunately, there is a perceived lack of funding for landowner education and outreach. County planners and permit staff have reported that the NRI is the least well-known program among landowners (Basil et al., 2021). Others have pointed to the effects of backlogs and long waitlists in limiting participation, although private landowners resistance to land use limits undoubtedly plays a role, a well (Industrial Economics, 2022a).

5.4 Forestry Riparian Easement Program (FREP)

The Washington State Legislature tasked the UW College of the Environment with reviewing how the State might increase small forest landowner interest in improved forest stewardship (Rabotyagov et al., 2021). After surveys and interviews of a wide range of stakeholders, the authors concluded that the Forestry Riparian Easement Program (FREP) is one of the more popular incentive programs in the state, although customer-facing permitting staff cite the need to understand this program better (Basil et al., 2021). As a voluntary program that reimburses non-industrial forest landowners for protecting riparian forests (to protect fish habitat), it enjoys broad support. They found that nearly half of survey respondents would also be willing to enter into conservation easements contract of \$4,663 per acre. Yet opinion as to FREP's practical benefit varied.

Landowners expressed concern that easement rules were at odds with broader conservation goals. Several landowners opted-out of the program to prioritize fire resiliency efforts on their lands. Long waiting lists are also pervasive, even though participation rates are quite low (just 4 percent of landowners have forest conservation easements). This was attributed, at least in part, to underfunding. Finally, most landowners interested in learning about the program found it difficult to access and understand the relevant information (ibid).

The authors outline several recommendations: first, the State should provide more resources to program administrators to strengthen capacity and expand landowner outreach; second, that programs prioritize dialogue, engagement and coordination between regulators and landowners; third, that licensed foresters be available to assist landowners (including site visits) with legacy conservation goals and the development of management plans; fourth, that programs expand educational resources for landowners to promote better understanding of forest and riparian health.

The proposed additional financing mechanisms, including the establishment of a carbon credit trading programs. Though the latter was frequently cited by respondents as a conservation financing mechanism, to produce high levels of benefits, the program would need to ensure that revenues would be reinvested in forest retention and restoration programs.

6 Recommendations

6.1 Flexible Design

1. Landowners tend to prefer adaptive, rather than static, management plans (CPW 2015), even if that entails plans can only be realized across decades (Gordon et al., 2009).
2. Basing compensation on performance or outcomes (measured for instance through the amount of nutrient runoff reduced) rather than a measure or approach taken can be more cost-effective, flexible and attractive to landowners (NASEM, 2020).
3. Farmers have voiced support for compensation for revenues lost by voluntarily removing riparian lands from production (Crossley, 2023).
4. Landowners tend to resist permanent conservation easements. Temporary easements lasting even up to 100 years can reduce such concerns (Gordon et al., 2009).
5. Maintaining openness in program design and function to allow for local priorities such as fire resilience (Rabotyagov et al., 2021) or ethical, altruistic motivations (Gartner et al., 2013).

6.2 Catalyzing Resources

1. Committing funding to increase outreach and education, tailored support, and sustained monitoring capacity, especially for landowners restoring, rather than conserving buffers (Parker et al., 2015; Basil et al., 2021)
2. Establishing coordinating arms, partnerships or agencies to reduce competition or redundancy of riparian buffer programs, and optimize budgets (Industrial Economics, 2022a).
3. Complementing local government with federal programs, such as in the case of New York City encouraging CREP payments, to reinforce landowner participation and retention (NASEM, 2020).
4. Partnerships between non-profit organizations, local and state agencies, and landowners can aid in preventing land fragmentation and protecting habitat corridors (Gordon et al., 2009).

6.3 Engendering Trust

1. Structured agreements between agencies and landowners to build trust. These can include: flexible program choices, and committees representing agencies and participants to continuously understand motivations, constraints, and preferences (Parker et al., 2015).
2. Incentives structured in a way that responds to landowners personally, such as offering one-on-one technical support or reimbursing fees and field inspections (NASEM, 2020).
3. Integrating tax benefits for alternative uses of land which conform with riparian buffer establishment or conservation can provide an additional incentive (Gordon et al, 2009).
4. Ensuring a strong role and resources allocated to local agency arms of a program (e.g. conservation districts) increases connection between landowners and the watershed, their connection with the implementing organization (Bennett et al., 2014) and resources for the public-facing staff (Basil et al., 2021).

Appendix A. Limitations

This report has been produced on a shortened timeline. As such, the literature review was non-exhaustive and may not capture the full breadth of active programs, projects, initiatives, partnerships and collaboratives, or historically significant precursors to those efforts. Similarly, while our initial intention was to include interviews with Conservation District leaders (e.g. Spokane’s Commodity Buffer program) and other stakeholders within Washington state, scheduling and resource limits made this infeasible within the project timeline. Accordingly, there are likely alternative approaches to incentivizing responsible riparian management that we have not identified and addressed here.

Even so, we have taken a broad approach when identifying incentives. Further research could critically assess what constitutes more enabling or driving types of mechanisms from the perspective of the recipients. Some landowners have reported that purely financial incentives can make riparian buffer management efforts shorter-lived, in contrast to more altruistic motivations (Gartner et al., 2013).

Moreover, the success of some programs is driven by largely qualitative and contextual factors (e.g. effective partnerships and enabling institutions, as well as the level of trust cultivated and engendered). This suggests that what constitutes an incentive (remunerative, compensatory, supportive, or normative) and the conditions for success may be more nuanced, requiring even broader research strategies.

Finally, discussion of programmatic and pragmatic challenges was limited in the literature. A full assessment of riparian incentive programs would include a review of the experiences and perspectives of both landowners and coordinating agencies. For instance, Industrial Economics (2022) noted a lack of grantmaking capacity for Salmon Recovery Grants as the available funds have increased. Capturing stakeholder perspectives across key programs—from landowner/conservation district/local NGO experiences with application and reporting requirements, to considerations from assessment and oversight from grantmaking and managing institutions—is beyond the scope of this current effort, but could reveal important insights into the factors key to program success.

Riparian Incentive Programs

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Appendix B. Incentive Programs

Program Name	Agency	Initial Year	Locale	Primary/Secondary Focus	Mechanism	Directed to	Reference
California Forest Improvement Program	California Dept of Forestry and Fire Protection	1978	CA	Secondary (fish and wildlife habitat, conservation practices)	Sliding-scale cost-sharing (75–90%), based on forest size	Public, private nonindustrial forestland owners	CDFFP 2024 CDFFP 2023
Clean Water Act Section 319 Nonpoint Source Management Program	US EPA	1990	Federal	Secondary (nonpoint reduction projects)	Grants, technical assistance	States	US EPA 2023
Clean Water Act Section 319 Tribal Nonpoint Source Program	US EPA	1990	Federal	Secondary (nonpoint reduction projects)	Grants, technical assistance	Federally recognized tribes	US EPA 2024, US EPA 2022
Conservation Cost-Share Program	County Conservation Districts, oversight by Oklahoma Conservation Commission	1998	OK	Secondary (soil erosion reductions)	Cost-sharing for approved practices	Landowners	OCC 2024
Conservation Reserve Enhancement Program (CREP)	WA State Conservation Commission, oversight by Farm Service Agency (USDA)	1999	Federal (WA)	Primary (restore and protect riparian habitat along salmon streams)	Full implementation costs, maintenance costs for 5 years, rent for restored lands for 10-15 years	Conservation Districts working with local landowners	FSA 2021 WCC 2024
Conservation Reserve Program, Clean Lakes, Estuaries, and Rivers (CLEAR)	FSA (USDA)	2018	Federal	Secondary (water quality practices, including buffers)	Cost-sharing for approved practices, leasing for protected riparian areas	Landowners with marginal pasture, wetlands within riparian areas	FSA 2022

Program Name	Agency	Initial Year	Locale	Primary/Secondary Focus	Mechanism	Directed to	Reference
Conservation Stewardship Program	NRCS (USDA)	2008	Federal	Secondary (conservation best-practices)	Practice-based contracts (\$4K+ per year), technical assistance	Tribes, nonindustrial private forest landowners, farmers, ranchers	NRCS 2022
Environmental Quality Incentives Program (EQIP)	NRCS (USDA)	1996	Federal	Secondary (conservation best-practices)	Practice-based cost-sharing (50–70%), technical assistance	Tribes, nonindustrial private forest landowners, farmers	NRCS 2022
Estuary and Salmon Restoration Program (ESRP)	WDFW, Recreation and Conservation Office	2006	WA	Secondary (near-shore, wetlands; dike and bulkhead removal)	Grants (\$30K–\$150K)	Federal, state, local agencies, Tribes, NGOs, private projects on Puget Sound	WDFW 2024 WRCoa 2024
Forest Landowner Grant Program	Wisconsin Department of Natural Resources	1992	WI	Secondary (planting, buffer stand improvements)	Implementation cost-sharing ≤50%	Forest landowners	Wisconsin DNR 2020
Forest Legacy Program	State agencies, funding and oversight by USFS	1990	Federal	Secondary (forest preservation)	Permanent conservation easements	State agencies, land trusts, conservation organizations and large landowners	USFS 2017
Forest Resource Trust	Secretary of State	2007	OR	Secondary (establish riparian stands, improved forest management)	Technical assistance, payments for ecosystem services	Forest landowners	OSS 2009
Forestry Riparian Easement Program (FREP)	WA Department of Natural Resources	2002	WA	Primary (retaining and improving riparian buffers, tree conservation and fish habitat)	Compensation for 90% of foregone timber value within riparian buffers	Small forest landowners	WDNR 2024
Healthy Forests Reserve Program	NRCS (USDA)	1996	Federal	Secondary (restoring, protecting riparian forests)	Permanent or temporary (30-year) easements, 10-year cost-sharing	Private landowners, Tribes	NRCS 2024
Land and Water Conservation Fund (LWCF)	Recreation and Conservation Office	1965	WA	Secondary (preserve and develop outdoor recreation resources)	Grants (\$200K–\$2M)	Special districts, state and local agencies, Tribes	WRCo 2024b

Program Name	Agency	Initial Year	Locale	Primary/Secondary Focus	Mechanism	Directed to	Reference
Maryland Conservation Buffer Incentive	Maryland DNR Forest Service	2020	MD	Primary (grass and forest buffers, limited livestock access)	Payments, (\$500–\$4.5K/ac) based on project features, ≤\$330/ac/yr maintenance costs for 5 years	Landowners	MDA 2024
Natural Resource Investments	Washington Conservation Commission	2012	WA	Secondary (salmon recovery, climate resilience and water quality)	Grants and technical assistance for projects to improve water quality	Conservation Districts working with local landowners	WCC 2023
Ohio River Basin Trading Project	Multiple partners	2009	OH/IN/KY	Secondary (water quality improvement)	Water quality trading to meet TMDL effluent limits	Power companies, wastewater utilities, farmers	EPRI 2020
Public Benefit Rating System (PBRs)	Counties, reviewed by WA Department of Revenue (Property Tax Division)	1970	WA	Secondary (open space protection)	Reduced property taxes	Landowners	WDOR 2020
Regional Conservation Partnership Program	NRCS (USDA)	2014	Federal	Secondary (habitat health, sustainable water use, productive agriculture)	Partnership agreements to support best-practices, permanent or temporary conservation easements (awards \$250K–\$25M)	Private sector groups working directly with farmers, ranchers, forest landowners	NRCS 2024
Riparian Buffer Tax Credit	Virginia Department of Forestry	2000	VA	Primary	Tax credits for 25% of the value of timber retained as a buffer (≤\$17.5K per year)	Virginia tax-paying landowners	VDF 2024

Program Name	Agency	Initial Year	Locale	Primary/Secondary Focus	Mechanism	Directed to	Reference
Riparian Grant Program	Conservation Districts (oversight by Washington Conservation Commission)	2023	WA	Primary	Technical assistance, cost-sharing, tiered incentives (grants)	Private landowners, NGOs	WCC 2024
Rivers and Habitat Open Space Program (WAC 222-23)	WA Department of Natural Resources	2002	WA	Primary	Sale of permanent conservation easements	Landowners	WDFW 2020
Rural Forest Landowner Assistance Program	Illinois Department of Natural Resources	N/A	IL	Secondary (forest stewardship practices)	Cost-sharing and technical assistance	Forest landowners	Gordon et al 2009
Salmon Recovery and Puget Sound Acquisition and Restoration	Puget Sound Partnership, Recreation and Conservation Office	2007	WA	Secondary (removal of fish barriers, replanting stream banks, creating habitat, restoring estuaries, buying pristine habitat)	Grants >\$5K; design-only proposals limited to \$350K, 15% match required.	Special districts, state and local agencies, Tribes, NGOs, private landowners, fisheries enhancement groups	WRCO 2024c
Salmon Recovery Funding (SRF)	Conservation Districts (oversight by Washington Conservation Commission)	2022	WA	Primary	Cost-sharing landowner-implemented projects	Conservation Districts working with local landowners	WCC 2024
TDR Exchange	King County	2001	WA	Secondary (eligible sending sites are broadly defined)	Transferable Development Rights (permanent conservation easements)	Landowners, developers	King County 2024a, King County 2024b
Virginia Agricultural BMP Cost-Share (VACS) Program	Local Conservation Districts, oversight by VA Department of Conservation and Recreation	1984	VA	Secondary (conservation practices)	Cost-share (≤\$300K/year), income tax credits, technical assistance	Private farmland, pastures, forests	VDCR 2022

Program Name	Agency	Initial Year	Locale	Primary/Secondary Focus	Mechanism	Directed to	Reference
Voluntary Stewardship Program (VSP)	WA Conservation Commission	2011	WA	Secondary (critical areas on agricultural lands, broadly)	Cost-sharing and technical assistance	Counties and agricultural landowners	WCC 2024
Washington Wildlife and Recreation Program (WWRP)	Recreation and Conservation Office	1990 (expanded to forests in 2016)	WA	Secondary (forestland preservation)	Grants (≤\$500K) to support purchase of permanent or temporary conservation easements	Local governments, NGOs, salmon recovery leads, special purpose districts, state agencies, tribes	WRCO 2024a
Water Quality Combined (WQC) funding program	WA Dep of Ecology	N/A	WA	Secondary (non-point source pollution, riparian buffers eligible)	Combines state and federal funding sources to offer grants and loans	Local governments, special districts, conservation districts, and tribes	WDOE 2023
Watershed Agricultural Program (WAP)	NYC Department of Environmental Protection	1992	NY	Primary (riparian buffers, livestock exclusion)	Subsidies for best-practices	Private farmland	NYDEC 2024
California Forest Improvement Program	California Dept of Forestry and Fire Protection	1978	CA	Secondary (fish and wildlife habitat, conservation practices)	Sliding-scale cost-sharing (75–90%), based on forest size	Public, private nonindustrial forestland owners	CDFFP 2024 CDFFP 2023
Clean Water Act Section 319 Nonpoint Source Management Program	US EPA	1990	Federal	Secondary (nonpoint reduction projects)	Grants, technical assistance	States	US EPA 2023
Clean Water Act Section 319 Tribal Nonpoint Source Program	US EPA	1990	Federal	Secondary (nonpoint reduction projects)	Grants, technical assistance	Federally recognized tribes	US EPA 2024, US EPA 2022

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Appendix C. Annotated Bibliography

Source	Locale	Notes
Barnes et al 2017	OK	Brief mention of BMPs potentially eligible for NRCS support through the Environmental Quality Incentives Program (EQIP), detailed in Table 2 (p 23). Dollar amounts mentioned for what landowners received and cost share rates for different practices. General management strategy practices.
Basil et al 2021	WA	Detailed account from interviews around interaction between county land use planning and permitting staff and private landowners for land conservation. Direct, transparent and varied feedback and perceptions from landowners around challenges and best-practices for voluntary land protection and restoration programs. Context is around Puget Sound Partnership recovery goals and to reduce conversion of ecologically important lands. Recommendations included.
Bennett et al 2014	OR	Summary of EWEB customer opinions on incentives program: in favor for program in modest amount; role of connection to the watershed; trust in non-profits; importance of being informed.
Blair 2000	OR	EWEB public document including incentives mentioned in the context of septic systems (inspection). The McKenzie River is/was 303(d) listed, with a TMDL for temperature. Oregon's DEQ identified ten program elements necessary for successful nonpoint source control / watershed management programs, which include cost-share assistance and incentives for "watershed enhancement activities on private lands; coupled with contractual agreements by landowners to maintain the enhancements for an extended period."
Blue River Foundation 2019	OK	No clear focus on riparian buffers or areas. However, analysis of Conservation Innovation Grants and Environmental Quality Incentives Programs under umbrella NRCS, which are broadly pertinent.
Campbell et al 2011	OH	Evaluating the impact of grassroots, farmer-initiated watershed groups and collaborative partnerships on the adoption of best management practice. Critical analysis of the role of collaboration: "One interpretation of these results is that collaboration doesn't necessarily outperform traditional methods of promoting agricultural BMPs throughout a community, although it can increase BMP adoption among those participating in the collaborative effort."
Chan et al 2015	WA	Survey of Puget Sound residents showing significant WTP for riparian restoration; assessment of farmers' attitudes towards riparian buffers in Snohomish County and voluntary programs: motivated by possibilities for land improvement; a sense of stewardship; and the availability of technical, labor and financial assistance. More likely to adopt if: Flexibly structured incentive programs
Diaz et al 2018	WA/OR	Comparison of FSC and FPA rules impact on riparian protections. Economic policy suggestions for encouraging more sustainable forestry practices such as higher premiums for carbon storage and by extension riparian protection. Recommendation of FSC as cost-effective program to encourage carbon sequestration and by extension water quality and habitat improvement.

Source	Locale	Notes
Edmonds et al 2013	GA	Objective of securing healthy forested watersheds to provide clean water supplies to residents and reduce flood risks. Review of federal and state technical assistance, cost-share and financial incentive programs for private landowners protecting forests, as well as state, county and federal tax advantages of conservation easements. Assessment of payments for watershed services schemes involving downstream communities investing in upstream forestland protection. Case studies mentioned, e.g.: "Raleigh has invested more money into land protection outside than inside of its own boundaries. This investment is paying off: for every \$1 invested by the utility, \$17 worth of land is protected."
Ergler 2024	PA	One-page information for landowners to submit application for Riparian Buffer incentive program. Terms of agreement specified, including rates: "Payments will be paid on a per acre basis, with up to \$6,000 per acre and \$1,000 for maintenance during the first year."
EWEB 2015	OR	To value healthy riparian areas, the Voluntary Incentive Program rewards landowners for management practices that benefit water quality. Copies various components of CPW 2013 referenced above. Section on benefits of the program: alignment of funding from multiple sources in a focused geographic area and development of centralized fiscal management services". Value of increasing dividends over time to dial-in the price point that significantly increases landowner participation: \$100-150/acre. Review of available funds to support program.
Fisher et al 2016	USA	Framework for agricultural and conservation organizations, publicly-owned treatment works, and municipalities focused on reducing agricultural nonpoint source pollution (specifically nutrient reduction, not riparian buffer) for engaging farmers and other stakeholders, with a transferable "pay-for-performance" model. Useful for proposed financial mechanism and lessons learned for developers, however price is based on pound of nutrient or sediment loss reduction. Review of Pay-for-performance programs for nonpoint source pollution, however unclear whether these employed riparian buffers. "Farmers tend to appreciate the Pfp approach because of its focus on the economics of the farm and the performance of the conservation activity. In practice-driven cost-share programs, farm economics are not typically considered".
Gartner et al 2013	USA	Review of successful forest-based water management efforts to provide clean and abundant water at reduced cost with a suite of co-benefits, including recommendations for engaging landowners in natural infrastructure programs. Sections on "Engaging landowners", considering financial incentives against ethical, altruistic, or civic considerations. Ensuring flexibility, "recognizing and valuing the local knowledge of landowners, respecting their sense of pride, and providing positive feedback [...] Programs that are able to create a sense of community [...] may increase a landowner's desire to join the group". Note: EE contributed to this report.

Source	Locale	Notes
Gordon et al 2009	WA	Review of state, federal and incentive programs by type (Cost Share; Technical Assistance; Direct Payment; tax credits; Voluntary management agreement; purchase of development rights; revenue bond purchase) including other states. Critical assessment of programs: e.g. "riparian buffers disproportionately affected small landowners because they could not spread the impact over a larger area as could owners with larger properties"; " net result of these "mitigation" programs is a sense that early and/or lucky applicants are partially kept whole while many landowners simply absorb the costs of providing public benefits". "Washington Conservation Markets Study (2009) evaluates the feasibility of conservation markets in Washington to pay farmers and foresters for environmental benefits from conservation projects on their land." Whole section on landowner responses to incentives.
Highland Economics LLC 2019	OR	Review of methodologies for valuing environmental benefits of agricultural conservation practices (amenities, water quality, habitat, and carbon) that meets Oregon Agricultural Heritage Program criteria (grant program) to structure compensation methods for landowners. This paper is about <i>how to quantify</i> benefits, more so than <i>how to get farmers</i> to change their practices.
Industrial Economics 2022	WA	Systematic review and analysis of state voluntary and regulatory programs for riparian habitat conservation with recommendations to enhance their effectiveness, utilization, and outcomes. Key ones include the Conservation Reserve Enhancement Program, Forestry Riparian Easement Program, Voluntary Stewardship Program, and Salmon Recovery and Puget Sound Acquisition and Restoration Funding. Extensive repository to reference programs.
Johnson et al 2015	OR/WA	Reviews of some incentive programs as brief paragraphs. Table 2 (p 352) lists Landowner assistance programs administered in 1999 by federal agencies to aid private landowners in managing properties for improved environmental quality. "However, biologists working with private landowners must recognize that successful programs for enhancing wildlife habitats on private lands will depend on the landowners' personal interest and sense of stewardship." OBP published a booklet that discusses incentives, their strengths and weaknesses (<i>Stewardship incentives: conservation strategies for Oregon's working landscape</i>)
Johnston 2012	NM	Review of mechanisms to protect/enhance riparian areas: land use conservation tools including acquisition, transfer of development rights, and purchase of development right /conservation easement. Highlighting challenges and opportunities for each. " When the residents were asked if they would voluntarily support a TDR program to promote conservation, many of the responses were favorable although there was skepticism about the effectiveness of such a program [...] Conservation easements are probably the most practicable mechanisms." Review of funding programs and what costs they cover.
Klapproth and Johnson 2009	IL/MD	Examples from different states of incentive programs for riparian buffers, notably Illinois (cost-sharing) and Maryland (Reserve Program) and associated challenges and best-practices for adoption. "A number of studies have examined the relationship between individuals' personal beliefs and their adoption of conservation practices." "Buffer incentive program participant was more educated, younger, and had less farm management experience [...] many non-participating farmers would prefer to install grass buffers rather than forested buffers [...] More than half of those surveyed said economics would be the single most important factor." Importance of education, technical assistance and analysis of mechanisms such as cost-share, land retirement, tax incentives, etc.

Source	Locale	Notes
Kline et al 2000	OR	Analysis of motivations for private forest landowners' willingness to adopt harvest restrictions to protect riparian habitat in exchange for federal income tax return. Broader aim of restoring coho salmon populations. Review of mechanisms such as tax relief or cost sharing. "Greater interest in nontimber values relative to timber values appears to indicate greater willingness among respondents to forego harvest within riparian areas to protect or enhance riparian habitat [...] analysis suggests that a significant proportion of nonindustrial private forest owners are motivated by objectives other than timber production, and for many owners, protecting and enhancing habitat for threatened or endangered species is consistent with the reasons they own forest land."
Michie 2010	OR	Cost analysis of landowners installing buffers to prevent nonpoint pollution sources from farming, forestry and urban activities, examining municipal and federal programs supporting landowners with installation, maintenance, rental payments and incentive options. Not an analysis of which programs work better than others.
Musengezi et al 2012	US/CA	Review of water quality trading programs in the US and their applicability for source water protection in California, including incentives for ranchers conserving water quality. Best practice cases (of high landowner participation and buyer engagement) highlighted. Relevance of co-benefits for ecosystem services assessed. List of market, policy and participation recommendations included. " Rangelands are best suited to point source-to-nonpoint source trading where regulated entities such as private and public utilities realize that ranchers can supply water quality credits at a lower cost than constructed water treatment plants [...] Programs need to engage all stakeholders from the start, including regulators, buyers, ranchers and third party negotiators/aggregators, credit verifiers." Role of education, technical assistance, and state and federal programs to be used as springboards.
NASEM 2020	NY	Specific points about building community interests in stream management and stewardship. Comparative analysis of riparian buffers next to other water quality improvement strategies. Critical assessment of program coordination ("the Watershed Agricultural Program is doing stream restoration projects including the construction of riparian buffers, but usually assisted by the NRCS and not the SMP staff. The SMP, for example, could coordinate with the agricultural program to advance stream restoration design strategies specifically for nutrient-laden runoff.")
NRC 2002	USA	Critical review of laws and mechanisms protecting riparian areas. Evaluation of effectiveness of Conservation Reserve Enhancement Program and Total Maximum Daily Load program (from Section 303 of Clean Water Act). Comparison of different states' riparian goals and approach. "The program is limited by its reliance on voluntary landowner participation [...] Where there have been concerted efforts to contact individual landowners to inform them of the available funding, participation increases sharply, as experienced in the Maquoketa River watershed in Iowa." Suggestions for improving legal framework included.

Source	Locale	Notes
NRC 2008	USA	Riparian buffers among long list of watershed improvement measures. Chapter 6 contains a robust assessment of watershed-based committee structures and permitting as effective approach to minimize water pollution with pertinent case studies (e.g. "Clean Water Services [...] was market-based because it had financial incentives for certain groups to participate, it was cost-effective, and it provided ancillary ecosystem services [...] For the riparian shading, they developed an "enhanced" CREP program to increase the financial incentives to rural landowners (with Clean Water Services paying the difference over existing federal and state programs)") and sets of recommendations for watershed-based implementation (pp 410; committee structure roles and responsibilities, etc.). Glossary available.
ODEQ 2006	OR	Whole chapter on water quality management plan (pp 1126; chapter 14) to implement of Total Maximum Daily Load program with the overarching goal of achieving compliance with water quality standards for temperature, bacteria and mercury. Outline of responsible parties for permitting, organization of management entities, including Oregon Department of Agriculture and Forestry's responsibility for water quality improvements on agricultural lands (Senate Bill 1010 process) and non-federal forest lands (Forest Practices Act) respectively. Details of plan for evaluating progress, involving public and using adaptative management. No case study best-practices.
Parker et al 2007	OH	Exploratory examination of land tenure variables (and tenure, farm size, farm type, farm succession, and leasing-out) as factors in conservation (including community forested buffer) adoption. "A farm that is owner operated, is of medium size and with lower off-farm income is more likely to have conservation measures implemented on it. Farms that are leased to another farmer, the owners have a high degree of off-farm income, are large (>600 acres), and are grain farms will have lower conservation adoption rates." "Development phases of agricultural watershed programs should incorporate a preliminary analysis of the social networks and structure of the farming community."
Parker et al 2013	OR	Framework for implementing Voluntary Incentives Program based on public meetings with landowners. Overall goal to maintain water quality through the protection of intact and healthy riparian areas and reward good land stewards. WTP: "ratepayers showed a high level of support for fees up to \$1/month. Ratepayer support drops off at a \$3/month fee". Projected Watershed Protection Assessment Revenue based on WTP. "Financial incentives such as cash payments or vouchers for in-kind operational support." Detailed governance and funding structure. "Dividend payments need to be substantial enough to be attractive to landowners given restrictions placed on use of their land, but reasonable to justify the expense and water quality benefits to EWEB ratepayers [...] Net present value of total payments to each landowner should not exceed the market value of the land itself". Suggested approach for structuring dividend payments. Recommendations for building productive relationships with landowners and community outreach. Best practice for drafting landowner agreements.

Source	Locale	Notes
Parker et al 2015	OR	Evaluation of incentive-based program to protect existing healthy riparian areas and restore degraded riparian forests through voluntary actions. Findings from landowner surveys: largely a success; concerns about legal liabilities, governance, coordination; assessment process can be cumbersome and time-intensive; preference for adaptive, rather than static, management plans, and for agreement explanation done in person. "A majority of pilot participants expressed that they do not need a [financial] incentive to participate in the VIP."
Partridge and Bernath 2008	WA	Detailed plan of action and recommendations for forest landowners to participate voluntarily in an offset or credit mechanism under a regional greenhouse gas cap-and-trade system: either through developers creating conservation forest, or local governments creating a marketable offset by transferring development rights to lands within urban growth areas and compensating forest landowners for the transferred rights. Relevant environmental priority is avoided conversion to non-forest cover.
Partridge et al 2011	WA	Recommendations for landowner conservation incentives to reward forest landowners for providing ecosystem services, including carbon storage and improvement of forest health; (not in-depth and not including case studies or best-practices), including design of a "payment for ecosystem services system to match desirable conservation practices on forest lands with the willingness of forest landowners to provide those practices [...] Carbon payments would be based on contract length and quantity of enhanced carbon storage. A water quality premium could be added for quantified practices beyond forest practice minimum rules related to water."
Rabotyagov et al 2021	WA	Detailed policy tools of conservation easements and current use taxation, and assessment of efficacy as forest retention tools. Carbon-related recommendations provided and recommendations for policy improvements. Survey-based recommendations from general population. Specific attitudes towards riparian buffer policies listed (from pp 112). "Respondents said they are intentionally avoiding the riparian zone in their forest management plans, with the most common reason being to avoid the risk of regulatory non-compliance". "For respondents who indicate they have been paid for their easements, only 8% express dissatisfaction with the payment". "SFLOs who are interested in learning more about the care, management, or protection of their forest lands tend to also think the public benefits their forests provide are important and overwhelmingly want to keep their forest land forested."
Rideout 2012	Canada	Review of policies governing vegetated buffers, including for North America. Focus is on effectiveness of approaches and regulations for how vegetated buffers are designed and implemented. "Manitoba has a Riparian Tax Credit program that allows farmers who make a 5-year commitment to claim \$20-\$28 per year per acre". "Maryland State Buffer Incentive Program is to establish and maintain streamside forested buffers [...] one-time incentive payment of \$300 per acre". Description of Direct payments, tax credit mechanisms.
US EPA 2011	USA	Assessment and gap analysis of different approaches by states to utilize Clean Water Act section 319 funding to implement non-point source pollution reduction programs. Mention of a few riparian buffer-specific programs for private landowners: Oregon's Department of Environmental Quality, North Carolina Clean Water Management Trust Fund, North Carolina's Environmental Enhancement Program, Virginia Department of Conservation and Recreation's Agricultural BMP Cost-Share Incentives Program.

Source	Locale	Notes
WCSSP 2013	WA	Focus is on informing, rather than incentive mechanisms, to encourage all actors, including private landowners, in the broader restoration of salmon habitat. Strategic action points for preserving marginal land for salmon (in some ways synonymous to riparian buffers): " Create and publicize an inventory of existing programs available to landowners, current programs that help preserve critical areas beneficial to salmon" with list of programs (pp. 94). Other salmon-specific strategic action points such as restoring large woody debris in streams: " Promote a better public understanding of hydrology and large woody material".
WDFW 2020	WA	Brief chapter on implementing riparian strategies through incentives, individually going through financial assistance, tax adjustment, technical assistance and recognition. Contains all relevant resources tailored specifically to both agricultural and forest landowners. Not a thorough investigation of best-practices.

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