

Pulling Together In Restoration - Phase 6

WCRRI #24-1602

Jill Silver, Executive Director
Alana Gonczar, Project Coordinator

10,000 Years Institute



PTIR Highlights

Invasive Plant Focus for Future-Proofing Watersheds

- Scotch broom – Climate, carbon, forest health, wildfire impacts
- Reed canarygrass – Cold water and fish habitat protection
- Spotted jewelweed – Responding to new invasions!

Education and Outreach

Tours, workshops, presentations, curricula, trainings, and protocols

- Peninsula and Grays Harbor Colleges, WWU, TESC, UW
- Clallam, Jefferson, Grays Harbor Conservation Districts
- WSU Streamkeepers, RFEG, and Riparian Working Groups
- Lead Entities, RFEGs, and MRCs - Restoration Project Integration
- Olympic National Forest and WA DNR Collaboratives
- Quileute and Quinault Elementary and High Schools

Building Workforce

- **25 Local FTEs in PTIR**
- NOAA Climate Ready Workforce - \$347K Proposal (need \$30M!)
- Washington Conservation Corps

Natural Climate Solutions

- Scotch Broom Biochar
- Floodplain Thinning & Interplanting

Pulling Together in Restoration

#24-1602 General Vicinity Map
10,000 Years Institute



Goals

- 1) **Increase effectiveness of invasive species prevention** and management across the coast, **addressing root causes and sources of invasions**.
- 2) **Employ, train and deploy a local workforce** for local benefit in watershed resiliency through invasive species prevention and control.
- 3) **Improve and protect habitat restoration investments** through invasive species prevention and control across watersheds and increases in **partnerships** with restoration sponsors.
- 4) Increase public, private, and agency education, funding, and **engagement in effective action** by demonstrating success in jobs in and action on invasive plant prevention and control.
- 5) Increase coastal watershed **resiliency**; ensure native plant growth and increased carbon capture in native plant communities and healthy soil.

Objectives

- 1) **Survey, prevent and control invasive plants** and their propagules in eight coastal watersheds, in forests and along road and river corridor pathways to protect landscapes, resources, and restoration investments.
- 2) **Integrate invasive species in all projects**, LE Salmon Restoration Strategies, and other relevant plans (e.g. WCSSP, Middle Hoh Plan).
- 3) **Provide data** to the public, partners, agencies, policy makers on control costs and benefits.
- 4) Demonstrate that investment in **local jobs in ISP contributes to resiliency**, and advocate for dedicated funding for **permanent place-based CCC** crews in every watershed.
- 5) Increase availability of remotely-sensed **aerial imagery to enable better planning** and **justify funding**.

WRIA

Partners

Species

20

ONP, ONF, DNR, Clallam County NWB & CD, Jefferson County CD. City of Forks, Quileute Tribe, Hoh Indian Tribe, TNC, Trout Unlimited, EFMI, private residential and forestland owners

Scotch Broom, Knotweed, Reed Canarygrass, Herb Robert, Jewelweed, Tansy Ragwort, English Laurel, Holly, Yellow- Flag Iris, Canada Thistle, Bull Thistle Blackberry, Everlasting Peavine, St. John's Wort, Queen Anne's Lace

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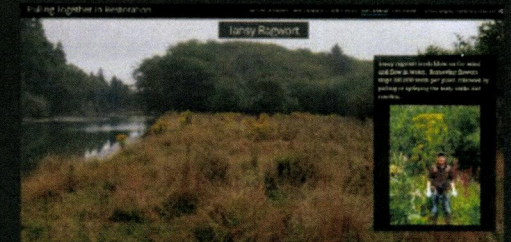
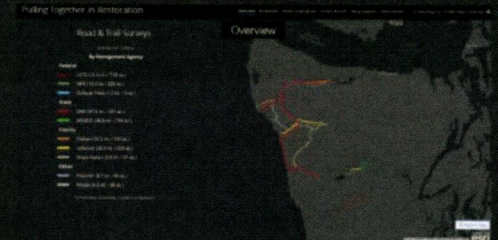
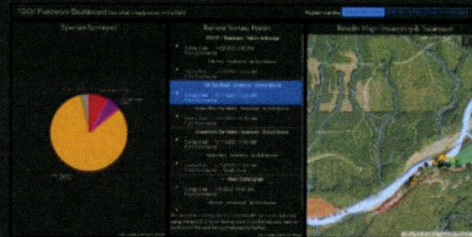
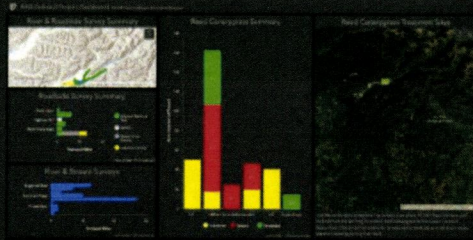
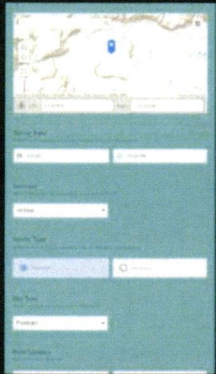
Scotch Broom, Knotweed, Reed Canarygrass, Gorse, Jewelweed, Herb Robert

Pulling Together in Restoration

#24-1602 Project & Work Sites
10,000 Years Institute



Data !!!



Collect

Crews collect data using mobile devices and GIS applications.

Communicate

GIS data is collated in site specific dashboards on the web, giving the public and partner organizations a direct near-real-time look at the work done.

Change

PTIR data tells a story that other agencies can grow with. We provide regular deliverables to numerous agencies for integration into their programs and practices.

10,000 YEARS INSTITUTE

Building the Coastal Conservation Corps Workforce



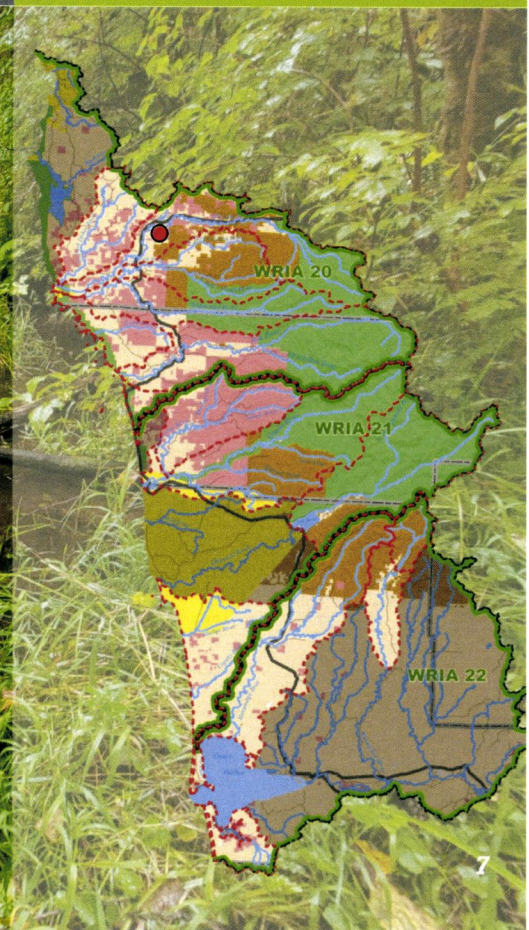
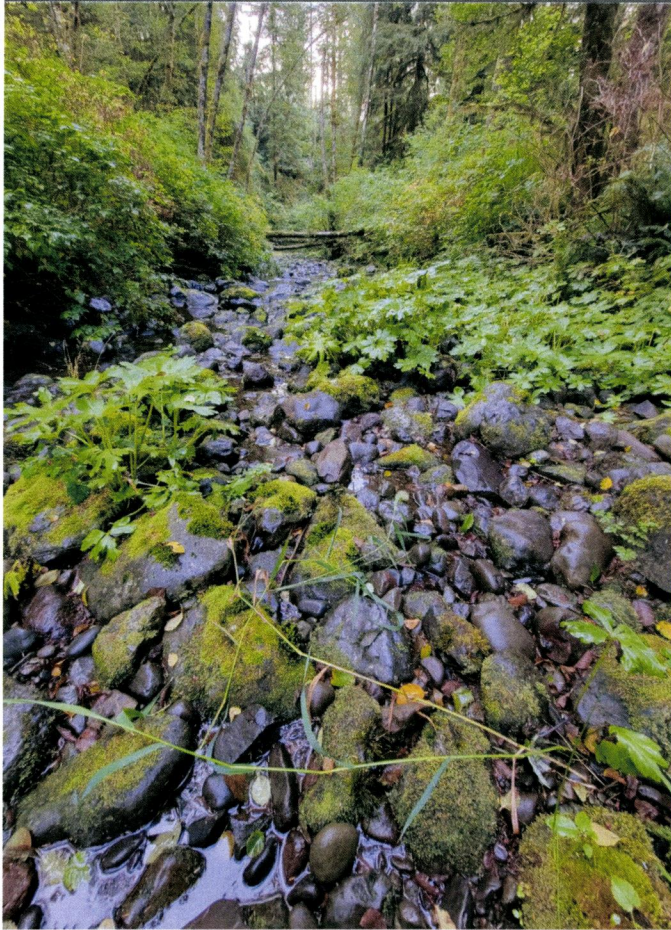
Bockman Creek Reed Canarygrass & ISP

Wild Salmon Center, ONF

River Miles 18.5

Acres 181

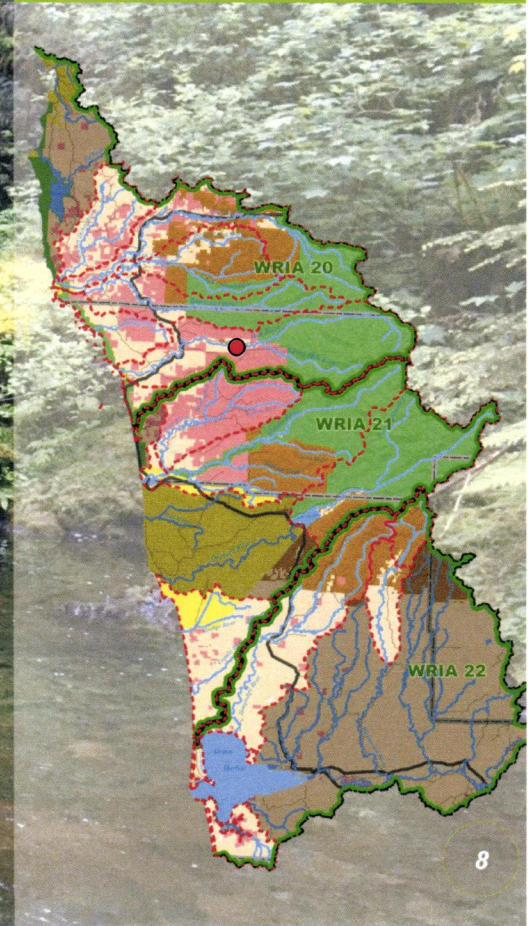
Total Treated 15



Owl Creek Invasives – WCRRI # 20-2021

Trout Unlimited, TNC, DNR, DFW, Hoh Tribe

River Miles	3
Acres	2.74
Total Treated	0.3



Goodman Creek – Reed Canarygrass

Pacific Coast Salmon Coalition, ONP, DNR, EFMI

River Miles 14

Acres 2.0

Total Treated 0.8



Quillayute Historic Oxbow – Reed Canarygrass

Quileute Tribe, ONP, EFMI, WCC

River Miles 1.75

Acres 84.8

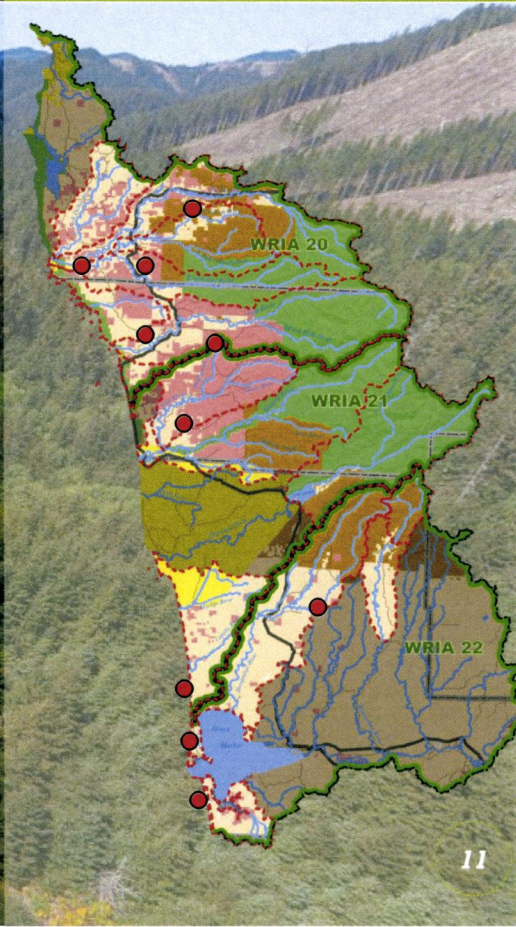
Total Treated 34



ALL OVER – Scotch Broom

Tribes, ONP, ONF, WA DNR & State Parks, Counties, Cities, TNC, EFMI

River/Road Miles	30/45
Acres	4000
Total Treated	1,421



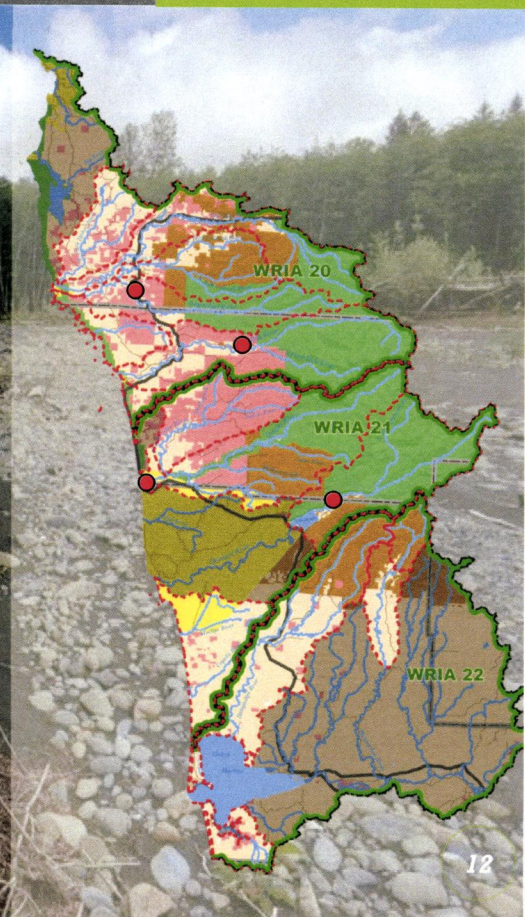
Bogachiel, Hoh, Queets & Upper Quinault Knotweed

River Miles 47

Acres 4000

Total Treated 32.5

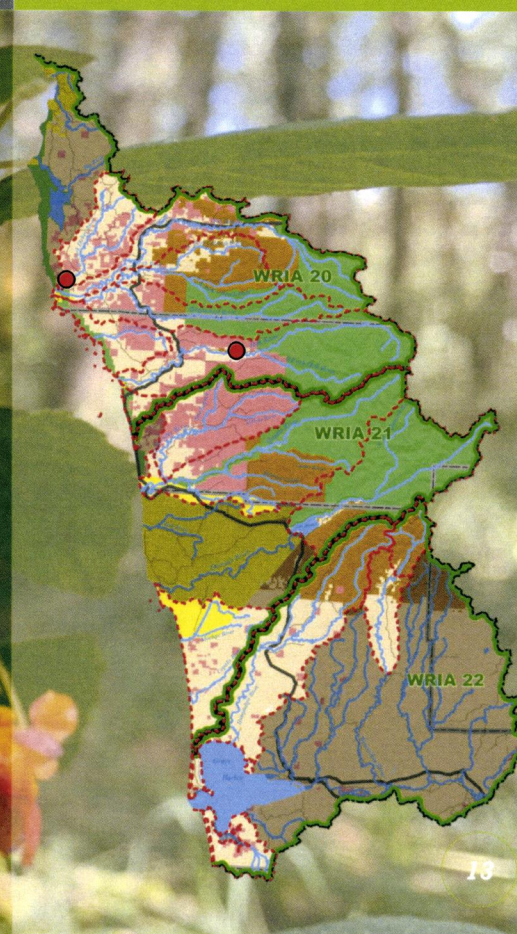
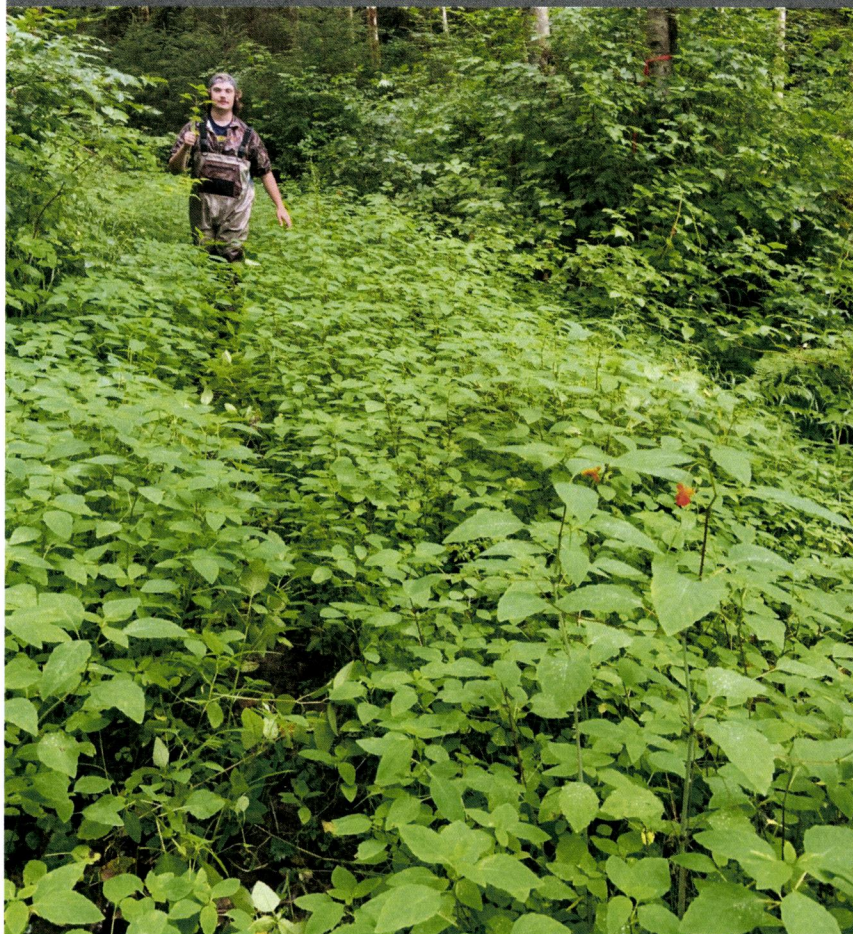
Clallam County, Quileute Tribe, Hoh Tribe, TNC, ONF, ONP, Quinault Nation,



Hoh and Dickey Watersheds – Spotted Jewelweed

Quileute Tribe, ONP, EFMI, TNC

River Miles	6
Acres	84
Total Treated	61.3



Lindner Complex Planning - # 22-1375

Upper Hoh Homestead Restoration - #23-1140

Jefferson County - Middle Hoh Resiliency Plan Invasives Integration

River Miles	20
Acres	1200
Total Treated	795



**Invasive species
prevention &
control – future
proofing for
project
protection**



**Mapping &
imagery support**



Education and Integration: Preventing Invasive Plant Spread

Risk and hazards: Invasive plant spread via streamflow, roads, equipment, hillslope processes, and weather

Species	Hazards to Habitat Type*									Propagules**	Risks by Disturbance Type*					Species
	Floodplain	Riparian	Side-channel	Instream	Gravel Bar	Wetland	Forest	Shrub/Grassland	Roadside		Erosion and Scour	Flooding/Deposition	Landslide/Slope Instability	Wind	Transportation/Construction	
Knotweeds	H	H	H	H	H	H	H	L	M	R, F/S, F/R	H	H	M to H	N/A	H	Knotweeds
Scotch broom	H	H	L	L	H	M	H	H	H	S	M to H	H	M to H	M	H	Scotch broom
Reed canarygrass	H	H	H	H	H	H	H	H	H	S, F/S, F/R	H	H	L	M to H	H	Reed canarygrass
Herb Robert	H	H	M	M	L	M	H	L	M	S	L	M	M to H	N/A	H	Herb Robert
Canada thistle	H	H	L	L	H	L	M	H	L	S, R	M	H	L	H	M	Canada thistle
Tansy ragwort	H	H	L	L	M	L	M	H	H	S	M to H	M to H	M to H	H	H	Tansy ragwort
Jewelweed	H	H	L	L	L	H	M	L	H	S	H	H	H	H	H	Jewelweed

Level of risk and hazard: High (H), Moderate (M), Low (L), Not applicable (N/A)

*Propagules: Rhizome (R), Fragment-Stem (F/S), Fragment-Root (F/R), Seed (S)

Methods to Meet the Needs

Protocol for the Prevention and Control of Reed Canarygrass

[http://10000yearsinstitute.org/s/Protocol Reed-Canarygrass 10KYI December 2021.pdf](http://10000yearsinstitute.org/s/Protocol%20Reed-Canarygrass%2010KYI%20December%202021.pdf)

An iterative protocol for best practices:

- **Protect uninvaded habitats**
- Focus on **sources, vectors, and pathways**
- Determine site issues
 - Flooding and water pathways
 - Mowing and equipment vectors
 - Beavers and animal vectors
- **Prevent seed dispersal!**
 - Collect and remove seeds OR
 - Push stems into clumps OR
 - Mow before seeds
- **Protect native species** during treatment
- Protect soil and water during treatment



Methods to Meet the Needs

Protocol for the Prevention and Control of Spotted Jewelweed

An iterative protocol for best practices, to come:

- Protect uninhabited habitats
- Focus on sources, vectors, and pathways
- Determine site issues
 - Flooding and water pathways
 - Mowing and equipment vectors
 - Beaver, elk, and human vectors
- Prevent seed dispersal!
 - Pull and remove plants before flower and seeds
- Protect native species during treatment
- Protect soil and water during treatment
- Ensure equipment washing in road and restoration or construction projects.



Biocontrol Releases for Scotch Broom

WASHINGTON STATE
UNIVERSITY
EXTENSION



BIOLOGICAL CONTROL OF SCOTCH BROOM
Pest Watch

By Jennifer E. Andreas, Integrated Weed Control Project Director
Washington State University Extension

WASHINGTON STATE
UNIVERSITY
World Class. Face to Face.

Integrated Weed Control Project

WSU Extension

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Resources

IWCP Home
Weeds
Integrated Weed Management
Biological Control Agents
By Weed
By Insect
WSU Invasive Species Team

Bruchidius villosus

[<<back](#) to Scotch broom

Common Name
Scotch broom bruchid

Weeds Impacted
This beetle attacks Scotch broom, Portuguese broom, Spanish broom, and French Broom. Larvae inhibit plant reproduction by feeding on developing seeds.

Insect Description
Adults are small (2 mm or approximately 1/16 inch), grayish beetles with short wing coverings. Eggs are clear, oblong and visible on the surface of young developing pods (see picture). Larvae are difficult to observe as they are inside the developing seeds. If found, they are very small and whitish with a brown head capsule.

Life Cycle
Adults emerge in the spring from overwintering, feed on pollen and remain active throughout the blooming period from May through June. Females glue their eggs onto small developing seed pods. Once the eggs hatch, generally one to two weeks, the larvae tunnel into seeds, feed, and then pupate within the seed coat. Generally one larva is completes development per seed. Pupation lasts from 10 to 20 days and new adults emerge in July and August when the Scotch broom pod cracks open (dehiscence).

Field Identification
Two other beetles may be found on Scotch broom flowers—a vetch bruchid (*Bruchus brachialis*) and the Scotch broom seed weevil (*Exapion fuscicorne*). *Bruchidius villosus* and *B. brachialis* can be distinguished from the weevil by their lack of a snout. *Bruchidius villosus* can be distinguished from *B. brachialis* by its smaller size and its dark-colored legs and antennae (the front legs and antennae of *B. brachialis* are yellowish).



<https://pubs.extension.wsu.edu/pest-watch-biological-control-of-scotch-broom>

<http://invasives.wsu.edu/biological/bruchidiusvillosus.htm>

Workforce Development and Training



Coastal Conservation Corps

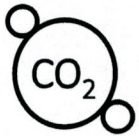
Permanent place-based conservation corps

Matches local skills and expertise with local youth in training to perform work that supports:

- Forestry
- Fisheries
- Shellfisheries
- Agriculture
- Recreation



Climate Resiliency – Natural Climate Solutions



**Carbon,
Methane,
& PM
Emissions**



Needed to Support Investments in Forest Health and Workforce Development

Research – Carbon Stocks, Seedbank, Red Alder, Nutrients, Water, Mycorrhizae...

Remote Sensing - Aerial photography in bloom and more... **10,000 Years Institute**

Waste Biomass to Beneficial Biochar



Ring of Fire Kiln

ing of Fire Kiln - <https://wilsonbiochar.com/>

S-IBI – Onsite Biochar Production and Use for Conservation Objectives

https://www.youtube.com/watch?v=sYTCvVp5bZ8&ab_channel=USBiocharInitiative

Are Flame-cap Kilns the same as Burn Barrels? **NO.**

A quick explainer in support of SSB 6121

Six key differences to know about:	Burn Barrels	Flame-cap Kilns
#1 - What is the intent of use?	Get rid of trash and convert it to ash.	Create as much high quality biochar as possible. Biochar, in addition to sequestering carbon, is a high-value soil amendment.
#2 - What inputs are put into the vessel?	Typically trash - which could include anything, including plastics. This is a big part of why they're illegal.	Clean biomass from forestry or agricultural activity, such as wo brush, and crop residue - the same materials that are regulated part of legal open pile burning. There's a big incentive to use clean material that will positively impact the quality of the biochar.
#3 - What are typical designs of these vessels?	Tall & narrow, typically using a 55 gallon drum. Air holes around bottom and base.	Wider than tall, purpose-built for biochar production. Completely sealed around the bottom by soil or metal.
#4, 5 - What impacts do air flow and flame caps have on carbon sequestration, air quality, and emissions?	With co-current air flow, sparks and embers from incinerating trash rapidly move from the bottom, up and out of the burn barrel, thanks to the constant supply of fresh air through the bottom. Oxygen & carbon meet, join as CO ₂ , and escape with other greenhouse gasses like methane.	With counter-current air flow, the fire burns at the top of the kiln creating a vortex ; little oxygen makes its way inside. Low oxygen + high temperatures enable pyrolysis , where durat biogenic carbon manifests in biochar and collects at the bottom of the kiln. The flame cap burns off combustibles like methane, plus most smoke & embers resulting in a cleaner burn and lower emission.
#6 - How does the process end ?	When the people doing the burn believe that the burn barrel is safe to leave. Spoiler alert: it's often still burning.	When the flames have subsided and hot coals remain, the biochar is quenched with water to stop the burn and then raked out to cool it quickly. ensure there are no hot spots , prevent the transition to ash, and maximize the volume of valuable biochar from the batch.
Burn Barrel Airflow and Flames – air from the bottom transports embers out of the barrel Ring of Fire Biochar Kiln® Airflow and Flames – Counter-flow air from the top keeps embers contained and flame lengths low. Illustrations courtesy of wilsonbiochar.com		
Let's get SSB 6121 to the Governor's desk!		

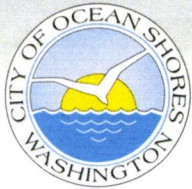
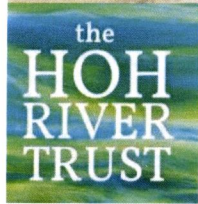
PTIR #24-1602 Budget

Category	Grant Request	Match	Total
Coordination/Supervision	\$180,500	\$ 24,000	\$204,500
Crew Fieldwork	\$830,000	\$124,800	\$954,800
GIS Services	\$126,000	\$ 3,600	\$129,600
Remote Sensing	\$ 32,000	-	\$ 32,000
Equipment/Supplies	\$109,600	\$ 2,000	\$111,600
Licensing	\$ 2,400	-	\$ 2,400
Permits	\$ 800	-	\$ 800
Education/Outreach	\$ 6,400	-	\$ 6,400
AA&E	\$ 52,000	\$ 27,000	\$ 79,000
Indirect	\$133,970	-	\$133,970
Total	\$1,473,670	\$181,400	\$1,655,070

Growing glaciers back with resilient forests and fish!



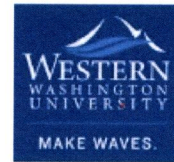
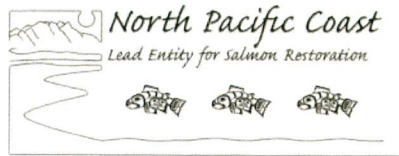
PTIR Partners, Collaborators, and Project Sponsors



CITY OF FORKS
forkswashington.org



PENINSULA COLLEGE





Thank You!

Jill Silver 

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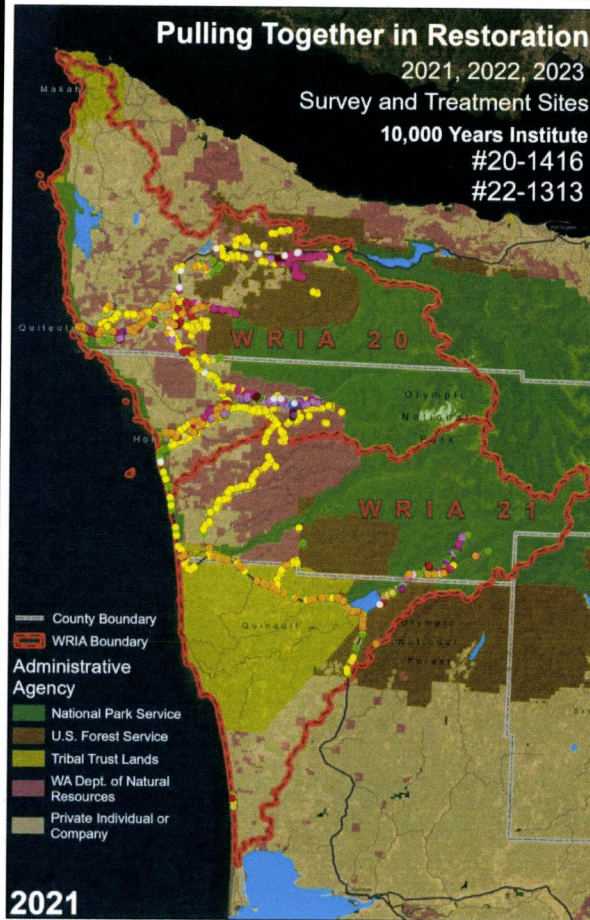
#24-1602 General Vicinity Map
10,000 Years Institute



Pulling Together in Restoration

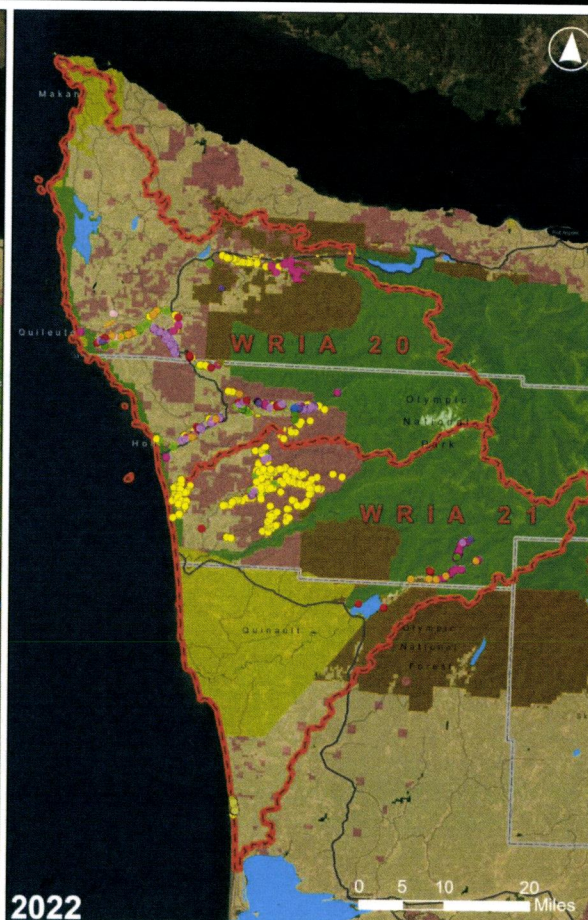
2021, 2022, 2023
Survey and Treatment Sites

10,000 Years Institute
#20-1416
#22-1313



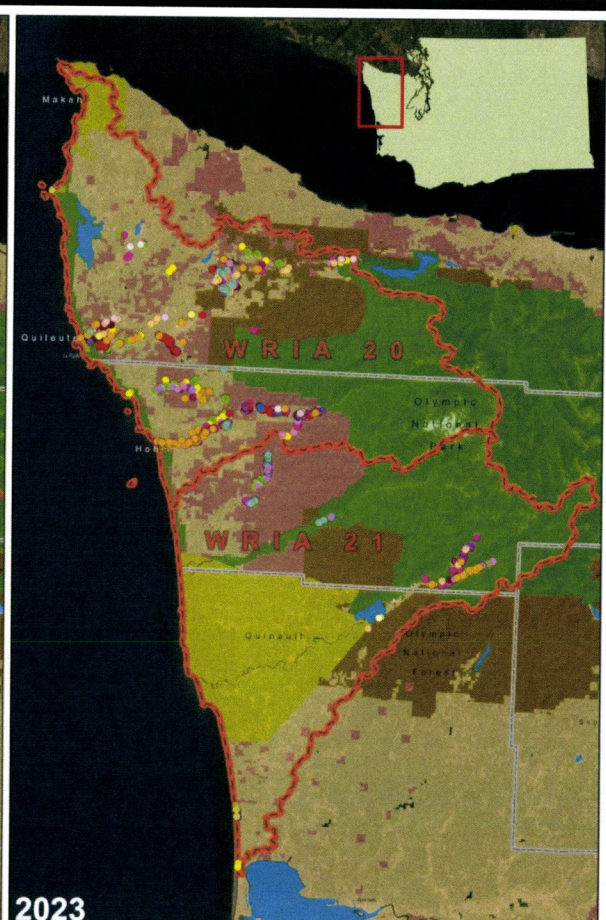
2021

Reed Canarygrass	565 Sites / 15.2 Acres	Everlasting Peavine	7 Sites / 1,237 Sq. ft.
Scotch Broom	1371 Sites / 344.9 Acres	Foxglove	10 Sites / 0.1 Acres
Herb Robert	613 Sites / 144.1 Acres	Himalayan Blackberry	26 Sites / 4.4 Acres
Spotted Jewelweed	37 Sites / 0.4 Acres	Hawkweed Spp.	3 Sites / 2,423 Sq. ft.
Knotweed Spp.	272 Sites / 1.5 Acres	Morning Glory	1 Site / 15 Sq. ft.
Bull Thistle	31 Sites / 1.0 Acres	Queen Anne's Lace	25 Sites / 1.9 Acres
Common Tansy	4 Sites / 124 Sq. ft.	Tansy Ragwort	208 Sites / 42.5 Acres
Canada Thistle	256 Sites / 34.5 Acres	Yellow Archangel	1 Site / 150 Sq. ft.
Evergreen Blackberry	14 Sites / 1.2 Acres	Yellow Flag Iris	12 Sites / 0.2 Acres
English Holly	20 Sites / 1426 Sq. ft.		



2022

Reed Canarygrass	279 Sites / 76.0 Acres	English Ivy	1 Site / 100 Sq. ft.
Scotch Broom	958 Sites / 998.4 Acres	Everlasting Peavine	1 Site / 250 Sq. ft.
Herb Robert	343 Sites / 190.3 Acres	Himalayan Blackberry	27 Sites / 6.0 Acres
Spotted Jewelweed	13 Sites / 81.1 Acres	Hawkweed Spp.	1 Site / 150 Sq. ft.
Knotweed Spp.	155 Sites / 4.3 Acres	Morning Glory	1 Site / 12 Sq. ft.
Canada Thistle	146 Sites / 3.7 Acres	Tansy Ragwort	29 Sites / 255.0 Acres
Evergreen Blackberry	8 Sites / 0.3 Acres	Yellow Flag Iris	11 Sites / 0.1 Acres
English Holly	6 Sites / 327 Sq. ft.		



2023

Reed Canary Grass	937 Sites / 172.3 Acres	Knotweed Spp.	296 Sites / 26.7 Acres
Scotch Broom	1029 Sites / 743.2 Acres	Himalayan Blackberry	96 Sites / 12.7 Acres
Herb Robert	711 Sites / 268.8 Acres	Spotted Jewelweed	102 Sites / 22.4 Acres
Bull Thistle	66 Sites / 0.7 Acres	Morning Glory	3 Sites / 0.02 Acres
Common Tansy	2 Sites / 7 Sq. ft.	Queen Anne's Lace	4 Sites / 0.28 Acres
Canada Thistle	580 Sites / 64.4 Acres	St. John's-wort	32 Sites / 0.4 Acres
Evergreen Blackberry	42 Sites / 1.5 Acres	Tansy Ragwort	195 Sites / 3.7 Acres
English Holly	34 Sites / 0.07 Acres	Yellow Archangel	2 Sites / 15 Sq. ft.
English Laurel	35 Sites / 0.4 Acres	Yellow Flag Iris	11 Sites / 0.2 Acres
Everlasting Peavine	10 Sites / 0.2 Acres	Broad Dock	51 Sites / 0.8 Acres
Foxglove	104 Sites / 14.4 Acres		

Map Data: USGS, WA DNR, GMTED2010, Earthstar Geographics

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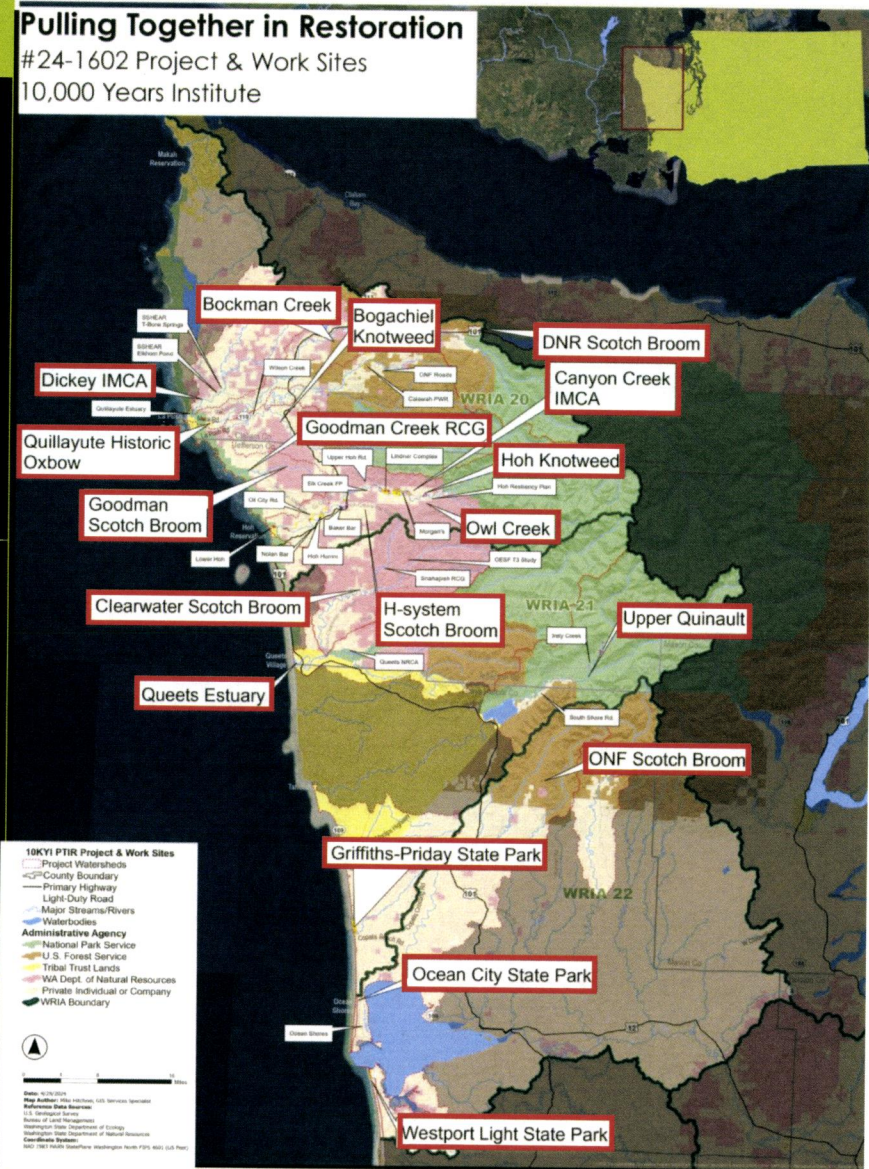
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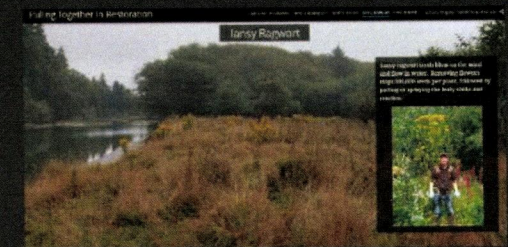
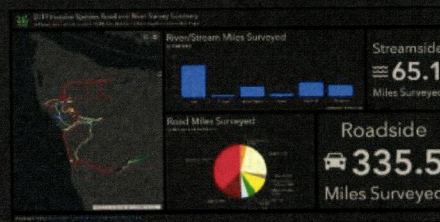
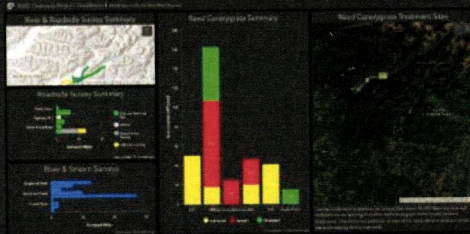
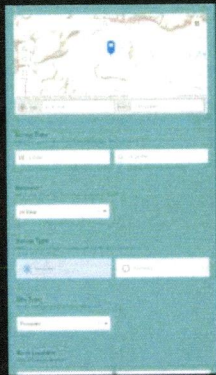
Scotch Broom, Knotweed, Reed Canarygrass, Gorse, Jewelweed, Herb Robert

Pulling Together in Restoration

#24-1602 Project & Work Sites
10,000 Years Institute



Data !!!



Collect

Crews collect data using mobile devices and GIS applications.

Communicate

GIS data is collated in site specific dashboards on the web, giving the public and partner organizations a direct near-real-time look at the work done.

Change

PTIR data tells a story that other agencies can grow with. We provide regular deliverables to numerous agencies for integration into their programs and practices.

10,000 YEARS INSTITUTE

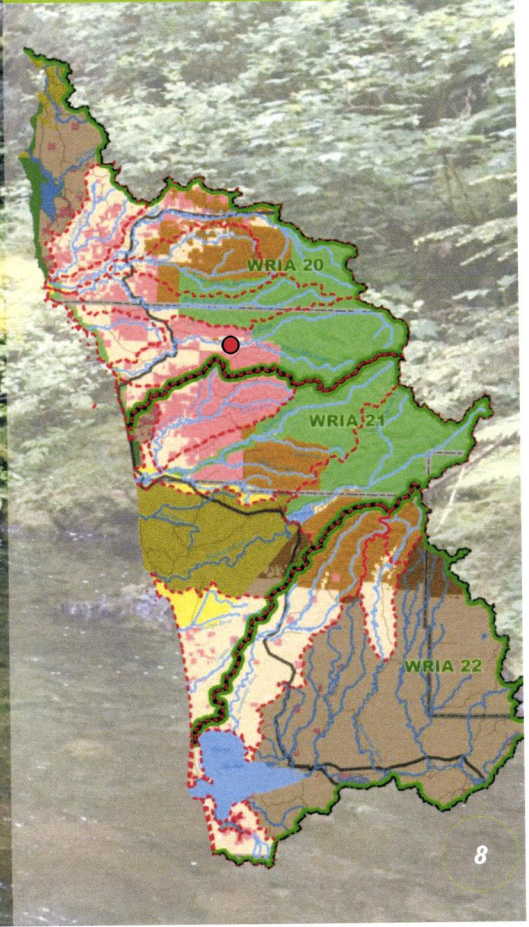
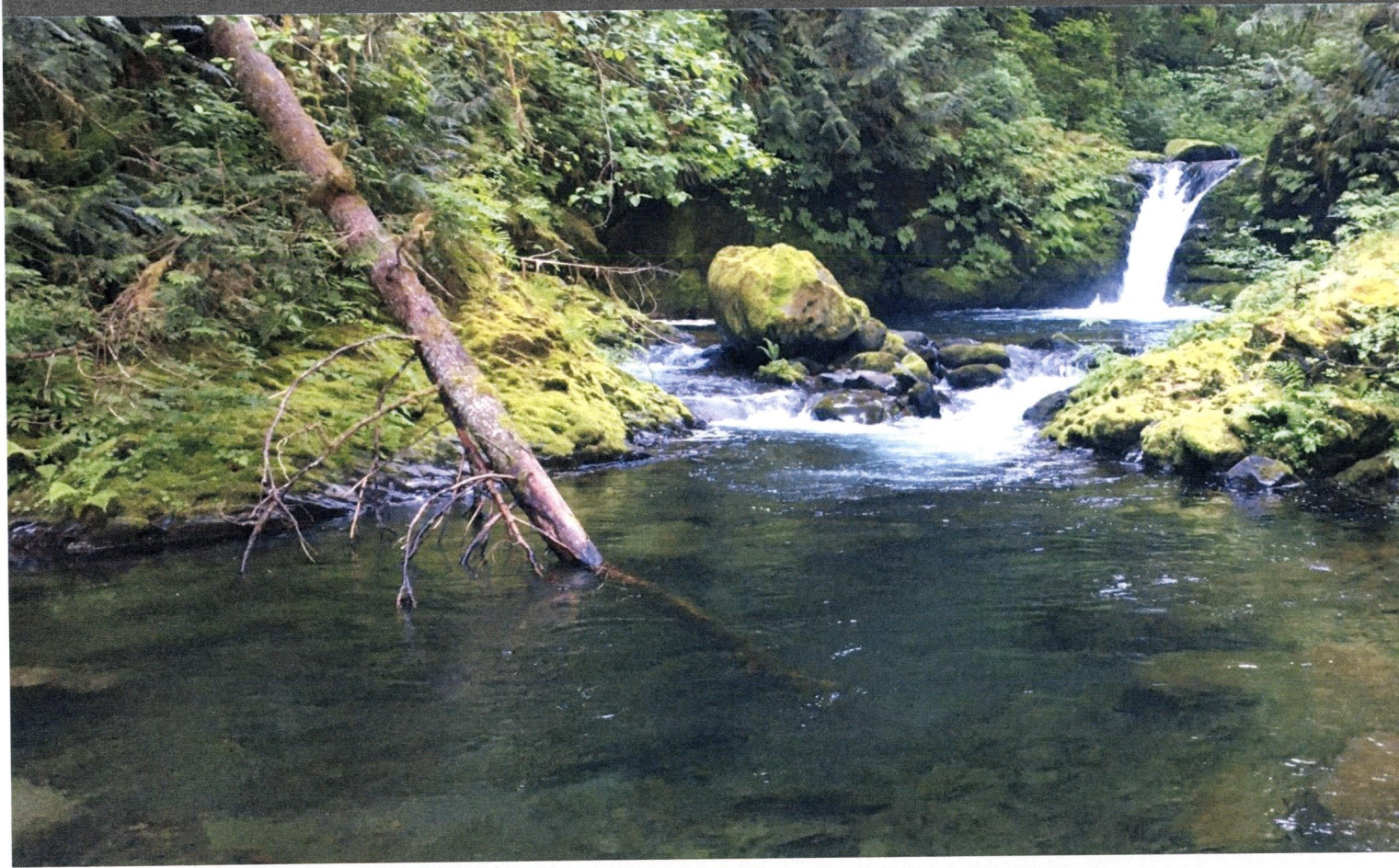
Building the Coastal Conservation Corps Workforce



Owl Creek Invasives – WCRRI # 20-2021, #22-1330

Trout Unlimited, TNC, DNR, DFW, Hoh Tribe

River Miles	3
Acres	12.74
Total Treated	0.3



Goodman Creek – Reed Canarygrass

Pacific Coast Salmon Coalition, ONP, DNR, EFMI

River Miles	14
Acres	102
Total Treated	0.8



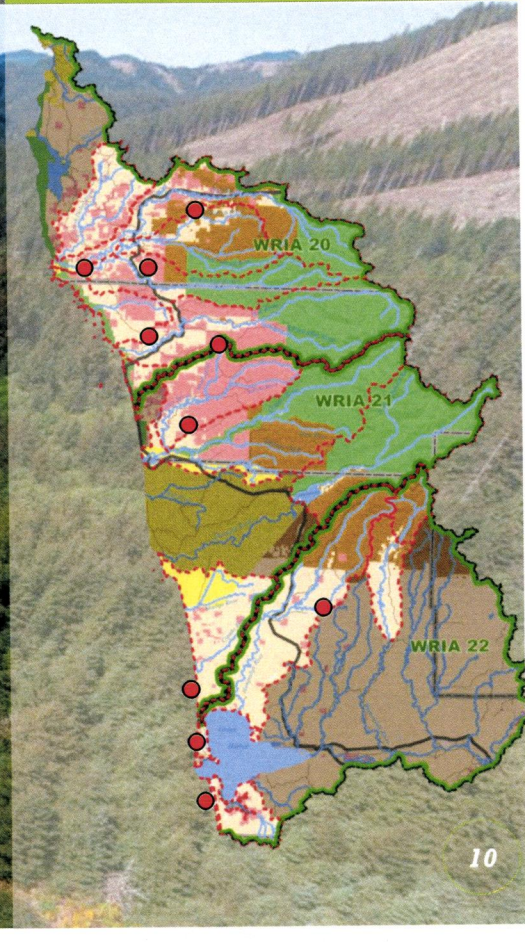
ALL OVER – Scotch Broom

Tribes, ONP, ONF, WA DNR & State Parks, Counties, Cities, TNC, EFMI

River/Road Miles 30/45

Acres 4000+

Total Treated 1,421



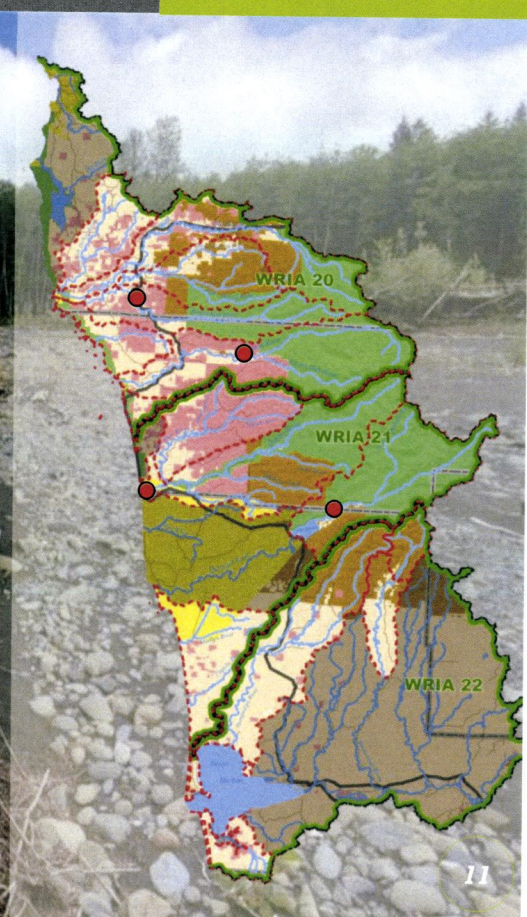
Bogachiel, Hoh, Queets & Upper Quinault Knotweed

River Miles 47

Acres 4000+

Total Treated 32.5

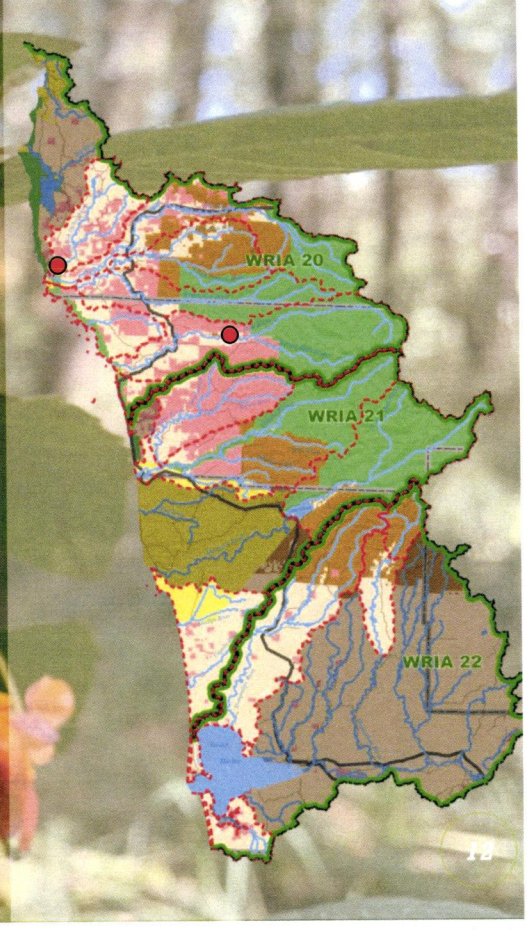
Clallam County, Quileute Tribe, Hoh Tribe, TNC, ONF, ONP, Quinault Nation,



Hoh and Dickey Watersheds – Spotted Jewelweed

Quileute Tribe, ONP, EFMI, TNC

River Miles	6
Acres	84
Total Treated	61.3



Lindner Complex Planning - # 22-1375

Upper Hoh Homestead Restoration - #23-1140

Jefferson County - Middle Hoh Resiliency Plan Invasives Integration

River Miles	20
Acres	1200
Total Treated	795



Invasive species
prevention &
control – future
proofing for
project
protection



Mapping &
imagery support



Education and Integration: Preventing Invasive Plant Spread

Risk and hazards: Invasive plant spread via streamflow, roads, equipment, hillslope processes, and weather

Species	Hazards to Habitat Type*									Propagules**	Risks by Disturbance Type*					Species
	Floodplain	Riparian	Side-channel	Instream	Gravel Bar	Wetland	Forest	Shrub/Grassland	Roadside		Erosion and Scour	Flooding/Deposition	Landslide/Slope Instability	Wind	Transportation/Construction	
Knotweeds	H	H	H	H	H	H	H	L	M	R, F/S, F/R	H	H	M to H	N/A	H	Knotweeds
Scotch broom	H	H	L	L	H	M	H	H	H	S	M to H	H	M to H	M	H	Scotch broom
Reed canarygrass	H	H	H	H	H	H	H	H	H	S, F/S, F/R	H	H	L	M to H	H	Reed canarygrass
Herb Robert	H	H	M	M	L	M	H	L	M	S	L	M	M to H	N/A	H	Herb Robert
Canada thistle	H	H	L	L	H	L	M	H	L	S, R	M	H	L	H	M	Canada thistle
Tansy ragwort	H	H	L	L	M	L	M	H	H	S	M to H	M to H	M to H	H	H	Tansy ragwort
Jewelweed	H	H	L	L	L	H	M	L	H	S	H	H	H	H	H	Jewelweed

Level of risk and hazard: High (H), Moderate (M), Low (L), Not applicable (N/A)

*Propagules: Rhizome (R), Fragment-Stem (F/S), Fragment-Root (F/R), Seed (S)

Methods to Meet the Needs

Protocol for the Prevention and Control of Reed Canarygrass

[http://10000yearsinstitute.org/s/Protocol Reed-Canarygrass 10KYI December 2021.pdf](http://10000yearsinstitute.org/s/Protocol%20Reed-Canarygrass%2010KYI%20December%202021.pdf)

An iterative protocol for best practices:

- **Protect uninvaded habitats**
- Focus on **sources, vectors, and pathways**
- Determine site issues
 - Flooding and water pathways
 - Mowing and equipment vectors
 - Beavers and animal vectors
- **Prevent seed dispersal!**
 - Collect and remove seeds OR
 - Push stems into clumps OR
 - Mow before seeds
- **Protect native species** during treatment
- Protect soil and water during treatment

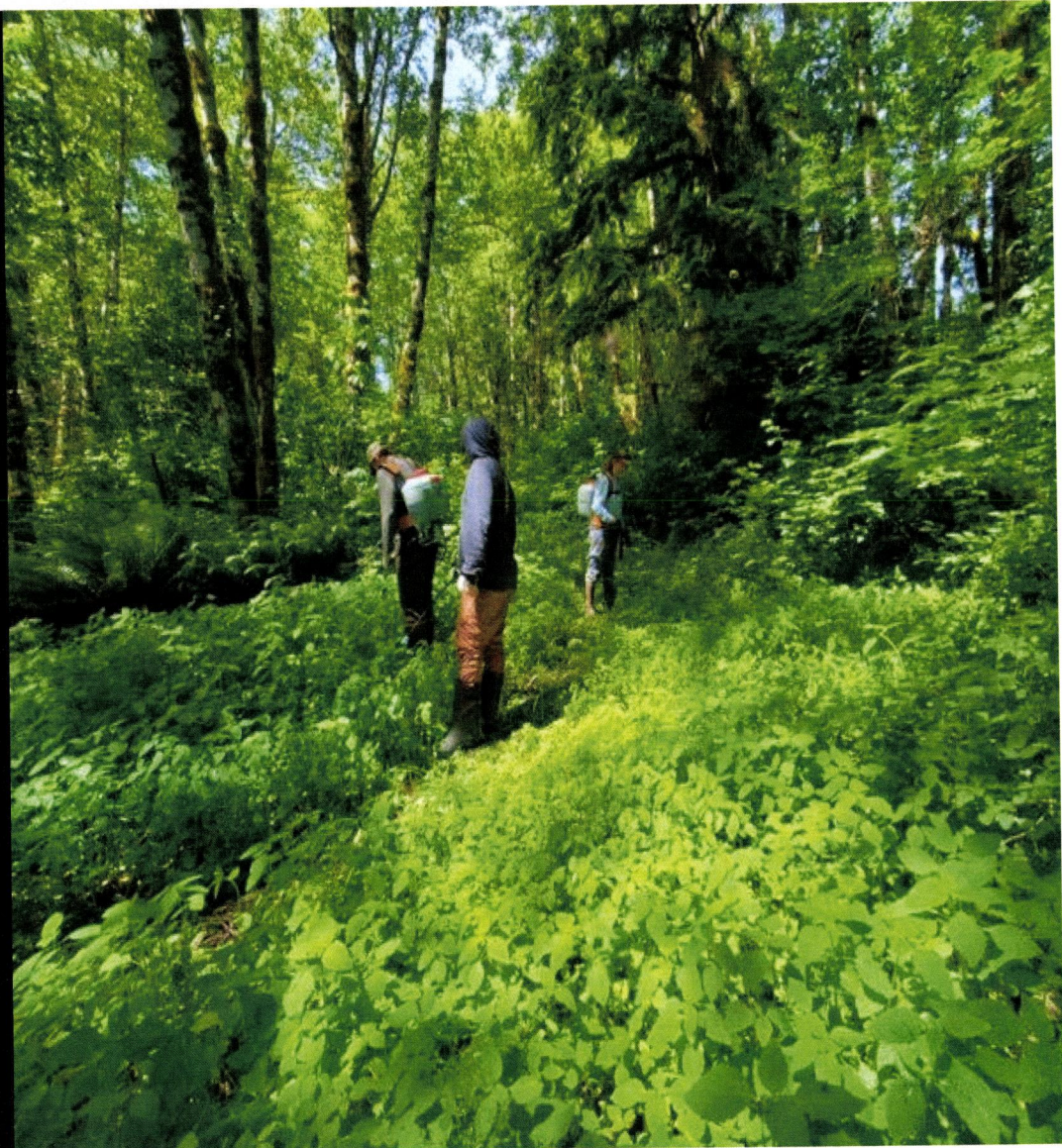


Methods to Meet the Needs

Protocol for the Prevention and Control of Spotted Jewelweed

An iterative protocol for best practices, to come:

- Protect uninvaded habitats
- Focus on sources, vectors, and pathways
- Determine site issues
 - Flooding and water pathways
 - Mowing and equipment vectors
 - Beaver, elk, and human vectors
- Prevent seed dispersal!
 - Pull and remove plants before flower and seeds
- Protect native species during treatment
- Protect soil and water during treatment
- Ensure equipment washing in road and restoration or construction projects.



Biocontrol Releases for Scotch Broom

WASHINGTON STATE
UNIVERSITY
EXTENSION



BIOLOGICAL CONTROL OF SCOTCH BROOM
Pest Watch

By Jennifer E. Andreas, Integrated Weed Control Project Director
Washington State University Extension

WASHINGTON STATE
UNIVERSITY
World Class. Face to Face.

Integrated Weed Control Project

WSU Extension

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Press Room
Resources

IWCP Home
Weeds
Integrated Weed Management
Biological Control Agents
 By Weed
 By Insect
WSU Invasive Species Team

Bruchidius villosus

[<<back](#) to Scotch broom

Common Name
Scotch broom bruchid

Weeds Impacted
This beetle attacks Scotch broom, Portuguese broom, Spanish broom, and French Broom. Larvae inhibit plant reproduction by feeding on developing seeds.

Insect Description
Adults are small (2 mm or approximately 1/16 inch), grayish beetles with short wing coverings. Eggs are clear, oblong and visible on the surface of young developing pods (see picture). Larvae are difficult to observe as they are inside the developing seeds. If found, they are very small and whitish with a brown head capsule.

Life Cycle
Adults emerge in the spring from overwintering, feed on pollen and remain active throughout the blooming period from May through June. Females glue their eggs onto small developing seed pods. Once the eggs hatch, generally one to two weeks, the larvae tunnel into seeds, feed, and then pupate within the seed coat. Generally one larva is completes development per seed. Pupation lasts from 10 to 20 days and new adults emerge in July and August when the Scotch broom pod cracks open (dehiscence).

Field Identification
Two other beetles may be found on Scotch broom flowers—a vetch bruchid (*Bruchus brachialis*) and the Scotch broom seed weevil (*Euscelinus fuscicostre*). *Bruchidius villosus* and *B. brachialis* can be distinguished from the weevil by their lack of a snout. *Bruchidius villosus* can be distinguished from *B. brachialis* by its smaller size and its dark-colored legs and antennae (the front legs and antennae of *B. brachialis* are yellowish).



<https://pubs.extension.wsu.edu/pest-watch-biological-control-of-scotch-broom>
<http://invasives.wsu.edu/biological/bruchidiusvillosus.htm>

Workforce Development and Training



Coastal Conservation Corps

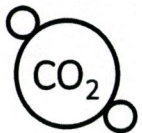
Permanent place-based conservation corps

Matches local skills and expertise with local youth in training to perform work that supports:

- Forestry
- Fisheries
- Shellfisheries
- Agriculture
- Recreation



Climate Resiliency – Natural Climate Solutions



**Carbon,
Methane,
& PM
Emissions**



Needed to Support Investments in Forest Health and Workforce Development

Research – Carbon Stocks, Seedbank, Red Alder, Nutrients, Water, Mycorrhizae...

Remote Sensing - Aerial photography in bloom and more... **10,000 Years Institute**

Waste Biomass to Beneficial Biochar



Ring of Fire Kiln

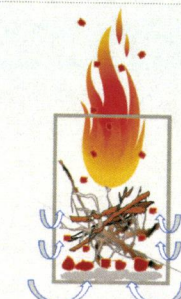
Are Flame-cap Kilns the same as Burn Barrels? **NO.**

A quick explainer in support of SSB 6121

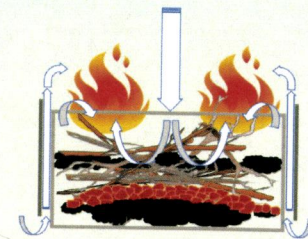
Six key differences to know about:	Burn Barrels	Flame-cap Kilns
#1 - What is the intent of use?	Get rid of trash and convert it to ash.	Create as much high quality biochar as possible. Biochar, in addition to sequestering carbon, is a high-value soil amendment.
#2 - What inputs are put into the vessel?	Typically trash - which could include anything, including plastics. This is a big part of why they're illegal.	Clean biomass from forestry or agricultural activity, such as woody brush, and crop residue - the same materials that are regulated part of legal open pile burning. There's a big incentive to use clean material that will positively impact the quality of the biochar.
#3 - What are typical designs of these vessels?	Tall & narrow, typically using a 55 gallon drum. Air holes around bottom and base.	Wider than tall, purpose-built for biochar production. Completely sealed around the bottom by soil or metal.
#4, 5 - What impacts do air flow and flame caps have on carbon sequestration, air quality, and emissions?	With co-current air flow, sparks and embers from incinerating trash rapidly move from the bottom, up and out of the burn barrel, thanks to the constant supply of fresh air through the bottom. Oxygen & carbon meet, join as CO ₂ , and escape with other greenhouse gasses like methane.	With counter-current air flow, the fire burns at the top of the kiln creating a vortex ; little oxygen makes its way inside. Low oxygen + high temperatures enable pyrolysis , where durat biogenic carbon manifests in biochar and collects at the bottom of the kiln. The flame cap burns off combustibles like methane, plus most smoke & embers resulting in a cleaner burn and lower emissions.
#6 - How does the process end ?	When the people doing the burn believe that the burn barrel is safe to leave. Spoiler alert: it's often still burning.	When the flames have subsided and hot coals remain, the biochar is quenched with water to stop the burn and then raked out to cool it quickly, ensure there are no hot spots , prevent the transition to ash, and maximize the volume of valuable biochar from the batch.

- Airflow
- Flame
- Biomass
- Embers
- Biochar

Illustrations courtesy of wilsonbiochar.com



Burn Barrel
Airflow and Flames - air from the bottom transports embers out of the barrel



Ring of Fire Biochar Kiln®
Airflow and Flames - Counter-flow air from the top keeps embers contained and flame lengths low.

Let's get SSB 6121 to the Governor's desk!

ing of Fire Kiln - <https://wilsonbiochar.com/>

US-IBI - Onsite Biochar Production and Use for Conservation Objectives

https://www.youtube.com/watch?v=sYTCvVp5bZ8&ab_channel=USBiocharInitiative

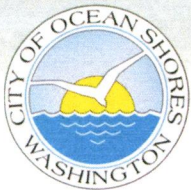
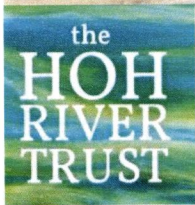
PTIR #24-1602 Budget

Category	Grant Request	Match	Total
Coordination/Supervision	\$180,500	\$ 24,000	\$204,500
Crew Fieldwork	\$830,000	\$124,800	\$954,800
GIS Services	\$126,000	\$ 3,600	\$129,600
Remote Sensing	\$ 32,000	-	\$ 32,000
Equipment/Supplies	\$109,600	\$ 2,000	\$111,600
Licensing	\$ 2,400	-	\$ 2,400
Permits	\$ 800	-	\$ 800
Education/Outreach	\$ 6,400	-	\$ 6,400
AA&E	\$ 52,000	\$ 27,000	\$ 79,000
Indirect	\$133,970	-	\$133,970
Total	\$1,473,670	\$181,400	\$1,655,070

Growing glaciers back with resilient forests and fish!



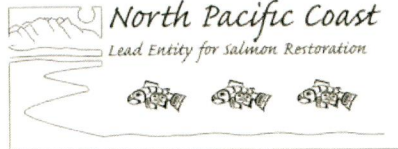
PTIR Partners, Collaborators, and Project Sponsors



CITY OF FORKS
forkswashington.org



PENINSULA COLLEGE





Thank You!

Jill Silver 🧑

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www.10000yearsinstiute.org 🌐

