

# Aquatic and Riparian Effectiveness Monitoring Program Invasive Species Report 2015 Field Season



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## Introduction

Invasive species have been identified as one of the four critical threats to the Nation's ecosystems by the Chief of the USDA Forest Service. The broad geographic area sampled by the Aquatic and Riparian Effectiveness Monitoring Program (AREMP) provides an excellent opportunity to detect the presence or absence of "high concern" aquatic invasive plants and animals (Table 1) on federal lands while surveying stream reaches in randomly-selected watersheds in the Northwest Forest Plan area (NWFP; "west of the Cascades" from Point Reyes, California north to the Canadian Border).

## Methods

Searches for invasive terrestrial plants were performed at all sites within each watershed between longitudes A-B, F-G, J-K (Figure 1). AREMP field crews began searches at the bankfull indicator of the upper transect (B, G, K) with one crew member on each bank. For 5 minutes crew members thoroughly searched downstream in a zigzag pattern no more than 5 meters from bankfull. When an invasive plant or animal was encountered, the search time was paused and the crew member recorded the longitude segment, species code, bank the plant was found on (left or right), and the photo numbers of the pictures. Additionally, a GPS location was recorded. If a suspected invasive plant species was encountered but couldn't be clearly identified in the field, a specimen was collected and placed in a plant press so that it could be later identified.

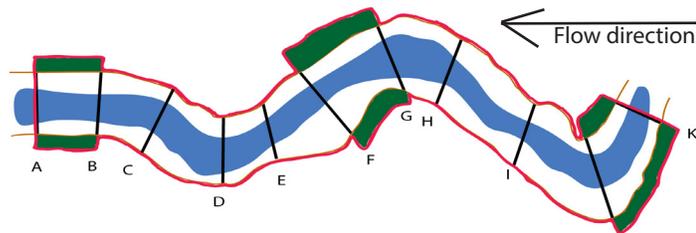


Figure 1. Schematic of search areas for Aquatic and Riparian Effectiveness Monitoring Program terrestrial invasive species surveys, letters represent transect locations. Areas in green represent the area searched by crew members.

To determine the presence of any invasive snails, mussels, or crayfish listed in Table 1, AREMP crews collected eight benthic macroinvertebrate subsamples in the first four fast-water riffles at each site using a kick net. After the field season those samples were sent to the Utah State National Aquatic Monitoring Center and processed under a microscope to ensure invasive species that may have been too small for field crews to identify were not present (results from the laboratory are still pending and any invasive species found will result in immediate notification of local managers). After the original eight subsamples were preserved, and if an invasive snail, mussel or crayfish was suspected to be present in the field, photographs were taken and the specimen was preserved in 95% ethanol. Then, more aquatic invasive samples were opportunistically collected throughout the site. For invasive aquatic plants, AREMP crews searched the wetted portion of the channel and any off channel wetted areas during site layout. When a suspected invasive plant was encountered, the longitudinal segment was recorded, photographs were taken, and a specimen was collected and placed in a plant press to later verify identification.

Table 1. Invasive species surveyed for during the 2015 field season.

Type	Common Name	Genus Species
Aquatic animals	New Zealand mudsnail	<i>Potamopyrgus antipodarum</i>
	Zebra mussel	<i>Dreissena polymorpha</i>
	Quagga mussel	<i>Dreissena rostriformis bugensis</i>
	Rusty crayfish	<i>Orconectes rusticus</i>
	Red swamp crayfish	<i>Procambarus clarkii</i>
	Ringed crayfish	<i>Orconectes neglectus</i>
	Northern crayfish	<i>Orconectes virilis</i>
	Bullfrog	<i>Rana catesbeiana</i>
	Nutria	<i>Myocastor coypus</i>
	Asian Clam	<i>Corbicula flumina</i>
	Chinese mystery snail	<i>Cipangopaludina chinensis</i>
	Big-eared radix	<i>Radix auricularia</i>
Aquatic plants	Yellow flag iris	<i>Iris pseudacorus</i>
	Hydrilla	<i>Hydrilla verticillata</i>
	Parrot feather watermilfoil	<i>Myriophyllum aquaticum</i>
	Variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>
	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
	Giant reed	<i>Arundo donax</i>
	Brazilian elodea	<i>Egeria densa</i>
	Didymo	<i>Didymosphenia geminata</i>
	Yellow floating heart	<i>Nymphoides peltata</i>
	Giant salvinia	<i>Salvinia molesta</i>
	Flowering rush	<i>Butomus umbellatus</i>
	Kudzu	<i>Pueraria lobata</i>
	Common reed	<i>Phragmites australis</i>
	Curly-leaf pondweed	<i>Potamogeton crispus</i>
	Purple loosestrife	<i>Lythrum salicaria</i>
Garden loosestrife	<i>Lysimachia vulgaris</i>	
Water primrose	<i>Ludwigia spp.</i>	
Terrestrial animals	Feral swine	<i>Sus scrofa</i>
Terrestrial plants	Japanese knotweed	<i>Fallopia japonica</i>
	Himalayan knotweed	<i>Polygonum polystachyum</i>
	Giant knotweed	<i>Polygonum sachalinense</i>
	Old man's beard	<i>Clematis vitalba</i>
	Garlic mustard	<i>Alliaria petiolata</i>
	Giant hogweed	<i>Heraclium mantegazzianum</i>
	Himalayan blackberry	<i>Rubus armeniacus</i>
	English ivy	<i>Hedera helix</i>
	Salt cedar	<i>Tamarix ramosissima</i>
	Herb Robert	<i>Geranium robertianum</i>
Shiny geranium	<i>Geranium lucidum</i>	

## Verified Invasive Species

AREMP crews surveyed 177 sites in 34 watersheds for aquatic invasive species throughout the 2015 field season (June through September). Of these surveys, a subset of the total (31 sites in 10 watersheds) were sampled as part of a protocol overlap study executed this season. All of the overlap study watersheds were located in Oregon, and are included in Figure 2d as an addition to the Oregon watersheds in Figure 2a (shown independently for map clarity). AREMP crews recorded 18 verified invasive detections. Of the 18 detections, 17 were of Himalayan [Armenian] blackberry (*Rubus armeniacus*). This species was detected in all three states surveyed. The only other invasive species detected was Parrot feather watermilfoil (*Myriophyllum aquaticum*). This detection occurred in Oregon (Figure 2a).

# Oregon

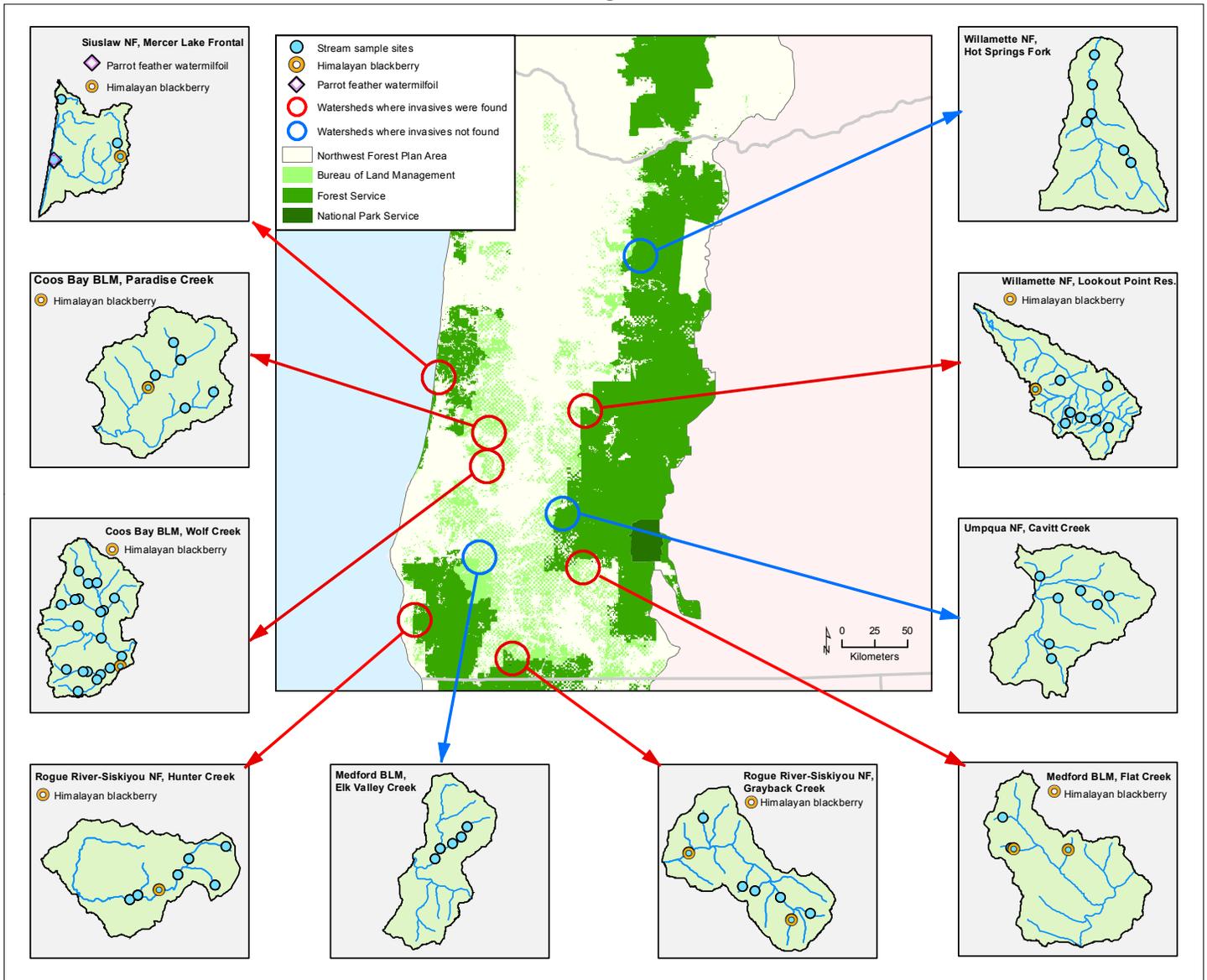


Figure 2a. Map of Oregon watersheds surveyed by Aquatic and Riparian Effectiveness Monitoring Program crews during the 2015 field season. Blue lines represent watersheds where invasive species were not found; red lines depict watersheds where invasive species were detected. NF = National Forest. BLM = Bureau of Land Management.

# Northern California

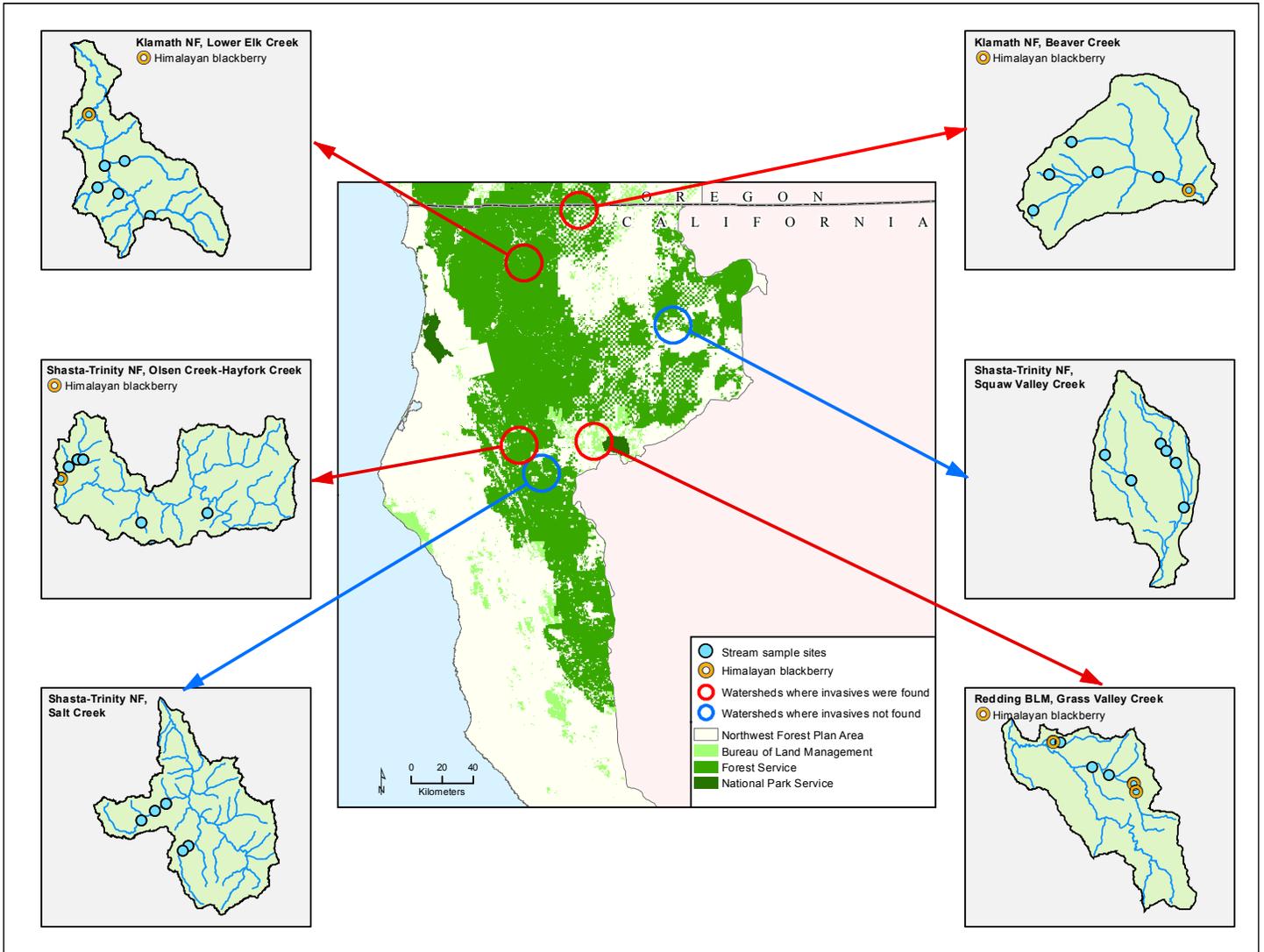


Figure 2b. Map of California watersheds surveyed by Aquatic and Riparian Effectiveness Monitoring Program crews during the 2015 field season. Blue lines represent watersheds where invasive species were not found; red lines depict watersheds where invasive species were detected. NF = National Forest. BLM = Bureau of Land Management.

# Washington

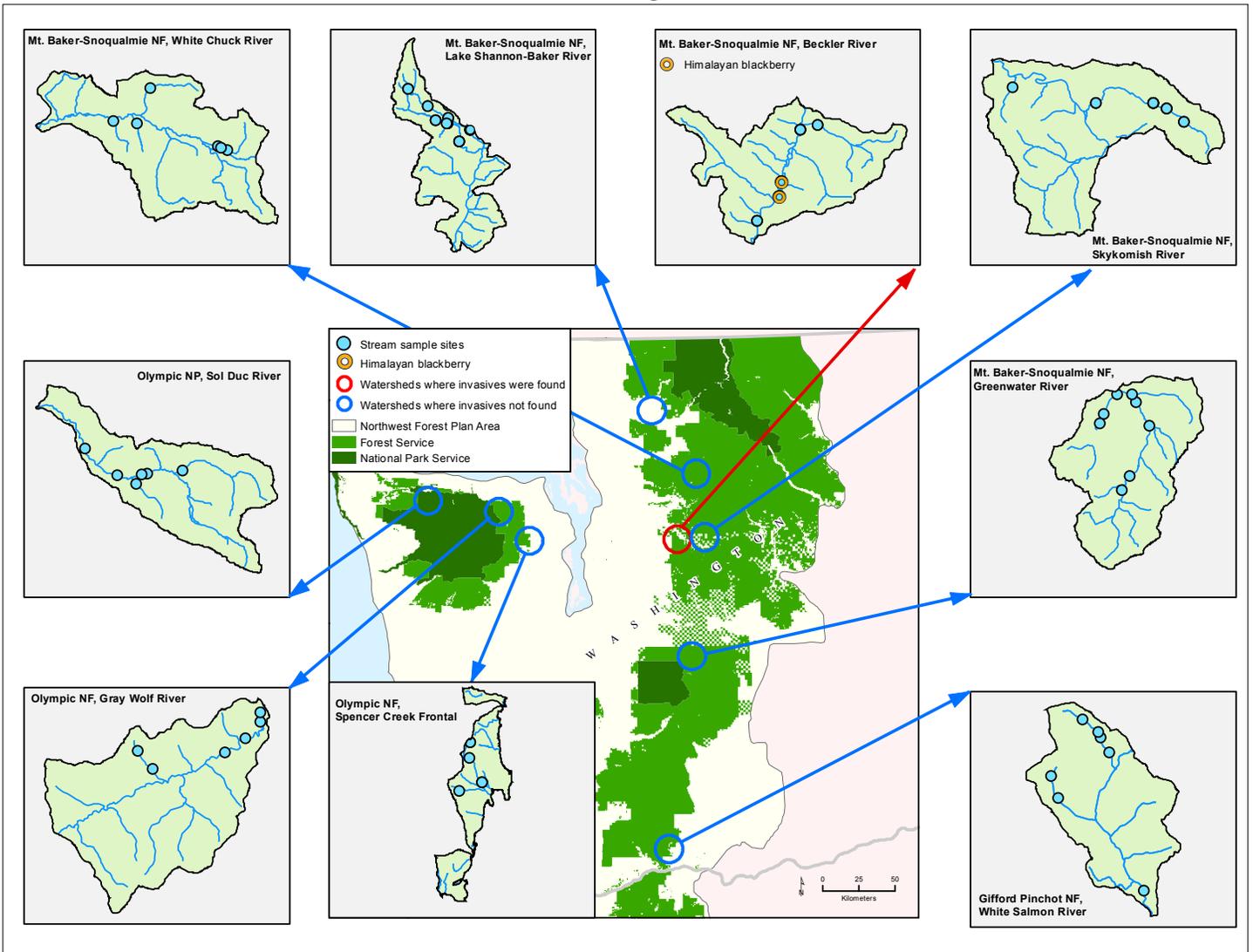


Figure 2c. Map of Washington watersheds surveyed by Aquatic and Riparian Effectiveness Monitoring Program crews during the 2015 field season. Blue lines represent watersheds where invasive species were not found; red lines depict watersheds where invasive species were detected. NF = National Forest. NP = National Park.

## Overlap Study

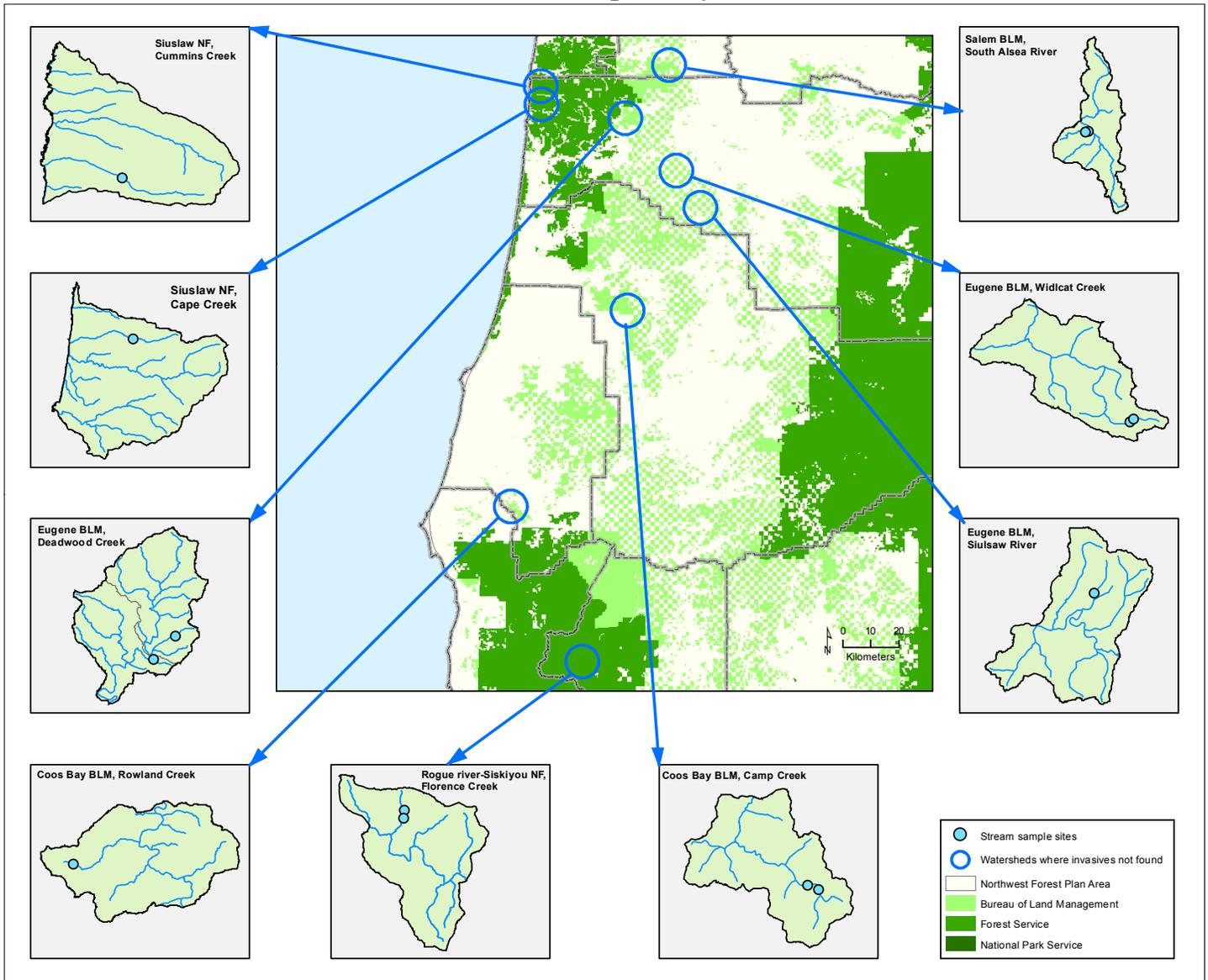


Figure 2d. Map of Overlap Study watersheds surveyed by Aquatic and Riparian Effectiveness Monitoring Program crews during the 2015 field season. Blue lines represent watersheds where invasive species were not found. NF = National Forest. BLM = Bureau of Land Management.

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