

Best Management Plan: Lilliwaup Tree Octopus Forest Reserve



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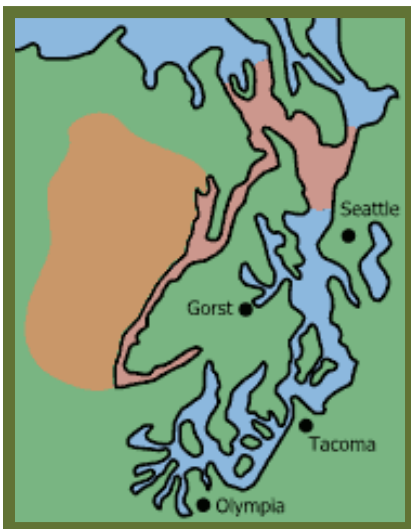
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OBJECTIVES OF THE PLAN

To develop a long-term best management plan (100 years) for the Lilliwaup Tree Octopus Forest Reserve on the Olympic Peninsula of Washington. The plan should contribute to the long-term sustainability of the Pacific Northwest Tree Octopus (*Octopus paxarbolis*), a species of concern, and balance management of the octopus with financial realities and the needs of local stakeholders.

BACKGROUND

The Pacific Northwest Tree Octopus is a shy species found only on the Olympic Peninsula of the west coast of North America. It is a solitary species of cephalopod that can reach a size of up to 13 inches across. Like other octopus species tree octopus have eight tentacles. Tree octopi are typically mottled brown in color and blend in well with their surroundings (see photo on the right). However, they can change color when frightened (white) or during aggressive encounters (red).



Range of the Pacific Northwest Tree Octopus including its spawning grounds.

The Pacific Northwest Tree Octopus spends most the year in moist rainforests and are opportunistic predators feeding on a variety of prey items including insects, frogs, rodents, and birds eggs. They spend much of their time in the canopy but frequently move to the ground to soak in puddles or streams during dry periods or to hunt. They benefit from a diverse forest with different size trees to provide cover at all heights. Tree octopus are amphibious species and return annually to a marine environments in the Hood Canal and Puget Sound to spawn. Here males and females come together in large numbers to mate. After mating males return to the rainforest while females stay behind and guard the egg-clusters. While guarding the egg-clusters female tree octopus rarely feed. After the eggs hatch the young octopi spend one or two months in the Hood Canal before moving onto land and beginning their adult life.

Pacific Northwest Tree Octopus has been on the decline for several decades. They are not yet a protected species but their populations have been impacted by loss of habitat due to logging and urban growth and many are killed each year by cars and trucks on their annual migration to the spawning grounds. In addition, feral house cats often attack and kill tree octopus and native predator such as Bald Eagles and sasquatch are increasing in number. The species is currently classified as a species of concern.

The Lilliwaup Tree Octopus Forest Reserve was founded in 2000. It is approximately 3,500 acres in size and contains a diversity of different age forest stands including some old-growth forest. In addition, the reserve contains some small meadows as well as 3 miles of coastline on the Hood Canal. The reserve surrounds the small town of Lilliwaup, Washington and Highway 101 runs through the entire reserve. The reserve was created as a joint effort between local and state governments and conservation groups primarily to conserve habitat for the Pacific Northwest Tree Octopus. The reserve currently supports a population of about 350 Pacific Northwest Tree Octopus. However, biologists believe that it could support a population of up to 1,000 octopi. The reserve also appears to be an important corridor for migrating tree octopus on their way to and from their spawning grounds. The reserve is currently open to the public and there are many trails on the reserve used for hiking, biking, and octopus watching. During the fall the reserve is open to octopus hunters that come from all over the world to hunt this challenging game species.



A map of the Lilliwaup Tree Octopus Forest Reserve (Yellow) on the Hood Canal.

STAKEHOLDERS

Lilliwaup Tree Octopus Forest Reserve (Decision Makers)

The Lilliwaup Tree Octopus Forest Reserve is a joint effort between local and state governments and wildlife conservation groups. It employs a handful of local people. The objectives of the reserve and the people who work there is to maintain a stable healthy population of Pacific NW Tree Octopus, access to the forest for public recreation and for logging, and to accomplish all of the above within a limited budget.

Friends of the Northwest Tree Octopus

The Friends of the Northwest Tree Octopus is a non-profit organization founded in 1995. The primary goal of the organization and its members is to encourage the conservation of the Pacific NW Tree Octopus by protecting its habitat and reducing tree octopus deaths due to hunting and road mortality.

Hood Canal Loggers

The Hood Canal Loggers are a small cooperative of local loggers and wood mill owners in the Hood Canal region. They are interested in keeping an active and sustainable logging and timber milling industry in the region. Members of their cooperative have been removing timber from the Lilliwaup Tree Octopus Forest Reserve since it was founded in 2000 and would like to continue to do so.

Olympic Octopus Hunters Association

The Olympic Octopus Hunters Association is a small and active hunting group based out of Olympia, Washington. They are dedicated to protecting the right to hunt the Pacific NW Tree Octopus but also concerned with its conservation. Tree octopus hunters are an important source of income to the local economy and come from around the world to hunt tree octopus in the Lilliwaup area including on the reserve.

Lilliwaup Outdoor Club

The Lilliwaup Outdoor Club is a small group of local citizens dedicated to preserving public rights to access lands for hiking, mushroom picking, mountain biking, and wildlife watching. They are deeply concerned about keeping access to the Lilliwaup Tree Octopus Forest Reserve open and were instrumental in building many of the trails and foot bridges on the property. They also built a hide from which Pacific NW Tree Octopus can occasionally be seen.

DESCRIPTION OF MANAGEMENT ALTERNATIVES

Habitat Management Options

- 1.) *Do nothing* – Just leave the forest alone and do not do anything to improve habitat for the Pacific Northwest Tree Octopus.
- 2.) *Maintain current* – Currently 30 percent of the forest is maintained each year through tree planting, pruning, and invasive weed removal.
- 3.) *More aggressive* – Plant more trees, increase invasive weed removal, and provide more moist areas for octopus to live in up to 50 of the forest reserve.
- 4.) *Restoration* – Restore 10% of reserves non-suitable octopus habitat through removal of invasive plants, planting of a diversity of large and small trees, and introduction of octopus food sources.

Habitat Management Options	Affect on Octopus Population Growth Rate	Cost	Public Acceptance (-3 to 3 scale)
1.) Do nothing	-0.02	\$0	-1
2.) Maintain current	0.01	\$-30,000	0
3.) More aggressive	0.015	\$-50,000	1
4.) Restore	0.025	\$-75,000	-1

Hunting Management Options

- 1.) *No harvest* – Close the Lilliwaup Octopus Forest Reserve to hunting entirely.
- 2.) *Harvest 1%* – Allow hunters to harvest up to 1% of the Lilliwaup Tree Octopus Forest Reserve’s octopus population.
- 3.) *Harvest 1.5%* – Allow hunters to harvest up to 1% of the Lilliwaup Tree Octopus Forest Reserve’s octopus population.
- 4.) *Harvest 2.0%* – Allow hunters to harvest up to 2% of the Lilliwaup Tree Octopus Forest Reserve’s octopus population.

Hunting Management Options	Affect on Octopus Population Growth Rate	Cost	Public Acceptance (-3 to 3 scale)
1.) No harvest	0	\$-5,000	-2
2.) Harvest 1%	-0.005	\$0	-1
3.) Harvest 1.5%	-0.01	\$1,000	0
4.) Harvest 2.0%	-0.015	\$2,000	-1

Logging Management Options

- 1.) *No logging* – Close the Lilliwaup Tree Octopus Forest Reserve to logging entirely.
- 2.) *Light logging (50 trees/yr)* – Allow loggers to selectively harvest 50 trees/year from the Lilliwaup Tree Octopus Forest Reserve.
- 3.) *Moderate logging (100 trees/yr)* – Allow loggers to selectively harvest 100 trees/year from the Lilliwaup Tree Octopus Forest Reserve.
- 4.) *Intense logging (250 trees/yr)* – Allow loggers to selectively harvest 250 trees/year from the Lilliwaup Tree Octopus Forest Reserve.

Logging Management Options	Affect on Octopus Population Growth Rate	Cost	Public Acceptance (-3 to 3 scale)
1.) No logging	0.01	\$0	-2
2.) Light logging (50 trees/yr)	0.015	\$5,000	-1
3.) Moderate logging (100 trees/yr)	-0.005	\$10,000	0
4.) Intense logging (250 trees/yr)	-0.03	\$25,000	1

Recreation Management Options

- 1.) *Close reserve to public* – Close the Lilliwaup Tree Octopus Forest Reserve to the public entirely.
- 2.) *Seasonal closures* – Close the Lilliwaup Tree Octopus Forest Reserve only during the octopus’s spring migration to the spawning grounds.
- 3.) *Partial closures* – Close only portions of the Lilliwaup Tree Octopus Forest Reserve that are most important to the forest octopus.
- 4.) *Open year-round* – Allow public access to the entire Lilliwaup Tree Octopus Forest Reserve year-round.

Recreation Management Options	Affect on Octopus Population Growth Rate	Cost	Public Acceptance (-3 to 3 scale)
1.) Close reserve to public	0.01	\$-7,500	-3
2.) Seasonal closures	-0.05	\$-3,500	-2
3.) Partial closures	-0.05	\$-2,000	-1
4.) Open year-round	-0.01	\$2,000	2

Other Management Options

- 1.) *Monitoring (assess at 50 years)* – Monitoring of Pacific Northwest Tree Octopus populations in the Lilliwaup Tree Octopus Forest Reserves is difficult due to the secretive nature of the species. However, monitoring allows assessments of selected management strategies at year 50.
- 2.) *Hatchery program* – Like many fish species, tree octopus can be raised in hatcheries and released to artificially increase the population size.
- 3.) *Predator control* – Trapping and removal of birds of prey (owls and hawks) and fences to deter sasquatches are methods used to reduce predation of forest octopus.
- 4.) *Arboreal Octopus Overpass* – Arboreal octopus overpasses are built to reduce road-kill forest octopus on coastal Highway 101 when they are migrating to spawning. There is room to build up to 3 overpasses on the property.
- 5.) *Public outreach & education* – By making presentations and communicating with local stakeholders we can reduce habitat impacts, road impacts, and poaching on the reserve.

Other Management Options	Affect on Octopus Population Growth Rate	Cost	Public Acceptance (-3 to 3 scale)
1.) Monitoring (assess at 50 yrs)	0	\$-30,000	1
2.) Hatchery program	0.015	\$-75,000	1
3.) Predator control	0.01	\$-20,000	-1
4.) Arboreal Octopus Overpass (up to 3)	0.0025	\$-10,000	1
5.) Public outreach & education (up to 3)	0.001	\$-10,000	3

Rapid Prototype Results

Each stakeholder group developed a rapid prototype of a management plan. Management parameters were input into a model to compare the costs of each stakeholder's management plan and its impacts on public perception and the tree octopus population.

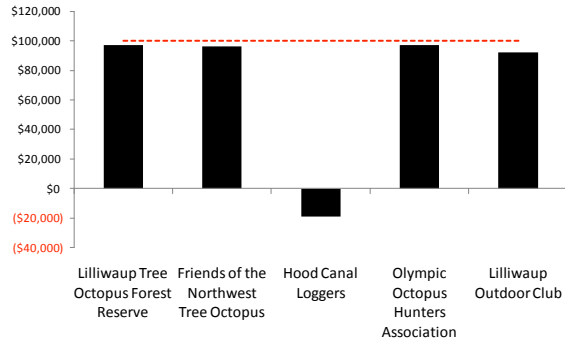


Fig. 1. Cost comparison of each stakeholder's management plans.

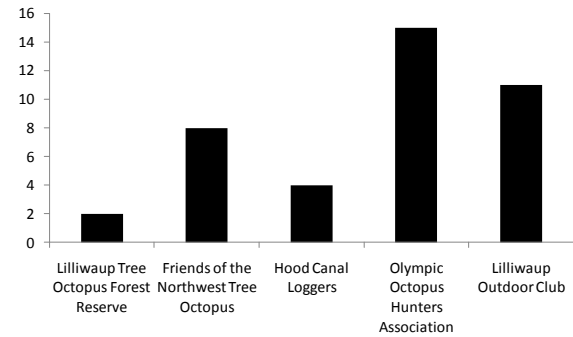


Fig. 2. Comparison of public perception scores for each stakeholder's management.

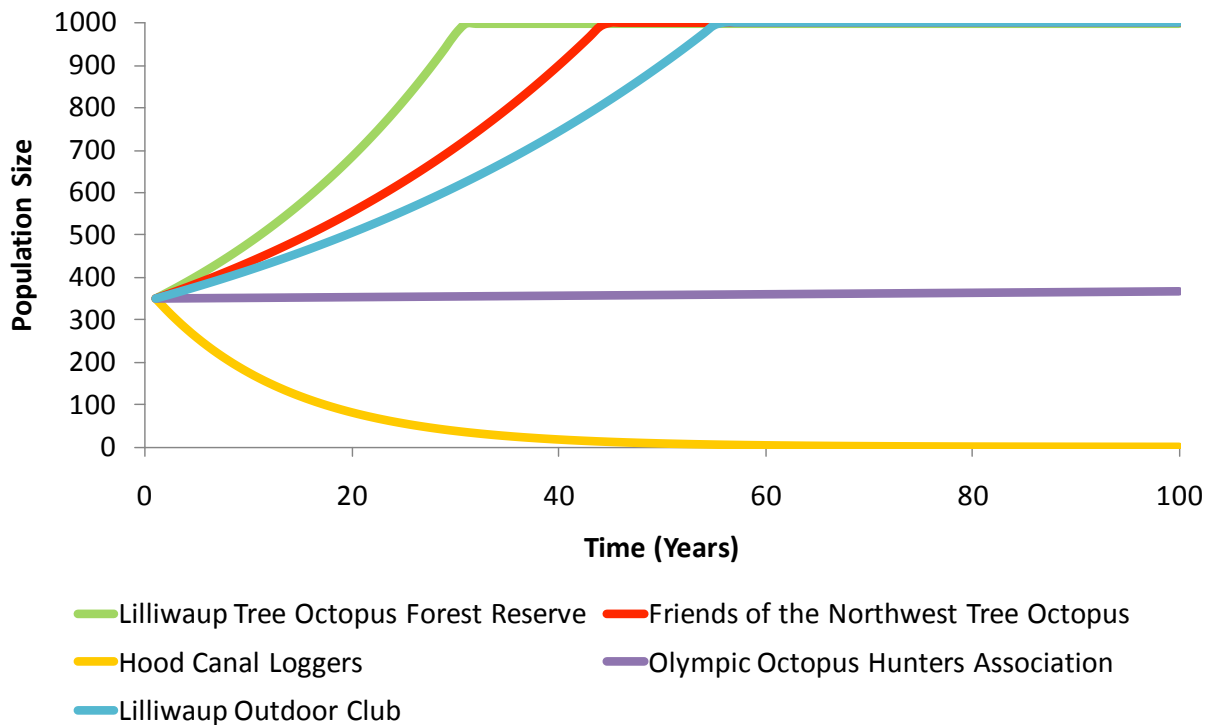


Fig. 3. Projected impacts of each stakeholder's plans over a 100 year period on the forest reserves tree octopus population.

Statements from Stakeholders to Decision Maker

Friends of the Northwest Tree Octopus

We want to save the tree octopus because it is an important species. Without this species sasquatch would go extinct, birds and insects would become over populated, and we would lose a major source of income from the reserve because people come from all over the world to see this amazing creature.

Hood Canal Loggers

The Hood Canal Loggers should get moderate logging. We need moderate logging because we all need a job to support our families and to put food on the table. We get 100 trees each and that shouldn't effect the tree octopus. And without us there would be no paper and pencils and without this nobody would be writing. That's why we should get moderate logging.

Olympic Octopus Hunters Association

We hunter would like to have the right to hunt the tree octopus. This will provide us with food and recreation. We shall only hunt 1.5% of the population we will not endanger the species. We want to be able to hunt tree octopus with only a handgun or rifle so we do not hurt the environment much.

Lilliwaup Outdoor Club

The Lilliwaup Outdoor Club has decided to do light logging. We've chosen light logging because of noise reduction, not as much disturbed octopi, and less logging means less interruption for people's activities. We've also chosen only 1 overpass, because it would save money and some bridge supports the octopi, we've found this out from our monitoring. This will keep our costs low and habitat for the octopi will be larger, so that they can reproduce to keep the population high.

Final Management Model

Management Type	Management Decision (Period 2)
Habitat	Maintain current – Currently 30 percent of the forest is maintained each year through tree planting, pruning, and invasive weed removal.
Hunting	Harvest 1.5% – Allow hunters to harvest up to 1.5% of the Lilliwaup Octopus Forest Reserve's octopus population.
Logging	Moderate logging (100 trees/yr) – Allow loggers to selectively harvest 100 trees/year from the Lilliwaup Tree Octopus Forest Reserve.
Recreation	Open year-round – Allow public access to the entire Lilliwaup Octopus Forest Reserve year-round.

Other	Predator control – Trapping and removal of birds of prey (owls and hawks) and fences to deter sasquatches are methods used to reduce predation of forest octopus.
Other	Arboreal Octopus Overpass (3) – Arboreal octopus overpasses are built to reduce road-kill forest octopus on coastal Highway 101 when they are migrating to spawning. There is room to build up to 3 overpasses on the property.
Other	Public outreach & education (3) – By making presentations and communicating with local stakeholders we can reduce habitat impacts, road impacts, and poaching on the reserve.

Cost \$\$\$	Public Perception
\$97,000	13

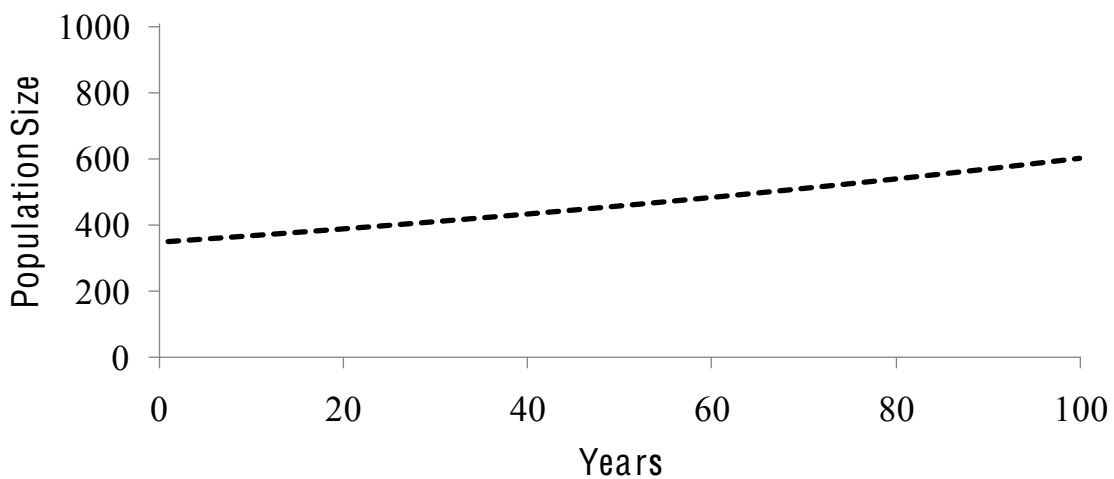


Fig. 4. Projected costs, public perception scores, and projected impacts on the reserve’s tree octopus populations for the final management plan chosen by the Lilliwaup Tree Octopus Forest Reserve group.

Justification for Decision

Our decision is justified because we stayed under budget, with \$3,000 left over. We also have a slow increase in octopi population, so the area won’t overflow, and the population will stay stable. Lastly, we have a high level of public appreciation and involvement with the community through public outreach.

We acknowledge the logging, outdoor, and hunting groups and are doing as much as possible for you without hurting the octopus.

Appendix

Friends of the Northwest Tree Octopus

We are neutral because the octopus population grows by the reserve is open year round and we wanted it seasonal. Also we don't like the predator control and you have too much hunting. You should have 0.5% hunting because if you have the predators the tree octopi will be kept under control even with light hunting. But we like the overpasses and public outreach.

Hood Canal Loggers

I don't concur with your decision to allow moderate logging. While we are in a current economic recession in the city of Lilliwaup, the Lilliwaup Tree Octopus Forest Reserve is preventing many Hood Canal Loggers from providing necessities their families need. Besides moderate logging, we believe that all of your decisions were very productive and professional. Although your public acceptance rate is already extremely high, the decision to log intensely would great increase the joy of the public.

Olympic Octopus Hunters Association

Our group appreciates your effort in maintaining a steady population of tree octopi as well as providing local citizen with education of them too. Your plan was much like ours with public perception, budget, and extra efforts. You thought out your decisions carefully and the population growth of the tree octopi were exactly what we strived for. Over time, we hope for the tree octopi to grow and thrive in the Lilliwaup Forest Reserve. We appreciate your time and efforts. The octopi will thank you for it.

Lilliwaup Outdoor Club

The Lilliwaup Outdoor Club is mostly happy with the decisions made. We like that the reserve will be open for recreation year round. We also approve of the logging, hunting, the public outreach, and overpasses. Unfortunately the LOC was hoping for predator control so that we could see more wild birds. Also we were hoping for more habitat control, in order to make the forest more lush. So, to recap we are very pleased but hope you can still make a few small adjustments.