Appendix A: Details of scenario cost calculations

In the following, calculations of costs for small (up to 100 m^2), medium (>100-1,000 m^2) and large areas (>1,000 m^2) are shown in some detail. Only the low-cost alternative for optimistic as well as pessimistic assumptions for each area size was chosen for further cost-benefit analysis. We assume 1% increase of labor costs, 1% inflation rate and discounting rates of 1%, 2% and 3% per year. All calculations include 50% of the cost for after-treatment (if measure conducted) and monitoring (30% of labor costs). Additionally we added an excess burden of taxation at the rate of 15%.

Table A 1. Scenario calculations for small areas (up to 100 m^2) with discount rate of 1%

Alternative	Small area	Calculation period in years									
		Costs in €									
		0-1	2	3	4	5	6	7	8	9	10
Optimistic	Root destruction with shovel	399	37	37	37	38	38	39	39	39	39
Pessimistic	Root destruction with shovel	399	37	369	37	38	38	378	39	39	40

For *optimistic scenario* implementation concerning small, medium and large areas (Table A1, A2 and A3; first row) no additional infestation of *Heracleum mantegazzianum* is assumed. For the *pessimistic scenario,* (Table A1, A2 and A3; second row) we calculate two additional treatments for all measures within a time period of ten years (e.g. re-infestation in third and seventh year; for chemical control, costs of renaturation are included). Both scenarios include 50% additional costs for after-treatment and 30% additional costs for monitoring (30% of labor costs) for each year.

Table A 2. Scenario calculations for medium areas (>100-1,000 m^2) with discount rate of 1%

Alternative	Medium area	Calculation period in years									
		Costs in €									
		0-1	2	3	4	5	6	7	8	9	10
Optimistic	Chemical control	3,107	168	170	172	173	175	177	179	180	182
Pessimistic	Chemical control	3,107	168	2,961	172	173	175	2,991	179	180	182

For year ‘0’ we assume cost of labor, cost of material for one treatment, after-treatment (50% of total costs) and monitoring (30% of labor costs). For year ‘1’ we assume monitoring costs (30% of labor costs). The same conditions are suggested for the years ‘2’ to ‘10’ (time period of ten years) in *optimistic scenario* calculations. In pessimistic scenario calculations, the same conditions are suggested except for year ‘3’ and year ‘7’, where we assume re-infestation for the whole sites. For these two years, control, treatment and after-treatment (restoration for chemical control) are calculated.

Optimistic scenario calculations:

$$\text{Costs (year}_0\text{)} = \text{monitoring} + \text{labor} + \text{material} \quad (1)$$

$$\text{Costs (second year with DR of 1\%)} = \frac{monitoring * 1.02^2}{1.01^2} \quad (2)$$

$$\text{Costs (year}_x\text{ with DR of 1\%)} = \frac{Labor * 1.02^x}{1.01^x} \quad (3)$$

Pessimistic scenario calculations

$$\text{Costs (3rd and 7th year)} = \frac{monitoring * 1.02^x}{1.01^x} + \frac{labor * 1.01^x + material * 1.02^x}{1.01^x} \quad (4)$$

Except for year 3 and 7 pessimistic scenario is calculated as shown in the optimistic scenario analysis (1)-(3).

Table A 3. Scenario calculations for large areas (>1,000 m^2) with discount rate of 1%

Alternative	Large area	Calculation period in years									
		Costs in €									
		0-1	2	3	4	5	6	7	8	9	10
Optimistic	Mechanical cutting	33,523	636	643	649	656	662	669	675	682	689
Pessimistic	Grazing	11,322	3,791	3,804	3,818	3,833	3,847	3,862	3,877	3,893	3,909

Since grazing is a regularly conducted measure, we assume grazing as *pessimistic scenario*, meaning that re-infestations could appear at any time within 10 years. For year '0' costs of labor and materials are calculated (5). For the following years '2' to '10' costs of labor and running costs are calculated (6) and (7).

$$\text{Costs (year}_0\text{)} = \text{labor} + \text{material} \quad (5)$$

$$\text{Costs (second year with DR of 1\%)} = \frac{Labor * 1.02^2 + running\ costs * 1.01^2}{1.01^2} \quad (6)$$

$$\text{Costs (year}_x\text{ with DR of 1\%)} = \frac{Labor * 1.02^x + running\ costs * 1.01^x}{1.01^x} \quad (7)$$