

## INTRODUCTION

- Conservation translocations are conducted to restore populations, but they can also magnify the spread of pathogens.
- A Disease Risk Analysis (DRA) is a tool to gather information, identify the hazards, analyze the risks and manage the process in an informed way.



## OBJECTIVE

- Perform the hazard identification step of a DRA for the reintroduction of European polecats in Catalonia.

## METHODS

- Initial bibliographic search to list infectious and toxic diseases that could potentially affect polecats or mustelids (=hazards)
- Subsequent specific search to gather relevant information on each hazard

## RESULTS

Pathogen / Toxic agent	Symptoms	Mode of transmission	Detected in <i>M. putorius</i>
<b>Virus</b>			
Suid herpesvirus type 1	Hypersalivation/ vomiting/ depression/ coma	Direct contact/ ingestion of infected wild boar carcasses	No
Canine distemper virus	Neurological, respiratory and gastrointestinal signs	Inhalation/ direct contact	Yes, in Spain
Influenza viruses	Respiratory and neurological signs/ systemic lesions	Ingestion/ inhalation	No
Rotaviruses	Diarrhea/ dehydration/ abdominal distension	Fecal-oral route	No (detected in domestic ferrets)
Aleutian mink disease virus	Apathy/ poor pelt/ anorexia/ weight loss/ diarrhea/ melaena/ infertility/ polydipsia/ neurological signs/ blood-clotting abnormalities/ ocular lesions	Direct contact with contaminated urine, feces and saliva/ vertical transmission	Yes, but not in Spain
Infectious canine hepatitis virus	Loss of appetite/ depression/ vomiting/ diarrhea/ abdominal pain/ cough/ nasal discharge/ neurological signs	Ingestion/ inhalation	Yes, but not in Spain
Sars-CoV-2	Asymptomatic	Direct contact/ inhalation	No (detected in domestic ferrets)
<b>Bacteria</b>			
<i>Clostridium botulinum</i> (botulism)	Flaccid paralysis of skeletal muscles	Ingestion of preformed toxin of <i>C. botulinum</i>	Yes, but not in Spain
<i>Mycobacterium bovis</i> (tuberculosis)	Asymptomatic (coughing and nasal exudates in severe cases)	Ingestion/ inhalation/ vertical transmission	Yes, but not in Spain
<i>Streptococcus</i>	Non-specific	Direct contact/ ingestion/ mastitic milk/ pus/ nasal discharge	Unknown
<i>Clostridium perfringens</i> type A	Abdominal distension/ dyspnea	Fecal-oral route/ fomites	Yes, but not in Spain
<i>Staphylococcus delphini</i> group A	Hypersecretory diarrhea in ferret kits	Mustelids are natural hosts of <i>S. delphini</i> g. A	Yes, but not in Spain
<i>Lawsonia intracellularis</i> (proliferative colitis)	Poor growth/ diarrhea/ hypoproteinemic edema	Fecal-oral route	Yes, but not in Spain
<i>Leptospira</i> spp. (leptospirosis)	Unknown in wildlife	Via mucosal surfaces/ via skin cuts or trauma	Yes, but not in Spain
<i>Emmonsia</i> spp. (adiaspyromycosis)	Usually asymptomatic (but causes granulomatous pneumonia)	Inhalation of the ubiquitous fungus <i>Emmonsia</i> spp.	Yes, but not in Spain
<i>Anaplasma phagocytophilum</i>	Unknown	Tick-borne disease	Yes, but not in Spain

Pathogen / Toxic agent	Symptoms	Mode of transmission	Detected in <i>M. putorius</i>
<i>Yersinia</i> spp.	Acute forms: fulminating septicaemia/ Chronic forms: loss of weight, fever, abdominal pain, nausea, necrotizing enteritis, anorexia, diarrhea, respiratory distress, muscular weakness, incoordination	Fecal-oral route/ vertical	Yes, but not in Spain
<i>Candidatus Neororlichia mikurensis</i>	Unknown	Tick-borne disease	Yes, but not in Spain
<b>Toxic agent</b>			
Anticoagulant rodenticide	Haemorrhages/ lethargy/ reduced scape response	Ingestion of the drug or contaminated preys	Yes, but not in Spain
<b>Parasite</b>			
Fleas (e.g. <i>Ctenocephalides</i> spp., <i>Paraceras</i> spp., ...)	Asymptomatic or pruritus and flea allergy dermatitis	Direct/ indirect contact	Yes, in Spain
Ticks (e.g. <i>Ixodes</i> spp., <i>Dermacentor</i> spp.,...)	Asymptomatic or symptoms of tick-borne diseases	Direct/ indirect contact	Yes, in Spain
Mites (e.g. <i>Otodectes</i> spp., <i>Sarcoptes</i> spp., <i>Demodex</i> spp.,...)	Pruritus/ crusty dermatitis/ erythema/ papules/otitis	Direct/ indirect contact	Yes, in Spain
Diptera (e.g. <i>Wohlfahrtia</i> spp., <i>Oestrus</i> spp.,...)	Myiasis/ dermatologic signs/ lancinating pain/ serosanguineous discharge/ agitation/ insomnia	Flies deposit living larvae that penetrate skin and feed subcutaneously	Yes, in Spain
Trematoda: Lung flukes (e.g. <i>Paragonimus</i> spp.), intestinal flukes (e.g. <i>Trichostrongylus axei</i> spp.,...), and liver flukes (e.g. <i>Fasciola</i> spp.,...)	Lung flukes: cough, weakness and lethargy/ Intestinal flukes: enteritis and pulmonary hemorrhages during migration/ Liver flukes: usually asymptomatic. But in severe infections weakness, vomiting, jaundice, diarrhea, coma and death.	Ingestion of intermediate hosts	Yes, but not in Spain
Cestoda: tapeworms (e.g. <i>Taenia</i> spp., <i>Monordotaenia</i> spp., <i>Oschmarenia</i> spp.,...)	Intestinal signs	Ingestion of contaminated food or intermediate hosts	Yes, but not in Spain
Nematoda: lung worms (e.g. <i>Skrjabinylus nasicola</i> ,...), heartworms ( <i>Dirofilaria</i> spp.,...), trichinosis ( <i>Trichinella</i> spp.), ascariasis (e.g. <i>Toxocara</i> spp.,...)	Asymptomatic, remodeling of frontal bone ( <i>S. nasicola</i> ) or affectionation of many organs (lungs, heart...) with unspecific symptoms	Paratenic hosts ( <i>S. nasicola</i> )/ vectorial transmission ( <i>Dirofilaria</i> spp.)/ ingestion ( <i>Toxocara</i> spp.)	Yes, but not in Spain ( <i>Toxocara</i> spp. and <i>Dirofilaria</i> spp. are present)
Protozoa (e.g. <i>Babesia</i> spp., <i>Toxoplasma gondii</i> , <i>Leishmania infantum</i> ,...)	Anorexia, polypnea and pale mucous membranes ( <i>Babesia</i> spp.), papular lesions ( <i>L. infantum</i> ) and lethargy, corneal edema, ataxia and abortions	Tick-borne disease ( <i>Babesia</i> spp.)/ vector ( <i>L. infantum</i> ) / ingestion/ vertical transmission	Yes, in Spain ( <i>L. infantum</i> has only been reported in domestic ferrets)

## CONCLUSIONS

After gathering the information to perform the “hazard identification”, we have identified 27 hazards that could have an impact in the outcome of the reintroduction project. Assessing the risks and plan proper measures for these hazards will increase the possibilities of success.