

Assessment and Control of Biological Invasion Risks

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Raccoon (*Procyon lotor*) naturalised in Japan probably predated the endemic salamander (left, *Hynobius tokyoensis*). Photo: Masato Kaneda. (See p.196 Hayama *et al.*; p.148 Koike)



Raccoon dog (*Nyctereutes procyonoides*) is native in east Asia, and probably competing with feral raccoons. Photo: Go Abe. (See p.116 Abe *et al.*)



Coypus (*Myocastor coypus*) naturalised in wetlands. Photo: Mieko Kawamichi. (See p.142 Baker)



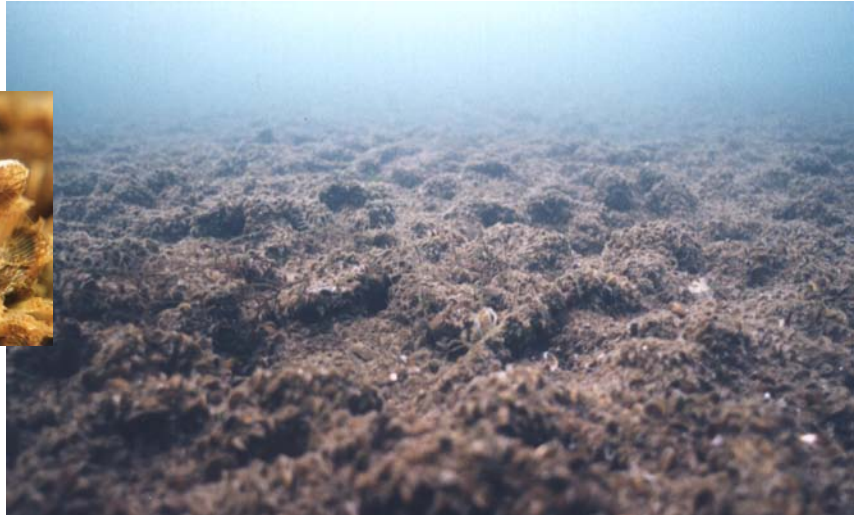
Mongoose (*Herpestes javanicus*) captured by the control operation. Photo: Ministry of the Environment, Japan. (See p.157 Abe *et al.*; p.165; Ishii *et al.*; p.122 Watari *et al.*)



Black rat (*Rattus rattus*) predated fruits of the endemic pandan (*Pandanus boninensis*) in the oceanic islands of Ogasawara. Photo: Keita Fukasawa. (See p.127 Clout and Russell for eradication of rats from islands)



Formosan squirrel (*Callosciurus erythraeus taiwanensis*) and related taxa naturalised in Japan and southern Europe. Photo: Miho Sato. (See p.204 Hori *et al.*)



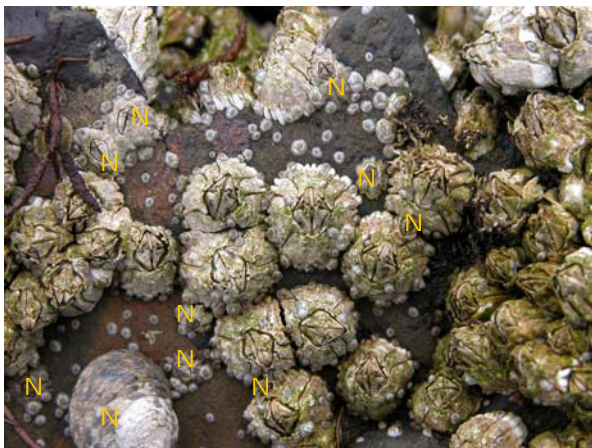
***Musculista senhousia* (mussel)** modifies soft-sedimented habitat to a dense mat of mussels. Photo: Masumi Yamamuro. (See p.113 Crooks)



Moon snail (*Euspira fortunei*) predated clam shell causing economic damage. Photo: Kenji Okoshi. (See p.104 Iwasaki)



Chinese mitten crab (*Eriocheir sinensis*) naturalised widely. The crabs accumulated at the migration barrier (a salmon support pathway). Photo: Stephan Gollasch. (See p.104 Iwasaki)



***Balanus glandula* (barnacle)** dominates this intertidal rocky shore (adults and new recruits). N: native species. Photo: Ryusuke Kado. (See p.104 Kado and Nanba; p.94 Otani; p.106 Iwasaki)



Mediterranean blue mussel (*Mytilus galloprovincialis*) dominates this intertidal shore. Photo: Keiji Iwasaki. (See p.95 Otani; p.104 Iwasaki)



Photo: Koichi Mikami.



***Bischofia javanica* (Euphorbiaceae)** is a secondary forest tree in the native range. The species dominates in climax forests in oceanic islands having disharmonic flora. A: *B. javanica*; N: native species. Photo: Keita Fukasawa. (See p.65 Kato et al.; p.73 Koike and Kato)



***Podocarpus nagi* (Podocarpaceae)** is a shade tolerant climax forest tree in the native range. The species was intentionally introduced 1200 years ago to the Kasugayama Shrine, and spread in the climax forest. Photo: Yuri Maesako. (See p.5 Koike)

Velvetleaf (*Abutilon theophrasti*, Malvaceae) has weedy (left) and cultivated non-weedy (right) strains. Photo: Shunji Kurokawa. (See p.84 Kurokawa et al.)



GLOSSARY

Terminology has developed independently in different sectors that address Invasive alien species (IAS), reflecting their different mandates. Managers, law makers and researchers sometimes have different requirements for terminology. Even within ecological sciences, botanists and zoologists may use terminology differently. This glossary explains the terminology as used in this volume. However, sometimes there is a need to use terminology differently, for example where a particular term has been defined in the national law of a country (e.g. "Invasive Alien Species" in Japanese law or "invasive species" in U.S. law). In such cases, this particular meaning, as used in that case, will be clarified in the text.

native species: a species, subspecies, or lower taxon, living within its natural range (past or present) including the area which it can reach and occupy using natural dispersal out of its natural range even if it is seldom found there.

endemic species: a species that is native to a particular area and ONLY in that area. (Example: the kiwi bird is native to New Zealand, and it is endemic there, while the white fronted tern is also native to New Zealand but is not endemic there because it also is native to Australia).

alien species: a species, subspecies, or lower taxon introduced outside its normal past or present distribution. Synonym in this volume: "introduced species". (Synonyms used elsewhere: non-native, non-indigenous, exotic).

introduction: the movement, by human agency, of a species, subspecies or lower taxon outside its natural range (past or present). This movement can be either within a country or between countries.

- *intentional introduction*: the purposeful movement by humans of a species outside its natural range and dispersal potential (for example: introduction of a species for aquaculture, for fishing, for aquarium use, for use as a crop or a garden plant, for biological control, etc....)
- *unintentional introduction*: an introduction of a species outside its natural range introduced "unwittingly" by humans or human delivery systems (for example: in ballast water, as contamination in soil or seeds, a contamination inside or on a container, as a parasite or pathogen of an intentionally introduced species, etc. It also includes the use, by a species, of tunnels and canals).

introduced species: same as *alien species*

invasive alien species: an alien species whose establishment and/or spread threaten ecosystems, habitats or species with economic or environmental harm. Note: national law and regulations in many countries often contain a legal definition of "invasive alien species" or "invasive species" which can be different from the ecological definition in this glossary. Where this is the case in this volume, the specific meaning will be clarified.

pathway: For the purpose of this manual, a pathway is broadly defined as the means (e.g. aircraft, ship or train), purpose or activity (e.g. agriculture, forestry, fisheries or horticulture), or commodity (e.g. timber, grain) by which an alien species may be transported to a new location, either intentionally or unintentionally.

biodiversity: the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Synonym: biological diversity.

ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

habitat: means the place or type of site where an organism or population naturally occurs. The place where an organism is currently absent but potentially viable is included in the context of metapopulation ecology.

pest: This term is sometimes used as synonym to invasive alien species. (Note: many use it in an agricultural context only. Moreover, in the context of International Plant Protection Convention and some other international instruments, it has a well defined meaning, specific to that context).

weed: a plant growing where it is not wanted; Sometimes used as synonym for invasive alien species that is a plant. It includes woody species (e.g. shrubs, trees) and it includes natural and semi-natural environments (i.e. undisturbed environments).

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<i>Quercus myrsinaefolia</i>	207	<i>Saccharum officinarum</i>	72	<i>Stachyurus praecox</i>	207	Western mosquito fish	42
<i>Quercus serrata</i>	200	<i>Salmo gairdneri</i>	107	<i>Stellaria neglecta</i>	2	White bass	42
Rabbit	134	<i>Salmo salar</i>	107	<i>Stenothyra</i> sp.	94, 107	White-browed laughingthrush	42
Raccoon	6, 41, 116 , 148 , 197	<i>Salvelinus fontinalis</i>	7	Stoat	134	<i>Xenostrobis securis</i>	94
Raccoon dog	6, 116 , 199	<i>Salvelinus leucomaenis</i>	7	<i>Strelitzia reginae</i>	72	<i>Xenostrobis securis</i>	106
<i>Ramiella bisbambari</i>	178	<i>Sander lucioperca</i>	43	Striped bass	42	<i>Xenostrobis securis</i>	108
<i>Rana amaminensis</i>	123	<i>Sansevieria nilotica</i>	72	Sugar beet	143	<i>Xironogiton victoriensis</i>	183
<i>Rana catesbeiana</i>	42	<i>Sansevieria stuckyi</i>	72	<i>Sus scrofa</i>	135	<i>Yucca smalliana</i>	72
<i>Rana ishikawae</i>	123	<i>Sargassum muticum</i>	113	<i>Syzygium jambos</i>	72	<i>Zanthoxylum ailanthoides</i>	207
<i>Rana subaspera</i>	123	<i>Satchellius mammalis</i>	177	Taiwan beauty snake	42	Zebra mussel	44, 90
<i>Rapana venosa</i>	109	<i>Satobdrilus attenuatus</i>	183	Taiwan macaque	41	<i>Zoobotryon pellucidum</i>	94
<i>Rattus exulans</i>	132	<i>Scapharca broughtonii</i>	109	Taiwan pit vipers	42	<i>Zoysia japonica</i>	72
<i>Rattus norvegicus</i>	133	<i>Scapharca kagoshimensis</i>	109	Taiwan squirrel	41		
<i>Rattus rattus</i>	6, 133, 157, 165	<i>Schoenoplectus grossus</i>	72	<i>Temnosewellia minor</i>	185		
		<i>Schoenoplectus brevifolius</i>	72	<i>Temnosewellia</i> sp.	185		
		<i>Sciurus aberti</i>	208	<i>Tetraclita japonica</i>	210		
		<i>Sciurus carolinensis</i>	41	<i>Thatonia exilis</i>	178		
				<i>Thatonia gracilis</i>	178		