Begeleidend schrijven bij de aanvragen voor een ontheffing ex. Art. 75 Ff-wet en een EG-certificaat ex. Art. 8, derde lid, CITES Basisverordening.

Geachte heer, mevrouw,

Bij onderhavige aanvraag wil ik het volgende onder uw aandacht brengen:

- Het volledige adres van het Dolfinarium past niet op het aanvraagformulier. Dit moet zijn Strandboulevard **Oost** 1
- Het volledige adres van de bestemming past niet op het aanvraagformulier. Dit moet zijn: Avenida Loro **Parque**

De documenten bij de aanvraag zijn:

1. Machtiging ten behoeve van de aanvraag: dit zijn de stukken van de kamer van koophandel
2. Ontheffing
3. Motivatie bij de aanvraag
4. Wetenschappelijk rapport Dolfinarium
5. Opmerkingen Dr. A. Foote
6. Vrijlatingsplan Free Morgan Expert Panel
7. Kritische beschouwing van het Vrijlatingsplan
8. Res. Conf. 10.7
9. Introductieplan
10. 10-13 Wetenschappelijke onderzoeksprogramma's

Dossiernummer: 08017774 Blad 00001

Uittreksel uit het handelsregister van de Kamers van Koophandel
Deze inschrijving valt onder het beheer van de Kamer van Koophandel voor Oost Nederland

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Rechtspersoon:

Rechtsvorm	:Besloten vennootschap
Naam	:Dolfinarium Harderwijk B.V.
Statutaire zetel	:Harderwijk
Eerste inschrijving in het handelsregister	:31-03-1959
Akte van oprichting	:26-03-1959
Akte laatste statutenwijziging	:14-12-2007
Maatschappelijk kapitaal	:EUR 2.250.000,00
Geplaatst kapitaal	:EUR 1.090.485,00
Gestort kapitaal	:EUR 1.090.485,00

Onderneming:

Handelsna(a)m(en)	:Dolfinarium Harderwijk B.V.
	Veluwestrand
	Dolfinarium Harderwijk
	Dolfinarium Harderwijk "De Wereld van de Zee"
	De Lagune
	Lagune
	Dolfijnenlagune
	Zeedierenlagune
	Indianenlagune
	Zeelagune
	Lagunerestaurant
	Laguneshop
	Lagunewinkel
	Lagune Cadeaushop
	Lagune Snackbar
	Lagune Cafetaria
	Laguneterras
	Lagunepodium
	Lagunepromenade
	Lagunedorp
	Lagune-Uitkijktoren
	Lagune-Evenement
	Lagune Fotoshop
Adres	:Strandboulevard Oost 1, 3841AB Harderwijk
Correspondentieadres	:Postbus 9114, 3840GC Harderwijk

02-03-2010 Blad 00002 volgt.

Dossiernummer: 08017774 Blad 00002

Telefoonnummer	:0341-467467
E-mailadres	:info@dolfinarium.nl
Datum vestiging	:00-03-1938
De rechtspersoon drijft de onderneming sinds	:30-08-1972
Bedrijfsomschrijving	:Het instandhouden van een toonaangevend thema-park met betrekking tot de wereld van de zee; het instandhouden van speeltuinen, attracties en horecagelegenheden, in het bijzonder te Harderwijk
Werkzame personen	:225

Enig aandeelhouder:

Naam	:Harderwijk Hellendoorn Holding B.V.
Adres	:Strandboulevard Oost 1, 3841AB Harderwijk
Inschrijving handelsregister onder dossiernummer	:34161632
Enig aandeelhouder sedert	:11-09-2001

Bestuurder(s):

Naam	:Harderwijk Hellendoorn Holding B.V.
Adres	:Strandboulevard Oost 1, 3841AB Harderwijk
Inschrijving handelsregister onder dossiernummer	:34161632
Infunctietreding	:29-03-2002
Titel	:Directeur A
Bevoegdheid	:Alleen/zelfstandig bevoegd
Naam	:Marten, Fopper
Geboortedatum en -plaats	:29-01-1975, Ermelo
Infunctietreding	:11-02-2010
Titel	:Directeur B
Bevoegdheid	:Gezamenlijk bevoegd (met andere bestuurder(s), zie statuten)

Alleen geldig indien door de kamer voorzien van een ondertekening.

02-03-2010 Blad 00003 volgt.

KAMER VAN KOOPHANDEL

ONTVANGEN

Dossiernummer: 34161632 Blad 00001

Uittreksel uit het handelsregister van de Kamers van Koophandel
Deze inschrijving valt onder het beheer van de Kamer van Koophandel voor Oost Nederland

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Rechtspersoon:

Rechtsvorm	:Besloten vennootschap
Naam	:Harderwijk Hellendoorn Holding B.V.
Statutaire zetel	:Harderwijk
Eerste inschrijving in het handelsregister	:07-09-2001
Akte van oprichting	:07-09-2001
Akte laatste statutenwijziging	:14-12-2007
Maatschappelijk kapitaal	:EUR 1.250.000,00
Geplaatst kapitaal	:EUR 252.000,00
Gestort kapitaal	:EUR 252.000,00

Onderneming:

Handelsna(a)m(en)	:Harderwijk Hellendoorn Holding B.V.
Adres	:Strandboulevard Oost 1, 3841AB Harderwijk
Correspondentieadres	:Postbus 9114, 3840GC Harderwijk
Telefoonnummer	:0341-467467
Datum vestiging	:07-09-2001
Bedrijfsomschrijving	:Houdster- en financieringsmaatschappij
Werkzame personen	:0

Enig aandeelhouder:

Naam	:Compagnie des Alpes S.A.
Adres	:6 Place Abel Gance, 92100, Boulogne Billancort, Frankrijk
Ingeschreven in	:Greffe du Tribunal de Commerce de Nanterre te Nanterre Cedex in Frankrijk onder nummer 349577908 - 1991 B 06069
Enig aandeelhouder sedert	:05-05-2006

Bestuurder(s):

Naam	:Reuvers, Jan
Geboortedatum en -plaats	:21-03-1948, Leiden
Adres	:Vossenlaan 2 A, 6705CE Wageningen
Infunctietreding	:14-12-2007
Titel	:Directeur A

21-01-2008 Blad 00002 volgt.

DE MINISTER VAN LANDBOUW, NATUUR EN VOEDSELKWALITEIT

Naar aanleiding van het verzoek van de heer F.H.G. van Beers op 14 oktober 2008, namens het Dolfinarium Harderwijk BV

gelet op artikel 75, lid 3, 5 en 6, onderdeel a en c, van de Flora- en faunawet

Verleent hierbij aan:	Dolfinarium Harderwijk BV (hierna: ontheffinghouder)
Adres:	Strandboulevard Oost 1
Postcode en woonplaats:	3841 AB HARDERWIJK
Voor het tijdvak van:	3 februari 2009 t/m 2 februari 2014

ONTHEFFING

FF/75A/2008/064

- **Van de verbodsbepaling genoemd in artikel 13, lid 1, van de Flora- en faunawet voor het onder zich hebben van maximaal 40 exemplaren van de tuimelaar *(Tursiops truncatus)*, inclusief de geboren jongen, voor onderwijs;**

- **van de verbodsbepalingen genoemd in artikel 13, lid 1, van de Flora- en faunawet voor het onder zich hebben van maximaal 10 exemplaren van de bruinvis *(Phocoena phocoena)* voor onderwijs.**

- **van de verbodsbepalingen genoemd in de artikelen 9, 10 en 13, lid 1, van de Flora- en faunawet, voor het doden, verwonden, vangen, bemachtigen of met het oog daarop opsporen, opzettelijk verontrusten, vervoeren, binnen of buiten het grondgebied van Nederland brengen en het onder zich hebben van exemplaren van walvisachtigen *(Cetacea)* voor onderzoek en bescherming van flora en fauna, te weten opvang, revalidatie en het terugzetten in de vrije natuur;**

1. Aan deze ontheffing zijn de volgende voorwaarden verbonden:

2. Het bestuur van de ontheffinghouder dient toe te zien op de strikte naleving van deze ontheffing met de daarin vermelde algemene en specifieke voorwaarden.

3. De ontheffinghouder dient alle door of namens de minister van Landbouw, Natuur en Voedselkwaliteit verstrekte of nog te verstrekken aanwijzingen in verband met de uitvoering van deze ontheffing nauwkeurig op te volgen.

4. Voor het verrichten van de in deze ontheffing genoemde handelingen, voor wat betreft artikel 9, 10 en 13, lid 1, van de Flora- en faunawet, mogen vaste medewerkers van de ontheffinghouder middels een machtiging gebruik maken van deze ontheffing. Indien de ontheffinghouder een ander dan een vaste medewerker machtigt, dan dient de ontheffinghouder een kopie van de verleende machtiging aan Dienst Regelingen, Postbus 19530, 2500 CM Den Haag te zenden. De machtiging vermeldt in ieder geval de volgende gegevens:

Paraaf:

a. volledige naam, adres, woonplaats en geboortedatum van degene aan wie de machtiging is verleend;
b. soort(en) en eventuele aantallen waarvoor de machtiging geldt;
c. kwalificaties met betrekking tot deskundigheid op het gebied van beschermde soorten;
d. de handelingen die mogen worden verricht;
e. plaats(en) waar de handelingen mogen worden verricht;
f. periode waarvoor de machtiging geldt
g. naam en handtekening ontheffinghouder.

5. Gemachtigden dragen bij het verrichten van de handelingen waarvoor de ontheffing verleend is de machtiging bij zich. Deze machtiging dient te zijn gehecht aan een kopie van deze ontheffing. Gemachtigden dienen de machtiging op eerste vordering te tonen aan een bevoegd controleur of opsporingsambtenaar.

6. De aangegeven handelingen mogen uitsluitend worden verricht voor de projecten: Opvang en rehabilitatie op het Dolfinarium, Wetenschappelijk onderzoek Dolfinarium Harderwijk en Dolfinarium Educatie, volgens de bij de aanvraag gevoegde bijlagen.

7. Alléén aangespoelde, gewonde of verzwakte exemplaren van de bruinvis (*Phocoena phocoena)* mogen worden gevangen, als bedoeld in het projectplan: Opvang en rehabilitatie op het Dolfinarium. Indien de dieren geen levenskansen meer hebben, mogen zij worden geëuthanaseerd.

8. Gevangen exemplaren van walvisachtigen (*Cetaceae*) mogen tijdelijk onder zich gehouden worden ter revalidatie, met het doel deze later weer vrij te laten. Als weer vrij laten niet mogelijk is, mogen dergelijke dieren permanent onder zich gehouden worden voor het doen van wetenschappelijk onderzoek dat relevant is in het kader van door de EU-Habitatrichtlijn, de Conventie van Bern en ASCOBANS opgelegde verplichtingen. Het wetenschappelijk onderzoek dient uitgevoerd te worden met behulp van een onderzoeksplan welke naar Dienst Regelingen gestuurd moet worden.

9. Aangespoelde en gevangen dieren dienen zo spoedig mogelijk na rehabilitatie (en eventueel onderzoek) te worden uitgezet in een geschikt leefgebied zo dicht mogelijk bij de vindplaats.

10. Overleden exemplaren van walvisachtigen *(Cetacea)* dienen, na vaststelling van de doodsoorzaak, te worden vernietigd of ter beschikking te worden gesteld aan wetenschappelijke instituten die over een ontheffing voor het onder zich hebben van deze dieren beschikken. Hiertoe dient contact op te worden genomen met dhr. dr. C. Smeenk, conservator van het Nationaal Natuurhistorisch Museum Naturalis te Leiden.

11. Het is niet toegestaan de diersoorten die vermeld staan op Bijlage A van de Verordening (EG) 338/97 voor overwegend commerciële doeleinden, zoals bedoeld in artikel 8, lid 1 van Verordening (EG) 338/97, te gebruiken.

12. Het is niet toegestaan de merktekens waarmee dieren individueel herkenbaar zijn gemaakt, te verwijderen zonder toestemming van ondergetekende.

13. De ontheffing voor het binnen of buiten het grondgebied van Nederland brengen van de dieren geldt uitsluitend indien hiervoor voorafgaand toestemming is verleend door de bevoegde instanties van de betrokken landen en de benodigde CITES-documenten afgegeven zijn.

14. Ontheffinghouder voldoet aan de eisen van houden, huisvesten en verzorgen van diersoorten als bedoeld in artikel 6 tot en met 11 van het Dierentuinenbesluit.

15. Ontheffinghouder voert een inzichtelijke administratie van de gehouden diersoorten, als bedoeld in artikel 2 en 3 van de Regeling administratie bezit van en handel in beschermde dier- en plantensoorten.

16. De ontheffinghouder dient jaarlijks vóór 1 april schriftelijk aan Dienst Regelingen te rapporteren hoeveel tuimelaars (*Tursiops truncatus*), bruinvissen (*Phocoena phocoena*) en eventuele andere walvisachtigen (*Cetaceae*) in het voorgaande jaar in bezit waren. Deze rapportage bevat de volgende gegevens:
    a) soort
    b) plaats van opvang
    c) datum van opvang
    d) reden van opvang
    e) uitzet locatie
    f) uitzet datum

17. Deze ontheffing kan bij het niet of niet voldoende naleven van de voorwaarden worden ingetrokken.

Den Haag, 3 februari 2009

DE MINISTER VAN LANDBOUW, NATUUR EN VOEDSELKWALITEIT,
voor deze:
de teammanager uitvoering Dienst Regelingen

B. Kluivingh - Deelman

Motivatie bij de aanvragen

Samenvatting

Morgan is door het Dolfinarium rechtmatig verkregen in de Nederlandse territoriale wateren en gehouden onder de daartoe door de Minister verleende ontheffing voor opvang van specimens van onder andere de soort Orcinus orca.

Er zijn onvoldoende gegevens bekend over orka's in de Noorse Zee om Morgan's oorspronkelijke groep te traceren en haar daarin terug te plaatsen. Aansluiting bij een andere groep orka's mag niet verwacht worden. Dit zal er in de praktijk, gelet op eerdere ervaringen, toe leiden dat Morgan, wanneer zij in de natuur wordt uitgezet, sociaal contact blijft zoeken met mensen. Dit is gelet op de risico's en gevaren voor mens en dier onwenselijk. Verder is het in de natuur uitzetten van dieren waarvan de oorspronkelijke populatie/groep/habitat onbekend is ongewenst gelet op de eisen die de internationale CITES-regelgeving stelt.

Verder blijkt uit ervaring dat sociaal contact voor orka's vanuit welzijnsoverwegingen belangrijker is dan een onbeperkte leefruimte. Sociaal contact met andere orka's moet verkozen worden boven uitsluitend sociaal contact met mensen, ook wanneer dergelijk contact alleen in gevangenschap kan plaatsvinden. Gelet op het ontwikkelingsstadium van Morgan dient met de grootste voortvarendheid een aanvang te worden gemaakt met het socialisatieproces met andere orka's.

Het houden van Morgan in gevangenschap in een sociale groep dient plaats te vinden op een locatie die enerzijds aan de hoogste huisvestings- en verzorgingseisen kan voldoen en anderzijds wetenschappelijk onderzoek uitvoert zoals bedoeld onder ASCOBANS, de Habitatrichtlijn, de CITES-Basisverordening en de ontheffing verleend aan het Dolfinarium.

De aangewezen locatie binnen de EU is Loro Parque op Tenerife. Dit park voldoet zowel de vereiste mogelijkheden voor socialisatie met andere orka's, de hoogste eisen op het gebied van huisvesting en verzorging en voert ook wetenschappelijke onderzoek uit dat bijdraagt aan de instandhouding van de soort zoals bedoeld onder ASCOBANS

Kwalificatie van de Orka (Orcinus orca)

De Orka is aangewezen als een strikt beschermde soort onder verschillende Europese wetgevingsstelsels. De orka is opgenomen op Bijlage A bij de Europese CITES Basisverordening. Verder is de orka, omdat hij behoort tot de orde van de Cetaceae opgenomen op Bijlage IV bij de Habitatrichtlijn. De soort is eveneens opgenomen op Bijlage II van de Bern Conventie (dit wil zeggen onder dit verdrag strikt beschermd). Ook valt de soort onder Bijlage I van de Convention on Migratory Species en onder ACCOBANS. Morgan is door het Dolfinarium Harderwijk verkregen en gehouden conform alle relevante bepalingen van voornoemde wet- en regelgeving.

Het individuele dier Morgan is uit het wild afkomstig, hetgeen van belang is bij het vaststellen van de eisen aan het onder zich hebben en overdragen van het dier binnen de EU.

Het houden door het Dolfinarium en de voorwaarden van de ontheffing

Omdat de Orcinus orca een strikt beschermde diersoort is en Morgan aan de natuur is onttrokken, is voor het onder zich hebben van dit dier, gelet op de eerder genoemde regelgeving zoals geïmplementeerd en uitgewerkt in de Flora- en faunawet een bezitsontheffing nodig. Het Dolfinarium beschikt over een dergelijke ontheffing waarbij voor (o.a.) deze soort als voorwaarde is opgenomen dat het dier:

- Alleen mag worden gehouden met het oog op opvang met als doel het uitzetten in de natuur;
- Mocht dit niet mogelijk zijn dan mag het dier gehouden worden met het oog op wetenschappelijk onderzoek als bedoeld onder ASCOBANS

Uitzetten in de natuur versus houden in gevangenschap

In de ontheffing van het Dolfinarium is als voorwaarde opgenomen dat het dier in principe alleen mag worden gehouden met het oog op opvang met het doel het dier later, na revalidatie, weer uit te zetten in de natuur. Alleen wanneer dit uitzetten niet mogelijk mocht blijken mag het dier in gevangenschap worden gehouden en dan nog alleen met het oog op wetenschappelijk onderzoek zoals bedoeld onder ASCOBANS.

Deze voorwaarden sluiten nauw aan op o.a. de Habitatrichtlijn die steeds de Lidstaten van de EU verplicht een alternatievenonderzoek uit te voeren wanneer mogelijk een ontheffing wordt verleend voor onder andere het onder zich houden van specimens van soorten opgenomen op Bijlage IV bij deze richtlijn. Verder bepaalt deze richtlijn dat een ontheffing slechts mag worden verleend voor een beperkt aantal specifiek omschreven doeleinden. Wetenschappelijk onderzoek is één van deze toegestane doeleinden. Deze voorwaarde sluit eveneens nauw aan op ASCOBANS.

Alvorens een aanvraag kan worden ingediend om ontheffing te vragen voor het overdragen met het oog op het houden in gevangenschap van Morgan, zal eerst moeten worden beoordeeld of het mogelijk is het dier in de natuur uit te zetten.

Voor het uitvoeren van deze beoordeling is gebruik gemaakt van drie instrumenten:

- Ervaringen opgedaan in het verleden met het in de natuur uitzetten van exemplaren van de Orcinus orca;
- Het vrijlatingsplan voor Morgan zoals ingediend door het Free Morgan Expert Panel;
- Het wetenschappelijk rapport zoals ingediend door het Dolfinarium Harderwijk dat verklaringen bevat van deskundigen op het gebied van de soort Orcinus orca.

De laatste twee documenten vormen een bijlage bij deze motivatie.

Na bestudering van de ervaringen en documenten kan men vaststellen dat bij het uitvoeren van het alternatievenonderzoek duidelijke elementen bepalend zijn bij het al dan niet slagen van het uitzetten in de natuur van een levend dier van de soort Orcinus orca. Deze elementen worden door alle partijen genoemd, maar in sommige gevallen verschillend gewogen. Derhalve is het raadzaam de volgende uitkomst vast te stellen als een succesvolle uitzetting in de natuur:

- Morgan is in staat zichzelf in leven te houden;
- Het welzijnsniveau is aanvaardbaar gelet op de bestaande kennis en ervaring met Orka's;
- Morgan vormt wanneer zij is teruggezet in de natuur geen bedreiging voor de mens.

De elementen die uit de ervaringen en rapporten kunnen worden geëxtraheerd en meegewogen in het alternatievenonderzoek zijn de volgende:

- Sociaal gedrag van Orka's met elkaar
- Bekendheid van de verschillende groepen Orka's die leven in het gebied waar Morgan naar verwachting vandaan komt en de mogelijkheid om Morgan in de juiste groep terug te laten keren
- (opnieuw) zoeken van contact met mensen en daaruit voortvloeiende gevaren voor mens en dier

<u>Korte schets kenmerken Orka's</u>

Voor een uitgebreide beschrijving van de sociale en gedragskenmerken van Orka's wordt verwezen naar het wetenschappelijk rapport van het Dolfinarium, het vrijlatingsplan van het expert panel Free Morgan en de daarin genoemde analyses en beschrijvingen van eerdere ervaringen met het vrijlaten in de natuur van orka's. De in casu belangrijkste kenmerken zijn echter de volgende:

- Orka's leven in kleine of grotere groepen samen. Voor de haringvissende Orka's uit de Noorse Zee, waartoe Morgan lijkt te behoren, gaat het om kleine groepen die samengesteld zijn uit een moederdier en haar nakomelingen. Deze dieren blijven zeer lange tijd, tot het overlijden van het moederdier, bij elkaar. Een dergelijke groep heeft een eigen dialect en jachtmethode. Dat een jong dier als Morgan uit deze groep is losgeraakt is zeer uitzonderlijk en is naar alle waarschijnlijkheid veroorzaakt door een zeer ingrijpende gebeurtenis en niet door natuurlijk gedrag van de groep.
- De ontwikkeling van een jonge Orka tot een volwassen, zelfredzaam dier is er een van vele jaren. Op de leeftijd die Morgan had ten tijde van haar stranding en de leeftijd die zij nu heeft bereikt is sprake van een ontwikkelingsstadium dat vergelijkbaar is met een menselijke peuter. Het dier is nog geenszins in staat om

zelfstandig in haar voedsel te voorzien en verder is zij op een leeftijd is die voor haar socialisatie met andere Orka's van groot belang is.
- Orka's blijven vaak hun hele leven in dezelfde groep, uitwisseling tussen verschillende groepen is zeldzaam, zeker bij de haringvissende Orka's, en in die zeldzame gevallen tijdelijk en niet als succesvol te beschouwen.
- Ervaringen uit het verleden leren dat voor orka's sociaal contact het meest belangrijke element voor het welzijn van het dier is. Wanneer geen sociaal contact kan worden gevonden met andere Orka's richten zij zich tot mensen door deze actief op te zoeken.
- Gelet op eerdere ervaringen is het voor het succesvol terugbrengen in de natuur, waarbij een zelfstandig bestaan wordt opgebouwd, zonder opnieuw contact te zoeken met mensen, meest essentieel dat de oorspronkelijke groep waaruit een Orka afkomstig is wordt gevonden en het dier daarin wordt teruggeplaatst.

Alternatievenonderzoek

Het vrijlatingsplan zoals ingediend door het expert panel is serieus bestudeert. Alhoewel het plan een zeer praktische insteek heeft, zijn er een aantal uitgangspunten die niet overgenomen kunnen worden.

In de eerste plaats is dit de aanname dat een vrijlating succesvol is wanneer Morgan in staat is om in de oceanen te overleven, zelfs wanneer er sprake is van verdere menselijke bemoeienis of, wanneer deze bemoeienis overbodig lijkt, ook als er geen sprake is van verdere sociale aansluiting met andere Orka's.

Juist uit de in eerdere vrijlatingen opgedane ervaring blijkt dat de aansluiting bij andere Orka's bepalend is voor het al dan niet zelfstandig functioneren van Orka's. Slechts in dat geval dat een orka kan worden teruggeplaatst in de directe nabijheid van zijn oorspronkelijke groep en aansluiting daarbij slaagt, is het aannemelijk dat een dier zijn natuurlijke bestaan voortzet. De ervaring leert tevens dat wanneer een dergelijke aansluiting niet slaagt, de Orka contact blijft zoeken met de mens. Dit is niet alleen vanuit welzijnsoverwegingen van het dier onwenselijk, maar ook gelet op het daaruit ontstaan van gevaar voor zowel mens als dier bij deze contacten. Juist door het dier, zoals voorgesteld, te laten fixeren op een schip, kan dit leiden tot gevaarlijke situaties, zowel voor Morgan als voor schepen en de daarop aanwezige personen.

Het is derhalve essentieel voor het slagen van een terugplaatsing van Morgan in de natuur dat dit gebeurt in haar natuurlijke groep.

Terugplaatsing in de oorspronkelijke groep

Gelet op het bovenstaande is het derhalve essentieel voor het uitvoeren van een terugplaatsing in de natuur van Morgan dat haar oorspronkelijke groep wordt teruggevonden.

Het Dolfinarium heeft dit belang van het begin van de opvang aan onderkend en op drie wijzen getracht de oorspronkelijke groep van Morgan terug te vinden. In de eerste plaats is fotomateriaal opgestuurd aan de North Atlantic Killer Whale ID Group, de houder van de grootste databank van foto's van deze soort. In de tweede plaats is dit getracht door middel van het beschikbaar stellen van DNA aan deskundigen die dit materiaal kunnen vergelijken met materiaal dat aanwezig was van orka's uit het betreffende, uitermate uitgestrekte gebied.

Hierbij worden aangetekend dat van visetende orka's uit de Noorse Zee geen materiaal beschikbaar is waarmee Morgan tot een groep herleid kan worden . DNA-onderzoek was alleen bruikbaar om te bepalen uit welke (hoofd)populatie Morgan afkomstig was, de Noors visetend, de IJslandse visetend, de makreeletende, of de populatie van Gibraltar. In de derde plaats is door middel van geluidsmateriaal van Morgan te vergelijken met beschikbare geluidsfragmenten getracht haar groep te achterhalen. Iedere groep heeft zijn eigen dialect en dit maakt deze methode tot een bruikbaar instrument.

Echter, bij beide methoden moet men helder voor ogen houden dat er zeer weinig materiaal beschikbaar is van de groepen orka's die in het betreffende gebied leven. Het verkrijgen van zowel DNA-materiaal als geluidsmateriaal is zeer moeilijk gelet op de uitgestrektheid en ontoegankelijkheid van het gebied waar. Ook en mede gelet op deze omstandigheden is er veel minder onderzoek gedaan naar de groepen Orka's die in de Noorse zeeën leven dan bijvoorbeeld de Orka's die langs de Amerikaans-Canadese kusten leven. Dit brengt met zich mee dat er weinig DNA- en geluidsmateriaal beschikbaar is als referentiemateriaal. Het verzamelen van meer materiaal is juist gelet op de uitgestrektheid van het gebied en de moeilijke toegankelijkheid daarvan zeer moeilijk en binnen een kort tijdsbestek onmogelijk.

Ondanks de grote inspanningen die het Dolfinarium zich heeft getroost om Morgan's groep terug te vinden heeft dit niet die informatie opgeleverd die noodzakelijk is om aan het belangrijkste vereiste te voldoen om Morgan succesvol terug te plaatsen in de natuur, namelijk het traceren van haar oorspronkelijke groep. Hierbij moet overigens worden opgemerkt dat, ondanks dat het geluidsmateriaal opvraagbaar was, dit materiaal door niemand is opgevraagd, ook niet door het Free Morgan Experts Panel. Dit is opmerkelijk juist omdat in het vrijlatingsplan veel aandacht wordt besteed aan het gebruik van deze materialen om de oorspronkelijke groep van Morgan te traceren.

Om duidelijk aan te geven hoe de feiten liggen moet na alle inspanningen het volgende worden geconstateerd:

- Er is slechts zeer geringe kennis van wat de verspreidingsgebieden en trekroutes van de haringvissende Orka's zijn. Deze zijn na 2002 ingrijpend gewijzigd. Van individuele groepen is onbekend hoe zij zich door het gebied begeven.
- Er is slechts geringe en onvolledige bekendheid over welke groepen Orka's in de Noorse zee leven
- Er zijn derhalve ook onvoldoende DNA-gegevens beschikbaar om een referentiekader op te stellen om te toetsen tot welke groep Morgan behoort (zie ook uitleg van Dr. Andrew Foote)

Gelet op het bovenstaande kan slechts de volgende conclusie worden getrokken:

Het is niet mogelijk om Morgan terug te plaatsen in haar eigen groep omdat er onvoldoende gegevens zijn deze groep te traceren en deze gegevens gelet op de uitgestrektheid en ontoegankelijkheid van het gebied waar de orka's in de Noorse Zee leven niet verzameld kunnen worden.

Het vrijlatingsplan geeft aan dat het noodzakelijk is om wetenschappelijke kennis te vergaren bij het uitzetten van gestrande Orka's om rehabilitatie- en herintroductieprogramma's

wereldwijd te kunnen realiseren. Daarmee instemmend kan echter slechts worden geconcludeerd dat juist uit eerdere opgedane ervaring moet worden vastgesteld dat voor succesvolle vrijlating in de natuur het bekend zijn van de oorspronkelijke groep en het daarmee aansluiting laten vinden cruciaal is.

Verder moet worden vastgesteld dat het gelet op de uitgestrektheid en ontoegankelijkheid van het verspreidingsgebied van de Orka's het niet mogelijk is om aan een groot aantal vooronderstellingen zoals aangegeven in het vrijlatingsplan te voldoen, zoals door middel van DNA en akoestische analyses vergelijkingen mogelijk te maken van de in het wild levende Noorse Orka's, eenvoudigweg omdat het verzamelen van voldoende gegevens van in het wild levende dieren niet mogelijk is.

Overigens is dit niet alleen het uitgangspunt voor Orka's gelet op de hiervoor aangehaalde documenten maar is dit ook het uitgangspunt die binnen de uitvoering van CITES-regelgeving wordt gehanteerd bij het terugplaatsen van dieren in de natuur.

Dit is uitgewerkt in Res. Conf. 10.7 bij het CITES-Verdrag die weliswaar oorspronkelijk bedoeld voor dieren die in beslag zijn genomen na illegale onttrekking aan de natuur, maar is van dien aard dat het ook bruikbaar is in geval van legale onttrekking met het oog op (tijdelijke) opvang.

Drie uitgangspunten staan centraal in de CITES richtlijnen waarbij twee uitgangspunten relevant zijn indien dieren ten behoeve van opvang aan de natuur zijn onttrokken:

- In de eerste plaats moet het de waarde die het dier heeft ten behoeve van de instandhouding van de soort geoptimaliseerd worden, zonder dat daarbij de gezondheid, het gedragsrepertoire of de staat van instandhouding in gevaar worden gebracht
- In de tweede plaats moet er een humane oplossing worden gezocht, ongeacht of het gaat om terugplaatsing in de natuur of het in gevangenschap houden van het dier dan wel het plegen van euthanasie op het dier.

"In some cases, release of confiscated animals into existing wild populations has been done after careful evaluation and with due regard for existing guidelines. In other cases, such releases have not been well planned. Poorly planned releases of confiscated animals may doom these animals to a slow, painful death. Such releases may also have strong negative conservation value by threatening existing wild populations. Threats to existing populations can take several forms: 1) diseases and parasites acquired by the released animals while held in captivity may spread into existing wild populations; 2) individuals released into existing populations, or in areas near to existing populations, may not be of the same race or subspecies as those in the wild population, resulting in mixing of distinct genetic lineages; 3) animals held in captivity, particularly juveniles and immatures, may acquire an inappropriate behavioural repertoire from individuals of other related species. Release of these animals could result in inter-specific hybridization

Disposal of confiscated animals is not a simple process. Only on rare occasions will such disposal be straightforward or result in an action with conservation value. Options for disposal of confiscated animals have thus far been influenced by the perception that returning animals to the wild is the optimal solution in terms of both animal welfare and conservation. A growing body of scientific study of reintroduction of captive animals suggests

that such actions may be among the least appropriate options for many reasons. This recognition requires that the options available to confiscating authorities for disposal of the animals be carefully reviewed.

Management options

In deciding on the disposal of confiscated animals, managers must ensure both the humane treatment of the animals and the conservation and welfare of existing wild populations of the species involved. Options for disposal fall into three principal categories: 1) maintenance of the individuals in captivity; 2) returning the individuals in question to some form of life in the wild; and 3) euthanasia. The last option may often prove the most appropriate and most humane.

Return to the wild" – Concerns and benefits

Before "Return to the wild" of confiscated animals is considered, several issues of concern must be considered in general terms: welfare, conservation value, cost and disease.

a) Welfare. While return to the wild may appear to be humane, it may be nothing more than a sentence to a slow death. Humane considerations require that each effort to return confiscated animals to nature be thoroughly researched and carefully planned. Such returns also require long-term commitment in terms of monitoring the fate of released individuals. Some authors have advocated that the survival prospects for released animals must at least approximate those for wild animals of the same sex and age class in order for return to the wild to be seriously considered. While such demographic data on wild populations are, unfortunately, rarely available, the spirit of this suggestion should be respected; there must be humane treatment of confiscated animals when attempting to return them to the wild.

b) Conservation value and cost. In cases where returning confiscated animals to the wild appears to be the most humane option, such action can only be undertaken if it does not threaten existing populations of wild plants and animals or the ecological integrity of the area in which they live. The conservation of the species as a whole, and of other animals already living free, must take precedence over the welfare of individual animals that are already in captivity.

Before animals are used in programmes in which existing populations are reinforced, or new populations are established, it must be determined that returning these individuals to the wild will make a significant contribution to the conservation of the species. Larger populations are less likely to become extinct, hence reinforcing existing very small wild populations may reduce the probability of extinction. In very small populations a lack of males or females may result in reduced population growth or in population decline. Reinforcing a very small population lacking animals of a particular sex may also improve prospects for survival of that population.

It should be noted that where confiscated individuals are used for reintroduction (as defined above) they will form the nucleus of a new population. If such a programme is to be successful, a relatively large number of individuals will be required. Hence, small groups of confiscated animals may be inappropriate for reintroduction programmes.

The cost of returning animals to the wild in an appropriate manner can be prohibitive for all but the most endangered species. The species for which the conservation benefits clearly

outweigh these costs represent a tiny proportion of the species listed in the CITES Appendices, although it includes numerous species not regulated under CITES. In the majority of cases, the costs of appropriate, responsible reintroduction will preclude return to the wild. Poorly planned or executed reintroduction programmes are the equivalent of dumping animals in the wild and should be vigorously opposed on both conservation and humane grounds.

c) Source of individuals. If the country of origin and site of capture of the animals is not known, or if there is any question of the source of the animals, supplementation may lead to inadvertent pollution of distinct genetic races or subspecies. If particular local races or subspecies show specific adaptation to the local environment, mixing in animals from other races or subspecies may be damaging to the local population. Introducing an animal into the wrong habitat type may also doom it to death.

d) Disease. Animals held in captivity and/or transported, even for a very short time, may be exposed to a variety of pathogens. Release of these animals into the wild may result in introduction of disease to conspecifics or unrelated species with potentially catastrophic effects. Even if there is a very small risk that confiscated animals have been infected by exotic pathogens, the potential effects of introduced diseases on wild populations are so great that this will often preclude returning confiscated animals to the wild.

Where confiscated animals are found to be unsuitable for return to the wild, disease screening and appropriate quarantine are, nevertheless, essential in order to ensure that they are free of disease, or that diseases and parasites harboured by these animals are found in the captive population to which the animals may be transferred. Introduced diseases can be dangerous to captive facilities, particularly in zoos where infection across different species in a collection is a serious threat. Where such quarantine can not ensure that an individual is healthy, isolation for an indefinite period or euthanasia must be carried out.

There are clearly instances where return to the wild of confiscated animals must be considered an option for disposal. First and foremost, the question to be addressed is: will returning the animals to the wild make a significant contribution to the conservation of the species in question? Release into the wild of any animal that has been held in captivity is risky. While some diseases can be tested for, tests do not exist for many animal diseases. Furthermore, animals held in captivity are frequently exposed to diseases not usually encountered in their natural habitat. Veterinarians and quarantine officers, thinking that the species in question is only susceptible to certain diseases, may not test for these diseases picked up in captivity.

Given that any release incurs some risk, we must adopt the following 'precautionary principle': if there is no conservation value in releasing confiscated specimens, the possibility of accidentally introducing into the environment a disease that is not already present, however unlikely, will rule out returning confiscated specimens to the wild.

There are several benefits of returning animals to the wild, either through reintroduction or reinforcement of an existing population.

a) In situations where the existing population is severely threatened, such an action might improve the long-term conservation potential of the species as a whole, or of a local population of the species (e.g. golden lion tamarins).

b) Returning animals to the wild makes a strong political/educational statement concerning the fate of the animals (e.g. orangutans Pongo pygmaeus and chimpanzees Pan troglodytes) and may serve to promote local conservation values. However, as part of any education or public awareness programme, the costs and difficulties associated with return to the wild must be emphasized.

Morgan uitzetten zonder groep

Nu is komen vast te staan dat Morgan niet kan worden teruggeplaatst in de natuur in haar eigen groep zal moeten worden onderzocht of het mogelijk is haar zonder contact met andere orka's terug te plaatsen in de natuur. Zoals aangegeven zijn hierbij twee criteria van belang:

- Het welzijn van Morgan
- Het ontstaan van mogelijke gevaren voor mens en dier

Bij het beoordelen van het welzijn van Morgan moeten twee elementen met elkaar vergeleken worden en op basis van bekende onderzoeksgegevens naar het gedrag van orka's afgewogen. Dit zijn de vrijheid ofwel ruimte die Morgan tot haar beschikking zal krijgen om in te leven en daarin in meerdere of mindere mate zelfstandig te functioneren en daarnaast de behoefte die Orka's hebben aan sociaal contact met andere Orka's of, indien deze mogelijkheid niet bestaat, met mensen.

Uit de verschillende rapporten alsmede opgedane ervaring blijkt dat de Orka's die niet in hun oorspronkelijke groep leven moeilijk zelf in hun voedselbehoefte kunnen voorzien. Bij Morgan is dit probleem extra groot omdat zij nog niet in die fase van haar ontwikkeling zat ten tijde van haar stranding dat zij over de vereiste vaardigheden beschikte om zelf in haar voedselbehoefte te voorzien. De training die jonge Orka's van hun moeder krijgen naar volwassenheid is zeer langdurig en dan nog zijn zeker haringvissende Orka's geen solitair jagende dieren. Door de groepen worden gezamenlijke jachttechnieken gebruikt waarbij iedere groep zijn eigen methodieken lijkt toe te passen. Dat Morgan ooit geheel zelfstandig in haar voedselbehoefte kan voorzien is daarmee onaannemelijk. Contact met mensen zal dan ook al alleen voor haar voeding naar alle waarschijnlijkheid noodzakelijk zijn.

In het vrijlatingsplan is hiermee rekening gehouden door aan te geven dat Morgan gefixeerd zou kunnen worden op een boot waarin begeleiders zich kunnen bevinden om enerzijds haar bij te staan in haar groei naar volwassenheid en anderzijds te kunnen bijdragen in haar behoefte aan voeding. Hierbij is rekening gehouden met het uit alle documenten en ervaringen af te leiden feit dat Morgan zich in een heel vroeg stadium van haar ontwikkeling bevindt en nog niet in staat is om zelfstandig in haar voedselbehoefte te voorzien.

Om te toetsen of deze methodiek uitvoerbaar is moet worden gekeken naar eerdere ervaringen met het in de natuur uitzetten van Orka's. Het gaat hierbij om drie gevallen waarbij in één geval het dier succesvol is teruggebracht bij haar eigen groep. In de overige twee gevallen is gebleken dat Orka's zich inderdaad zullen richten op mensen wanneer geen succesvol contact met andere Orka's mogelijk is. In beide gevallen is eveneens gebleken dat dit onaanvaardbare risico's met zich meebrengt voor zowel mens als dier. In één geval heeft dit uiteindelijk geleid tot een fataal ongeluk tussen mens en dier waarbij het dier is overleden.

Dit risico wordt onaanvaardbaar geacht waarbij tevens wordt overwogen dat contact tussen Morgan en andere Orka's in een gelimiteerde ruimte in plaats van uitsluitend contact tussen Morgan en mensen in een ongelimiteerde ruimte vanuit welzijnsperspectief het meest optimaal lijkt te zijn. Hierbij wordt het volgende overwogen.

De twee dieren die buiten hun eigen groep werden uitgezet in de natuur bleven contact met mensen verkiezen boven het gebruikmaken van hun vrijheid, dat wil zeggen een onbeperkt

leefgebied. In tegenstelling tot Orka's die altijd in de natuur hebben verbleven, gingen deze dieren niet trekken en evenmin zich verplaatsen over grote afstanden. Zij bleven zich steeds in een zeer beperkt gebied ophouden om op die manier sociaal contact te kunnen houden met in die gevallen mensen. Hieruit kan de conclusie worden getrokken dat sociaal contact voor het welzijn van Orka's van dusdanig groot belang is dat het door de dieren zelf wordt verkozen boven een onbeperkt leefgebied. Hierbij moet de opmerking van Alexandra Morton, een veldbiologe die tientallen jaren orka's in het wild bestudeerd heeft, centraal staan:

"More than mating, more than food, more than home territories it is family around which a killer whale's world revolves."

Daarbij in aanmerking nemende dat mens-dier contact in de natuur ongewenste grote risico's voor zowel mens als dier met zich meebrengt, dient de optie Morgan te laten socialiseren met andere Orka's in een beperkt leefgebied verkozen te worden boven het in vrijheid stellen van het dier waarbij niet de voor het welzijn van Morgan vereiste socialisatie mogelijk is.

Het is echter van het allergrootste belang om binnen de kortst mogelijke termijn over te gaan tot het maken van een begin met dit proces van socialisering met andere Orka's omdat Morgan nu de leeftijd lijkt te hebben waarop dit proces van socialisering plaatsvindt. Uitstel kan ertoe leiden dat zij de periode waarin socialisatie mogelijk is voorbij loopt en nooit meer met andere Orka's kan socialiseren.

Overdracht naar nieuwe locatie en eisen daaraan

Op de locatie waar Morgan momenteel verblijft is geen mogelijkheid voor socialisatie met andere orka's. Het is derhalve noodzakelijk dat zij wordt overgebracht naar een locatie waar dit socialisatieproces wel kan plaatsvinden en waar tevens wordt voldaan aan alle overige eisen die wet- en regelgeving stellen:

- De locatie dient voor wat betreft huisvesting en verzorging adequaat te zijn zoals vereist op grond van de CITES Basisverordening.
- Naast dit vereiste voor welzijn dient te worden voldaan aan het vereiste dat wetenschappelijk onderzoek plaatsvindt zoals vereist onder ASCOBANS, de Habitatrichtlijn, de CITES Basisverordening en de aanvullende vereisten van de ontheffing die aan het Dolfinarium is verleend.
- Het wordt daarnaast wenselijk geacht Morgan te houden in een locatie binnen de EU om ervoor zorg te dragen dat zijn onder de strikte Europese regelgeving blijft vallen.

Er is een locatie gevonden die aan al deze vereisten kan voldoen. Dit is Loro Parque op Tenerife.

De huisvesting en verzorging van Loro Parque is in het algemeen goedgekeurd door de Wetenschappelijke Autoriteit van Spanje als bedoeld in de CITES-Basisverordening. Loro Parque houdt reeds vijf exemplaren van de Orcinus orca, beschikt over uitgebreide ervaring met de verzorging van dieren van deze soort en beschikt over het grootste bassin ter wereld om deze dieren in te houden. De dieren die in Loro Parque worden gehouden vormen een stabiele groep waarin Morgan de sociale aansluiting kan vinden die zo noodzakelijk is voor haar welzijn.

Op welke wijze introductie van Morgan in deze groep kan plaatsvinden is op zeer nauwkeurige wijze beschreven in het "Introduction Plan of a rescued Orcinus orca individual in the Orca Ocean Group".

Verder voert Loro Parque uitgebreid wetenschappelijk onderzoek uit naar deze soort op verschillende terreinen die van groot belang zijn voor het voortbestaan van de soort in het wild. Dit onderzoek vindt plaats in nauwe samenwerking met experts op het gebied van de Orcinus orca over de hele wereld. Beschrijvingen van het onderzoek zijn bijlage bij deze motivatie. Het gaat om onderzoek naar het ontwikkeling van sofware ten behoeve van vocaal onderzoek bij orka's, gedagskenmerken gerelateerd aan het soortenbehoud van de Orka's, onderzoek naar het migratieproces van de orka's van het Iberische schiereiland en het ontwikkelen van onderzoeksmethodieken om bepaalde antilichamen in het serum van Orka's te detecteren hetgeen van groot belang is bij veterinaire zorg voor orka's en onderzoek naar in het wild levende dieren van deze soort.

Vereiste documenten voor de overdracht aan Loro Parque

Zowel de Flora- en faunawet als de Europese regelgeving die in deze wet is geïmplementeerd respectievelijk uitgewerkt, te weten de Habitatrichtlijn en de CITES Basisverordening, verbieden onder andere de overdracht van specimens van soorten die zijn aangewezen als beschermde uitheemse diersoort respectievelijk soorten die zijn opgenomen op Bijlage IV bij de Habitatrichtlijn respectievelijk Bijlage A bij de CITES Basisverordening.

Overdracht onder de CITES Basisverordening
Art. 8, eerste lid, van de CITES Basisverordening verbiedt de overdracht van specimens van soorten opgenomen op Bijlage A bij deze verordening. Een ontheffing in de vorm van een EG-certificaat kan, in geval van aan de natuur onttrokken dieren die niet vallen onder de kwalificatie preconventie, worden verleend indien overdracht geschiedt met als doel educatie, wetenschappelijk onderzoek of fok in gevangenschap ten behoeve van het voortbestaan van de soort (art. 8, derde lid, onder e), f), en g) van de CITES Basisverordening).

Voor levende, aan de natuur onttrokken specimens van soorten opgenomen op Bijlage A bij de CITES Basisverordening geldt op grond van art. 9 van deze verordening tevens de eis dat voor het vervoer een ontheffing vereist is welke alleen mag worden afgegeven indien de Wetenschappelijke Autoriteit van de Lidstaat van bestemming bepaalt dat de bestemming adequaat is.

Het Dolfinarium Harderwijk vraagt dan ook ontheffing aan van zowel het bepaalde onder art. 8 als art. 9 van de CITES-Basisverordening voor wetenschappelijk onderzoek.

Overdracht onder de Habitatrichtlijn
De Habitatrichtlijn verbiedt, naar Nederlandse interpretatie, eveneens de overdracht om niet van specimens van soorten opgenomen op Bijlage IV bij deze richtlijn. Ontheffing kan slechts worden verleend indien aan drie voorwaarden is voldaan.

- Er is geen nadelig effect op de gunstige staat van instandhouding van de soort: Hierop mag geen invloed verwacht mag worden omdat Morgan enerzijds ten tijde van de aanvang van de opvang in een gezondheidssituatie verkeerde waarbij zonder menselijk ingrijpen het dier zou zijn gestorven en anderzijds haar oorspronkelijke groep niet kan worden getraceerd zodat ook bij uitzetting in de natuur niet mag worden verwacht dat zij in leven kan blijven.
- Er is sprake van een belang genoemd in art. 16, eerste lid, van deze richtlijn, in casu moet daarbij worden verwezen naar art. 16, eerste lid, onder a, de bescherming van de wilde fauna. alsmede het bepaalde onder d) het onder zich hebben met het oog op wetenschappelijk onderzoek: ten aanzien van het wetenschappelijk onderzoek wordt verwezen naar de bijgevoegde, reeds eerder genoemde onderzoeksprogramma's
- Er is geen alternatief: dat er geen alternatief is voor overdracht is in het vorengaande reeds uitgebreid aan de orde gekomen

Eisen aan de bestemming

Nu gelet op het bepaalde in de CITES Basisverordening en de Habitatrichtlijn niet alleen van belang is te bepalen of er een mogelijkheid bestaat om het levende specimen van de soort Orcinus orca weer in het wild te laten verder leven maar ook om vast te stellen dat, indien het alternatief van terugkeer naar het wild geen optie is, de gekozen bestemming voldoet aan de vereisten van wetenschappelijk onderzoek , zal niet slechts de overdracht maar ook de bestemming op overeenstemming op deze wettelijke eisen moeten worden gecontroleerd. Het Dolfinarium verwacht dat Loro Parque aan alle vereisten voldoet dient dan ook voor deze bestemming de aanvraag in.

Aansluitende voorwaarden in de ontheffing nr. Ff/75A/2008/064

Aansluitend op de eisen die de Habitatrichtliin en de CITES-Basisverordening stellen, heeft de Minister in de ontheffing nr. FF/75A/2008/064 de eis geformuleerd dat opvang alleen geschiedt indien gericht op terugkeer naar het wild of, indien dit niet mogelijk mocht zijn, op het houden in gevangenschap in het kader van een wetenschappelijk onderzoeksprogramma dat relevant is in het kader van de in de Habitatrichtlijn, het Verdrag van Bern en ASCOBANS opgelegde verplichtingen. Door middel van verschillende onderzoeksbeschrijvingen van Loro Parque wil het Dolfinarium aantonen dat ook aan deze vereisten wordt voldaan.

Analysis and conclusion

All contributors are opposed to a release into the wild of Morgan. (Ford; Camphuysen; Leopold; Guinet; Lockyer; Ugarte; McBain)

Concerns over successful introduction and acceptance of Morgan into a pod in the wild were mentioned by most contributors (Ford, Camphuysen, Leopold, Guinet and McBain).

Lack of hunting skills and capability to successfully forage were mentioned by four contributors (Ford, Ugarte, Guinet, McBain).

Habituation to humans was seen as a potential problem by four authors (Ford, Camphuysen, Lockyer and McBain).

Leopold mentioned the possibility that a catastrophic event with Morgan's pod or a mental or physical health problem of Morgan may have caused her separation from the pod.

Camphuysen touched upon the concern that Norway with its killer whales mainly located off-shore presents an extremely difficult environment for a release attempt.

In conclusion, no data are present on the history or identity of Morgan's pod. The killer whales of the region where she may originate from are currently not monitored in a structural and scientific manner. There is no knowledge on the cause of her being found alone. No disease has been found which may explain her separation. She was emaciated and defecated algae during the first week besides demonstrating a huge appetite, indicating she had been extremely hungry and unable to feed herself. Acceptation into a pod is of paramount importance for her welfare and survival chances. Only her natal pod is a potential candidate that provides an acceptable chance of introducing her successfully given what is known about the social structure of killer whales.

Research on her DNA and vocal repertoire indicate she originated from the population of killer whales that hunt the Norwegian Spring Spawning herring. This population consists of 400 to 800 animals. Two issues now have to be considered.

The first is that Morgan's natal pod has not been identified. Her specific vocal repertoire has no match in historic records. Identification is only possible by finding the pod that has the exact same vocal repertoire as Morgan and identifying this pod visually. Only in winter does this population of killer whales gather in still a fairly large and poor defined area offshore. However in winter it is, due to poor light conditions and rough weather, extremely difficult to impossible to visually identify animals that have been recorded by hydrophone. An added difficulty is multiple groups may be recorded together making even more difficult to match a recorded vocal repertoire to a specific pod (Patrick Miller personal communication).

Second the location of release would most probably then have to be offshore as this is where most of the pods spend most of their time. Transporting and releasing her to

a once found and followed pod would be hazardous to impossible (especially in rough winter weather conditions) and a contingency plan to help her if she is not accepted by the selected pod is hard to imagine, unless she was trained to follow boats which would make the risk of her interfering with other boats and humans after an attempted release very high and could lead to unacceptable and dangerous situations.

Morgan therefore can not be released and a proper location and setting for keeping her under human care has to be arranged.

To whom it may concern,

I am a post-doctoral fellow at the Centre for GeoGenetics at the University of Copenhagen. My doctoral thesis focused on the use of an extensive dataset of tissue samples and photo-identification of killer whales in the Northeast Atlantic to investigate population structure in this species in this region. The results of this study formed the basis of reports and consultation with the relevant departments of the Scottish, Norwegian, Iceland and Spanish Governments and was therefore a valuable advisory tool for management and conservation. This work was also published in the highly respected peer-reviews scientific journals Molecular Ecology, Genome Research and Evolutionary Ecology.

It was therefore decided that I was in the best position to try and apply genetic analyses and photo-identifiation matching to try and identify the population, and if possible, the pod of Morgan. The details of the work conducted have previously been given in the extensive and comprehensive report compiled by Niels van Elk. Briefly, there were no photographic matches of Morgan's dorsal fin, eye patch or the underside of her tail flukes with the catalogue of over 1,000 individuals that have been photo-identified in the Northeast Atlantic. The mitochondrial DNA control region and further diagnostic regions of the mitogenome were sequenced and compared with a sequence library of over 200 individuals including historic strandings from the Dutch coast. There was a match with DNA sequences from the Norwegian herring-eating killer whale population. This was then confirmed using acoustic methods to search for a match of stereotyped call type repertoires, work which was conducted by Filipa Samarra of the Sea Mammal Research Unit. Some call types produced by Norwegian pods were matched to Morgan's calls.

Further genetic analyses will not shed further light on Morgan's origins. To identify relationships between individuals using DNA, photo-id or acoustics requires not just data such as the DNA of the subject, but also a comprehensive catalogue with which to compare it to. Something that none of the parties affiliated to FreeMorgan possesses as none of them have ever been involved in any research work on North Atlantic killer whales to date. Collecting this data is extremely challenging. In 2007 I spent one month in Northern Norway trying to collect biopsy samples from killer whales for DNA analysis. This was with the logistic support of the Norwegian Naval Research Department (FFI) and their vessel the Svedrup. We collected samples from just three individuals. Due to the light conditions there were no usable photo-identification photos collected concurrently. This population contains over 1,000 individuals based on Mark-recapture abundance estimates by the International Whaling Commission. The tissue library that the DNA sequences from Morgan were compared to represents over a decade of data collection at a cost of several tens of thousands of euros.

Using this mutli-discipliary study we were therefore able to identify Morgan's natal population, but were not able to identify her pod. The opinion of all the scientists consulted and as far as I am aware, all scientists with experience of working with this species in these North Atlantic waters, is that a release, in any form including the gradual release proposed by FreeMorgan, would lead to the slow death of Morgan by starvation.

My research career has led me to conduct research in Washington State USA, British Columbia Canada, the Aleutian Islands, the Strait of Gibraltar, Iceland, Norway, Shetland, the North Sea and Ireland. In each location I have had to adjust my research technique to match the local conditions, and as those conditions have changed, which they did drastically in Norway following the change in migration of the herring, I have to adjust my approach. The

proposal put forward by the FreeMorgan group is designed around a set up that could and has worked in the nearshore waters of British Columbia or Washington State where every individual is censused annually and population sizes are small and there is high site fidelity to core areas. The parties that support FreeMorgan are those which only have experience of working in these sheltered North Pacific waters with these well-studied populations and they have no experience of working with a pelagic North Atlantic population of over 1,000 individuals.

It is therefore my independent opinion that the request for DNA from FreeMorgan should not be granted, it will not provide any further information that can help Morgan and is not in her best interest. At this point the discussion should be focused on how to enhance her life in captivity and further delays on putting this into action will be detrimental to her well-being.

Yours faithfully

Dr Andrew Foote

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Voorstellen om zwaardwalvis (orka) "Morgan" terug te brengen naar een natuurlijk leven in de oceaan.

www.freemorgan.nl

Management samenvatting

"Morgan" is een jonge vrouwtjes orka (zwaardwalvis), van ongeveer 3 a 4 jaar oud, die op 23 juni 2010 gered is uit de Waddenzee.
Op dit moment verblijft zij in het dolfinarium te Harderwijk.
Nu, vier maanden na haar reddingsoperatie beginnen er zorgen te ontstaan over haar opsluiting in een kleine betonnen bak, en de consequenties hiervan voor haar terugkeer in het wild.
De voorstellen in dit plan zijn bedoeld om de Nederlandse overheid (Ministerie van Economie, Landbouw en Innovatie) en het Dolfinarium te Harderwijk de mogelijkheid te bieden om Morgan terug te brengen naar haar leefgebied in de oceaan en hiermee bij te dragen aan de bescherming van orka's in het wild en het vergroten van de wetenschappelijke kennis.

De ontwikkeling van dit rehabilitatie en verplaatsingsvoorstel is een gezamenlijk project van een groep nationale en internationale partners waaronder wetenschappers, natuurbeschermingsgroepen, mensen die zich inzetten voor dierenwelzijn en orka liefhebbers, die allen het gezamenlijke doel hebben dat Morgan een vrij leven in de oceaan krijgt, het liefst op de plaats waar ze weer in contact kan komen met haar directe familie of haar populatie.

We adviseren een Stuurgroep aan te stellen die het "Release Morgan" project gaat leiden.
Het voorstel in dit document is bedoeld om Ministerie van E. L. &I te assisteren in zijn beslissingen en acties. Dit voorgestelde vrijlatingsplan voor Morgan bevat vier hoofd fases, ieder met een set een aantal nood maatregelen.
De voortgang van de ene fase naar de andere is afhankelijk en gebaseerd op de criteria gesteld door de Stuurgroep.
De gezondheid en welzijn van Morgan heeft de hoogste prioriteit in dit plan en ze zal voortdurend worden gecontroleerd gedurende de verdere rehabilitatie voorafgaande aan de daadwerkelijke vrijlating.

Achtergrond en Overzichtsinformatie

De basis van deze strategie is afkomstig van enkele medewerkers die meegewerkt hebben aan, en ervaring hebben met, de rehabilitatie van drie andere orka's namelijk; 'Springer', een twee jarige wees die alleen werd aangetroffen in de buurt van Seattle Washington USA in 2002; 'Luna', een andere twee jarige orka die alleen werd aangetroffen in Nootka Sound, British Colombia, Canada in 2001; en 'Keiko'een orca die op twee jarige leeftijd werd gevangen in de Atlantische Oceaan bij IJsland en twintig jaar in gevangenschap heeft geleefd in dolfinaria, voordat een poging werd ondernomen


Photo of Morgan © Jenny van Twillert

gedurende 1999 tot 2003 om hem
terug te brengen naar, en uiteindelijk vrij te laten in de Atlantische Oceaan bij IJsland.
Van deze drie eerder genoemde pogingen werd Keiko weer in het wild losgelaten (hetzij kortstondig) maar kwam later opnieuw in contact met mensen en stierf uiteindelijk aan longontsteking.
Luna, wiens verplaatsingsplan niet geimplementeerd werd, stierf toen zij geraakt werd door de schroef van een schip; Springer daarentegen heeft het overleefd en is nu volledig opgenomen in haar wilde familie, die aan de centrale kust van British Colombia voorkomt.
Bij alle pogingen speelde politieke en economische factoren een belangrijke rol, maar bovenal werden bij deze pogingen zeer waardevol wetenschappelijk informatie gewonnen, die een enorme schat aan informatie en kennis heeft gegeven om ons te helpen om alomvattende en succesvolle rehabilitatie en herintroductieprogramma's van walvisachtigen, wereldwijd te kunnen realiseren.

Dit voorstel wil bijdragen aan de kansen die Morgan ons biedt om onze gemeenschappelijke kennis op het gebied van rehabilitatie van wilde zeezoogdieren te vergroten en het verbeteren van ons vermogen om wederom een jonge orka succesvol te kunnen laten terugkeren naar haar thuis wateren.
In het licht van wereldwijde milieuklimaat en ecosysteem veranderingen, is de vooruitgang van de kennis op het gebied van succesvolle herintroductie programma's van zeezoogdieren meer en meer van belang.
In sommige gevallen, is er sprake van kritische biodiversiteit in afgelegen zeezoogdier populaties (bijv. de Beluga's in de St Lawrence and Cook inlet, Southern Resident orca, de Baiji dolfijn in de Yangtze Rivier, de Vaquita dolfijn in Mexico, en de Indus Rivier dolfijn, etc.) en ons vermogen om succesvolle re-introducties uit te voeren van gestrande of gewond geraakte zeezoogdieren - of de mogelijkheid te hebben om in gevangenschap gehouden of in gevangenschap gefokte dieren weer te kunnen introduceren in deze wilde populaties zeezoogdieren - zou voor deze unieke soorten het verschil kunnen betekenen tussen uitsterven of niet.
De omstandigheid die ons gepresenteerd word met een grote dolfijn als Morgan geeft een enorme mogelijkheid aan kansen voor onderzoekers, aquaria, overheden en anderen om onze wereldwijde en gezamenlijke kennis uit te breiden en ook onze kennis en mogelijkheden omtrent de bescherming en het versterken van afgenomen wilde populaties walvisachtigen.

Op de drempel van het tijdperk dat veel grote zeezoogdiersoorten en andere landzoogdieren worden geconfronteerd met uitroeiing of uitsterven, is elke mogelijkheid tot het meer te weten komen over rehabilitatie en herintroductie van populaties van groot belang, en is dit een stap die genomen moet worden. Ondanks verschillen in perspectief of benadering van bescherming, is één element gelijk en dat is onze wereldwijde afspraak om onze biodiversiteit te beschermen en er zeker van te zijn dat er gezonde, duurzame populaties van zeezoogdieren blijven voorkomen in onze oceanen en rivieren. Met dit voorstel om Morgan te rehabiliteren en terug te brengen naar haar thuis wateren, vervullen we zowel een morele als ecologische plicht. We kunnen niet toestaan dat deze mogelijkheid verloren gaat terwijl we een inhaal race aan het maken zijn om meer te weten te komen op het gebied van herintroductie van walvisachtigen, en dat we onze kennis hierover moeten verbeteren.
Met samenwerking en gedeelde zienswijze, kunnen we de tragische omstandigheden van Morgan omkeren tot een stap voorwaarts in een progressief leer moment, en toewerken naar overlevingskansen voor alle walvis en dolfijn populaties die de oceanen van onze planeet bevolken.

DOEL

'Morgan' opnieuw introduceren in de oceaan , haar thuis wateren en orka leefgemeenschap
Of Morgan nu wel of niet langdurige sociale aansluitingen heeft met andere orka's, haar vrijlating is een succes als zij in staat is om te overleven in de oceaan idealiter zonder verdere menselijke bemoeienis.

Voordelen van poging tot vrijlating

- **Voor Morgan; het creëren van een kans om haar leven in de oceaan te hervatten.**
- **Voor de toekomstige rehabilitatie pogingen van walvisachtigen; Het redden en herintroduceren van Morgan zal leiden tot verbeterde planning en voorbereiding technieken.**
- **Voor het publiek; het creëren en bevorderen van bewustwording en zorg voor de bescherming van orka populaties in de Noord Atlantische oceaan en andere populaties elders in de wereld.**
- **Voor het Dolfinarium Harderwijk en andere betrokken belang hebbenden biedt het positieve aandacht voor hun inzet.**
- **Voor wetenschap en bescherming; het verkrijgen van data voor de gezamenlijke studie van de sociale structuren van de Noord Atlantische orka populaties.**

De bijdrage van niet overheid gerelateerde organisaties (NGO)
De expertpanel en aangesloten NGO's danken en feliciteren de Nederlandse overheid en het Dolfinarium voor hun keuze om Morgan te redden, en juichen de inzet die het Dolfinarium heeft gegeven om Morgan haar gezondheid weer terug te laten krijgen, toe. Het Dolfinarium Harderwijk heeft haar faciliteiten en deskundig personeel ingezet voor Morgan. Het welzijn van Morgan heeft de hoogste prioriteit voor zowel het Dolfinarium als de expertpanel en het gewone publiek. De expertpanel geeft haar volledige medewerking aan de Nederlandse overheid en het Dolfinarium Harderwijk om te helpen een positieve uitkomst voor Morgan te bewerkstelligen.

De expertpanel zal haar uitgebreide wereldwijde netwerk gebruiken om:

- **Het bevorderen van publieke bewustwording door een publiek forum te organiseren waarin het plan voor het terug brengen van Morgan naar haar natuurlijke thuis wateren besproken kan worden.**
- **Te helpen om fondsen bij elkaar te krijgen voor het project.**
- **Helpen met planning, logistiek en documentatie.**

Periode voor de vrijlating
Voordat Morgan word vrijgelaten, om er zeker van te zijn dat deze succesvol zal verlopen, moet het volgende gedaan worden:

- Morgan's prooi voorkeur achterhalen. Dit zal helpen om te begrijpen a) bij welke populatie zij hoort b) wat haar voedingsbehoeften zijn c) wat haar sociale afhankelijkheid is.
- DNA en andere analyses om enige overeenkomstigheid te kunnen vaststellen met bekende populaties.
- Acoustische analyse maken van haar vocalisaties om zo overeenkomsten te vinden met bekende Noord Atlantische populaties.
- Een zo compleet mogelijke digitale fotoreportage te maken van haar lichaam zoals van haar rugvin, oogvlekken, zadelvlekken, borstvinnen, staart en markeringen op haar lichaam, om later een zo goed mogelijke match te kunnen maken.
- Morgan's vooruitgang en gereedheid voor de volgende stap moet gecontroleerd en geauditeerd worden door dierenartsen gespecialiseerd in zeezoogdieren en experts gespecialiseerd orkaonderzoek en orkagedrag in het wild.

Fase 1. Gevangenschap: Het terug krijgen van haar initiële gezondheid in het Dolfinarium te Harderwijk

Toen Morgan in de Wadden zee werd aangetroffen was ze alleen, ziek en sterk vermagert. Sinds haar redding in juni 2010 krijgt zij zorg van het Dolfinarium te Harderwijk in Nederland.
De medische staf en trainers van het Dolfinarium hebben haar weer op gewicht gekregen en haar behandeld voor diverse lichamelijke aandoeningen. Alles bij elkaar opgeteld is Morgan's lichamelijke gesteldheid enorm verbeterd en is fase 1 bijna klaar.

Noodplan voor fase 1:
Als haar lichamelijke gesteldheid snel achteruit gaat gedurende deze fase dan blijft zij onder de zorg van het Dolfinarium te Harderwijk, tot ze weer hersteld is.

Fase 2 Gevangenschap en uitgebreide lichamelijke rehabilitatie

Zo gauw als de veterinaire staf van het Dolfinarium heeft vastgesteld dat Morgans gezondheid voldoende is voor transport, zal ze naar een afgesloten plek in zee worden gebracht. Het doel gedurende en direct na het transport zal zijn om Morgans continuïteit zoveel mogelijk te waarborgen.
Gezien de sterke sociale gebondenheid met haar veterinaire staf, en andere verzorgers, zullen zij haar dienen te begeleiden gedurende alle fasen van het transport en zullen zij zo lang mogelijk bij haar moeten blijven na haar aankomst.

- Morgan zal daar verdere lichamelijke rehabilitatie ontvangen en op nieuw aanpassen aan haar meer natuurlijke omgeving in zee.
- Blootstellen aan mensen (bezoek) zal gereduceerd en gecontroleerd worden.
- Morgan zal geïntroduceerd worden met levende prooi.
- Morgan's lichamelijke gezondheid en welzijn zal voortdurend worden gecontroleerd
- Morgan zal verder gereconditioneerd worden om haar te helpen overleven in de oceaan.

Delta Park Neeltje Jans. Locatie en details

We stellen voor dat Delta park Neeltje Jans een geschikte plaats is om fase 2 uit te voeren. De locatie ligt aan de binnenkant van de stormvloedkering in de provincie Zeeland nabij Burg-Haamstede. Deze lokatie heeft;

- Semi-natuurlijke havens
- Goede toegankelijkheid voor verzorgers en medische assistentie
- Ruime mogelijkheden om overlevingstechnieken aan te leren
- De directie van Delta Park Neeltje Jans heeft aangegeven graag te willen meewerken aan dit project.

Het Delta Park is een waterpark met diverse kunstmatige baaivormige inhammen cq havens. De Naam Neeltje Jans komt van de zandplaat die voor het park in de Oosterschelde ligt. Het gebied rond Neeltje Jans is een natuurreservaat waar het verboden is voor scheepvaart aan beide zijden van de locatie.
De twee stormvloedkeringen zijn gebouwd om overstromingen door stormvloed te voorkomen, en zijn bij normale weersomstandigheden geopend en kunnen afgesloten worden als dit nodig is.
De diepe geulen voor de locatie die gevormd zijn door sterke stroming tijdens getijde wisselingen zijn ongeveer 25 meter diep.
De kunstmatige baaivormige inhammen cq havens (Fig. 2) zijn ongeveer 5 meter diep, wat dieper is dan het bassin waar Morgan nu in verblijft in het dolfinarium te Harderwijk.
Ze zijn ook groter dan de huidige bassin. Haven #1 is 200 bij 150 meter, haven #2 en #3 zijn beide ongeveer 100 bij 200 meter.

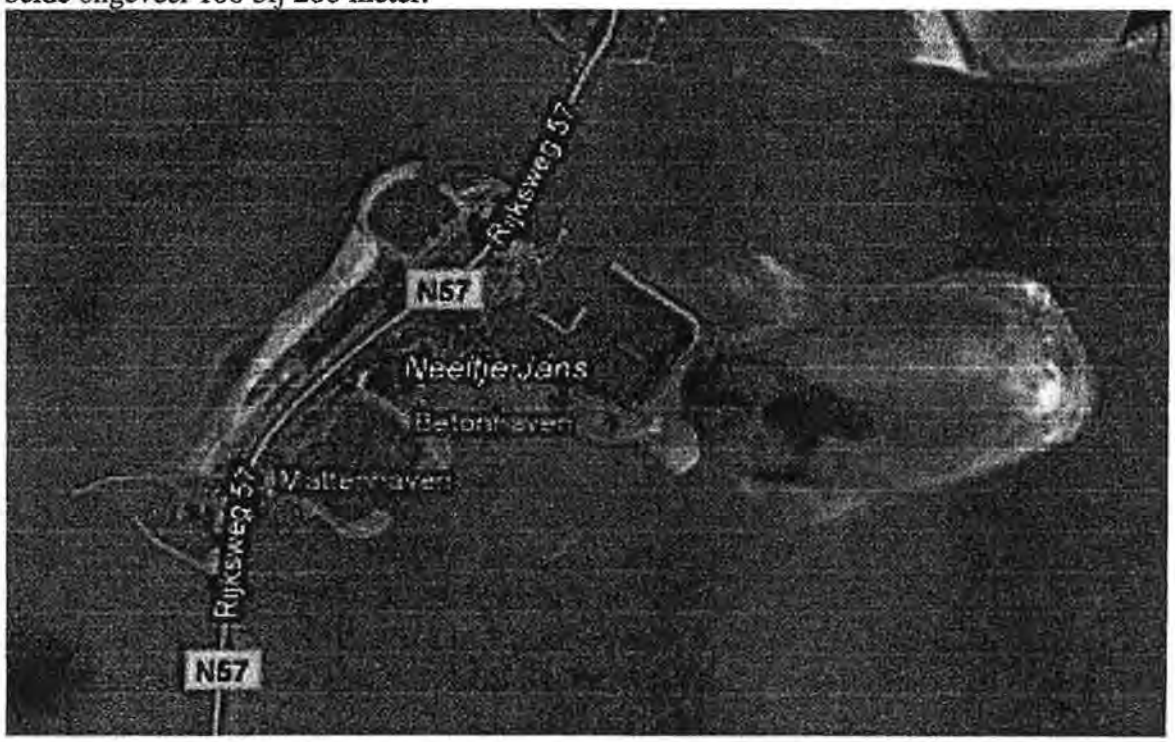
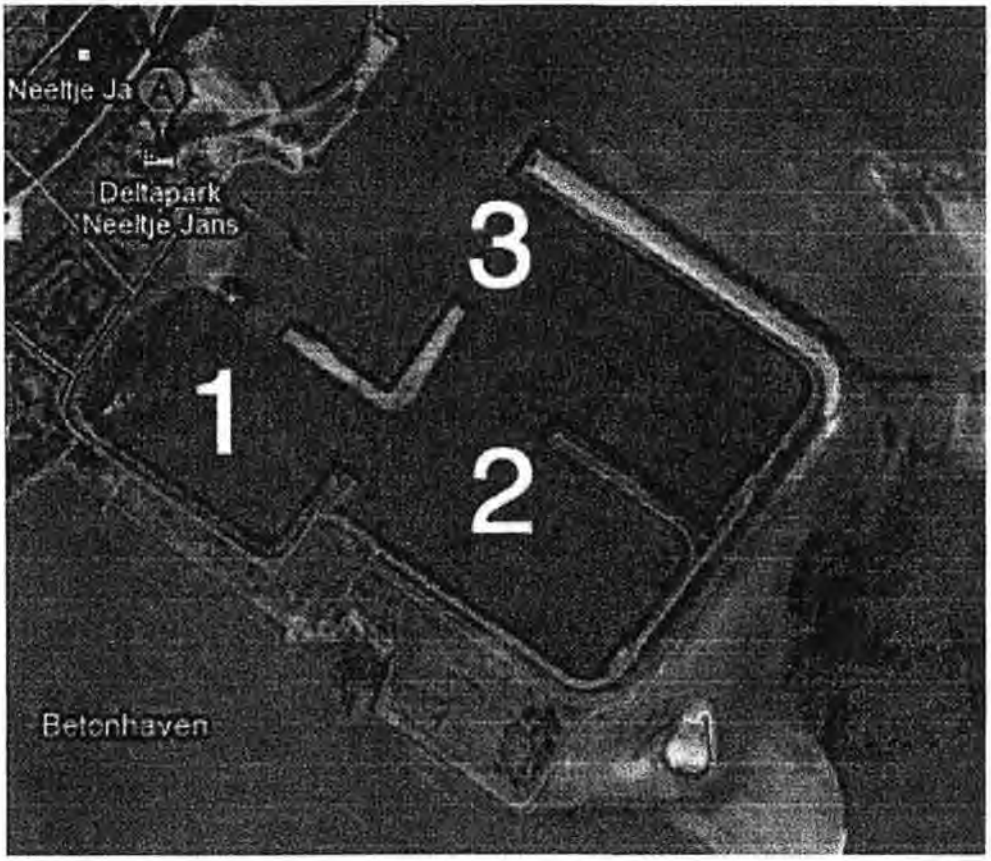


Foto Neeltje Jans
Figure 1. Overzichtsfoto van de locatie Neeltje Jans, de zandbank rechts is duidelijk te zien.



Figuur 2 Close- up foto van het Delta park met zijn afgesloten havens.
De faciliteit van het delta Park leent zich uitstekend voor een breed aantal testen om er zeker van te zijn dat Morgan de noodzakelijke vaardigheden om te overleven, fysieke kracht en uithoudingsvermogen heeft.

De voordelen van de locatie Delta Park Neeltje Jans gedurende fase 2.

- Er zijn mogelijkheden om voedsel aan te bieden op verschillende manieren en locaties rond de havens om Morgans jacht naar voedsel te stimuleren.
- Er kunnen camera's (zowel boven als onder water) en hydrofoons geplaatst worden om haar 24 uur per dag te kunnen observeren, en data te kunnen verzamelen.
- Gedurende fase 2 kan Morgan getraind worden om op een akoestisch signaal te reageren, dit is nodig in voorbereiding op fase 3.

Noodplan voor fase 2
We verwachten het niet, maar mocht in deze fase Morgan's gezondheid plots snel achteruitgaan, dan kan gezien de voor handen zijnde faciliteiten in het Delta Park, heel gemakkelijk intensieve zorg toegepast worden.

Fase 3. Terug naar haar thuis wateren

Het vaststellen van Morgan's thuis wateren en van welke familie zij afkomstig is kan tijd in beslag nemen, of het kan misschien vrij eenvoudig door het gebruik van bestaande DNA, foto's en/of acoustische data.

Gegeven het feit dat het vaststellen van de exacte plaats van Morgan's thuis wateren onzeker is, is het wel mogelijk om fase 3 te starten en haar te verplaatsen naar een plek waar wilde orka's regelmatig langs komen. Dit gezien het feit dat sommige orka'populaties sociaal flexibel zijn en dat zo'n groep, alhoewel ze geen familieband hebben met Morgan, haar wel kunnen opnemen binnen de groep.
Een alternatief zou kunnen zijn om haar te verplaatsen naar een plek waar er mogelijkheden zijn om zelfstandig te leven.

Zodra Morgan's mogelijke thuis wateren zijn vastgesteld of als er een alternatieve plek is gevonden waar ze zelfstandig zou kunnen leven:

- dan zal Morgan verplaatst worden naar een tijdelijke zee pen.
- daar ter plaatse haar training afmaken om te acclamatiseren in de oceaan, waar ze tevens kan laten zien of ze zelfstandig kan leven en als het mogelijk is haar in contact te brengen met wilde orka's.

Net als in fase 2 zullen Morgan's dierenartsen en verzorgers haar bijstaan bij alle fasen van transport. Zij zullen zolang mogelijk bij haar blijven zodra ze aangekomen is in haar thuis wateren.

Zodra Morgan is gewent aan haar zee pen, zal gestart worden met de training om via het aangeleerde 'terugkomen' op een acoustische signaal, 'het volgen van de boot' aan te leren zoals aanbevolen door de aangestelde stuurgroep.

Stap 1. Morgan zal in de zeepen getraind worden om te terug te komen op een aangeleerd acoustisch signaal.
Stap 2. Deze signaal training zal voortgezet worden buiten de zee pen, met voorkeur in een zeer ruim gebied dat tijdelijk met netten afgesloten is.
Stap 3. Gestart zal worden met uitgebreide boot volg sessies buiten het afgesloten gebied naar gebieden waar van men weet dat daar orka's zich ophouden om te fourageren en langs trekken.
Aanvullende voeding is aanwezig indien nodig.

Voorafgaande aan de uitgebreide 'boot volg' sessies:

- Foto's van Morgan zullen verspreid moeten worden in de dichtstbijzijnde dorpen aan vissers en booteigenaren enz. die dicht bij het gebied van de vrijlating wonen. Zo ook zal informatie over Morgan uitgezonden worden via locale radio stations en VHF radio freqeunties. Dit om een zo effectief mogelijk netwerk op te bouwen die aan de juiste personen van het vrijlatingsproject of andere betrokken organisaties kunnen doorgeven waar en wanneer ze Morgan hebben gezien.
- Morgan zal een satelliet/radio zender aan haar rugvin bevestigd krijgen zodat men voortdurend weet waar ze zich ophoud en om informatie te krijgen over haar gedrag (Hoe diep duikt ze, hoelang blijft ze onder water, welke gebieden bezoekt ze en waar ze voorkeur voor heeft etc.)
- Morgan zal getraind worden om te reageren op een lange afstandssignaal gedurende de voorbereidende korte boot sessies. De sessies worden langzaam uitgebreid totdat ze in staat is om lange periodes uit te gaan tot uiteindelijk ook 's nachts.

- Uitzendingen van Morgan's eigen vocalisatie zullen uitgezonden worden in de omringende wateren om eventueel andere orka's te stimuleren om naar haar locatie te komen.

Als Morgan gedurende de boot sessies contact maakt met andere wilde orka's gedurende een langer tijd dan zal de boot in de omgeving blijven zodat Morgan gebruik kan maken van deze back-up als ze dat nodig heeft. Mensen belast met de observatie van Morgan blijven haar in die situatie met andere wilde orka's monitoren door middel van fotografie, video en acoustische opnames. Als de ontmoeting met de wilde orka's voortgang heeft kan de boot stationair stil blijven liggen en zo een grotere afstand van de orka's creeren.Uiteindelijk zal de boot vertrekken zonder het akoestische 'terugkom' signaal te laten horen.

Waar Morgan zich ophoud kan via de radio/satelliet zender bijgehouden worden en een overvliegend vliegtuigje kan controleren of ze in de buurt van de orka's blijft.
Als blijkt dat ze alleen is kan beslist worden of het 'terugkom' signaal weer word afgegeven.
Als er beslist word dat ze terug moet komen naar de zee pen dan zal direct haar gezondheid gecontroleerd worden. Als Morgan alleen word aangetroffen en ze blijkt gezond te zijn en zich normaal te gedragen dan zal er een beslissing moeten worden genomen of het goed is om haar daar te laten en haar bewegingen te volgen via de radio/satelliet zender.
Men zal zich er bewust van moeten zijn dat de reintroductie van Morgan om een 'normaal' leven in de oceaan te kunnen leiden zal bestaan uit meerdere pogingen.

We adviseren om een zogenaamde "soft release"als alternatief te overwegen.
"Soft release" houdt in dat er een permanente opening in de afzetting van de zee-pen gelaten word terwijl wel alle faciliteiten en zorg aanwezig zijn.
Morgan zal continue zorg krijgen tot dat ze uit zichzelf de zee pen durft te verlaten. Net als in de bovenstaande procedure zal ze voorzien zijn van een radio/satelliet zender aan haar rugvin zodat al haar bewegingen, gedrag en haar gezondheid bijgehouden kan worden. In deze situatie zal de mogelijkheid voor Morgan om terug te keren naar de zee pen voor lange tijd mogelijk blijven.
Terug keren naar de zee pen word aan Morgan zelf overgelaten, tenzij er indicaties zijn dat ze gestrest is, niet in staat is zelf voedsel te bemachtigen of als om gezondheidsredenen ingrijpen noodzakelijk maakt.

Noodplan van fase 3

Als Morgan laat zien dat zij niet in staat is zelf voedsel te bemachtigen en gewichtsverlies lijd of gedesorienteerd lijkt, moet er een optie zijn om haar terug te halen via het aangeleerde acoustische signaal en zal ze daar langer zorg en training ontvangen.
Als Morgan andere orka's ontmoet en zij blijkt geen binding met hen te krijgen dan bestaat de mogelijkheid om haar zelfstandig te laten blijven en haar via de radio/satelliet zender te volgen, ze moet wel zelfstandig voedsel vangen.
Ze kan ook naar de zee-pen terug geroepen worden waar dan proviand beschikbaar is, maar verder is ze wel vrij om te gaan en te komen.

Als het gebeurt dat alle systemen en procedures om Morgan terug te roepen tijdens de "boot sessies" niet werken dan zal er een vliegtuig moeten worden ingezet die zodanig uitgerust is dat die in staat is om haar opnieuw te localiseren.

Fase 4. Monitoren na de vrijlatings periode

Als de re-introductie succesvol is dan zal het monitoren van Morgan essentieel zijn, niet alleen voor Morgan maar ook om informatie te winnen over haar en de Noord Atlantische populatie.

Met de aangebrachte radio/sateliet zender zal het mogelijk zijn om Morgan's bewegingen voor een lange tijd en grote afstand te kunnen blijven volgen. Zodra het kan, dan is het van belang om op een schip professioneel getrainde spotters data te laten verzamelen omtrent Morgan's activiteiten. Elke betrouwbare observatie van het netwerk van algemene spotters zal worden nagetrokken door getraind personeel.
De observatie data zal opgeslagen worden in een "Morgan" database.
Om Morgans succesvolle vrijlating te kunnen volgen zal de database frequent aangevuld worden en de database is toegankelijk via het internet, zodat iedereen die geïnteresseerd is haar kan volgen.

Project Management: Stuurgroep
Belast met het aan sturen van het project, zal de Stuur groep een Project Manager moeten bevatten die aangesteld is door de Nederlandse Overheid, een afgevaardigde van het Dolfinarium te Harderwijk, officials van het Ministerie E.L&I, en experts op het gebied van wetenschappelijk Zeezoogdierkundigen die ruime ervaring hebben op het gebied van orka onderzoek in het wild.

Project Management: Project Manager
Een betaalde project manager zal ter plaatse en dagelijks de operatie aansturen.

Project Management: Wetenschappelijk Commitee
Het Wetenschappelijk Commitee zal gekozen worden door het Stuurgroep.
Zij zullen de Project manager adviseren omtrent de procedures met betrekking tot voeding, zorg, training, transport, rehabilitatie en re-introductie.

Fondsen
Bij alle fasen van Morgan's terugkeer naar haar natuurlijke leven in de oceaan zullen kosten gemoeid zijn. Het is van groot belang dat zo snel mogelijk inzichtelijk word gemaakt welke componenten geld gaan kosten en hoeveel dit is.
Zodra de Nederlandse overheid besluit akkoord te gaan met het vrijlatingsplan en een Project manager heeft aangesteld zullen deze kosten inzichtelijk moeten worden gemaakt.
Zodra de geraamde kosten bekend zijn zullen er direct stappen ondernomen moeten worden om dit geld bij elkaar te krijgen. Dit zal ook gedeeltelijk een verantwoordelijkheid zijn van de overheid, en mogelijk ook overheden binnen Morgan's voorgestelde leefgebied.
Ook zal er financiele steun gevraagd worden van NGO's en andere belanghebbende zoals het publiek. Zonder twijfel zal Morgan's terugkeer veel geld kosten, maar waar een wil is is een weg.

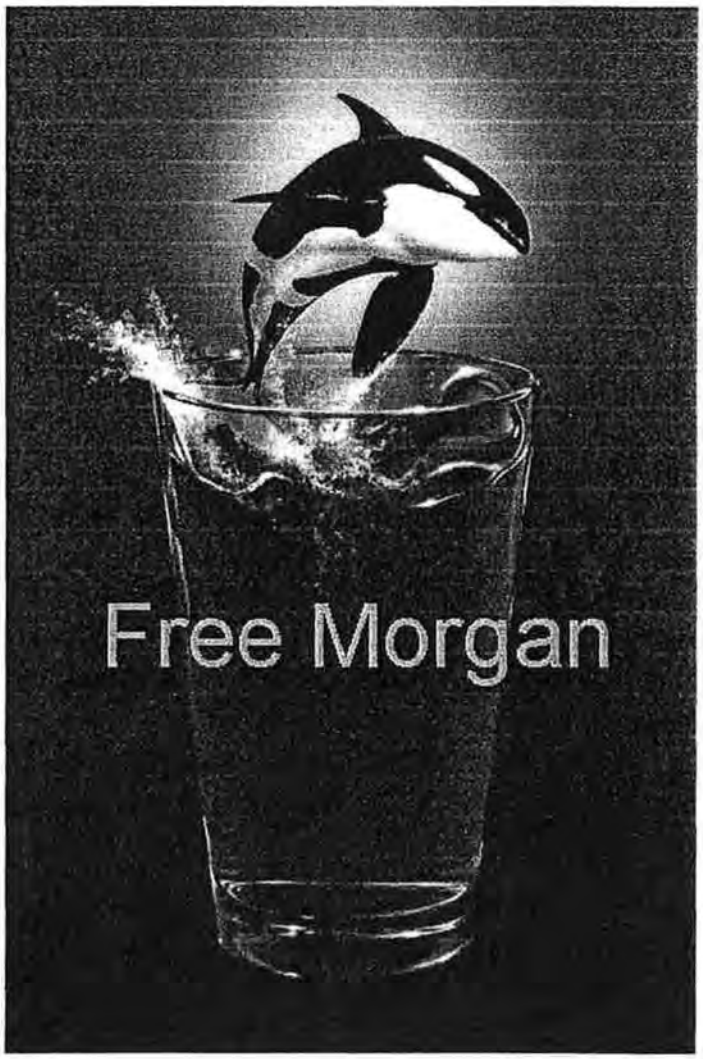
Aansprakelijkheid
De Expertpanel realiseert zich dat het terug brengen van Morgan naar haar natuurlijk leven in de oceaan, zeer complexe procedures en onverwachte factoren met zich mee zal brengen, die allen risico's voor Morgan kunnen bevatten. De Expertpanel stelt vast dat, zoals het nu is gesteld, geen blaam tegen medewerkende organisaties of mensen te zullen hebben, mochten die fouten maken of dat daardoor oponthoud ontstaat tijdens het proces van Morgan's

succesvolle vrijlating. Het enige wat zij verwachten is dat een ieder zijn uiterste best doet om Morgan haar leven in de oceaan terug te geven.

Onderschrijving betrokkenen
Dit plan voor Morgans vrijlating is onderschreven door de volgende personen (in willekeurige volgorde)
Verdere details kunt u vinden op www.freemorgan.nl

Paul Spong & Helena Symonds	OrcaLab Pacific Orca Society www.orcalab.org
Howard Garret & Susan Berta	Orca Network www.orcanetwork.org
Ingrid Visser & Terry Hardie	Orca Research Trust www.orcaresearch.org
Kenneth Balcomb	Center for Whale Research www.whaleresearch.com
William Rossite	Cetacean Society International www.csiwhalesalive.org
Michael Kundu & Bob MCLaughlin	Project Sea Wolf Coastal Protection www.projectseawolf.org
Mark Berman	International Marine Mammal Project of Earth Island www.earthisland.org Free Willy Keiko Foundation www.keiko.com
Christopher Porter	Free the Pod www.freethepod.org
Robin Baird	Cascadia Research Collective www.cascadiaresearch.org
Cathy Williamson	Whale and Dolphin Conservation Society www.wdcs.org
Lara Pozzato	
Peter Pijpelink	
Jan en Jenny van Twillert	
Norma Koning	

Het freemorgan plan kritisch beschouwd



Auteur: N van Elk

Datum: 4-4-2011

Achtergrond:

Free Morgan is een belangengroep die wenst dat de geredde orka Morgan terug gezet wordt op zee. Hiertoe heeft zij een terugkeer plan geschreven dan wel laten schrijven dat aangeeft hoe een dergelijke terugkeer vorm gegeven zou moeten worden.

Het plan (zie www.freemorgan.nl) kent geen duidelijke auteur en maakt ook geen referenties naar wetenschappelijke literatuur waarop gedane aannames gebaseerd zijn. Het plan is onderschreven door een aantal experts van uiteenlopende pluimage (wetenschappers, filmers, fotograven, dolfijnen trainer-vanger). Ongeveer de helft van deze experts (hieronder met de rode markerpen gemarkeerd) heeft bemoeienis gehad met het Free Willy, ofwel Keiko project. Het Free Morgan plan vertoont grote overeenkomsten met het plan waarmee getracht is Keiko te introduceren in het wild.

[redacted] & Helena Symonds OrcaLab Pacific Orca Society www.orcalab.org
[redacted] Orca Network www.orcanetwork.org
[redacted] Orca Research Trust www.orcaresearch.org
[redacted] Center for Whale Research www.whaleresearch.com
William Rossite Cetacean Society International www.csiwhalesalive.org
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[redacted] International Marine Mammal Project of Earth Island www.earthisland.org Free Willy Keiko Foundation ww.keiko.com
Christopher Porter Free the Pod www.freethepod.org
Robin Baird Cascadia Research Collective www.cascadiaresearch.org
Cathy Williamson Whale and Dolphin Conservation Society www.wdcs.org

Het plan voorziet in 4 fasen:

Fase 1: verblijf in Harderwijk

Fase 2: verblijf in de bassins van werkeiland Neeltje Jans, overeenkomend met het verblijf van Keiko in voor hem gebouwde grote bassins bij Oregon Aquarium. Hier moet Morgan kennis maken met levende vis en moet ze verder geconditioneerd worden om te overleven op zee.

Zwakke punten:

1. Welke levende vis er wordt aangeboden wordt niet duidelijk gemaakt echter het aanbieden van de vissoort die ze in haar natuurlijke omgeving achterna zit op een natuurlijke wijze is onmogelijk. (overeenkomend met scholen wilde haring die veelal door in groepen opererende orka's worden gevangen[7])

2. wat de verdere conditionering inhoudt wordt niet beschreven.

3. In geval dat er een medische noodsituatie bestaat claimt men dat er mogelijkheid is voor intensieve verzorging op Neeltje Jans. Gezien de grootte van de bassins, het afwezig zijn van een beweegbare bodem en de onmogelijkheid om in deze grote bassins een onwillige Orka te manipuleren is deze claim ongeloofwaardig.

Fase 3: verblijf in een pen (groot omnet stuk zee of gedeelte van een baai) waar de training wordt afgemaakt, Morgan geleerd wordt een boot te volgen en te komen als een

akoestisch signaal afgaat. Vervolgens wordt Morgan op boottochtjes langs langstrekkende orka's meegenomen in de hoop dat ze aansluiting vindt en of succesvol haar eigen vis vangt.

Zwakke punten:

1. Men claimt dat er groepen orka's zijn met een minder rigide sociale structuur. Dit is misleidend, aangezien bekend is dat Morgan uit een visetende populatie orka's komt. Visetende orka's zijn zeer rigide in hun sociale structuur en blijven levenslang bij hun moeder[1]. Alleen zeezoogdieretende orka's zijn minder rigide, deze groep orka's staat zover van de visetende orka's af dat ze door biologen als een andere soort worden beschouwd[2,3].

2. Als Morgan geleerd wordt een boot te volgen mag men aannemen dat ze wederom een boot zal zoeken als ze in de problemen komt. Interacties met mensen kunnen echter zeer problematische vormen aannemen zoals gebeurd is bij de verdwaalde juveniele orka Luna en eveneens bij Keiko[4,5].

3. Er is geen enkele aanwijzing dat het meenemen van Morgan achter een boot in een lokaal stukje zee haar het natuurlijke vanggedrag zou aanleren dat nodig is om met succes te jagen. De groep orka's waar zij uit afstamt, jaagt op de Noorse haring en migreert met de haring mee. Deze haring verblijft in de winter op 500 km westelijk van de Lofoten migreert dan langs de Noorse kust om te paaien op 150 meter diepte en trekt vervolgens de gehele Noorse zee op in een gebied wat zich uitstrekt van Noorwegen tot aan Groenland[6] (Personal communication: Leif Nottestad, principal scientist of the Institute of Marine Research Nordnes, Bergen, Norway). Deze haring wordt bejaagd door groepen orka's die ook gebruik maken van gecompliceerde samenwerking om succesvol op deze vissoort te jagen[7]. Het imiteren van dit jachtgedrag of het volgen van deze vissoort door de seizoenen heen is, met Morgan achter een volgboot aan, geheel onrealistisch.

Er zijn overeenkomsten tussen Morgan en Keiko. Keiko had verleerd hoe te jagen en zichzelf te redden in de natuur, na 16 jaar in een aquarium te hebben verbleven, Morgan had nog niet geleerd te jagen en zich te redden. We mogen dat laatste afleiden uit het feit dat Morgan zonder noemenswaardige ziekte de groep was kwijtgeraakt, totaal verdwaald, ver weg van haar oorsprongsgebied was geraakt en overduidelijk niet in staat was zich te voeden gezien de zeer vermagerde staat waarin ze werd aangetroffen.

Ondanks een investering van 20 miljoen dollar en een trainings- en herintroductie-programma van 7 jaar is het niet gelukt om Keiko aansluiting te doen vinden bij een groep orka's. Dit is omdat zijn oorsprong groep niet gelokaliseerd kon worden. Zo bevestigt ook de onderschrijver van het Free Morgan plan Paul Spong (dus opponent van de beslissing van de door het dolfinarium geconsulteerde wetenschappers) op de website www.keiko.com :

"My belief is that Keiko would have needed direct contact with members of his immediate family and community in order to fully integrate back into a life in the wild. That did not happen in Iceland, and it is very unlikely that it would have happened in Norway. However, this does not mean that it could not happen, given the appropriate circumstances. The story of Springer, an orphan baby orca who wandered far from her community's range, and was eventually reunited with her family, demonstrates what is possible. Had more been known about Keiko's social background, it would have been far easier to put him in contact with

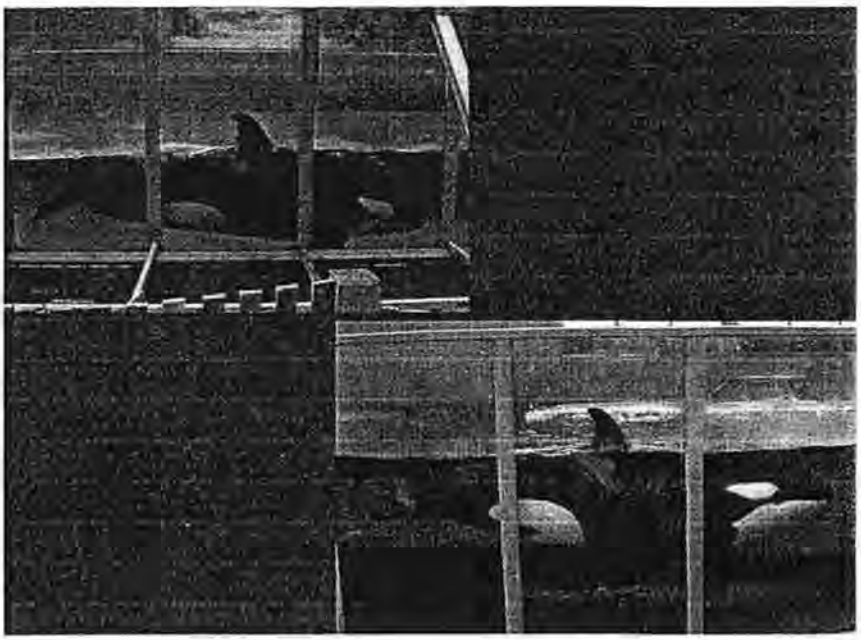
members of his family. I do not believe he met his mother, or any siblings or close cousins while he was swimming freely in Icelandic waters. He did meet and interact with other orcas, but they were not his kin, so he did not join them permanently. "

Dit is tevens het grote bezwaar dat de door het Dolfinarium geconsulteerde experts aanvoeren tegen uitzet van Morgan. De onmogelijkheid om haar oorsprong groep te vinden maakt dat uitzet zowel voor haar overlevingskansen als welzijn onverantwoord is. Overigens is de vraag gerechtvaardigd of Keiko en zijn oorsprong groep elkaar na een zodanig lange tijd nog herkend en geaccepteerd zouden hebben.

De claim van de Keiko groep dat hun uitzetpoging een succes was is gebaseerd op het feit dat ze onomstotelijk bewezen achten dat Keiko zichzelf gevoed heeft op een 56 daagse tocht van IJsland naar Noorwegen. Echter de claim is gebaseerd op waarnemingen van de behandelend dierenarts die onder andere stelde:

"FOR KEIKO TO SUSTAIN HIS WEIGHT AND CONDITION DURING THIS PERIOD OF EXTENSIVE ACTIVITY, IT IS MY VIEW THAT HE WOULD NEED TO HAVE MAINTAINED A FOOD LEVEL OF AN AVERAGE OF 125-150 LBS OF FISH PER DAY. OVER THIS 56-DAY PERIOD, MY ASSESSMENT IS THAT IF HE WERE NOT ABLE TO FEED ON HIS OWN, I WOULD HAVE EXPECTED TO SEE SIGNIFICANT, EASILY OBSERVABLE, AND POTENTIALLY CATASTROPHIC WEIGHT LOSS. IT WOULD MANIFEST IN EMACIATION AND SEVERE INDENTATION BEHIND THE HEAD AND IN THE RIB AREAS. NO SUCH CONDITIONS WERE OBSERVED." (http://www.keiko.com/news2.html)

Echter, het is maar de vraag of deze bewering steekhoudend is. Navraag leert dat bij SeaWorld een volwassen mannetje's orka die ziek was en de helft van zijn rantsoen ad in 30 dagen 6 % lichaamsgewicht verloor. Dit zou extrapolerend betekenen dat in 56 dagen 20% lichaamsgewicht verloren zou gaan. Dit is bij een volwassen mannelijke orka niet eenvoudig waarneembaar zoals gesteld door de dierenarts. Ter illustratie twee foto's van Morgan (met een verschil in lichaamsgewicht van 20%) op een optimale positie genomen om lichaamsomvang te kunnen vergelijken op een wijze die in het wild moeilijk na te doen is:



Samenvattend:

De poging om Keiko uit te zetten is vanaf meet af aan een controversiële actie geweest. Er is geen succes behaald om Keiko te integreren met zijn soortgenoten en of Keiko succesvol zijn eigen vis heeft kunnen vangen is evenmin onomstotelijk bewezen.
Buiten zijn ogenschijnlijke goede conditie, na zijn reis van IJsland naar Noorwegen, is nimmer waargenomen dat Keiko actief en efficiënt zijn eigen voedselvergaarde, niet voorafgaand aan zijn reis en niet na afloop.
Keiko ging wel na zijn reis interactie met mensen aan die problematisch was en door overheidswege beëindigd moest worden waarbij Keiko naar een ander stiller gebeid werd verplaatst[5].

De groep die Keiko die zich bezig heeft gehouden met de uitzet poging heeft nooit haar falen willen toegeven. Dit zien we ook terug in het doel wat voor de uitzet van Morgan is geformuleerd:

Morgan' opnieuw introduceren in de oceaan , haar thuis wateren en orka leefgemeenschap
Of Morgan nu wel of niet langdurige sociale aansluitingen heeft met andere orka's, haar vrijlating is een succes als zij in staat is om te overleven in de oceaan idealiter zonder verdere menselijke bemoeienis. (www.freemorgan.nl)

Dus als Morgan in alle eenzaamheid haar dagen moet slijten omdat ze niet opgenomen wordt in een groep orka's maar het toch lukt om vis te vangen (wat gezien het voorgaande volstrekt niet te verwachten valt (succesvol vis vangen)) dan is het nog volgens de freemorgan groep: missie geslaagd!

Vanuit dierenwelzijn oogpunt is het solitair laten zijn van een in zijn diepste fundament sociale diersoort zoals een orka uitermate verwerpelijk. Het laat zien hoezeer de groep achter de uitzet van Keiko en nu Morgan door idealisme wordt verblind. De natuur is heilig, het leven in een aquarium onacceptabel. Een dier is beter af verhongerend en in eenzaamheid in de natuur dan in gezelschap en goed verzorgd in een aquarium. Mocht Morgan het Nederlands machtig zijn dan zou ik graag hierover zijn mening horen!

Afsluitend nog een citaat van Alexandra Morton een veldbiologe die tientallen jaren orka's in het wild bestudeerd heeft:

"More than mating, more than food, more than home territories it is family around which a killer whale's world revolves."

Referenties:

1 Killer Whales the Natural History and Genealogy of *Orcinus orca* in British Columbia and Washington State. John KB Ford et al UBC Press Vancouver 1994 ISBN 0-7748-0469-6

2 Social organization of mammal-eating killer whales: group stability and dispersal patterns. Robin W Baird, H Whitebread Canadian Journal of Zoology 2000 78: 2096-2105

3 Complete mitochondrial genome phylogeographic analysis of killer whales (*Orcinus orca*) indicates multiple species. Philip A Morin et al. Genome research 2010 20: 908-916

4 Operation Orca Daniel Francis and Gil Hewlett. Harbour Publishing, Madeira Park, BC, Canada 2007 ISBN 978-1-55017-426-7

5 From captivity to the wild and back: An attempt to release Keiko the killer whale. Malene Simon et al. Marine Mammal Science 2009 25(3): 693-705

6 Occurrence and diet of killer whales in northern Norway: seasonal patterns relative to the distribution and abundance of Norwegian spring-spawning herring. T Similä et al. 1996 Canadian Journal of Fisheries and Aquatic Science 53: 769-779

7 Killer whales (*Orcinus orca*) feeding on schooling herring (*Clupea harengus*) using underwater tail-slaps: kinematic analyses of field observations. Paolo Domenici et al. The Journal of Experimental Biology 2000 203: 283-294

Conf. 10.7 (Rev. CoP15)*

Disposal of confiscated live specimens of species included in the Appendices

RECALLING Resolution Conf. 9.11, adopted by the Conference of the Parties at its ninth meeting (Fort Lauderdale, 1994);

RECALLING that according to Article VIII, paragraph 4 (b), of the Convention, confiscated live specimens shall, after consultation with the State of export, be returned to that State at the expense of that State, or to a rescue centre or such other place as the Management Authority deems appropriate and consistent with the purposes of the Convention;

RECALLING that Article VIII, paragraph 4 (c), of the Convention, leaves open the possibility for the Management Authority to obtain the advice of a Scientific Authority or of the Secretariat;

RECALLING Resolution Conf. 9.10 (Rev. CoP15), adopted at its ninth meeting and amended at its 10th, 13th, 14th and 15th meetings (Harare, 1997; Bangkok 2004; The Hague, 2007; Doha, 2010), on the *Disposal of confiscated and accumulated specimens*, which recommends to the Parties not having done so yet, to adopt legislation in order to charge to the guilty importer and/or carrier the costs of returning confiscated live specimens to the country of origin or re-export;

NOTING that shipments of Appendix-II or -III live specimens often include large quantities of specimens for which no adequate housing can be made available, and that in general there are no detailed data about country of origin and site of capture for these specimens;

CONSIDERING that the successful recovery of the costs of confiscation and disposal from the guilty party may be a disincentive for illegal trade;

CONSIDERING that specimens once in trade no longer form part of the reproducing wild population of the species concerned;

CONCERNED about the risks of releasing confiscated specimens into the wild, such as the introduction of pathogens and parasites, genetic pollution and negative effects on the local fauna and flora;

CONSIDERING that release to the wild may not always be in the best interest of the conservation of a species, especially one not in danger of extinction;

RECALLING that IUCN has developed *Guidelines for the Disposal of Confiscated Animals* and *Guidelines for Re-introductions*;

CONVINCED that the ultimate objective of the Convention is the continued existence of wild populations in their natural habitat;

THE CONFERENCE OF THE PARTIES TO THE CONVENTION

RECOMMENDS that:

a) a Management Authority before making a decision on the disposal of confiscated live specimens of species in the Appendices consult with and obtain the advice of its own Scientific Authority and, if possible, of that of the State of export of the confiscated specimens, and other relevant experts such as IUCN/SSC Specialist Groups;

b) each Scientific Authority in preparing its advice take note of the guidelines in Annexes 1 and 2;

c) the Secretariat be informed about any decision taken on the disposal of confiscated live specimens of species that are either in Appendix I or, if in Appendix II or III, involve commercial quantities;

d) in the case where live specimens arrive in an importing country without the proper export permits or re-export certificates, and where an importer refuses to accept a shipment of live specimens, the shipment be confiscated and the specimens disposed of in accordance with the guidelines set out in Annex 1 or 2; and

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* *Amended at the 15th meeting of the Conference of the Parties.*

e) priority be given to the care of seized or confiscated wild-collected specimens of Appendix-I species and of Appendix-II species that may be at risk;

URGES Management Authorities, in consultation with Scientific Authorities and other bodies concerned, to develop action plans to deal with seized and confiscated live specimens consistent with the guidelines set out in Annex 3; and

REPEALS Resolution Conf. 9.11 (Fort Lauderdale, 1994) – *Disposal of Confiscated Animals of Species Included in the Appendices.*

Annex 1

CITES guidelines for the disposal of confiscated live animals

Statement of principle

When live animals are confiscated by government authorities, these authorities have a responsibility to dispose of them appropriately. Within the confines of the law, the ultimate decision on disposal of confiscated animals must achieve three goals: 1) to maximize conservation value of the specimens without in any way endangering the health, behavioural repertoire, or conservation status of wild or captive populations of the species[1]; 2) to discourage further illegal or irregular trade in the species; and 3) to provide a humane solution, whether this involves maintaining the animals in captivity, returning them to the wild, or employing euthanasia to destroy them.

Statement of need

Increased regulation of trade in wild plants and animals and enforcement of these regulations has resulted in an increase in the number of wildlife shipments intercepted by government authorities as a result of non-compliance with these regulations. In some instances, the interception is a result of patently illegal trade; in others, it is in response to other irregularities, such as insufficient or incomplete paperwork from the exporting country or poor packing that has compromised the welfare of the live animals in the shipment. While in some cases the number of animals in a confiscated shipment is small, in many others the number is in the hundreds. Although, in many countries, confiscated animals have usually been donated to zoos or aquaria, this option is proving less viable with large numbers of animals and, increasingly, common species. The international zoo community has recognized that placing animals of low conservation priority in limited cage space may benefit those individuals but may also detract from conservation efforts as a whole. They are, therefore, setting conservation priorities for cage space.

In light of these trends, there is an increasing demand – and urgent need – for information and advice to guide confiscating authorities in the disposal of live animals. Although specific guidelines have been formulated for certain groups of organisms, such as parrots and primates, no general guidelines exist.

When disposing of confiscated animals, authorities must adhere to national, regional and international law. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requires that confiscated individuals of species listed in the treaty's Appendices be returned to the "State of export... or to a rescue centre or such other place as the Management Authority deems appropriate and consistent with the purpose of the Convention" (Article VIII). However, the treaty does not elaborate on this requirement, and CITES Management Authorities must act according to their own interpretation, not only with respect to repatriation but also as regards what constitutes disposal that is "appropriate and consistent" with the treaty. Although the present guidelines are intended to assist CITES Management Authorities in making this assessment, they are designed to be of general applicability to all confiscated live animals.

The lack of specific guidelines has resulted in confiscated animals being disposed of in a variety of ways, many inconsistent with conservation objectives. In some cases, release of confiscated animals into existing wild populations has been done after careful evaluation and with due regard for existing

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[1] *Although this document refers to species, in the case of species with well-defined subspecies and races, the issues addressed will apply to lower taxonomic units.*

guidelines. In other cases, such releases have not been well planned. Poorly planned releases of confiscated animals may doom these animals to a slow, painful death. Such releases may also have strong negative conservation value by threatening existing wild populations. Threats to existing populations can take several forms: 1) diseases and parasites acquired by the released animals while held in captivity may spread into existing wild populations; 2) individuals released into existing populations, or in areas near to existing populations, may not be of the same race or subspecies as those in the wild population, resulting in mixing of distinct genetic lineages; 3) animals held in captivity, particularly juveniles and immatures, may acquire an inappropriate behavioural repertoire from individuals of other related species. Release of these animals could result in inter-specific hybridization.

Disposal of confiscated animals is not a simple process. Only on rare occasions will such disposal be straightforward or result in an action with conservation value. Options for disposal of confiscated animals have thus far been influenced by the perception that returning animals to the wild is the optimal solution in terms of both animal welfare and conservation. A growing body of scientific study of reintroduction of captive animals suggests that such actions may be among the least appropriate options for many reasons. This recognition requires that the options available to confiscating authorities for disposal of the animals be carefully reviewed.

Management options

In deciding on the disposal of confiscated animals, managers must ensure both the humane treatment of the animals and the conservation and welfare of existing wild populations of the species involved. Options for disposal fall into three principal categories: 1) maintenance of the individuals in captivity; 2) returning the individuals in question to some form of life in the wild; and 3) euthanasia. The last option may often prove the most appropriate and most humane.

Within a conservation perspective, by far the most important consideration in reviewing the options for disposal is the conservation status of the species concerned. For confiscated animals of endangered or threatened species, particular effort should be directed towards evaluating whether and how these animals might contribute to a conservation programme for the species. The decision as to which option to employ in the disposal of confiscated animals will depend on various legal, social, economic and biological factors. The "Decision Tree" provided in the present guidelines is intended to facilitate consideration of these options. The tree has been written so that it may be used for both threatened and common species, although it is recognized that the conservation status of the species will be the primary consideration affecting whether or not confiscated animals might be valuable to an active conservation breeding/reintroduction programme, and whether or not local or international agencies will be willing to make an investment in expensive and difficult tasks such as genetic determination of country of origin and site of capture or the establishment of reintroduction, benign introductions, or reinforcement of extant wild populations. International networks of experts, such as the IUCN-Species Survival Commission Specialist Groups, should be able to assist confiscating authorities, and CITES Scientific and Management Authorities, in their deliberations as to the appropriate disposal of confiscated specimens.

OPTION 1 – CAPTIVITY

Confiscated animals are already in captivity; there are numerous options for maintaining them in captivity. Depending on the circumstances, animals can be donated, loaned or sold. Placement may be in zoos or other facilities, or with private individuals. Finally, placement may be in the country of origin, the country of export (if different), the country of confiscation, or a country with adequate and/or specialized facilities for the species in question. If animals are maintained in captivity, in preference to either being returned to the wild or destroyed, they must be afforded humane conditions and ensured proper care for their natural lives.

Zoological gardens, aquaria and safari parks are the captive facilities most commonly considered for disposal of animals, but a variety of other captive situations exist. These include the following:

a) Rescue centres, established specifically to treat injured or confiscated animals, are sponsored by a number of humane organizations in many countries.

b) Lifetime-care facilities devoted to the care of confiscated animals have been built in a few countries.

c) Specialist societies or clubs devoted to the study and care of single taxa or species (e.g. reptiles, amphibians, birds) have, in some instances, provided an avenue for the disposal of confiscated animals without involving sale through intermediaries.

d) Humane societies may be willing to ensure placement of confiscated specimens with private individuals who can provide humane lifetime care.

e) Universities and research laboratories maintain collections of exotic animals for many kinds of research (e.g. behavioural, ecological, physiological, psychological, medical). Attitudes towards vivisection, or even towards the non-invasive use of animals in research laboratories as captive study populations, vary widely from country to country. Whether transfer of confiscated animals to research institutions is appropriate will therefore engender some debate, although transfer to an establishment that conducts research under humane conditions may offer an alternative, and one which may eventually contribute information relevant to the species' conservation. In many cases, the lack of known provenance, and the potential that the animal in question has been exposed to unknown pathogens will make transfer to a research institution an option unlikely to be exercised or desired.

f) Sale of confiscated specimens to traders, commercial captive breeders, or others involved in commercial activities can provide a means of disposal that helps offset the costs of confiscation. However, sale should only be considered in certain circumstances, such as where the animals in question are not threatened and not subject to a legal prohibition on trade (e.g. CITES Appendix II) and there is no risk of stimulating further illegal or irregular trade. Sale to commercial captive breeders may contribute to reducing the demand for wild-caught individuals. At the same time, however, it may prove to be a poor option owing to the risk of creating a public perception of the State's perpetuating or benefiting from illegal or irregular trade. Finally, confiscating authorities should be aware that, unless specific legal provisions apply, it is impossible to assure the welfare of the animals following placement.

Where animals are transferred by the confiscating authority but not sold, ownership should be specified as one of the terms and conditions of the transfer. Where the country of origin desires return of the animals, this desire should be respected. The custodian (zoo, welfare organization) of confiscated animals should only move the animals to another facility for legitimate humane and propagation purposes with the authorization of the administrative authority.

Captivity – Benefits and disadvantages

The *benefits* of placing confiscated animals in a facility that will provide lifetime care under humane conditions include:

a) educational value;

b) potential for captive breeding for eventual reintroduction; and

c) possibility for the confiscating authority to recover, from sale, the costs of confiscation.

The *disadvantages* of placing animals in a facility not involved in an established programme for captive breeding and reintroduction include the following:

a) Potential to encourage undesired trade. Some authors have maintained that any transfer – whether commercial or non-commercial – of confiscated animals risks promoting a market for these species and creating a perception of the State's being involved in illegal or irregular trade.

BirdLife International suggests that in certain circumstances sale of confiscated animals does not necessarily promote undesired trade. They offer the following requirements that must be met in order for sale by the confiscating authority to be permitted: 1) the species to be sold is already available in the confiscating country in commercial quantities; and 2) wildlife traders under indictment for, or convicted of, crimes related to import of wildlife are prevented from purchasing the animals in question. Experience in selling confiscated animals in the United States suggests that it is virtually impossible to ensure that commercial dealers implicated or suspected of being implicated in illegal or irregular trade are not involved, directly or indirectly, in purchasing confiscated animals. This suggests that confiscation results in increased costs but is not necessarily a disincentive as regards the practices or problems that gave rise to confiscation.

Placing threatened species into commercial trade should not be considered because of the risks of stimulating unwanted trade. Appendix-I species may be sold to a registered commercial breeding facility for Appendix-I species, but these specimens should not be resold or enter commercial trade. As captive-bred offspring of Appendix-I species are deemed to be specimens of species included in Appendix II, there is the potential for commercial breeders to breed animals in captivity to replace wild-caught animals as a source for trade. Hence sale, in certain circumstances (e.g. to commercial captive breeders), may have a clearer potential for the

conservation of the species than non-commercial disposal or euthanasia. Such breeding programmes must be carefully assessed and approached with caution. It may be difficult to monitor these programmes and such programmes may unintentionally, or intentionally, stimulate trade in wild animals.

It is essential that confiscating authorities recognize that there are many threatened species that are not included in the CITES Appendices but may require the same treatment as CITES Appendix-I species.

b) Cost of placement. While any payment will place a value on an animal, there is no evidence that trade would be encouraged if the institution receiving a donation of confiscated animals were to reimburse the confiscating authority for costs of care and transport. However, payments should be kept to a minimum and, where possible, the facility receiving the animals should bear all costs directly.

c) Disease. Confiscated animals may serve as vectors for disease and, therefore, must be subject to extremely stringent quarantine. The potential consequences of the introduction of alien disease to a captive facility are as serious as those of introducing disease to wild populations.

d) Captive animals can escape from captivity and become pests. Accidental introduction of exotic species can cause tremendous damage and in certain cases, such as the escape of mink *Mustela vison* from fur farms in the United Kingdom, the introduction of exotics can result from importation of animals for captive breeding.

OPTION 2 – RETURN TO THE WILD

Although CITES requires that repatriation of confiscated CITES-listed animals to the country of export be considered as an option for disposal by a confiscating authority, the treaty in no way requires that animals be returned to the wild in that country. These guidelines suggest that return to the wild would be a desirable option in a very small number of instances and under very specific circumstances. Repatriation to avoid addressing the question of disposal of confiscated animals is irresponsible. When considering repatriation, the confiscating authority must ensure that the recipients of the animals are fully cognizant of the ramifications of repatriation and the options for disposal, as set forth in these guidelines. Furthermore, the country returning an animal to its country of origin for release must ensure that the Management Authority in the country of origin is aware of the return.

The rationale behind many of the decision options in this section is discussed in greater detail in the IUCN Guidelines for Reintroduction. It is important to note that these Guidelines make a clear distinction between the different options for returning animals to the wild. These are elaborated on the next page.

a) Reintroduction: an attempt to establish a population in an area that was once part of the range of the species but where it has become extinct.

Some of the best known reintroductions have been of species that were extinct in the wild. Examples include: Père David's deer *Elaphurus davidianus* and the Arabian oryx *Oryx leucoryx*. Other reintroduction programmes have involved species that existed in some parts of their historical range but that had been eliminated from other areas; the aim of these programmes is to re-establish a population in an area, or region, from which the species has disappeared. An example of this type of reintroduction is the recent reintroduction of the swift fox *Vulpes velox* in Canada.

b) Reinforcement of an existing population: the addition of individuals to an existing population of the same taxon.

Reinforcement can be a powerful conservation tool when natural populations are diminished by a process which, at least in theory, can be reversed. An example of a successful reinforcement project is that involving the golden lion tamarin *Leontopithecus rosalia* in Brazil. Habitat loss, coupled with capture of live animals for pets, resulted in a rapid decline of the golden lion tamarin. When reserves were expanded, and capture for the pet trade curbed, captive golden lion tamarins were then used to supplement depleted wild populations.

Reinforcement has been most commonly pursued when individual animals injured by human activity have been provided with veterinary care and released. Such activities are common in many western countries, and specific programmes exist for species as diverse as hedgehogs, Erinaceinae, and birds of prey. However common an activity, reinforcement carries with it the

very grave risk that individuals held in captivity, even temporarily, are potential vectors for disease back into a wild population.

Because of inherent disease risks, reinforcement should only be employed in instances where there is a direct and measurable conservation benefit (demographically or genetically), as when reinforcement is critical for the viability of the wild population into which an individual is being placed.

"Return to the wild" – Concerns and benefits

Before "Return to the wild" of confiscated animals is considered, several issues of concern must be considered in general terms: welfare, conservation value, cost and disease.

a) Welfare. While return to the wild may appear to be humane, it may be nothing more than a sentence to a slow death. Humane considerations require that each effort to return confiscated animals to nature be thoroughly researched and carefully planned. Such returns also require long-term commitment in terms of monitoring the fate of released individuals. Some authors have advocated that the survival prospects for released animals must at least approximate those for wild animals of the same sex and age class in order for return to the wild to be seriously considered. While such demographic data on wild populations are, unfortunately, rarely available, the spirit of this suggestion should be respected; there must be humane treatment of confiscated animals when attempting to return them to the wild.

b) Conservation value and cost. In cases where returning confiscated animals to the wild appears to be the most humane option, such action can only be undertaken if it does not threaten existing populations of wild plants and animals or the ecological integrity of the area in which they live. The conservation of the species as a whole, and of other animals already living free, must take precedence over the welfare of individual animals that are already in captivity.

   Before animals are used in programmes in which existing populations are reinforced, or new populations are established, it must be determined that returning these individuals to the wild will make a significant contribution to the conservation of the species. Larger populations are less likely to become extinct, hence reinforcing existing very small wild populations may reduce the probability of extinction. In very small populations a lack of males or females may result in reduced population growth or in population decline. Reinforcing a very small population lacking animals of a particular sex may also improve prospects for survival of that population.

   It should be noted that where confiscated individuals are used for reintroduction (as defined above) they will form the nucleus of a new population. If such a programme is to be successful, a relatively large number of individuals will be required. Hence, small groups of confiscated animals may be inappropriate for reintroduction programmes.

   The cost of returning animals to the wild in an appropriate manner can be prohibitive for all but the most endangered species. The species for which the conservation benefits clearly outweigh these costs represent a tiny proportion of the species listed in the CITES Appendices, although it includes numerous species not regulated under CITES. In the majority of cases, the costs of appropriate, responsible reintroduction will preclude return to the wild. Poorly planned or executed reintroduction programmes are the equivalent of dumping animals in the wild and should be vigorously opposed on both conservation and humane grounds.

c) Source of individuals. If the country of origin and site of capture of the animals is not known, or if there is any question of the source of the animals, supplementation may lead to inadvertent pollution of distinct genetic races or subspecies. If particular local races or subspecies show specific adaptation to the local environment, mixing in animals from other races or subspecies may be damaging to the local population. Introducing an animal into the wrong habitat type may also doom it to death.

d) Disease. Animals held in captivity and/or transported, even for a very short time, may be exposed to a variety of pathogens. Release of these animals into the wild may result in introduction of disease to conspecifics or unrelated species with potentially catastrophic effects. Even if there is a very small risk that confiscated animals have been infected by exotic pathogens, the potential effects of introduced diseases on wild populations are so great that this will often preclude returning confiscated animals to the wild.

   Where confiscated animals are found to be unsuitable for return to the wild, disease screening and appropriate quarantine are, nevertheless, essential in order to ensure that they are free of

disease, or that diseases and parasites harboured by these animals are found in the captive population to which the animals may be transferred. Introduced diseases can be dangerous to captive facilities, particularly in zoos where infection across different species in a collection is a serious threat. Where such quarantine can not ensure that an individual is healthy, isolation for an indefinite period or euthanasia must be carried out.

There are clearly instances where return to the wild of confiscated animals must be considered an option for disposal. First and foremost, the question to be addressed is: will returning the animals to the wild make a significant contribution to the conservation of the species in question? Release into the wild of any animal that has been held in captivity is risky. While some diseases can be tested for, tests do not exist for many animal diseases. Furthermore, animals held in captivity are frequently exposed to diseases not usually encountered in their natural habitat. Veterinarians and quarantine officers, thinking that the species in question is only susceptible to certain diseases, may not test for these diseases picked up in captivity.

Given that any release incurs some risk, we must adopt the following 'precautionary principle': if there is no conservation value in releasing confiscated specimens, the possibility of accidentally introducing into the environment a disease that is not already present, however unlikely, will rule out returning confiscated specimens to the wild.

There are several *benefits* of returning animals to the wild, either through reintroduction or reinforcement of an existing population.

a) In situations where the existing population is severely threatened, such an action might improve the long-term conservation potential of the species as a whole, or of a local population of the species (e.g. golden lion tamarins).

b) Returning animals to the wild makes a strong political/educational statement concerning the fate of the animals (e.g. orangutans *Pongo pygmaeus* and chimpanzees *Pan troglodytes*) and may serve to promote local conservation values. However, as part of any education or public awareness programme, the costs and difficulties associated with return to the wild must be emphasized.

OPTION 3 – EUTHANASIA

Euthanasia – the killing of animals carried out according to humane guidelines – is unlikely to be a popular option amongst confiscating authorities for disposal of confiscated animals. However, it can not be overstressed that euthanasia may frequently be the simplest and most humane option available. In many cases, authorities confiscating live animals will encounter the following situations.

a) return to the wild in some manner is either unnecessary (e.g. in the case of a very common species), impossible, or prohibitively expensive as a result of the need to conform to biological and animal welfare guidelines.

b) Placement in a captive facility is impossible, or there are serious concerns that sale will be problematic or controversial.

c) During transport, or while held in captivity, the animals have contracted a chronic disease that is incurable and, therefore, a risk to any captive or wild population.

Euthanasia has several clear advantages.

a) From the point of view of conservation of the species involved, and of protection of existing captive and wild populations of animals, euthanasia carries far fewer risks when compared to returning animals to the wild.

b) Euthanasia will also act to discourage the activities that gave rise to confiscation, be it smuggling or other patently illegal trade, inadequate paperwork, poor packing, or other problems, as the animals in question are removed entirely from trade.

c) Euthanasia may be in the best interest of the welfare of the confiscated animals. Unless adequate finances are available for reinforcement of existing populations or reintroduction, release to the wild will carry enormous risks for existing wild populations and severely jeopardize the survival prospects of the individual animals, which may, as a result, die of starvation, disease or predation.

d) When animals are destroyed, or when they die a natural death while in captivity, the dead specimens should be placed in the collection of a natural history museum, or another reference collection in a university or research institute. Such reference collections are of great importance for studies of biodiversity. If such placement is impossible, carcasses should be incinerated to avoid illegal trade in animal parts or derivatives.

DECISION TREE ANALYSIS

For decision trees dealing with "Return to the wild" and "Captive" options, the confiscating Party must first ask the question:

Question 1: Will returning the animal to the wild make a significant contribution to the conservation of the species, including through education and other means?

The most important consideration in deciding on disposal of confiscated specimens is the conservation of the species in question. Because there can never be absolute certainty that a confiscated animal is free of diseases and parasites, returning to the wild an individual that has been held in captivity will always involve some level of risk to existing populations of the same or other species in the ecosystem to which the animal is returned.

Where releasing confiscated animals to the wild appears to be the most humane action, it must improve the prospects for survival of the existing wild population. Humanitarian and conservation interests are best served by ensuring the survival of as many individuals as possible, not just the short-term comfort of a few individuals. The benefits of the return in terms of conservation value must clearly outweigh the potential risks.

In most instances, the benefits of return to the wild will be outweighed by the costs and risks of such an action. If returning animals to the wild is not of conservation value, "Captive" options pose fewer risks and may offer more humane alternatives.

Answer: Yes: Investigate "Return to the wild" options.

No: Investigate "Captive" options.

DECISION TREE ANALYSIS – CAPTIVITY

The decision to maintain confiscated animals in captivity involves a simpler set of considerations than does the decision to return them to the wild. It should be noted that the order in which options are placed in the present decision tree is not necessarily the most appropriate for all authorities in all countries: it is expected that each confiscating authority will determine which option is most appropriate based on the particular case and its particular situation.

Question 2: Have animals been found to be disease-free by comprehensive veterinary screening and quarantine?

Because of the risk of introducing disease to captive populations, animals that may be transferred to certified captive facilities must have a clean bill of health. If confiscated animals are not found to be healthy they must be placed in quarantine before being transferred or the facility to which they are transferred must have adequate quarantine facilities. If, during quarantine, the animals are found to harbour diseases that can not be cured, they must be destroyed to prevent infection of other animals.

Answer: Yes: Proceed to Question 3.

No: Quarantine; re-assess question 2 after quarantine.

If chronic and incurable infection, first offer animals to research institutions. If impossible to place in such institutions, destroy.

Question 3: Is space available in non-commercial captive facility (e.g. lifetime-care facility, zoo or rescue centre)?

Transfer of animals to either zoological gardens or lifetime-care facilities should generally provide a safe and acceptable means of disposal of confiscated animals. When a choice must be made between several such institutions, the paramount consideration should be which facility can provide the most consistent care and ensure the welfare of the animals. The terms and conditions of the transfer should be agreed between the confiscating authority and the recipient institution. Terms and conditions for such agreements should include:

a) a clear commitment to ensure lifetime care or, in the event that this becomes impossible, transfer to another facility that can ensure lifetime care, or euthanasia;

b) exclusion from resale of the animals involved; and

c) clear specification of ownership of the specimens concerned and, where breeding may occur, the offspring. Depending on the circumstances, ownership may be vested with the confiscating authority, the country of origin, or the recipient facility.

In the majority of instances, there will be no facilities or zoo or aquarium space available in the country in which animals are confiscated. Where this is the case: 1) other captive options should be investigated; 2) transfer to a captive facility outside the country of confiscation should be explored; or 3) the animals should be destroyed.

Answer: Yes: Execute agreement and transfer.

No: Proceed to Question 4.

Question 4: Are private individuals able and willing to provide humane lifetime care on a non-commercial basis?

In many countries, there are active specialist societies or clubs of individuals with considerable expertise in the husbandry and breeding of individual species or groups of species. Such societies can assist in finding homes for confiscated animals without involving sale through intermediaries. In this case, individuals receiving confiscated animals must have demonstrated expertise in the husbandry of the species concerned and must be provided with adequate information and advice by the club or society concerned. Transfer to specialist societies or individual members must be made according to terms and conditions agreed with the confiscating authority. Such agreements may be the same or similar to those executed with lifetime-care facilities or zoos.

Answer: Yes: Execute agreement and transfer.

No: Proceed to Question 5.

Question 5: Are institutions interested in animals for research conducted under humane conditions?

Many universities and research laboratories maintain collections of exotic animals for research conducted under humane conditions. If these animals are kept in conditions that ensure their welfare, transfer to such institutions may provide an acceptable alternative to other options, such as sale or euthanasia. As in the preceding instances, such transfer should be subject to terms and conditions agreed with the confiscating authority; in addition to those already suggested, it may be advisable to include terms that stipulate the types of research the authority considers permissible.

Answer: Yes: Execute agreement and transfer.

No: Proceed to Question 6.

Question 6: Is the species listed in Appendix I or regarded as endangered or critical?

Commercial sale of specimens of Appendix-I species should not be permitted as it is undesirable to stimulate trade in these species. Species not listed in any CITES Appendix, but which are nonetheless seriously threatened with extinction, should be afforded the same caution.

Answer: Yes: Proceed to Question 7.

No: Proceed to Question 8.

Question 7: Is there a commercial facility breeding this Appendix-I species and is that facility interested in the specimens?

As discussed above, captive-bred offspring of Appendix-I species offer the potential for commercial breeders to breed animals in captivity to replace wild-caught animals as a source for trade. These breeding programmes must be carefully assessed and approached with caution. It may be difficult to monitor such programmes and they may unintentionally, or intentionally, stimulate trade in wild animals. The conservation potential of this transfer, or breeding loan, must be carefully weighed against even the smallest risk in stimulating trade which would further endanger the wild population of the species.

Answer: Yes: Execute agreement and transfer.

No: Destroy, and dispose of carcass as described above.

Question 8: Are there grounds for concern that sale will stimulate further illegal or irregular trade?

Sale of confiscated animals, where legally permitted, is a difficult option to consider. While the benefits of sale – income and quick disposal – are clear, there are many problems that may arise as a result of further commercial transactions in the specimens involved. Equally, it should be noted that there may be circumstances where such problems arise as a result of a non-commercial transaction and that, conversely, sale to commercial captive breeders may contribute to production offsetting capture from the wild.

More often than not, sale should be considered only for species that are neither threatened with extinction nor legally protected from commercial trade (i.e. CITES Appendix-II species). There may be rare cases where a commercial captive-breeding operation may receive individuals for breeding, which may reduce pressure on wild populations subject to trade. In all circumstances, the confiscating authority should be satisfied that: 1) those involved in the illegal or irregular transaction that gave rise to confiscation can not obtain the animals; 2) the sale does not compromise the objective of confiscation; and, finally, 3) the sale will not increase illegal, irregular or otherwise undesired trade in the species. Previous experience with sale in some countries (e.g. the United States) has indicated that selling confiscated animals is rife with both logistical and political problems and that, in addition to being controversial, it may also be counter-productive.

Answer: Yes: Destroy, and dispose of carcass as described above.

No: Sell to qualified buyers.

DECISION TREE ANALYSIS – RETURN TO THE WILD

Question 2: Have animals been found to be disease-free by comprehensive veterinary screening and quarantine?

Because of the risk of introducing disease to wild populations, animals that may be released must have a clean bill of health. If such animals are not found to be healthy they must be placed in quarantine before being considered for return to the wild. If, during quarantine, the animals are found to harbour diseases that can not be cured, they must be destroyed to prevent infection of other animals.

Answer: Yes: Proceed to Question 3.

No: Quarantine; re-assess question 2 after quarantine.

If chronic and incurable infection, first offer animals to research institutions. If impossible to place in such institutions, destroy.

Question 3: Can country of origin and site of capture be determined?

The geographical location from which confiscated individuals have been removed from the wild must be determined if they are to be reintroduced or used to supplement existing populations. In most cases, animals should only be returned to populations that are of a similar genetic constitution to those from which they were taken.

If the country of origin and site of capture of the animals are not known, release for reinforcement may lead to inadvertent hybridization of distinct genetic races or subspecies resulting in outbreeding depression. Related species of animals that may live in sympatry in the wild and never hybridize have been known to hybridize when held in captivity or shipped in multi-species groups. This type of 'mis-imprinting' can result in behavioural problems compromising the success of any future release and can also pose a threat to wild populations by artificially destroying reproductive isolation that is behaviourally controlled.

Answer: Yes: Proceed to Question 4.

No: Pursue "Captive" options.

Question 4: Can animals be expeditiously replaced to origin and do benefits of such action outweigh the risks?

Answer: Yes: Repatriate and reinforce at origin (specific location) following IUCN Guidelines.

No: Proceed to Question 5.

Question 5: Does a generally recognized captive-breeding or reintroduction programme exist for the species in question?

If the species in question is part of a coordinated captive-breeding and/or reintroduction programme, the animals should be offered to this programme.

Answer: Yes: Proceed to Question 6.

No: Proceed to Question 7.

Question 6: Are the animals from an appropriate population for an existing breeding/ reintroduction programme?

In the case of species for which active captive-breeding and/or reintroduction programmes exist, and for which further breeding stock/founders are required, confiscated animals should be transferred to such programmes after consultation with the appropriate scientific authorities. If the species in question is part of a captive-breeding programme, but the animals are of a subspecies or race that is not part of this programme, other methods of disposal must be considered. Particular attention should be paid to genetic screening to avoid jeopardizing captive-breeding programmes through inadvertent hybridization.

Answer: Yes: Transfer to existing programme.

No: Proceed to Question 7.

Question 7: Is there a commitment to establish a new reintroduction programme following IUCN guidelines?

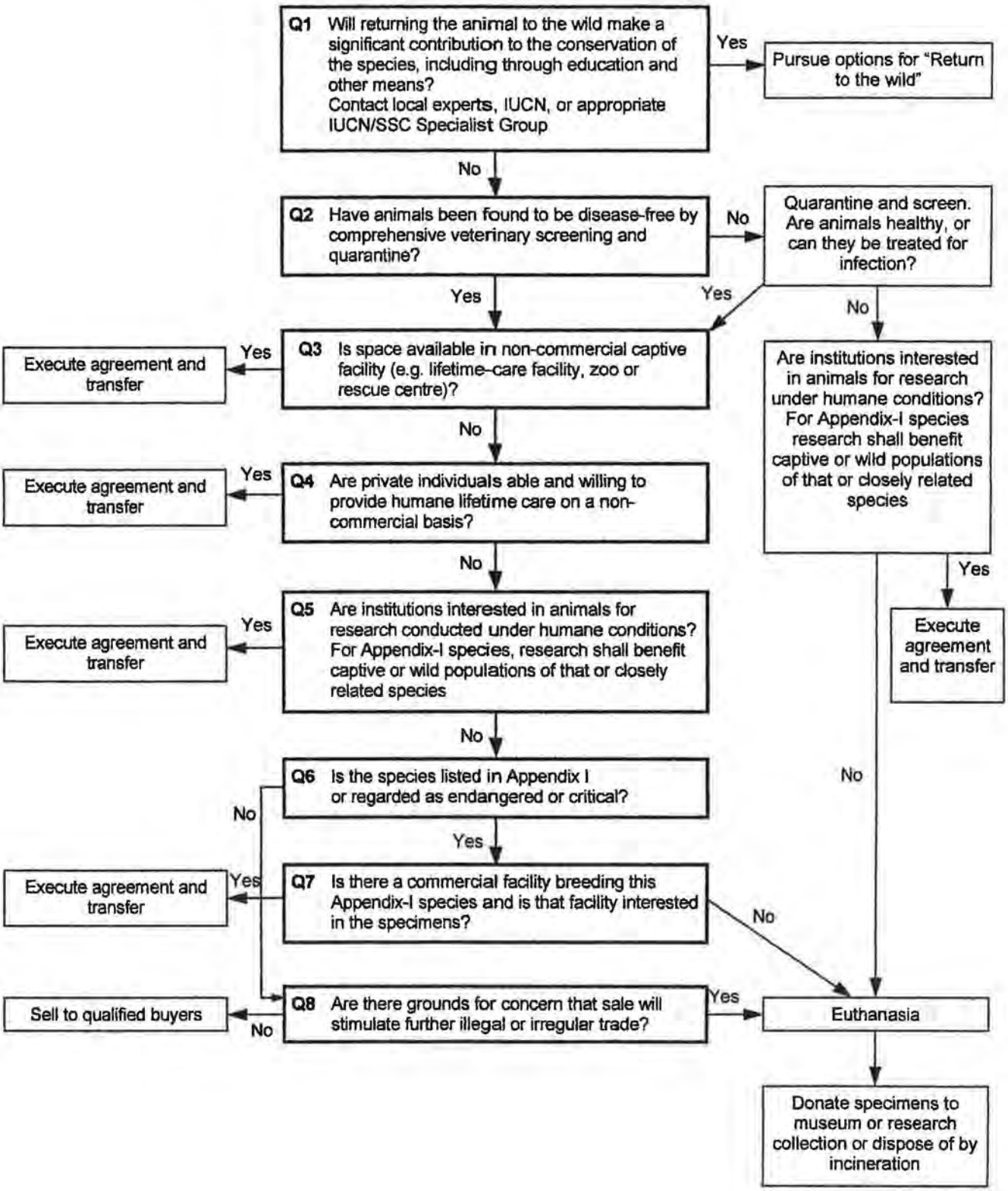
In cases where the animals can not be transferred to existing programmes, their return to the wild, following appropriate guidelines, will only be possible under the following circumstances: 1) appropriate habitat exists for such an operation; 2) sufficient funds are available, or can be made available, to support a programme over the many years that reintroduction will require; and 3) either sufficient numbers of animals are available so that reintroduction efforts are potentially viable, or only reinforcement of existing populations is considered. In the majority of cases, at least one, if not all, of these requirements will fail to be met. In such cases, other options for disposal of the animals must be considered.

It should be emphasized that, if animals of a particular species or taxon are confiscated with some frequency, consideration should be given to whether to establish a reintroduction or reinforcement programme. Animals should not be held by the confiscating authority indefinitely while such programmes are planned, but should be transferred to a holding facility after consultation with the organization that is establishing the new programme.

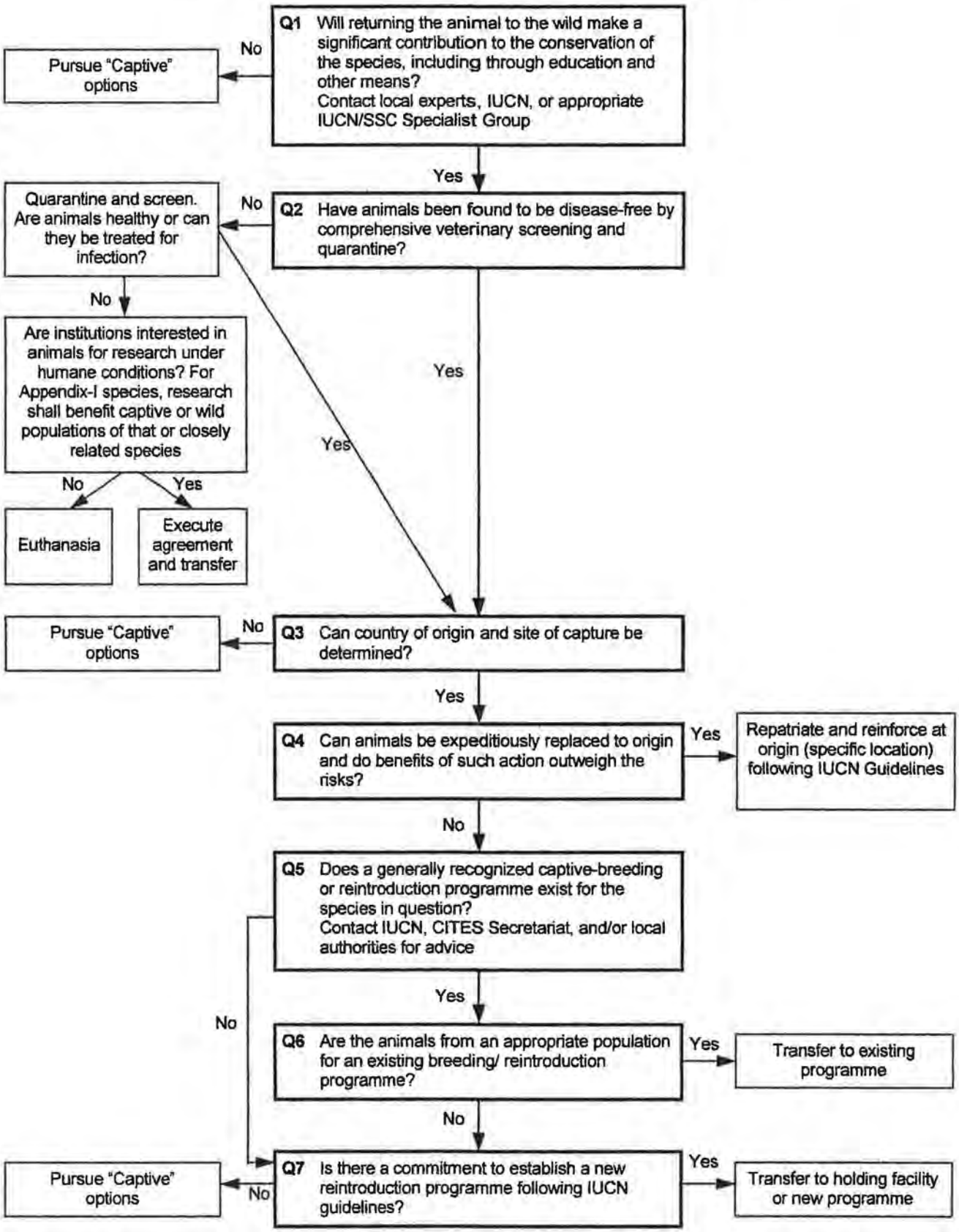
Answer: Yes: Transfer to holding facility or new programme.

No: Pursue "Captive" options.

Decision tree for "Captive" options



Decision tree for "Return to the wild" options



Annex 2

CITES guidelines for the disposal of confiscated live plants

These Guidelines are addressed to authorities in countries of origin and countries of import. When government authorities seize and subsequently confiscate live plants, these authorities have a responsibility to dispose of them appropriately. In the case of importing countries, the country of origin and/or export of the plants will normally first be contacted and notified of the seizure. Within the confines of the law, the ultimate decision on disposal of confiscated plants must achieve three goals:

a) to maximize conservation value of the specimens without in any way endangering the genetic integrity or conservation status of wild or cultivated populations of the taxon (species, subspecies, etc.);

b) to discourage further illegal or irregular trade in the taxon; and

c) to avoid the resources used by organizations involved in their care or disposal being diverted away from other equally important conservation activities.

Statement of need

Increased regulation of trade in wild plants and animals and enforcement of these regulations have resulted in an increase in the number of wildlife shipments intercepted by government authorities as a result of non-compliance with these regulations. In some instances, the interception is a result of patently illegal trade; in others, it is in response to other irregularities, such as insufficient or incomplete paperwork from the exporting country or poor packing of the shipment. Whilst in some cases the number of plants in a seized shipment is small, in many others the number is in the hundreds or thousands. Although, in many countries, confiscated plants have been donated to botanic gardens or other publicly managed living plant collections, this option is proving less viable with large numbers of poorly documented plants and common species of artificially propagated horticultural origin.

In light of these trends, there is an increasing demand – and urgent need – for information and advice to guide CITES authorities in the disposal of live plants. Although the options available have been discussed for certain groups of plants, such as cycads, no general guidelines exist.

When disposing of confiscated plants, authorities must adhere to national, regional and international law. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requires that confiscated live specimens of taxa listed in the treaty's Appendices be returned to the "State of export ... or to a rescue centre or such other place as the Management Authority deems appropriate and consistent with the purpose of the Convention" (Article VIII). However, the treaty does not elaborate on this requirement, and CITES Management Authorities must act according to their own interpretation, not only with respect to repatriation but also as regards what constitutes disposal that is 'appropriate and consistent' with the treaty. Although the present guidelines are intended to assist CITES Management Authorities in making this assessment, they are designed to be of general applicability to all confiscated live plants.

The lack of specific guidelines has resulted in confiscated plants being disposed of in a variety of

Management options

Within a conservation perspective, by far the most important consideration in reviewing the options for disposal is the conservation status of the species concerned. For confiscated plants of endangered or threatened taxa, particular effort should be directed towards evaluating whether and how these plants might contribute to a conservation programme for the taxon concerned. The decision as to which option to employ in the disposal of confiscated plants will depend on various legal, economic and biological factors. The 'Decision Tree Analysis' provided in the present guidelines is intended to facilitate consideration of these options. The tree has been written so that it may be used for both threatened and common taxa, although it is recognized that the conservation status of the taxa will be the primary consideration affecting whether or not confiscated plants might be of value to an active conservation propagation / reintroduction programme, and whether or not local or international agencies will be willing to make an investment in expensive and difficult tasks such as genetic determination of country of origin and site of collection, the establishment of reintroduction programmes, or reinforcement of extant wild populations. International networks of experts, such as the IUCN/Species Survival Commission's Specialist Groups, Botanic Gardens Conservation International (BGCI) and the International Association of Botanic Gardens (IABG), should be able to assist confiscating authorities and CITES Scientific and Management Authorities in their deliberations as to the appropriate disposal of confiscated specimens. Confiscated plants, whether destined for long term maintenance at horticultural premises or eventual reintroduction into the wild, should first be made available to propagation centres in the country of origin, if these exist and are willing to accept the consignment.

OPTION 1 – MAINTENANCE IN CULTIVATION

Seized plants are usually maintained in publicly managed horticultural establishments pending a decision on confiscation; subsequently there are numerous options for their maintenance. Placement may be in the country of origin, the country of export (if different), the country of confiscation, or a country with adequate and/or specialized facilities for the taxa in question. Depending on the circumstances and national laws, plants can be donated, loaned or sold. Final placement may be in botanic gardens or other publicly managed facilities, or with private organizations/individuals.

Placement options include:

a) Botanic gardens and other publicly managed facilities, which are those that have mostly been used to date (and which in some cases are reaching the limit of capacity, placing in jeopardy their ability to carry out other *ex situ* conservation activities).

b) Universities and research laboratories, which maintain living botanical collections for many kinds of research and teaching purposes (e.g. molecular systematics, anatomy, cytogenetics, reproductive biology, etc). Whether transfer of confiscated plants to research institutions is appropriate will depend on the likelihood that research carried out may eventually contribute information relevant to the species' conservation. In some cases, the lack of known provenance will make transfer to a research institution an option unlikely to be exercised or desired. Depending on the nature of the research being carried out it may also be important to establish written agreements protecting the rights of the country of origin of the plants concerned in line with the Convention on Biological Diversity.

c) Specialist societies or clubs devoted to the study and care of particular plant groups (e.g. succulent plants), which could, in some instances, provide an avenue for the disposal of confiscated plants without involving sale through intermediaries. However, care must be taken to ensure that such organizations do not include persons trading in wild-collected specimens.

d) Sale of confiscated specimens to traders, commercial propagators or others involved in commercial activities, which can provide a means of disposal that helps offset the costs of confiscation, especially in the case of large consignments of artificially propagated material. However, sale should not be considered unless the plants in question have been legally collected in the country of origin, are not going to be exploited in contravention of the Convention on Biological Diversity, are not subject to a legal prohibition on trade and there is no risk of stimulating further illegal or irregular trade. Sale to commercial propagators may contribute to reducing the demand for wild-collected specimens. At the same time, however, it may prove to be a poor option owing to the risk of creating a public perception of the State's perpetuating or benefiting from illegal (unlicensed) or irregular trade.

Where plants are transferred by the confiscating authority but not sold, ownership by the Management Authority should be specified as one of the terms and conditions of the transfer. Where

the country of origin may desire return of the plants, this desire should be respected, so long as the condition of the plants is such that they will survive the return voyage. The custodian (botanic garden or other organization) of confiscated plants should only move confiscated stocks to another facility for legitimate propagation purposes with the authorization of the administrative authority.

"Maintain in cultivation" – Benefits and disadvantages

The *benefits* of placing confiscated plants in a facility that will provide a satisfactory standard of horticultural care include:

a) educational value;

b) potential for propagation for eventual reintroduction and/or to satisfy consumer demand for artificially propagated specimens; and

c) potential to carry out genetic fingerprinting and other molecular studies contributing to a better understanding of the population genetics and therefore conservation status of the taxa concerned.

The *disadvantages* of placing plants in a facility not involved in an established programme for artificial propagation and reintroduction include the following:

a) The risk of encouraging illegal trade unless:

   i) the species to be sold is already available in the confiscating country in commercial quantities or as legally traded wild-collected specimens; and

   ii) wildlife traders under indictment for, or convicted of, crimes related to import of wildlife are prevented from obtaining the specimens in question.

   Placing threatened taxa into commercial trade should not be considered because of the risks of stimulating unwanted trade. Appendix-I taxa may be sold to a nursery registered under CITES for the propagation of Appendix-I taxa, but the confiscated specimens themselves should not be resold or enter commercial trade. Since artificially propagated offspring of Appendix-I taxa are deemed to be specimens of species included in Appendix-II, there is the potential for commercial growers to propagate specimens to replace wild-collected plants as a source for trade. Hence the loan or sale, in certain circumstances (e.g. to commercial nurseries) may have a higher potential for the conservation of the species than non-commercial disposal or destruction. Such propagation activities must be carefully assessed and approached with caution, since they may be difficult to monitor.

   It is essential that confiscating authorities recognize that there may be threatened plant taxa that are not currently included in CITES Appendix I but may, nevertheless, warrant the same treatment.

b) Cost of placement. While seized plants are being maintained pending a decision on confiscation, the facility providing care for the plants may have its expenses reimbursed by the importer, airline carrier and/or the confiscating authority. Upon confiscation, if the plants are sold to a commercial organization, any payment received by the CITES authorities will place a value on such specimens. However, there is no evidence that trade would be encouraged if a commercial trader were to reimburse costs of care and transport.

c) Disease. Confiscated plants may serve as vectors for disease and, therefore, must be subject to proper quarantine inspection. The potential consequences of the introduction of alien disease to a horticultural establishment are as serious as those of introducing disease to wild populations.

d) Risk of escape. Plants can escape from horticultural control and become deleterious weeds. Accidental introduction of exotic species can cause tremendous damage and certain countries have strict legislation aimed at limiting the risks of this happening.

OPTION 2 – RETURN TO THE WILD

Although CITES requires that repatriation of confiscated CITES-listed plants to the country of export be considered as an option for disposal by a confiscating authority, the treaty in no way requires that plants be returned to the wild in that country. These guidelines suggest that return to the wild would be a desirable option only in certain circumstances. Repatriation to avoid addressing the question of disposal of confiscated plants is irresponsible. When considering repatriation, the confiscating authority must ensure that the recipients of the plants are fully cognizant of the ramifications of

repatriation and the options for disposal, as set forth in these Guidelines. Furthermore, the country returning a plant to its country of origin must ensure that the Management Authority in the country of origin is aware of the return and welcomes it.

The rationale behind many of the decision options in this section is discussed in greater detail in the IUCN Guidelines for Reintroduction (IUCN/SSC Reintroduction Specialist Group, IUCN, 1995). It is important to note that these Guidelines make a clear distinction between the different options for returning organisms to the wild. These are elaborated below.

a) Reintroduction: an attempt to establish a population in an area that was once part of the range of the species but where it has become extinct.

   Some of the best known reintroductions involving plants have been of taxa that were extinct in the wild. Other reintroduction programmes have involved taxa that existed in some parts of their historical range but that had been eliminated from other areas; the aim of such programmes being to re-establish a population in an area, or region, from which the species has disappeared.

b) Reinforcement of an existing population: the addition of specimens to an existing population of the same taxon.

   Reinforcement can be a powerful conservation tool when natural populations are diminished by a process which, at least in theory, can be reversed.

   Because of inherent disease risks, reinforcement should only be employed in instances where there is a direct and measurable conservation benefit (demographically or genetically), as when reinforcement is critical for the viability of the wild population into which a specimen is being placed.

"Return to the wild" – Concerns and benefits

Before "Return to the wild" of confiscated plants is contemplated, several issues of concern must be considered in general terms: conservation value, cost, source of specimens and disease.

a) Conservation value and cost. In cases where returning confiscated plants to the wild appears to be feasible, such action can only be undertaken if it does not threaten existing populations of wild plants and animals or the ecological integrity of the area in which they live. The conservation of the taxon as a whole, and of other organisms already living free, must take precedence over the welfare of specimens that are already in cultivation.

b) Source of specimens. If the country of origin and site of collection of plants is not known, or if there is any question of their source, supplementation may lead to inadvertent pollution of distinct genetic races or subspecies.

c) Disease. Plants maintained in cultivation and/or transported, even for a very short time, may be exposed to a variety of pathogens. Release of these plants into the wild may result in introduction of disease to conspecific or unrelated species with potentially catastrophic effects. Even if there is a very small risk that confiscated plants have been infected by exotic or common horticultural pathogens, the potential effects of introduced diseases on wild populations are so great that this will often preclude returning confiscated plants to the wild.

   Where confiscated plants are judged unsuitable for return to the wild, disease screening and appropriate quarantine are, nevertheless, essential (and are frequently a legal requirement) in order to ensure that they are free of disease, or that diseases and parasites harboured by these plants are already present in the cultivated population to which the specimens may be transferred. Introduced diseases can be a serious threat to horticultural establishments. Where such quarantine can not provide a reasonable level of certainty that a specimen is healthy, isolation for an indefinite period or destruction of the confiscated specimens must be carried out.

   Clearly, there are instances where return to the wild of confiscated plants must be considered an option for disposal. First and foremost, the question to be addressed is: will returning the plants to the wild make a significant contribution to the conservation of the taxon in question? Release into the wild of any plant that has been held in horticultural premises is risky. While some diseases can be tested for, tests do not exist for all plant diseases. Furthermore, plants held in horticultural premises are frequently exposed to diseases not usually encountered in their natural habitat.

Given that any release incurs some risk, we must adopt the following 'precautionary principle': if there is no conservation value in releasing confiscated specimens, the possibility of accidentally introducing into the environment a disease that is not already present, however unlikely, will rule out returning confiscated specimens to the wild.

There are certain benefits of returning plants to the wild, either through reintroduction or reinforcement of an existing population.

a) In situations where the existing population is severely threatened, such an action might improve the long-term conservation potential of the taxon as a whole, or of a local population of the taxon.

b) Returning plants to the wild makes a strong political/educational statement concerning their fate

Question 2: Have plants been subjected to comprehensive plant health screening and quarantine?

Plants that may be transferred to horticultural premises must have a clean bill of health because of the risk of introducing disease to cultivated populations.

These plants must be placed in quarantine to determine if they are disease-free before being transferred to a propagation centre.

Answer: Yes: Proceed to Question 3.

No: Quarantine and screen and move to Question 3.

Question 3: Have plants been found to be disease-free by comprehensive plant health screening and quarantine or can they be treated for any pests and diseases discovered?

If, during quarantine, the plants are found to harbour pests that can not be eliminated or diseases that can not reasonably be expected to be cured, they must be destroyed to prevent infection of other plants. If the plants are suspected to have come into contact with diseases for which screening is impossible, extended quarantine, donation to a research facility or destruction must be considered.

Answer: Yes: Proceed to Question 4.

No: If with chronic and incurable infection, first offer plants to research institutions or to herbaria/museums for preservation. If impossible to place in or not required by such institutions, destroy.

Question 4: Are there grounds for concern that sale or donation will stimulate further illegal or irregular trade?

Commercial sale of Appendix-I taxa might stimulate trade in these species. Taxa that are not listed in any CITES Appendix but that are nonetheless seriously threatened with extinction should be afforded the same caution.

Sale or donation of confiscated plants, where legally permitted, is a difficult option to consider. While the benefits of sale – income and quick disposal – are clear, there are many problems that may arise as a result of further commercial transactions of the specimens involved. Equally, it should be noted that there may be circumstances where problems arise as a result of non-commercial transactions. It should also be noted that sale or donation to commercial nurseries may increase the availability of propagated material, thereby reducing the threats from wild-collection.

More often than not, sale of threatened taxa should not take place. Sale of or trade in threatened species may be legally proscribed in some countries, or by CITES. There may be instances where a commercial nursery may purchase or receive specimens for propagation, which may reduce pressure on wild populations subject to trade. In all circumstances, the confiscating authority should be satisfied that:

a) those involved in the illegal or irregular transaction that gave rise to confiscation can not obtain the plants;

b) the sale or donation does not compromise the objective of confiscation; and

c) the sale or donation will not increase illegal, irregular or otherwise undesired trade in the taxon.

Answer: Yes: Proceed to Question 5a.

No: Proceed to Question 5b.

Question 5a: Is space available in a botanic garden/non-commercial propagation centre, whether publicly managed or privately owned?

Question 5b: Is space available in a botanic garden/non-commercial propagation centre, whether publicly managed or privately owned, or is there a commercial facility propagating this taxon, and is it interested in the plants?

Transfer of plants to non-commercial propagation facilities, if their sale, donation or loan may stimulate further illegal or irregular trade, or to commercial propagation facilities, an option only if sale/donation/loan will not stimulate further illegal or irregular trade, should generally provide a safe

and acceptable means of disposal of confiscated plants. When a choice must be made between several such institutions, the paramount consideration should be which facility can:

a) offer the opportunity for the plants to be used in a programme of propagation; and

b) provide the most consistent care without compromising the resources available for other equally valuable conservation activities in which it is engaged.

The terms and conditions of the transfer should be agreed between the confiscating authority and the recipient institution. Terms and conditions for such agreements should include:

a) a clear commitment to ensure indefinite care to an acceptable standard or, in the event that this becomes impossible, transfer to another facility that can ensure such care;

b) a clear specification of ownership of the specimens concerned (as determined by national law) and, where propagation may occur, the offspring. Depending on the circumstances, ownership may be vested with the confiscating authority, the country of origin or export, or with the recipient facility; and

c) a clear specification of conditions under which the plants, or any plants propagated from them, may be sold.

In the majority of instances, there will be limited facilities available in the country in which plants are confiscated. Where this is the case other horticultural options should be investigated. This could include transfer to a propagation centre outside the country of confiscation and ideally in the country of origin, or, if it will not stimulate further illegal trade, placement in a commercial propagation facility. However, such propagation programmes must be carefully assessed and approached with caution, bearing in mind the restraints implied by the Convention on Biological Diversity. It may be difficult to monitor these programmes and such programmes may unintentionally stimulate trade in wild-collected plants. The conservation potential of transfer to a commercial propagation facility, or loan for propagation, must be carefully weighed against even the smallest risk of stimulating trade that would further endanger the wild population of the taxon.

In many countries, there are active specialist societies or clubs of individuals with considerable expertise in the care and propagation of particular plant groups in trade. Such organizations can assist in finding homes for confiscated plants without involving sale through intermediaries. In this case, individuals receiving confiscated plants must have demonstrated expertise in the cultivation of the taxa concerned and must be provided with adequate information and advice by the relevant club or society. Transfer to specialist societies or individual members must be made according to terms and conditions agreed with the confiscating authority. Placement with these societies or members is an option if sale or donation of the confiscated plants may or may not stimulate trade.

Answer: Yes: Execute agreement and sell/donate/loan.

No: Proceed to Question 6.

Question 6: Are institutions interested in plants for research as museums specimens?

Answer: Yes: Execute agreement and transfer.

No: Destroy.

DECISION TREE ANALYSIS – RETURN TO THE WILD

Question 2: Have plants been subjected to comprehensive plant health screening and quarantine?

Because of the risk of introducing disease to wild populations, plants that may be reintroduced must have a clean bill of health. These plants must be placed in quarantine to determine if they are disease-free before being considered for return.

Answer: Yes: Proceed to Question 3.

No: Quarantine and screen and move to Question 3.

Question 3: Have plants been found to be disease-free by comprehensive plant health screening and quarantine or can they be treated for any pests and diseases discovered?

If, during quarantine, the plants are found to harbour pests that can not be eliminated or diseases that can not be expected reasonably to be cured, unless any institutions are interested in the plants, whether alive or preserved, they must be destroyed to prevent spread of disease. If the plants are suspected to have come into contact with diseases for which screening is impossible, extended quarantine, donation to a research facility or destruction must be considered.

Answer: Yes: Proceed to Question 4.

No: If with chronic and incurable infection, first offer plants to research institutions or to herbaria/museums for preservation. If impossible to place in such institutions, destroy.

Question 4: Can country of origin and site of collection be confirmed?

The geographical location from which confiscated specimens have been removed from the wild must be determined if these specimens are to be reintroduced or used to supplement existing populations. In most cases, plants should only be returned to the population from which they were taken or to populations that are known to have gene exchange with this population.

If the provenance of the plants is not precisely known, their use for reinforcement may lead to inadvertent hybridization of distinct genetic races or subspecies. Related plant taxa that live in sympatry in the wild and never hybridize may do so when held in cultivation and this problem is in no way restricted either to naturally sympatric taxa or even to closely related taxa in the plant kingdom.

Answer: Yes: Proceed to Question 5.

No: Pursue "Maintain in cultivation" options.

Question 5: Can specimens be returned expeditiously to origin (specific location), and will benefits to conservation of the taxon outweigh any risks of such action?

Reintroduction of the specimens and reinforcement of the population will only be options under certain conditions and following the IUCN/SSC Reintroduction Specialist Group's 1995 Guidelines. An appropriate habitat for such an operation should still exist in the specific location from which the specimens were removed.

Answer: Yes: Repatriate and reinforce at origin (specific location) following IUCN Guidelines.

No: Proceed to Question 6.

Question 6: For the taxon/taxa in question, does a generally recognized programme exist whose aim is conservation of that/those taxon/taxa and eventual return to the wild of confiscated specimens and/or their progeny? (Contact relevant IUCN/SSC Specialist Group, BGCI and/or IABG).

In the case of species for which active propagation and/or reintroduction programmes exist, and for which further propagation material / mother plants are required, confiscated plants should be transferred to such programmes after consultation with the appropriate scientific authorities. If there is such a programme for the taxon in question, but the actual subspecies or race confiscated is not part of this programme, other methods of disposal must be considered. Particular attention should be paid to genetic screening to avoid jeopardizing reintroduction programmes through inadvertent hybridization.

Answer: Yes: Execute agreement and transfer to existing programme.

No: Proceed to Question 7.

Question 7: Is there a need and is it feasible to establish a new reintroduction programme following IUCN Guidelines?

In cases where specimens can not be transferred to existing reintroduction programmes, return to the wild, following appropriate guidelines, will only be possible under the following circumstances:

a) appropriate habitat exists for such an operation;

b) sufficient funds are available, or can be made available, to support a programme over the many years that (re)introduction will require; and

c) either sufficient numbers of specimens are available so that reintroduction efforts are potentially viable or only reinforcement of existing populations is considered.

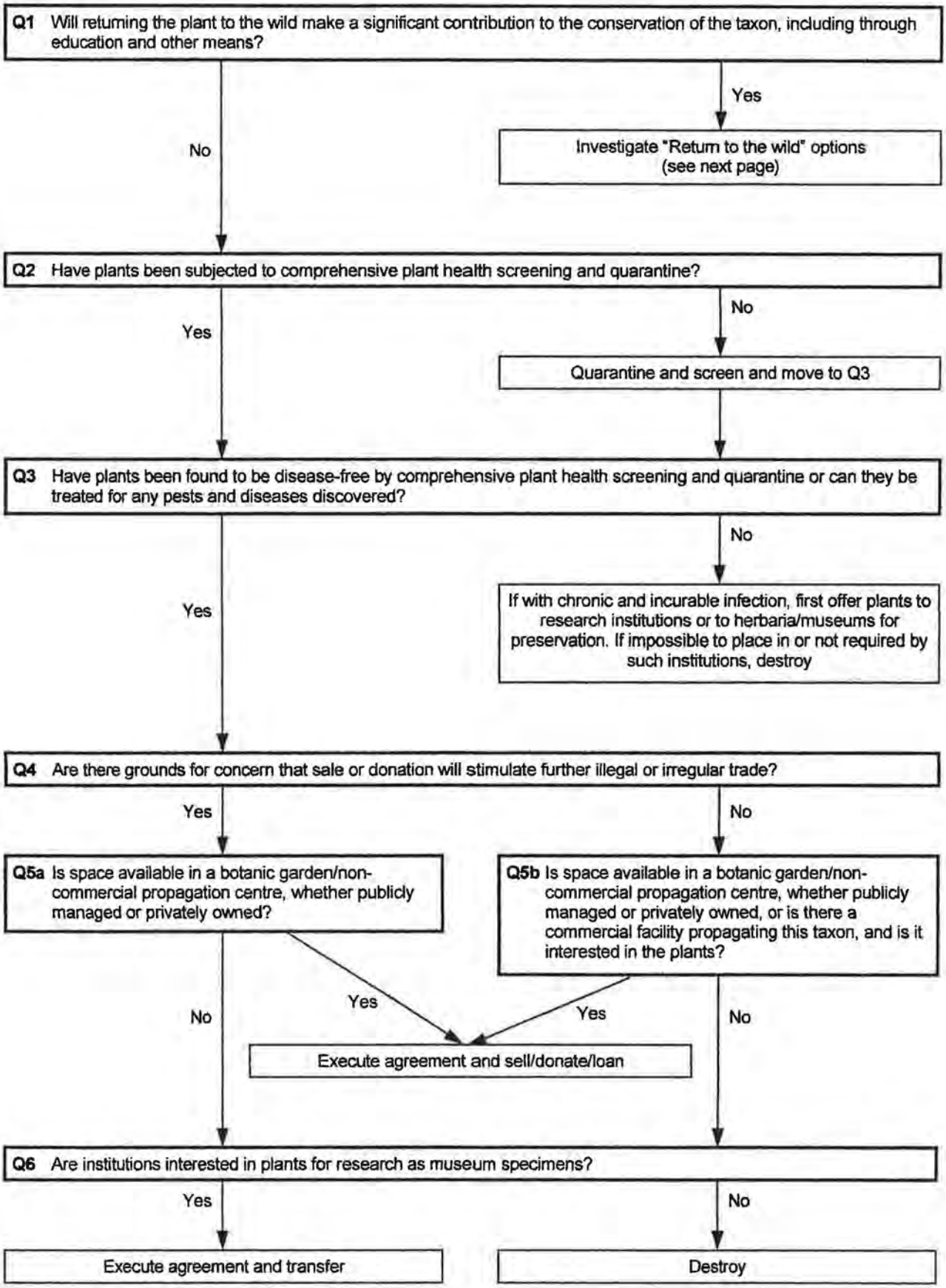
In the majority of cases, at least one, if not all, of these requirements will fail to be met. In this instance, either conservation introductions outside the historical range of these species or other options for disposal of the plants must be considered.

It should be emphasized that, if a particular taxon is confiscated with some frequency, consideration should be given as to whether to establish a reintroduction, reinforcement or introduction programme. Plants should not be held by the confiscating authority indefinitely while such programmes are planned, but should be transferred to a holding facility after consultation with the organization that is establishing the new programme.

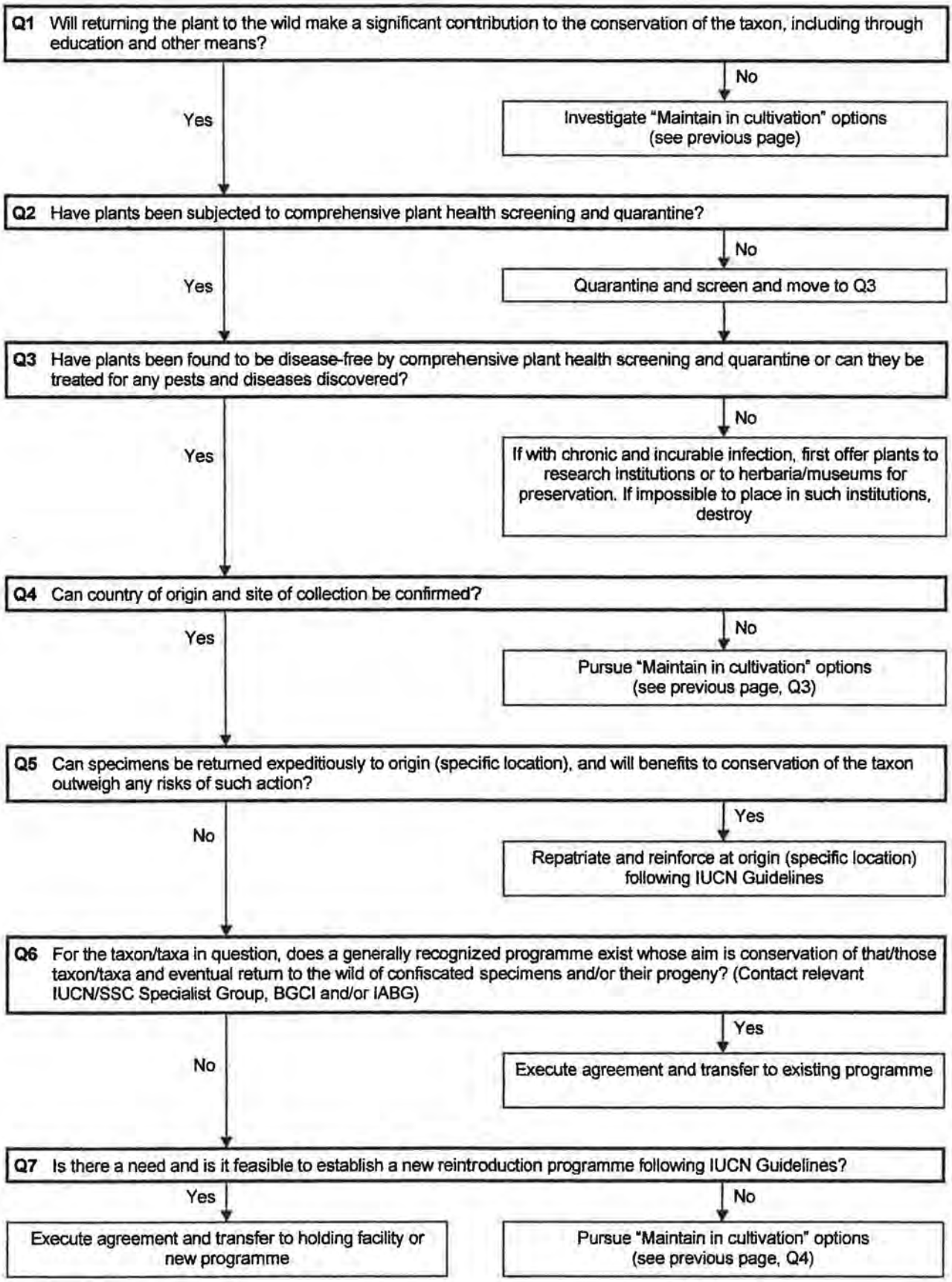
Answer: Yes: Execute agreement and transfer to holding facility or new programme.

No: Pursue "Maintain in cultivation" options.

Decision tree for "Maintain in cultivation" options



Decision tree for "Return to the wild" options



Annex 3 Guidelines to develop an action plan on seized and/or confiscated live specimens

Each Party should develop a plan of action that can be executed without delay in the event that live specimens are seized. This action plan should be developed in accordance with the CITES Guidelines for the Disposal of Confiscated Live Animals in Annex 1 and the CITES Guidelines for the Disposal of Confiscated Live Plants in Annex 2. The plan should:

1. identify means for procuring funds to provide care, quarantine, and transport and other costs incurred for seized and confiscated live specimens. Funding might be secured through levying of fines, obtaining reimbursement from importers, licensing and bonding importers and exporters, requiring import duties or permit fees, seeking donations from private or government sources, obtaining government allocations, or selling confiscated live specimens, where appropriate;
2. establish a procedure for implementing the Guidelines in accordance with the Party's domestic law and policy;
3. identify government agencies and personnel with authority to make decisions regarding the seizure and disposal of live specimens and clarify their roles and jurisdiction in this process. Such agencies and personnel may include Customs, agricultural inspection services, law enforcement agencies, veterinary agencies, public health services, and the Management and Scientific Authorities;
4. identify which authority in the country of origin listed in the CITES Directory should be contacted in the event that live specimens are seized. This authority should be annotated in the CITES Directory;
5. provide for training of personnel involved in the seizure and disposal of live specimens to ensure both the immediate and long-term welfare of the specimens;
6. include a list of experts who or institutions which can assist in species identification, care and/or other technical aspects of the seizure, confiscation and disposal process;
7. identify and/or develop facilities to provide for the care of live specimens immediately after seizure;
8. identify temporary holding facilities that have agreed to provide adequate care for seized live specimens of particular taxa until the confiscation process is completed;
9. identify approved facilities and programmes located within the country that have agreed to provide adequate care, including veterinary or phytosanitary care, and that are willing to accept confiscated live specimens of particular taxa. Parties should prepare a list of such facilities and programmes, which should be submitted to the Secretariat which will make it available to the Parties on request; and
10. ensure that the Party begins evaluating options for disposal of seized live specimens immediately after seizure.

Introduction Plan of a rescued *Orcinus orca* individual in the Orca Ocean group

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INTRODUCTION 1

1.1 BACKGROUND:

During the afternoon of the 23rd of June the patrol vessel "de Krukel" of the Ministry of Agriculture, Nature and Food Quality called the Dolfinarium for advice on a cetacean that seemed lost in the shallow Wadden see. Pictures were sent and Kees Camphuysen, a Dutch biologist and expert on cetacean identification confirmed it was an *Orcinus orca*. The size of the animal indicated this was a very juvenile specimen which had no hope of survival if left on its own.

The Dolfinarium offered to send out a rescue team to attempt to catch the killer whale which was subsequently determined to be female, and take her to Harderwijk for rehabilitation. The Ministry supported this intervention and declared it was according to the permit the Dolfinarium holds for rescue and rehabilitation of toothed cetaceans. In the early evening of the 24th of June the animal was localized by the rescue team swimming in about 125 cm of water. After an uneventful caught, transport aboard the ship and later on the truck, she was transferred to one of the pools of the Dolfinarium.

Initial treatment consisted of saline infusions and broad spectrum antibiotics. Blood analysis revealed an inflammatory reaction, microcytic regenerative anaemia and mild dehydration. Upon admission she was offered a few fish which she took. Clinical inspections during the initial period after her admission including multiple advanced research techniques for viral and bacterial diagnostics of multiple organ systems (respiratory, digestive, and renal) revealed no other gross pathology than dermatitis and severe malnourishment. In the first week after admission, faeces mainly containing algae were found multiple times.

Dead fish was thrown into the pool and within an hour she started to take these fish. Her appetite was ravenous and her daily ration was increased over a week to 32.5 kg daily. She started to gain weight and during the first two and half months her weight increased from 430 kg to 690 kg.

Attempt at photo ID with the North Atlantic Killer whale ID group has failed (Andrew Foote, University of Copenhagen, and NAKID). Genetic analysis indicated Morgan is related to the Norwegian sub-population of killer whales. It cannot completely be excluded Morgan originates from the Icelandic sub-population of killer whales. (Andrew Foote). Vocal data again indicated Morgan originated from the Norwegian population of killer whales that hunt for Norwegian Spring Spawning herring. She is likely closely related to the "NP" pod although not originating from this pod based on present data. Due to lack of data on the vocal repertoires of this population it is not possible to give more detail on her origin than the entire population of NSS hunting killer whales. Due to the difficulties to find the origin of Morgan, Dolfinarium Harderwijk consulted a group of independent experts the feasibility of her release back to the sea, and they unanimously concluded that the best option for this whale is to be cared for in an appropriate facility with the highest standards of animal husbandry, preferably in the company of other killer whales in order to meet her social needs.

During the rescue and recovery of Morgan, imprinting on humans has taken place and was unavoidable as she had to be handled and, especially, because a juvenile killer whale needs social contact and activity for her psychological well being. However, given the social nature of this species is essential to integrate her in a group of orcas to complete its development. From the welfare point

of view, her best option seems to be remain under human care, integrated in some of the existing groups of orcas.

In that sense, the technical staff from Dolphinarium Harderwijk has identified Loro Parque facilities as an ideal place for Morgan to join a group of orcas, with high handling standards and optimal care for this species, and also with research, conservation and educational activities that fulfil the guidelines established by the Department of Biodiversity of the Dutch Government.

If she is finally integrated in the group of orcas at Loro Parque, Morgan would be able to develop social bonds with other specimens of its kind, which would greatly improve her welfare. She would also have the opportunity to be hosted in more appropriate facilities, with a team keepers and veterinarians with long experience in orcas.

From the educational point of view, Morgan would join the rest of the animals in performing the awareness activities carried out with the general public and school groups. These include: awareness raising workshops, video conferences, tours, presentations, audiovisual materials, etc. All of them are are developed in compliance with Loro Parque Educational Program (Spanish Zoo Law 31/2003). Environmental authorities of the Canary Islands Government annually perform inspections to verify the quality of the educational activities of Loro Parque, and they receive educational plans and activity reports on a yearly basis.

Moreover, Morgan would be available to the scientific community to improve knowledge about the species and its conservation, as the rest of the zoological collection of Loro Parque. The group of Orcas at Loro Parque is integrated in the Loro Parque Science and Conservation Program in compliance with Spanish Zoo Law (31/2003), which currently has five active cetacean conservation projects (three of them on *Orcinus orca*). Environmental authorities of the Canary Islands Government annually perform inspections to verify the quality of the research and conservation activities of Loro Parque, and they receive research and conservation reports annually.

1.2 Previous experience:

The group of orcas hosted at Loro Parque are part of the SeaWorld population. Therefore, the management of the group (and the eventual introduction of Morgan) will be continuously under the supervision of the Zoological Department of SeaWorld. This department has a long experience in the introduction of new specimens in orca groups, as it has being done routinely to manage the total population of orcas among the different parks belonging to SeaWorld.

The very formation of the Orca Ocean group was an introduction of two pairs of animals (two males and two females) who came from different parks and had not been in contact before. Orca Ocean staff, supervised and assisted by technicians and trainers from SeaWorld Zoological Department, was charged with the task of introducing and training the group, which took place smoothly.

The experience of the Orca Ocean staff in the introduction of orca individuals in an established group has continued with Adan, a calf who was born at Loro Parque in October 2010. Since the link between mother and calf was not established after birth, he was hand raised from the first day of his life, without direct contact with the rest of the group. Currently the process of introducing Adan to the group of orcas in Orca Ocean is underway. The introduction of a baby (much smaller than the rest of orcas in the group) represents a challenge, as any social displacement or agonistic behaviour by any member of the group could cause serious injury. This made necessary a detailed planning and care in every step of the introduction. As a result, the process of introduction of Adan is an experience that ensures optimal training of Loro Parque staff for the introduction of Morgan.

1.3 Positive Reinforcement and Training

One of the essential aspects that will favour the introduction of Morgan in the rest of the group is operant conditioning and positive reinforcement. All Orca Ocean animals are trained and respond to control calls from their keepers. This will be essential to manage the group of animals in order to introduce

gradually Morgan to individuals with different hierarchy within the group.

The use of positive reinforcement is a very useful tool in linking the presence of a new issue in the group with pleasant stimuli for all animals. The reinforcement will be used both primary (food), and secondary (play, sensory stimulation, physical contact, etc.).

1.4 Facilities

Orca Ocean facilities consist in a multi-pool system with four pools, a main pool (9.178 m^3), two holding pools (7.082 y 4.534 m^3) and a medical pool (363 m^3) (See figure at the end of the document). Each f them has at least two stainless-steel doors activated ith a hydraulic system (improved for fast open and lose). This allow to manage the group of orcas at any time in the best way, obtaining the necessary grouping in each case.

The pools are constructed from reinforced concrete with a strength of 35 N/m2. The intention of the construction method is to build watertight pools that do not require the addition of a waterproof coating. All surfaces are smooth and without holes or cracks and all corners, door entrances, wall tops etc. are rounded with a 50-centimeter radius.

The pools have been coated with synthetic paint. This coating has been used to avoid the algal nd bacterial growth in the concrete pores, making e cleaning operations easier. So the characteristics of the pool walls and the coating guarantee the maximum possible hygiene and minimize the risk of the animals getting accidentally wounded.

The shade structure is supported on two large steel arches with tensioning cables and is fabricated from PVC coated polyester material. The material is white and partially translucent, giving a pleasant, bright aspect to the area below the shade structure.

The life support system consists in three independent filtering processes that keep the water (collected directly from the Atlantic Ocean in a coastal dwell) quality in an optimum range. Water passes through mechanical sand filters at 30 m^3/m^2 h. Then is conducted to the protein skimmer filters were millions of tiny ozone bubbles are injected with Venturi tubes. This bubbles aggregate and flocculate the dissolved and suspended proteins, and drag them to a collector in the top of the skimmer. Then the water passes a degasification chamber to eliminate the excess of ozone before conducted back to the pool. Finally an additional treatment with chloride hydrolysed from the seawater is performed to completely oxidize the remaining organic matter, providing a residual chlorine level lower than 0,4 mg/l.

The life support system in the facilities has been designed to guarantee the supply of an adequate volume of seawater with the following characteristics:

Temperature: 13 ºC
Ammonium: < 0,05 mg/l
Nitrites: < 0,1 mg/l
Nitrates: < 30 mg/l
Ph: 8,0-8,3
Dissolved Oxygen: > 95% saturation
Chloride: 0,4 mg/l

These parameters are considered as the most important in the maintenance of marine mammals in captivity. Loro Parque has a strict control of water physicochemical parameters in their systems and, in the case of marine mammals, water quality is tested and monitored daily.

In addition, water facilities to house marine mammals is also controlled to prevent the presence of pathogens that could have negative effects on the health of animals. Loro Parque, routinely performs a weekly analysis of the microbiological characteristics of water in the marine mammal facilities. In this analysis the presence of pathogens or indicators is determined:

E. coli
Total coliform
Faecal coliform
Clostridium sulfide reducers
Enterococo
Pseudomonas sp.

In conclusion, both the sizing of the life support system, and the daily routine of monitoring and testing ensures, under any circumstances, the optimum water quality for the orcas hosted at Loro Parque.

ADAPTATION TO THE STAFF

2

2.1 INTRODUCTION

Although the orcas are prevented from establishing an exclusive link with one keeper, is encouraged that at least two of them have a closer relationship, and work on a preferential basis with an individual. Similarly, it is intended that the animals are used to receive signals from any of the keepers and display the associated behaviour.

It is reasonable to think that Morgan will need some time to liaise with the team of keepers at Orca Ocean that will be responsible for her maintenance and care once in Loro Parque. Furthermore, it is also appropriate that Orca Ocean keepers have accurate information on the behaviour, character and training skills of the animal to plan the early stages of introduction.

To achieve this adaptation as fast and smooth as possible for the animal, there will be a transient stage during which management will be transferred from Harderwijk keepers to the Loro Parque staff.

2.1 TRANSIENT STAGE

In the days before the transfer, the Head of the Orca Ocean department will move to Harderwijk facilities to get familiar with the animal, their level of training, the type of signals she responds to, food type, etc. During that time he will begin to work with the animal in order to make her familiar to his presence.

Depending on the achievements during this stage, the need for one or more of Morgan's keepers in Harderwijk to move to Loro Parque while she adapts to her new keepers will be evaluated.

During the transfer Morgan will be assisted by keepers from Harderwijk, the head of the Orca Ocean Department and veterinary staff.

The head of the Orca Ocean department will determine the duration and organization of this transitional period in terms of the attitude of the animal and how it relates to her new keepers and the rest of the Orca Ocean staff.

2.2 WORKING PHASE

During the transient stage the head of the Orca Ocean department will decide which keepers will be assigned to Morgan. Once completed the transitional period the Head of Orca Ocean will allocate the husbandry tasks to the staff, and will verify that the adaptation of the animal to the staff has been adequate.

Adaptation to the Facilities

3

3.1 Holding Pool

Initially Morgan will be housed in the medical pool, since the lifting floor greatly facilitates the manipulation of the animal in case is necessary. This will be her main accommodation pool during every phase of the introduction to the group, although the animal will be quickly adapted to the use of other pools in the facilities to have the medical pool available for the rest of the orcas if necessary.

3.2 Adaptation to the rest of the pools

The connection between pools B and C and the medical pool consist in a door with a very short channel (less than a meter long). So, initially, Morgan will be adapted to use the pools B and C of the enclosure. Finally, as the channels to the main pool are longer, and a process of desensitization can be expected, she will be adapted to the use of the main pool. The adaptation to each of the gates and channels will be through positive reinforcement when she responds properly to control calls in different parts of the enclosure.

3.3 Adaptation to Channels and Gates

The connections of the pool A with B and C pools are formed by a shallow channel about 5 m long by 2.5 m wide. It is expected that the animal is afraid to cross this channels to pool A as they are longer than the rest of the connections between pools. Therefore, there will be a progressive desensitization to the channels through positive reinforcement when she responds correctly to control calls at different points in the channel.

3.4 Space usage

The group of orcas in Orca Ocean is managed to achieve a total use of the space by the animals. To do so, the keepers made frequent changes in the pools where any particular activity is done (rest, playtime, feeding, etc.). And the grouping of individuals in these situations is also changed regularly. At the time Morgan start using all the pools in the facility, she will enter in this space management scheme, to be capable of perform feeding activities, play or rest in any of the pools.

Adaptation to the Management Scheme

4

4.1 Feeding

It is expected that Morgan will not need to be adapted to the feeding at Loro Parque, because the feeding of cetaceans is highly standardized in both fish species used, as in the feeding system, distribution of food throughout the day, nutritional supplements, use of complementary foods such as gelatin, etc..

In the days prior to the transfer the Head of the Orca Ocean department, along with keepers of Harderwijk, will prepare a transition if necessary. The amount of food ate by the animal during the first weeks at Loro Parque will be specially evaluated.

4.2 Basic Medical Behaviours

Since the arrival of the animal at Loro Parque a training process to strengthen and adapt her repertoire of behaviours will start, in order to ensure proper medical management and control by the veterinary team.

Currently (at the time of this writing) Morgan has already acquired a basic repertoire of medical behaviours in Harderwijk:

Voluntary Blood
Voluntary Rectal Temperature
Blow hole
Body inspection, parallel and lateral
Mouth open an teeth control
Gating
Sending and receiving from A to B

In the days prior to the transfer the Head of the Orca Ocean department will verify the training skills of the animal, especially the use of targets and the gating. Once in Loro Parque, during an initial phase the behaviours that the animal knows will be consolidated and adapted to the group standards, both from the point of view of the signals, and the execution.

4.3 Additional Medical Behaviours

When the head of Orca Ocean department considers the basic medical behaviours are consolidated, a process of acquiring new behaviours through training and positive reinforcement will be initiated. In the process of learning new behaviours, those considered to be critical elements in the management and control of the animal health will be prioritized: voluntary weight, obtaining voluntary urine samples and the use of the pool deck. The head of Orca Ocean department will establish priorities for the rest of behaviours that will be incorporated into the repertoire of the animal, depending on the needs of management and other processes of adaptation. Initially, all the medical behaviours or those behaviours that could lead to medical behaviours will be priorized. Gradually the repertoire of Morgan will be comparable to any other individual in the group.

Integration in the Social Group

5

5.1 Acoustic contact
5.2 Design of a Social Introduction procedure
5.2 Social Introduction stage

5.1 Acoustic contact

As soon as Morgan arrives to Loro Parque, she will be in acoustic contact with the rest of the group. Therefore, the introduction process will begin immediately.

In the weeks before the transfer the need to desensitize both the group of Orcas at Loro Parque and Morgan by playing sounds of other individuals in their respective enclosures will be evaluated. If it is necessary Loro Parque and Harderwijk will exchange sounds of their orcas, and they will plan experiments in order to become the animals familiar with the sounds of their counterparts.

During the first few days after the arrival of Morgan at Orca Ocean the behaviour of all the animals will be evaluated to see how they respond to the acoustic contact.

5.2 Social Introduction Stage

Once Morgan has been successfully adapted to the staff, facilities and management system, the Head of Orca Ocean department will initiate the development of a detailed Social Introduction Procedure.

Depending on the behaviour of animals at Orca Ocean during the whole introduction phase, and also based on the behaviour of the animals after the acoustic contact, the head of Orca Ocean department will plan a gradual process of introduction. It will determine the order in which she will be introduced to every individual in the group. The whole procedure will be carried out progressively, valuing each time the most secure and suitable match for Morgan among the rest of the whales in the group.

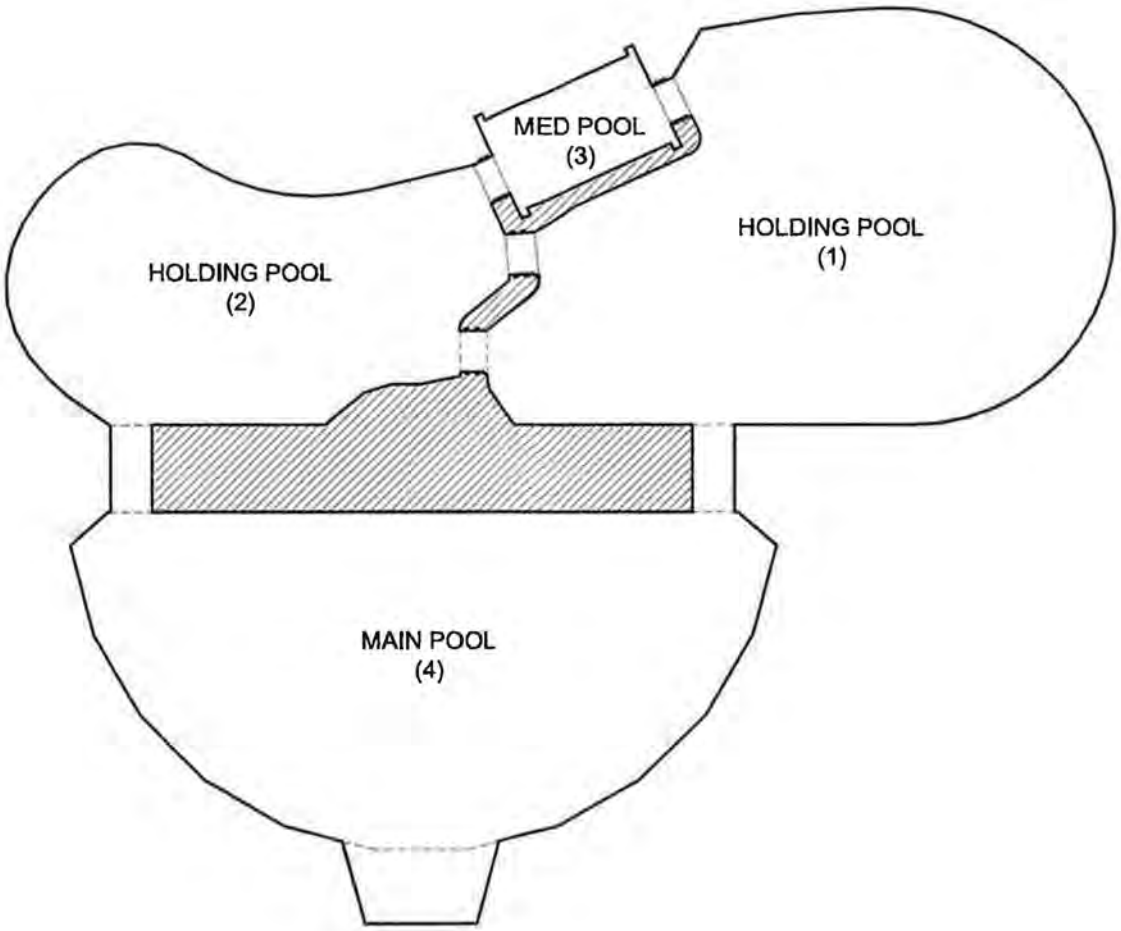
5.3 Social Introduction Stage

Once established that the animal is ready to be introduced to the group, the Head of Orca Ocean department will start the Introduction Procedure.

Each introduction event will be observed by orca keepers who will separate the animals if they appreciate some kind of social distress, agonist reactions or aggression. They will use positive reinforcement to help establish links between animals and facilitate the early stages of introduction.

The Zoological Department of SeaWorld will receive detailed information about each stage of the Introduction Plan and how each encounter develops during the social introduction. All decisions of the Plan shall be subject to supervision by the Zoological Department of SeaWorld.

KILLER WHALE EXHIBIT AND REPRODUCTION AREA



TOTAL VOLUME: 21,157,000 LITERS

15 SAND FILTERS, CPS CHAMBER (3No.PROTEIN SKIMMERS, FLUIDISED CARBON CHAMBER, VENTURI CHAMBER) WITH A TURN OVER OF 210 MINUTES.
DESINFECTION BY CHLORINE AND OZONE.

	MAX. DEPTH	MAX. HORIZONTAL WIDTH	MAX. HORIZONTAL LENGTH
MAIN POOL	12m.	24.5m.	50.8m.
MED POOL	4.2m.	7.1m.	12.4m.
HOLDING POOL 1	8.1m.	30.5m.	44.8m.
HOLDING POOL 2	8.1m.	20.5m.	36.5m.

English Extended Abstract
Research Project
I

Developement of Immunoassays to detect specific antibodies in the serum of Killer Whales

Abstract

1

1.1 Title

Development of immunoassays to detect specific antibodies in the serum of Killer Whales.

1.2 Principal Researcher

Javier Almunia, PhD.

1.4 Abstract

Research on the cetacean pathologies, specially on those pathogens affecting *Orcinus orca,* is not developed because of its difficulties. The absence of diagnostic tests for infective diseases is probably the main problem in this field. The main objective of this project is to develop several immunoassays to detect specific antibodies in the serum of killer whales in a simple and precise way. The antigens, which will be detected with the immunoassays (*Edwardsiella tarda*, *Brucella marina*, cetacean Poxvirus, cetacean morbilivirus, Herpesvirus, *Candida albicans*, *Aspergillus fumigatus*, *Pseudomona aureuginosa* and *Toxoplasma gondii*) have been chosen because of their negative potential for the species conservation. The research will be performed with the purification of the Killer whale Immunoglobulin G, which will be used to obtain an specific marker anti-IgG. Once the marker is obtained, all the proposed specific immunoassays will be developed and validated.

INTRODUCTION

2

2.1 STATE OF THE ART

Immunology and Biodiversity Conservation

IUCN (2002) considers that the activities that threat biodiversity *in situ* still expanding, and wild populations of many species are continuously reduced and fragmented. In this context, diseases caused by pathogens have become a menace for the viability of some species. As a consequence, several researchers have identified the infectious diseases as a potential threat for the wild species populations (Scott, 1988; Gulland, 1995; Deem et al., 2001; Gaydos et al., 2004) which has strong implications on the biodiversity conservation (Toung, 1994).

From the wild species *in situ* management point of view, pathogens may play a decisive role in the reduction of the threatened and endangered animal species, and also interfere in the conservation measures (McCallum, 1994; Gaydos and Corn, 2001). Specially in this cases pathogens are of great importance, as any potential disease transmission should be avoided through supplementation, translocation or reintroduction activities.

Also from the ex situ biodiversity conservation point of view the infectious diseases are of concern, as IUCN establish the captive population management should minimize the risk of the deleterious effects of epidemic diseases (IUCN 2002). The same document also considers the need to maintain the genetic integrity of the captive populations reducing the risk of pathogen transmission.

The health status of the incautated specimens is also a critical issue when determining its conservation potential, and one of the criteria to be addressed in order to decide whether they are useful for reintroduction, can be maintained in captivity or should be sacrificed (CITES, 1997).

The case of Orcinus orca

The relevance of the immunology research in this particular species is emphasized by its position on the top of the trophic chain. That makes *O. orca* specially vulnerable to the bioaccumulation of organohalogenated compounds (Rayne et al., 2004; Beckmen et al., 2003; Ross, 2002; Ross et al., 2000), which can have negative effects on its immunological response (Beckmen et al., 2003). So that, the research on the pathogen diagnosis would be a powerful conservation tool, as those organisms represent a potential risk for the species.

Despite the considerable amount of papers on infectious diseases on different cetacean species, research on killer whale immunology are scarce (King et al., 1996; Taylor et al., 2002; Funke et al., 2003). As a consequence, with the actual knowledge it is not possible to determine the pathogen wich is causing a immune response in a simple way.

From the conservation point of view, nowadays it is not possible to make an antibody screening of wild populations. Similarly, it is not possible to determine in a simple and rapid way if a group of individuals for population supplementation purposes had been in contact with certain pathogens of special concern.

Objectives

3

3.1 Project Objectives

The main objective of this project is to obtain several diagnostic kits to evaluate the presence of specific antibodies in the serum of O. orca.

As a result of this project a battery of standard diagnostic tests will be created, which will help to asses the health status of O. orca in relation to its potentially more lethal pathogens.

Pathogens which antibodies will be detected by the diagnostic kits have been selected among those identified to have the highest epizootic potential in O. orca and other cetacean species (Gaydos et al., 2004).

Those pathogens are: *Edwarsiella tarda, Brucella maris, Pseudomonas aureuginosa, Orthopoxvirus, cetacean morbillivirus, herpesvirus, Candida albicans, Aspergillus fumigatus* and *Toxoplasma gondii.*

3.2 Previous Research

Previous experience

As no previous research on this issues has been performed for *O. orca*, the closest previous research has been done by Loro Parque and the University of La Laguna in bottlenose dolphins (*Tursiops truncatus*). The most relevant outcome of this investigations is a toxoplasmosis diagnostic kit that is now finishing its validation process.

Earlier research to develop anti dolphin IgG based diagnostic tests in *T. truncatus* is also rare. In fact there is only one reference (Beck y Rice, 2003) . The authors used monoclonal specific antibodies to the dolphin IgG, with a limited success.

3.2 Detailed Objectives

The specific objectives of this research project are the consequence of the methodological development of the test.

The critical point is the purification of the specific antibodies to O. orca IgG. Once isolated, this will be used as an antibodies specific marker, and thus used as the basis of the diagnostic kits. Initially for the nine pathogens mentioned, but with further potential applications.

Those pathogens which immunologic diagnostic kit is specially difficult (viruses) would be processed through PCR (Polymerase Chain Reaction) to get diagnostic kits.

Methodology and Working Plan

4.1 Materials and methods
4.2 Working Plan

4

4.1 Materials & Methods

To obtain the diagnostic kits specific antibodies to the O. orca IgG should be obtained in rabbits.

To do so, the O. orca IgG will be purified from a serum sample, by means of several chromatographic and electrophoretic procedures.

Then the purified protein will be inoculated to three rabbits and, subsequently, obtaining and purifying the rabbit antibodies against the killer whale immunoglobulin G.

Once obtained, the kits will be performed using titulation plates with specific antigens for the listed pathogens.

4.2 Working Plan

This research will last for four years. The first year and a half will be focused in the obtaining of the polyclonal rabbit antibodies, and another year and a half will be dedicated to test the different antigens. During the last year, an antibodies screening will be performed in the wild population.

Working Plan Schedule

Activity/Task	*First Year*				*Second Year*				*Third Year*				*Fourth Year*			
Obtention and purification of *Orcinus orca IgG*	■	■	■													
Obtention and purification of killer whale Anti IgG			■	■	■	■	■									
Determinatio of Anti IgG specific activity							■	■								
Obtention of the specific antigens for the assays			■	■	■	■	■	■								
Development of the ELISA and IFI immunoenzimatic assays								■	■	■	■	■				
Development of PCR diagnostics											■	■				
Immunoassays contrast with positive serums												■				
Testing the assays in the captive population of *O. orca*													■	■	■	■

Project Benefits and Data Communication

5

5.1 Benefits
Communication Plan

5.1 Benefits

The main benefit of this research project will be the improvement of the knowledge and the methodological tools on cetacean immunology. This profit will be of special significance as, despite of the enormous negative potential represented by the pathogens for the species conservation, the actual acquaintance is insufficient.

The first direct application of the project results will be the possibility to implement epidemiology studies on the wild population, or in populations of special concern. This studies will allow a simple and fast determination of the pathogens of special concern, also helping to detect new epizootic risks and increasing the list of infectious agents for the species. In this sense, the results will have a direct application on the management of the wild population.

The project will also serve to improve the health management of the captive population, as it will permit to make a early diagnosis of the pathogen caused diseases. Making possible to make earlier prognosis and cure the animals with specific treatments.

Expected outcomes

The main outcome of the project will be the development of a immunology test battery to make rapid and reliable specific diagnosis of the most important pathogens from the conservation point of view.

Besides, the obtainment and purification of *O. orca* IgG will permit to develop new epidemiologic assays to detect other pathogens in the future.

Expected outcomes

Publishing in scientific media will be done in scientific journals with he highest possible impact (in the Science Citation Index). The spreading of the most significantly results will be done through communications in technical congresses and symposiums at a national and international level. Finally, the most relevant outcomes will be published in the Loro Parque Fundación web site. Among others, some of the potential scientific communication media, are:

JOURNAL
Biological conservation
Immunology
International Journal of Parasitology
Journal of the American Veterinary Medical Association
Journal Immunology Methods
Journal of Comparative Pathology
Journal of Parasitology
Journal of Wildlife Diseases
Marine Environmental Research
Marine Pollution Bulletin
Parasitology
The Journal of Parasitology
Trends in Parasitology
Veterinary immunology and immunopathology
Veterinary record
Veterinarian Microbiology

CONGRESSES
Annual Conference of the European Cetacean Society
Annual Symposium of European Association for Aquatic Mammals
Congreso Ibérico de Parasitología
Congress of Parasitology (World Federation of Parasitologists)
IAAAM(International Association for Aquatic Animal Medicine) annual conference

WORKING TEAM

6

6.1 WORKING TEAM

Working team will consist in researchers from Loro Parque Fundación with the collaboration of the Instituto Canario de Enfermedades Tropicales, of the La Laguna University, as stated in the Memorandum of Agreement (see appendix I).

The staff from Loro Parque Fundación dedicated to this project will consist at least in two researcher. A principal researcher with a dedication of 8 hours per week, and a researcher with a dedication of 20 hours per week. Several students will join the Loro Parque Fundación staff during the project,.

So the team will consist in:

Principal Researcher:
Javier Almunia, PhD. (Deputy and Science Director of Loro Parque Fundación).

Researcher:
María José Bernal Guadarrama, PhD

Students:
Two students with a minimum dedication of 240 hours each.

External Advisors

7

7.1 Independent Scientific Advisors

Three independent scientific advisors were contacted to know their opinion on the project feasibility and its interest from the scientific point of view. At the same time they were asked about their willingness to asses the CITES Spanish Scientific Authorities if needed.

The contacted researchers were:

Joseph K. Gaydos, PhD.

Wild Fauna veterinary and regional director of The SeaDoc Society
University of California, Davis Wildlife Health Center
1016 Deer Harbor Road, Eastsound, WA 98245

jkgaydos@ucdavis.edu

Stephen A. Raverty, PhD

Veterinarian Pathologist
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Andrew Greenwood, PhD

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7.2 Support Letters

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January 14, 2005

Dr. Javier Almunia
Director Adjunto
Loro Parque Fundación
Avda. Loro Parque, S/N
38400 Puerto de la Cruz
Tenerife (Canary Islands)

Dear Dr. Almunia,

I have read the abstract for your proposal entitled "Obtencion de varios kit de diagnostico para determnar la presencia de anticuerpos especificos frente a diferentes patogenos en suero de Orcinus orca" and I am very encouraged about this work. As you know, recent work we have done has shown that there is very little known about infectious diseases in free-ranging killer whales, yet diseases could be involved in the declines of some killer whale populations. Your work developing immunoassays to detect specific antibodies in killer whale serum would provide a great tool for us and other researchers around the world to learn more about infections diseases in free-ranging killer whales. We recently published a killer whale necropsy and disease testing protocol that is being used by veterinarians and biologists around the world. I think your immunoassays would be a great addition to this disease testing protocol.

Please feel free to have the Spanish authorities contact me if they would like my independent opinion on any aspect of the project. Also, please feel free to contact me if I can provide contacts for obtaining samples for testing of the newly developed immunoassays. Thank you for dedicating your time and energy to this important work.

Sincerely,

Joseph K. Gaydos, VMD, PhD
Wildlife Veterinarian / Regional Director
The SeaDoc Society, UC Davis Wildlife Health Center

THE SEADOC SOCIETY
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UC Davis School of Veterinary Medicine

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BRITISH COLUMBIA

Dr J Almunia,
Director Adjuncto
Loro Parque Fundacion
Avda. Loro Parque, S/N
38400 Puerto de la Cruz
Tenerife
Canary Islands

January 16, 2005

Dear Dr J Almunia,

This is a letter of endorsement for your scientific application for the development and validation of immunoassays for the diagnosis and screening of killer whale (*Orcinus orca*) pathogens. From a biomedical perspective, this is a critically important process in trying to resolve the disease concerns and conservation of these animals.

I am a veterinary pathologist with the British Columbia Ministry of Agriculture, Food and Fisheries, Abbotsford, BC with an interest in marine mammal pathology. Over the last 3-5 years our lab has been involved with the Canadian Department of Fisheries and Oceans, University of California, Davis, SeaDoc Society, Friday Harbor Museum, Cascadia Research, Washington Department of Fish and Wildlife, Wolf Hollow Rehabilitation Facility, Saltspring Island Rehabilitation, Vancouver Aquarium Marine Science Center and the US National Oceanic and Atmospheric Agency and National Marine Fisheries Service, Seattle, Washington, in providing diagnostic support and investigating disease concerns in killer whales in the northeastern Pacific Ocean.

As part of our killer whale necropsy protocol, post mortem heart blood is harvested, centrifuged and banked at -80 and cultures and molecular studies (polymerase chain reaction) are routinely conducted to screen for the pathogens listed on the accompanying Resumen (grant outline). Our laboratory has a CITES permit and is committed to forwarding serum (post mortem or antemortem) and providing diagnostic results from ancillary testing for correlation with serologic findings. If possible, we would be pleased to obtain and use the prepared kits to proactively screen stranded killer whales, and submit results to Dr Almunia.

Should you require any additional details, please do not hesitate to call me during regular office hours at 604-556-3003, Pacific Standard Time or email at Stephen.Raverty@gems3.gov.bc.ca The protocols from this research would be invaluable in the investigation of the health status and conservation of killer whales.

Kindest regards

SA Raverty

Stephen A Raverty, DVM, MSc, PhD, Diplomat ACVP
Veterinary Pathologist, Animal Health Center

Ministry of Agriculture and Food
Abbotsford Agriculture Centre
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English Extended Abstract
Research Project
II

DEVELOPEMENT OF SOFTWARE TOOLS AND RESEARCH ON THE VOCAL CULTURE OF ORCINUS ORCA.

Abstract

1

1.1 Title

Development of software tools and research on the vocal culture of *Orcinus orca*.

1.2 Principal Researcher

Javier Almunia, PhD.

1.4 Abstract

The killer whales (*Orcinus orca*) have an extraordinary complex culture. This culture favours a diverse set of behaviours among individuals of the same species, which gives certain adaptation advantages, promotes speciation and can be determinant in the conservation of other marine mammals, as in the management of the coastal ecosystems where they are present. This research proposal is focused in the main element of *O. orca* culture, its communication system. With this research we are willing to develop new tools for the bioacoustic analysis, raise the knowledge on the processes driving the dialectal variation, and shed light on the information codification in the *O. orca* calls.

This research would mean a new step on the development of analytic tools which have been developed for tonal sounds, and that are absent for pulsed sounds, which are the basis of the dialects of this species. At the same time, the research on the information codification on *O. orca* signals will be on the avant-garde of the cetacean bioacoustics, as the same studies are being implemented for bottlenose dolphins (*Tursiops truncatus*).

INTRODUCTION

2

2.1 STATE OF THE ART

Culture in Killer Whales

Killer whales have a complex behaviour, one of the most complex among the animals (Deecke *et al*, 2005; Hoelzel *et al*, 2002; Rendell and Whitehead, 2001; Delfour and Marten, 2001; Deecke *et al*, 2000; Deecke, 1998), giving full meaning to the non-human culture concept (Whitehead *et al*, 2004; Rendell and Whitehead, 2001). Cultural differences among the same species promotes different ecological role of the individuals (Deecke *et al*, 2005; Heise *et al*, 2003; Baird, 2000; Ford *et al*., 1998).

As other species, killer whales have a communication system with dialectal variations, not produced by geographical isolation (Conner, 1982), but to the matriarcal organisation (see Deecke *et al*., 2000). It has been proven that this dialects evolve in a coordinated way among related pods (Deecke, 1998).

Culture and Adaptation advantages

The cultural skills of a species increases its plasticity, reducing the intraspecific competition and increasing the breeding success (Whitehead *et al*, 2004). That relates the viability of the species with its cultural skills.

In the other hand some authors (Marler and Tamura 1962, sobre cetáceos ver Deecke, 1998) support that the dialects are tools to reduce endogamy, wilsth others argue that dialects are the result of demographic events (Mundinger, 1980).

Culture and Conservation

So that,culture can influence conservation and some authors point out that culture have to be considered on biodiversity conservation (Whitehead *et al*., 2004).

On the other hand, culture conservation can be considered per se (Dingle *et al*., 1997), as it is a part of the species. Shutherland (1998) also pointed out the importance of the conservation of the cultural diversity in the animal species.

When the conservation activities (eg. population supplementation) are considered, culture is also a relevant issue, as not only genetic contamination, but also cultural contamination of the wild populations can happen.

A deep knowledge on the culture of the species would be also useful in reintroductions to avoid the spread of unwanted cultures among the wild populations.

The important role of the culture in the reintroduction activities was shown by difficulties on the released Killer whale Keiko, to establish links with their wild conspecifics (van der Toorn, 2001). That proved the need to have a better knowledge of the Orcinus orca communication system.

Research and Knowledge on Cetacean Cultures

So that, the need to further research on the killer whale culture becomes evident. That is the reason why this proposal is focused on the bioacoustic research of Orcinus orca, and we propose to raise knowledge on the vocal dialects of the species to improve the information on its culture.

Objectives

3

3.1 Project Objectives

The main objective of this proposal is to better know the vocal communication systems of *O. orca*, to provide a technical background that makes possible a conservation-oriented management of the wild populations. So that, two main research lines are proposed:

1.- Develop new bioacoustic analysis tools

2.- Research on the processes driving the dialect drift and in the information codification on the discrete calls of *O. orca*.

The bioacoustic research is based in the recording, classification and analysis of sounds emitted by animals. As the detailed signal processing requires the processing of hundreds to thousands of sounds, this task would be more efficiently performed with some automatic tool. The development of this tools is a complex task, and despite there are some computer programs proposed (Mundry y Sommer, 2004; Datta y Sturtivant, 2002; Mundry y Todt, 2000; Sturtivant y Datta, 1997; Sturtivant y Datta, 1996; Sturtivant y Datta, 1995), none of them is completely satisfactory. Besides, the developed tools are intended to process tonal sounds, meanwhile most of the vocal Killer whale communication is made through pulsed sounds.

On the other hand, to deep insight on the information of the killer whale calls, it is necessary not only to compare sounds on a highly precise way (Deecke et al., 2000; Deecke 1998), but also to design and perform a new set of experiments.

3.2 Previous Research

Cetacean Bioacoustics

Bioacoustics is a well developed science in birds and terrestrial mammals (Brumm, 2004; Todt y Geberzham, 2003; Brensing et al., 2001; Mundry y Todt, 2000). Nevertheless, its development in marine mammals was slower, and it has been related with research in captivity as proves the amount of references (Datta y Sturtivant, 2002; McCowan y Reiss, 2001; Buck et al., 2000; Janik, 2000; McCowan et al., 1999; Janik y Slater, 1998; Todt et al., 1998; Veit, 1998; Tyack, 1997; McCowan, 1995; McCowan y Reiss, 1995; Sayigh et al., 1995; Sturtivant y Datta, 1995a; Sturtivant y Datta, 1995b; Janik et al., 1994; Buck y Tyack, 1993; Reiss y McCowan, 1993; Smolker et al., 1993; Caldwell, Caldwell y Tyack, 1990; Sayigh et al., 1990; Zanin et al., 1990; Tyack, 1986; Herman, 1984; Bastian et al., 1966; Caldwell y Caldwell, 1965) on the cetacean species most frequently kept in captivity, the bottlenose dolphin (Tursiops truncatus)

As a consequence, nowadays there is a large amount of research on the tonal sounds, which are considered to carry the information on bottlenose dolphins (Janik, et al., 1994). Despite this scientific effort, there is a considerable amount of controversy in several aspects of this field of study (Mikis et al., 2002; McCowan y Reiss, 2001; Janik y Slater, 1998; Tyack, 1997; Sayigh et al., 1995; Janik et al., 1994; Smolker et al., 1993; Sayigh et al., 1990; Tyack 1986) which points out its complexity.

Even thought of its zoological proximity, the vocal behaviour of killer whales is different to

that of bottlenose dolphins, as most vocalizations of the former are pulsed sounds (Ford y Fisher, 1982). Those pulsed sounds consist in a rapid succession of individual pulses, and have two characteristic parameters tone and repetition index (Schevill y Watkins, 1966).

Killer whale dialects

Killer whales discrete calls are highly stereotyped and can be easily classified, which made possible to characterize the repertoire of the most studied pods (Ford 1987, 1989). It has been demonstrated that each pod has its own repertoire (dialect), and that the related pods share some of the calls (Ford 1989,1991). On the other hand, this shared calls suffer subtle variations which are caused by a coordinated dialectal evolution (Deecke et al. 2000). So that, Deecke et al., (2000) showed the importance of the detailed analysis of the vocalizations, pointing out that subtle changes in the signals had signification, at least an ecological one.

It has also been demonstrated by Yurk et al., (2002) that the vocalizations of killer whales are strongly influenced by the calls of the rest of the pod. That means that killer whales establish matching calls with other individuals of the group, and sets up a potential experimental strategy, that is, reproduce natural calls or create synthetic ones to establish matching calls with the individuals. That would possible be the basis of experiments to study signal codification. That experimental strategy has been used before in dolphins with natural sounds (Mundry, 2004; Sayigh 1999).

Sound Discrimination

A common problem in the study of human and animal vocalizations relies on the description and quantification of similar acoustic signals (Deecke, et al. 1999). To find a quantitative measurement of the acoustic similarity is crucial for any study trying to compare vocalizations of different species, social groups or individuals.

One approach to the resolution of this problem is the use of statistical measurements of the acoustic similarity, with different parameters extracted from the signals (see Deecke et al., 1999). This statistical approach has the advantage to be comparable and easy to reproduce, but not always has a biological meaning (Horn and Falls, 1996).

Automatic Sound Classification

Several automatic classification systems for the vocalizations use different kinds of statistical approach (Deecke et al., 2000; Deecke et al., 1999; McCowan et al., 1999; Deecke, 1998; McCowan, 1995; Sturtivant y Datta, 1995; Buck y Tyack, 1993). Usually, this methods extract parameters from the frequency contour of the acoustic signal, unfortunately most of them are intended to be used with tonal sounds (McCowan et al., 1999; McCowan, 1995; Sturtivant y Datta, 1995; Buck y Tyack, 1993). And, as a consequence, only a few procedures are able to cope with pulsed sounds (Deecke et al., 1999). Both systems have to manage also the signal distortion caused by reverberation on the pool walls.

Once the parameters are extracted from the frequency contour, they are used to classify the sounds, which has been done in several ways (Mundry y Sommer, 2004; Mundry y Todt, 2000; McCowan et al., 1999; McCowan, 1995; Sturtivant y Datta, 1995; Buck y Tyack, 1993; Bain, 1986), and nowadays the neural network approach is the most popular (Deecke et al., 2000, Deecke et al., 1999, Spong et al., 1993).

Automatic Analysis and Signification

Bain (1986) made the first attempt to build an automatic analysis tool for killer whale vocalizations, despite it was a simple (one parameter) classification tool and no further developments were published.

Mundry and Todt (2000) also worked on the automatic analysis for bird calls, with several interesting approaches using the energy distribution in time and frequency. Later on, Mundry and Sommer (2004) developed a semi-automatic system based on the contour analysis on bird vocalizations, and concluding that the frequency contour should be the way to determine the signal signification in animals.

This hypothesis agrees with previous observations of Janik et al. (1984) who studied the variations on the bottlenose dolphin signature

whistles (despite it has to be considered that the study only included one individual).

Similar variations on the stereotyped killer whale calls were identified by Ford (1989), but it was not possible to say if those were emitted by the same individual.

Above observations are coherent with the observations made by Todt et al. (1998) in play back experiments with bottlenose dolphins, who observed different behavior when natural and synthetic sounds with small modifications were played.

Synthetic call generation

On this particular issue, there is no reference for killer whales, nevertheless, there is a paper on the generation and modification of dolphin synthetic sounds (Buck et al., 2000). This method was used with bottlenose dolphins, trying to find the key sound characteristics for the dolphins. The initial tests revealed that the humans unequivocally discriminated natural and synthetic whistles, which meant that also dolphins could. Unfortunately there is no further scientific literature on synthetic generated sounds, despite the research on sound modification and synthesis continued (Tang et al., 2001).

State of the art on killer whale dialects

Regardless of the extensive research on killer whale communication, we are far from understand the function and meaning of dialects. Several researchers pointed out the possibility to determine the distance and direction to the emitting individual using the differential frequency attenuation in the sea (Ford, 1991; Schevill and Watkins, 1966).

Kroch (1989) and Payne (1996) showed the need to evaluate the dialect change in time, and Deecke (1998 and 2000) made the most extensive research on killer whale dialects, proving the coordinated evolution among related pods. The same author revealed the killer whale dialects had important differences with bird dialects, being the former closer to the human social dialects; and showed the killer whale ability to modify its vocal behavior during all its life (see Deecke, 1998), meanwhile bird vocal behavior remains unchanged after the learning period (Todt y Geberzahn, 2003).

From the methodological point of view, all this results showing the importance of the detailed discrimination of very similar calls, reveal the need to build more precise sound classification tools.

Open Questions

From the previous exposition we can identify several open questions:

There is an unconfirmed hypothesis about the use of small modifications of stereotyped calls to code information on cetaceans (McCowan y Reiss, 2001; Todt et al., 1998; Janik et al., 1994).

There is no information on the forces driving the dialect change in killer whales (Deecke 1998 y 2000).

To shed light in this two questions, the development of new analytic and experimental tools is needed. Basically improving the capacity to automate the call identification and classification tasks, and also improving the ability to modify natural killer whale calls or synthesize it.

3.2 Detailed Objectives

We have identified four specific objectives to accomplish the main goal of this proposal, two on each of the planned main research lines:

1.- Development of new bioacoustic analysis tools

1.1 Develop a computer program to perform the automatic sound analysis.

1.2 Develop a computer program to modify killer whale discrete calls or even synthesize it.

2.- Research on the processes driving the dialect drift and in the information codification on the discrete calls of O. orca.

2.1 Evaluate the dialect variation on the individuals when separated from the main group

2.2 Determine if small variations in the discrete calls can code context information

Methodology and Working Plan

4

4.1 Materials & Methods

Sound Acquisition

The pools on the Loro Parque future installation will have the latest technology to record sound and video, avoiding any risk or unpleasant situations for the animals. The hydrophones will be installed in arrays of four to make possible the identification of the animal emitting the call, using the methodology developed by the Hubbs SeaWorld Research Institute (Bowles et al., 2004). All the information will be directed to a control room with the necessary equipment to record, analyze and store the data.

To complement the sound localization system, additional hydrophones (with a wider frequency range to cover all the killer whale call spectra) will be placed on the pools.

The recording system will have, at least, .he following characteristics:

Recording Hardware y Software

High Hard Disk capacity (over 100 GB), with high capacity external storage systems (DAT, DVD) to store all the audio and video data.
Independent video monitors to observe the pools live during the experiments.

ORCA software, developed by Hubbs SeaWorld Research Institute and implemented for MATLAB® (Mathworks®). This software is designed to calculate and display the distance from the sound source to up to eight hydrophones, using the energy density flux.

Noise and anti-aliasing filtering will be included if needed

Bioacoustic Analysis Software

The development of the computer bioacoustic analysis tools will be performed with a computer and a programming language. The programming language will be the usual among the bioacoustic developers, MATLAB® (Mathworks®). This working environment will be completed with an existing sound analysis software created by the Cornell University CANARY@, and a FORTRAN compiler.

The algorithms implemented with the software will be based on previous ones used to discriminate and classify tonal sounds : neural networks (Deecke et al., 1999; Spong et al., 1993), cross correlation (Cortopassi y Bradbury, 2000; McCowan, 1995) and time warping (Buck y Tyack, 1993). To extract the frequency contours from the pulsed sounds, the signals will be processed with CANARY® using Fourier transforms (FFT), with a 88hz band filter and a length of 1024 points.

Finally, comparison and discrimination of the contours will be done using different approaches based on previous investigations (Cortopassi y Bradbury, 2000; Deecke et al, 1999; McCowan, 1995; Buck y Tyack, 1993; Spong et al., 1993). Depending on the results with the program prototypes, other possibilities will be explored, as the contour comparison using image processing software.

Experimental Methods

The evaluation of the individual's dialect will be performed by either determining the repertoire of

the discrete calls regularly (each six months), and implementing a detailed analysis of the structure of the discrete calls to asses any difference in the long term (each two years). Nevertheless, all the recordings will be stored and available for future analysis. To make the comparison of the discrete call structure, the sound analysis software developed in the project will be used when available.

To determine if small variations on the discrete calls of O. orca code contextual information, several experiments will be performed:

- Experiments with match calling
- Experiments to determine the killer whale reaction when playing natural, modified or synthetic discrete calls.

4.2 Working Plan

This research will last for six years. The first three will be dedicated to the creation of the proposed bioacoustic tools, building the algorithms, doing the programming and testing the software to get the best results. During this time regular recordings will be made in order to get data for the software calibration. All the recordings will be stored for future analysis.

In the second part of the research, the analysis and experiments will be performed. All the stored material will be used to asses any potential variations on the dialect. Simultaneoulsy, during the last two years, the signification experiments will be carried out.

Working Plan Schedule

Activity/Task	*First Year*	*Second Year*	*Third Year*	*Forth Year*	*Fifth Year*	*Sixth Year*
Regular audio/video recordings						
Algorithm development						
Software Programming						
Test, and software debugging						
Dialect evolution Analysis						
Experiments on information codification						

Project Benefits and Data Communication

5

5.1 Benefits
Communication Plan

5.1 Benefits

The main benefit of this research project will be the improvement of the killer whale dialect knowledge, specially those issues related with the repertoire change and information encoding. Hopefuly, this improvement will have a positive effect on the wild species conservation, and could be used to reduce the conflicts among killer whales and man activities.

Simultaneously, the sound analysis tools will be useful for the bioacoustic studies either in captivity or in the wild. The developed software would be useful to increase the analytical power of the researchers, and that would raise the results of their scientific effort, improving the knowledge on the vocal culture of the species.

Complementarily, the creation of a bioacoustics research team in one of the most important cetacean biodiversity hot spots all over Europe, would benefit the cetacean populations around the Canary Islands. This is specially significant when we consider that, despite the highest cetacean biodiversity in the area, a few bioacoustics field studies have been published (Rendell et al., 1999; André, 1997).

Finally, the results of this project will be also useful to improve the captive killer whale population welfare, by promoting better acoustic conditions to raise the wellbeing of the animals and helping to manage their vocal culture.

Communication Plan

Right after the finishing of the first phase, the efficiency of the bioacoustic analysis tools and the obtained results will be published. Afterwards, and simultaneously to the experimental phase, all the conclusive results will be published either in scientific and non scientific media.

Publishing in scientific media will be done in scientific journals with he highest possible impact (in the Science Citation Index). The spreading of the most significative results will be done through communications in technical congresses and symposiums at a national and international level. Finally, the most relevant outcomes will be published in the Loro Parque Fundación website. Among others, some of the potential scientific communication media, are:

JOURNALS
Acoustic letters
Acoustical Society of America
Animal Behaviour
Behavioural Ecology and Sociobiology
Bioacoustics
Biological Conservation
Canadian Journal of Zoology
Cognition
Deep Sea Research
Ethology
European Research on Cetaceans
Journal of the Acoustical Society of America
Journal of Mammalogy
Journal of Comparative Psychology
Proceedings of the Institute of Acoustics
Signal Processing
Zoologica

CONGRESSES
Acoustical Society of America Conference
Animal Acoustic Communication Conference
American Cetacean Society Conference
European Cetacean Society Conference
International Conference on Methods and Techniques in Behavioral Research
Euro. Assoc. of Aquatic Mammals Symposium

WORKING TEAM

6

6.1 WORKING TEAM

Working team will consist in researchers from Loro Parque Fundación and Hubbs SeaWorld Research Insitute, as stated in the Memorandum of Agreement (see appendix I).

The staff from Loro Parque Fundación dedicated to this project will consist at leas in one researcher (Principal researcher) with a dedication of 27 hours per week. Several students will join the Loro Parque Fundación staff during the project, through a Memorandum of Agreement with the Marine Sciences Faculty of the University of Las Palmas de Gran Canaria (See appendix I). One student will be selected each year for a three months stance. Complementarily, other two students from the Universitat Autónoma de Barcelona will be chosen through another Memorandum of Agreement (see appendix I).

So the team will consist in:

Principal Researcher:
Javier Almunia, PhD. (Deputy and Science Director of Loro Parque Fundación).

Researcher from the Collaborative Institution:
Ann E. Bowles, PhD

Students:
Eight students with a minimum dedication of 240 hours.

External Advisors

7

7.1 Independent Scientific Advisors

Three independent scientific advisors were contacted to know their opinion on the project feasibility and its interest from the scientific point of view. At the same time they were asked about their willingness to asses the CITES Spanish Scientific Authorities if needed.

The contacted researchers were:

Michel André, PhD.

Director of Laboratorio de Aplicaciones Bioacústicas. Escuela Universitaria Politécnica de Vilanova i la Geltrú. Universidad Politécnica de Cataluña
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7.2 Support Letters

veritas
iustitia
libertas

Freie Universität Berlin

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Dr. Francisco Javier Almunia,
Loro Parque Fundación
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Tenerife (Canary Islands)

Berlin, 8 March 2005

→ **Research Line II :** **Bioacoustics**

Here: **Letter of Support**

Dear Dr. Almunia,

many thanks for sending your Bioacoustics Proposal. After careful reading, I like to certify that this is a profound peace of work which outlines a series of scientifically very interesting and important projects on the acoustic accomplishments of Killer Whales *(Orcinus orca)*. The designs of these projects are excellently developed and clearly in accordance with the scientific state of art. Given your working plan and your list of experts who will be involved in the research, I am convinced that the various objectives of your proposal are highly feasible and will bring valuable results within the described time schedule. In summary, I support a performance of this proposal very strongly and would feel delighted to act as a referee of the Spanish CITES authority.

My expertise in providing this letter of support and/or acting also as a referee of the proposal is substantiated by the following details. Since long, my research is concentrated on avian and mammalian bioacoustics, and my academic teaching at the Free University of Berlin concerns this topic, too. I offer, for example, field courses on the bioacoustics of marine mammals, e.g. a population of *Tursiops truncatus* living in a semifree enclosure at the Red Sea (Dolphin Reef, Eilat). In addition, I have supervised several Diploma and PhD Thesis on this matter.

With my best regards,

Yours sincerely,

(PD Dr. Henrike Hultsch)

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8

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English Extended Abstract
Research Project
III

RESEARCH ON CONSERVATION RELATED ASPECTS OF THE BEHAVIOUR OF ORCINUS ORCA

Abstract

1

1.1 Title

Research on Conservation-related aspects of the behaviour of O. orca.

1.2 Principal Researcher

Prof. Dietmar Todt

1.3 Abstract

The killer whales (*Orcinus orca*) have an extraordinary complex culture. This culture favours a diverse set of behaviours among individuals of the same species, which gives certain adaptative advantages, promotes speciation and can be determinant in the conservation of other marine mammals, as in the management of the coastal ecosystems where they are present. The research detailed in this proposal is intended to raise knowledge on the way *O. orca* faces different situations related with changes in their physical environment. To reach this objective, the research has been organised in several areas, which are focused on the determination of the psychopathological status of the animals, and its behaviour in different circumstances. The proposal represents an advanced research on *O. orca*, as it never has been done before, and the same research performed in bottlenose dolphins (*Tursiops truncatus*) produced positive outcomes related with the possibility to readapt cetaceans to the wild.

Introduction

2

2.1 State of the art
Immunology and Biodivesity Conservation
The case of Orcinus orca

2.1 State of the Art

Orcas *(Orcinus orca)* have a wide distribution and occur in three ecologically different forms. One form is resident and lives in family groups (pods) that develop clear dialects and feed exclusively on fish; whereas another form is transient, e.g. travelling along shorelines, occurs in smaller and less stable groups and feeds mainly on mammals. At the Northern West coast of America both forms are sympatric, but establish separate populations; i.e. they are morphologically distinct and do not mix (Ford 1996; Deecke et al. 2000). Besides such resident and transient populations, there is a third form of populations called 'offshore' and travelling in larger groups. Their morphology and behaviour seems to be specific, but is not really clear yet. John Ford (1996) suggested to use their vocalisations for further inquiries into their behaviour and ecology.

The role of Orcas as top predators favours conflicts with fisheries and aquaculture, and also bycatch, which has raised the concerns of IUCN. In some places so-called 'Repellent Devices' are used to reduce marine mammal predation on fisheries and aquaculture installations. These devices operate by sound which obviously harasses the animals, and there is evidence that they caused the displacement of a group of Orcas. Such displacement would conflict, however, with other economic valuable activities with orcas, e.g. whale watching. In addition, displacements of the top predators could cause unpredictable imbalances in the ecosystem. Besides, the habituation to the sound of this devices by this inteligent animals has shown that are olny effective in the short term.

Thus, an improvement in the knowledge on the species' behaviour in special situations, e.g. encounters with physical barriers or obstacles, and on its behaviour coordination, would make an expedient tool to avoid the mentioned conflicts, and to find better solutions than just an Acoustic Harassment.

Objectives

3

3.1 Project Objectives

The main objective of this research proposal is to improve the knowledge on the behaviour of *Orcinus orca*, to improve the conservation of this species in the wild and, additionally, also housing conditions of captive Orcas.

3.2 Previous Research

The research on orca natural history and behaviour can be traced back to the early 1970s when first field studies began to investigate the orca populations of British Columbia. After the pioneering studies of Michael Bigg (1982) many other members of John Ford's team continued this work (review in Ford & Ellis, 1999). Currently, however, many laboratories at different parts of the world, e.g. Norway (Steiner et al., 1979; Similä & Ugarte, 1993; Strager, 1995) are concentrating on the behaviour of wild orcas. In contrast to the relatively large quantity of such research, the amount of behavioural studies on captive orcas remained rather small.

Social Accomplishments

Orcas are classed into three different races (see Introduction). Comprehensive data are currently available only for the social life of the so-called residents. These are highly social and live in stable matrilineal family groups which typically encompass three or four generations. Dispersal of individuals seems to be rare as long as the mother animal is alive (Balcomb 1991), and some individuals may even stay in the same group for their entire live (Ford, 1991). On the other hand, a family group may fracture when a mother dies or a daughter moves away and founds a new mobile matriarchal unit of her own.

In contrast to residents, transient orcas tend to travel in small groups of two to six individuals, mostly a mother and her offspring. Thus, the basic social unit is the maternal group here too. But in transients an offspring does not necessarily stay with its natal group for life. Because of their different social structure such groups of transients were not regarded as pods (Ford & Ellis 1999). A similar distinction is made for large swarms documented for a further race, i.e. the 'offshore orcas' which live in large groups of thirty up to sixty or more individuals and seem to prefer open waters. Although only little is known about this orca race, it seems to be genetically closer related to residents than to transients (Ford & Ellis1999).

Vocal communication

The vocalisations of orcas can be subdivided into three types of patterns: whistles, pulsed sounds and clicks. Whereas both whistles and pulsed sounds play a prominent role in the social communication of animals and thus merit to be classed as genuine calls, clicks serve mainly for echolocation. A similar distinction is also reported for other dolphins and whales, and needs to be supplemented only if the 'songs' of whales shall be included into the overall marine mammal repertoire (Todt 1986; Brensing et al. 2001; Veit, 2002).

Basing on their structural properties orca vocalisations can be characterised as follows: Whistles are highly variable pure-tone signals with a peak frequency ranging between 1.5 kHz and 18 kHz (Ford 1989). They are regarded as close-range sounds used during various socializations (Thomsen et al. 2001; 2002).

Pulsed signals, in contrast, have a complex structure consisting of multiple parts that contain a low-frequency component ranging to 10 kHz or higher (Watkins 1967). Many of them contain also a high-frequency component which consists of a fundamental ranging from 2 kHz to 12 kHz (Hoelzel & Osborne 1986). Pulsed calls dominate the vocal behaviour of orcas (Ford 1989) and are explained as long-term indicators of affiliation. They seem to be pod specific, obviously as a result of differences between matrilineal units (Miller & Bain 2000).

Clicks, finally, show a broad band configuration with a measurable energy usually extended from 4 to 35 kHz and occasionally to 50 kHz (Barrett- Lennard et al. 1996). In addition, they are short in duration, what makes them optimal for echolocation (Au 1993).

Recently, a study on the acoustic behaviour of captured orcas showed that call variability within individuals is likely to be large (van Parijs et al. 2004), and that the current literature on calls types may be rather incomplete. This demonstrates the need of further research under conditions which are more controlled and allow access also to information about the behavioural contexts of specific sounds. The projects planned with the orcas of the Loro Parque provide a good chance to improve this situation.

Behavioural Coordination

The behaviour of orcas is an example per excellence of activities performed in well coordinated and synchronized modality. Group members often surface and dive at the same time. If prey is detected, whales start to act in close cooperation and with a coordination mode adjusted to a given sort of prey (Ford & Ellis 1999). Cooperative hunting allows individuals to capture even manoeuvrable prey, such as porpoises, dolphins or small schooling prey as herring (Similä et al., 1996).

Founded on the evidence that orcas, like most other whales and dolphins, perform their various behaviours in a highly coordinated and synchronised manner, we will use these accomplishments as clues of their well-being. That is, we will investigate the degree of their behavioural coordination and take deviations as a tool for an early detection of any possible shift in the psycho physical state of the animals.

Coordination in the wild and in captivity

The discussions on whether and how to keep marine mammals otherwise than in the open sea have a long tradition. They are necessary, but need to be both honest and rational and also have to be based on profound data and experience. Common criteria of good housing and caring conditions are successful reproduction as well as the life span of offspring and adults.

With regard to orcas, our future research on this issue will be based on the outcome of former orca studies and on results of investigations performed in the Dolphin Reef (Eilat), e.g. when preparing three successful releases of adult individuals in the Black Sea (1996, 2004).

The perspective of this study is based on an earlier work with the same species (Poché et al., 1982). The results indicated that bottlenose dolphins modify the spectrum of their echolocation clicks in response to changes of some environmental conditions, such as an unusual signal reverberation or a high ambient noise. However, further experiments are necessary to clarify the role of echolocation in a marine mammal's life under tank-related conditions. Environmental areas with and without signal reverberation have a clear advantage for inquiries into the mechanisms of echolocation.

3.3 Detailed Objectives

Projects (1) and (2) will concentrate on the animals' normal behaviours, e.g. parameters of their vocalisations and measures of their motor coordination, and use such data gain information about relationships between the Orcas' psychophysical state, e.g. degrees of their well-being, and their social or ecological conditions. Projects (3) and (4) will deal with tests designed to identify possible problems that Orcas could face either in a given enclosure or, in particular cases, also in the wild and especially if (in a theoretical case) being released to the open sea. Founded on the results of these projects, a further approach (5) will serve to develop and test strategies or procedures which allow to improve the conditions of Orca housing, and also to also to enlarge the current knowledge in Orca Conservation, or to stimulate a novel discussion on Orca Rehabilitation.

Methodology and Working Plan

4.1 Materials and methods
4.2 Working Plan

4

4.1 Materials & Methods

Above all, our research on the behaviour of Orcas will be strictly non invasive. In addition, it will be guided by a methodological concept that guarantees a high standard approach. This concept is distinguished by the following three procedures:

Multi-channel recording: Parallel use of video cameras and hydrophones for recording of dolphin movements, distances, positions and movements of other organisms.

Multi-focal recording: this recording supplements the multi-channel method by a procedure which allows to record data system-wise.

Continuous recording: The recording of behaviour and events occurring in the environment of dolphins has to take place in a temporally coherent manner.

Applying a combination of these methods is a methodological strategy which is well-proven already by various behavioural approaches (review in Todt & Hultsch 1998).

The study of behavioural coordination will be based on an analysis of video recordings. Pattern categorisation will follow established procedures (Altmann 1974; Todt 1986), and also adust Orca Ethograms available from other laboratories, e.g. the Vancouver Museum (Thomsen et al. 1996). To investigate pattern coordination we will used two different designs. Details on the first method are documented in publications about duetting birds (e.g. Todt & Fiebelkorn 1979; Todt & Naguib 2000). Statistical data evaluation will be done via Chi-square methods (Hultsch & Todt 1989a).

In the other case, we will adopt a method recently applied in our dolphin studies (Perelberg & Schuster, 2004). It is based on the use of so-called Half Weight Index (HWI) which measures the strength of the pattern association between two different animals.

In order to identify the quality of any association, we will use Monte-Carlo procedure iterations on the Orcas' synchrony of locations by generating a frequency distribution based on 1,000 iterations from permutations of the original data.

The experimental parts of the studies have been developed during our research in the Dolphin Reef (Israel), and - with an exception of the so-called 'Acoustic Window' – were even applied and tested there. As the details are documented in four Diploma Thesis (K. Heilsberg; S. Schuster; C. Liebscher, B. Hand) and also reported in a publication (Heilsberg et al. 1998), our methodological description can be cut short. The core design was given by exposing the animals with sets of different devices that were presented in different successions in the subjects' normal enclosure. The devices comprised especially 'gates' of different sizes, most of which were first explored by the animals, then passed and finally even used for extended face-to-face encounters.

In the Window Paradigm research, the new device will allow to present the mammals with an 'echo-free' area simulating a 'window' in the enclosure's wall. We plan to enrich this device by four loudspeakers hidden behind the window's special material. The loudspeakers serve a playback of specific sound spectra. Currently, we are starting to develop, built and test the device in the Dolphin Reef (Eilat). Only if our tests

are successful, we will suggest to present the Orcas with 'window' device, as well. Recorded Orca behaviours and expected preferences for particular stimulus configurations will finally be evaluated by non-parametric statistical tests (Sokal & Rohlf 1995).

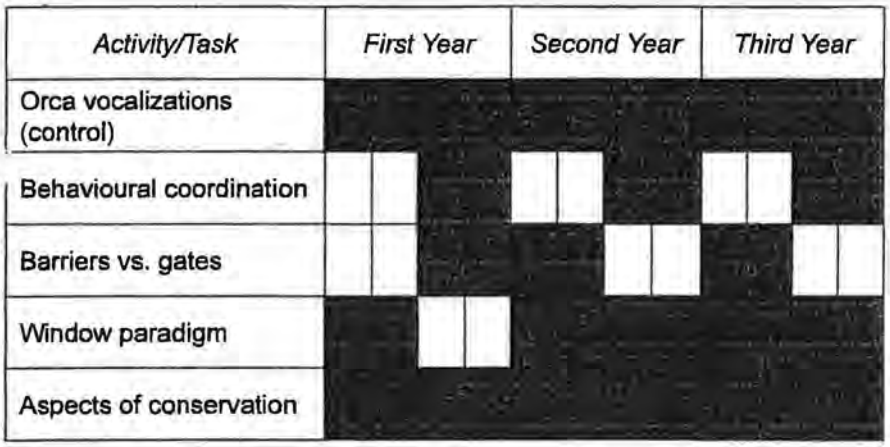
4.2 Working Plan

The preparation of the Research has been started already. This first phase will last until the Orcas arrive at their new Loro Parque enclosure. It will include the cited tests in the Dolphin Reef (Eilat), data analyses at the FU Berlin, and finally data recordings an the Orcas' acoustic and behavioural accomplishments in their North American enclosures and during their transport. These data will later serve as a baseline for some crucial comparative studies.

After the Orcas' arrival, the data recording and performances of the behaviours will take place in Tenerife, whereas experimental preparations and data analyses will be done in our laboratory at the FU Berlin. We anticipate a symmetrical distribution of time investment. The following time-table shows both the succession and the distribution of work on the projects listed above after the arrival of Orcas.

5.1 Benefits

Working Plan Schedule



Project Benefits and Data Communication

5

5.1 Benefits
Divulgation
Communication Plan

Because of our experience and former success with the research outlined in this proposal, we are convinced that our study will achieve the aims listed above. That is, the projects will definitely enlarge the current knowledge in Orca Conservation, and also stimulate a novel discussion about Orca Rehabilitation, which after the death of Keiko is distinguished by disappointment. In addition, the projects will provide information which allows to improve the conditions of Orca housing.

Diffusion

Dissemination of the research's results and benefits will be accomplished by a number of different activities. These include, for example, a publication of the study in relevant international journals and also a presentation of all results on Scientific Conferences. Above all, however, we will additionally organise an International Symposium on Orca Conservation in Puerto de la Cruz (summer 2007). To make the new knowledge about issues of Orca Conservation as effective as possible, representatives of institutions such as IFAW, IWC, the CITES offices and also the media will be invited to attend the meeting.

Among others, some of the potential scientific communication media, are:

JOURNAL
Biological conservation
Immunology
International Journal of Parasitology
Journal of the American Veterinary Medical Association
Journal Immunology Methods
Journal of Comparative Pathology
Journal of Parasitology
Journal of Wildlife Diseases
Marine Environmental Research
Marine Pollution Bulletin
Parasitology
The Journal of Parasitology
Trends in Parasitology
Veterinary immunology and immunopathology
Veterinary record
Veterinarian Microbiology

CONGRESSES
Annual Conference of the European Cetacean Society
Annual Symposium of European Association for Aquatic Mammals
Congreso Ibérico de Parasitología
Congress of Parasitology (World Federation of Parasitologists)
IAAAM(International Association for Aquatic Animal Medicine) annual conference

WORKING TEAM

6

6.1 WORKING TEAM

Working team will consist in researchers from the Free University of Berlin, which will operated as an independent team, coordinated with Loro Parque Fundación staff to avoid conflicts with other experiments or research activities.

So the team will consist in:

Principal Researcher:

Prof. D. Todt, Head of the Research Unit of the FU Berlin.

Researchers:

J. Cirillo, PhD
H. Hultsch, PhD
R. Mundry, PhD

Moreover, three to four young scientists will be selected out of about 20 people to perform research activities.

LPF Coordinator:

Javier Almunia, PhD

External Advisors

7

7.1 Independent Scientific Advisors
7.2 Support Letters

7.1 Independent Scientific Advisors

Three independent scientific advisors were contacted to know their opinion on the project feasibility and its interest from the scientific point of view. At the same time they were asked about their willingness to asses the CITES Spanish Scientific Authorities if needed.

The contacted researchers were:

Prof. Boris Culik
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7.2 Support Letters

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8.1 References

8

8.1 REFERENCES

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Memoria Científico-Técnica del Proyecto

III

PATRONES DE ALIMENTACIÓN DE ORCAS (ORCINUS ORCA) EN EL ESTRECHO DE GIBRALTAR A PARTIR DE PERFILES DE ISÓTOPOS ESTABLES (^{13}C Y ^{15}N) MEDIDOS EN EJEMPLARES EN LIBERTAD Y EN EJEMPLARES EN CAUTIVIDAD

UAM
UNIVERSIDAD AUTONOMA DE MADRID

CIRCE
CONSERVACION INFORMACION & ESTUDIO SOBRE LOS CETACEOS

LORO PARQUE FUNDACIÓN

El "must" de Canarias
LORO PARQUE
Puerto de la Cruz - Tenerife - España

Resumen

1

1.1 Título

Patrones de alimentación de orcas (*Orcinus orca*) en el Estrecho de Gibraltar a partir de perfiles de isótopos estables (^{13}C y ^{15}N) medidos en ejemplares en libertad y en ejemplares en cautividad.

1.2 Supervisores, Investigadores Principales y Coordinador en Loro Parque

Supervisores: Dr. Christophe Guinet y Dr. Ángel Baltanás
Investigadores Principales: Renaud de Stephanis y Susana García Tiscar
Coordinador en Loro Parque: Dr. Javier Almunia

1.3 Resumen

Se sabe que la población de orcas del Estrecho de Gibraltar incluye el atún rojo (*Thunnus thynnus*) entre sus presas en primavera y en verano, pero la proporción de esta especie en la dieta de la citada población de orcas es desconocida. Las poblaciones de esta especie, sometidas a una terrible explotación por parte de las pesquerías, tanto españolas, como italianas, francesas, tunecinas, turcas... tienen un gran problema, y su reducción en cuanto a efectivos, podría poner en peligro la viabilidad de las orcas que se alimentan de ellas, si éstas no son capaces de alimentarse de otro tipo de presa. El objetivo de este proyecto es el de analizar la dieta de la población de orcas residentes o semi-residentes del Estrecho de Gibraltar, a través del análisis de perfiles de isótopos estables (principalmente ^{13}C y ^{15}N) en piel. Para calcular las tasas de renovación, así como el factor de corrección por fraccionamiento isotópico de la piel y de la sangres en orcas, necesarios para poder calibrar los análisis mencionados anteriormente, se realizarán estudios con orcas en cautividad alimentadas a través de dietas controladas mono-específicas.

Los estudios en mar, se harán a través de una plataforma de investigación en el Estrecho de Gibraltar. Se realizarán muestreos aleatorios en el Estrecho, tres veces al año, para conseguir muestras de piel de la población a lo largo del año, y poder predecir así si hay algún cambio estacional en la dieta. Las campañas de investigación en mar permitirán, así mismo, cuantificar la abundancia, la estructura social, y el grado de residencia de las orcas en el Estrecho de Gibraltar.

De manera esquemática, este proyecto permitirá contestar a las siguientes preguntas:

1- *¿Cuál es la tasa de renovación de la piel y la sangre de las orcas adultas?*
2- *¿Cuál es el factor de corrección por fraccionamiento isotópico para sangre y piel de un grupo de orcas adultas?*
3- *¿Cuales son los patrones de distribución espacial de las poblaciones de orcas presentes en aguas del Estrecho de Gibraltar?*
4- *¿Cuales son los patrones de distribución temporal de las poblaciones de orcas presentes en aguas del Estrecho de Gibraltar, en función de sus presas principales?*
5- *¿Cual es la dieta de las orcas presentes en las aguas del Estrecho de Gibraltar a lo largo del tiempo?*
6- - *¿Existe algún tipo de interacción entre orcas y pesquerías (aparte de las del atún) en el Estrecho de Gibraltar? ¿Qué medidas se pueden aplicar para limitar este tipo de interacción?*

1.3 Abstract

Killer whales in the strait of Gibraltar are observed to feed on red tunna (*Thunnus thynnus*) in spring and summer but the exact contribution of this fish to the diet of that killer whale population remains unknown. The populations of this species are under great exploitation by different fisheries, such as Spanish, Italian, French, Turkish and Tunisian. The decreasing red tuna population could put in danger the survival of killer whales, which feed on them, if these are not able to feed on another type of prey. The aim of this project is to analyze the diet of the resident or semi-resident killer whale population of the Strait of Gibraltar, through the analysis of stable isotope profiles (mainly ^{13}C and ^{15}N) in the skin. To calculate the turn-over rate and the isotopic fractionation factor in the skin and blood of killer whales, one needs to calibrate the analyses mentioned before. These analyses will be carried out on killer whales in captivity fed through controlled mono-specific diets.

The studies at sea will be carried out from an investigation platform in the Strait of Gibraltar. Aleatoric transect will be carried out in the Strait of Gibraltar four times per year to get skin samples of the population through the year. The surveys at sea, will let us quantify the abundance, social structure and grade of residency of the killer whales in the Strait of Gibraltar

This project will answer the following questions:

1 *What is the turn-over in the skin and blood of adult killer whales?*
2 *What is the correction factor by isotopic fractionation for blood and skin of a group of adult killer whales?*
3 *What are the spatial distribution patterns of the killer whale population present in the waters of the Strait of Gibraltar?*
4 *What are the temporal distribution patterns of the killer whale population present in the waters of the Strait of Gibraltar, in function of its main prey?*
5 *What is the diet of the killer whales present in the waters of the Strait of Gibraltar through time?*
6 *Are there any type of interaction between killer whales and fisheries (apart from the red tunas) in the Strait of Gibraltar? What measures could be applied to limit this type of interaction?*

Introducción

2

2.1 Justificación y Antecedentes

Las orcas son un grupo de depredadores muy adaptable, que se alimentan de una gama de presas que se extienden desde los arenques (Simila y Ugarte 1993) hasta el más grande de los mamíferos marinos como es la ballena azul (p. ej. Heyning and Dahlheim 1988, Jefferson et al. 1991). Según las localidades, las poblaciones de orcas parecen estar más o menos especializadas en la explotación de algunas categorías de presas. En Columbia Británica, las orcas llamadas "residentes" se han especializado en el salmón, mientras que las llamadas "transeúntes" solo se alimentan de mamíferos marinos (Baird y Dill 1995 ; Ford *et al.*, 1998). En el archipiélago de Crozet, las poblaciones de orcas se alimentan tanto de peces, como de pingüinos reales y mamíferos marinos (Guinet, 1992). Estas diferencias en la ecología alimenticia tienen una importancia consecuente en el modo de organización social y la ecología del comportamiento de estas orcas (Bigg *et al.*, 1985 ; Barrett-Lennard , 1996 ; Baird y Dill 1996 ; Baird y Whitehead, en prensa).

Los trabajos que versan sobre la estructura genética de las diferentes poblaciones de orcas (Stevens *et al.*, 1989, Hoelzel *et al.*, 1998, Lance Barret-Lennard com. pers.) indican que poblaciones que genéticamente están muy relacionadas pueden presentar papeles tróficos muy diferentes (Lance Barret-Lennard com. pers.). Estos resultados sugieren que las orcas son capaces de ajustar localmente su ecología trófica en función de las presas disponibles, y de las condiciones ambientales de contorno Apoyándose en las observaciones realizadas en Argentina (Lopez y Lopez, 1985) y en el Archipiélago de Crozet (Guinet 1991, Guinet y Bouvier 1995) sobre el aprendizaje de técnicas de caza, sobre las observaciones producidas en cautividad y sobre la ontogénesis de los gritos en orcas recién nacidas (Bowles et al 1988), Rendell y Whitehead (2000) proponen la existencia de una transmisión cultural por aprendizaje en el seno del grupo social. Tal proceso de transferencia cultural sería la llave de la gran adaptabilidad de las orcas a condiciones medioambientales tan dispares como zonas polares y zonas tropicales, así como a recursos alimenticios tremendamente variados (desde el arenque al más grande de los cetáceos).

Conclusión

Dado que *O. orca* es una especie con una etología muy compleja (Deecke, 1998; Deecke *et al*, 2000; Delfour and Marten, 2001; Rendell and Whitehead, 2001; Hoelzel *et al*, 2002; Deecke *et al*, 2005), su cultura, y la forma en la que esta influye a su comportamiento trófico, son elementos muy a tener en cuenta desde el punto de vista de la gestión de sus poblaciones. Al mismo tiempo, y debido a la influencia potencial de esta especie sobre el ecosistema, y sobre la supervivencia de otras especies, el conocimiento sobre el comportamiento trófico de *O. orca* es también vital para gestionar y conservar los ecosistemas costeros del área geográfica en la que se desarrollan sus poblaciones.

Por lo tanto, se hace necesario establecer una base de conocimiento sobre el comportamiento trófico de *O. orca* que, por un lado, permita reducir los

conflictos entre las orcas y las actividades humanas y, de forma complementaria, sirva para reducir las interacciones negativas entre las orcas y otras especies marinas, mejorando así los problemas de conservación descritos y elevando la capacidad de gestión para la conservación de *O. orca* y de los recursos marinos costeros.

En este sentido, resulta especialmente importante para la conservación de la especie y la mejor gestión de los recursos marinos, el desarrollo de herramientas que permitan evaluar de forma precisa la dieta de las diferentes poblaciones de *O. orca*.

OBJETIVOS

3

3.1 OBJETIVOS DEL PROYECTO

El objetivo principal de este trabajo es determinar la dieta de las poblaciones de orcas presentes en el Estrecho de Gibraltar. En concreto, se tratará de esclarecer si las poblaciones de orcas del Estrecho de Gibraltar se alimentan únicamente de atunes rojos, o si su dieta es más variada que lo que se supone a priori.

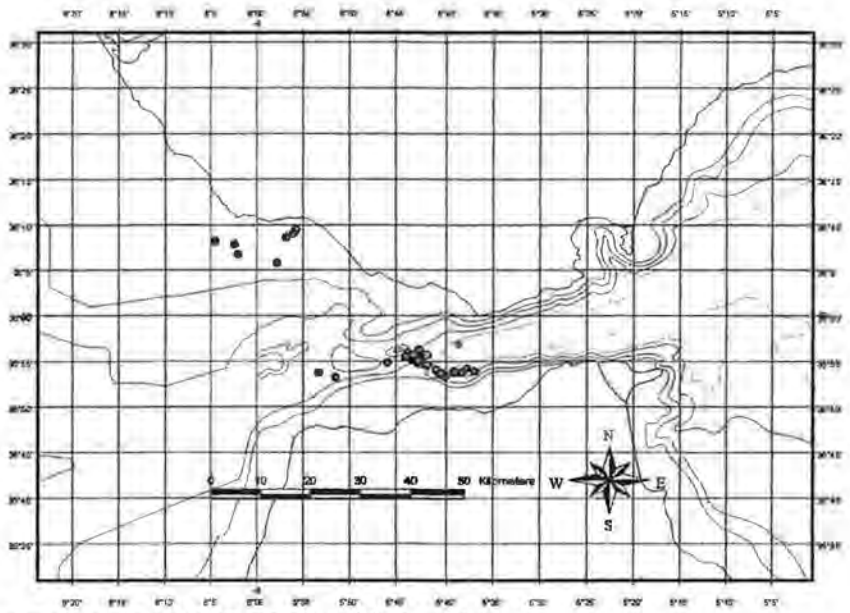
Para alcanzar este objetivo se emplearán técnicas isotópicas usadas de forma habitual en la determinación de las relaciones tróficas entre poblaciones de diferentes especies. Dichas técnicas no han sido anteriormente utilizadas en ninguna especie de cetáceos, debido a dificultades metodológicas que se pretenden solventar con este proyecto para el caso concreto de *O. orca*.

3.2 ANTECEDENTES Y RESULTADOS PREVIOS

La población de O. orca en el Estrecho de Gibraltar

A pesar de que las orcas son meros visitantes del mediterráneo, (Nortobartholo di Sciara 1987), poca gente sabe que ésta especie puede observarse de forma regular en el Estrecho de Gibraltar en asociación con atún rojo (*Thunnus thynus*). Situación documentada desde hace al menos 600 años (Morcillo com. pers.). Durante la época primaveral, las orcas cazan atunes que entran en el mediterráneo, y durante el verano hacen lo mismo con los atunes que vuelven al Atlántico, una vez que se han reproducido. Numerosas interacciones son observadas, entre las orcas y las pesquerías de atún durante la época estival, con perdidas en los pescadores españoles de alrededor 18% de las capturas en el año 2004 (datos propios). Así mismo, las orcas son observadas alrededor de las almadrabas, tanto de Barbate como de Conil, Tarifa y Zahara de los Atunes en la provincia de Cádiz. Este tipo de interacciones se ha observado en varias zonas del mundo. En Islandia, las orcas interfieren en la pesca del arenque, y en aguas noruegas, las orcas interaccionan con la pesca de fletan. Así mismo, interacciones entre pesqueros de atún y orcas son observadas en aguas del Golfo de Vizcaya, Atlántico norte y Océano Indico. En Tasmania, las orcas interaccionan con la pesca de trevalla (*Hyperoglyphe porosa*). Finalmente, desde hace unos años, grupos de orcas y cachalotes son observados interaccionando con las pesquerías de Bacalao negro (*Disostichus eligenoides*) en aguas de Crozet (Océano Indico). (Leatherwood *et al.*, 1987, Dahlheim 1988, Duhamel com. pers).

Según estudios recientes realizados por CIRCE, la población de orcas del Estrecho de Gibraltar se compone de al menos 30 individuos, distribuidos en 3 grupos sociales más o menos estables. Su distribución se explica principalmente por la longitud geográfica (situándose sobre todo en la zona Oeste del Estrecho) y a la profundidad; ya que tanto en primavera como en verano (a excepción del mes de junio) están presentes en aguas relativamente poco profundas. Durante los meses de marzo a mayo, los grupos de orcas se sitúan sobre todo en las zonas



Avistamientos de orcas realizados por CIRCE entre 2001 y 2004

del Golfo de Barbate, y cercanías de Conil, mientras que durante el mes de junio, éstas se encuentran en proximidad del puerto de Tarifa, y durante los meses de julio, a septiembre y octubre, se encuentran en las zonas de pesquerías de atún con anzuelo, tanto marroquíes como españolas. En prácticamente todas las ocasiones, se las observó pescando atunes rojos, sin embargo no está claro si se alimentan únicamente de esta presa, o si por el contrario, diversifican sus presas a lo largo del año, como se observó en 1880, cuando un grupo de orcas fue avistado atacando un rorcual común en aguas del Estrecho de Gibraltar.

Antecedentes Metodológicos

El análisis de perfiles de isótopos estables (principalmente ^{13}C y ^{15}N) se utiliza para elucidar estructuras de redes tróficas en ambientes terrestres y marinos desde hace varias décadas. Este tipo de análisis se viene utilizando cada vez más en la identificación de dietas de depredadores, ya que la composición isotópica de un organismo está relacionada con la de sus presas (Lajtha y Michener, 1994).

Los valores de isótopos de carbono y nitrógeno varían entre los organismos y sus dietas debido a una retención selectiva del isótopo más pesado y la excreción del más ligero. Como resultado, los organismos tienen valores de isótopos más elevados que los de su dieta. (Rau *et al.*, 1983) El Nitrógeno 15 normalmente muestra un incremento escalonado con el nivel trófico a lo largo de la cadena alimenticia, con un enriquecimiento de alrededor del 3‰. Por el contrario, un animal tiene valores de Carbono 13 cercanos a los de su dieta, por lo que se usa generalmente para indicar contribuciones relativas a la dieta de fuentes primarias potenciales en una red trófica.

Desde el año 2000 se están utilizando modelos isotópicos que permiten el cálculo de las diferentes contribuciones de cada presa a la dieta del depredador. (Phillips y Gregg 2003; Phillips, 2001; Phillips y Koch, 2002; Koch y Phillips, 2002; Phillips, Gregg y Newsome, 2005) Para conseguir el cálculo exacto de la contribución de una determinada presa a la dieta del depredador, es necesario aplicar un factor de "corrección por fraccionamiento isotópico". Esto es debido a que diferentes presas presentan diferentes composiciones isotópicas y se metabolizan de forma diferente tras la ingestión por parte del depredador. Es decir, es posible que un depredador este alimentándose de dos presas en igual proporción (50 % de la presa A y 50% de la presa B) pero que la señal isotópica en los diferentes tejidos del depredador no refleje esta proporción de modo exacto. Esto es

debido a que hay tejidos con mayor tasa metabólica que otros y presas que se metabolizan con mayor facilidad que otras, lo que hace que la proporción isotópica en los tejidos del depredador no tenga por qué corresponderse exactamente con la proporción de presas en la dieta.

Para relacionar la contribución relativa de isótopos de cada presa con la medida en el depredador, es necesario aplicar el "factor de corrección por fraccionamiento isotópico" que normalmente y para muchas especies de depredadores se encuentra descrito en la literatura científica especializada y que se calcula a partir de experimentos con animales en cautividad a los que se proporciona una dieta controlada (Hobson *et al.*, 1996).

En el caso de cetáceos no hay cálculos de factores de corrección por fraccionamiento debido principalmente a dos causas: (1) la reciente aplicación de este tipo de análisis al trabajo con mamíferos marinos en general y (2) la dificultad de mantener cetáceos en cautividad para la realización del experimento. Estas dos cuestiones ponen de manifiesto la importancia de la realización de experimentos con mamíferos marinos en cautividad que permiten ajustar el cálculo de las contribuciones relativas a la dieta de su congéneres en libertad.

Otro importante factor a tener en cuenta es la tasa de renovación de los diferentes tejidos en un mismo individuo, de modo que tejidos con tasa metabólica .nás lenta cómo dientes o tejido óseo proporcionaran información sobre la dieta del animal en un periodo más largo que tejidos con tasas metabólicas más rápidas cómo la piel o sangre. En cetáceos, no se ha determinado con exactitud la tasa metabólica de ningún tejido. De forma que no es posible establecer si el perfil isotópico medido en animales silvestres se corresponde con la dieta del último día, la última semana o el último mes.

Como consecuencia, tanto para trabajar con animales en libertad, cómo para diseñar experimentos de cálculo de factor de corrección por fraccionamiento en animales cautivos, es importante conocer la tasa de renovación de los tejidos que habitualmente se utilizan en este tipo de análisis. Por lo general se trata de la piel y en algunas ocasiones sangre, dientes o tejido muscular (Fry, 1988; Hobson *et al.*, 1996; Greaves *et al.*, 2004; Abend y Smith, 1997).

3.2 Objetivos Concretos

Para alcanzar el objetivo principal del proyecto, es necesario establecer previamente otras cuestiones:

1.- Determinar la tasa de renovación de la piel y la sangre de las orcas adultas.

Para ello se realizará un primer experimento de piscina durante el que se proporcionará a los animales una dieta controlada (de perfil isotópico conocido) a lo largo de un periodo de tiempo fijo durante el que se realizaran varias extracciones de sangre y piel que serán objeto de análisis.

2.- Determinar el factor de corrección por fraccionamiento isotópico para sangre y piel en un grupo de orcas adultas.

Para ello se realizará un segundo experimento de piscina con orcas en cautividad a las que se proporcionara una dieta controlada (de perfil isotópico conocido) durante un periodo fijo de tiempo (que se establecerá en base a los resultados del experimento anterior). Se extraerá una muestra de sangre y una de piel por cada periodo experimental. El proceso se repetirá para cada especie de pescado de interés identificada en un trabajo previo.

3.- Determinar la variación temporal del perfil isotópico de la población salvaje de *Orcinus orca* en el Estrecho de Gibraltar.

Con ese objeto se establecerá previamente la distribución espacial y temporal de la población de *Orcinus orca* en el Estrecho de Gibraltar. Especialmente determinando su distribución entre septiembre y febrero, que hasta la fecha es desconocida.

De forma simultánea a la determinación de la distribución espacial y temporal de las orcas, se tomarán muestras de piel y sangre para determinar el perfil isotópico de la población. De igual manera se tomarán muestras de los peces presentes en la misma zona y susceptibles de ser sus presas, para determinar también su perfil isotópico.

4.- Inferir la dieta de la población salvaje de *Orcinus orca* en el Estrecho de Gibraltar a partir de los datos de perfiles isotópicos.

Por último, y en base a los datos de fraccionamiento isotópico obtenidos a partir de las muestras tomadas en la población de orcas del Estrecho de Gibraltar, se inferirá la proporción de presas que constituyen la dieta de dicha población a lo largo del año. De esta forma se podrá determinar si existe una variación en la dieta y, consecuentemente, en el papel trófico de la población.

METODOLOGÍA Y PLAN DE TRABAJO

4

4.1 MATERIAL Y MÉTODOS

Experimentos para la determinación de la tasa de renovación de dos tejidos en orcas adultas

Para determinar la tasa de renovación de la piel y la sangre en ejemplares de *O. orca* adultos se realizará un experimento consistente en la administración a los animales objeto del estudio de una dieta controlada (constituida por una única especie de pescado) y de perfil isotópico conocido durante un periodo de tiempo aproximado de 42 días. Durante ese periodo de tiempo se recogerán muestras de sangre (aprox. 1 cm^3) y piel (muestra aprox. de 16 mm^2) a intervalos de tiempo no regulares y especificados en la Tabla 1. Después del periodo de tiempo establecido, se cambiaría la especie de pescado proporcionada como alimento por otra única especie durante un segundo periodo experimental de otros 42 días. A lo largo de este segundo periodo experimental se tomarán de nuevo muestras de piel y sangre según los intervalos no regulares especificados en la Tabla 1.

La situación ideal sería la administración de las dietas experimentales al mayor número de orcas posible para reducir la influencia de la variabilidad individual. El perfil isotópico de las muestras se determinará lo más rápidamente posible tras su recogida de modo que se minimice el tiempo de

DÍA	ALIMENTO
0	Dieta habitual
1	Dieta experimental 1 (DE 1) Una única especie
3	DE 1
7	DE 1
14	DE 1
21	DE 1
28	DE 1
35	DE 1
42	Cambio de dieta . Dieta experimental 2 (DE 2) Una única especie diferente de la anterior
43	DE 2
46	DE 2
50	DE 2
57	DE 2
63	DE 2
70	DE 2
77	DE 2
84	DE 2

Tabla 1. Diseño experimental para el cálculo de la tasa de renovación de piel y sangre.

reacción y tan pronto cómo se estabilice la señal isotópica en los tejidos se interrumpirá el experimento. Las dietas experimentales estarán conformadas por las especies habituales en la alimentación de los animales, la única modificación consistirá en la administración de una sola especie durante cada periodo experimental. Para decidir que dos especies de pescado conformaran las dietas experimentales 1 y 2 es necesario un estudio previo de las especies de peces que habitualmente se proporcionan a las orcas cómo parte de su dieta. Se seleccionaran las más adecuadas para el experimento de acuerdo a las necesidades nutricionales de los animales y a las diferencias en las señales isotópicas. De nuevo la situación ideal sería la administración de las dos dietas experimentales de forma consecutiva, pero sería posible separar los dos periodos experimentales por un periodo de dieta no experimental si las necesidades nutricionales de las orcas así lo exigiesen. En cualquier caso el experimento se interrumpiría en caso de observarse anomalías en el comportamiento o salud de las orcas.

Con este experimento se determinaría el tiempo transcurrido desde que las orcas empiezan a alimentarse de una presa hasta que la señal isotópica de sus tejidos se estabiliza y es indicadora de esa dieta específica y no de la dieta ingerida antes del inicio del experimento.

Cálculo de los factores de corrección por fraccionamiento isotópico en orcas en cautividad.

Mediante este experimento se determinarán los factores de corrección de fraccionamiento isotópico para las especies identificadas como presas probables de la población de *O. orca* en el Estrecho de Gibraltar. Para llevarlo a cabo, habrá que determinar de todas las posibles presas potenciales cuáles son las que a priori se asumen como importantes en la dieta de las orcas y de éstas, cuáles son susceptibles de ser utilizadas en el experimento. Esto se hará de manera simultánea a las campañas de muestreo del primer año.

Inicialmente se trabajará con 15 especies de peces presentes en el área y que pueden ser potenciales presas de las orcas de la zona. Las 15 especies de peces propuestas son; Atún rojo (*Thunnus thynnus*), Caballa (*Scomber scombrus*), Estornino (*Scomber japonicus*), Jurel (*Trachurus trachurus*), Chicharro (*Trachurus mediterraneus*), Sardina (*Sardina pilchardus*), Arenque (*Cuplea harengus*), Voraz (*Pagellus bogaraveo*), Palometa (*Trachinotus ovatus*), Bonito (*Sarda sarda*), Boquerón (*Engraulis encrasicolus*), Breca (*Pagellus erythrinus*), Cherna (*Polyprion americanus*), Merluza (*Merluccius merluccius*) y pez espada (*Xiphias gladius*). Si durante el desarrollo del estudio previo se identifica alguna otra especie que pudiese ser de interés se incluiría en el trabajo para comprobar su susceptibilidad a formar parte del ensayo. Se analizará el perfil isotópico de las 15 especies para comprobar si son susceptibles de ser consideradas en el experimento. Es posible que algunas especies no se distingan entre sí, en lo que a sus perfiles isotópicos se refiere, de modo que podrían agruparse en un solo grupo y formar parte de una misma dieta experimental (caso probable de los jureles y chicharros y de las caballas y estorninos). De las que resulten seleccionadas se comprobaran los siguientes aspectos; que cubran las necesidades nutricionales de las orcas en cautividad, que puedan ser suministradas de forma eficaz a Loro Parque para cubrir con garantías la alimentación de los animales durante el periodo experimental, y que dicho suministro sea razonable desde el punto de vista económico. De las especies susceptibles de ser utilizadas en el experimento se escogerá el mayor número posible, siempre de acuerdo con los responsables del cuidado de las orcas, y se iniciará el experimento. El experimento consistirá en la administración a las orcas de una dieta experimental compuesta por una única especie durante el tiempo necesario para detectar su señal en la piel y sangre del animal. (Ese periodo será el calculado previamente en el experimento de piscina anterior). Se tomara una muestra de sangre (de 1 cm^3) y una de piel (de 16 mm^2) al final del periodo experimental. El experimento se repetirá hasta que todas las especies de presas potenciales que se hayan seleccionado para esta fase experimental hayan sido probadas. La situación ideal sería

aquella en la que tras la administración de una dieta experimental se obtuvieran las muestras y se iniciara inmediatamente el periodo experimental siguiente. Pero si se considera preciso se pueden separar periodos de dietas experimentales por periodos de dieta habitual. Se tratará de realizar el experimento con el mayor número de animales posible, para que el índice obtenido integre la posible variabilidad individual.

Con los resultados del experimento se calcularán los factores de corrección por fraccionamiento isotópico que se aplicarán a los resultados de los trabajos con las orcas en el Estrecho de Gibraltar.

Estudio de la distribución espacial de la población de orcas presente en el Estrecho de Gibraltar a lo largo del año

El objeto principal de esta parte del trabajo es mejorar el conocimiento que se tiene actualmente sobre la distribución espacio-temporal de la población de orcas en el Estrecho de Gibraltar.

La zona prevista de estudio es el área que engloba la Bahía de Barbate, y aguas de Conil de la Frontera, hasta el Estrecho de Gibraltar. Este área de estudio es en donde se han realizado la mayor parte de los avistamientos de orcas por CIRCE, y por donde las orcas han sido señaladas, según los registros de avistamientos oportunistas de CIRCE.

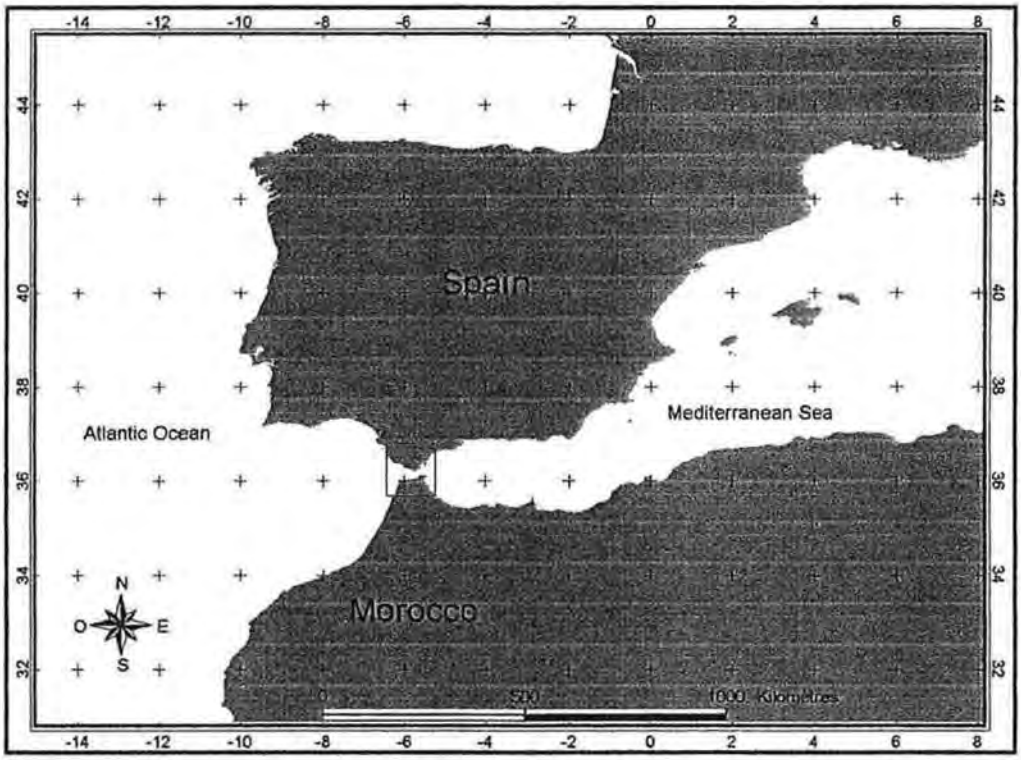
El estudio consistirá en 3 campañas de 15 días en la zona de estudio a lo largo del año, y durante tres años, siguiendo transectos aleatorios por la zona de estudio. Durante las campañas se realizarán observaciones desde una plataforma de observación visual, para obtener datos de distribución de la población de orcas presentes. La estrategia de muestreos a lo largo del proyecto se establecerá en función los resultados obtenidos en las campañas del primer año.

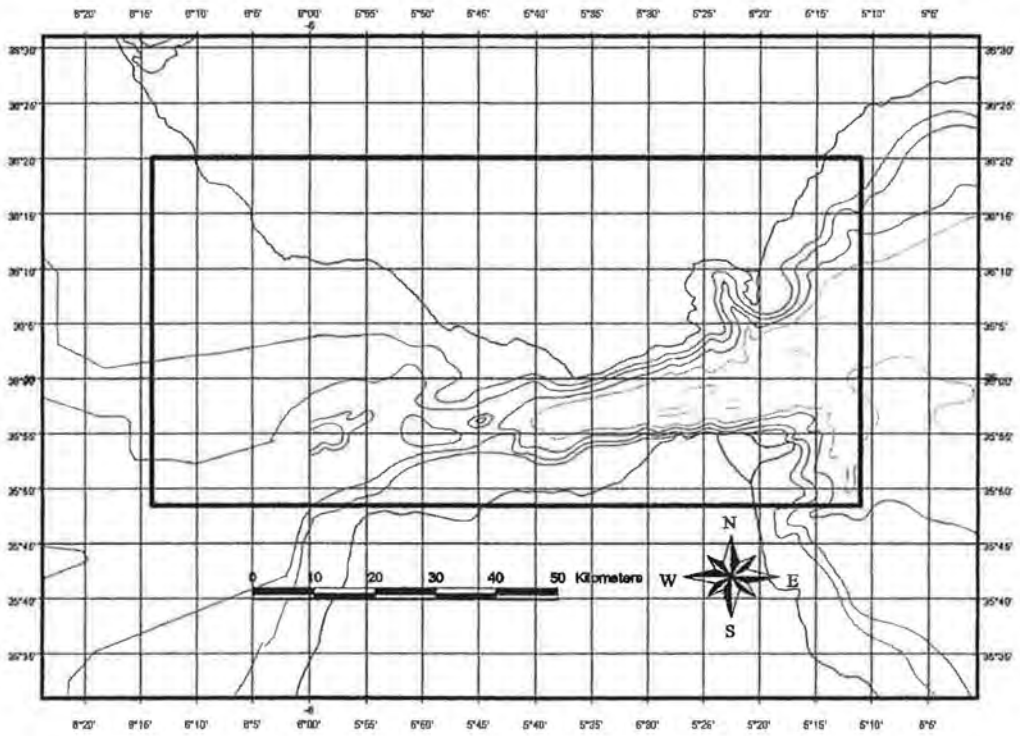
De forma complementaria, se construirán modelos de predicción de la distribución espacio-temporal de las orcas, en base a parámetros oceanográficos y geográficos. Para ello se utilizarán datos geográficos obtenidos en los avistamientos previstos en este proyecto, así como modelos oceanográficos previamente desarrollados por investigadores de la Universidad de Cádiz (Alonso del Rosario, *et al.* 2003; Bruno, *et al.* 2002; Echevarría, *et al.* 2002; Ruíz, *et al.* 2001; Reul 1998; Reul, *et al.* 2002; Rubín, *et al.* 1997)

Asimismo, los avistamientos realizados durante este proyecto, servirán para completar los catálogos de foto-identificación de CIRCE, lo que permitirá evaluar el grado de residencia de la especie observada. En la actualidad, CIRCE dispone de catálogos fotográficos que identifican a los diferentes individuos que pueden transitar o residir en la zona de estudio desde 1999. La colección total de fotografías asciende a unas 5.000 imágenes, que serán muy útiles a la hora de dilucidar si siempre se encuentran en la zona las mismas orcas, y evitará duplicar biopsias en los mismos individuos durante una misma campaña, o entre diferentes campañas.

Toma de muestras en la población de orcas del Estrecho de Gibraltar y sus presas potenciales

Durante las campañas de mar se procederá a la toma de muestras de las orcas avistadas en el área de estudio para determinar su perfil isotópico. Las muestras de las orcas se obtendrán mediante la realización de biopsias remotas. Con una ballesta armada con un dardo con una punta de biopsia se dispara a los animales situados a una distancia entre 6 y 15 metros. Se dispara a las orcas cuando salen a respirar y se apunta al costado justo bajo la aleta dorsal. La punta del dardo penetra en la hipodermis del animal aproximadamente un centímetro, y rápidamente se libera, reteniendo una pequeña muestra de piel y grasa que se utilizará para el análisis. El diámetro y longitud de la punta están calibrados para la obtención de muestras de orcas en verano cuando la capa de grasa subcutánea es mas fina, de modo que nunca se toca el tejido muscular minimizando los riesgos para el animal. Las puntas serán proporcionadas por Finn Larsen, y por Lance Barret Lennard proveedores habituales de puntas de





Situación de la Zona de Estudio prevista

biopsia para trabajos similares en Europa y Estados Unidos y con gran experiencia en la realización de biopsias a orcas. No se realizarán biopsias de animales juveniles ni de crías, ni de animales que estén constantemente acompañados por crías o juveniles.

Cada uno de los intentos de biopsia, se consiga muestra o no, va acompañado de una hoja de datos en la que se recogen datos relativos al intento y a la respuesta del animal al disparo.

Las muestras obtenidas de tal forma se conservan en hielo desde el momento de su obtención hasta el procesado preliminar, que consiste en la extracción de la muestra de la punta, separación de la piel y grasa y congelación hasta el procesado definitivo en el laboratorio. Este procesado preliminar de las muestras se realizará siempre en un periodo de tiempo inferior a 24 horas desde su obtención. Las puntas se limpian y esterilizan después de cada utilización y se mantienen estériles hasta el momento de usarlas en un nuevo disparo.

Durante las campañas de muestreo de piel y sangre de orcas, se obtendrán también muestras de las posibles presas de las orcas presentes en las aguas de la zona de estudio en ese momento.

Determinación del perfil isotópico de las muestras

Todas las muestras de piel, tanto las de orcas en libertad obtenidas por biopsia, cómo las de las orcas en cautividad, se mantienen congeladas a -20 ºC hasta el momento de su análisis, que se realizará en el Departamento de Ecología de la Universidad Autónoma de Madrid.

Las muestras aún congeladas se colocarán en placas de Petri de vidrio y se introducirán en la estufa a 60 º centígrados durante 48 horas para su secado. Una vez secas se pulverizan en un mortero de ágata y se guardan en tubo de plástico tipo eppendorf hasta el momento de la extracción de lípidos.

La presencia de gran cantidad de lípidos en las muestras a analizar hace que se falseen los resultados del análisis de isótopos de Carbono ($^{12}C/^{13}C$) (Sotiropoulos *et al.*, 2004; (Hobson *et al.*, 1997; Hobson *et al.*, 1996; Das, 2000 y Ponsard, 1999), de modo que es necesario extraerlos y eliminarlos de la muestra antes del análisis. Para ello se seguirá el protocolo propuesto por Morin en 2003 (Morin y Lesage, 2003). Se trata de una modificación del método de Folch para extraer lípidos. Una vez la muestra sea pulverizada, se toman 0,2 gr. de tejido y se colocan en un tubo de vidrio con 10 mililitros de cloroformo/metanol (2:1 v/v). Para asegurar la total disolución y facilitar el acceso del disolvente polar a los lípidos, cada muestra se agita en un agitador automático durante 10 minutos. Una vez agitada la muestra se mantiene durante una noche (al menos 12 horas) a 4 ºC. Tras este proceso, la muestra se centrifuga a 750 rpm durante 10 minutos y se elimina el sobrenadante. La extracción se repite dos veces más a temperatura ambiente y por periodos de una hora. Las muestras se dejan secar en un desecador durante una noche (al menos 12 horas). El residuo sólido, se disuelve en 10 ml de agua destilada, y se agita en un agitador automático durante 5 minutos, se centrifuga durante 10 minutos a 1.200 rpm y se elimina el sobrenadante. El proceso de aclarado con agua destilada se repite en dos ocasiones y el residuo sólido se deja secando en la estufa a 50 ºC durante una noche (al menos 12 horas). Una vez seca, la muestra se vuelve a pulverizar en el mortero de ágata y se envía al laboratorio de espectrometría de masas de relaciones isotópicas

Las muestras de pescado, tanto las que forman parte de la dieta habitual de las orcas en cautividad cómo las que serán testadas cómo especies susceptibles de formar parte del segundo experimento se someten a un tratamiento similar. En este caso se identifican los ejemplares hasta el nivel de especie. Se trabaja con el animal sin descongelar para evitar en la medida de lo posible toda actividad bacteriana que pudiese afectar a los resultados del análisis. Cada individuo se mide y se fotografía para posteriores comprobaciones en la identificación. Con una hoja de bisturí estéril, se cortan muestras

de músculo, sin piel, grasa o huesos, de al menos 2 centímetros de largo, un centímetro de alto y 0.5 centímetros de grosor. En los casos en los que el ejemplar muestreado presenta una talla mayor de 8 centímetros de longitud, se obtienen varias de esas piezas de músculo, de modo que una se conserva congelada a modo de reserva para poder obtener réplicas de los resultados en caso de ser necesario. Estás muestras de reserva se devuelven al congelador en el momento inmediatamente posterior al corte, y no se descongelan en todo el proceso. En peces grandes, de más de 20 centímetros, las muestras utilizadas en el análisis y las reservadas para réplicas son aproximadamente el doble del tamaño antes mencionado.

Las muestras de músculo destinadas al análisis se colocan en placas de Petri de vidrio y se introducen, aún congeladas, en la estufa a 60 ° centígrados para su secado. El proceso de secado tiene una duración media de 48 horas, aunque dependiendo de la especie (y por tanto de la cantidad de lípidos presente en la muestra), oscila entre 24 horas y 6 días. Una vez secas, el proceso es el mismo que el descrito para las muestras de piel de orcas, pulverizado, extracción de lípidos por el mismo procedimiento y análisis en el laboratorio de relaciones de masas isotópicas.

Las muestras de sangre recogidas de las orcas en cautividad se conservaran en un vial con 1,5 mililitros de etanol al 70% y se conservan a temperatura ambiente hasta el momento del análisis. Una vez en el laboratorio se congelan y aún congeladas se secan en la estufa, se pulverizan y se analizan en el laboratorio de masas de relaciones isotópicas. (Hobson *et al.*, 1997). En el caso de la sangre, la extracción de lípidos no es necesaria debido a la baja cantidad de estos compuestos en ella. (Forero *et al.*, 2002)

Una vez en el Laboratorio de espectrometría de relaciones de masa isotópicas se reduce la muestra a una mezcla de gases (CO_2, N_2, SO_2, SF_6 y H_2) que es analizada por el espectrómetro de masas. Se utiliza un espectrómetro de masas Micromass Cf-Isochrom de sector magnético que analiza las relaciones isotópicas $^{13}C/^{12}C$ y $^{15}N/^{14}N$ en CO_2 y N_2 de las muestras mediante un analizador elemental Carlo Erba 1108-CHNS de flujo continuo.

El espectrómetro de masas cuenta con 4 partes básicas: un sistema de entrada de muestra, una fuente de ión, un analizador que separa las partículas en función de su masa y un detector en el cuál los iones separados son recolectados y caracterizados.

En la fuente de iones se introduce el gas para ser ionizado mediante calor eléctrico a unos 1.800 °C. El gas ionizado es acelerado con ayuda de alto voltaje y centrado en dos rayos paralelos. En el campo magnético del analizador de masas los iones positivos son repelidos formando una curva acorde con su masa; el isótopo pesado forma una curva de mayor radio que el isótopo ligero. De forma que ambos se separan y se recogen en detectores de iones donde se cuentan las cargas y se suman a una señal eléctrica la cual, después de su amplificación, proporciona la abundancia isotópica. Una vez definidos los estándares, los amplificadores son calibrados de manera que la señal eléctrica sea proporcional a una razón isotópica dada. La precisión analítica alcanza alrededor de 0.1 y 0.2 $‰$ para C y N respectivamente.

Estimación de la dieta

La proporción con que cada presa contribuye a la dieta del depredador se calculará con los modelos isotópicos propuestos por Phillips en el año 2001. De forma resumida las ecuaciones del modelo son:

$$\gamma J_D = f_A \delta J_A + f_B \delta J_B + f_C \delta J_C$$
$$\gamma K_D = f_A \delta K_A + f_B \delta K_B + f_C \delta K_C$$
$$1 = f_A + f_B + f_C$$

Donde δJ y δK representan perfiles isotópicos para dos elementos (por ejemplo $\delta^{13}C$ y $\delta^{15}N$) y A, B y C representan tres fuentes/presas y D representa la mezcla/depredador.

f representa la contribución fraccional de cada uno de los recursos a la mezcla.

Las señales isotópicas de los tres recursos A, B y C deben ser, si es posible, corregidas con el factor de

fraccionamiento de cada especie en el depredador.

Este modelo simple asume que cada presa contribuye a los tejidos del depredador con la misma cantidad de C y N. En el caso de que los experimentos con dietas controladas muestren lo contrario, se utilizaría el sistema de ecuaciones propuesto por Phillips y Koch (2002), que permite considerar la concentración de carbono y nitrógeno de cada presa en el modelo.

De la misma manera, y dado que los dos modelos anteriores tan sólo consideran tres fuentes, es decir tres presas, en el caso de que durante el proyecto se determine que el número de presas es mayor que tres, se utilizará el modelo de Phillips y Gregg (2003). En este caso la solución del sistema de ecuaciones no es exacta, sino probabilística.

La tasa de renovación calculada en los experimentos con dietas controladas, servirá para establecer el tiempo durante el cual se ha consumido la dieta determinada mediante los modelos isotópicos.

El desarrollo de esta investigación tendrá una duración aproximada de tres años y estará estructurado en tres periodos anuales.

Anualmente se realizarán tres campañas de muestreo en el mar de 15 días de duración, y tras cada una de ellas se procesarán los datos de avistamientos obtenidos para determinar la distribución espacial y temporal de las poblaciones investigadas.

Los experimentos con dietas controladas se llevarán a cabo en las instalaciones de Loro Parque de manera continuada durante los tres años. Inicialmente no hay fechas previstas para la realización de cada uno de los experimentos, ya que estas se determinarán en función de la disponibilidad de los animales, y los condicionantes logísticos de las dietas experimentales a suministrar.

Al final de cada año se realizarán los informes y las publicaciones que resulten de los datos obtenidos.

4.2 Plan de Trabajo

Desglose del Plan de Trabajo

Actividad/Tarea	*Primer año*	*Segundo año*	*Tercer Año*
Campañas en el Mar			
Análisis resultados Mar			
Análisis isotópico			
Experimentos con dietas controladas			
Informes			

BENEFICIOS DEL PROYECTO, DIFUSIÓN Y EXPLOTACIÓN DE LOS RESULTADOS

5

5.1 BENEFICIOS

El cálculo de la tasa de renovación de la piel y sangre de las orcas supone un estudio pionero en el ámbito de la investigación con mamíferos marinos, y será de gran utilidad en la determinación del papel ecológico de las orcas.

Los resultados obtenidos mediante los muestreos llevados a cabo en las poblaciones silvestres incrementarán el conocimiento que se tiene hasta el momento de las poblaciones de orcas en aguas del Estrecho de Gibraltar, y permitirán el esclarecimiento del papel ecológico de esta población de orcas y, en consecuencia, la identificación de riesgos potenciales sobre su conservación.

Del mismo modo, el cálculo de los factores de corrección por fraccionamiento isotópico es un trabajo pionero en cetáceos, ya que hasta la fecha no hay ninguno descrito en la literatura científica especializada. El hecho mismo de poder realizar el experimento y comprobar el buen funcionamiento de la técnica y la aplicabilidad de la teoría a la práctica supone un importante paso en el desarrollo de nuevas herramientas y metodologías que permitan el mayor conocimiento de las poblaciones de orcas y por tanto su conservación. Los resultados específicos del trabajo serán de gran utilidad en la identificación de la dieta de las orcas presentes en el Estrecho de Gibraltar. La posibilidad de estimar la contribución relativa de cada presa a la dieta del depredador supone un importante instrumento científico que permite esclarecer la influencia del depredador en su red trófica y por tanto en su ecosistema.

En el caso concreto de las orcas del Estrecho de Gibraltar y dada la intensa interacción entre las orcas y las pesquerías profesionales de atún rojo de la zona, unida a la alarmante situación de las poblaciones de atún rojo; este proyecto aportaría información sin la cual sería difícil comprender el alcance real de la explotación pesquera en el ecosistema. De igual manera, la información obtenida sería de enorme utilidad a la hora de establecer medidas de gestión para la conservación de las poblaciones de interés.

Contribuciones esperables

La principal contribución esperable del proyecto es la determinación de la dieta de la población de *O. orca* del Estrecho de Gibraltar, así como la determinación de si su composición dietética varía a lo largo del año.

De manera adicional, el proyecto determinaría la tasa de renovación de la piel y sangre de las orcas. Este índice permitiría establecer el plazo de tiempo durante el cual el contenido isotópico de la dieta de las orcas permanece registrado en su piel y sangre. Este índice podría utilizarse en investigaciones dietéticas similares en otras poblaciones de orcas, independientemente de las presas que consuman.

Otra contribución del proyecto serían los factores de corrección de fraccionamiento isotópico para una serie de especies de peces presentes en la zona del Estrecho de Gibraltar. Los valores de estos factores de corrección, a pesar de ser específicos para la población estudiada, podrían utilizarse en estudios con poblaciones de orcas que consumieran el mismo tipo de presas, o servir como estimación

para especies similares o afines, en el caso de que no existieran estimaciones mejores o posibilidad de realizar nuevos experimentos.

Desde el punto de vista de la distribución de la población de orcas del Estrecho de Gibraltar, el proyecto aportaría información sobre el periodo del año durante el que los atunes rojos están ausentes de la zona.

Por último, se obtendrán perfiles isotópicos de diferentes peces, que potencialmente pueden ser presas de las orcas, que podrán ser de utilidad en estudios de relaciones tróficas del ecosistema.

Plan de difusión y explotación

A medida que se vayan terminando las diferentes fases experimentales previstas, se llevará a cabo la difusión de los resultados, que se hará tanto en el ámbito científico como en el social.

En el ámbito científico se prevé realizar diferentes publicaciones en revistas científicas internacionales con la mayor difusión e impacto posibles (dentro del Science Citation Index). Las publicaciones previstas serán las siguientes:

- Publicación de los resultados sobre tasa de renovación de piel en orcas en la revista en marine Mammal Science o revista de índice de impacto superior.
- Publicación de los resultados sobre Factor de corrección isotópica en orcas del Estrecho en la revista Marine Ecology Progress series
- Publicacióndelosconocimientosgenerales obtenidos sobre orcas silvestres a lo largo del Proyecto. Distribución espacial, temporal, abundancia y estructura social en Marine Mammal Science.
- Publicación de los resultados globales del proyecto. Dieta de las orcas en el Estrecho de Gibraltar en Marine Ecology Progress Series
- Interacciones entre pesquerías y las poblaciones de orcas en Conservation Biology.

Así mismo, se prevé presentar los resultados en dos congresos de la European Cetacean Society a lo largo del proyecto. Se estima que, al menos, se presentarán tres posters con los resultados obtenidos a lo largo del proyecto.

En el ámbito social, la difusión se llevará a cabo a través de la publicación de los resultados en los principales medios de comunicación hablados, escritos y audiovisuales, incluyendo la publicación en revistas divulgativas de difusión científica. A nivel interno, se preparará material educativo en colaboración con el Departamento de Educación de Loro Parque Fundación, consistente, al menos, en:

- Póster divulgativos de las orcas del Estrecho
- Póster divulgativo del proyecto
- Charla oral para niños del proyecto (Power point y texto)
- Charla oral para adultos del proyecto (Power point y texto)
- Charla oral para niños sobre las orcas del Estrecho de Gibraltar (Power point y texto)
- Charla oral para adultos sobre las orcas del Estrecho de Gibraltar (Power point y texto)
- Aplicaciones didácticas interactivas para el Aula de los Cetáceos de Loro Parque
- Audiovisual para utilizar en los talleres del Aula de los Cetáceos de Loro Parque.

5.2 Plan de Explotación

Los objetivos del proyecto son puramente científicos, no hay prevista ninguna aplicación comercial por parte de Loro Parque. Los usos públicos previstos del material obtenido de este proyecto tienen propósitos científicos y educativos; no se contemplan usos comerciales

Por todo ello no existe un plan de explotación de los resultados del proyecto.

EQUIPO DE TRABAJO

6.1 EQUIPO DE TRABAJO

El equipo de trabajo que llevará a cabo las investigaciones estará formado por personal de CIRCE, del Departamento de Ecología de la Universidad Autónoma de Madrid, de Loro Parque y de Loro Parque Fundación.

El personal del Departamento de Ecología de la Universidad Autónoma de Madrid estará formado por una investigadora con dedicación completa al proyecto. El personal de CIRCE dedicado al proyecto estará formado por un investigador con un 70% de dedicación al proyecto, así como por tres personas que asistirán a los investigadores principales y participarán en las campañas en el mar. El personal de Loro Parque Fundación dedicado al proyecto estará formado, al menos, por un coordinador de investigación, con una dedicación de cuatro horas semanales. Por último, Loro Parque aportará al proyecto la colaboración de los cuidadores de los animales, así como de personal del departamento veterinario para la extracción de muestras de tejido y sangre durante los experimentos.

El equipo estará formado por:

Supervisores:
Dr. Christophe Guinet (Centre d'Etudes Biologiques de Chizé)
Dr. Ángel Baltanás Gentil (Departamento de Ecología. Universidad Autónoma de Madrid)

Investigadores Principales:
Susana García Tiscar (Licenciada en Biología. Departamento de Ecología Universidad Autónoma de Madrid)
Renaud de Stephanis (Presidente de CIRCE y Licenciado en Ciencias del Mar)

Coordinador Científico:
Dr. Javier Almunia Portolés (Director Adjunto y responsable del Departamento Científico de Loro Parque Fundación).

Supervisor de Loro Parque en las campañas:
Joan Salichs Oliveras

Asistentes de Investigación:
Philippe Verborgh
Alicia Sánchez Cabanes
Sergi Pérez Jorge

6.2 Curricula de los Integrantes del Equipo

Supervisor

Christophe GUINET
Born 26/06/1963
Married, 3 children

Personal address : Mairé, 79 170 Périgné, France
Phone : 05 49 07 56 88

Professional Address :Centre d'Etudes Biologiques de Chizé, UPR 4701,
Centre National de la Recherche Scientifique,
79 360 Villiers en Bois, France
Phone : 05 49 09 78 39
Fax : 05 49 09 65 26
e-mail : guinet@cebc.cnrs.fr

Field studies and research:

1. August 1985-August 1986: Study of two sympatric forms of killer whales in the Johnstone Strait area, British Columbia, Canada. Under the supervision of Dr. M. Bigg, Nanaimo Biological Station. Part of a degree in agriculture and ecology.

2. March 1987-September 1987 : Diplome d'Etudes Approfondie (i.e. Master Degree). *Compared behavioral ecology of killer whale populations.* Research conducted at the Centre d'Etudes Biologiques de Chizé-Centre National de la Recherche Scientifique (CEBC-CNRS) under the supervision of Dr. P. Jouventin.

3. September 1987-January 1989 ; National Service conducted as a Biologist volunteer at Ile de la Possession, Crozet Archipelago (Terres Australes et Antarctiques Françaises).

   Scientific programs conducted under the supervision of Dr. P. Jouventin :
   Biodemography and breeding strategies of seabirds and marine mammals and behavioral ecology of killer whales of the Crozet Archipelago.

4. April 1989-October 1991 : Ph.D. (CEBC-CNRS) under the supervision of Dr. P. Jouventin with two field seasons at Possession Island.

   Behavioral ecology of killer whales of the Crozet Archipelago : a comparative approach.

   As part of this Ph.D. I was involved in the making of a documentary "*Wolves of the sea*"co-produced by National Geographic et Australian Broadcasting Corporation and realized by David Parer et Elizabeth Parer-Cook.

5. December 1991- February1993 : Researcher under contract at Océanopolis, Brest.

   Ecology of the bottlenosed dolphin (Tursiops truncatus) and gray seal (Halichoerus grypus) of the Iroise sea (Western Brittany).

6. March 1993-today: Researcher at the CEBC-C.N.R.S.
   1) Consequences of environmental variability on the breeding strategies of seabirds and marine mammals of the Southern Ocean.

   2) Maternal strategies of fur seals (*Arctocephalus sp.*) under contrasted environmental conditions.

   3) foraging ecology of elephant seals in relation to oceanographic conditions.

   4) at sea distribution of the Mediterranean fin whales in relation to observed and modeled oceanographic

conditions.

Publications:

1988

01 GUINET C. 1988 - Historique de la présence d'orques autour de l'île de la Possession, archipel Crozet : photoidentification 1964-1986. Mammalia 52: 132-135.

1990

02 GUINET C & JOUVENTIN P. 1990 - La vie sociale des "baleines tueuses". La Recherche 220: 508-510.

03 GUINET C. 1990 - Sympatrie de deux catégories d'orques dans le Détroit de Johnstone, Colombie Britannique. Rev. Ecol. (Terre Vie) 45: 26-34.

1991

04 GUINET C. 1991 - Growth from birth to weaning in the southern elephant seal Mirounga leonina. J. Mammal. 72: 617-620.

05 GUINET C. 1991 - L'Orque autour de l'archipel Crozet, comparaison avec d'autres localités. Rev. Ecol. (Terre Vie) 46: 321-337.

06 GUINET C. 1991 - Intentional stranding apprenticeship and social play in Killer Whales (Orcinus orca). Can. J. Zool. 69 2712-2716.

1992

07 GUINET C. 1992 - Croissance des éléphants de mer de l'Archipel Crozet (46°25'S, 51°45'E) pendant leur première année de vie. Mammalia 56(3): 459-468.

08 GUINET C. 1992 - Comportement de chasse des orques (Orcinus orca) dans l'archipel Crozet. Can. J. Zool. 70: 1656-1667.

09 GUINET C., JOUVENTIN P. & WEIMERSKIRCH H. 1992 - Population changes, movements of southern elephant Seals on Crozet and Kerguelen Archipelagos in the last decades. Polar Biol. 12: 349-356.

1993

10 FERRET M., COLLET A. & GUINET C. 1993 - Statut et comportement social du Grand Dauphin Trsiops truncatus Mont. 1821 dans le bassin d'Arcachon. Revue d'Écologie (La Terre et la Vie) 48: 257-278.

1994

11 GUINET C. 1994 - Poids à la naissance et croissance des éléphants de mer austraux : quelles informations nous apportent-ils sur le milieu marin ? Recueil de Médecine Vétérinaire 170: 105-110.

12 GUINET C., JOUVENTIN P. & GEORGES J.-Y. 1994 - Long term population changes of fur seals Arctocephalus gazella and A. tropicalis on subantarctic (Crozet) and subtropical (Saint Paul and Amsterdam) islands and their possible relationship to El Niño Southern Oscillation. Antarctic Science 6: 473-478.

1995

13 CHEREL Y., WEIMERSKIRCH H., GUINET C. & JOUVENTIN P. 1995 - Oiseaux de mer bio-indicateurs. Pour la Science 213: 14-15.

14 GUINET C. & BOUVIER J. 1995 - Development of intentional stranding hunting techniques in Killer whale (Orcinus orca) calves at Crozet Archipelago. Canadian Journal of Zoology 73: 27-33.

15 GUINET C., JOUVENTIN P. & MALACAMP J. 1995 - Satellite remote sensing in monitoring change of seabirds : a use of spot image in King penguin population increase at Ile aux Cochons, Crozet archipelago. Polar Biology 15: 511-515.

16 WEIMERSKIRCH H., WILSON R.P., GUINET C. & KOUDIL M. 1995 - The use of seabirds to monitor sea-surface temperature and validate satellite remote-sensing measures. Marine Ecology Progress Series 126: 299-303.

1996

17 GUINET C., CHEREL Y., RIDOUX V. & JOUVENTIN P. 1996 - Consumption of marine resources by seabirds and seals in Crozet and Kerguelen waters : changes in relation to consumer biomass 1962-1985. Antarctic Science 8: 23-30.

18 CHEREL Y., GUINET C. & TREMBLAY Y. 1996 - Fish prey of Antarctic fur seals Arctocephalus gazella at Ile de Croy, Kerguelen. Polar Biology. 17: 87-90.

1997

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23 GEORGES J.-Y., GUINET C., JOUVENTIN P. & WEIMERSKIRCH H. 1997 - Satellite tracking of seabirds : interpretation of activity pattern from the frequency of satellite locations. Ibis. 139: 403-405.

24 RIDOUX V., GUINET C., LIRET C., CRETON P., STEENSTRUP I., BEAUPLET G. 1997 - A video sonar as a new tool to study marine mammals in the wild: measurement of dolphin swimming speed. Marine Mammal Science. 13: 196-206.

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En revision:

STEPHANIS (DE), GIMENO-PEREZ, N., SALAZAR SIERRA, J.M., FERNANDEZ CASADO, M. GUINET, C., Summer spatial distribution of cetaceans in the Strait of Gibraltar in relation to the oceanographic context. Marine Ecology Progress Series.

DUBROCA, L.; GUINET, C. ; ANDRÉ, J.-M. ; DAVID, L.; BEAUBRUN, P. ; Inter-annual variation in fin whale (Balaenoptera physalus) abundance in relation to oceanographic condition in the North-western Mediterranean Sea. Progress in Oceanography.

DUBROCA, L., GUINET, C., MONESTIEZ, P., ANDRE, J.-M., DURBEC, J.-P., Scale dependant correlation between the occurrence of fin whales (Balenoptera physalus) sightings and oceanographic parameters in the Mediterranean Sea: a geostatistical approach.

MONESTIEZ, P., DUBROCA-L., BONIN E., DURBEC, J-P. GUINET, C. Geostatisitical modelling of spatial.distribution of balaenoptera physalus in the Northwestern Mediterranean Sea from sparce count data and heterogeneous observation effort. Ecological Modelling.

DUBROCA, L., GUINET C., BEAUPLET, G., ARNOULD, J., LUQUE S. Exhaustive pinnipeds activity from a simple pressure recorder: method and validation. Marine Mamm. Sci.

PASTOUT, L, GUINET, C., GARCIA MEUNIER, P., Using PCR to sex fetal resorptions in *Myocastor coypus* L.

BEAUPLET, G., BARBRAUD, C., CHAMBELLANT .M., GUINET, C. Long term evaluation of postweaning and juvenile survival rates in subantarctic fur seals, *Arctocephalus tropicalis*, at Amsterdam Island. Journal of Animal Ecology.

MATE, B., GUINET, C.; BENTALEB, I., ANDRÉ, J. M., Evidences of Mediterranean in Whale Movements into the North Atlantic. Science.

RUCHONET, D., MAYZAUD, P., BOUTOUTE M., GUINET, C. Fatty acid composition of Mediterranean fin whale (Balaenoptera physalus) blubber with repect to body heterogeneity and trophic interaction. Mar. Ecol. Prog. Ser.

Bailleul, F., Luque; S. Dubroca L., Arnould, J. Guinet, C. How Mar. Ecol. Prog Ser.

Mary-Anne Lea [1,2*], Christophe Guinet[2], Yves Cherel[2], Guy Duhamel[3], Laurent Dubroca[2], Patrice Pruvost[3], Mark Hindell[1] Resource acquisition and pup provisioning of a Southern Ocean predator in response to oceanographic variability.

Supervisor

Ángel BALTANÁS GENTIL
D.N.I.: *51.362.643-D*
Fecha de nacimiento: *13/02/1961*
Sexo: *Varón*

Situación profesional actual

Organismo: Universidad Autónoma de Madrid
Facultad, Escuela o Instituto: Facultad de Ciencias
Depto./Secc./Unidad estr.: Departamento de Ecología
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Formación Académica

Titulación Superior	Centro	Fecha
Licenciado en CC. Biológicas	Universidad Autónoma de Madrid	Junio-1984
Licenciado con Grado	Universidad Autónoma de Madrid	Diciembre-1995

Doctorado	Centro	Fecha
Doctor en CC. Biológicas	Universidad Autónoma de Madrid	Abril-1990

Actividades anteriores de carácter científico profesional

Puesto	Institución	Fechas
Becario Predoctoral (P.F.P.I.)	Museo Nal. CC. Naturales (CSIC)	1985-1988
Becario Predoctoral (Ad Honorem)	Museo Nal. CC. Naturales (CSIC)	1989-1990
Becario Postdoctoral CSIC	Centro de Investigaciones del Agua (CSIC)	1991-1992
Becario Postdoctoral en el Extranjero	Institut für Limnologie (ÖAW)	1993 (Enero-Mayo)
Profesor Asociado	Universidad Autónoma de Madrid	1993-1998
Profesor Titular Interino	Universidad Autónoma de Madrid	1998-2001

Idiomas (R = regular, B = bien, C = correctamente)

Idioma	Habla	Lee	Escribe
Inglés	C	C	C

Participación en Proyectos de I+D financiados en Convocatorias públicas.
(nacionales y/o internacionales)

TITULO DEL PROYECTO: **Evaluación de Funciones Biogeoquímicas y Ecológicas de Humedales de la Comarca de Doñana**
ENTIDAD FINANCIADORA: CICYT, proyecto HID97-0321-C02-01.
DURACION DESDE: 1997 *HASTA*: 2000.
INVESTIGADOR PRINCIPAL: Prof. Dr. Carlos Montes del Olmo, Catedrático de Universidad. Departamento de

Ecología. UAM.

TITULO DEL PROYECTO: **Especiación y adaptación en crustáceos continentales: aplicación de análisis morfométricos a los ostrácodos**
ENTIDAD FINANCIADORA: Programa de Acciones Integradas (HU97-9)
DURACION DESDE: 1998 *HASTA*: 1999
INVESTIGADOR PRINCIPAL: Prof Dr Carlos Montes del Olmo (UAM).

TITULO DEL PROYECTO: **Ubiquitous dispersal of free-living microbial species: testing the hypothesis in freshwater and marine environments**
ENTIDAD FINANCIADORA: Natural Environment Research Council (Reino Unido) NER/T/S/2000/01351
DURACION DESDE: Junio-2001 *HASTA*: Mayo- 2004
INVESTIGADOR PRINCIPAL: Dr B.J. Finlay (CEH, Windermere) y Dr T. Cavalier-Smith (Oxford University)

TITULO DEL PROYECTO: **Disparidad Morfológica y Plasticidad Fenotípica en Linajes Sexuales y Asexuales de Ostrácodos no-marinos (Crustacea, Ostracoda)**
ENTIDAD FINANCIADORA: Ministerio de Ciencia y Tecnología (BOS2001-0237)
DURACION DESDE: 2002 *HASTA*: 2004
INVESTIGADOR PRINCIPAL: Dr Angel Baltanás Gentil (UAM).

Publicaciones o Documentos Científico-Técnicos

(CLAVE: L = libro completo, CL = capítulo de libro, A = artículo, R = "review", E = editor,
S = Documento Científico-Técnico restringido.)

Otero, M.; Rossi, V.; Baltanás, A. & Menozzi, P. 1998
Effect of genotype and environment on diapause strategies in Eucypris virens (Jurine, 1820) (Crustacea: Ostracoda)
Archiv für Hydrobiologie (Adv. Limnol.), 52: 229-236.
CLAVE: A

Gutiérrez-Yurrita, P.J., Sancho, G., Bravo-Utrera, M.A., Baltanás, A. & Montes, C. 1998
Diet of the red swamp crayfish Procambarus clarkii in natural ecosystems of the Doñana National Park temporary fresh-water marsh (Spain
Journal of Crustacean Biology, 18(1): 120-127.
CLAVE: A

Baltanás, A.; Alcorlo, P. & Danielopol, D.L. 2002
Morphological disparity in populations with and without sexual reproduction: a case study in *Eucypris virens* (Crustacea, Ostracoda)
Biological Journal of the Linnean Society 75: 9-19
CLAVE: A

Danielopol, D.L.; Rouch, R. & Baltanás, A. 2002
Taxonomic diversity of groundwater harpacticoida (Copepoda, Crustacea) in Southern France
Vie et Milieu 52 (1): 1-15
CLAVE: A

Álvarez-Cobelas, M; Baltanás, A.; Velasco, J.L. & Rojo, C. (2002)
Daily variations in the optical properties of a small lake
Freshwater Biology 47: 1051-1063
CLAVE: A

Participación en contratos de I+D de especial relevancia con Empresas y/o Administraciones (nacionales y/o internacionales)

TITULO DEL PROYECTO: **Ecological bases for the sustainable management of flooded tropical ecosystems: Case studies in the Llanos (Venezuela) and the Pantanal (Brazil).**
ENTIDAD FINANCIADORA: Proyecto INCO (Unión Europea).
DURACION DESDE: 1997 *HASTA*: 1999.
INVESTIGADOR PRINCIPAL: Prof Dr Francisco Díaz Pineda (UCM)

TITULO DEL PROYECTO: **Caracterización y seguimiento de los niveles de contaminación por metales pesados en el Cangrejo Rojo Americano (*Procambarus clarkii*)**
ENTIDAD FINANCIADORA: Junta de Andalucía- proyecto perteneciente al Convenio 3 'Seguimiento de seres vivos en área afectada por el vertido de las minas de Aznalcóllar' dentro del Programa de Investigación del Corredor Verde del Guadiamar (Junta de Andalucía).
DURACION DESDE: 1999 *HASTA*: 2001.
INVESTIGADOR PRINCIPAL: Dr Angel Baltanás (UAM).

PRECIO TOTAL DEL PROYECTO: **15.000.000**

TITULO DEL PROYECTO: **Estudio y caracterización de las poblaciones de cangrejo rojo americano (*Procambarus clarkii*) en el río Guadiamar**

ENTIDAD FINANCIADORA: Junta de Andalucía- Convenio del Segundo Programa de Investigación del Corredor Verde del Guadiamar (Junta de Andalucía).

DURACION DESDE: 2002 *HASTA*: 2003

INVESTIGADOR PRINCIPAL: Dr Dr Angel Baltanás Gentil (UAM)

PRECIO TOTAL DEL PROYECTO: **10.000.000**

Contribuciones a Congresos

Autores:. ALCORLO, P. & BALTANÁS, A.

Título: **Community structure and size spectra in two shallow saline lakes in Los Monegros (NE SPAIN)**

Tipo de participación: Póster

Congreso: *VII International Salt Lake Conference*

Lugar celebración: Death Valley (EE.UU.) Fecha: 1999

Autores:. DIAZ Y.; OTERO, M., MARTINEZ, J.M., BALTANÁS, A. & MONTES, C.

Título: **Distribución y abundancia de las poblaciones de cangrejo rojo (*Procambarus clarkii*) en el Bajo Guadalquivir**

Tipo de participación: Póster

Congreso: *X Congreso de la AEL y II Ibérico de Limnología*

Lugar celebración: Valencia Fecha: 2000

Autores:. ALCORLO, P.; RODRIGUEZ, H. & BALTANÁS, A.

Título: **Descripción de la red trófica de la laguna Dulce (manto eólico-litoral del P.N. Doñana) mediante el uso de las proporciones naturales de isótopos de carbono y nitrógeno (C^{13}/C^{12} y N^{15}/N^{14})**

Tipo de participación: Póster

Congreso: *X Congreso de la AEL y II Ibérico de Limnología*

Lugar celebración: Valencia Fecha: 2000

Tesis Doctorales dirigidas

Título: **Redes Tróficas en Lagunas Salinas Temporales de la comarca de Los Monegros (Zaragoza).**

Doctorando: Paloma Alcorlo Pagés

Universidad: Autónoma de Madrid

Facultad / Escuela:Ciencias

Fecha: Julio de 1999

Investigadores principales

Nombre: Renaud de Stephanis
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Nacido en: Bélgica el 21/06/1975
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Formación Académica

Actualmente:	Escribiendo la **Tesis Doctoral,** "Estrategias de alimentación en función del tiempo de los diferentes grupos de calderones común (*Globicephala melas*) en el Estrecho de Gibraltar." Universidad de Cádiz y CNRS-CEBC. (Finaliza diciembre 2005).
2002-2004:	**Diploma de Estudios Avanzados,** a través del programa de doctorado "Recursos Naturales y Medio Ambiente", Universidad de Cádiz.
2001-2002:	**Beca de Formación: Marie Curie Training Site de la Comisión Europea** "Biodiversity and environmental change, an evolutionary ecology approach" en el Centro Nacional de Investigaciones Científicas Francés, CNRS-CEBC de Chizé.
1998-2001:	**Alumno colaborador** en el Laboratorio de Ingeniería Acústica de la Universidad de Cádiz.
1999-2000:	**Master en Evaluación de Impacto Ambiental,** Instituto de Investigaciones Ecológicas, Málaga.
1994-2000:	**Licenciado en Ciencias del Mar**, Universidad de Cádiz.
1996-1997:	**Instructor de Buceo Open Water Diver y Primeros Auxilios** de PADI.

Experiencia Profesional

2005-2008 CIRCE: *Coordinador* Estudio de los impactos producidos por el implante de una planta de eólicas marinas en las poblaciones de mamíferos marinos y tortugas marinas en el Golfo de Cádiz

Junio 2001-Actualmente CIRCE: *Presidente y coordinador* del grupo de investigación CIRCE (Conservación, Información y Estudio sobre Cetáceos, www.circe-asso.org). Coordinación de los proyectos de investigación del grupo relacionados con estrategias de alimentación, distribución en tres dimensiones, comportamiento acústico y abundancia de las especies calderón común, delfín mular, cachalote y orcas en el Estrecho de Gibraltar, así como coordinador de los proyectos de educación ambiental del grupo.

Noviembre 2004-Julio 2006 SEC: *Coordinador* de los catálogos de foto-identificación, y aplicación de modelos de captura y recaptura (aspectos demográficos) de delfín mular (*Tursiops truncatus*) en el Golfo de Cádiz y Estrecho de Gibraltar en el proyecto europeo LIFE02NAT/E/8610 "Conservación de Cetáceos y tortugas de Murcia y Andalucía" proyecto cofinanciado por la Unión Europea, los Ministerios de Medio Ambiente, y de Agricultura y Pesca, las Juntas de Andalucía y Murcia, la Universidad de Cádiz y la Sociedad Española de Cetáceos (SEC), y coordinado por la SEC. (Presupuesto 3 500 000 Euro).

Julio 2002-Julio 2006 SEC: *Coordinador* de las campañas de investigación del proyecto europeo LIFE02NAT/E/8610 en el sector del Golfo de Cádiz y Estrecho de Gibraltar.

Julio 2002-Noviembre 2004 Laboratorio de Ingeniería Acústica de la Universidad de Cádiz: *Coordinador* en Andalucía y Murcia de la acción relacionada con la contaminación acústica, incluidos en el proyecto europeo LIFE02NAT/E/8610.

Octubre 2001-Octubre 2004 CIRCE: *Coordinador* de la acción concertada europea EVR1-2001-00015 "Europhlukes: Iniating a European Network to Develop a European Cetacean Photo-id System and Database"

en el grupo CIRCE.

Enero 2004-Marzo 2004 CNRS-CEBC: *Asesor Científico* abordo del buque Céltic en un estudio sobre interacciones entre orcas, cachalotes y pesquerías de bacalao negro en aguas de los Territorio Antárticos Franceses.

Febrero 2003-Marzo 2003 Laboratorio de Ingeniería Acústica de la Universidad de Cádiz: *Asesor Científico* abordo del buque Hidrográfico Malaspina durante la campaña Zifio I, desarrollada por la Armada Española en aguas del Archipiélago Canario, a raíz del varamiento masivo de zifios en aguas del Archipiélago en septiembre 2002, proyecto financiado por la Armada Española.

Septiembre 2001 y Marzo 2002 Proyecto Cultural Alnitak-Universidad Autónoma de Madrid: *Coordinador* de dos campañas de investigación en el área comprendida entre Portugal-Gibraltar, para el proyecto Nacional: "Proyecto Mediterráneo: Identificación de áreas marinas de especial interés para la Unión Europea", coordinado por la Universidad de Valencia y financiado por el Ministerio de Medio Ambiente. (Presupuesto 500 000 Euro)

Noviembre 2000- Noviembre 2001 Biosfera XXI S.L.: *Coordinador* del proyecto "Consultoría y asistencia técnica relativa al estudio de las poblaciones de cetáceos y tortugas marinas de las aguas adyacentes a la Ciudad Autónoma de Ceuta", financiado por la Ciudad Autónoma de Ceuta.

Octubre 2000-Noviembre 2000 SEC: *Coordinador* del proyecto "Informe sobre el impacto de las actividades de los fast ferries en las poblaciones de cetáceos en España", proyecto financiado por el Ministerio de Medio Ambiente. (Presupuesto 6 000 Euro).

Junio 1998 Octubre 2000 Operation Cétacés/Fundación Firmm: *Asistente de Investigación*, a bordo de las embarcaciones de avistamiento de cetáceos de tipo comercial en el Estrecho de Gibraltar y del grupo de invetigación Opération Cétacés en aguas de Nueva Caledonia (Pacifico Sur).

Junio 1996-Julio 2000 Varios/Autónomo: *Guía e Instructor de Buceo* en la costa de Almería y Cádiz.

Asesoramientos Científicos, Proyectos de Educación ambiental, Cursos Impartidos, Publicaciones

Asesoramientos Científicos en documentales de las productoras Saint Thomas Production en Crozet (Tierras Antárticas Francesas), BBC Natural History Unit, TG Films, Thalassa Francia, Thalassa España, Antena 3, Canal Sur, Gedeon, y radios y televisiones locales en el Estrecho de Gibraltar.

Coordinación de Proyectos de educación ambiental en la empresa Turmares S.L. (2002), con charlas dadas a 10000 personas, así como con el Ayuntamiento de Algeciras (2003-2005), con charlas dadas a unos 3 000 alumnos.

Cursos y congresos Asistidos: Asistencia a 8 congresos anuales de la Sociedad Europea de Cetáceos (ECS) y 4 de la Sociedad Española de Cetáceos (SEC), así como a 12 Talleres (Workshops) organizados por estas dos sociedades, y 14 cursos y symposiums organizados por organizaciones como Universidades de Cádiz y Huelva, CNRS-CEBC, NOAA... y que versan sobre Gestión de espacios marinos, gestión de especies en peligro de extinción, gestión de recursos marinos así como metodologías de estudio (Acústicas, transectos lineales, modelos de captura recaptura, telemetría...).

Cursos o ponencias en cursos impartidos en 4 symposiums de la Sociedad Española de Cetáceos, 12 Talleres de la Sociedad Europea de Cetáceos, del Gobierno Canario, Colegio Oficial de Biólogos, Universidad de Cádiz...

Publicaciones Científicas en dos revistas de impacto, 23 posters de investigación presentados en los congresos de la Sociedad Europea de Cetáceos y 12 en los de la Sociedad Española de Cetáceos , 8 Ponencias orales en Congresos tanto nacionales como internacionales.

Publicaciones de artículos de vulgarización científica y de fotografías en revistas, periódicos y páginas webs.

Idiomas

Idioma	Nivel
Español y Francés	Lenguas maternas, nacionalidad francesa y residente en España desde 1976
Inglés	Hablado, leído y escrito, nivel alto.

Conocimiento de Informática

Conocimientos	Nivel
Formateado de ordenadores, instalación y reparación de sistemas operativos y de programas	Alto
Creación y gestión de bases de datos relacionadas, Organización de redes informáticas	Alto
Programas Específicos	
Microsoft Office Xp, 2000, 97, Openoffice.org	Alto
Sistemas de Información Geográficos GIS: Surfer 8.0, Arc view 3.2, Logger 2000	Alto
Microsoft Explorer, Outlook Express, Messenger, Spy Sweeper, Sygate Personal Firewall	Alto
Raven, Spectral Lab, Cool Edit Pro 2.1, Corel Draw 11.0, ACD see 7.0, End note 6.0	Alto
Derive for Windows, SPSS, Statistica, R, Programación en Turbopascal y Visual Basic	Medio

Información de Interés

Permiso de Conducir A1, A2 ,B1 con coche propio desde 1993.
Patrón de Embarcación de Recreo-Conocimientos náuticos: Capitán de la Embarcación de Investigación ELSA, desde 2000, y durante 41 campañas de investigación (más de 350 días de embarque como capitán y coordinador de campaña). Más de 200 días de embarque en otras embarcaciones (Buque Hidrográfico Malaspina, Buque de Investigaciones Celtic, Inco Explorer, Toftewaag...).
Jugador de Rugby desde 1982 en los equipos Liceo Francés, Club de Rugby Atlético Portuense y Carboneras Rugby Club. Selección española sub-22 en 1996 y 1997. Entrenador de categorías Infantiles y Cadetes.

Apellidos: García Tiscar.
Nombre: Susana.
Fecha de nacimiento: 29- Junio- 1975.
Lugar de nacimiento: Madrid
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Domicilio: C\ Rioja Nº 114 10º B. C.P. 28915. Leganés. Madrid.
Teléfono: 91 497 2808. 630 84 99 15. (Móvil).
E-mail : susana.tiscar@uam.es
stenella50@hotmail.com

FORMACIÓN ACADÉMICA.

2000. Licenciado en Ciencias Biológicas, especialidad de Biología ambiental, por la Universidad Autónoma de Madrid.

2001. Consecución de los 20 créditos teóricos correspondientes a la primera parte del tercer ciclo en el programa de Ecología de la Universidad Autónoma de Madrid.

2002. Consecución de los 12 créditos prácticos correspondientes a la segunda parte del tercer ciclo en el programa de doctorado de Ecología de la Universidad Autónoma de Madrid.

2003. Licenciada con diploma en estudios avanzados.

2003- 2005. Beca predoctoral de la Fundación de la Universidad Autónoma de Madrid asociada al proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía" Bajo la tutela de Dr. Ángel Baltanás Gentil (depto. de Ecología de la Universidad Autónoma de Madrid)

CURSOS Y SEMINARIOS.

1994. Orcas del mundo. Modelo de estudio de cetáceos. Organizado por el Instituto para la Investigación Científica y Conservación de los Mamíferos Marinos: Balaena. Impartido por D. Miguel A. Iñiguez (Fundación Cetus).

1995. Curso de Educación Ambiental en la Universidad Autónoma de Madrid (U.A.M). Impartido por D. Javier Benayas del Álamo. (Profesor del departamento de Ecología de la U.A.M.)

1995. Curso de iniciación a la biología marina. Organizado por la Asociación Científica de Estudios Marinos de Santander. Dirigido por D. Gerardo García Castrillo.

1995. Curso de buceo deportivo. Organizado por la Sección de Actividades Subacuáticas de la Universidad Autónoma de Madrid. Título F.E.D.A.S. Buceador una estrella.

1998. Jornadas de medicina veterinaria en animales de zoo. Organizadas por la facultad de veterinaria de la Universidad Complutense de Madrid, conjuntamente con el Colegio Oficial de Veterinarios de Madrid y el Zoo-Aquarium de Madrid.

1998. Delfines fluviales. Organizado por el Instituto para la Investigación Científica y Conservación de los Mamíferos Marinos: Balaena. Impartido por D. Fernando Trujillo (Fundación Omacha).

1998. Seminario de biología y ecología marina. Organizado por el Grup de Recerca i Estudi de Cetacis (G.R.E.C) en colaboración con la Unidad de Biología Animal del Departamento de Ciencias Ambientales de la Universidad de Girona. Impartido por D. Ramón Margalef.

1998. Second European Seminar on Marine Mammals: Biology and Conservation. Organizado por la Universidad Internacional Menéndez Pelayo. Dirigido por D. Juan Antonio Raga y D. Peter Evans.

1998. Curso de fotografía de naturaleza. Organizado por el Ayuntamiento de Leganés, e impartido

por Mario Cruz Leo, biólogo y fotógrafo de naturaleza.

2000. Jornadas de debate sobre el vertido minero de Aznalcollar y el proyecto del corredor verde del Guadiamar. Organizado por la Universidad Autónoma de Madrid, Fundación Fernando González Bernáldez, y la Consejería de Medio Ambiente de la Junta de Andalucía.

2000. Third European Seminar on Marine Mammals: Biology and Conservation. Organizado por la Universidad Internacional Menéndez Pelayo. Dirigido por D. Juan Antonio Raga y D. Peter Evans.

2000. Asistencia a las II Jornadas de Avafes-Madrid sobre la conservación de Fauna Ibérica y de las Islas Canarias. Facultad de Veterinaria, Universidad Complutense de Madrid (Noviembre) .

2001. Curso de biología y medicina veterinaria de mamíferos marinos. Universidad de Santiago de Compostela. Dirigido por D. Josep M. Alonso Farre y D. Alfredo López.

2001. Estadística aplicada a las ciencias ambientales. Impartido por Dr. Luis Maria Carrascal de la Puente. Museo Nacional de Ciencias Naturales. Consejo Superior de Investigaciones Científicas (M.N.C.N-C.S.I.C).

EXPERIENCIA EN INVESTIGACIÓN.

1999- 2005. Investigador en el proyecto de Earthwatch Institute: "Spanish dolphins" Investigador principal; Ana Cañadas. Alnitak; Marine Enviroment Research and Education Center.

2000- 2002. Investigador en el "Programa para la Identificación dé Áreas de Especial Interés para los Cetáceos del Mediterráneo Español" Puesto en marcha por la Dirección General para la Conservación de la Naturaleza, del Ministerio de Medio Ambiente.

2002. Investigador en calidad de "Foreign trainee", en la Campaña de biopsias de delfín mular en la costa Este de Estados Unidos organizada por el Nacional Oceanographic and Atmospheric Administration (NOAA) del gobierno de los Estado Unidos y dirigida por la Dra Aleta Hohn.

2003- 2005. Investigador, responsable de la Acción D10A1 (Competición por recursos tróficos entre cetáceos y pesquerías en Andalucía y Murcia) proyecto financiado por la Dirección General de Conservación de la Naturaleza del Ministerio de Medio Ambiente dentro del marco del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía"

OTRA EXPERIENCIA PRÁCTICA.

1994. Trabajo en calidad de voluntario en el vivero de flora autóctona "El Encin", gestionado por Adena-WWF.

1995. Trabajo en calidad de prácticas en la sección de aves y mamíferos marinos del Zoo-Aquarium de la Casa de Campo de Madrid.

1996-1998. Asistente de entrenador en la sección de mamíferos y aves marinas del Zoo-Aquarium de la Casa de Campo de Madrid.

1998. Colaboración en calidad de prácticas en el Centro de Recuperación de Especies Marinas Amenazadas (C.R.E.M.A.) de Andalucía.

2002-2004. Colaborador en el proyecto europeo "Europhlukes" de catalogación y reconocimiento individual de cetáceos en aguas europeas.

PARTICIPACIÓN EN GRUPOS CIENTÍFICOS.

1998-2003 Socio de la Sociedad de Cetólogos andaluces - ESPARTE.

1998-2001 Socio fundador y miembro de la junta directiva de la Asociación para el Estudio, Protección, y Conservación de los Vertebrados Marinos. ALBORÁN. Universidad Autónoma de Madrid.

1999-2005 Socio de la European Cetacean Society - ECS.

1999-2005 Socio de la Sociedad Española de Cetáceos - SEC.

2003-2005 Socio de la Society for Marine Mammalogy. SMM

CONGRESOS Y REUNIONES CIENTÍFICAS.

Asistencia al XIII congreso anual de la European Cetacean Society. Valencia, España. 5-8 Abril, de 1999.

Asistencia a la reunión de la Sociedad Española de Cetáceos para el desarrollo del proyecto "Recopilación, Análisis, Valoración y Elaboración de Protocolos sobre las labores de Observación, Asistencia a Varamientos y Recuperación de Mamíferos y Tortugas Marinas de las Aguas Españolas". Valsain. Segovia. Octubre. 1999.

Asistencia al Primer Simposium de la Sociedad Española de Cetáceos. "Hacia la conservación de los mamíferos y tortugas marinas en España." Ceuta. 22-27 Febrero de 2000.

Organización y coordinación del I Ciclo de Conferencias de Biología Marina en la Universidad Autónoma de Madrid. Marzo. 2000.

Asistencia al XIV congreso anual de la European Cetacean Society. Cork, Ireland. 2-5 Abril, de 2000.

Organización y coordinación del II Ciclo de Conferencias de Biología Marina en la Universidad Autónoma de Madrid. Noviembre. 2000.

Asistencia al XV congreso anual de la European Cetacean Society. Roma, Italia. 6-10 Mayo, de 2001.

Asistencia al Segundo Simposium de la Sociedad Española de Cetáceos. Valsaín. 2-4 Noviembre de 2001.

Asistencia al XVI congreso anual de la European Cetacean Society. Liege, Bélgica. 6-10 Abril, de 2002.

Asistencia al Tercer Simposium de la Sociedad Española de Cetáceos. Almería. 24-27 Octubre de 2002.

Asistencia al XVII congreso anual de la European Cetacean Society. Gran Canaria. España. 9-13 Marzo, de 2003

Asistencia al Tercer Simposium de la Sociedad Española de Cetáceos. Almería. 11-14 Diciembre de 2003.

Asistencia al XVI congreso anual de la Society for Marine Mammalogy (SMM) Greensbor, North Carolina, EE.UU. 13-19 Diciembre de 2003

Asistencia al XIX congreso anual de la European Cetacean Society. La Rochelle.Francia. 9-13 Abril, de 2005

Asistencia al Cuarto Simposium de la Sociedad Española de Cetáceos. Málaga. 8-12 Diciembre de 2004.

PRESENTACIONES ORALES EN CURSOS Y JORNADAS.

"Metodología para el estudio de delfines mulares pelágicos" En el "II Curso de bioloxía e medeciña veterinaria de mamíferos mariños" Organizadas por CEMMA y la Universidad de Santiago de Compostela. 17-19 de Mayo de 2002.

"Metodología para la investigación de cetáceos en el mar". En las "I Jornadas sobre investigación y conservación de cetáceos y tortugas marinas" de Ecologistas en Acción- Almería, y III Symposium de la Sociedad Española de Cetáceos (SEC). Universidad de Almería, 24-27 de Octubre de 2002.

"El uso de isótopos estables en cetología". En el "III Curso de bioloxía e medeciña veterinaria de mamíferos mariños" Organizadas por CEMMA y la Universidad de Santiago de Compostela. 17-19 de Mayo de 2002.

"Estrategias de conservación de mamíferos marinos definidas en el Proyecto LIFE. La importancia de la recogida de muestras: el ejemplo de los estudios genéticos y de los isótopos estables" En el curso de especialización para personal de centros de recuperación de fauna marina en el marco del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía" Málaga 13-15 Junio 2003.

"Interacciones entre delfines y pesquerías en Andalucía y Murcia". Escala en Cartagena (Murcia) de la gira divulgativa del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía". Cartagena (Murcia). 28 de Septiembre al 5 de Octubre de 2003.

"Metodología para la investigación de cetáceos en el mar". Escala en Cartagena (Murcia) de la gira divulgativa del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía". Cartagena (Murcia). 28 de Septiembre al 5 de Octubre de 2003.

"Interacciones entre delfines y pesquerías en Andalucía y Murcia". Escala en Garrucha (Almería) de la gira divulgativa del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía". Garrucha (Almería). 6-11 Octubre de 2003.

"Interacciones entre delfines y pesquerías en Andalucía y Murcia". Escala en Málaga de la gira divulgativa del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía". Málaga, 3-8 Noviembre 2003..

"Metodología para la investigación de cetáceos en el mar". En las "I Jornadas de biología marina" de la Universidad de Granada, 5-11 de Diciembre de 2003.

"Interacción entre cetáceos y pesquerías, problemática de gestión de un área marina protegida". En el Tercer Simposium de la Sociedad Española de Cetáceos. Almería. 11-14 Diciembre de 2003.

"Interacciones entre delfines y pesquerías en Andalucía y Murcia". Escala en Málaga de la gira divulgativa del proyecto LIFE (LIFE/NAT02/8610) "Conservación de cetáceos y tortugas en Murcia y Andalucía". Málaga, 4-7 diciembre 2004.

PUBLICACIONES Y PRESENTACIONES EN CONGRESOS.

García-Tiscar, S., Mons, J.L., Sagarminaga, R., Urquiola, E. 2005. Preliminary results of 13C and 15N stable isotopes analyses in bottlenose dolphins, common dolphins and harbour porpoises in South Spain. Poster en 19th Annual Conference of the European Cetacean Society. La Rochelle. Francia. 9-13 Abril 2005

García-Tiscar, S., Sagarminaga, R.,Baltanás. A., Cañadas, A., Hammond, Phill. 2003 "Using habitat selection models to assess spatial interactions between bottlenose dolphins (*Tursiops truncatus*) and fisheries in South-East Spain". Presentación oral en 15th Biennial conference on the biology of Marine Mammals of the Society for Marine Mammalogy (SMM) Greensboro, North Carolina, EEUU. 13-19 Diciembre 2003.

García-Tiscar, S., Sagarminaga, R., Cañadas, A., Hammond, Phill. 2003. An approach to the spatial interactions between bottlenose dolphins and fisheries in South-East Spain using habitat selection models. 2003. Poster en 17th Annual Conference of the European Cetacean Society. Las Palmas de Gran Canaria España. 9-13 Marzo 2003.

García-Tiscar, S., Sagarminaga, R., Cañadas, A. 2001. Arrival and permanence of an inmigrant group of bottlenose dolphins in the north-eastern Alboran Sea. Proceedings of the 15th Annual Conference of the European Cetacean Society. Rome, Italy. 6-10 May 2001.

García, S. 2001. "El proyecto Mediterráneo". Oral presentation at the II Symposium of the Spanish Cetacean Society. Valsain, Segovia. 2-4 November 2001.

García, S., Knouse, D., Sagarminaga, R., Cañadas, A. 2001. An Insigth on the biological significance of mixed groups of common dolphins (*Delphinus delphis*) and striped dolphins (*Stenella coeruleoalba*) in the Alboran Sea. 14th Annual Conference of the European Cetacean Society. Cork, Ireland. 2-5 April 2000.

García, S. 2000. "Ecología de las poblaciones de delfín mular (*Tursiops truncatus*) y delfín listado (*Stenella coeruleoalba*) en el mar de Alborán". Presentación oral en el I Symposium de la Sociedad Española de Cetáceos. Ceuta. 22-27 Febrero 2000.

Garcia, S. 2000. "Ecología y estado de conservación actual de las poblaciones de delfín mular (Tursiops truncatus) en el mar de Alborán". Presentación oral en el workshop de estudiantes organizado por Sea Mammal Research Unit (S.M.R.U.) de la Universidad de St Andrews, y la Universidad de Aberdeen. St Andrews. Reino Unido. 14-15 Diciembre 2000.

Cañadas, A., R. Sagarminaga, and S. García-Tiscar. 2002. Cetacean distribution related with depth and slope in the mediterranean waters off southern Spain. Deep Sea Research. Vol. 49(11) 2053- 2073

Fayos, J.A., García-Tiscar,S., Sagarminaga, R., Cañadas, A. 2001.(in press). Habitat use and general behaviour analysis as a tool for the designation of marine protected areas. Proceedings of the 15th Annual Conference of the European Cetacean Society. Rome, Italy. 6-10 May 2001.

Cañadas, A., Sagarminaga, R., García, S., Marcos, P.1999. Cetacean distribution with respect to the physiography of the Alboran Sea. European Research on Cetaceans-13. Proceedings of the thirteen Annual Conference of the European Cetacean Society. Valencia, Spain. 5-8 April 1999.

Marcos, P., García, S., Saldaña, E., Benito, M., Sagarminaga, R., Cañadas, A. 2001. Use of Satellite imagery to study the distribution of cetaceans with respect to sea surface temperature in the Alboran Sea. 14th Annual Conference of the European Cetacean Society. Cork, Ireland. 2-5 April 2000.

Coordinador Científico

Nombre: Francisco Javier Almunia Portolés
DNI: 18028274-T
Fecha de Nacimiento: 20/02/1969
Estado Civil: Casado
Domicilio:
C/ El Bejeque, 16
38611 San Isidro de Abona
TENERIFE
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FORMACIÓN ACADÉMICA

Licenciado en Ciencias del Mar por la Universidad de Las Palmas de Gran Canaria 1993
Doctor en Ciencias del Mar, con la calificación Sobresaliente "Cum Laude" por unanimidad con el título: "Estudio de las características tróficas y modelización del Ecosistema de la Charca de Maspalomas". 1998
Tesis dirigida por el Dr. D. Javier Arístegui Ruíz

"Master en Gestión Medioambiental" constituido por 420 horas lectivas, y un trabajo final de graduación "MODELOS DE ANALISIS PARA LA GESTION DE RESIDUOS SÓLIDOS URBANOS EN AREAS POCO POBLADAS", Organizado por el Instituto de Investigaciones Ecológicas (A.M.E.I.C.), en colaboración con The Open International University, obteniendo una calificación de Sobresaliente. 1993

OTRAS ACTIVIDADES DE FORMACIÓN

Estancia de dos meses en el Chesapeake Biological Laboratory bajo la dirección del Prof. Robert E. Ulanowicz; colaborando con el grupo de Robert Costanza en la elaboración de un modelo dinámico del ecosistema acuático de la laguna litoral de Maspalomas. 1998

Estancia de tres meses en el Chesapeake Biological Laboratory bajo la dirección de Robert E. Ulanowicz; estudiando la metodología de análisis de parámetros ecológicos en modelos de redes tróficas Network análisis, desarrollada por el Prof. Ulanowicz. 1996

Asistente al Oceanography Summer School "Upwelling Systems: Eastern Boundary of the Atlantic Ocean". 1995

OTROS MERITOS ACADÉMICOS

1996 – 1998
Beca de postgrado del Programa de Formación de Personal Investigador. Convocada por el Ministerio de Educación y Ciencia a través de la Secretaría de Estado de Universidades e Investigación.

1994 - 1996
Beca de postgrado de la Dirección General de Universidades e Investigación del Gobierno de Canarias.

OTROS TÍTULOS

Título de escafandrista autónomo deportivo de dos estrellas de la Federación Española de Actividades Subacuáticas

PUBLICACIONES Y COMUNICACIONES A CONGRESOS:

Arístegui J.; Denis M.; Almunia J. y Montero M. F. (2002) Water column remineralization in the Indian sector of the Southern Ocean during early spring. Deep Sea Research Part II: Tropical Studies in oceanography. 49 (9-10), 1707-1720.

Almunia J, Basterretxea G., Arístegui J. y Ullanowicz R. (1999) Benthic-pelagic switching in a coastal subtropical lagoon. *Estuarine, Coastal and Shelf Science.* 49,363-384.

Barton, E. D., J. Arístegui, P. Tett, M. Cantón, J. García-Braun, S. Hernández-Leon, L.Nykjaer, C. Almeida, J. Almunia, S.Ballesteros, G. Basterretxea, J. Escánez, L. García-Weill, A. Hernández-Guerra, F. López-Laatzen , R. Molina, M.F. Montero, E. Navarro-Pérez, J.M. Rodríguez, K. van Lenning, H. Vélez & K. Wild (1998). The coastal transition zone of the Canary Current upwelling region. *Progress in Oceanography* 41, 455-504.

Basterretxea, G. y Almunia, J. (1997) Informe final sobre las actividades de seguimiento del ecosistema planctónico de La Charca de Maspalomas. Informe técnico presentado a la Viceconsejería de Medio Ambiente del Gobierno de Canarias para asesorar sobre la gestión del espacio natural protegido.

Coautor de la ponencia "Activite respiratoire des assemblages microbiens: distribution verticale, variation temporelle, energíe d'activation" en el Workshop sobre la campaña ANTARES III celebrado el 28 y 29 de Mayo de 1997 en Montpelier, organizado por la Delegation Regionale du CNRS.

Coautor de la ponencia "Fotorespiration du Fitoplancton et glycolate dissous" en el Workshop sobre la campaña ANTARES III celebrado el 28 y 29 de Mayo de 1997 en Montpelier, organizado por la Delegation Regionale du CNRS.

Basterretxea, G. y Almunia, J. (1996) Seguimiento del ecosistema planctónico de La Charca de Maspalomas. Informe técnico presentado a la Viceconsejería de Medio Ambiente del Gobierno de Canarias para asesorar sobre la gestión del espacio natural protegido.

Coautor del poster "Influencia del transporte advectivo de masas de agua sobre la distribución espacial y el metabolismo del plancton en el Estrecho de Bransfield (Océano Antártico)" en el Congreso Español de Estudios Antárticos, celebrado en Madrid del 4 al 8 de septiembre de 1996.

Presentación del Poster "Biological Characterization of an Upwelling Filament" en el curso del European Institute for Advanced Studies in Oceanography Summer School "Upwelling Systems: Eastern Boundary of the Atlantic Ocean", celebrado en la Universidad de Las Palmas de Gran Canaria en 1995.

PARTICIPACIÓN EN PROYECTOS DE I+D

PROYECTO: Coastal Transition Zone- Islas Canarias
ENTIDAD FINANCIADORA: Comunidad Europea: Marine Science and Technology Projects (MAST)
FECHA: 1990-1993
JEFE CIENTÍFICO: Dr. Eric D. Barton
ORGANISMOS: ULPGC,IEO,Univ.North Wales
TAREAS: Análisis de parámetros microbiológicos (ETS, abundancia de fitoplancton,

concentración de oxígeno disuelto, producción primaria y materia orgánica particulada).

PROYECTO: FRENTES
ENTIDAD FINANCIADORA: CICYT
DURACIÓN: 1996 - 1998
JEFE CIENTÍFICO: Dr. Javier Arístegui Ruíz
TAREAS: Análisis de parámetros microbiológicos (ETS, abundancia de fitoplancton, concentración de oxígeno disuelto, producción primaria, materia orgánica particulada y materia orgánica disuelta) y toma de datos físicos (temperatura, presión, salinidad, y fluorescencia) con un CTD; calibración del fluorímetro y del salinómetro; procesado de los datos de ETS, extracción de datos de los "CTD casts".

PROYECTO: Influencia de las ondas internas de mareas sobre la productividad en aguas costeras de Canarias
ENTIDAD FINANCIADORA: Gobierno Autónomo de Canarias
DURACIÓN: 1993 - 1995
JEFE CIENTÍFICO: Dr. Javier Arístegui Ruíz
TAREAS: Análisis de parámetros microbiológicos (ETS, abundancia de fitoplancton, concentración de oxígeno disuelto) y toma de datos físicos (temperatura, presión, salinidad, y fluorescencia) con un CTD.

EXPERIENCIA EN CAMPAÑAS DE INVESTIGACIÓN OCEANOGRÁFICA Y MUESTREOS LITORALES

MUESTREOS: Muestreos en la laguna litoral "Charca de Maspalomas"
FECHA: 1996-1999
TAREAS: Planificación de muestreos, redacción de informes técnicos, construcción del modelo de red trófica y del modelo dinámico. Muestreo y determinación de: temperatura, salinidad, concentración de oxígeno, concentración de nutrientes, concentración de clorofila, concentración de carbono orgánico disuelto, concentración de carbono orgánico particulado, actividad ETS, biomasa del zooplancton, conteo de bacterias y flagelados; realización de experimentos de producción con incubaciones "in situ" de botellas claras y oscuras, y determinación de la variación del oxígeno disuelto mediante el método microwinkler.

CAMPAÑA: HE047 E-DOVETAIL
BARCO: B. I. O. Hespérides
FECHA: Diciembre de 1997 - Febrero de 1998
TAREAS: Toma de muestras para calibración del fluorímetro del CTD, toma de muestras para ETS y HPLC, toma de muestras para citometría de flujo y para la determinación del Carbono Orgánico Disuelto. Experimentos de producción primaria con el método del oxígeno y comparación con el método de la pp de CO2. Cálculo de cocientes respiratorios del fitoplancton. Colaboración en la preparación de incubaciones "in situ" de C14.

CAMPAÑA: FRENTES
BARCO: B. O. García del Cid
FECHA: Junio 1998
TAREAS: Toma de muestras para estudios taxonómicos y de estructura de tamaños de la población mediante citometría de flujo; experimentos de producción primaria por el método del oxígeno, toma de muestras para determinar el carbono orgánico disuelto total, filtraciones para determinar el carbono orgánico particulado, filtraciones para determinación de la actividad ETS, filtraciones para la determinación de pigmentos, etc.

CAMPAÑA: GAC 9510

BARCO: Taliarte
FECHA: Octubre de 1995
TAREAS: Filtración de muestras para la determinación de la actividad ETS del fitoplancton, cálculo de la producción primaria por el método del oxígeno, realización de perfiles físicos con un sensor CTD autocontenido con un fluorímetro acoplado, filtraciones para determinar la concentración de clorofila y calibración el fluorímetro del CTD.

CAMPAÑA: Antares 3 (MD103)
BARCO: Marion Dufresne
FECHA: Del 26-9-1995 al 8-11-1995
TAREAS: Muestreo para la determinación de indicadores metabólicos de la fotorrespiración del fitoplancton, extracción de sustancias orgánicas en etilen-glicol y concentración para la separación y determinación del Ácido Glicólico en el HPLC. Obtención de muestras y determinación a bordo de la actividad enzimática del sistema de transporte de electrones (ETS) del fitoplancton.

CAMPAÑA: MAST 9308 (HE011)
BARCO: B. I. O. Hespérides
FECHA: Agosto de 1993
TAREAS: Filtración para ETS, HPLC, Muestreo de PP y experimentos de producción primaria por el método del oxígeno; filtración de muestras para POM y para CHN. Mediciones de luz con espectroradiómetro.

CONOCIMIENTO Y EXPERIENCIA EN METODOLOGÍAS DE INVESTIGACIÓN CIENTÍFICA.

PRODUCCIÓN PRIMARIA (Técnicas principales y accesorias)
Determinación de la variación en la concentración de oxígeno en botellas incubadas a la luz y en la oscuridad, mediante el método microwinkler.
Determinación de la variación en la concentración de CO_2 en las botellas incubadas a la luz y en la oscuridad, mediante la presión parcial de CO_2
Determinación de la asimilación de C^{14} en la materia orgánica particulada en botellas incubadas a diferentes intensidades de radiación luminosa.
Determinación de parámetros fotosintéticos con un Fast Repetition Rate Fluorometer (FRRF)
Construcción de incubadores termostáticos
Mediciones de luz con espectroradiómetro

Determinación de la BIOMASA FITOPLANCTÓNICA
Estimación mediante la determinación directa de la concentración de clorofila y mediante el uso de fluorímetros calibrados (en continuo al agua superficial o en perfiles verticales adosados a una sonda CTD)
Determinación del carbono orgánico particulado y del nitrógeno orgánico particuado mediante el análisis de muestras filtradas con un analizador elemental CHN.

RESPIRACIÓN COMUNITARIA, RESPIRACIÓN FITOPLANCTÓNICA, FOTORRESPIRACIÓN
Análisis de actividad enzimática de la cadena de transporte de electrones del fitoplancton.
Determinación de las variaciones en la concentración de O_2 disuelto mediante el método microwinkler en incubaciones de botellas oscuras.
Determinación de las variaciones en la concentración de CO_2 disuelto por $ppCO_2$ en incubaciones de botellas oscuras
Determinación de la concentración de metabolitos procedentes de actividades de fotorrespiración (Ac. Glicólico).

DETERMINACIÓN DE LAS ESTRUCTURAS DE TAMAÑOS Y DE LA COMPOSICIÓN TAXONÓMICA DE LAS COMUNIDADES FITOPLANCTÓNICAS

Filtración fraccionada de las muestras de agua con diferentes tipos de filtro y tamaños de poro para determinar la concentración de clorofila fraccionada.

Microscopía invertida

Microscopía de epifluorescencia

Citometría de flujo

HPLC

CARACTERÍSTICAS BIOLÓGICAS, QUÍMICAS Y FÍSICAS DE LA COLUMNA DE AGUA

Espectrofotometría de absorción "in vivo"

Determinación de la radiación upwelling y downwelling mediante un espectroradiómetro

Preparación y operación de una sonda CTD autocontenida acoplada a un fluorímetro.

Preparación y operación de una roseta oceanográfica de 24 botellas , con CTD y fluorímetro.

Desarrollo de software a medida en varios lenguajes de programación (BASIC, FORTRAN, PASCAL) para operación automática de analizadores y para extracción de datos de los "CTD casts" de las campañas.

Determinación de la concentración de Nitratos, Nitritos, nitrógeno inorgánico total, amonio y fosfatos.

Determinación de la concentración de Carbono Orgánico Disuelto (COD) mediante un analizador de carbono orgánico total en muestras líquidas.

USO DE OTRO INSTRUMENTAL DE APOYO

- Usuario experto de sistemas de ultrapurificación de agua, espectrofotómetros, centrífugas, fluorímetros, balanzas de precisión
- Usuario habitual de autoanalizadores (ASPEC), microscopios de epifluorescencia
- Usuario ocasional de contadores de centelleo.

USO DE HERRAMIENTAS INFORMÁTICAS DE ANÁLISIS Y PRESENTACIÓN DE DATOS

- Usuario experto de entornos de modelización y simulación matemática (Stella, Ntwork, Automod, Matemática),
- Usuario experto de programas de autoedición (Pagemaker, QuarkXpress, Photoshop, Illustrator, Freehand, MS-Word) presentación, animación y diseño de páginas web (MS-Power Point, Ilife, Flash, Director, Dreamweaver) análisis de datos (SPSS, statistica, Excel, Lotus) representación gráfica (Surfer, Grapher, Deltagraph), etc.

TUTORIZACIONES DE BECARIOS

BECARIO: Gergey Torda

BECA: Predoctoral del Ministerio Español de Asuntos Exteriores

PROYECTO: Comunicación en cetáceos

- FECHA: 2002- 2004

BECARIO: Mercedes García Muñoz

BECA: Predoctoral de la Dirección General de Universidades e Investigación del Gobierno de Canarias

PROYECTO: Dinámica del Carbono Orgánico Disuelto en el mar

FECHA: 1997-1998

Asistentes de Investigación

Nombre SÁNCHEZ CABANES, ALICIA
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Teléfono 661-794849 / 954-716218
Correo electrónico alicia@gustavosanchez.es
Fecha de Nacimiento 25 de Marzo de 1978

EXPERIENCIA LABORAL

• Fechas (de – a) 2003- 2004
• Nombre y dirección del empleador LIMNOMAR (www.limnomar.de) . Bei der Neuen Münze, 11 D-22145, Hamburg, Alemania
• Tipo de empresa o sector Laboratorio para la Investigación de Aguas Marinas y Continentales y de Patología Comparativa en Hamburgo y en la isla de Nordeney
• Puesto o cargo ocupados Investigadora. Trabajo con contrato de prácticas, promovido por beca del programa de la EU LEONARDO DA VINCI
• Principales actividades y responsabilidades
•Analisis de secciones histológicas, pertenecientes a moluscos (Marisa cornuarietis) y al erizo de mar (Paracentrotus lividus), expuesto en un estudio para el Proyecto de Investigación de la EU COMPRENDO (Comparative Researche on Endocrine Disrupters, Phylogenetic Aproach and Common Principles foccusing on Androgenic-Antiandrogenic Compounds)
•Preparación de las muestras histológicas (todo el proceso), cálculos estadísticos y medida de parámetros morfológicos mediante análisis de imagen. Trabajos con muestras de animales expuestos a TPT y TBT, sustancias tóxicas que se encuentran con frecuencia en las pinturas antiincrustantes de los barcos.
•Traducciones alemán-español y viceversa.
•Durante la estancia en la Estación Marina de la isla de Nordeney (islas Frisias):
-Recogida y determinación taxonómica de los grupos dominantes de organismos incrustantes, macrozoobentos y endobentos, así como recogida de muestras y determinación de biomasa.

Otros trabajos de interés •Ayudante de anillador en la campaña de anillamiento que se engloba en Trayectoria Espacio Temporal, Ecología y Energética de Passeriformes Migrantes Transaharianos, en el Parque Nacional de Doñana, entre el 21 de septiembre y el 30 de Octubre de 2002 y 2003.
•Trabajo voluntario como bióloga, guía en pequeña embarcación, y traductora en la fundación FIRMM, Foundation for Information and Research on Marine Mammals, en Tarifa, septiembre y octubre de 2001.
•Informe Limnológico sobre el río Guadiamar, tras la catástrofe de la mina de Bolidén-Apirsa en abril de 1998, durante el año 2002, departamento de Limnología de la Universidad de Sevilla.
•Informe Limnológico sobre la restauración de la Marisma de Algaida, año 2002, departamento de Limnología de la Universidad de Sevilla.

EDUCACIÓN Y FORMACIÓN

Actualmente
Cursos de Doctorado, Departamento de Ecología de la Universidad de Sevilla.

• Fechas (de – a) 1996-2002
• Nombre y tipo de organización que ha impartido la educación o la formación Licenciada en Biología por la Universidad de Sevilla

• Fechas (de – a)

2004

Curso G.I.S. (sistemas de información geográfica), Universidad de Sevilla

• Fechas (de – a) 2002-2003
• Nombre y tipo de organización que ha impartido la educación o la formación Técnico en Gestión de Reciclaje de Residuos, C.E.A. (Confederación de Empresarios de Andalucía)

• Principales materias Especializado en Residuos Líquidos.

• Fechas (de – a) 2002
• Nombre y tipo de organización que ha impartido la educación o la formación Curso de Análisis de Aguas, Departamento de Limnología de la Universidad de Sevilla
• Principales materias Estudios biológicos y fisico-químicos

• Fechas (de – a) 2001
• Nombre y tipo de organización que ha impartido la educación o la formación Curso de Biología Marina, Departamento de Biología Marina de la Universidad de Sevilla, 50 h
Cursos "El Mar como Recurso Natural I, II y III", Universidad de Sevilla, 60 horas
• Principales materias Método de estudio de los ecosistemas costeros y marinos y niveles de contaminación.

IDIOMAS

INGLÉS, PUNTUACIÓN TOEFL: 545, AÑO 2002
• Lectura Nivel muy alto
• Escritura Nivel alto
• Expresión oral
Nivel alto

ALEMÁN, DEUTSCH ZERTIFIKAT, JUNIO 2004, INSTITUTO GOETHE
EN PREPARACIÓN MITTEL-STUFFE
• Lectura Nivel alto
• Escritura Nivel medio
• Expresión oral
Nivel medio

CAPACIDADES Y APTITUDES

Trabajo muy bien en equipo, donde la comunicación es importante, así como capacidad organizativa en puestos de mayor responsabilidad.

CAPACIDADES Y APTITUDES TÉCNICAS

INFORMÁTICA NIVEL DE USUARIO ALTO, PAQUETE OFFICE, WINDOWS, HOJAS DE CÁLCULO, BASESDE DATOS, INTERNET, SOFTWARES PROFESIONAL, ANÁLISIS DE IMAGEN
LABORATORIO
EXPERIENCIA CON RADIOTRACKING

PERMISOS Permiso de conducción B, coche propio.
Permiso de buceo

Sevilla, Octubre de 2004

Name: Sergi Perez Jorge
Gender: Male
Date of Birth: 20th March 1981
Nationality: Spanish
Address: Psg. Immaculada Concepció n°18 5°l° 08786 Capellades (Barcelona)
E-mail: seke20@hotmail.com
Date: April 2005

EDUCATION

-Bachelor in Marine Biology at the Fairleigh Dickinson University, New Jersey. December 2003

-Diploma of Management in Marine Science. International University Study Center, Barcelona (1999-2002)

RELEVANT EXPERIENCE

March – April 2005: Tecnoambiente S.L, Valldoreix (Catalonia)

Studies and enviromental control to the dredgers: Costa Blanca, F. Volker Sr i Mellina.
Experience included:

- Analizing samples of sediments of the dredging operations in the harbour of Sant Carles de la Ràpita and Barcelona

April 2004 – present: Cardigan Bay Marine Wildlife Centre/Sea Watch Foundation, New Quay (Wales)

Research Assistant
Having joined CBMWC for a four months voluntary position in April 2004, I was invited back by the Science Officer to work on the photo-Id catalogue f bottlenose dolphins. Experience included:

§ Boat-based distance sampling surveys to estimate the abundance of marine mammals.
§ Land-based surveys to investigate the use by bottlenose dolphins of New Quay Bay and the impact of boat on these dolphins
§ Photo-identification: data collection, taking photos, matching and creating a database.
§ Naturalist guide on board dolphin-watching trips.

Target species: Bottlenose dolphins (*Tursiops truncatus*), harbour porpoises (*Phocoena phocoena*) and grey seals (*Halichoerus grypus*)

November 2004: Conservation, Information and Research on Cetaceans (CIRCE),

Algeciras (Spain)

Research Assistant
I joined CIRCE for the Life Project "Conservation of cetaceans and turtles in Andalusia and Murcia" LIFE02NAT/ E/8610. Experience included:

§ Aleatoric transect surveys.
§ Additional study: photo-identification of sperm whales of Crozet.

Target species: Pilot whales (*Globicephala melas*), killer whales (*Orcinus orca*), striped dolphins (*Stenella coeruleoalba*), common dolphins (*Delphinus delphis*) and bottlenose dolphins (*Tursiops truncatus*).

October-December 2004: Sea Watch Foundation, New Quay (Wales)
Database Assistant
Inputting data on search effort and cetacean sightings from different parts of the United Kingdom into the National Sea Watch Database.

June 2004: Sea Watch Foundation, Celtic Deep (UK)

Research Assistant
Observer on board surveys to measure the seasonal abundance of common dolphins in the Celtic Deep.

Target species: Common dolphins (*Delphinus delphis*), harbour porpoises (*Phocoena phocoena*) and other cetaceans.

Jan. – Feb. 2004: Centre of Recuperation of Marine Animals (CRAM), Premia de Mar (Catalonia)

Volunteer position
Volunteer at the Centre of Recuperation of Marine Animals. Feeding, handling and curing loggerhead turtles (*Caretta caretta*)

August – December 2003: Fairleigh Dickinson University, Hackensack (New Jersey)

Professor's Assistant
Assistant Dr McClary at the Hackensack River research projects.
Experience included:

- § Species identification of invertebrates.
- § Desk based research.

SEMINARS & COURSES

- § Bio-sonar and communication between cetaceans: mechanisms and social behaviour. Mediterranean Campus. Vilanova i la Geltru, Catalonia. September 2004 (30 hours)
- § Fifth European Seminar on Marine Mammals: Biology and Conservation. UIMP. Valencia, September 2004
- § Rehabilitation and Conservation of marine animals: birds, turtles and mammals. CRAM (Center of recuperation of marine animals) Premia de Mar, Spain, 2003 (40 hours)
- § Ecology, environment and sustainability at Mila i Fontanals, Igualada, Catalonia. (51 hours)

SKILLS

Sound understanding and good working knowledge of IT: GIS, Microsoft Word, Microsoft Excel, Microsoft PowerPoint and www.

Name: Philippe VERBORGH
Born on 27.05.1980 in Uccle (Brussels)
Address: 19 rue Wilmotte
1060 Brussels
BELGIUM
Mobile : 0033 (0)6 60 97 26 65
Email : philippeverborgh@yahoo.fr

Researcher for CIRCE (Conservation, Information and Research on Cetaceans)

ACADEMIC FORMATION

2004-Present **Master of Science in Marine Mammal Science at University of Wales, Bangor (UK)**

2003-2003 Licence of Biology at Université de La Rochelle (France)

2001-2001 Bachelor of Science with Honours in Marine Biology (2.1) at University of Newcastle upon Tyne (UK)

1998 Certificat d'Enseignement Secondaire Supérieure at école Decroly in Brussels (Belgium)

TRAINING AND PROFESSIONAL EXPERIENCES

January 2004-Present **Research project on population tendencies of the pilot whales through photo-identification in the Strait of Gibraltar under the supervision of Christophe Guinet (CEBC-CNRS) for CIRCE**

Nov 2003-Present **Participation in the European LIFE02NAT/E/8610 "Conservation of cetaceans and turtles in Murcia and Andalusia" in the Strait of Gibraltar and the Gulf of Cadiz**

Summer 2002-03-04 **Research assistant on cetaceans and nature guide for research volunteers in the Strait of Gibraltar for CIRCE**

April 2003-04 **Research assistant on cetaceans and nature guide for research volunteers in the Strait of Gibraltar for CIRCE**

August 2002 **Scientific assistant for the BBC Natural History Unit for a special program on killer whales in the Strait of Gibraltar with CIRCE**

June 2002-Present **General coordinator of the association CIRCE France. Comptability and administration of the association**

April and July 2002 **Scientific supervision of a project on automatic detection of cetaceans through video in the Mediterranean Sea for 2 weeks**

Decembre 2001 **Beginning of training on cetology and webmaster of the website www.circe-asso.org for the association CIRCE. Making of Newsletters and information on the website**

October 2001 **Research volunteer in the Strait of Gibraltar with the association CIRCE for 2 weeks. Help in the making of the killer whale photo-identification catalogue**

August 2000 **Two weeks with the Groupe de Recherche et d'Education sur les Mammifères Marins in Tadoussac, Canada. Making of a report on the endangered population of beluga.**

April 1998 **One week training in a the company Aqualift in Nieuport (Belgium). Painting of boat**

hulls.

SCIENTIFIC PRESENTATIONS

April 2005 **Ake, H.C., Ansmann, I.C., Lewis, K.M.[1,2], Pratt, R., Verborgh, P. (2005). Behavioural responses to ferries by four small odontocetes. . Poster at the ECS Congress in La Rochelle, France 2005.**

Stephanis De , R., Guinet, C., Buisson, L., Verborgh, P., Dominici, P. (2005). Population status, social organisation and feeding strategies of killer whales (*Orcinus orca*) in the Strait of Gibraltar. Poster at the ECS Congress in La Rochelle, France 2005.

March 2004 **Verborgh, P., De Stephanis, R. and Guinet, C. (2004). A global Access database for your cetacean work: an efficient way to save time. Poster at the ECS Congress in Kolmarden, Sweden 2004**

Pérez-Gimeno, N., De Stephanis, R., Salazar-Sierra ,J.M., Verborgh, P., Cañadas, A. Guinet, C. (2004). Do bottlenose dolphins (*Tursiops truncatus*) follow any seasonal movement pattern in the Strait of Gibraltar? Poster at the ECS Congress in Kolmarden, Sweden 2004

Laplanche, C., De Stephanis, R., Adam, O., Lopakta, M., Demoulin, X., Savanier, O., Rondepierre, F., Pérez Gimeno N., Verborgh P., Guinet, C. and Motsch, JF. (2004). The Strait of Gibraltar as a feeding ground for sperm whale (*Physeter macrocephalus*). Poster at the ECS Congress in Kolmarden, Sweden 2004

Salazar Sierra J., De Stephanis R., Cañadas A., Verborgh P., Perez-Gimeno N., Sagarminaga, R., Guinet C.. Evidences of exchanges of fin whales through the Strait of Gibraltar. Poster at the ECS Congress in Kolmarden, Sweden 2004

March 2003 **De Stephanis, R., Salazar-Sierra ,J.M., Pérez-Gimeno, N., Verborgh, P., Tellez, E., Rueda, L. (2003). Collision between a sperm whale (*Physeter macrocephalus*) and a ferry in the Strait of Gibraltar. Poster at the ECS congress**

SKILLS

Languages French **(mother tongue)**, english **(fluent in talking, reading and writing)**, flemish **(scholar 'evel in talking, reading and writing)** and spanish **(notions of talking and reading).**

Computer skills **Notion in Office, Dreamweaver, Minitab, Flash, Photoshop, Premiere**

CONSULTORES EXTERNOS

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7.1 Asesores Científicos Independientes

Consultores Externos pendientes de determinar.

PRESUPUESTO

8.1 PRESUPUESTO

Personal	**113.900 €**
Coordinación científica y supervisión de las campañas por Loro Parque	6,000 €
Personal CIRCE y UAM	107.900 €
Campañas en el Mar	**54,000 €**
Experimentos	**15.595,62 €**
Otros	**12.870,00 €**
TOTAL	**196.365.62 €**

* 151.515,62 € serán aportados por Loro Parque,
31.350 por la UAM y 13.500 por CIRCE.

8.2 DESARROLLO DEL PRESUPUESTO EN EL HORIZONTE DEL ESTUDIO

Primer año	**67.843,34 €**
Personal	37,966,67 €
Campañas, experimentos y otros	29.876,67 €
Segundo año	**65.615,97 €**
Personal	37.966,67 €
Campañas, experimentos y otros	27.649,30 €
Tercer año	**62.906,61 €**
Personal	37.966,67 €
Campañas, experimentos y otros	24.939,64 €
TOTAL	**196.365.62 €**

BIBLIOGRAFÍA Y ANEXOS

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9.1 BIBLIOGRAFÍA

Abend, Alan G. and Smith, Tim. 1997. Differences in stable isotope ratios of carbon and nitrogen between long-finned pilot whales (*Globicephala melas*) and their primary prey in the western north Atlantic. ICES Journal of Marine Science. (54):500-503.

Alonso del Rosario JJ, Bruno Mejías M, Vázquez-López-Escobar A (2003) The influence of tidal hydrodynamic conditions on the generation of lee waves at he main sill of the Strait of Gibraltar. Deep-sea Research I 50:1005-1021

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Baird R.W., Dill L.M. 1995. Occurrence and Behaviour of transient killer whales : seasonal and pod specific variability, foraging behaviour, and prey handling. Can. J. Zool. 73 : 1300-1311.

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Bowles A.E., Glenn Young W., Asper E.D. 1988. Ontogeny of stereotyped calling of a killer whale calf, *Orcinus orca*, during the first year. Rit Fiskideildar 11 :251-275.

Bruno M, Alonso JJ, Cózar A, Vidal J, Ruiz Cañavate A, Echevarría F, Ruiz J (2002) The boiling- water phenomena at Camarinal Sill, the strait of Gibraltar. Deep-sea Research II 49:4097-4113

Dahlheim M. E. 1988 Killer whale (*Orcinus orca*) depredation on longline catches of sablefish (Anoplopoma fimbria) in Alaskan waters. NWAFC Processed Report 88-14 31 pp.

Das, K. (2000) Tuna and dolphin Associations in the North-east Atlantic: evidence of Different ecological niches from stable isotope and