

NRDA Results

Definite damage: murre, oystercatchers, harlequins, eagles, birds in the freezers

Probable damage: murrelets, guillemots, kittiwakes, loons

*diff. not too sig. for Rest'n Studies*

*Suspected damage:*

Types of Studies on USFWS List

<u>Restoration</u>	<u>Monitoring</u>	<u>Technical Support</u>	<u>Feasibility</u>
3	4	1	5
6	9	2	C-1
16	10	7	
17	12	8	
	13	14	
	C-2	15	
		18	
		C-3	
		C-4	

10/30/90

(1)

Kathy Kul et z

- 1 tree nest in SE
- 1 ground nest

- 700-800 carcasses from spill
- probably underrepresented in body count
- proportionately more killed than those at risk (probable)
- apparent decline from early 70's to date
  - most of decline may have been ~~there~~ in mid-80s
- birds on water within 200 m of shore
  - 1989 very low compared to prior years
  - at Naked Is., juv numbers very high
- 32 collected birds
  - 9 analyzed
  - 6 w/ hydrocarbon levels in liver
- nests are in old-growth trees
  - 200 y to get mass growth
- Jeff Hughes - two nests in 1990
  - alder site Rugged Island
  - talus slope near Stone Pt.
- Mickelson also found something at Perry Is.
- 1990 methods
  - "down watch" Lower 48 - 3 methods
  - stationary transect, road grid
    - 50% open/ten cover stationary
    - recorded birds overhead
    - detection
    - visual and/or auditory
    - within 200 m radius
    - record behavior
      - circling
      - above or below canopy

(2)

500
100
-----
000
000
000
-----
60,000

- went out at dusk, but w/ almost no detections
- 57 watches done
- bog-meadow valleys were heavy flight paths
  - steep slopes at heads of bays
- most detections around 04:00 h
- activity tails off rapidly after 10 August
- juveniles start appearing on water in ~~mid~~ mid July
- 85% of detections are aerial
- type of detection important for type of activity

peak of fledging in  
late July

- 1990/1

1. develop + refine methods

2.

3.

4.

- continue Naked fel. work intensively for habitat data
- restoration needs of 2 types
  - distribution of mussel concentrations within spill area
  - habitat attributes / use within ocean of concentrations
- any existing survey program that will give needed survey results?
  - at-sea distribution ~~is~~ is well-known  
("at-sea" means within PWS - open water)
- at-sea distributions can give presence or absence
  - but the areas suggested are still large (lots of shoreline)

Sam Patten Harlequin

- 1st major work in Iceland in 1966
- in No. Am. -
  - M.S. in Glain Park
  - M.S. in P.W.S. by student of Jovic @ O.S.U.
- other than general bird surveys, nothing done since then until damage assessment
- poor physiological condition
  - hydrocarbon contamination in livers
  - products also in the bile
- Harlequin is an historical breeder in western PWS
  - Kulatz has anecdotal records of breeders from Stary, Nashed, and other islands
- Survey of 140 anadromous fish streams
  - each surveyed 3 times
  - walked by Comm. Fish person
- no nesting ♀♀ or ♀♀ w/ broods on Knight Island
- no evidence of nesting at all in oil-spill area
- no nests, per se, found anywhere
  - broods were evidence of breeding
- stream parameters to document
  - length, depth, turbidity, etc
  - clear flowing water (non glaciated)
- propose 2 field camps
  - Knight Island
  - one in eastern PWS (e.g., Port Heavens, abandoned NMFS camp)

- Stream

- 30-50' wide
- moderate gradient
- 0.3-0.5 m in depth
- clear
- salmon (♂ humpback + chum)
- extensive intertidal



- females feed at stream mouth until salmon eggs are in streams
- moulting sites
  - rocky
  - extensive intertidal
  - lots of fungus + barnacles, etc
- what information is available from commercial fish streams
  - apparently quite general
- migrant population moves in in the winter
  - Kachemak Bay has big wintering population
- Roby suggests that intertidal mouth of streams may be really key, especially for food during nest periods (many rely on food rather than fat)
- need random sample, including "wounded" streams

Dear Anne

- guillemots
  - long-term failures
- murrets, all eggs
  - long-term decline
- Kittiwakes
- temporal and spatial abundance of forage fish in relation to seabird distribution
  - fish transects (between 0-200 ft.)
  - overlay grid - index of relative abundance
  - 
  - more fish near shore rather than offshore
  - also more birds near shore rather than offshore
  - Alsea had more fish than Valdez Arm + Tatitlek Narrows

(3)

- more fish deep at Glacier Isl
- near shore, less difference among sites
- no diff. in fish or birds between slack & flowing tides
- not on transects
  - more foraging flocks at Tatitleh than other sites
- significant correlation between # fish at less than 50 ft and birds @ less than 50 ft.
  - makes sense - murre, gulls & kittiwakes are shallow feeders

10/31/90

Dave from, continued

- In 1989, reproduction in kittiwakes was half what it should be in ~~avoided~~ area
- In 1990, reproduction throughout PWS was reduced
  - in oil area, it was even lower than in 1989
- just knowing total abundance of fish isn't necessarily critical - knowing what is available is critical
- major prey fish study lacks immediate pay-off to restoration
  - more appropriate for long<sup>term</sup> restoration program
- kittiwake ~~and~~ experienced damage - and we can expect damage to herring population beginning in 1991
  - critical to monitor situation in 1991-92 to not miss picture
  - may be restoration action possible in the way of herring enhancement + management

RESTORATION PROJECTS

Introduced predator removal

- best chance are out-of-spill area
- some overlap in EPP - but best opportunities for other spp.
- 2 islands in 1991 @ \$50,000
- 4 islands " 1992 @ \$160,000
- + monitoring 1st 2

does not include vessel cost

- anything in spill area
- are proposed islands rodent free?
- any spill spp. on <sup>out-of-spill area</sup> islands that ~~are~~ are proposed for removal

Bald eagle disturbance

- work if tied to clean up - port activity

Marine Sanctuaries

- critical habitat area preferred over state park
  - more emphasis on resource; less of park for recreation
- marine sanctuary
  - management tool
  - research + monitoring activities
- area meriting special attention (AMSA)
- recommend initiation of process to review on multi-agency
- concern about political salability

17. Educate, Tourists, etc.

- pamphlets
- workshops
- NOAA charts →
- has immediate pay-off in restoration benefit
- no disagree that it is important
  - priority is uncertain
- part of a series of educational materials
- Overall theme: "Restoring environment begins with you..."

Other restoration ideas

- acquisition of timbered habitat

14(h)(1) sites

- priority in forest - nesting birds
- Bull Ter. etc. not same priority as forest habitat but could be very important
- acquisition is also tool to reduce disturbance

Monitoring

- long-term monitoring for eagles
  - needed for adequate baseline
  - model for future gull damage

Restoration Workshop - Birds  
30-31 October 1990  
Participants

Principal Investigators

Kathy Kuletz, USFWS	murrelet
Dave Irons, USFWS	forage fish
Sam Patten, ADF&G	sea ducks
Bob Hunter	Patten's assistant

Agency Personnel

Kent Wohl, USFWS	migratory birds	
Bob Leedy, USFWS	migratory birds	
Dave Nysewander, USFWS	murres	
John Piatt, USFWS	alcids/forage fish	
Steve Klosiewski, USFWS	statistics/study design	
Dirk Derksen, USFWS	?	waterfowl
Tom Rothe, ADF&G		waterfowl
John Wright, ADF&G		nongame/conserv. biology
Roy Nowlin, ADF&G		damage assessment
Mark Willette, ADF&G		forage fish
Ken Krieger, NOAA/NMFS	?	forage fish

Outside Personnel

Kim Nelson, OSU		murrelets
Dan Roby, SIU		seabirds/physiol. ecol.
David Bowden, CSU	?	sample design

Restoration Group

Stan Senner, ADF&G  
Sandy Rabinowitch, USDOJ  
Linda Comercci, USEPA  
Carol Gorbics, USFWS

RPWG

RESTORATION WORK PLAN SCHEDULE

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March 24, 1991	Publish final FR notice
March 15	FR notice to Office of FR
March 1	Complete review of and response to public comment
February 13	Close of public comment period

1 9 9 0

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December 28, 1990	Publish draft FR notice ( <i>work plan + 1991 program</i> )
December 21	FR notice to Office of FR
December 17-20	Revision of FR notice
December 17	Final comments due from WPG and State of Alaska
December 14	Final draft submitted to WPG
December 13	Trustee Council review and recommendation
December 12	Final draft submitted to Trustee Council through Management Team
December 7	Comments due from the Management Team
November 28	Draft 1991 work plan/1990 status report submitted to Management Team
November 12	Background sections and detailed outline of draft public document submitted to RPWG
October 10-11	RPWG meeting to adjust internal schedule and make assignments
October 5	Teleconference of Trustees and/or Washington Representatives
October 4	Circulate schedule and draft initial FR notice

Bird Meeting - (Oct. 30, 1990)

Stun → introduction

Tech workshop

-feas. studies (1990)

→ accelerated process now

we shld view this as an opportunity to id. things to go forward with.

→ review work plan schedule

(detailed enough, but not too detailed to lock us into things)

additional tech consultations → after Jan. 1.

(oppty for additional consultat.)

final restr. workplan -

used @ final plan

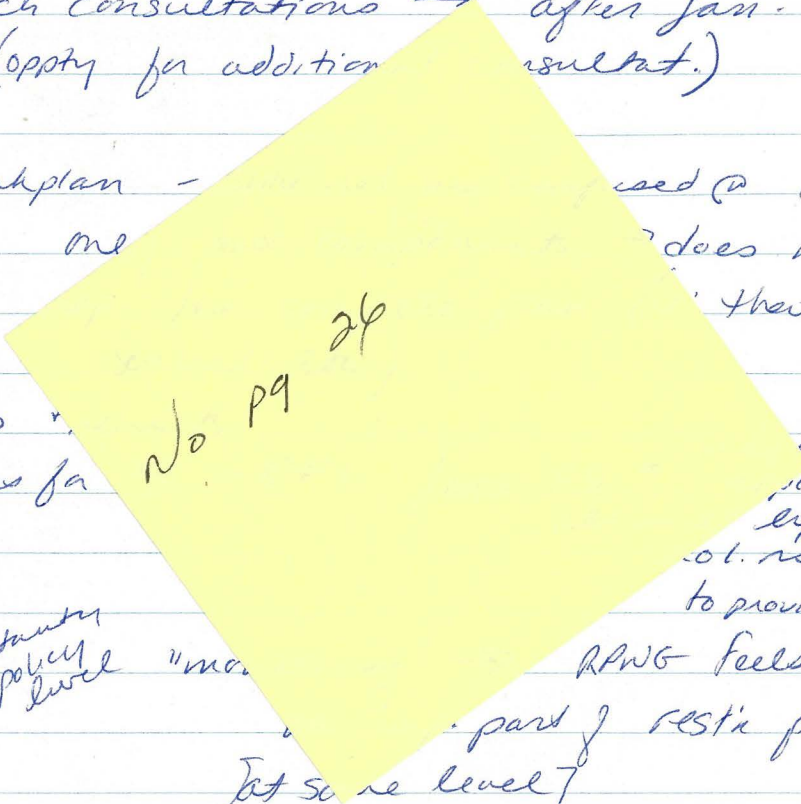
me

does not

that follows

① look at 90 studies

② add possibilities for



No p9 2p

not be  
[public to birds]  
life history]

not restr. nec.  
to provide info

RAWG feels it is

part of restr. program

[at some level]

→

MOU → "restr." def includes monitoring as part of def.

→ reviewed factors to be considered not limited to only these factors

cost → shld not be majority obstacle for this grp.

at some level  
understand  
not policy level

"mo."



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we shld view this as an opportunity to id. things to go forward with.

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additional tech consultations → after Jan. 1. (oppty for additional consultat.)

final rest'n workplan - shld not be confused @ final plan only ~~part~~ <sup>"step"</sup> components → does not rep. the complete plan (i.e. that follows exult. etc.)

① look at 90 studies + results

② addi possibilities for F.S. + R.P's. [expl. F.S. → may not be applic to birds also incl: life history scot. resch. nec. to provide info]

within and between countries at policy level

"monitoring" → RSWG feels it is an imp. part of rest'n program [at some level]

→ MOU → "rest'n" def includes monitoring as part of def.

→ reviewed factors to be considered not limited to only these factors

cost → shld not be majority obstacle for this grp.

rec's shld be tech. appropriate & responsive to  
criteria

\$ is beyond our power

once projects have passed factors → how do we choose  
no good answer [partly subjective dec;  
dep. on agencies & \$ they  
are willing to put in

~~DA~~

D. Brown → ? damage assmt projects vs. rest'n. (limited \$ for  
damage assmt)

fed agencies are expecting a shift from NRDA to Rest'n.

→ DA studies (some) can be argued from a rest'n  
view; ∴ we can possibly pick up on some

tendency "name chg" [agree that its all info we need] →

RPWG will look for real tight tie in to rest'n goal.

one fear → NRDA will shut down

Sandy → ↓ in \$ on the whole

RPWG is trying to pt. out that rest'n is <sup>credible</sup> expensive,  
maybe more than NRDA

~~Damage Assmt~~

Spottler → is there same confident. constraints as NRDA

Shum [at this mtg, OK.]

same restrictions apply (but in principle, the  
results of rest'n program is public)

so far, no R. study results have been released

exped the Dec. document will report 1990 results (short)

→ RSWG will argue disclosing ~~any~~ only results  
that PI feel comfortable with.



# K. Kulitz → Marbled Murrelet Study

goal → gather info to i.d. upland habitats  
of spp. impacted by spill → <sup>ult. goal:</sup> hab. prot.

breeding - <sup>use</sup> upland area; but we don't <sup>know</sup> specifically

marbled murrelet (small alcid) forages near shore  
feeds on small fish

widely dispersed - nests quite abt  
inland (old growth - South (OR, CA)  
etc.)  
one tree nest found in <sup>SE</sup> AK

Pilot study → look at feas. of collecting this info

Damage Assmt:

700-800 bodies actually recovered [prob. underrep.]  
more birds were killed than <sup>greater</sup> at risk (than expected)  
pop → appears decline from early 70's (mostly in  
mid 80's)

specific site (Naked Is) → '89 pop was  
lower than '70's + 80's

in '90 → #s came back up again;  
could <sup>have</sup> been a temporary decline

but really  
need to  
consider  
#s near  
shore  
as well  
#s usually increase  
in July  
(birds on  
the up  
200m from  
shore)

→ in '90, higher #s in June (could have  
been problems  
w/ breeding)

direct Damage link → <sup>32</sup> collected birds  
9 analyz.; 6 had ↑ HC in livers  
control areas

Naked Is  
lymphy  
sited

marked inured → L48  
sp. of concern in L48  
\* 75-90% of pop is in AK (large % was in spule zone)

(4)

Naked Is. (N + East side oiled 1st)

trying methods from L48 to id. habitat [can't find their nests]

favours large trees, old growth → flat branch, broken limb, top. moss  
mtn. hemlock & doug. fir but can id. areas of nesting

Pilot Project:

in PWS nests found on ground, slopes } rugged Is.  
hard to id. eggs. } Seward  
gone Pt-Kenai

unit dev. in L48 → "dawn watch"  
(inubat. + chick feeding)  
set locat. + degree of use from watching

also set } Pomy Is.  
Knight Is.

used official sun-rise time

L48 uses → transects  
grid method (rotate on 3 pts)  
\* Stationary observ.

Re. Proj. used stationary method → one observ. stat. (200 m. radius)  
audial set.

some remote sites visited less freq.

Visual/audial  
or  
visual only

? use tape recorder - 1st hear, type of behav, # calls  
\* did AK birds have same type of pattern as L48 (due to diff in day/night)  
Yes, pretty close  
at dusk → don't call as much; fly alot in fog

Naked Is.

57 watches total

0 → ~700' elev.

large bog meadow valley

→ river/bog meadow valleys at heads of bay

used slopes, steep at heads of bay, more heavily (N + W facing slopes)

→ more remote sites (even tho heavily wooded) → less active



Started watches June 9

Fig 2300 detections in 57 watches (3AM → 6AM)  
most around 4AM

will be converted to time around sunrise  
[ 15 minutes before + after sunrise ]  
↓ does dep. on weather

Fig S. Cabin drainage → activ. ↑ in July; dropped off alot after Aug. 10

Fig Kachem. Bay → transects on H<sub>2</sub>O  
peak in late May  
levels during incub.  
1<sup>st</sup> juvenile → 1<sup>st</sup> wk in July  
birds increas. (upto 5x) thru 1<sup>st</sup> wk Aug  
[nonbreeders may move into foraging areas]

conclat @ #s on H<sub>2</sub>O + detections of other inland

Fig Naked Is.  
85% detects → auidial  
10% both  
~ 20% visual only?

Type of Detect → imp to id flight corridors VS. actual nesting locat.

use behav. to map areas

- Stat. 1 - wide bog valleys → ↑ auidial det.
- Stat. 2 → steep slope (nesting) → ↑ <sup>for more stats</sup> circling, or flying straight thru
- Visual det's.
  - Stat 1 - high #s of circling high.
  - Stat 2 - land, below canopy

Stat. call → from specific spot in trees.

(6)

Jesses share incub duties + both feed chicks  
have videotaped (can see timing of sex)

working close to shore worked out well

in general  
peak of fledg →  
late July

2 nests on Tulemie Is. → July in Aug

Montague → eggs found in Aug

re-nesting worth is rare @ alcids.

1991 Proposal →

continue →

- ① dev. + refine methods to locate + monitor
- ② expand type of hab's. / data base  
(exp. hab. / murrelet data base)
- ③ test predictions from #2
- ④ id. pot. sites + check specific sites

2 ways to approach:

- one time quick survey to id areas of highest activ.
- gather more detailed info on use at spec. study sites + extrapolate to spill area

→ Kittlitz + marbled mure.  
(more restricted in range, more clumped in dist'n.)

→ look at both together

Propose → ① \* Naked Is. (use USFS GIS - mult. spp.)  
USFS crew could map west. pt. of island



9

② Kachemak Bay - feasible (altho not much <sup>old</sup>)  
large murlet pop.  
accessible (trails & rds)  
some hab known

need elab. recording sys; or ↑ people  
has old growth + 2° growth; alpine,  
glacial etc.

survey data - no Ds in '89 from '88;  
add'l. data was collected but  
not analyzed yet

### Summary

test methods

to see if patterns are same as L48

is it poss to locate hotspots

Naked Is → rel. to NRDA

→ can use dawn watch method

→ rate of and vs vis. simil. to L48

→ diff. behav. can be used to pick out nesting site vs fit. corr.

can use <sup>field</sup> greater sample of diff. hab. types - monitor more sensitively

→ narrowed down "clump of trees" → prob could  
go back + find specific nests based  
on last year's data

issue: → how much do we want to deal @

rest'n for a spp that has not shown a specific  
pop. loss (altho that could've been a prob @  
monitoring) could've been underestimated

Stan → 700800 dead birds is a fraction of pop in AK

of ~~the~~ '   
murlets fall in "probable damage" @ room for  
argument

2000 in OR WA  
since in WA

definitely habitat in PWS (western part), Kodiak

8

Jan → should proceed; altho its possible if we spend \$, it may not be reimbursable (policy decision)

reviewed BlueBook descript/justif for project [concern was that no good base of info for nesting of murrelets in SC AK] needed to consider for (justify) occurr. to heavy hab.

Other recom.'s for mark. mun →

Loony

disturbance in nearshore areas

(e: 1989 - lowflying planes/boat may keep birds from certain areas)

forage fish → need info on

"clumped" → may be do to limiting forage <sup>good</sup> areas.

? any <sup>mgmt</sup> guidelines/ to protect murrelets <sup>m 248</sup> interim <sup>guidelines</sup> currently being drafted (BLM, USFS, State F&G)

Kim

all pot. nesting areas

shd be protected"

some overlap in areas of spotted owl.

Chyach → no proposed USFS sales on current schedule.

real issue is private/native land

any conflict @ near at. use? Kim → prob. not

\* Focus → Mark mun. emphasis is habitat protection

T. Rotte

establ. restn criteria → so could aim at endpt.

began with murrelet dist'n at sea.

(long range planning to see if set asides were effective)



→ problem ~~of~~ many non-breeders also come in

(9)

better to work in one area (PWS)

Steve Thos?

shd expand study (sur. areas to Naked Is) to det. if nesting occurs on ground

→ e: what's done at Naked Is. doesn't necessarily translate to Montague, Knight

Stan → 2 levels

\* logistics are problem

① overall dist'n (where are conc.'s of murlet on full area)

② w/in those area, what are char's + attributes of that habitat

unless get a random sampling of breeding pop. is using ground nests in Oregon systematic transects (N, S, E, W) how can det. what prop. of breeding pop. is using ground nests e: grid-nests are easier to find but looking for bird activity

other studies w/in PWS boat surveys (at sea) for

possibly using trees for inter. roost before grid nest still (but using trees)

\* Kach, Naked Is obser → birds are not traveling as far as in L48 in L48 → dist'n of birds mimics dist'n inland

85% of surveys had mark. murlets ∴ harder to pick out hot spots from at-sea surveys

possibly ~~using~~ use dogs to look for gd. nests

remote recorder (can pick up distinctive nest vocalis.)

poss. f.s. → dev. radiotags? [for one study using radiotags only caught 3 birds]

crowning; tracked to ledge nests

if found 25 tree nests in diff. area

during breeding season => don't roost

\* dawn watch has not been tried from boat => prob. be hard to tell difference btwn offshore could helicopter in + leave recorder

Stan => since concern is on private land; should we attempt to doc. importance of some private land for murrelets (e.g. Patton Bay, Montezuma) along @ Noked Is. (shore work at several spots, @ more detailed work at some spots)

Dank.

go from intensive effort into areas of predictive

id. areas of interest look at these

if possible to focus on threatened areas, assuming coop. of landowners

then good to set data here.

Stan => std. of science for Rest'n might not be quite as high as NREAT

Martha => level of proof will (Rest.) not have to be as good, but must be able to make a reas. showing that [aquir.] will benefit the spp.

possibly introd. a bias

need to start on wide scale => get

overall dist'n; then based on that - go back to pot. nesting sites + look for nest



(11)

active logging in  
- Two Moon Bay, Cordova  
- Fish Bay, Nelson Bay, Sheep Bay  
actively proposed.  
- in hole/dumps in  
Kachik Bay

Steve →

look at at-seas dist'n to start  
(surveys cover E+W PWS)

Chenege Is → hi murrelet.  
Emga Is → hi

Tom

Object → not totally define dist'n in 2 spp.;  
but do it in confines of nest'n need

define hab. in PWS/Kenai → look at  
private areas to ~~state~~ <sup>state</sup> out

→ fairly broad look at nesting  
hab in PWS area. [shld be done quicker]

Steve

\* 1<sup>st</sup> look at AT sea data for areas of concentration

\* more birds  
winter on  
E side of PWS  
(look at '72-'73  
data for  
wintering)

\* 2<sup>nd</sup> Step → sample variety of habitats;  
to extrapolate

but could go in-b areas of concern. (meat)

\* better to conc. on smaller area

Jim → could limit geog. scope; then come  
up @ basic hab. types  
need to know what areas <sup>shore</sup> birds  
are going to (? from at-sea)

? can stat. surveys be used to find truth?  
(at-sea hotspots)  
hotspots

biased for areas you can get to.  
could have miles of shoreline  
around each hot spot

electronics may be more cost effective →  
(call given on nest could be picked up)

OR → 137 transects  
visit sites  
4x

could cover larger areas

could use electronics as 1st step;  
focus in on visuals next year

Stan w/ broader approach  
could miss oppty to document some sites where  
something could be done  
Karmy → could incl. those areas  
of interest in broader survey

Stan need to assume that 1 year's worth of study  
will get something

Part of  
Restin. Study  
\$13,000  
NRDA portion →  
~50,000

Should not shy away from \$100,000  
? → look at likelihood of actually acquiring hab  
Stan → pretty likely; considered by all agencies on RANW

Karmy if study looks at all species →  
then det. area @ most use by  
most spp.

Stan ⇒ pleg. murrelets + harl. still;  
not clear cut @ goldeneye + scoters,  
doc. to justify other species might be  
difficult.

pop  
of survey data shows no effect (exc. 800 bodies), where  
does that leave us?

murrelets → but, but not nuked; still restin  
is based rec.

Stan { \* more clear the link to damage - easier to justify doing something  
\* can't justify hab. acq. based on single spp.



Natives selected best timber

John  
Pilot

→ link btwn near shore / + breeding near shore →  
prob. not traveling 50 mi. cause they don't have to.

→ look at things that can be realistic. be done

→ long term benefits of study (will anyone go back + look later)

Best Pot. Site → Kachemak Bay [rel. large pop, good place to continue studies in future will give good value for info.]

Jan → link to damage in Kach. Bay will be harder

Tom → ? What would be best for long term benefits for pop'n.

? What is breeding dist'n of the 800 dead [most were just coming in] winter dist'n

→ Acquis. of Equiv. Resources →

strictly speaking → no equiv. resources to acquire (marine damage in timber is not really equiv. but indirectly relat.)

Ask  
John  
about  
replacement

of out-of-court settlement → broad guidelines → then much freer to make a decision

Stronger argument for doing something in PWS, than Kach. Bay

with  
broader  
survey work over larger area

PWS. logistical is prohib; Kach. Bay is also prob.

→ has variety of hab. in small area

500  
500%  
250,000

(14)

kind ? hab selection in L48 →

- takes slope work in Olympics + N. Cascades  
did not find murlets

in L48 — based on survey prefer old growth, a mature growth

areas @ trees, & above timber line are both avail → if can det.

reference; then work...

(need to look at predator presence, too)

best data exists in PWS

~~habitat~~

↙ (avail from USFS mostly)

(cont what) → hab. type info for PWS; is it equally avail for Kach. Bay (aerial photos are avail)

Can USFS help do detailed hab. studies for PWS, would need to be re-done (exc. Montague)

→ could there in fact be diff's bwn PWS + Kach. ? more bias

should we restrict ourselves to PWS

tentative agreements →

① look at at-sea dist'n data

(rel. part of project?) ↗ possibly could be ready for proposal

② once found initial areas → add'l observ. / or audio sampling

to establish areas of higher use

(broader sample to incl. private inholdings;

? includ. Kach Bay → yes, if it is reason. cost

↘ will there be more intensive?

use of audio samples (~\$500 per monitor set up)

↘ will give an idea of how you start posit. people to do visual

75m to hear wing flap  
(200 m to person)  
tripod  
(beath. tho-proof)  
Cornell



→ shld require detailed proposal.

15

5 hab types (15 per hab)

linear transects

perp. to coastline

once find area of high activity →  
station an observer, +  
find nest sites

consist. flight up low valleys → leading toward bowl  
(in OR, WA → go up rivers; CA → cut arbitrarily)  
↳ repeated use  
of flight corridors

more intensive site specific work →

(concern giving up long term work - PWS work should be continued)  
might be worth documenting tree nests in PWS)

RPF needs enough info (on prob. of success etc) to present case to  
budget team)

↳ more detailed proposal would then be  
peer reviewed

<how imp is species you're working on shows damage>

↳ e: easier to justify small study on munes  
mark. murrelet. → widespread public concern

↳ can't tell which colony was heavily impacted

<USFS shld work jointly → sp. for habitat analysis. (can be  
used later)>

USFS will put more emphasis into GIS sys. (Ken Barber  
Zane Co.  
to ~~frank~~ maps  
crew for 1 mo → 24000

12:15 → lunch

Summary → Murrelet

habitat is limiting everywhere South of PWS (possibly SEAK)

limited by large trees @ moss

- # detected ~~is~~ directly correlated @ size of habitat

S. Patten  
ADFG  
Bob Hunter

Harley's Ducks

Sea Duck Damage Assmt Proj

- Harley's
- ~~Sparrows~~ Common Goldeneye
- White Scoters
- Blk Scoters

Harley → species showing most damage

- No. Hemisph. spp (Iceland, Sov. Un., Canada)
- center of dist'n → So. AK
- no one has done very much work

1<sup>st</sup> major work (Iceland) 1966

MS thesis → Glacier Nat'l Pks

MS thesis → 79-80 Zimbal (OSU) <sup>Jan</sup>  
↳ (summer feeding ecol)

general <sup>1/2</sup>FWS air/boat surveys

- <sup>in addition</sup> direct mortality; prop. of surviving ducks are in physiol. poor condit.

(min. adipose tissue)

harley + some goldeneye → Petro Chem in liver  
↳ <sup>+</sup> waxes in bile



Summer 90 → investig. feas. of conducting a larger study harley ducks.

historically bred in areas of PWS → something was happening to: Knight Is. (South) Main Bay

No reproductive (♀ broods) could be found. data existed for Green Elenor Naked Stray

Streamwalker could

also not find any in oiled areas - also evidence that harley pop in oil spill area is declining

Lack of Harley such breeding ecology → needed to be done before rest'n.

Feas. Study:

Resident & migratory (winter) component, Summer birds breed there

- extensive survey of 190 streams (3x 1) (Comm. Fish. persons)

[900+ pink salmon streams in PWS]

- no nesting females found, no ♀ @ broods

hot spots → harl. duck breeding in PWS:

NE St. Port Exp. W-Montague (Hanning Bay Harbor) McLeod Island Coshull R. / College Find

harley. broods observed in 1990

candidate streams for intensive study for further investig.

- Stellar Cr. (Sawmill Bay) {concrete baseline data 2yr → 2mball - never found nests per say found broods}
- New Check Pt est. } Hickenbr.
- ? Pt E. }
- Dog Salmon Creek
- Hanning Cr } Montague
- McCloud Cr }
- Coghill R. Pt. Wells College Fjord

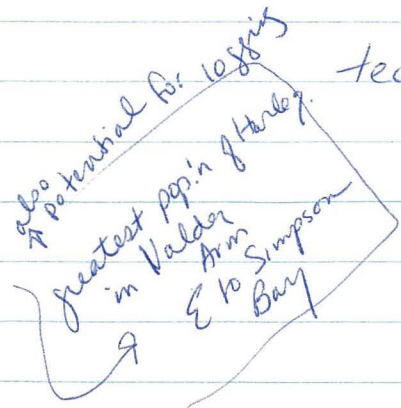
develop predictive model about nesting streams + characteristics

B. Hunter

- Stream parameters :
- R<sub>eff</sub>, width, depth
  - flow, rate
  - substr., turbidity
  - basic prod. (chem/bio) analysis
  - Temp, DO, CO<sub>2</sub>, etc)
  - riparian cover by spp.
  - density of canopy
  - forest substrates

tech. phase →

setup 2 camps: Knight Is. (where NRDA was done, Eastern PWS (mainland area - Olsen Bay (WMEF Camp,



could complement this project: (E PWS) Mountain goat winter habitat stud



[<sup>ptarmigan</sup> dep on FW watersheds for productiv.]

→ radiotag some birds early in season,  
(<sup>have</sup> some info on capture tech's)  
radiotracking → most succ. method to follow  
birds to nest

→ Port Echers (Hitchensbrook) USFS property → habitat is rel. secure  
cluster of <sup>(3)</sup> very productive streams  
could use to doc. what good hab. is.

→ Probable outcome → id of imp riparian hab  
for prot. → benefits other org's.

May 1991 → Aug } catalog of streams, <sup>prod</sup> molting sites  
+ model

other probs → Males leave ♀ in June → go to secluded rocky bays to molt - stay for <sup>8</sup> months (eat a lot)  
70 per site  
could id. molting area (inertid; ~~secluded~~ rocky bay)  
6 sites found  
low dist'n  
low density

breeding pop'n → ~ 4000 total during breeding season

pop'n demonstrated to ↓ in oil spill area.

(K. Kulsh)  
10-20  
melt  
within  
location

87-89 (nonoiled) 13030 - 1460

9% inc. in non-oil  
81% ↑ in oiled areas (not accurate)

→ molting sites located ~~was~~ <sup>were</sup> in oil spill area.  
↳ just discovered this yr. (rocky <sup>rich feeding</sup> areas)  
could be location effect or do where they breed?

Char's Nesting Items:

- 30-50' w at mouth to
- mod gradient
- .3~~3~~ - .5 m in depth
- clear
- salmon stream.
- extensive intertidal stream currents
- 5-8 km long
- <sup>birds 1st</sup> seen .5 km from mouth → + 3.5 km upstream.
- 750' elev. (streams begin)
- is there suff. breeding habitat in E AWS.

Northern end of Montague Is. (Rocky Bay) → ↑

- eat both salmon eggs <sup>⊙ ← ⊙</sup> & invertebrates  
held sample for avail. of food.

pred. model →

to id. suitable vs. unsuitable streams  
absence/presence [not predict # nests]

bias b/w E + W halves of sd.

Laguna Cove → early on

catal. → spp of salmon  
some habits of Gulls +

Critical reaches

use streams of AWS

→ predation by otter, ~~the~~ mink  
nest near brown bear

W AWS →  
Paw brown  
Black bear

- several (low) hundreds of  
dead birds by were harley ducks

90% of time spent in intertidal

Petrol. components → live

bite (carcinogens)

K. Kelly  
obs

1978-79 nesting on Nuket → on coast or  
shoreline (coves)

Elenor Is → 30 young; 3-4 adults

blk oyster catcher

→ nest was found  
in same area as harley ducks



winter migrant population → great influx after major aspect of spill  
 no absolutes [∴ shld have ↓ levels of Hg] ?  
 breed up in mtns - away from salt H<sub>2</sub>O (even footbeds of Brooks)

banding? prob not.

males in rich area in summer; ♀ fly up & down streams

anyone assaying MFO's? Short term response only analysed → ~~liver~~ liver, bile (short-term ↑)

shed energy lipid. (fat samples were not saved)

up show decline of

- stream has → w: mgmt guidance
- molting areas → marine sanctuary (molting areas)

usually rich for other spp.

dit  
 target  
 over  
 than  
 AWS

suggs for molting areas:



NRPA data survey data from Kevai/Kodeak exists

winter surveys (still not analysed) → might show larger diff than summer

Academy → lag laying interval  
btwn breeding;  
♀ getting ~~of~~ food are limited  
could capture ♀, put radio;  
regurgitating

3<sup>rd</sup> wk June → 1<sup>st</sup> wk July → hatch  
(should be off nest by  
time bear come)

nest sites described: (small ~~islands~~ islands on river  
~~area~~ @ knick)

radiology + find specific nest or can nest. be traced  
on location of broods.  
if suspect reprod problem, want egg.

is nesting restricted to being right near H<sub>2</sub>O?  
make consid effort to <sup>actually</sup> document nest (buffer strip)

molting →

skewed  
sex  
ratio  
(more M.)

manure / byproduct

- examine data avail. now  
(molting areas are prob not limited)
- intertidal → so may not be many  
options for rest'n.
- (coastal prob → mussel  
map ~~area~~ <sup>areas</sup> for use in mgmt)

~~600~~ (molted areas)  
Secluded bays @ large rocky can  
be identified based  
on maps.

Mgmt std. + →

Stan → water pltons in

Outsized PWS →

oil tends to hit certain pts.  
will strm popul. be different in PWS +  
Kwin / Kedun?

Aleutians → no breeding info  
Foxes

[PWS → more imp. for viewing  
than Aleutians

type re → more work in Kodiak [some stream work]

reprod. failure work could continue as damage  
assmt (if collective aspect is  
curtailed)

Review / Summary :

1990 F.S. (extensive survey oil + nonoiled areas)  
larger full scale nest study :

↳ analysis of adadrom. fish streams  
to id strms used for nesting / reprod

→ intent for add'l. protection

addt. tech work on sel. strms to quantify  
parameters for model →

for comparisons of E+W PWS ; addt. info on PWS?

- NRDA work may go further (in some or diff form)



- reprod failure work could be caused NRDA

- better understanding of male molting (mid-summer)  
uniform quality; protect of  
these sites are imp. (deflect dev.)

⇒ Harlequin go where action is (food, habit - hi qual. streams)  
for near. young molting  
potential for Kodiak comp (↑ logistics, ↑ \$)

(histopath. results not back yet)

some food chain data can be gotten w/o destructively  
sampled

- HC data on food items is not back yet

? any advisories rel. to eating harlequin (no advisories  
out now)

Kodiak

? Spar harvest (outside Kachem. Bay)  
not much magnitude

total seabird  
harvest → 1500  
July coast  
keep

# Forage Fish

techniques of data collect.

kittiwakes foraging areas in rel'tn to food that was out there

last 18 yrs → species decline

pyg. gull 11000 (1970)  
2000 (1980)

Sooters 1972 30,000  
(don't breed in Sd.) 1985, 89 < 500

Arctic terns 10,000 1972  
< 1,000 1989

something going on in PWS for some spp.

Harley → didn't change

1990 forage fish avail - kittiwakes  
surveys using chart recorder  
# fish, # birds (down to 200')

→ find & variat (temporal / spatially) for # forage fish compared to <sup>sea</sup> birds

3 sites { Valdiz Arm } perpend. transects from shore 0-500  
{ N side glaciers }  
{ Titled narrows } offshore 1000-1500

to det. diff. in nearsh. / offshore  
temporal (seasonal diff.)  
slack / normal tide

raw data  $\Rightarrow$  [fish showed up dark]

used grid; grade each sq. 1-9 based on darkness  
showed relative index of shading for diff. areas  
# of abundances  $\div$  # grids?

mean fish abundance: } nearsh. } no diff  
over entire 200' } offsh.

< looked at correlat btwn fish + birds >

stat sig, not known yet

m fish abund. (top 50') } nearshore } more than offshore  
25' } more fish nearshore

#birds nearshore 2x than offshore (means)

fish abund (200')  $\rightarrow$   $\uparrow$  glacier Is than Tattit. Is. Valdez (none of these animals hit by oil)  
 $\leq 50'$  Tattit. + Valdez same, glac Is drops a little

more fish deep at glac. Is; Tattit + Valdez Is. same

no diff in birds at 3 locations

{ no diff (fish abund) btwn slack + flowing tides  
no real diff in  $\bar{x}$  birds in slack/flow tides

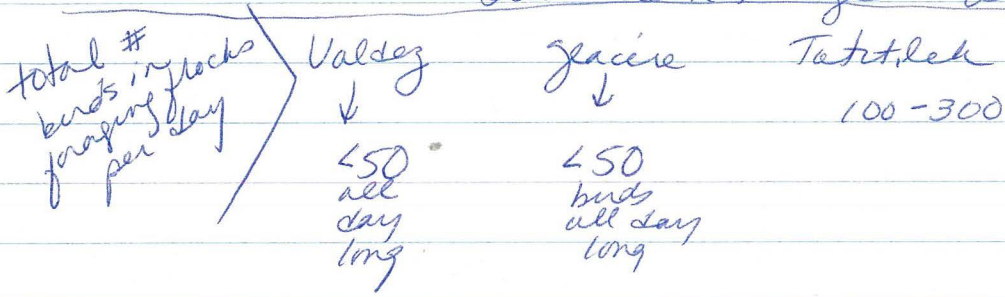
early seas  $\rightarrow$  not much diff in fish @ 200'  
mid seas  $\rightarrow$  450' not much diff.  
late seas  $\rightarrow$  425' not much diff.

btwn middle + late  $\rightarrow$  fewer birds in late



morning + we differences not done

Prob → takes long time to do transects, but don't get alot of data



\* D. Irons feels Tattler is more imp. for foraging (foraging flocks not been caught in transects) but were there

how imp is depth of fish to # birds?



as fish got deeper, less birds in transects

sig correlat → # birds + # fish in <50'

\* shallow fish more imp. to birds than deep fish

only correlatabon

Nearsh/offsh → diff in abund of fish + birds

foraging flock data → diff in 3 areas

no diff → slack/rowing

" → season

restn for forage fish → need to know?

+ took data to answer.

\* no damage to forage fish etc. herring (larvae deformed) in oil area (no damage asst study)

food samples for kulliwaks

herring, sand lance, caplan, pollack

? can do bestia study on something where no damage is shown?

→ don't know what fish were represented by bio-acoustics

Chute Bay did have some data on <sup>collected</sup> birds to see what they were eating  
nets didn't work  
some cast nets

Chute Bay }  
no records of kittiawaks eating juv. salmon (salmon stay around til 1st wk of july)

(early on - w/ large pollack) (til 7/15) not analysed yet  
later → some herring, caplan, sand lance

& no lit. on salmon being food source for birds  
D. Fry Kaduk K.

Elmington Passage } Mark  
Montague Is. } worked

at sill (Chute) - large sp. of pollack → foraging more intensive at flow thr. stacks (prob at certain locations)

→ should look at daytime effects

herring - 2 yr. old (90-110 mm) } size of fish being taken  
pollack - smaller ~80 mm



→ must explicitly state objective (before det tech.)

- could look at abund. in oil vs non-oil but no historical data to compare with.

2 questions re: technique →

① how large an area can you look at to quantify abund of fish & document

② if can do, how much natural variation

→ actually looking at index, not abundance

Rest'n. Does it need to be tied in to non/oil vs oil area?

history → this pilot proj outgrowth of sense of longterm pop'n declines in PWS;

sugg. that forage fish avail could be a factor. ∴ possible link to NRDA

link to NRDA is not key?; but

is there info that can lead to some rest'n action (re: hab prot. mgmt type)

this generally prob could make damages

must set off for rest'n

E. Biggs →

know better about dist'n of herring exc. for spawning time.

mgmt. implic: for herring from this type of informat.

Competition btwn hatchery - rel. fish & other fish that eat as forage fish

need to know what spp. ∴ biomass; abundance

need to know what spp fish eat

[CFOS project (corp. fish/ocean.) need copepod study? sand lance/pollack

mixin @ salmon fry.

? correlat. btwn release of hatchery fish +  
bird decline?

if lack of food for birds, shouldn't it be  
reflected in reprod success.

interesting?  
could look at → reprod succ correl. @ fish in water around  
colony

OR

reprod. succ.

Prob? Fish move  
(palest) need to  
really sample  
whole  
PW sound

tech. ? Can acoustic electro<sup>chemical</sup> differentiate what you're  
looking at below.

- can tell gross differences (if experienced)  
(e.g. large fish vs. small)

but e.g. pollack vs sandlance is difficult.

for biomass → need new grade of equip (50-100,000\$)

↳ but still need to sample (trawling is most difficult part)

even if could estab rel'n btw abund of birds + fish →  
What could you do about it? major proj.

→ natural fluctuations are common  
in fish pop.

this type of longterm project might be approp → when  
got sellout so it could be

multi-yr, multi-disc. project.

(may be difficult to relate to  
Rest'n projects for 1991)



10/31

# Forage Fish

temporal & spatial variability fish

near shore / offshore \* difference

flowing / slack no diff

3 areas < 50' less diff

time (season) no diff

conelast btwn birds & shallow fish above

tie in to rest n / damage

no prev. data } forage fish

damage asmt } exc.)

no data on sand lance, pollock cap. } but may have been hunt if have same lifecycle as herring

herring → data on damages to herring larvae (pop. level impacts are not known)

Pink Salmon:

wildstock in oil streams were hunt

hatchery stock was record return when spill

1990 cohort that ret'd, were already hatched ^

\* 1991 " ~~only~~ 1<sup>st</sup> to have been in egg + juvenile stage after spill

What kind of ?'s can be answered @ tech. avail

→ can't assess stocks of smaller areas + is that meaningful? → since moving, hard to tell real impacts (could be in next bay)

→ use seabirds (productivity) as indic. of prey avail; only show avail to those birds → may not reflect if fish are there



# Damage to Kitiwakes →

1989 reprod success of colonies in oil spill area was half of expected. (sig.)  
 colonies outside oil had best year  
 buds sent in did show oil

in 1990 all PWS colonies were about 1/2 of what they had been in past years ~~years~~. [but <sup>size</sup> lower in oil area in 1990]  
 indic that not enough food was around (normally fledge 30% of chicks - usually 2 chick broods)  
 broods size for PWS was ~ 1/2 what it was in previous years  
 ∴ food was limiting in 1990.

why is food down?

(sea temp was warmer; sea birds entire N. Pacific did poorly did not do well for reprod succ)

PWS does not normally reflect other areas usually

discontinued kitiwake study in 1990 (only did <sup>nest</sup> monitoring)

→ fledging wts for juveniles was lower in 1990 compared to other years

if assume that food shortage occurred → then maybe need study

? did kitw. start nests in 1990 before prob @ food →

1990 → highest # of nests built in PWS  
1990 → highest # of clutch size  
(based on 3 yrs data)

was't this surprising if food was short;  
→ early on looked like no prob. maybe food prob started after eggs  
Middleton Is → most nests,  
but 0 productivity  
↳ largest kittiwake colony in AK  
but predator prob

opinion  
in 1989 → appears eggs got oiled + didn't hatch  
prob not food limiting (some 2 chick broods survived)

in 1990 →

no good diet data on PWS;  
1989 pollock early on in season  
but unks. if this (2 yr old herring) is normal herring  
← herring in mid July + other spp.

any correl. of reprod failure of birds to herring stock  
(lot of variat in herring stock)

Planning to monitor <sup>kittiw.</sup> chicks for next couple years.

need another yr or two to see <sup>pop.</sup> any herring D5  
→ next year, would expect blip in herring,  
but <sup>then</sup> may not have herring in diet, may compensate @ other fish







can't go back & start a new dam. assess  
study  
but some aspect of monit. can be  
justified from rest'n. stopt.

looks like damage to kittiwakes ∴  
maybe shed expand Chute Bay  
study to other colonies in ~~down~~  
other ~~oily~~ areas.

Shm → imp to monitor kit.° for next couple years if  
expecting to see ~~kit~~ herring  
changes

possible drop  
in herring  
in next 2 yrs  
∴ need to  
continue  
the seabird  
monit effort

what can be done if re. rest'n →  
possibly chg in mgmt Δ in herring  
(for benefit of ecol. resource  
in addit. to commerc.  
resource)

→ more protection is prob. not necessary for kittiwakes

→ could make some chgs. on Middleton Is to help  
kittiwakes

→ are there any ways to enhance forage fish pop'n.  
[e.g. quality of substrate]

log dumps  
mariculture activ. } could be protected  
from current laws

workwhile to continue using seabirds as signa  
(kittiwakes, gullleasts) food avail.

marine electronics on sportfish are getting better

→ Bird people shld talk to fish people  
(tried to get some fish people to this mtg, but noone could make it)

Tech. Studies / Feas. + Rest'n. for 1991 :

expl./revisited → factors  
matrix (blue book)  
green book except (p. IV-23-25)  
one pg. NRDA Results

Monitoring vs. Restoration →

RRWG → monitoring is an appropri. part of rest'n.  
- effectiveness of rest'n project itself  
- public (damages in 10 yrs that rest'n could respond to)  
- baseline  
for - for future damage awards  
- response

MOA (fed. state) → incl. monitoring in def'n of rest'n.

⇒ for '91 program → need to justify that there is a reason to start a particular ~~rest'n~~ monitoring proj. in 1991 - inst'd of ~~longer~~ starting later



fed. pressure

Shift rest'n projects as opposed to studies  
would expect skepticism re: Feas. studies  
state would support real credible rest'n projects; but mostly support more resch.

### IV. Direct Rest'n Projects:

#### ① Removal of Introd. Animals on Selected Col. Seabird Nesting

some islands w/in spill area that worthwhile program

1991 efforts shld have link to spill area  
(longer term efforts outside spill)

- current proposal have no islands in spill area
- some isls. in spill area did have some in "

S. Patten → cost effect most bang for buck - meets criteria potential to be a productive exercise; remove limiting factor - will effect pop'n. soon (~10 yrs)

USFWS has sev. years experience doing this

could piggyback on existing prog.

drawbacks → outside spill zone ("equiv. resources" ~~equiv. resources~~) may not be effect. species most hit (murrelets & murrelets most hit) } some overlap of spp.

estimat of cost → see sheets

- \* poisons (banned by EPA)
- trapping is difficult



1991 rec. (for 2 islands) → may be able to sidestep poison?

explore poss. of using other type of poison.

\* probs. @ present public sentiment

only weakness →

- nonspill area

- not the same mix of birds that were damaged

→ is there an island in spill area that can be added.

prohib of eggtaking →

subst. controversy;

also eggtaking is not a big impact

\* will rodents become a prob if foxes are removed [veg/erosion prob]

\* do 1991 proposed islands incl. some of damaged spp.

follow-up monitoring might be the real expense.

RAWG can only propose year by year

→ all biologists in group feel that this project is better than trying to enhance seabird colonies (bring birds back) → this project is more effective

("introd.")

rabbits on Middleton? → may compete for space; many rabbits

red fox (neutered) + put back on island (done on 2 islands) could be used to enhance trapping  
reds + mchcs do not co-exist

### ② Disturbance on Bald Eagle

"looks like monitoring" or feasibility studies

Spill response → not particularly relevant

Possible re-evaluation of guidelines for  
dist's. ~~from~~ for bald eagle

old guideline - 330' (nesting tree)

R/WG could be prob since it addresses dist's from clear-up activities  
(not nec. to do in 1991)

D. Bly → not a high priority for next year

→ does address dist'n / guideline chgs for future

→ conned. to nesting projects that will occur in other areas

→ if need to use pre 1991 activities for this project, then needs to proceed in '91

no write-up

### ③ Designate PWS as Marine Sanctuary or Marine Park

#3-14 state marine parks in PWS (c: Chute Bay)

? all have upland hab as part of park

[state claims tidelands + territorial H<sub>2</sub>O] 3 miles  
administrative created → limit } must count water  
legislatively created → limit }

flexible authority has

→ written in regulat's for activity (c: oil + gas, comm. fisheries)

→ can tailor design to particular prob / isch. you're trying to address



shd. get <sup>copy of</sup> marine park legisl.

\* → for bird resource, ~~shd~~ <sup>added</sup> will protect. be beneficial

State of AK has been historically opposed to Fed marine sanct.

Estuarine reserve } instead  
State parks }  
State marine sanct }

→ could be initiated in 1 year; may not have to start in '91 however

\* would a desig. be beneficial for birds  
(desig needs to have \$ set aside for monitoring)  
ie: Fed desig gives sanct. a small budget, has active operating plan

ie: Preset sd. → marine sanct. proposals (oil industry is considered about tanker traffic)

desig. alone  
a could bring mgmt / \$ (continued research) to area & do alot more to regulate

? who would do it →

if marine sanct. (prob NOAA would do review of resources/oppty's. <sup>OR state if marine park or critical hab</sup> legesl. component

is this a feas. study? not really cause method is establ.

could incr. recreat. use & be detrimental? (ie: four boats etc)

maybe don't want to support state park (due to ↑ recreat)



once <sup>spell</sup> attention to PWS, <sup>PWS</sup> ~~factv.~~ drawn to due  
publicity →  
more, + could get worse

? CZM (state, Cordova + Valdez)  
3yrs<sup>030</sup> proposal to include rest of PWS in CZM  
plan  
Cordova

AMSA (guidelines)

? \$<sup>2-3</sup>3-5 mill dollars costs for estab. marine sanct.

rest'n funds to support desig (mgmt, monitoring)

could be  
Pead.  
or  
tech.  
support

multi-agency team to come up @ booking  
at what desig. is best

if proceeding @ estab. → Act. Rest'n  
should we proceed → Feasib. project

Concept. (AK perspective) on "Lock up of land"

what is needed to address resource concerns

Luna

Tour Operations / Commercial Fish

→ see  
new  
pad

Board Meeting - Oct. 30

④ Educate Tourists

(similar proposal for Recreat)

- reduce disturbance by <sup>educ.</sup> tour operators & others who come into contact @ seabirds handouts, etc

not costly, fairly easy  
not critical to happen in 91 (not <sup>lost</sup> vital data)  
but will have an immed. impact on reducing disturbance

potential for disturbance → indiv. wknd boater (probably not the tour boat operator)

also @ Henry Spothis, purse seiners

? priority for 1991 → can't be answered til we know what competing interest group

↓  
this will enhance & sustain productiv. of a damaged resource  
[disturbance is potentially limiting young productiv.]

disturbance listed as high priority in last year's resource

→ Any additional restoration oppdy's for 1991 →

look at matrix in blue book

Purchases of habitat (mult-species benefits)

USFWS/NPS trying to pull some things together & see how overlap

"Postal stamps"

State is interested in identifying opportunities to benefit damaged resources; prepared to go to legis to try to get \$

Notice of intent or FR includes possibility of acquis. of habitat

in order to propose in '91 →

critical to have enough info to propose it now

① risk (threat)

② link to habitat as being used likely, a imp. habitat

∴ muddled / hareleg → hard to justify argue

needing info \$ to get info on nesting; while arguing for hab. purchase

\* → if benefit many species

impending logging on critical hab?



e. eagle distn  $\rightarrow$  ~~ade~~ suff. justificat.  
to go right to rest in no further studying

(3)

logging may be occurring in areas not spec. affected by spill

$\rightarrow$  should talk about easements; etc other  
 $\rightarrow$  cospayments than outright purchase for 1991

RPMG uses term "argus" loosely; will pick most appropriate tool

need is immediate (esp for eagles)

State Forest practices act

66' buffer on 1<sup>o</sup> arad fish str.

rest \$ could double buffer + pick up tributaries

USFS (Tongass) 50-60,000/yr to look at dist'n.

U: naked ls  $\rightarrow$  humelits using trees  
warley nest in sal. strms

$\rightarrow$  need to set up mech to determine where to put \$ (what to protect)

<sup>may</sup> need further studies to det. boundaries

$\rightarrow$  will give factual basis for full program when settlement \$ becomes available.

set aside a pot of \$;  $\rightarrow$  set up process to negot. for

prot. of key habitats  
looking for "oppty's" that make sense

Imp  
to → ① Fox <sup>mont</sup>  
- habitat sav

④

look for intersects of values  
↓

look at prop. of ownership

14H-1 sites (cult. resources) should be kept in mind

Fish Bay (Tahiti) - potential site; no direct oil  
- need to look at what's avail?

do we need to stick where the oil struck shore?

- buffer strips should be priority (at least have to buy parcels)  
(Natives want to retain title)

① need to maintain

? Priority → habitat most in jeopardy  
opter centers (not checked)  
↳ for forest env. reference.

ie: for murre (colonial seabird) → looking at pieces of real estate  
USFS / USFWS etc. private ownership

NPS

① protect now  
② public agency  
NPS, → apply for publ. ed.

ie: Gull Is. → [owned by native corp.]  
2 acr.

must restore  
not only birds,  
but also  
provident

also → visitor center

④

? Kerai R. corridor → fish; any connect for birds?  
gulls,  
imp spring staging for snowgeese <sup>at mouth</sup>  
attempts in past to get some

Summary:

- ① Forest hab - primary importance
- ② Seabird nesting hab (in prox. to people)
- ③ Use acquis. to reduce dist'n.

? Loons (yellow-billed) (summer hab.)

\$8 million

- buy back lease sales in Colville
- protect. Is. Wildlife Refuge (Puget Sd) for San Juan Is.

tech support →

birds that were killed in PWS → don't know where they breed  
← possibly note to Colville



- dist'n message on NOAA charts
- locate seabird colonies on charts

could be prob to pt. out these sites on charts



5) Long Term Monitoring - Bald Eagles

what ~~purpose~~ monitoring for recovery → to present a case

continuation of damage assessmt work?  
if <sup>NRRA was was</sup> ~~continued~~, ~~then~~ will it be continued?

probably  
↳ maybe then shld not pick it up under rest'n now

? is this appropriate / important for the next decade  
clean damage in 1989; 1990 product. maybe normal  
USFWS → yes

develop of a model to show extent / durat. of injury  
(how do we look at lifecycle for long life bird, over next 10-20 yrs)

if justified under monitoring → is there <sup>some</sup> result in next ~4 years that could suggest rest'n options?  
< monitoring is imp. to have data on hand to assess damage next time >

dev. a model (one cohort's decline → what are effect)

Other arguments for monitoring

① recovery (measure + det)

is this only lost-use value

② connection to doing something toward the rest'n of spp.

What about "gaining knowledge for support of future mgmt decisions"  
↳ does it qualify for rest'n

need to push monitoring of all spp. { if support  
mont. @ eagles, then shld support other

USFWS  
List 2

Other Monitoring:

- ⑨ Pkg. Gullenets
- ⑩ Arct Terns
- ⑫ Kittiwakes
- ⑬ Murrelets
- MurreS?

do same arguments  
for monitoring apply

damage vs. non-damaged:

eagles	} monitor
Kittiwakes	
Gullenets	
murrelets	

bec of damage

can make case for  
damaged resources  
post settlement

arbitrary → damage?  
not much

10-31-90  
@ Simpson

## Birds - Restoration Worksession

(This is Day 2 of Stan's agenda - after lunch)

Looking @ matrices for ideas that can be implemented in '91:  
Irons - mixing is habitat protection for murrelets, harlequins, eagles (acquisition).

Bob <sup>Dady</sup> need is immediate for eagles, at least. Proj. #1 (listed in the handout as under Tech. Support) has a habitat protection component & should be considered.

Re: Study 3: some of logging going on now likely in proximity to eagle nests - good opportunity to do studies on effects.

Stan - don't we feel there's sufficient info to move right into protection - Bob - wouldn't argue against

Stan - Anthony + Iovace paper from Ore. suggesting need for ~300m buffer strips ... (eagles?)

John P. - murrelets are using trees, harlequins are using salmon streams, salmon streams need tree cover for integrity ... so yes, do know enough now to move into protection.

Keep 14(h)(1) sites (ANILCA) in mind - arch'd. sites that will tend to be in rich, productive habitats (such as near stream mouths) - ostensibly ~~limited~~ restricted development anyway, but could help <sup>land</sup> owners by tying together w/ cultural, too.

Stan - asked group - what about Tatitlek land @ Fish Bay. Not oiled directly, but is ecosystem consideration enough to justify it? Group - clearly, yes →



10-31-91

# Birds, cont.

2

Stan - where do you (group) rate habitat protection in overall scheme?

Group - clearly #1, esp. if include marine habitat -  
Irons said fox eradication important, too.

Overall, group felt this was only best way to get/keep production. Won't have "bird farms" in any meaningful way.

Stan - habitats in jeopardy: eagles, murrelets, harlequins as main priority & others somewhat less? (Not cliff-nesting colonial seabirds)? (Irons - pigeon guillemots nest @ interface w/ uplands, as do oystercatchers. But main link = e, m, h: yes.) (No disagreement)

Stan - what about Gull island, Kachemak Bay (Native) - for public info, education, etc. (2° to forest hab. protection)

Bob (also, acc. to limit disturbance - eg, to p. guillemots)

- YB loons - N. slope (Colville Δ) or N. Manni Sanct. in Puget Sd where many winter. → too specific pop'n injured by spill - uncertain.

Also, see handout.

Break -

Monitoring - See handout for project #'s -

#1 Eagle pop'n monitoring - Concerns that it must continue (under some program - NRDA or Restn) in '91 - high profile spp., clear injury in '89. Bob - but to extent that it focuses on <sup>level of</sup> a productivity model, should better be NRDA.

Stan - another test - will monitoring eventually result in restn, or just tell us the degree of impacts that occurred. →

10-31

# Birds

Bob - providing baseline for future events?

- - Re: This proposal as written, not restr. Need links to recovery monitoring established, or its NRDA.

Idea that, if rewrite + support eagle recovery monitoring under restr program, should support similar programs for "less sexy" species for same reasons (not let Trustees just drop <sup>those</sup> projects for \$ reasons) (Exp for those species w/ good info they were damaged.)

Linda leaving here - use these notes for last hr. of mtg.

Murre, hardest hit, not on list (handout?) - group feels important - the spp they'll push hardest for staying as an NRDA study (along w/ eagles).

Sten - will look @ them if NRDA doesn't pick them up.

↳ Murre - restr possibility on Baren Is.

~~Pigeon~~ (P. Guil + BL Kittiwake) imp to monitor given colonial - can tell repro effects more easily than murrelets, etc.

Murrelet repro success would be adult/juv. ratio, oiled vs unoled areas.

(Keep in mind <sup>for FS</sup> reasonable likelihood of study success - for above study, eg, ask if OY 3 is still possible to tell diff. in productivity in oiled vs unoled areas.)

Sten - suggest FWS to write up more general "marine bird repro success monitoring" program that covers several spp.

(<sup>incl.</sup> murre (outside PWS) - are there marine birds to monitor on Kodiak to keep from spewing to PWS? <sup>need to</sup> Devel. progr. outside PWS.   
↳ <sub>to baseline prog.</sub>



10-31

# Birds

4

Kent Wall - they'll follow Stan's suggestion - & will include black oystercatchers. (other surfbirds?)

Another monitoring proposal:

C-2 = Aerial surveys of birds & mar. mammals (see Hotchkiss)

(Steve & why is boat monitoring (C-1) <sup>not</sup> in monitor category?)

[Stan - misclassified] → but presented as method dev't, <sup>misstated - really</sup> better efficiency of approach. Methods known.

Stan Red flag in this package - rearing of beaches (implies still documenting impacts of oil (from beaches) - so that part at least is NRDA.

(duck, not alcid) → gets loons, too

Sam - Otherwise - aerial survey info valuable for supporting other monitoring or restra or NRDA work. Feels fits well under monitoring.

Bob - thinks this is one that won't be continued under NRDA.

feels very strong that it should be continued as winter survey on duck wintering popn (FTE summer for breeding pop).

(May be too high a price tag - no need to hire FTE for 2 wks of surveys)

Stan - is a criticism here that this is info that managers should be doing this anyway? Or is this nat'l recovery monitoring?

Bob <sup>yes - nat'l recovery monitoring</sup> no need for popn mgmt to do this, but for spill concerns.

? - need for aerial and boat surveys? (winter-aerial gives full coverage of shoreline - but is index vs harder #'s - & can't do winter survey from boats on outer coast.)

me → <sup>Package</sup> Group find aerial & boat monitoring under 1 project?





10-31

Birds

5

Bob - for NRDA '91 - boat likely to continue, reduced  
 (10<sup>2</sup> 3 surveys) (+ boat monitoring necessary for  
 pigeon guil, marbled murrelets, oystercatchers) (more intensive  
 monitoring of repro success of some of these spp. does  
not cover broader-based boat survey need, since  
 not broad-scale and since the other give index #'s, not  
 pop'n #'s) (Consensus these are very imp't monitoring  
 projects)

4:00  
Tech Support Proposals

Bob - (#1) - P. Schempff  
 ID done well in Western PWS. Very spotty in  
 eastern PWS, + Kenai coast. To protect eagle  
 nesting <sup>roosting + concentration</sup> hab. in those areas, critical to ID where the  
 hab. is, specifically. Proj. places highest priority  
 on threatened lands (private) - boats there, survey  
 can be most accurate. Helicopters on public land.

Stan - seems imp't proj, to extent eagle figure prominently into  
 hab. protection. (Consensus) <sup>Bob</sup> May not be covered by NRDA.

(#2) - Schempff, also - prey hab. - not clear exactly what  
 eagles feed on, esp in winter. Need to ID better ~~what~~  
 what intertidal resources they use.

Stan - less clear how this one pays off for reatin, vs other one.  
 - esp. since intertidal reatin work itself moving toward

Consensus → monitoring + protection of adj. upland hab.  
 - short of supplementing eagle food in winter - as some have  
 asked (public)! - But reatin in 89, too. →

INCL  
 GROUND NESTING  
 ON GREEN IS.  
 INCL LATE WINTER  
 HOLLAND RUN L3 @  
 AKUTAT, EXAMPLE.

10-31

# Birds

(#7) done earlier

(#8) (Kittiwake, p guil, m. murrelets food habits) (Short & write-up only) -

Dave Irons - tied-in w/ prey avail (forage fish) -

Stan - hard to sell in '91 (No disagreement)

(#14 + 15) - ID habitats needing protection

Kent W - to help support acquisition + moine save. / critical hab. projects. esp - colonies / habitats <sup>we</sup> don't own (public) now.

Stan - can 14+15 be packaged? What's diff between

7+15 - 7 needed for 15? Package 7+15

(#14) is basically a desk study - existing info - low cost.

(#18) - Subsistence bird harvest (broader to harvest, not just birds)

- inpt to economists to help establish value of birds to people. + Noone knows what fed or state economists are doing, so unsure if already being covered.

Stan - how tie to resin? Kent - could help target the more inpt esp to restore from standpoint of use.

→ We need to find out what economists are doing

- #46 doing subsistence surveys by village. Initial work could likely be desk spruce ~~from~~

John S - any HC sampling of subsistence birds?

Stan <sup>5000</sup> - Roche addressed yesterday. No highly signif findings - matter of debate/viewpoint. Contem'n was there, but ~~wasn't~~ #46 said ok to eat as long as don't eat livers. →



10-31

# Birds

7

John - as consider potential to pop'n damage - he would have expected proposal to look @ molecular indicators of damage - DNA adducts, etc. Anyone thinking of this?

- Genetics <sup>NRDA</sup> proposal made early on, but not funded. (Stock separation, eq.)

- 4:30 - Stan has reprieve will continue until 5:00! -

Talking about a genetics stock ID type program.

Stan - must it be done in '91? (Samples already avail.)

(#C-3) - devel. ecosystem model to direct restra in future

(#C-4) → not something we can do well enough in '91 - discussed earlier

→ Stan - seems something to address after info from all studies in...

Author - sees as useful to satisfy any objectives here. But not a discrete product. Dynamic - add all future info into the database.

Bob - lack of a <sup>such</sup> model is glaring hole in NRDA itself.

Stan - but don't see clear expression of how to use / why we need now, in such a way that T.C. will see they want it? How large an undertaking?

Kent W - Like NOAA MESA project & OCSEAP ~~type projects~~ type projects → had proposed for PWS several years ago.

Stan - no matter what - need to repackage it.

John - & might try again under NRDA process. →



10-31

# Birds

8

Stan - + coord'n w/ Spies is necessary - had to be but to push it.

Kent - try for project to begin developing an ecosystem model (i.e. - seed \$ to begin its devel't)

Group recommends suggesting to Spies that he do this. If he thinks it's good idea, \$ could be found now to devel. the approach.

## Feasibility

→ Nyswander's new proposal - recolonization of murre (Below) (deery Procellariids)

## (#5) - oystercatchers

Kent - clear damage to them. So clear that WRDA study dropped after 1st yr. Talked today about including in rep's success monitoring <sup>for main bird app.</sup> - agrees. And, focus should be on nat'l recovery monitoring <sup>Green, Montague, etc.</sup> Also, to extent more cleanup may occur in '91 imp't to start in '91.

Stan - for rep's success, agrees. What's restoration connection (vs for future cleanups) for 2nd part (need to do in '91)

Kent - agrees none. Focus should be nat'l recovery monitoring + rep's success monitoring.

Stan - <sup>agrees</sup> should be 1<sup>o</sup> focus, not treatment.

## Murre Recolonization

(Handout)

Nyswander - not here

Murre was hit hardest of all birds.

Dan Roby - questions meaning of asynchrony. Diff't reasons possible. Treating "symptom" of asynchrony may not help restore the pop'n. →

10-31

## Birds

9

Stan - is worth testing tho?

Roby - ~~yeah~~ - must focus on murre since so heavily damaged and predictions are many decades to recover. Concerned that "sexy" spp. ~~are~~ are getting most of the attn. This proposal, ~~though~~ <sup>since</sup> unsure if it will make a diff. since entire colony wasn't wiped out, <sup>NOT</sup> ~~is~~ worth trying at this time!

John - lots of mures still on Barrens (this colony) - doesn't think will help health/productivity of colony. And won't be able to measure whether the technique is of benefit under this design.

But - the portions dealing w/ increasing info on recovery <sup>dynamics</sup> of mures is very important.

Brian - why focus on this as only murre project? If want to restore pops, aren't there other potential approaches such as reducing high seas mort? ...

Bob - ~~this~~ murre ~~project~~ <sup>study is</sup> likely to be covered by WRDA in some manner. May not address asynchronous mechanisms, etc.

Stan - So - for now - we need to ID what will be done by WRDA.  
- Ask Steve (?) Cross, too for ideas -

Passed out formats/instructions.

5:20 - End meeting



10/30/90

Bud Restoration Meeting

<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>	<u>Fax (if known)</u>
Linda Comerici	USEPA	(907) 271-2461	(907) 271-2467
Sandy Rabinowitch	Dept. Interior	907 257-2653	907 257-2510
Dee Bowden	Colo. State Uni.	303 <del>491</del> 5077	303 491-7895
Steve Klosevic	USFWS	907-786-3523	562-2297
John Pratt	USFWS	907 786-3549	"
David Leans	"	786-3376	"
Kent Wohl	USFWS	786-3503	562-2297
Robert Hunter	ADFG	424-3215	424-3505
MARTHA FOX	EPA	206 442-1497	
SAM PATTER	ADFG	907-344-0541 ext 376	
KIM NELSON	OREGON STATE UNIV.	(503) 737-1962	(503) 737-3590
Dan Roby	Southern Illinois Univ.	(618) 536-7766	
Carol Garbin	USFWS	786-3520	907-786-3350
JOHN WRIGHT	ADFG	456-5156	
Mary Anne Bishop	CRDI, USFS	1-424-7212	1-424-7214
Keith Bejantansen	CORROON DIST USFS	424-7661	"
Kathy Kuletz	USFWS	(917)-786- <del>3453</del>	
TOM ROTHE	ADFG	267-2206	344-7914

10/31/90

Ann F. Barber	USFS	271-2836	?
Robert R. Leedy	USFWS	786-3444	—
Brian Ross	USEPA	907 271-2461	271-2467



Monst?

TITLES OF ADDITIONAL RESTORATION FEASIBILITY STUDIES 10/8/90

SUBMITTED BY DAVID IRONS AND KAREN LAING

Temporal and Spatial Differences in Food Habits of Black-legged Kittiwakes, Pigeon Guillemots and Marbled Murrelets in Prince William Sound.

Justification: Damage Assessment Studies have shown damage to kittiwakes and guillemots. Diets of these species have been sampled in only one or two locations in the Sound. It has been, perhaps incorrectly, assumed that these samples are representative for all birds in the entire Sound. We must know what species of fish are being eaten by birds throughout the Sound and throughout the summer while the data for the Food Availability project are being collected. This project could be combined with the Food Availability project or could stand alone.

Population Status and Reproductive Success of Pigeon Guillemots in Prince William Sound.

Justification: Damage Assessment Studies have shown damage to guillemots. The population in the Sound, which was at a 20 year low, was further damaged by the oil spill. Their numbers may be at a critical level and need to be restored, through insuring reproductive success and survival of adults.

Submitted by  
Sandy Rabinowitz - DOT

Mount 7

TO: Paul Gertler  
Oil Spill Coordinator

FROM: Lee A. Hotchkiss  
Project Leader, Bird Study 2A

DATE: September 17, 1990

SUBJECT: Oil Spill Year 1991 Restoration Monitoring Proposal and Budget

Aerial surveys of the Prince William Sound and Kenai Peninsula have been flown during March of 1989 and 1990, April of 1989 and 1990, May of 1989 and 1990, July 1989 and October 1989. The October 1990 survey will begin late this week or early next week. These aerial surveys provide a relative index to the waterfowl and waterbird populations and is an excellent method of detecting population and distribution changes in those populations impacted by the Exxon Valdez oil spill. Injuries to waterfowl and waterbirds from exposure to the oil spill included, but were not limited to, death, changes in behavior, and decreased productivity. This aerial survey proposal is offered to continue monitoring waterfowl and other waterbirds recovery response to the oil spill by observing and reporting changes to the distribution and abundance of waterfowl and waterbirds in Prince William Sound and the northern Gulf of Alaska.

Re-oiling of beaches by oil released from the beach substrate will continue to affect waterfowl and other waterbirds. Other bird studies such as the sea duck study No. 11 are indicating a possible relationship between some sea duck species and the contaminated food chain they are dependent upon.

Aerial surveys will also provide a reliable index to the marine mammal populations found in the study area. The resulting survey data showing distribution and population of sea otters, sea lions and other marine mammals could prove to be valuable to other ongoing investigations.

These surveys will provide a valuable index in the measure of recovery of the oil spill zone as it will measure changes in wildlife use of those habitats impacted by oil in comparison with those that were not impacted.

This proposal is expected to cost:

Salaries	\$67,000
Travel/PerDiem	7,000
Supplies/Equipment	5,000
Aircraft	<u>45,000</u>
Total	\$124,000



# DRAFT

## INTRODUCTION TO PROPOSED RESTORATION FEASIBILITY STUDIES FOR BALD EAGLE PROTECTION AND MONITORING IN THE EXXON VALDEZ OIL SPILL AREA

Bald eagles are a frequently seen resident of the area affected by the Exxon Valdez oil spill with approximately 2,500 adults and near adults in Prince William Sound, 500 along the Kenai Peninsula, 1,500 on Kodiak and the surrounding islands and another 1,000 along the south coast of the Alaska Peninsula. Roughly half that number of immatures also occur in these areas. Response teams collected more than 150 dead eagles after the spill and it is likely that many more were not recovered. Surveys conducted by the Fish and Wildlife Service found that reproduction during the 1989 breeding season was essentially eradicated in areas of significant contamination and substantially reduced in areas up to 50 miles from the actual path of the spill.

Potential restoration work can be classified into four areas of activity:

1. Identification and protection of important habitats,
2. Delineation and protection of prey resources,
3. Reduction of potential sources of disturbance, and
4. Population monitoring.

Study proposals are attached addressing each of these four areas. The proposals are interrelated; activities conducted to accomplish one will facilitate the accomplishment of others. Some of the topics have also been partially addressed by the assessment studies. The proposals are written as "stand-alone" projects, but they would more reasonably be conducted as tasks under a single project in a sequenced multi-year approach. It is likely that some of the tasks cannot be accomplished in a single year, but these concerns will be identified in the individual proposals. Work on bald eagles will be more involved than on some other species because:

1. Eagles are present in the spill area for the entire year so more facets of their life history are potentially impacted,
2. Sexual maturity is delayed in eagles until at least their fifth year of life, delaying the observable impacts from lost production and the recovery from lost adults, and
3. Longevity is great so the loss of breeding adults is "felt" by the population for many years.

These proposals were hurriedly prepared and are preliminary in nature. Please call Phil Schempf at 586-7244 in Juneau to clarify any points.



5

Munit.

ee

## FEASIBILITY STUDY: LONG-TERM POPULATION MONITORING FOR BALD EAGLES IN THE EXXON VALDEZ OIL SPILL AREA

Bald eagles are relatively unique among the species impacted by the oil spill, having a delayed sexual maturity and relatively long life spans under normal conditions. Population level impacts may not be readily apparent due to the slow population turnover rates in bald eagles. For example, experiments have been conducted in southeastern Alaska for the last 10 years where the annual nestling production has been removed and released in the eastern United States to augment depleted populations there. The effects of the removal have been monitored and compared with a neighboring area where no young were removed. It was not until the fifth year of the study that differences in reproductive parameters were noted between the experimental and control areas.

In order to determine the population level effects of the loss of the 1989 season nestling production and a yet to be estimated number of older bald eagles, estimates are needed for the normal annual production, survival of each age class and the average age when eagles first breed. Assessment studies have addressed these questions, but it is uncertain how long funding will be available from assessment sources.

Information has been collected on reproductive success for one year that was strongly influenced by the oil spill and for a second year that may be normal. One season's worth of data is available on survival for adults and for one cohort of young during their first year of life. Insufficient time has passed to determine the survival of known age eagles for the age classes between the nestlings of 1989 and sexually mature adults. The average date of first breeding is unknown. In unregulated populations that have been studied in the eastern U.S., adults are thought to achieve sexual maturity in their fifth year. Density dependent factors may play a role in the more densely populated habitats of Alaska, significantly delaying the time when a maturing eagle can successfully compete for a breeding place. All of these factors need to be determined to understand the value of nestlings to the population and how long it will take to replace sexually mature adults that were lost during the spill.

### OBJECTIVE

Monitor reproductive parameters and survival of a representative segment of the bald eagle population in the oil spill area to determine age specific survival rates, normal reproductive parameters and the average age of first breeding. Use these data to prepare an accurate model that will show the extent and duration of the injury sustained by bald eagles within the spill area.

### SCOPE OF WORK

This study would be a continuation of work initiated during the assessment. Breeding success would be monitored in a sample of nests in the spill area. Approximately 40 adult eagles would be kept radio tagged throughout the duration of the study to provide survival

data for this segment of the population. A group of 40 or more nestlings would be tagged annually and monitored throughout the maturation process until they become established as breeding adults. Only a small percentage of each year's nestlings would survive to adulthood, but the data for each age class could be pooled to give statistical significance. Radio tagged eagles would be relocated on a routine basis to determine their status. Because of the length of time it takes for bald eagles to become sexually mature (speculatively, 6-8 years in Alaska), the tagging study would need to be conducted for at least 10 years to collect the necessary data.

#### PERIOD OF PERFORMANCE

Due to the nature of the bald eagle's biology, this must be a long-term study to collect the data described above. During the next year, March 1, 1991 through February 29, 1992, data on a second normal year of reproduction, survival of adults and of eagles during the first year of life and the first year of data on survival for eagles during their second year of life will be collected.

#### PRODUCTS

A draft report on the next year's data would be completed by December 31, 1991, and a final progress report would be completed by February 29, 1992. A draft of the population model framework would be completed by February 29, 1992.

#### RESPONSIBLE AGENCY

U.S. Fish and Wildlife Service  
Raptor Management  
P.O. Box 21287  
Juneau, AK 99802

Philip F. Schempf, Principal Investigator  
(907) 586-7243



# DRAFT

SEP 19 1990

## FEASIBILITY STUDY PROPOSAL: POPULATION MONITORING OF MARINE BIRDS AND MAMMALS IN THE EXXON VALDEZ OIL SPILL AREA

### INTRODUCTION

The Exxon Valdez oil spill caused direct mortality to thousands of marine birds and mammals in Prince William Sound and the Gulf of Alaska. In addition, habitats and food resources were damaged, providing the potential for additional bird and mammal mortality or loss of productivity in the years following the spill. Preliminary results from Damage Assessment studies suggest that sea otters and some bird species are continuing to decline since the spill. Restoration of injured populations will require population estimates to determine whether declines continue after the spill, and to monitor recovery. The goal of this feasibility study is to devise a more cost-effective and logistically efficient method of estimating bird and mammal populations in the area affected by oil, making future population recovery monitoring possible.

### OBJECTIVES

- A. To establish a cost-effective, logistically efficient and statistically rigorous method to determine distribution and estimate abundance of marine birds and mammals in Prince William Sound, the Kenai Peninsula and Kodiak Island waters.
- B. To evaluate restoration efforts by monitoring recovery of marine bird and mammal populations in the spill area, and by documenting continuing population declines due to the spill.

### METHODS

Surveys will be conducted from 25-foot motor vessels manned by an operator and two observers. Scientifically sound, statistically rigorous sampling methods will be designed using information available from previous surveys, including Damage Assessment studies carried out by the principal investigators (Bird Study 2, Marine Mammal Study 6) and information recently made available by the Service's new Pelagic Seabird Database.

In 1991, Prince William Sound, the Kenai Fjords National Park area of the Kenai Peninsula, and Kodiak Island waters would each be sampled once in late winter, (between February and April) and once during the summer. Prince William Sound is the highest priority for surveying, as future oil accidents are most likely to occur there, and historical population information exists for that area. Kodiak Island waters and a portion of the southern coast of the Kenai Peninsula are next in priority for surveying. Kenai Fjords National Park and the adjacent islands of the Alaska Maritime National Wildlife Refuge are within potential spill zones and have recreational value. Both areas have large seabird and mammal populations in winter and summer and have been significantly affected by oil spills in the past.

Information gathered from these surveys would be used to determine the minimum number of sampling units needed to detect population change of a given size. Reducing the number of sampling units compared to previous surveys will decrease the length of time each survey takes, simplify logistics, and reduce the cost of determining population indices.



10/22/90 11:20 2001 1000000

The goal would be to make such surveys more cost-effective, making future population recovery monitoring feasible.

#### PERIOD OF PERFORMANCE

The period of performance of this study will be March 1, 1991 to February 29, 1992.

#### PRODUCTS

The U.S. Fish and Wildlife Service will complete a draft report by December 31, 1991, and a final report by February 29, 1992.

#### RESPONSIBLE AGENCY

U.S. Fish and Wildlife Service

Principal Investigators: Karen Laing, Migratory Bird Management  
Douglas Burn, Marine Mammal Management

## FEASIBILITY STUDY: REDUCTION OF POTENTIAL SOURCES OF DIS FOR BALD EAGLES IN THE EXXON VALDEZ OIL SPILL AREA

Disturbance has been cited as an alternate cause of the reduction in breeding success for bald eagles observed following the EXXON Valdez oil spill. Intense air traffic and frequent disturbance by cleanup workers may have had adverse consequences for nesting success. As a result of these concerns activity near bald eagle nests was controlled during the 1990 nesting season. The management guidelines developed to control activities near nest sites were based primarily on the best judgement of experienced biologists rather than on empirical data. These guidelines could undoubtedly be improved through a review of existing data collected during response and assessment activities and carefully designed experiments. Guidelines based on fact instead of intuition would provide better future protection to bald eagles and be more acceptable to people influenced by those guidelines.

### OBJECTIVE

Determine the influence of disturbance on bald eagle reproductive success by activities associated with spill response or other human actions and develop sound guidelines that will provide protection for nesting eagles while not unduly restricting human activity.

### SCOPE OF WORK

The project would be conducted in two phases. The initial phase would review information collected in 1989 on the reproductive success of bald eagles and attempt to correlate the observed success rates with the level of cleanup activity. The review would need to consider the timing of the human activities in relationship to the nesting chronology and the confounding influence of the oil. It is likely that the most heavily oiled beaches were also the beaches most disturbed by cleanup activities.

The second phase would be experimental simulation of response type disturbances to collect the empirical data necessary for the development of sound guidelines. Insights gained during the review of the 1989 data will be used to design meaningful simulations and disturbance models.

### PERIOD OF PERFORMANCE

The initial phase of the project would be conducted from March 1, 1991, through February 29, 1992. The experimental phase would be conducted in subsequent field seasons.

### PRODUCTS

A report on the review on 1989 data and a study plan for the second phase would be completed by February 29, 1992. Revised guidelines and project reports would be completed on a schedule defined in the study plan for the second phase.

SEP 19 '90 17:24 FWS JUNEAU

**RESPONSIBLE AGENCY**

**U.S. Fish and Wildlife Service  
Raptor Management  
P.O. Box 21287  
Juneau, AK 99802**

**Philip F. Schempf, Principal Investigator  
(907) 586-7243**



DRAFT

Feas.

RESTORATION FEASIBILITY STUDY

STUDY TITLE: EFFECTS OF INTERTIDAL RESTORATION ON BLACK OYSTERCATCHERS

SEP 17 1990

INTRODUCTION

Black oystercatchers (Haematopus bachmani) have been impacted by the EVOS and may have been impacted by the subsequent clean up efforts. With more clean up and restoration activities planned, they may face further disruption. Study is needed to evaluate the effects of human activity on breeding black oystercatchers. In 1991 we can determine if black oystercatchers have differential reproduction in shoreline areas treated differently. To determine the feasibility of studying the effects on black oystercatchers of clean up or restoration versus natural recovery, we will also need to determine if it is possible to follow a sufficient sample size in each treatment type to warrant monitoring the recovery of black oystercatchers.

OBJECTIVES

- A. Determine if a sufficient number of black oystercatcher nests can be found and monitored at shorelines where different restoration processes will be implemented.
- B. Determine if feeding territories, prey choice and chick feeding rates vary among differently treated shorelines.
- C. Determine whether black oystercatcher breeding success is differentially affected in areas with different treatment regimes.

METHODS

Study methods will replicate those used in Bird Study 12 in 1989. Black oystercatcher feeding territories, feeding rates, prey choice and breeding success will be monitored in conjunction with levels and types of onshore human activity. Transects similar to those established in 1989 will be surveyed in the intertidal zone. Study sites will include areas that were unoiled or cleaned mechanically or bioremediated. In 1991, areas undergoing restoration activities will be added.

The primary study sites will be those used in 1989 on Green and Montague where a total of 37 nests were monitored. Other sites may be established on Channel, Naked, Smith, and Knight Islands, or where restoration activities dictate. Site location and analysis would be coordinated with Coastal Habitat Studies.

①

Direct Rest'n

**TITLE: Preliminary Restoration Project Proposal  
Removal of Introduced Animals on Selected  
Colonial Seabird Nesting Islands**

**INTRODUCTION**

Arctic foxes, red foxes, and rodents were introduced by fur farmers to many islands between the western Aleutians and southeastern Alaska. These exotic animals have preyed heavily on seabirds and destroyed nesting habitat. Some burrow- and ground-nesting seabird populations such as storm-petrels, tufted puffins, some auklets, terns and gulls were extirpated from some islands while other species were reduced to remnant populations. The Fish and Wildlife Service has removed foxes from 17 islands to date. The removal program has resulted in significant increases in some seabird populations. For example, on Alaid and Nizki Islands, several species of seabirds increased five to 15-fold following fox removal. There has also been a large increase in auklets following fox removal on Big Koniugi Island in 1985-86. The Exxon Valdez oil spill caused direct mortality to thousands of marine birds and reduced productivity in others in Prince William Sound and the Gulf of Alaska. Fox removal is a cost effective method for acquiring equivalent resources to replace birds lost in Prince William Sound and Western Gulf of Alaska due to the 1989 oil spill.

**OBJECTIVES**

- o To eliminate foxes and rodents on selected colonial seabird nesting islands to reestablish populations of burrow- and ground-nesting seabirds or enhance remnant populations.
- o To monitor the recovery of selected burrow- and ground-nesting seabird species.

**SCOPE OF WORK**

Six islands (Ulak, Amatignak, Segula, Herbert, Ugamik, and Gareloi Islands) will be selected that have or had burrow- and ground-nesting colonial seabird populations and on which foxes occur. Removal of foxes will be completed on Ulak and Amatignak in year 1 and on the other 4 in year 2. The Service will use trapping and shooting as removal methods on the first five islands. Gareloi Island, the sixth location will be included only if the Service receives the approval from the Environmental Protection Agency to use toxicants (M-44 cyanide projectile and 1080 compound).

*none are in spill area*

*off the market*

Colony size, reproductive success phenology, and recruitment of young birds will be measured on the selected islands for five-years following fox removal to ensure the success of the removal effort and to monitor bird recovery. Pre-eradication bird surveys will be



completed. Permanent population and productivity plots will be established and monitored annually following the removal of foxes.

### PERIOD OF PERFORMANCE

The period of performance of this project will be five years beginning March 1, 1991.

### PRODUCTS

The Fish and Wildlife Service will complete draft reports by December 31 and final reports by February 29 throughout the five-year period of performance.

### RESPONSIBLE AGENCY

U.S. Fish and Wildlife Service in cooperation with Department of Agriculture (Animal Damage Control) and Environmental Protection Agency.

### BUDGET

Year One:	\$	(Remove foxes on two islands)	\$50,000	← Utah + Amat.
Year Two:	\$	(Monitor recovery on two islands and remove foxes on four islands)	\$160,000	
Year Three:	\$	(Monitor recovery on six islands)	\$100,000	
Year Four:	\$	(Monitor recovery on six islands)	100,000	
Year Five:	\$	(Monitor recovery on six islands)	100,000	

\* does not include cost of vessels

at least 2 years to confirm eradication



# DRAFT

SEP 20 1990

## RESTORATION PROJECT: DEVELOPMENT OF A CONCEPTUAL ECOSYSTEM MODEL FOR PRINCE WILLIAM SOUND.

### INTRODUCTION

The Prince William Sound ecosystem is regulated by a complex set of interactions, and as such, can best be managed by taking a holistic approach rather than by managing it as separate unrelated parts. Certainly, this concept is not new to the resource managers (see e.g., Flint 1984, Truett 1984, Zeitlin Hale and Wright 1979). However, the vehicle to take such an approach does not exist. Support for defining the interactions among species comes from the discussions of the need for synthesizing results from the Exxon Valdez oil spill assessment studies. But, this synthesis will be limited by the scope of the oil spill studies themselves. Effects of the fishing industry, fisheries enhancement, timber harvesting, and oil spills will, as a whole, still be poorly understood because of the lack of a conceptual ecosystem model. In this regard, a conceptual model can be used to better understand the total impact of the Exxon Valdez oil spill, identify the need for other restoration studies, identify significant information gaps and rank them based on need, and direct future research and monitoring plans.

### OBJECTIVES

- o To catalog and gather information from the literature (including grey literature) pertaining to species and processes occurring in Prince William Sound though not limited in scope to work conducted in the Sound itself.
- o To incorporate information gathered from the literature into a knowledge database.
- o To develop a black-box conceptual model using a knowledge based, i.e. artificial intelligence, approach to identify the links and to determine strength of links among species and processes (including anthropogenic ones).

### SCOPE OF WORK

This study will require an extensive search of the literature, much of which can be done electronically. Pertinent literature will be incorporated into a bibliographic database. The literature will be reviewed and information will be incorporated in a knowledge database. Black-box models will be developed from the knowledge database.

### PERIOD OF PERFORMANCE

The period of performance of this project will be March 1, 1991, to February 29, 1992.

### PRODUCTS

The Fish and Wildlife Service will complete a draft report by December 31, 1991, and final report by February 29, 1992.

## **RESPONSIBLE AGENCY**

U.S. Fish and Wildlife Service

## **LITERATURE CITED**

Flint, R.W. 1984. Ecosystems Integration and environmental decision-making. Coastal Ocean Pollution Assessment News 3:17-18.

Truett, J.C. 1984. Ecological process studies of a barrier island-lagoon system, Beaufort Sea, Alaska. U.S. Department of Commerce, NOAA, OCSEAP Final Report 24:113-127.

Zeitlin Hale, L., and R.G. Wright. 1979. The Glacier Bay marine ecosystem. A conceptual model. National Park Service. Anchorage, Alaska.

## RESTORATION STUDY NUMBER 4

Study Title: Identification of Upland Habitats Used by Wildlife Affected by the EVOS  
Principal Investigator: Kathy Kuletz, MBM/U.S. Fish & Wildlife Service

### INTRODUCTION

The area effected by EVOS is one of the principal population centers of the Brachyramphus species, in particular, the marbled murrelet (B. marmoratus). These alcids suffered direct mortality from EVOS. Recovery could be enhanced by identifying and protecting important nesting habitat. In 1990, a Restoration Pilot Study was done to investigate methods of studying upland use by marbled murrelets. This proposal outlines a Restoration project to define murrelet and upland habitat associations for use by appropriate management agencies to identify critical murrelet nesting habitats.

There is no clear definition of marbled murrelet nesting habitat in Alaska, where the species has been known to nest on the ground and in the canopy of old-growth trees. First, we will perfect methods of identifying upland use by marbled murrelets. This will include distinguishing the inland activity and habitat use of the marbled from that of the Kittlitz's murrelet, a closely related species also at risk by EVOS. Second, a database integrating habitat data with murrelet nesting use will be developed. Finally, predictions of murrelet habitat use will be tested in the field and specific sites with high murrelet nesting activity identified.

### OBJECTIVES

- A. Develop methods and define parameters used to locate and monitor murrelet nesting activity.
- B. Integrate habitat data with murrelet upland activity to define murrelet nesting habitat requirements.
- C. Test the predictions of murrelet nesting habitat requirements.
- D. Identify potential murrelet nesting sites in the EVOS zone and check specific sites of interest for level of murrelet activity.

### SCOPE OF WORK

In 1990, the pilot study at Naked Island was successful at using the "dawn watch" method to monitor inland activity by marbled murrelets. In some cases, potential nest sites were narrowed down to a few trees. At sites with frequent watches, we were able to track variability in detections, seasonal patterns and behavioral changes over time. These efforts will be continued to refine protocols for censusing murrelet upland activity. In 1990, sites with single watches scattered throughout the island were added to include a greater variety of habitats. This effort will also be expanded to increase sample size and habitat types.



With the baseline of data established at Naked Island, it would be advantageous to continue the study at that site. A cooperative agreement would be pursued to have the U.S. Forest Service implement the habitat component of Objective B. Their habitat data will be used in conjunction with the murrelet observations to map and define habitat preferences via ARC/INFO.

Naked Island does not have the full range of habitat types, and a complete data set requires a second study site, preferably with both Brachyramphus species and a mosaic of alpine and forested upland habitats. The most cost-effective site for fulfilling Objectives A and B is Kachemak Bay, which was also within the oil spill zone. As with the Naked Island site, Kachemak Bay benefits from the availability of historic data and a large murrelet population. Additionally, a variety of upland areas can be accessed via boat, road and trail systems with fewer logistic problems than more remote sites. Aerial photos exist for habitat classification.

Objective C will utilize results from Objectives A and B to test the predictions of murrelet presence among habitat types throughout the EVOS zone. In the final phase, areas of interest to management agencies will be identified with respect to potential murrelet nesting habitat and specific sites will be censused for upland murrelet activity.

#### PERIOD OF PERFORMANCE

The period of performance of this study will be three years beginning April 1, 1991.

#### PRODUCTS

The U.S. Fish and Wildlife Service will complete draft reports by December 31 and final reports by February 29 throughout the three-year period of performance.

#### RESPONSIBLE AGENCY

U.S. Fish and Wildlife Service  
Principal Investigator:

Kathy Kuletz, Marine and Coastal Bird Project

U.S. Forest Service:

Bill Ostrand, Glacier Ranger District

#### BUDGET

Year one: \$  
Year Two: \$  
Year Three: \$

1991 Prince William Sound Harlequin Duck Restoration Study  
Proposal (Brief Description)

Project Leader: Dr. Samuel M. Patten  
Assisted by: Robert G. Hunter  
Leading Agency: Alaska Department of Fish and Game  
Division of Wildlife Conservation  
Cooperating Agency: U.S. Fish and Wildlife Service  
Date of Plan: October 29, 1990

1) Known NRDA Damage to Species of Concern

Harlequin Ducks (Histrionicus histrionicus) are both resident in and winter migrants to Prince William Sound, Alaska, feeding in intertidal zones and breeding along nearby streams. Harlequins were subjected to considerable direct mortality associated with the Exxon Valdez Oil Spill of March 24, 1989. The NRDA Bird Study No. 11 (Seaduck Damage Assessment Study) has also documented that a significant proportion of the Harlequin population surviving in oiled areas of Prince William Sound is in physiologically poor condition, probably associated with consumption of oiled intertidal prey items. Affected birds exhibit minimal adipose tissue and concentrations of petroleum chemicals in liver and bile. Results of the summer 1990 investigation of resident Harlequin Ducks in the oil spill area of western Prince William Sound further indicate a reproductive failure and population decline. In contrast, a stable population and normal reproduction was observed in unoiled areas of southern and eastern Prince William Sound.

2) Technical Feasibility

USFWS and ADF&G biologists attending the April 1990 Restoration Planning Meeting in Anchorage identified the lack of knowledge of Harlequin Duck breeding ecology in Prince William Sound as being a critical data gap which needs to be addressed before recovery/restoration efforts can proceed for this seaduck species.

A Harlequin Duck Feasibility Study was conducted by ADF&G in summer 1990 in Prince William Sound under the auspices of the Restoration Planning Office. This pilot study progressed logically from the Seaduck Damage Assessment Study. Information gathered during the 1990 field season on the distribution of females with young and groups of moulting males demonstrates the proposed restoration study is technically and logistically quite feasible utilizing experienced personnel.

### 3-4) Implementation

Implementation of this study in 1991 is considered critical, given the demonstrated reproductive failure of Harlequin Ducks in the oil spill area in 1990. Impending logging, aquaculture, and hydroelectric development along other breeding streams in Prince William Sound may slow, delay or hinder Harlequin population recovery from the EVOS.

### 5-6) Environmental Benefit

Probable outcome of this work is identification of important riparian habitat around Prince William Sound requiring additional protection, not only for Harlequin Ducks, but for a multiplicity of other vertebrate and invertebrate organisms dependent upon undisturbed watersheds.

### 7) Duration of Project

Field work on this project is expected to commence in May 1991 and continue through August. Two additional field seasons are planned. Expected results include a catalogue of Harlequin breeding streams and intertidal moulting sites in Prince William Sound, and a predictive model of hydrological, limnological, and vegetative characteristics of nesting streams.



RESTORATION PROPOSAL: RECOLONIZATION OR RESTORATION OF  
NORMAL DENSITIES AND REPRODUCTIVE BEHAVIOR OF ALASKAN  
MURRE COLONIES

Title

Use of decoys and vocalizations to encourage restoration of numbers of breeding murre and synchronization of egg laying at a selected site in Alaska.

Introduction

Work has been done in recent years (Science News, September 1990) where decoys and recordings of colony sounds and vocalizations have been utilized to encourage the return of terns, puffins, and petrels to breeding islands that no longer contained those species because of past perturbations. One of the effects of the Exxon Valdez oil spill has been to greatly reduce the numbers and density of common murre at certain colonies in the Gulf of Alaska. An additional effect is a new lack of synchrony in egg laying at these same murre colonies. This lack of synchrony in egg laying has dramatically decreased the productivity of these murre colonies the last few years. No work is published or known that has been done with murre to see if the restoration of synchronized egg laying and murre numbers at colony sites can be enhanced by techniques such as decoys and vocalizations.

Objectives

A. To try different applications of decoys and vocalizations to determine if these techniques can be used successfully to hasten restoration of murre breeding colonies or portions thereof that have lost breeding populations.

B. To refine our understanding of how a murre colony reestablishes itself.

Methods

This type of study will probably require a site which has the following characteristics: 1)the actual murre colony or breeding ledges can be reached; 2)the site has a known history of murre use and change in usage; 3)the use of equipment and batteries will need some site that is relatively easy logistically; and 4)the site should not have other biological complexities that limit its capability to increase murre numbers.

There are only a few murre colonies in Alaska where the ledges can be reached very easily (Middleton Island, Bogoslof Island, and the Pribilof Islands). Bogoslof is probably not desirable because it is remote, logistically tough, and does not have a base line data of past murre numbers. Middleton Island is probably not suitable because of the exponentially increasing gull population found there and the limited habitat and historical potential for murre numbers

to be large at this site. The Pribilof Islands, at least some parts of the colonies, meet all of the above requirements.

Objective A. Productivity Plot 62 and other nearby sites at St. Paul Island, Pribilof Islands are sites that the biologists at the Alaska Maritime National Wildlife Refuge would recommend. Plot 62 used to be utilized by approximately 80 common murres and some thick-billed murres. Then a fox discovered how to get onto this ledge and the murres have not been able to breed for several years now and have abandoned the spot other than minor occasion roosting. It would not be hard to modify this cliff so that the fox could not get on it again. The use of decoys and vocalizations could then be used to see if recolonization could be restored. There are other sites where a wall could be built or cliffs modified and the same procedures could be used to see if murres can be encouraged to use suitable habitat that did not even exist before.

Objective B. At the present time, we do not know what triggers the synchronized egg laying of common murres, which appears to be very important for their breeding success. Is it certain densities, presence of experienced breeders, or what? Is there a nutritional control and do oil contaminants have any effect on this process? These experiments can provide some additional insight into some of the causes of failure as well as mechanisms and timing of recovery.

#### Budget

I have not been able to work up a budget, but I would estimate something in the 20,000-40,000 unless it was added on to some other project already in effect at the desired site. I would suggest that someone like Art SOWLS who is familiar with work on the Pribilof Islands comes up with specific budget recommendations.

#### Period of Performance

Since most colonial seabirds are long-lived and do not reproduce until 3-5 years of age, this study should be spread out over as many years as possible so as to give it a reasonable chance of success in documenting some change.

#### Responsible Agency

This proposal has been requested at short notice and prepared by David Nysewander, who works out of the Alaska Maritime National Wildlife Refuge. He is personally not available for this project due to other commitments. Some refuge personnel might be available if money is provided or some entity outside of the Service could be contracted to pursue this project if it is deemed desirable.

## FEASIBILITY STUDY: DELINEATION AND PROTECTION OF PREY RESOURCES FOR BALD EAGLES IN THE EXXON VALDEZ OIL SPILL AREA

Adequate prey resources, well distributed spatially and temporally, are essentially to the health of bald eagle populations. Eagles feed extensively in the intertidal habitats, which were heavily impacted by the EXXON Valdez oil spill. They use a combination of prey items that varies throughout the year as different items become abundant or scarce. Food resources are least abundant during the late winter and early spring and most abundant during the summer spawning season of the various pacific salmon species. The actual prey items used by bald eagles within the spill area has not been adequately documented. Prey remains have been collected during the spill assessment, but these were collected for hydrocarbon testing and not for food habit analyses.

### OBJECTIVE

Determine the prey items important to breeding and non-breeding bald eagles throughout the year, assess the impacts to these resources identified by ongoing assessment projects, and recommend actions to preserve or enhance the abundance of these items.

### SCOPE OF WORK

Field work will need to be conducted throughout at least one full year to determine the seasonally important prey resources used by bald eagles in the spill area. Direct observation of feeding eagles will determine soft tissue foods that they use. Collection of prey remains and regurgitated pellets at nest sites, perch trees and night roosts will provide supplemental information on prey with more durable parts. Data on the impacts of the oil spill on important prey will be obtained from other principal investigators. Recommendations on potential restoration or enhancement procedures will be developed in conjunction with the other principal investigators.

### PERIOD OF PERFORMANCE

Field work will be conducted from March 1, 1991 through February 29, 1992. A preliminary report will be completed by February 29, 1992 with a final report incorporating data collected from the winter period (Dec. to Feb.) will be completed by July 1, 1992.

### PRODUCTS

A report detailing the prey resources of importance to bald eagles in the spill area and an action plan for the restoration or enhancement of these resources will be completed by July 1, 1992.



SEP 19 '90 17:23 FWS JUNEAU

**RESPONSIBLE AGENCY**

U.S. Fish and Wildlife Service  
Raptor Management  
P.O. Box 21287  
Juneau, AK 99802

Philip F. Schempf, Principal Investigator  
(907) 586-7243

by no means agreed upon by all Alaskans that it is desirable for  
 sea otters to expand further.

Para 2, sea otters - Delete this statement. This was not the  
 consensus of the group. There is no factual information to  
 support a recommendation that harvest be restricted.

IV-28 - I am assuming that this entire section on a sea lion  
 disturbance study has been deleted. It is inappropriate and  
 NMFS/ADF&G currently have ongoing studies at Marmot Island.

I have a suggestion for a marine mammal demonstration project on  
 habitat use by harbor seals. Currently, we know nothing about  
 site tenacity within or between years in PWS. We know nothing  
 about seasonal movements, or about the relationship between  
 harbor seals in PWS and the Copper River delta. These questions  
 are all essential to assessing the impact of the 1989 oil spill,  
 or of any other future action. Unless one has an indication of  
 how readily animals switch haulout locations, how dependent they  
 are on PWS on an annual basis, etc. it is impossible to assess  
 the effects of damage to habitat or of disturbance and  
 displacement. Harbor seals are currently declining, but not yet  
 on the endangered list, so should be (but are not) receiving  
 additional attention. Because we think they are relatively  
 sedentary, they may be a good way to monitor the health of the  
 sound. PWS is an ideal place to conduct such a study because of  
 the spill focus, simple logistics, some historic data on numbers  
 and diet. Without understanding dependence on particular places  
 or habitat, it isn't possible to address restoration goals.

Estimated cost (if conducted by ADF&G, NMFS, and Texas A&M along  
 with ongoing studies) would be \$40-50,000 for year 1 and  
 approximately \$100,000 for year 2. Satellite transmitters would  
 be attached to seals and monitored. Funding would include  
 transportation, field logistics, purchase of satellite  
 transmitters, satellite time, some salary, and analysis of data.

I hope these comments are helpful. I am sorry they were so long  
 in coming, but the last few weeks have been hectic and I've spent  
 less than a full week in the office since mid-May.

Sincerely,

*Kathy Frost*

Kathy Frost  
 Marine Mammals Biologist  
 Wildlife Conservation

cc: Stan Senner  
 Don Calkins

## FWS Restoration Feasibility Proposals as of 10/19/90

Birds

1. Identification and protection of important bald eagle habitats in the Exxon Valdez oil spill area.
2. Delineation and protection of prey resources for bald eagles in the Exxon Valdez oil spill area.
3. Reduction of potential sources of disturbance for bald eagles in the Exxon Valdez oil spill area.
4. Long-term population monitoring for bald eagles in the Exxon Valdez oil spill area.
5. Effects of intertidal restoration on black oystercatchers.
6. Removal of introduced animals on selected colonial seabird nesting islands (modified from initial submission).
7. Identification of upland habitats used by wildlife, particularly the marbled murrelet, affected by the Exxon Valdez oil spill.
8. Temporal and spatial differences in food habits of black-legged kittiwakes, pigeon guillemots and marbled murrelets in Prince William Sound.
- \* 9. Population status and reproductive success of pigeon guillemots in Prince William Sound.
- \* 10. Population status and reproductive success of arctic terns in Prince William Sound.
- \* 11. Population status and reproductive success of mew gulls in Prince William Sound.
- \* 12. Reproductive success of black-legged kittiwakes in Prince William Sound.
- \* 13. Reproductive success of marbled murrelets in Prince William Sound.
- \* 14. Identify, characterize and rank colonial seabird nesting, foraging and wintering habitats that need protection, either through purchase or legislation.
- \* 15. Identify marbled murrelet nesting habitat that needs protection, either through purchase or legislation.
- \* 16. Designate Prince William Sound as Marine Sanctuary, Estuarine Reserve or Critical Habitat area.



- \* 17. Educate tourists, tour operations and commercial fishing industry in seabird conservation, protection and viewing etiquette.
- \* 18. Determine the importance or the subsistence harvest of birds to Alaska Natives in Prince William Sound, Kenai Peninsula and Kodiak Island.

19. 1991 AWS Harlequin Duck Restoration Study  
 20. Recolonization & Restoration of Murre Colonies

Marine Mammals - Sea Otters

Not included

1. Determination of key sea otter prey species in western Prince William Sound for enhancement of restored or non-contaminated sea otter habitat.
2. Consumption of contaminated prey by sea otters in Prince William Sound.
3. Variation in effects of oil exposure among sea otters living in areas affected by the Exxon Valdez oil spill.
4. Determination of sea otter foraging depths in western Prince William Sound for population and habitat restoration.

Birds and Marine Mammals

1. Population monitoring of marine birds and mammals in the Exxon Valdez oil spill area.
  2. Aerial surveys of birds and marine mammals
  3. Development of a conceptual ecosystem model for Prince William Sound.
  4. Determine distribution, relative abundance and spatial and temporal variability of fish, foraging birds and mammals.
- \* Study description not available.

without indirect restoration efforts. Once these alternatives had been identified, a list of species or bird groups which had sustained damage from the spill and would benefit from each alternative was created. Subsequently, restoration guidelines were developed to assess the priority of the alternatives with respect to each of the species or groups. These guidelines were not rigorously or quantitatively applied but provided a framework within which to evaluate alternatives in terms of low, medium, and high priority of restoration for specific species or groups.

The guidelines created by the work session are not necessarily parallel in structure; some encompass relative priorities while others indicate performance evaluations. A few stipulate issues of fundamental importance to the participants rather than reflecting concrete criteria or guidelines. The guidelines for evaluating indirect restoration alternatives are as follows (order does not indicate relative importance):

- o Creating the appropriate clean habitat is fundamentally important
- o Degree of effectiveness of technique -- numbers of individuals must increase
- o Favor those alternatives that affect a broader geographic range than one of lesser coverage
- o Restoring the "natural" distribution of a species is important
- o Favor those alternatives that benefit a multiple array of species rather than ones targeted to just one species (collateral benefits)
- o Cost effectiveness
- o Must examine the relative recovery time of natural versus manipulative approaches
- o Favor natural (e.g., acquisition of habitat) versus artificial (e.g., nest boxes) techniques
- o Favor options that permanently restore the habitat or population versus temporary, repetitive measures
- o Must consider the length of time required for the active phase of the restoration; favor short versus long-term
- o Favor the reduction of introduced rather than natural predators to restore a population

- o Relationship to damages
- o Priority should be given to those species and geographic areas that have been directly affected by the spill, although a broad geographic range should be considered
- o Priority to endangered, threatened, or sensitive species
- o Favor species and alternatives for which performance evaluation of restoration effectiveness is possible.

Under federal law, environmental restoration includes the restoration, replacement, or acquisition of the equivalent of injured natural resources. Since the restoration alternatives recommended by the work session as being most applicable to the Exxon Valdez oil spill are indirect in nature, the succinct matching of restoration options and restoration categories (restore, replace, or acquire) is not always possible. All of the alternatives proposed stipulate reduction or restriction of particular activities, and many of the options also include some form of acquisition as a means to reduce stress and protect habitat from future disturbances.

Once indirect restoration alternatives, targeted species or groups, and guidelines had been identified, the work session ranked species/group -- alternative combinations by strength of recommendation. Ten restoration alternatives were identified for a total of 20 species/groups. Table IV-3 presents a matrix of this ranking. The sections that follow describe the restoration alternatives, provide some background and justification for work group ranking, and identify major information needs necessary to place spill damage effects in perspective.

### Logging

A decrease in logging pressure in the PWS area was identified as a restoration effort which potentially could benefit a number of different species by maintaining and protecting quality habitat. Increased habitat protection of the islands within PWS and the Gulf of Alaska would not only benefit a variety of marine birds but some marine mammals as well. Water-borne logging activities, especially log storage sites, eliminate important intertidal and shoreline areas for birds.

The actual acquisition of land would not necessarily be required, but the purchase of logging and development rights could have substantial positive effects. Even a change in



Table IV-3. Priority matrix of restoration alternatives with respect to various species or species groups, created by the bird session of the restoration planning workshop

	Logging	Disturbance	Commercial Fishing		Predation	Chronic Oil		Erosion	Mining	Disease	Hunting and Egging
			High Seas	Near Shore		Pollution	Mariculture				
Bald Eagle	1	2	2	2	3	3			2		
Peregrine Falcon	3	1				2		3			
Murrelet	1	1		2			3				
Great Blue Heron	1	2									
Guillemot	2	2					3				
Owl	1										
Shearwater			1								
Albatross			1								
Kittiwake				2							1
Cormorant				2							
Merganser	1			2					1		
Gulls				3	1			1			1
Sea ducks	1				2	1	1	2	1	3	1
Colonial sea birds		1	1	2	1						2
Non-colonial sea birds	1	2									
Shore birds (oyster catcher)		1				2		3			
Shore bird (migrants)		1		2							
Diving alcids			1	2							
Ground nesters					1			1			
Passerines	1				1						

1 = high priority

2 = moderate priority

3 = low priority

"priority" = potential to be of significant benefit