

July 17, 2014

Jeff Horan
Forest Ecologist, Division of Natural Resources
US Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035

Re: Proposal for Aerial/Orthophotography and Cover Type Mapping on Northern portion of Great Dismal Swamp NWR

Dear Mr. Horan:

James W. Sewall Company (Sewall) is pleased to submit an estimate to capture aerial photography, create orthophotography, and provide forest cover type interpretation services to the US Fish and Wildlife Service (USFWS).

Sewall has successfully completed several NWR aerial photography and/or mapping projects in the past, including the most recent mapping of the Umbagog, Missisquoi and Blueberry Swamp NWRs, located in Maine and New Hampshire.

This proposal covers services for the Northern portion of Great Dismal Swamp NWR in northeastern North Carolina. This includes complete new aerial photography and forest cover type mapping on the project area being defined by and contained in the shape file provided by USFWS named GDS_Northern_Acquired.shp, which covers approximately 66,812 acres.

Personnel assigned to this project will include Mary McDonald as overall Project Manager and Task Manager of Forest Cover Type Mapping, and Nicole Cyr as Task Manager for Aerial and Orthoimagery. We offer the following scope of services:

SCOPE OF SERVICES

This proposal covers aerial imagery, orthoimagery, and forest/non-forest cover interpretation for the northern portion of Great Dismal Swamp NWR.

AERIAL & ORTHOPHOTOGRAPHY

The project area will be flown in near IR at a ground sampling distance (GSD) of 20cm with stereo coverage in the spring (late April to early June) of 2015, at a time conducive to forest cover type interpretation.

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Specifications for the project area imagery are provided in the following table:

Imagery GSD	Type of Orthoimagery	Overlap
20 cm	0.3-meter pixel resolution, IR, digital ortho in MrSID MG3 format	Stereo: endlap will average 60 percent and sidelap 30 percent

Each individual image will be ortho-corrected using IMU and USGS DEM data to create individual digital ortho images. The ortho images will be mosaicked together, creating a seamless digital image backdrop for accurate mapping in a GIS. The orthophoto imagery will be delivered in refuge-wide seamless mosaics.

Aerial and Orthoimagery Deliverables

One seamless mosaic image for each of the refuge locations will be delivered in MrSID MG3 format with a 20:1 compression ratio, along with individual tiles in GeoTIFF format clipped to a 5000 ft x 5000 ft grid. One copy of digital orthoimagery will be delivered on DVD.

No photo prints are included in the pricing within this proposal.

MAPPING

Cover Types

The typing scheme will be similar in format to that which was used for the recent refuge mapping in the Northeast 2013. As with that project, National Vegetation Classifications (NVC) are not included. Forest cover types will be interpreted using composition, height and canopy closure classes. Up to two species composition codes will be used for each stand. The first will comprise at least 50% of the stand's crown closure and the second at least 25%. If no second code appears, then the first code is understood to comprise at least 75% of the crown closure. The codes S and H may be used when a stand is young and/or the species are very mixed. Otherwise, one of the other codes will be used. Up to two stories will be interpreted in this way. Individual species codes may be used by the interpreter if an individual species can be positively identified and it makes up an adequate percentage of the stand's composition according to the percentage rules stated above. An example list of species codes and other classes is included as Attachment 1. Sewall will work with the Refuge managers to develop a list that will be similar to this level of detail, but appropriate for the local vegetation, hydrology, and landforms of these NWRs.

Example Forest Cover Types

- SFCE4B: Primarily spruce/fir, with a significant component of cedar, 50+ feet tall, 41-70% crown closure
- THSF3A: Primarily tolerant hardwood (50% or more), with a component of spruce-fir, 31-45 feet tall, 71-100% crown closure
- WP4C/SF1B: Young Spruce-Fir stand 0-15 feet tall, crown closure 41-70%, with significant overstory of White Pine

USFW has requested that multi-storied forest stands are coded. This proposal allows for coding a single modifier field, the details of which will be determined. Also to be determined are specific non-forest type codes to be used. Both of these will be determined at project startup in consultation with USFW. Forest types will be interpreted to a minimum size of five acres and non-forest types to a minimum of one acre.

Standard GIS procedures will be employed to produce forest cover type data layers as specified. The method of conversion proposed for this project will be softcopy photogrammetric interpretation of forest cover type lines on a Summit Evolution 3D workstation. The control basis of the softcopy setup will be exterior orientation parameters produced for this project from airborne GPS and IMU data.

A stand labeling data entry form will be used by the image interpreter in the Summit Evolution/ARC environment. This form ensures automated labeling validation during the interpretation process.

After a preliminary interpretation of the project area using the proposed cover typing scheme, our interpreter will conduct fieldwork to review the typing accompanied by USFWS personnel if possible. Our plan is to conduct two days of fieldwork in the northern portion of the Great Dismal Swamp refuge. This fieldwork will enable examination of questionable stand classifications and will permit us to verify that classifications are properly applied. Upon return from the field, edits and final classification will occur. The NWR boundary lines provided by USFWS will be used as the boundary lines for the cover type mapping work. This proposal does not include any adjustment of the property line by Sewall.

While NVC coding is not included in this proposal, our past experience has been that a significant portion of NVC classification can be accomplished using the cover typing of this project (this is essentially how past contracts have worked, with NatureServe doing the translation/crosswalk, with supplementary fieldwork as necessary).

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Roads

No road centerline features will be compiled for this project. However, when road features form a cover type boundary, the digitized type boundary will correspond to the approximate centerline of the road.

Water

Sewall proposes to capture water polygons such as lakes, ponds, and double-line streams from the interpretation process and will include them in the forest cover polygon layer as non-forest polygons. No single line streams will be digitized.

Materials to be Supplied by USFWS

- A list of USFWS contacts from each region for the Sewall aerial crew to check local flight conditions
- Base data: Property/interpretation boundaries
- Historical covertype/vegetation classification coverage for the refuge, where available
- Other useful ancillary data that may be available

Mapping Deliverables

Sewall will deliver a single cover type shape file for each refuge, projected in the appropriate UTM, Zone 17 or 18, NAD83, meters.

SCHEDULE

Orthoimagery will be delivered within six to eight weeks after aerial compilation and approval of a digital image sample by USFWS. The cover typing process can begin upon USFWS' approval of the delivered imagery. Due to current workload, estimated timeframe for delivery is early in the fourth quarter of 2015.

COST

Under a five-year multi-schedule General Services Administration contract, Sewall is qualified to provide all federal agencies GIS consulting and spatial data development, environmental inventory, and assessment. The labor rates used by Sewall for pricing in this contract are our current GSA approved rates. We are in the process of renewing, so these rates may be adjusted slightly by 2015. (There is a possibility of a 3-5% change, as our rates have not increased in six years.)

Sewall GSA contract number is GS-00F-0012P. Our fees for completing the aerial imagery, orthoimagery, and cover-type mapping components for the project area are listed below.

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COMPONENT	COST (GSA Rates)
Aerial Imagery and Airborne GPS Post Processing	\$ 6,115
Orthoimagery	\$ 5,115
Forest Cover Type Mapping	\$ 43,200
Total	\$ 54,430

Note: The individual items are part of a package. If USFWS wishes to select individual line items, please call to discuss pricing. Also, pricing is based on the project being flown at the same time as the Southern portion of the Great Dismal swamp NWR. Sewall reserves the right to revisit this estimate if scope of work is different than that proposed above.

If Sewall is selected for the proposed work, a mobilization and film advance of 25% of the aerial portion of the project is respectfully requested and will be invoiced upon authorization from USFWS to proceed.

Unless otherwise negotiated, we allow 60 days from the date of delivery for client review and approval of our digital files. If we do not receive notice of rejection from USFWS before the review period expires, we will assume that you have accepted the data.

Once the project begins, USFWS will be billed monthly for the percentage of work in process or complete to date. Payment is due within 30 days after the date of invoice and balances outstanding beyond these terms will accrue interest at the rate of 1.5% per month (18% per annum), or the legally permitted maximum if that rate is lower. The prices and schedule listed above are valid for 60 days. If USFWS decides to proceed with the project after 60 days from the date of this proposal, or should the scope of the project differ from what we have proposed, Sewall reserves the right to revise the scope and fees for this project.

We look forward to working with you on this exciting project. Your notice to proceed can be a letter or purchase order that makes reference to this proposal, or a copy of this letter with an authorizing signature in the space provided below.



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Thank you for the opportunity to submit a bid. Should you have any questions about our proposal, please contact Project Manager Mary McDonald at (207) 817-5446; Email: mary.mcdonald@sewall.com.

Sincerely,
JAMES W. SEWALL COMPANY

Mary McDonald, LPF
Project Manager

David T. Edson, LPF
President/CEO

Attachment

Accepted by: (Typed name and title)_____

Signature:_____Date:_____

(140391)

APPENDIX 1

National Wildlife Refuge Photo Interpretation Codes

Species – primary and secondary only – example species list is provided below. Actual list to be devised with Refuge Personnel

Urban or Built-Up Land	
RE	Residential
CL	Commercial, Abandoned Military
UT	Utility/Transportation
JY	Junkyard
GP	Gravel Pit

Agricultural Land	
BB	Blueberry Barren
PA	Animal Pasture
CR	Cropland
AF	Abandoned Field
OT	Other

Forestland	
Species	
Evergreen Forest Land	
S	Softwood
SF	Spruce/Fir
SP	Spruces (White, Red, Norway)
BF	Balsam Fir
RS	Red Spruce
WS	White Spruce
BS	Black Spruce
LA	Larch
LC	Lowland Conifer
HE	Hemlock
CE	Cedar
PI	Pine
JP	Jack Pine

Height Class	
1	0-15 feet
2	16-35 feet
3	36-50 feet
4	51-70 feet
5	71+ feet
Crown Closure	
A	91-100%
B	61-90%
C	25-60%
D	5-25%

Water	
WA	Open Water
Wetlands & Nonforest	
Freshwater	
GM	Graminoid Marsh
PH	<i>Phragmites</i> spp.
SW	Red Maple Swamp
TB	Treed Peat Bog
OB	Peat Bog
PB	Pitch Pine Bog
MB	Macrophyte Bed
SS	Shrub Swamp
BV	Beaver Marsh/Bog/Pond
CM	Cattail Marsh
BL	Blueberry Shrubland Swamp
Estuarine	
SB	Sand Beach
CB	Cobble
Other	
BR	Upland Brush
YD	Log Yard
LG	Ledge

RP	Red Pine
WP	White Pine
PS	Pine/Scrub Oak
BP	Japanese Black Pine
PP	Pitch Pine
Deciduous Forest Land	
H	Hardwood
TH	Northern Hardwoods
IH	Pioneer Hardwoods
OH	Oak/Hardwood
OM	Mixed Oak
RM	Red Maple
HM	Hard Maple
BH	Bottomland Hardwood (silver maple, etc.)
YB	Yellow Birch
WB	White Birch
BE	Beech
RO	Red Oak
WO	White Oak
BO	Black Oak
CO	Chestnut Oak
BC	Black Cherry
PO	Poplars
WA	White Ash
MM	Mixed Mesophytic (HM, WA, RM)

Modifier	
F	Cutover
W	Wet

Minimum Mapping Unit:

5 acres forested

1 acre non-forested