BONNEVILLE POWER ADMINISTRATION

Habitat Evaluation Procedures (HEP) Report

Kaniksu Unit Pend Oreille National Wildlife Refure

Technical Report 1998 - 1999 January 1999 DOE/BP-22262-2

This Document should be cited as follows:

US Fish and Wildlife Service Staff, "Habitat Evaluation Procedures (HEP) Report; Kaniksu Unit Pend Oreille National Wildlife Refure", 1998-1999 Technical Report, Project No. 199106000, 15 electronic pages, (BPA Report DOE/BP-22262-2)

Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

Habitat Evaluation Procedure Report
For
Proposed Kaniksu Unit
Of The
Little Pend Oreille National Wildlife Refuge

Project Number 1991-060-00
Contract Number 00 BI 22262

Prepared By
U.S Fish and Wildlife Service
Upper Columbia River Basin Field Office
Little Pend Oreille National Wildlife Refuge
January 28, 1999

Introduction

Little Pend Oreille National Wildlife Refuge is proposing to acquire a 706-acre property located in Stevens County, Washington. The new acquisition would be called the Kaniksu Unit. A habitat evaluation was conducted on the property using the Habitat Evaluation Procedures (HEP) methodology (U.S. Fish and Wildlife Service 1980). Evaluation species were black-capped chickadee, mallard, ruffed grouse and white-tailed deer. Life requisites evaluated were food and reproduction for black-capped chickadee, food, cover, and reproduction for mallard, available winter browse for white-tailed deer and fall-to-spring cover for ruffed grouse.

Study Area

The property is located directly north of Deer Lake in Stevens County, Washington. Approximately 239 acres are bottomland or meadow habitats along Deer Creek and tributaries. Woody wetland and riparian habitats occupy approximately 23 acres. The remaining 216 bottomland and meadow acres consist mostly of seasonally flooded emergent wetlands and temporarily flooded emergent wetlands. Much of the bottomland and meadow habitat has been subject to intensive annual cattle grazing which has reduced or eliminated woody riparian and forb/grassland habitats. Approximately 467 acres are upland conifer forest dominated by ponderosa pine, douglas fir, lodgepole pine, and western red cedar.

Methods

We used existing models for ruffed grouse (Cade and Sousa 1985) and white-tailed deer (Martin et. al 1988) to evaluate 467 acres of upland forest. We stratified the upland forest area into 7 units for data collection (Units 1-7, Figure 1). Field data were collected on October 29, 30, and November 4, 1998. Data were collected at 10 points, spaced 20 paces (approximately 52.5 ft) apart along one randomly selected transect in each stand, for a total of seven transects. A circular quadrat (.01 acre) was used at each sampling point. Within this quadrat we counted all deciduous, coniferous, and shrub stems $\geq$ 3 ft in height and made an ocular estimate of percent shrub canopy cover < 4.9 ft in height. We measured the height of the closest (to the center of the quadrat) three deciduous trees, conifer trees, deciduous shrubs, and lowest conifer branch. Data for ruffed grouse and white-tailed deer were also collected along one transect within a 9-acre alder wetland (Unit 8, Figure 1). A Habitat Suitability Index (HSI) was calculated for each stand for both ruffed grouse and white-tailed deer. Weighted HSI scores were calculated by taking the HSI for each stand and multiplying by the stand acreage. The overall HSI is equal to the sum of the weighted HSI scores divided by the total area of all cover types.

The black-capped chickadee HSI model (Schroeder 1983) was used to evaluate the 23 acres of riparian and wetland forested areas. Data were collected at 10 points, spaced 15 paces (approximately 39 ft) apart along one transect in each forested riparian or wetland stand, for a total of three transects (Figure 2). At each point, we measured percent tree canopy cover,

average tree height, and counted the number of snags. A circular quadrat (.01 acre) was used at each sampling point.

We used an existing mallard HSI model (Martin et al. 1988) to evaluate approximately 148 acres of potential mallard nesting habitat in the meadow. Data relative to wetland type and cover were taken from the 1987 Nelson Peak, National Wetlands Inventory map and a 1997 Washington Department of Natural Resources orthophotograph. Reproductive cover data were collected at 10 points, spaced 15 paces (approximately 39 ft) apart along three transects (Figure 3). At each point we measured the height above the ground at which the vegetation provided 100% visual obstruction. Transect 1 represented heavily grazed meadow. Transect 2 was located along the upland edge of the large seasonal wetland. Transect 3 was located on the edge of the county road across the fence from the grazed meadow.

Changes in habitat and habitat units for all evaluation species were projected 15 years into the future. For black-capped chickadee, mallard and white-tailed deer, we assumed that existing habitat conditions would become optimum by year 5.

In order to project habitat changes during the next 15 years for ruffed grouse, a number of assumptions had to be made regarding natural vegetative growth rates un upland forests. We assumed an increase in deciduous shrub density of 285 stems/acre per year for the first 10 years based on past growth rates. Deciduous shrub stem increases dropped to 70 stems/ acre per year for years 11-15. Deciduous shrub heights are assumed to increase 50% by year 5 and an additional 50% by year 10, followed by an additional 25% increase by year 15. Deciduous tree density increased by 10 stems/acre by year 5. An additional 100% increase and a 50% increase in deciduous tree density were assumed by year 10 and 15, respectively. Deciduous tree heights increased to optimum heights of $\geq$ 14.9 ft by year 5. Conifer variables did not change.

We also made projections for deciduous tree and shrub plantings totaling 24 acres along the creek and in the meadow on the east side of the property. These plantings will ultimately result in additional HUs for black-capped chickadee, ruffed grouse and white-tailed deer, where there are no HUs currently.

Results

Ruffed Grouse

Field summary data and HEP calculations for ruffed grouse fall-to-spring cover for 8 units are shown in Table 1. HSIs ranged from 0.0 to 0.25. With exception of Unit 8, the alder swamp, HSIs were very similar. The overall HSI for ruffed grouse was 0.24, resulting in 114.2 existing HUs out of a potential 476 that would be present under optimum conditions.

White-tailed Deer

Data for white-tailed deer habitat suitability are presented in Table 2. Unit HSIs ranged from 0.0 (in the alder swamp) to 0.6. The overall HSI for white-tailed deer was 0.36 resulting in 171.4 HUs out of a potential 476 HUs which would be present under optimum conditions.

Black-capped chickadee

Data collected from the three chickadee transects are listed in Table 3. Unit 1 was an alder and hawthorn dominated riparian area in the northeast portion of the property along Deer Creek. A few large black cottonwoods were also present in the unit. Unit 2 was located near the eastern boundary of the property and was dominated by quaking aspen, but also included alder, larch, spruce, and western red cedar. Unit 3, located adjacent to Deer Creek in the southern part of the property, was an alder swamp with a few large cottonwoods. Total HUs were 11.9.

Mallard

We estimated that there were 148 acres out of the 239 bottomland and meadow acres that would be potential mallard nesting habitat. The remaining 91 bottomland acres consist of seasonally or semipermanently flooded wetlands (including the 9-acre alder swamp) and would preclude mallard nesting due to high water levels during the nesting season. Four acres of fairly dense grass and shrub habitat were immediately adjacent to the perimeter of the seasonal wetland. The HSI was for this portion was determined to be 0.8 resulting in 3.2 HUs present. The remaining 144 acres were located up slope of the seasonal wetlands and have been subject to heavy annual grazing. Therefore, this area currently offers little nesting cover as evidenced by an HSI of 0.1 and 14.8 HUs. The overall HSI for mallard nesting was determined to be 0.12, resulting in 17.8 HUs out of a potential 148.

Discussion

Ruffed grouse

Ruffed grouse fall-to-spring habitat components appear to be limiting on the Pearce property with current HUs representing only 24% of the potential HUs that would be available under optimum conditions. According to the model, relatively high densities of deciduous trees and shrubs are important components of vertical cover for ruffed grouse. The proposed Kaniksu Unit exhibits low densities of deciduous trees and shrubs. Conifers are the predominant tree, which do provide some cover, but are less important than the deciduous component. Tall conifers provide concealment for raptors which prey upon ruffed grouse, and conifers with low branches provide concealment for mammalian predators. Therefore, habitat suitability generally decreases as the percentage of conifers increases.

Future management of existing upland forests will likely provide for burning of the understory to stimulate shrub and deciduous tree growth. However, this is projected to result only in an additional 6.3 HUs during the first 15 year period. Conifers will continue to be dominant during this early period. As the deciduous tree component continues to increase, ruffed grouse HUs should increase more substantially in the future.

The 9-acre alder swamp currently contributes 0 HUs for ruffed grouse. We project no additional HUs for this area during the first 15 years. The absence of cattle grazing in the future will allow this area to regenerate, however the progression will be slow.

Planting of 24 acres along the creek and in the east meadows with deciduous shrubs and trees should result in an additional 24 HUs, during the first 15 years, where currently none exist. As these plantings expand in the future, more HUs should be realized. Thus, total HUs for ruffed grouse are projected to increase from 114.2 to 144.5 during the first 15 years (Table 4).

White-tailed deer

Results from the white-tailed deer habitat evaluation are based on the suitability of available browse for winter habitat. The model looks at percent canopy of deciduous shrubs < 4.9 ft in height. Suitability increases as shrub canopy increases with optimum conditions occurring at approximately 40% and above. For the proposed Kaniksu Unit, percent canopy of shrubs was approximately 15%.

Available browse for white-tailed deer in the upland forest and alder swamp should increase to optimum conditions during the first 15 years, resulting in 476 HUs. The remaining 14 acres of existing riparian habitat, in the absence of cattle grazing, should recover to optimum conditions for white-tailed deer, providing an additional 14 HUs. The 24 acres of deciduous plantings should contribute an additional 24 HUs where currently none exist. Total HUs for white-tailed deer at the end of the first 15 years are projected to be 514 (Table 4).

Black-capped chickadee

Black-capped chickadee habitat variables are projected to increase to optimum conditions in the 23 acres of existing riparian forest. The 24 acres of deciduous plantings should contribute an additional 24 HUs where currently none exist. Total HUs for black-capped chickadee after the first 15 years are projected to be 47 (Table 4). As these plantings expand in the future, more HUs should be realized.

Mallard

Current mallard nesting habitat is poor due to past overgrazing. The best nesting habitat currently is found along the county road ditch across the fence and thus not subject to past grazing. Mallard habitat variables are projected to become optimum in the absence of grazing for the current 148 acres of potential habitat, resulting in an increase of 140.2 HUs (Table 4). The shrub and tree plantings will contribute to mallard HUs in the first 15 years, however beyond that, mallard HUs will start to decrease as these plantings expand and become more dense.

Literature Cited

Cade, B. S., and P. J. Sousa. 1985. Habitat suitability index models: ruffed grouse. FWS/OBS-82/10.86. Fish and Wildlife Service. U.S. Department of The Interior. 31pp.

Martin, R. C., H. J. Hansen, and G. A. Meuleman. 1988. Albeni Falls wildlife protection, mitigation, and enhancement plan. Project No. 87-43. Bonneville Power Administration, Portland, Oregon.
123 pp.

Schroeder, R. L. 1983. Habitat suitability index models: black-capped chickadee. FWS/OBS-82/10.37. Fish and Wildlife Service. U.S. Department of The Interior. 12 pp.

U. S. Fish and Wildlife Service. 1980. Habitat evaluation procedures (HEP). Division of Ecological Services. Ecological Services Manual 102.

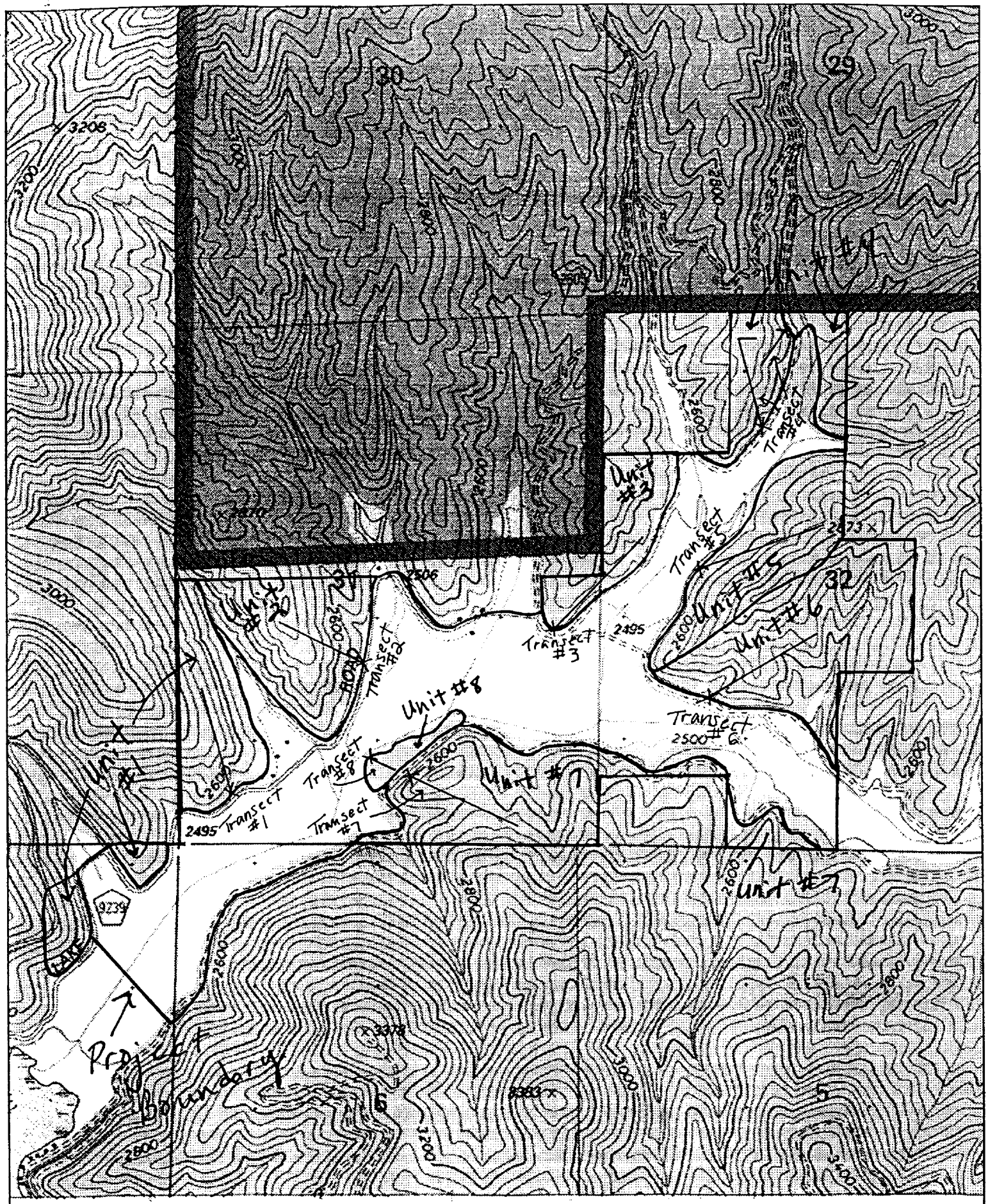

Figure 1. Approximate locations of unit boundaries and transects for ruffed grouse and white-tailed deer data collection for habitat evaluation of proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge.

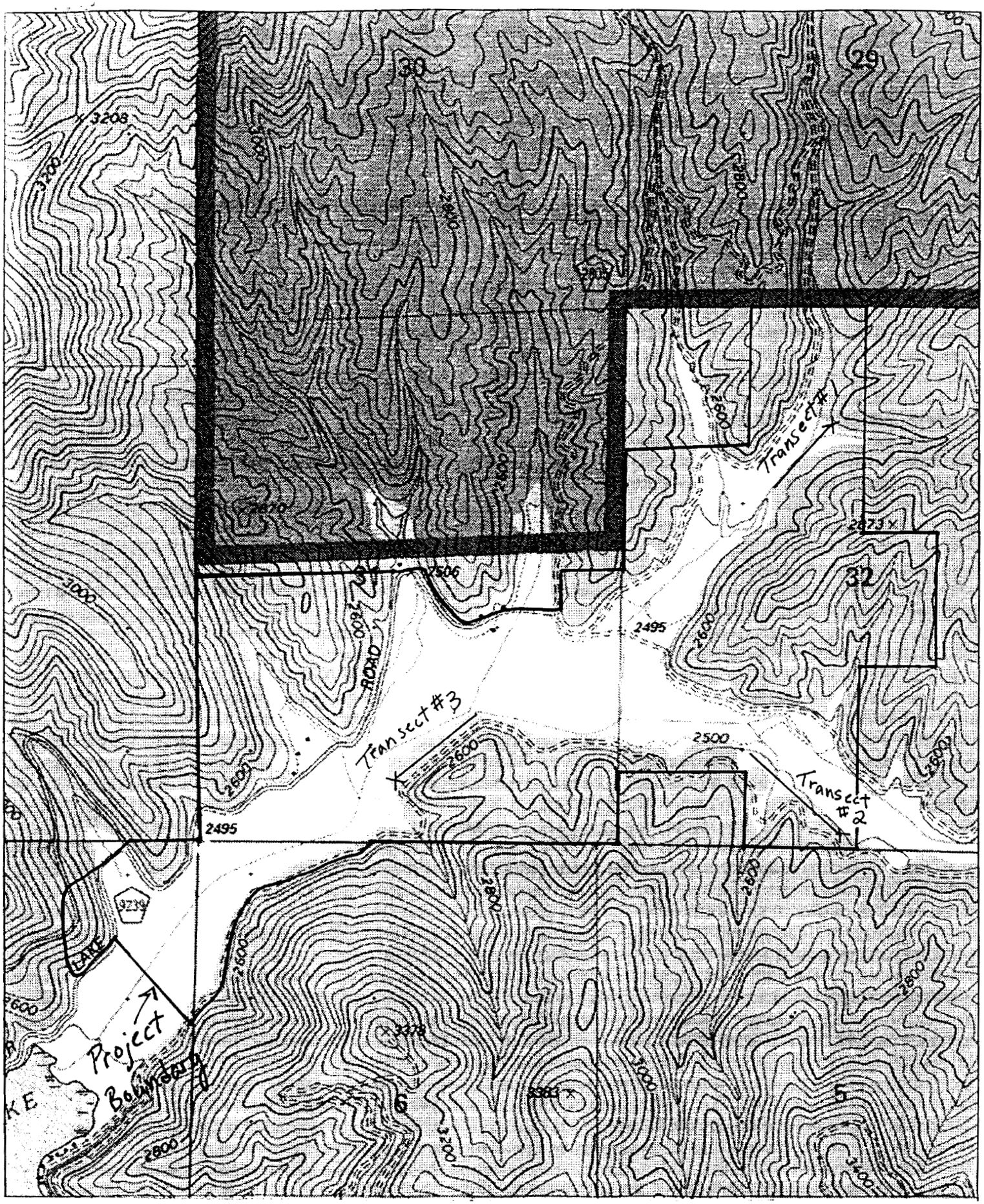

Figure 2. Approximate locations of transects used for collecting black-capped chickadee data for habitat evaluation of proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge.

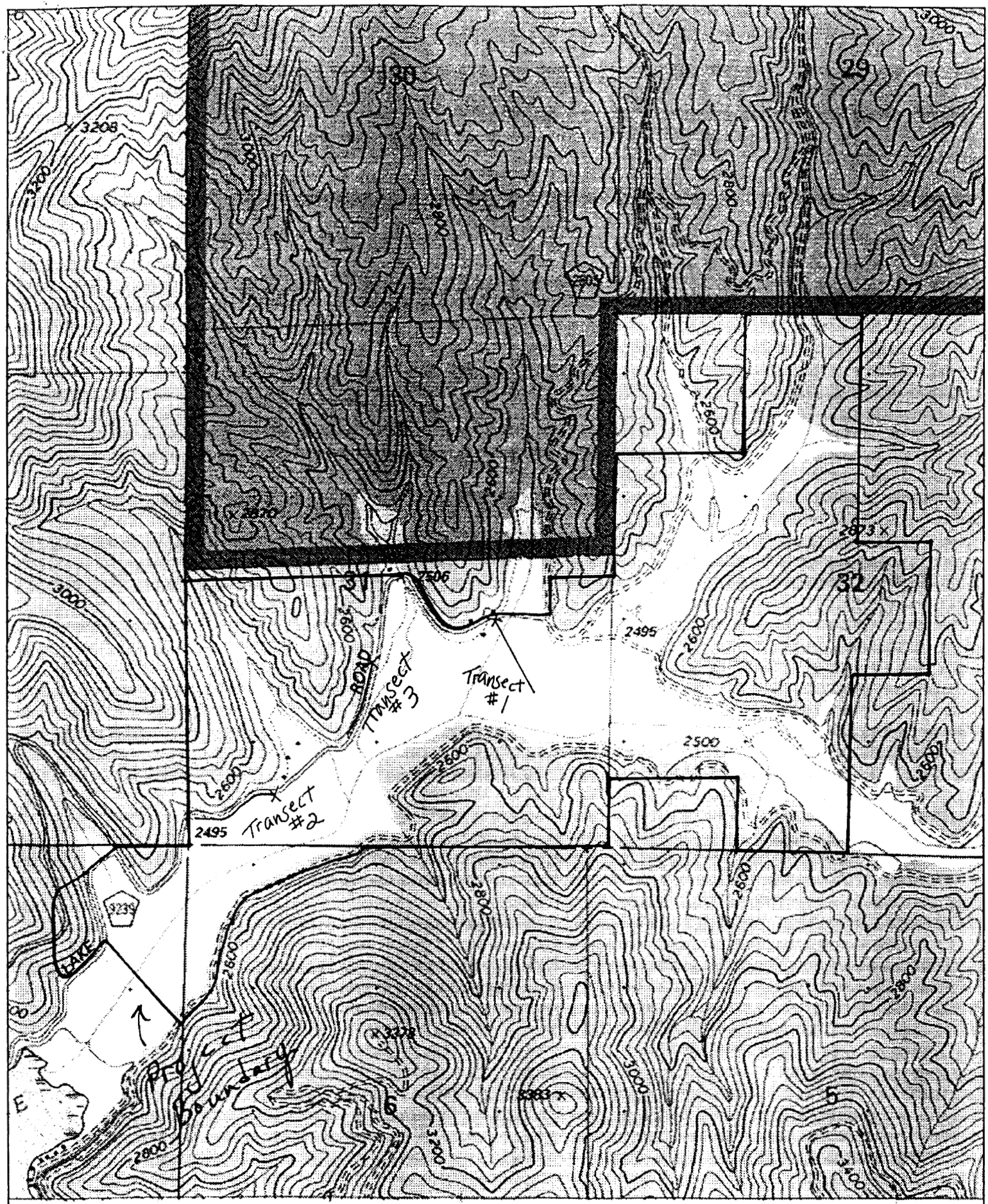

Figure 3. Approximate locations of transects for collecting mallard data for habitat evaluation of proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge.

Table 1. Baseline habitat conditions for ruffed grouse fall-to-spring cover on the proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge.

Stand	Density of decid. trees (#/acre)	Density of conifer trees (#/acre)	Density of decid. shrub stems (#/acre)	Equiv. stem density conifer trees (#/acre)	Equiv. stem density decid. shrubs (#/acre)	Mean height lowest conifer branch (ft)	Mean height decid. trees (ft)	Mean height conifer trees (ft)	Mean height decid. shrubs (ft)	Total equiv stem density (#/acre)	SIV3[a]	Weighted SIV4[b]	SIV5[c]	HSI[d]	Acres	HU
1	0	476	8117	1855	2029	3.6	N/A	17.4	5.6	3884	1.0	0.94	0.25	0.23	50	11.5
2	0	739	4879	2586	1220	5.2	N/A	22.3	5.9	3806	1.0	1.0	0.25	0.25	70	17.5
3	10	982	1640	3927	410	3.0	11.8	18.4	4.3	4347	1.0	1.0	0.25	0.25	39	9.7
4	10	516	1397	1755	349	6.2	7.9	29.2	4.6	2114	1.0	0.89	0.25	0.22	51	11
5	0	1204	4089	2409	1022	10.8	N/A	33.5	5.6	3431	1.0	1.0	0.25	0.25	47	11.7
6	0	1215	2166	4494	541	4.6	N/A	27.9	4.6	5035	1.0	1.0	0.25	0.25	104	26
7	0	972	8057	3887	2014	2.6	N/A	15.7	7.5	5901	1.0	1.0	0.25	0.25	106	26.5
8	0	0	1197	0	299	N/A	N/A	N/A	16.4	299	0.0	0.15	N/A	0.0	9	0.0
Overall														0.24	476	114.2

[a] SIV3 = Suitability Index (SI) for total equivalent stem density. Optimum total equivalent stem density (SI=1.0) occurs from 1983 to 8502 stems/acre.

[b] Weighted SIV4 = Suitability Index of weighted height of tallest 1,983 equivalent stems. Suitability of vertical cover is optimum if there are a minimum of 1,983 equivalent stems/acre at optimal heights (i.e., $\geq$ 15.1 ft). Suitability decreases when woody stems are $<$ 15.1 ft in height, and woody stems $\leq$ 4.9 ft do not provide suitable overhead cover. This variable takes into account the relationship between stem density and tree height.

[c] SIV5 = Suitability for conifer penalty. According to the model, maximum densities and survival of ruffed grouse are lower in forests where conifers are the predominant trees. Tall conifers provide concealment for raptors which prey upon ruffed grouse, and conifers with low branches provide concealment for mammalian predators. Therefore, this SI generally decreases as the percentage of conifers increases.

[d] HSI = Habitat suitability Index for each unit for fall-to-spring cover (FSCOV) calculated as follows: FSCOV = SIV3 x Weighted SIV4 x SIV5.

Table 2. Baseline habitat conditions for white-tailed deer available browse on the proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge.

Stand	Percent shrub canopy cover <4.9 ft in height[a]	HSI[a]	Acres	HU
1	21.5	0.5	50	25
2	28.75	0.6	70	42
3	12.25	0.2	39	7.8
4	5.5	0.1	51	5.1
5	15.75	0.3	47	14.1
6	18.75	0.4	104	41.6
7	17	0.35	106	37.1
8	0	0	9	0
Overall	14.9	0.36	476	171.4

[a] Optimum conditions (HSI=1.0) for white-tailed deer winter browse occur at $\geq$ 40%.

Table 3. Baseline habitat conditions for black-capped chickadee food and reproduction on the proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge.

Unit	Tree Canopy Cover (%)	Average Tree Height (ft)	Snags (#/acre)	V1[a]	V2[b]	V4[c]	HSI[d]	Acres	HU
1	66.8	29.8	20	1.0	0.6	1.0	0.6	6	3.6
2	32	57.7	40	0.6	1.0	1.0	0.6	8	4.8
3	17.2	35.7	110	0.3	0.7	1.0	0.4	9	3.6
Overall							0.52	23	11.9

[a] V1 = Suitability Index (SI) for percent tree canopy closure. Optimum (SI=1.0) canopy closure for chickadees is 50-75%.

[b] V2 = Suitability Index for average height of overstory trees. Optimum overstory height $\geq$ 49 feet.

[c] V4 = Suitability Index for number of snags/acre. Optimum snag density $\geq$ 2/acre.

[d] Habitat Suitability Index (HSI) for each unit. Each unit HSI is equal to the lower of either the food HSI or the reproductive HSI. The food HSI = $(V1 \times V2)^{1/2}$. The reproductive HSI = V4.

Table 4: Baseline Habitat Units and projected Habitat Units for evaluation species on the proposed Kaniksu Unit of the Little Pend Oreille National Wildlife Refuge

Species	Current Habitat units (1999)	Projected Habitat Units Year 15
Black-capped Chickadee	11.9	47
Mallard	17.8	148
Ruffed Grouse	114.2	144.5
White-tailed Deer	171.4	514