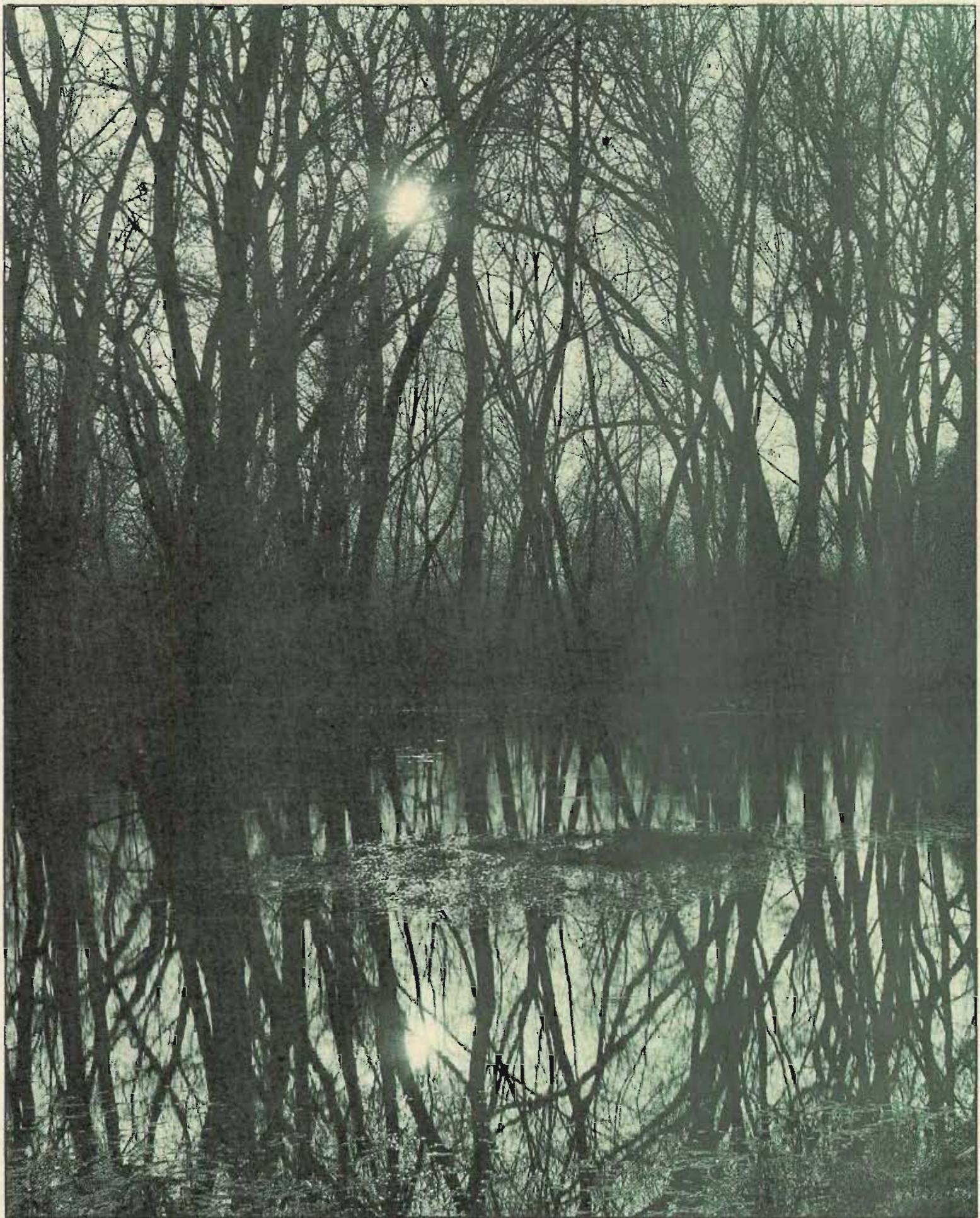


SACRAMENTO RIVER RIPARIAN ATLAS

VERONA TO REDDING

CALIFORNIA DEPARTMENT OF FISH AND GAME
WILDLIFE CONSERVATION BOARD

1988



Cover Photo by Hilary F. Marckx © 1984. This photograph made
possible by a fellowship from the Friends of Bannon Island.

SACRAMENTO RIVER RIPARIAN ATLAS



A survey of the important wildlife, fish and plant habitat along
the Sacramento River between the town of Verona
and Keswick Dam at Redding

Prepared by the California Department of Fish and Game
Nongame Heritage Program

State of California
The Resources Agency
Sacramento, California

1988

CREDITS

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I. INTRODUCTION

Senate Bill 1086 (Chapter 885, Statutes of 1986) sponsored by Senator Nielsen and Assemblyman Campbell required the Wildlife Conservation Board (WCB) to inventory the lands along a major portion of the Sacramento River and to identify and determine the priority of lands valuable to fish and wildlife. This Atlas contains the results of that inventory. The primary purpose of the Atlas is to provide current information to the "Upper Sacramento River Fisheries and Riparian Habitat Advisory Council." This group was also created by SB 1086 and charged with preparing a "management plan (that) shall provide for the protection, restoration and enhancement of fish and riparian habitat and associated wildlife."

SB 1086 specifically required the identification and biological evaluation of land that contains any of four specific biological resources: (1) sources of salmon spawning gravels; (2) habitat for rare, threatened and endangered species; (3) riparian habitat; and (4) opportunities for reestablishment of riparian habitat (i.e., potential riparian habitat). The bill also required the compilation of a fifth category of information: (5) a preliminary identification of potentially willing sellers of land identified in the inventory. Atlas sheets "A" contain the biophysical information obtained for categories (1) through (4), while Atlas sheets "B" present ownership data [category (5)] pertaining to high priority lands identified on sheets "A".

II. STUDY AREA

SB 1086 prescribes the study area as lands along "the Sacramento River upstream from the confluence with the Feather River and downstream from Keswick Dam." The width of the study area was not specifically set forth in the legislation and, for the purposes of accommodating the diverse entities that were inventoried, was not uniformly nor precisely delimited. The lateral bounds, however, can be generally described as follows: from the mouth of the Feather River upstream to approximately the Ord Ferry Bridge, the study area is bound by existing levees; from the Ord Ferry Bridge upstream to the mouth of Iron Canyon (just north of Red Bluff), the study area is bound by the outside edge of obvious oxbow lakes and meander scars; from the mouth of Iron Canyon upstream to the head of Iron Canyon, the study area is bound by the approximate level of the 100-year flood line; for the remainder of the river upstream, the study area is bound by levees, roads or development, whichever is closest to the river.

INVENTORY METHODOLOGY

Contracts were let with the California Department of Water Resources (DWR) to produce aerial photos of the study area. Sets of blue line prints of these photos, at a scale of 1" = 400', were prepared to serve as base maps for data recordation.

Because two types of information — biological and land ownership — were needed, two different approaches were

taken to gather them. For the biological information, contracts were let for each of the four data categories required. A set of blue line prints were provided to each of the contractors, upon which they mapped field data and supplementary information. These maps and a written report constituted the final contract product. A composite of all four sets of biological data is represented on Atlas sheets "A". More detailed site information specifically pertaining to the riparian and spawning gravel surveys, as well as each of the four final reports, has been placed on file with WCB (1416 Ninth Street, Sacramento, CA).

Ownership information was tabulated and mapped for the highest priority habitats. This is shown on Atlas sheets "B". Highest priority was generally considered to be polygons (i.e., delineated areas of land) rated A and at least 40 acres in size. Where rare species were concerned, no minimum acreage applied; where potential riparian lands were concerned, shape and location (i.e., manageability) were also considered.

Land ownership was delineated by superimposing assessor's parcel boundaries over high priority habitat. Parcel boundaries were transcribed from the most recent County Assessor parcel maps available. Parcels that contain one acre or less of a high priority habitat were excluded. A three-letter county descriptor, the assessor's parcel number and the number of acres in the parcel containing high priority habitat were recorded on Atlas sheets "B". This information, along with the name and address of the owner of record and the total acreage of the parcel, was entered into a data base. Landowners were surveyed by mail to determine their interest in negotiating the sale of the identified high priority habitat. The results of that survey have been placed on file with WCB.

IV. EXPLANATION OF BIOLOGICAL SURVEY METHODS AND EVALUATION TECHNIQUES

Each of the four biological surveys employed methods tailored to meet the survey objectives. These objectives include the evaluation of the results of the four surveys. Three summary categories are employed: A = high value; B = moderate value; and C = lower value. The reader should be aware that these values are relative; that is, polygons rated C are lower value only when compared to other polygons rated in the same survey. No attempt was made to compare polygons that represent one category with polygons of another - each category was considered of equal importance.

A. Salmon Spawning Gravel.

METHODS: Since salmon spawning in the Sacramento River occurs principally between Keswick Dam and Ord Ferry, only that section was surveyed for spawning gravel sources. Forty-three sites with eroding banks were surveyed using a sonar, tape, level and rod. Bank profiles were drawn showing the height of bank, height of gravel, layer in bank and height of silt layer.

The gravel layer was then sampled and sieved. An average of about 400 pounds of gravel was sieved at each site. The gravel data were plotted on a graph and the percentage of spawning-sized gravel in the sample determined.

Bank erosion rates were determined at each of the sites by comparing 1976 and 1987 aerial photographs. From these data, the yield in tons of spawning gravel was calculated for each site. To determine the value of bank-eroded spawning gravel to the salmon, available data on salmon spawning were plotted. The areas within one mile downstream of each site were then evaluated based on downstream spawning and the amount of spawning gravel provided by the banks.

EVALUATION: To determine the overall priority rating of each spawning gravel source, the four individual criteria were separately rated as high, medium or low, as explained below.

Criterion 1 - Proximity to active spawning (S) · Salmon redds recorded in 1964, 1980, 1983, 1985 and 1986 surveys were counted within one mile downstream of site and give the following ratings:

- S(A) = abundant redds
- S(B) = moderate number of redds
- S(C) = few to zero redds

Criterion 2 - Percent of spawning size gravel in sample (G) · Spawning gravel is defined as 0.5 to 5 inches in diameter and is rated as follows:

- G(A) = greater than 46% of sample is spawning size
- G(B) = between 31% and 45% of sample is spawning size
- G(C) = less than 30% of sample is spawning size

Criterion 3 - Bank erosion rate (E) · Values were assigned by determining the average bank recession between 1976 and 1986. It was rated as follows:

- E(A) = greater than 300 feet
- E(B) = 100-300 feet
- E(C) = less than 100 feet

Criterion 4 - Volume of spawning gravels (V) · Volume was measured in cubic yards per linear foot of bank eroded between 1976 and 1986, and was rated as follows:

- V(A) = greater than 50 cubic yards
- V(B) = 30 to 49 cubic yards
- V(C) = less than 30 cubic yards

Because each of the above criteria is not equal in overall importance, a weight factor was assigned to each:

- S = 1
- G = 1
- E = 2
- V = 3

The overall site rating was determined by assigning 3 points to all criteria rated A, 2 points to all criteria rated B and one point to all criteria rated C. These points are multiplied by the appropriate weight factor for the criteria and the four weighted scores from each site are then added to give the total score for the site. The total score, between 4 and 21, is then the basis for assigning an overall rating to the site, such that where total points are:

- 15 through 21, the site is rate A,
- 7 through 14, the site is rated B, and
- 4 through 6, the site is rated C.

B. Habitat for rare, threatened and endangered species.

METHODS · The primary objective of this survey was to identify existing occupied habitat of listed plant and animal species (i.e., Federal or State of California "Threatened," "Endangered" and "Rare" species). (Note: listed plant species locations were surveyed in conjunction with riparian communities; no listed plant locations were found.) In addition to habitat of specifically "listed" species, the survey also identified habitat of rare nonlisted species, special habitats of other species such as heron rookeries and colonial nesting sites, and areas of particularly high species diversity.

Locations of rare species were identified initially by reviewing records of the California Natural Diversity Data Base (California Department of Fish and Game). This information was supplemented by recent data obtained from three other independent studies: the elderberry longhorn beetle inventory (USDI 1987), the bank swallow survey (Laymon and Halterman, in press) and the yellow-billed cuckoo survey (Laymon and Halterman, in prep.). Some of these records were verified by field inspection; all locations of special habitat and high species diversity were visited. Data were delineated on blue-line aerial photos. Field work included direct observation, trap sampling, bird song, track, scat, nest and burrow identification, and seining and netting. (See addendum, below, for additional site location data made available after mapping was completed and therefore not shown on Atlas sheets "A".)

EVALUATION · While essentially all undeveloped land along the river provides habitat for various animal species, habitats that are known to be, or suspected of being, occupied by listed species or rare, unlisted

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- Holland, R.F. 1986. Preliminary description of the terrestrial natural communities of California. Nongame-Heritage Program, California Department of Fish and Game. 156 pp. (unpublished).
- Laymon, S.A., B.A. Garrison, and J.M. Humphrey. In press. Historical and current status of the bank swallow in California. 1987. Wildlife Management Division Administrative Report, California Department of Fish and Game.
- Laymon, S.A. and M.D. Halterman. In prep. Distribution and status of the yellow-billed cuckoo in California. 1986-1987. Draft report, California Department of Fish and Game.
- U.S. Department of the Interior. 1987. Survey of habitat and populations of the valley elderberry longhorn beetle along the Sacramento River. Jones and Stokes Associates, Inc., Sacramento. 48 p. + appendix.

species are considered the most important. Habitats that are used as concentration areas for either large numbers of individuals or species are considered significant but less so. Size of habitat area is also a measure of importance. Given these criteria, the following rankings were assigned:

A (high) = all habitat of Federal or California listed species or subspecies or significant habitat of candidate species (e.g., bank swallow colonies extending over 10 acres or more).

B (medium) = significant habitat (10 acres or more) of species or subspecies not federally or state listed but for which evidence is available that the species is declining in the Sacramento Valley.

C (lower) = smaller sites (less than 10 acres) of species otherwise qualifying as B priority (but also including small bank swallow sites), nesting or roosting sites for wading birds and relatives, and sites of higher species diversity (i.e., greater than 50 species).

C. Riparian communities.

METHODS - The riparian vegetation surveyed consists of five community types, as described by Holland (1986). Each of these communities is characterized by a unique assemblage of dominant plant species:

Great Valley Cottonwood Riparian Forest - overstory of Fremont cottonwood, Goodding's valley willow, etc., and an understory of wild grape and seedlings of Oregon ash and box elder.

Great Valley Mixed Riparian Forest - box elder, black walnut, sycamore, Fremont cottonwood, Goodding's valley willow, buttonbush, and clematis.

Great Valley Valley Oak Riparian Forest - valley oak, Oregon ash and black walnut, usually located in elevated areas which experience little flooding.

Great Valley Willow Scrub - generally small sites containing dense stands of various species of willow.

Coastal and Valley Freshwater Marsh - aquatic, floating and partially emergent vegetation, including bulrush, spikerush, cattail and sedges.

EVALUATION - Seven criteria were used to establish an overall site value of A, B or C. Each criterion was weighted (see final report on file with WCB for individual site score sheets and weights).

These criteria are described below:

(1) **Community rarity** - Higher value was given to Valley Oak Riparian Forest due to the rarity of its occurrences throughout its existing and historic range, while Willow Scrub was lower in value due to its abundance. Other communities were given intermediate values.

(2) **Vegetation quality** - Quality of a site was judged by density of canopy closure, plant species diversity and composition (i.e., native vs. weedy species), seedling establishment and maturity.

(3) **Size** - Generally sites over 100 acres were given the highest values while those under 50 acres were given the lowest scores.

(4) **Viability** - This criterion was judged primarily on the basis of the likelihood that erosion or some other agent would seriously damage the site in the foreseeable future.

(5) **Unique features** - Higher values were given to sites containing tributary streams or adjacent to other high quality communities.

(6) **Shape** - Sites with the least amount of edge area (and thus the least exposure to external weedy invaders and human disturbance) were rated highest.

(7) **Potential growth** - Higher values were given to sites with potential to expand into adjacent, suitable land.

D. Potential riparian habitat.

METHODS - Much of the land within the study areas, although presently devoid of riparian vegetation, is potentially suitable for either human-induced or natural revegetation. ("Riparian vegetation" for this purpose includes that associated with the riparian communities discussed above under Section C.) A review of relevant literature revealed that five characteristics of riparian land can help indicate the potential for successful revegetation. ("Riparian land" for this purpose is considered to include banks and other terrestrial environs of the river where transported water provides soil moisture in excess of that otherwise available through local precipitation, sufficient to support mesic vegetation.) These five characteristics are:

(1) **Evidence of past riparian vegetation at the site** - Sites were identified that were thought to be historically vegetated with woody species. This was determined by comparing aerial photos of the study area taken in 1952 (the earliest comprehensive photos available) with recent photos.

(2) **Proximity of seed sources** - Aerial photos (both low altitude color and high altitude black and white) were studied to determine distance of any particular site from existing riparian vegetation seed sources. This information was verified by field inspection where stands were accessible.

(3) **Bank stability** - This characteristic was studied by conducting a field survey of the river and classifying all riverbanks as either stable or eroding. Degree of stability and rate of erosion were determined by reviewing aerial photos and maps of river locations recorded on historical atlases. Potential for erosion damage was then determined for each site by measuring distance from actively eroding or accreting (i.e., gradually building by deposition of sediment) banks and rate of such activity.

(4) **Availability of groundwater** - Cottonwood and willows are the most easily established (and most common) trees in the study area. These species require considerable soil moisture and continuous availability of such moisture to the root system. Sites with groundwater more than 10 feet below the surface were considered unsuitable for cottonwood and willow. Groundwater depth was determined using USGS 7½' series quadrangle maps to identify low terrace riparian land (i.e., land with shallow groundwater).

(5) **Soil suitability** - Some mapping units of riparian soil series may be less suitable for revegetation. These difficulties arise from differences in soil texture, frequent flooding or impaired drainage. Soil type locations were obtained from maps prepared by the U.S. Soil Conservation Service and other sources.

EVALUATION - All lands classified as PR (potential riparian) are capable of supporting riparian vegetation. Degree of potential was established as follows:

A (high) = Sites which are predicted to reestablish riparian vegetation without human intervention, characterized by historic evidence of riparian vegetation, available groundwater and seed source for valley oak, black walnut or box elder within 200 meters, and not containing certain defined (suboptimum) soil types.

B (medium) = Sites which are predicted to have good potential for revegetation but will require substantial human intervention. These sites are similar to A priority sites but do not have available groundwater and are located more than 200 meters from an oak, walnut or box elder seed source.

C (lower) = Sites which are predicted to have limited or uncertain potential for human-assisted revegetation, characterized by first, having no historic evidence of riparian vegetation; second, are adjacent to eroding banks and are within the 30-year erosion zone; or third, are composed of certain defined (suboptimum) soil types.

ADDENDUM

The following are nesting and territory records not included on Atlas sheets "A"

| SPECIES | RIVER MILE | ACTIVE YEARS ON RECORD | COMMENTS |
|-----------------|-------------|---------------------------|-----------------------------|
| Swainson's hawk | 78.8R | 1984-87 | Nest |
| Swainson's hawk | 80.8R | 1987 | Territory-nest site unknown |
| Swainson's hawk | 83.2R | 1984 | Nest |
| bank swallow | 81.8R | 1986 | 37 burrows |
| bank swallow | 81.9RL | 1987 | 257 burrows |
| Swainson's hawk | 89.5R | 1986 | Territory-nest site unknown |
| Swainson's hawk | 88.5R | 1987 | Territory-nest site unknown |
| Swainson's hawk | 92.2R | 1987 | Nest |
| Swainson's hawk | 100.6R | 1985 | Territory-nest site unknown |
| Swainson's hawk | 99.2R | 1985 | Territory-nest site unknown |
| Swainson's hawk | 97.8R-98.5R | 1985-86 | Nest at 98.5R |
| Swainson's hawk | 105.3R | 1987 | Nest |
| Swainson's hawk | 108.9R | 1985-86 | Nest |
| Swainson's hawk | 110.8R | 1986 | Nest |
| Swainson's hawk | 113.2R | 1986-87 | Nest |
| Swainson's hawk | 117.9R | 1983-86 | Nest |
| bank swallow | 121.7L | 1986 | 106 burrows |
| Swainson's hawk | 122.7R | 1987 | Nest |
| Swainson's hawk | 124.2L | 1987 | Nest |
| Swainson's hawk | 130.6R | 1984 | Nest |
| bank swallow | 129.3R | 1987 | 233 burrows |
| bank swallow | 127.9L | 1986 | 342 burrows |
| bank swallow | 128.1L | 1987 | 432 burrows |
| Swainson's hawk | 134.5R | 1986 | Nest |
| Swainson's hawk | 141.2L | 1986 | Nest |
| Swainson's hawk | 142.5 | 1984 | Territory-nest site unknown |
| Swainson's hawk | 143.1R | 1985 | Territory-nest site unknown |
| Swainson's hawk | 161.5L | 1987 | Territory-nest site unknown |
| Swainson's hawk | 162.7L | 1985 | Territory-nest site unknown |
| Swainson's hawk | 169.0 | 1987 | Territory-nest site unknown |
| Swainson's hawk | 170.5 | 1985 | Territory-nest site unknown |
| bank swallow | 172.0L | 1987 | 210 burrows |
| Swainson's hawk | 178.0R | 1985 | Territory-nest site unknown |
| Swainson's hawk | 181.5R | 1985 | Nest |
| Swainson's hawk | 182.8R | 1985 | Territory-nest site unknown |
| Swainson's hawk | 184.7R | 1985 | Territory-nest site unknown |
| Swainson's hawk | 191.4L | 1985-86 | Territory-nest site unknown |
| osprey | 193.7 | 1985 | Sighting |
| Swainson's hawk | 198.0L | 1987 | Nest |
| bank swallow | 202.4L | 1987 | 1,568 burrows |
| bald eagle | 209.0R | 1987 | Territory-nest site unknown |
| bank swallow | 207.2R | 1987 | 226 burrows |
| bank swallow | 209.8R | 1986-87 | 245 burrows |
| Swainson's hawk | 211.5L | 1987 | Territory-nest site unknown |
| bank swallow | 218.6L | 1986-87 | 984 burrows |
| Swainson's hawk | 220.2L | 1985 | Territory-nest site unknown |
| bald eagle | 232.0L | 1985 | Sighting |

SUPPLEMENTARY LEGEND

Rare, Threatened and Endangered Species Symbols:

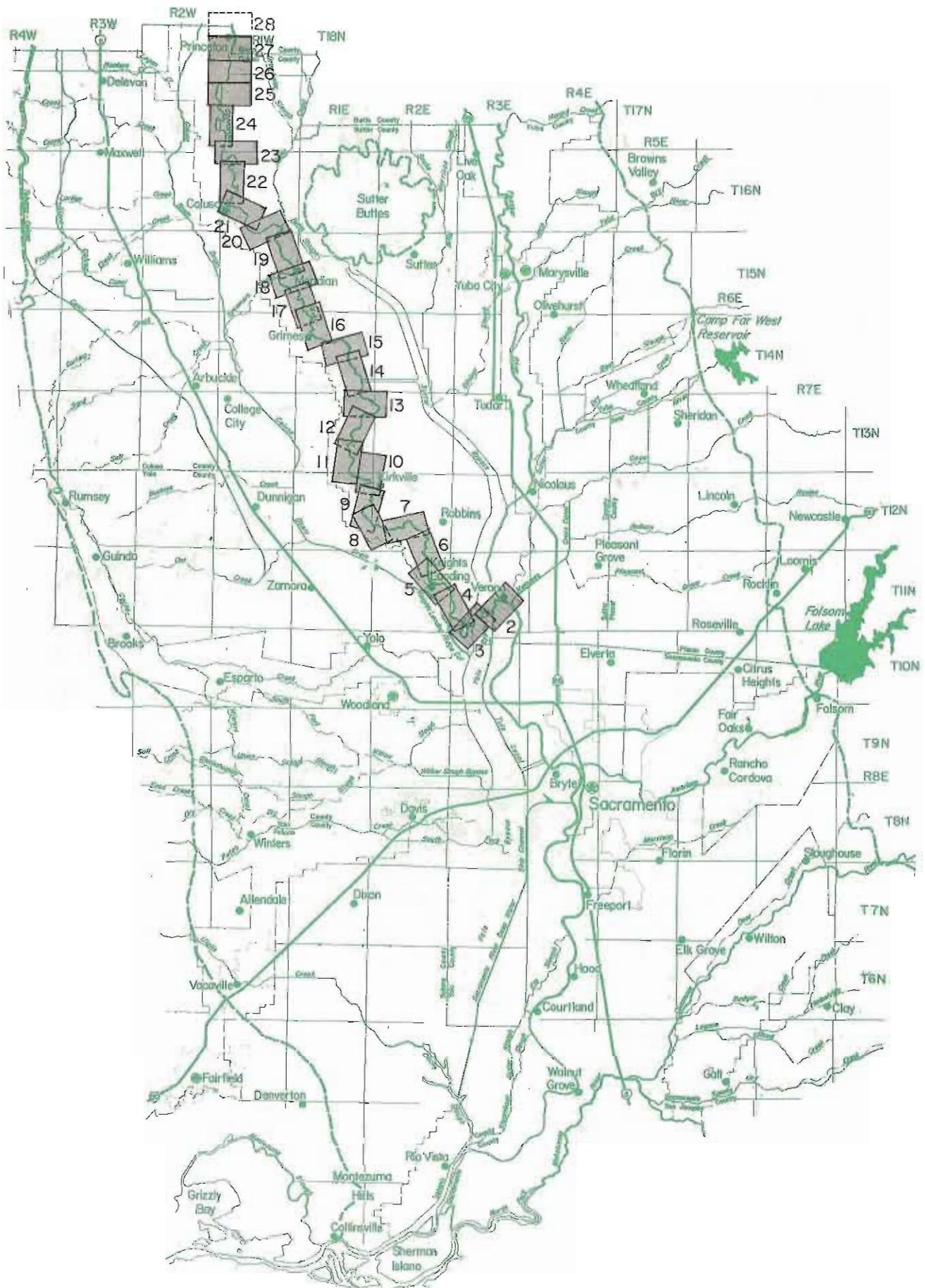
| | |
|--------------|--|
| A(Ac) | Cooper's hawk (<i>Accipiter cooperii</i>) |
| A(Ah) | great blue heron (<i>Ardea herodias</i>) |
| A(Ai) | Sacramento perch (<i>Archoplites interruptus</i>) |
| A(Bc) | Aleutian Canada goose (<i>Branta canadensis leucopareia</i>) |
| A(Bs) | Swainson's hawk (<i>Buteo swainsoni</i>) |
| A(Ca) | common egret (<i>Casmerodius albus</i>) |
| A(Cao) | western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>) |
| A(De) | Valley elderberry longhorn beetle (<i>Desmocerus californicus dimorphus</i>) |
| A(Div) | "high diversity of species" |
| A(Dp) | yellow warbler (<i>Dendroica petechia brewsteri</i>) |
| A(Hl) | bald eagle (<i>Haliaeetus leucocephalus</i>) |
| A(Iv) | yellow-breasted chat (<i>Icteria virens</i>) |
| A(Nn) | black-crowned night heron (<i>Nycticorax nycticorax</i>) |
| A(Pa) | double-crested cormorant (<i>Phalacrocorax auritus</i>) |
| A(Ph) | osprey (<i>Pandion haliaetus</i>) |
| A(Rr) | bank swallow (<i>Riparia riparia</i>) |
| A(Tc) | giant garter snake (<i>Thamnophis couchi gigas</i>) |

Riparian Community Symbols:

| | |
|-------------|---|
| R(MR) | Great Valley mixed riparian forest |
| R(CR) | Great Valley cottonwood riparian forest |
| R(VO) | Great Valley Valley Oak riparian forest |
| R(WS) | Great Valley willow scrub |
| R(FW) | Coastal and valley freshwater marsh |

County Symbols:

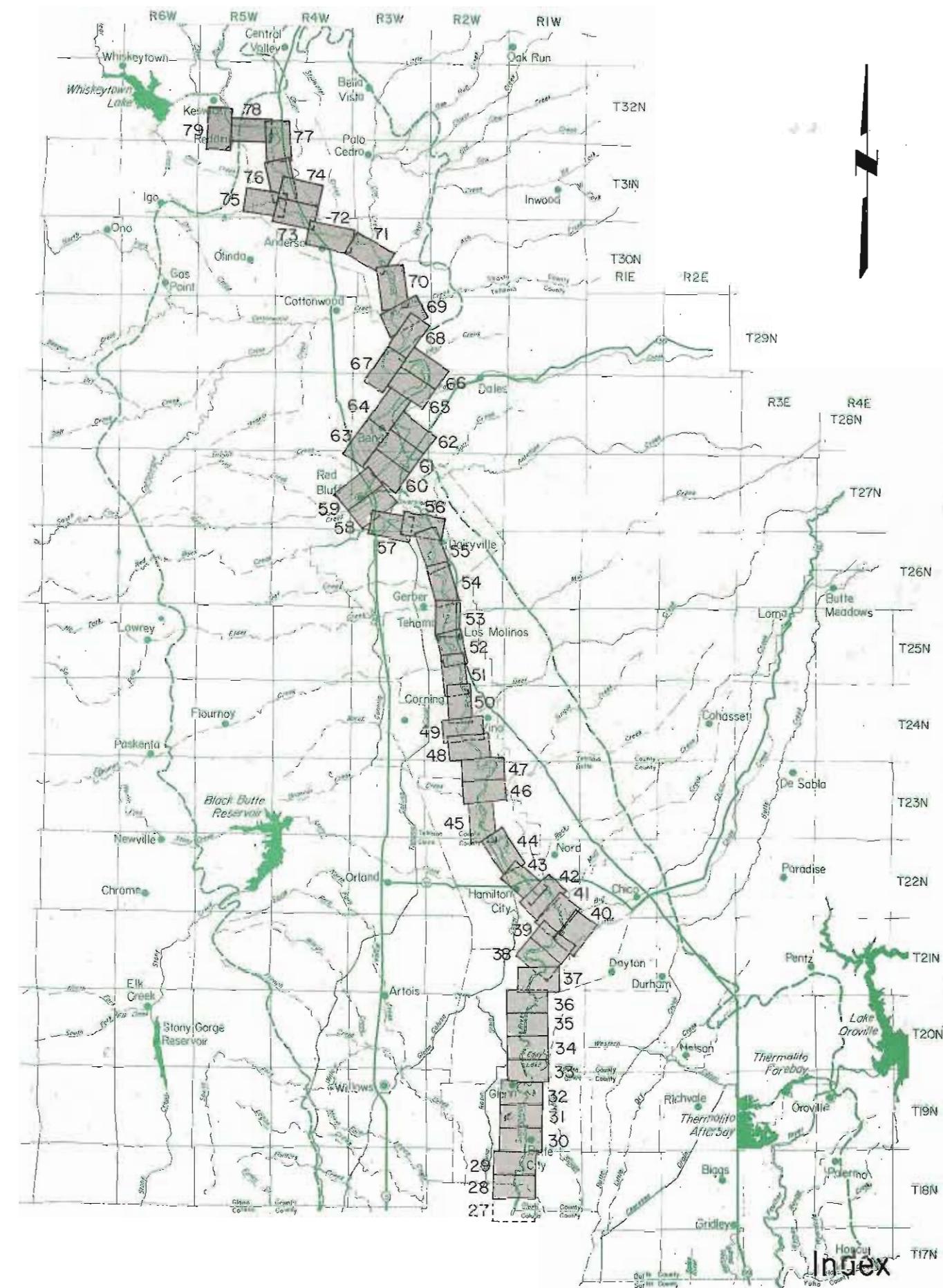
| | |
|------------|--------|
| BUT | Butte |
| COL | Colusa |
| GLE | Glenn |
| SUT | Sutter |
| TEH | Tehama |
| YOLO | Yolo |



APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM



SHEET 01 OF 79



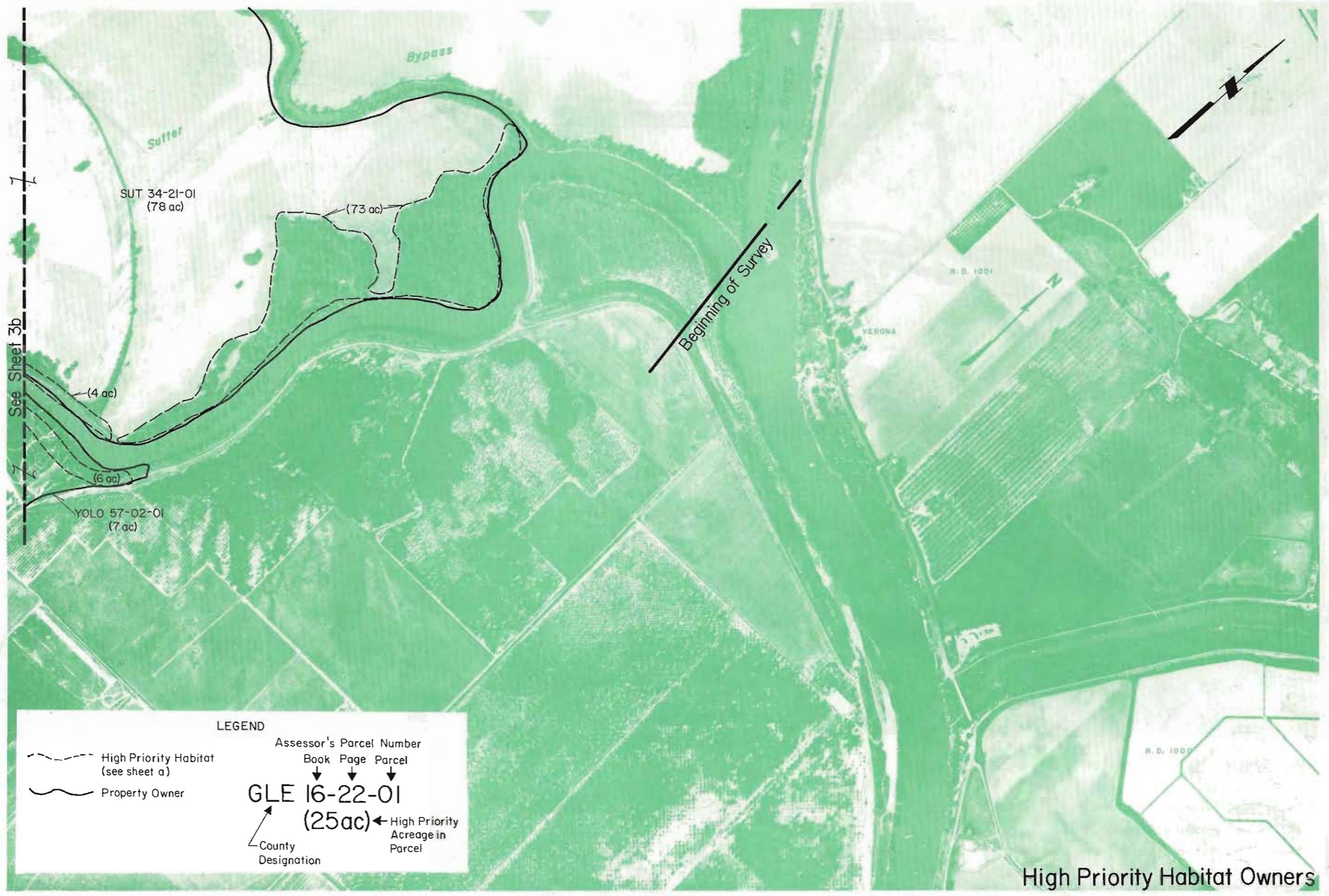
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SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 02a OF 79

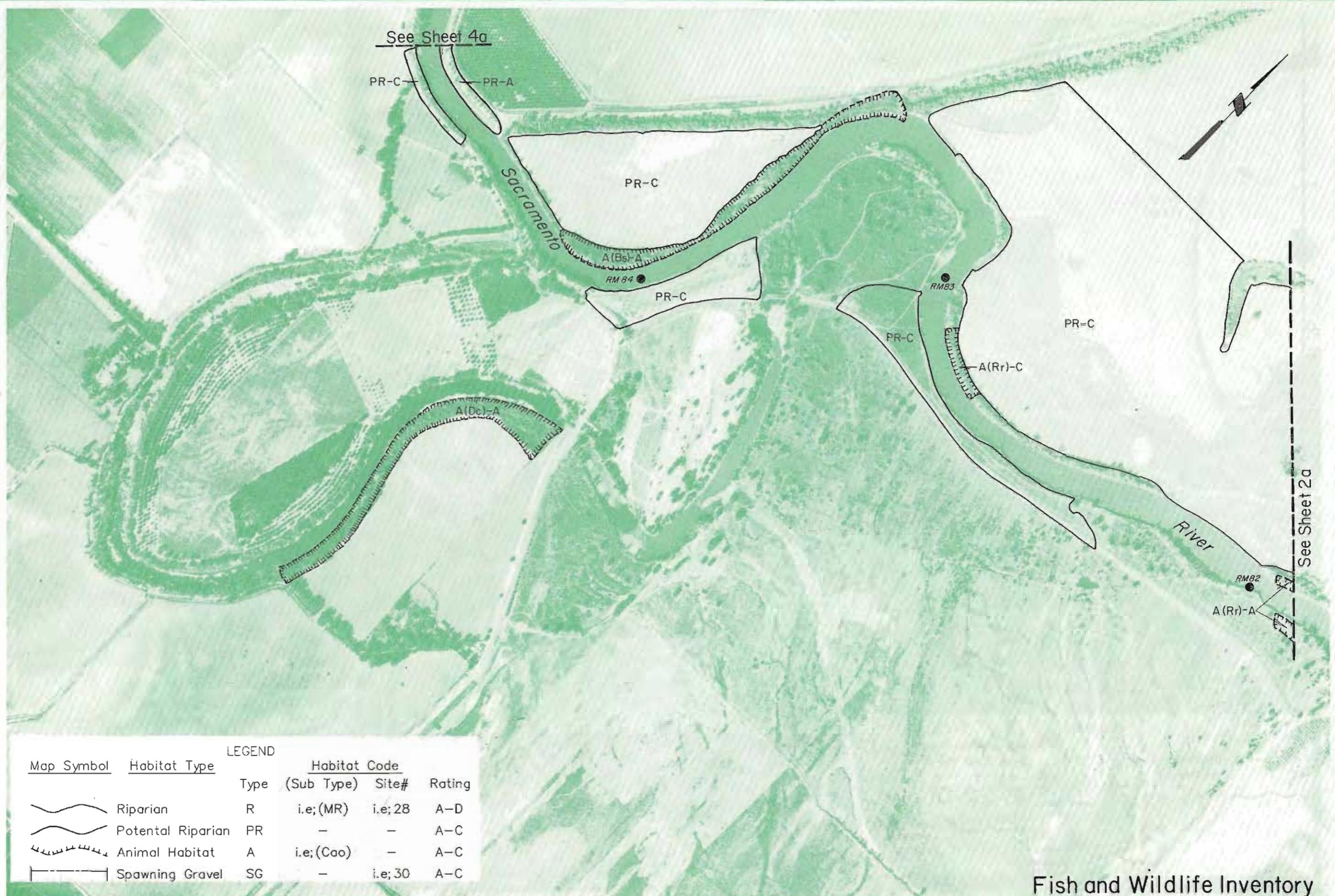


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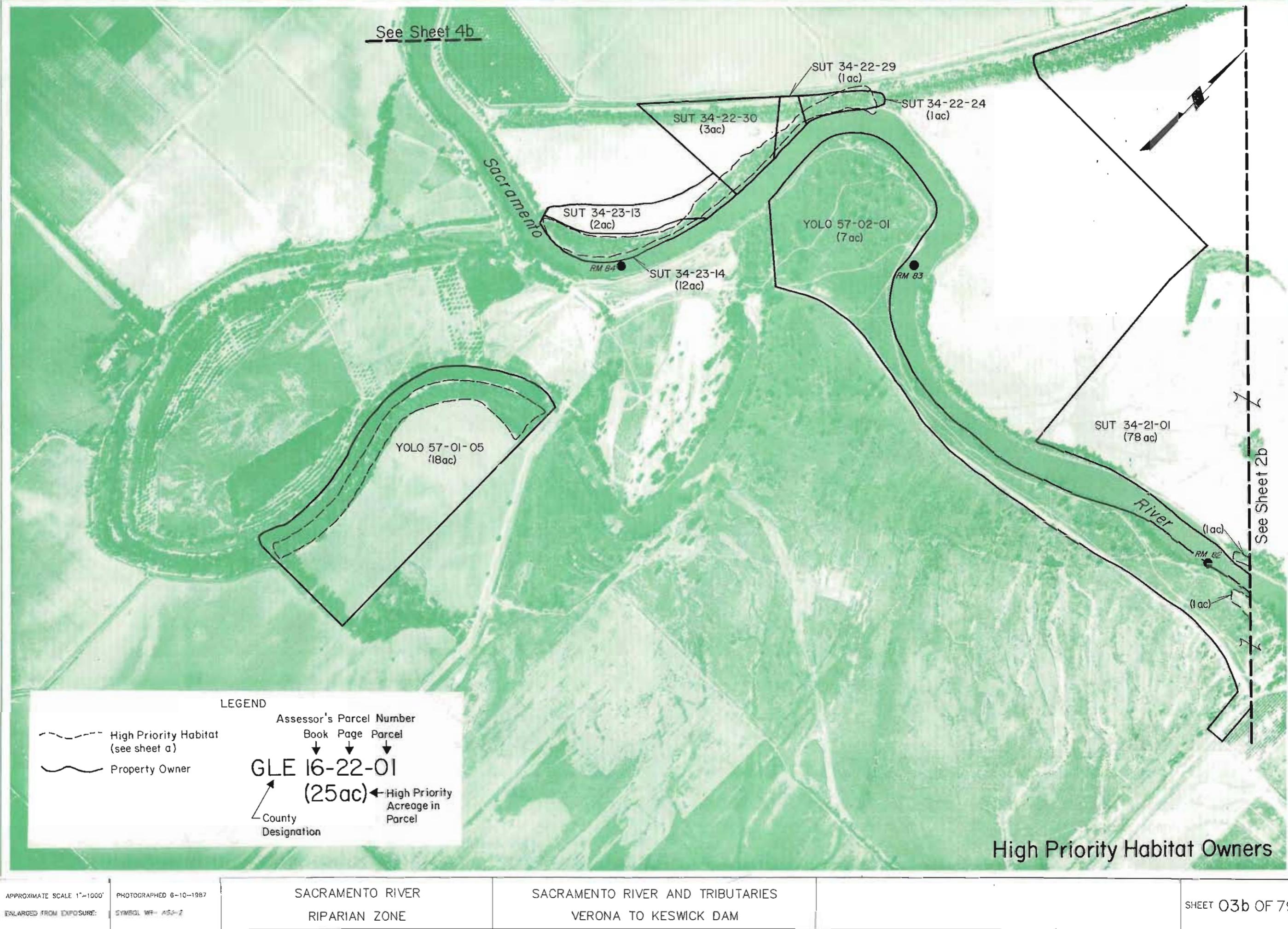
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VERONA TO KESWICK DAM

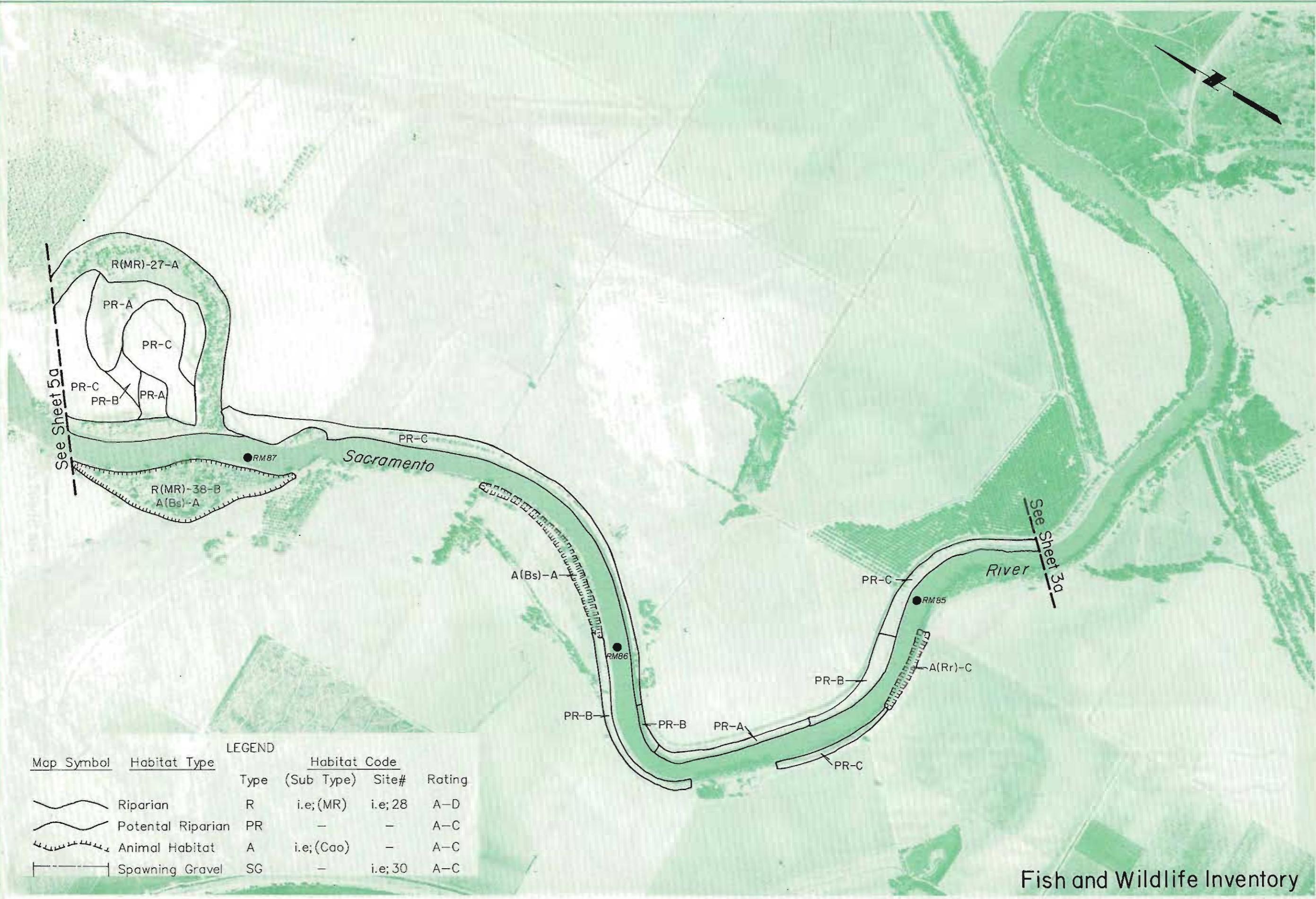
SHEET 02b OF 79



See Sheet 4b

Sacramento





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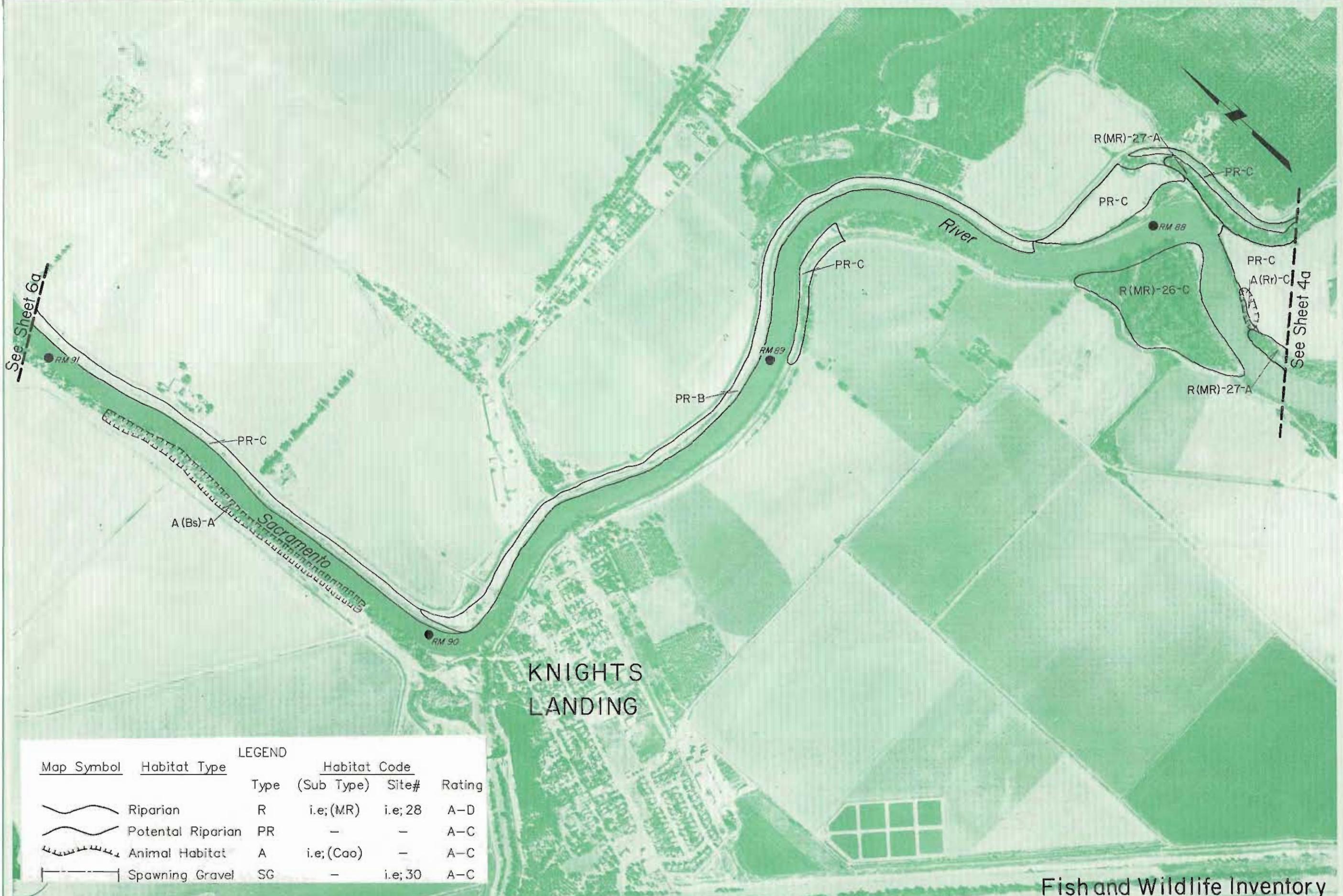
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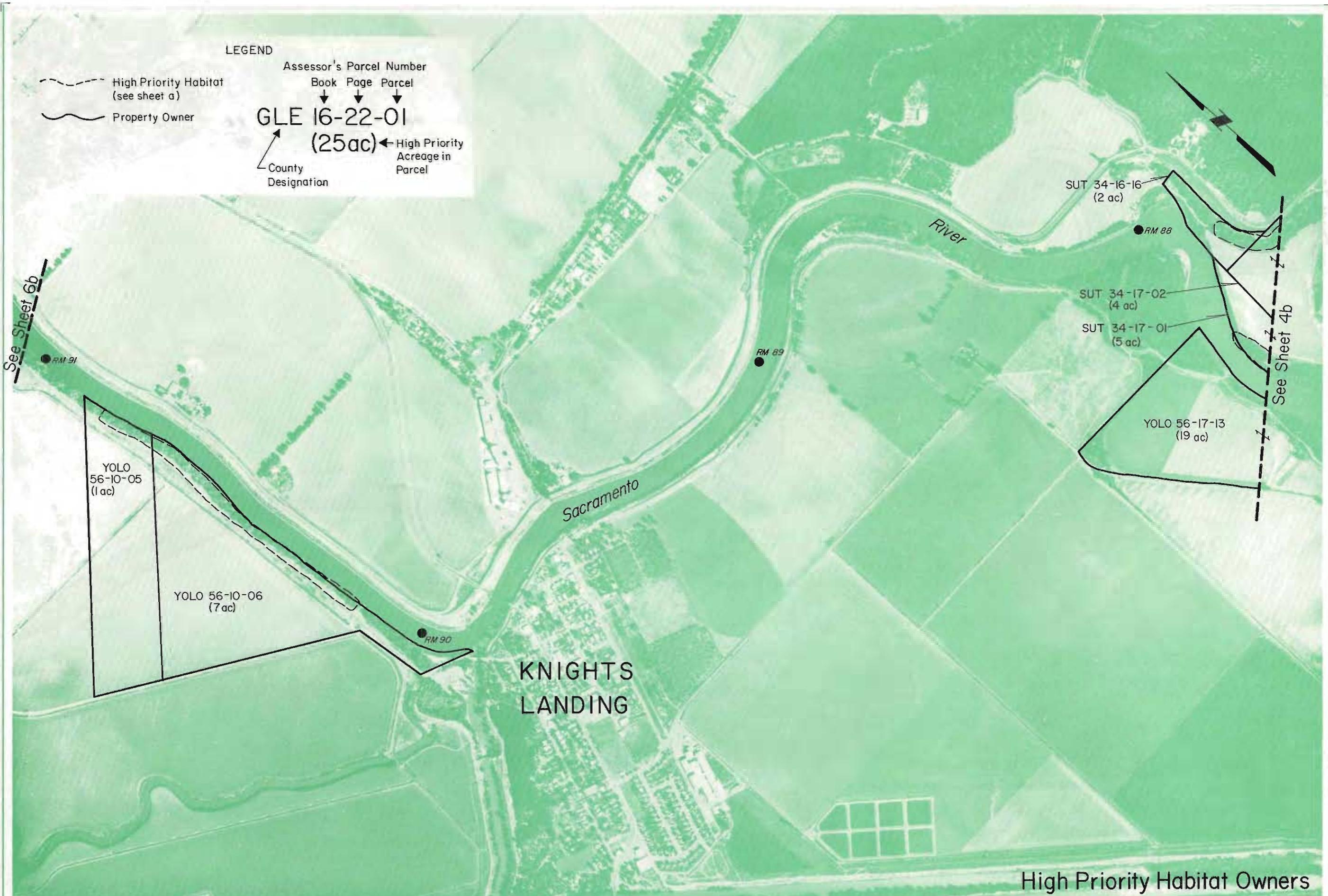
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RIPARIAN ZONE

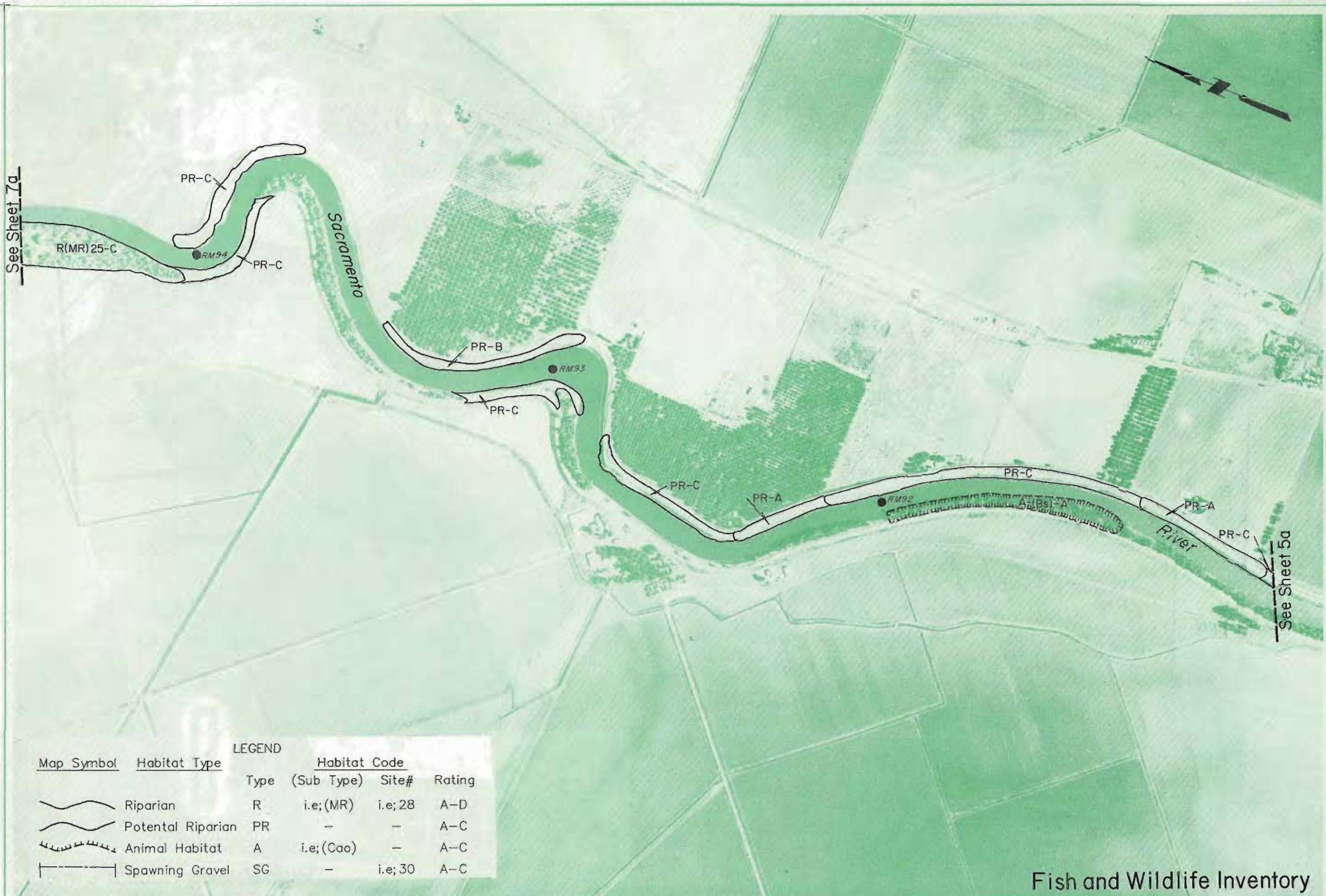
SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 04a OF 79





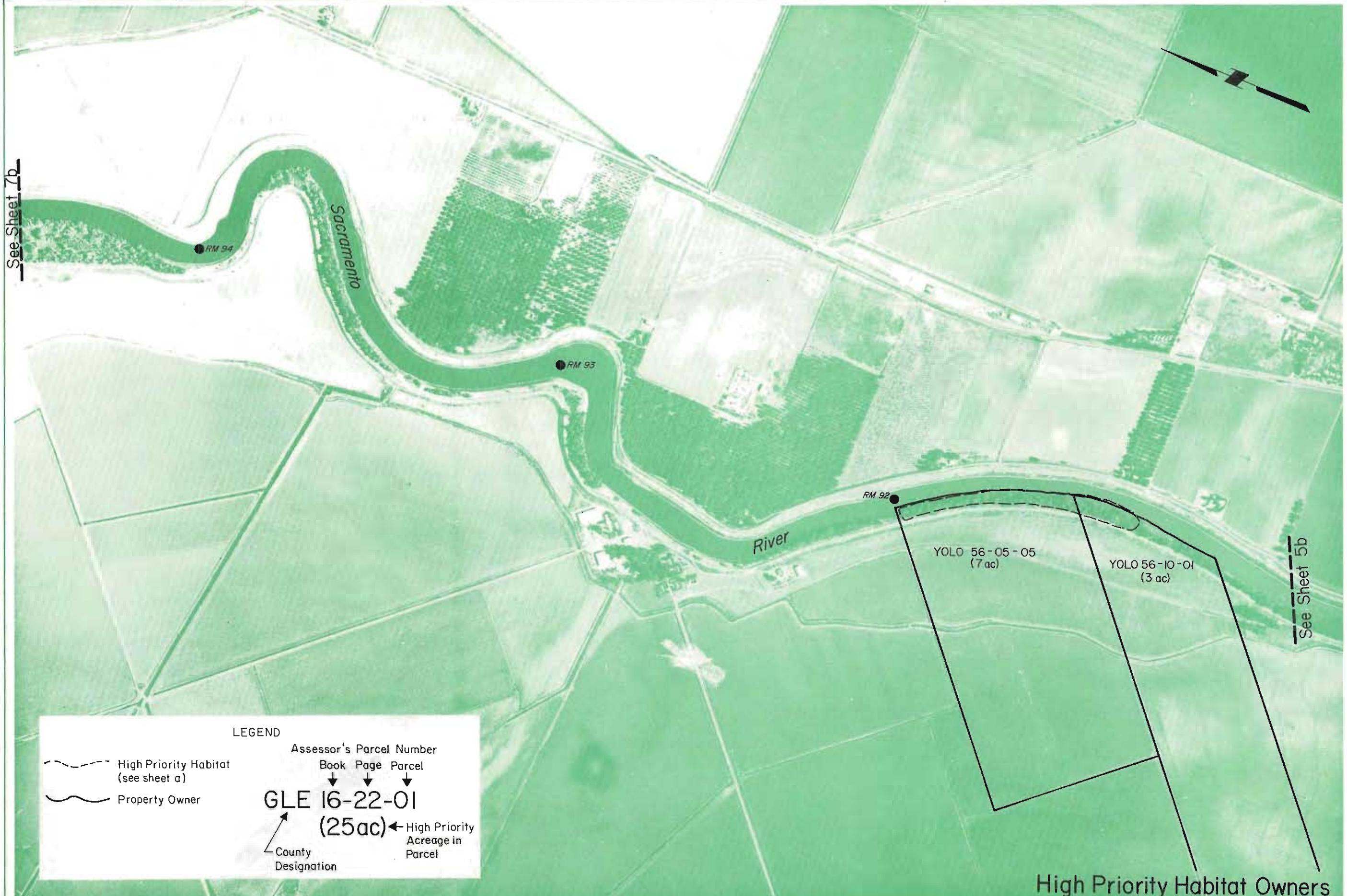


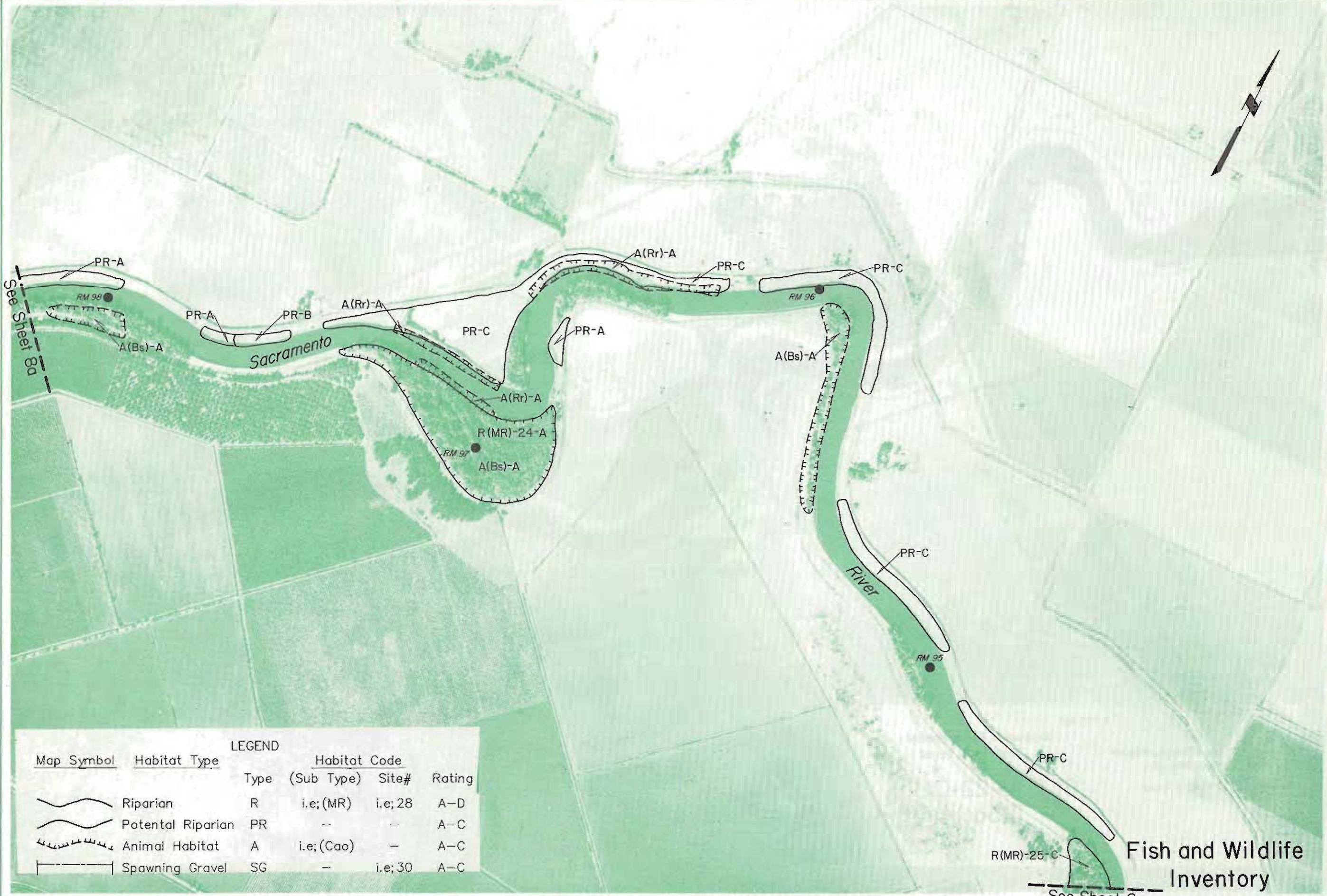


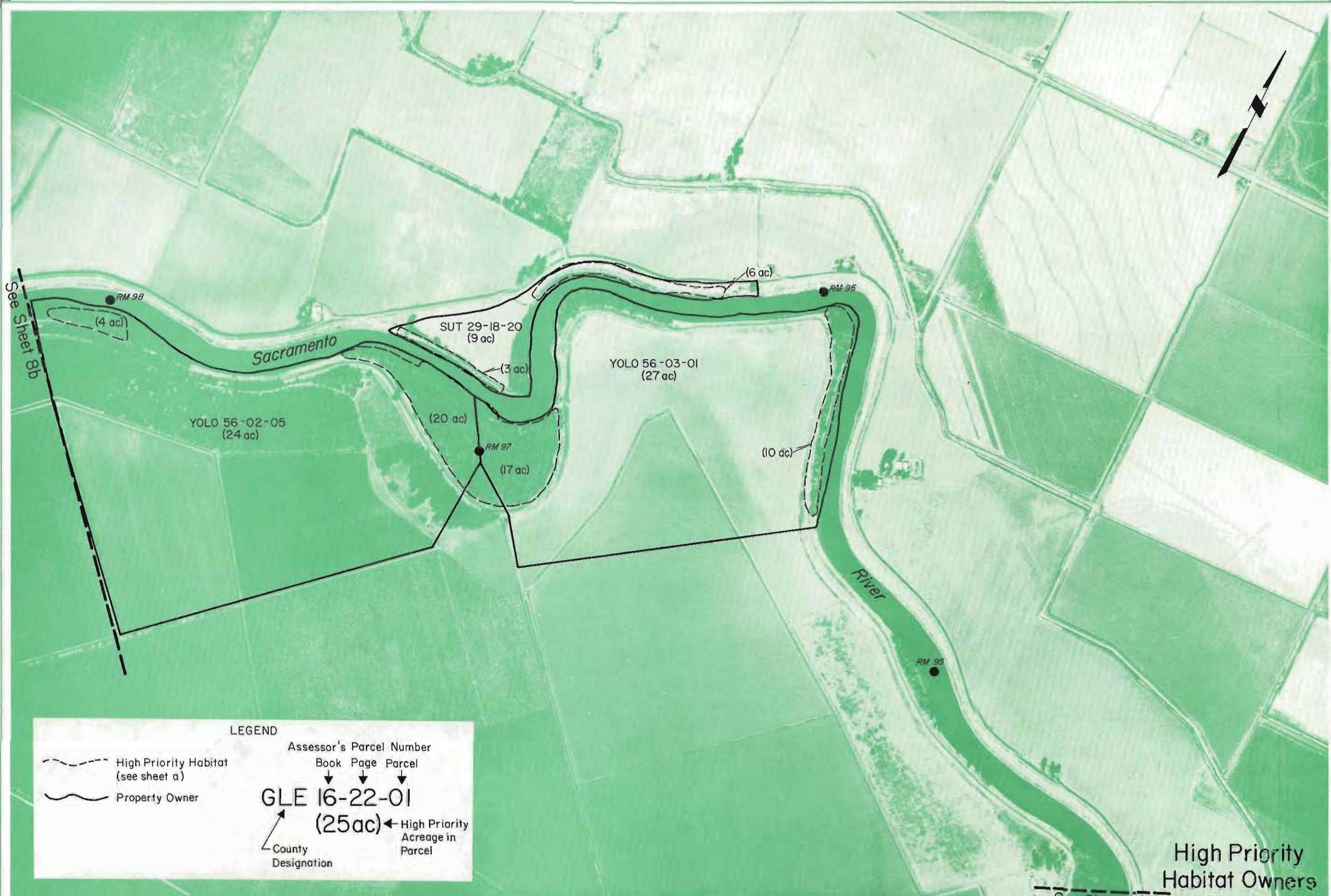
LEGEND

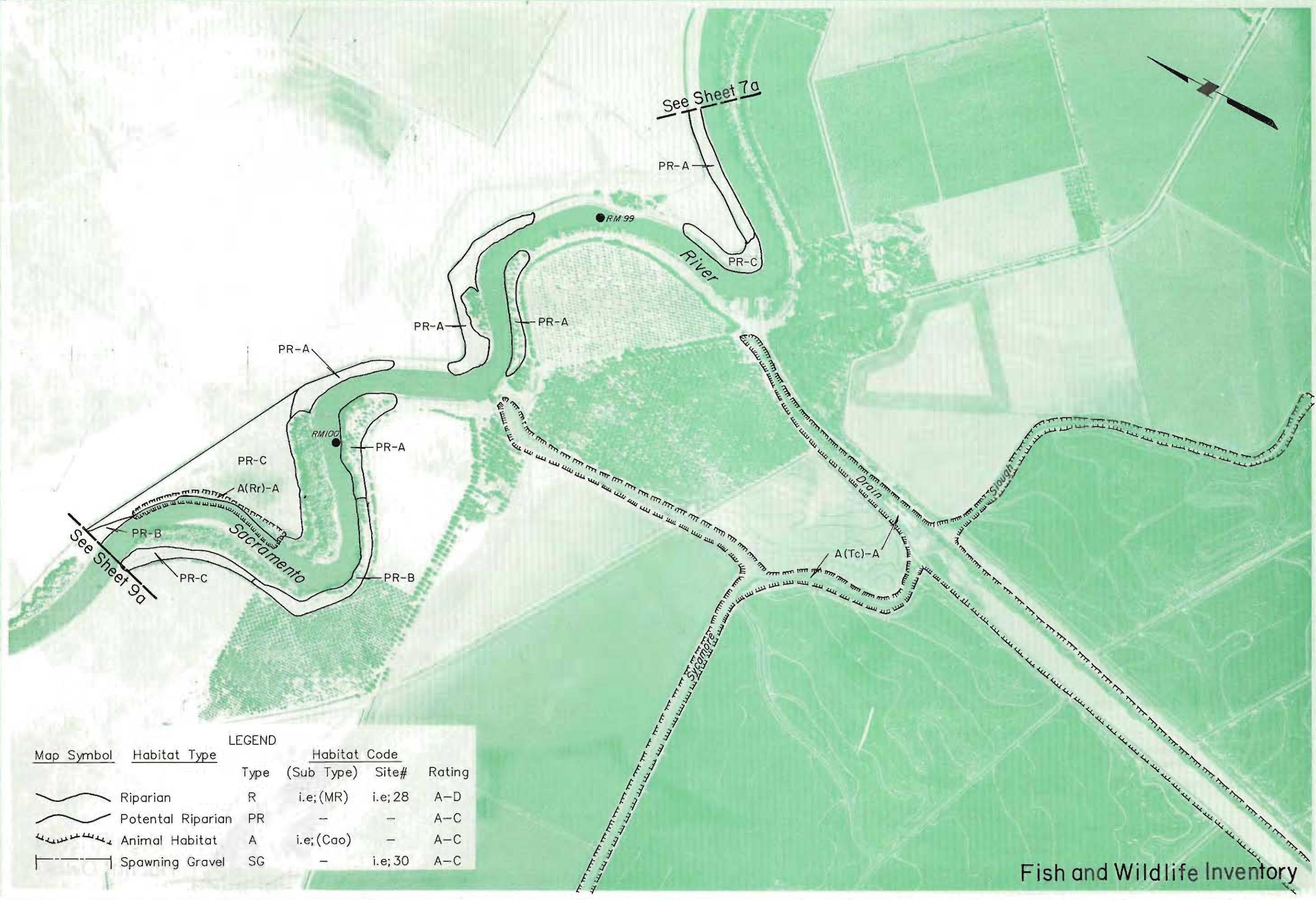
| Map Symbol | Habitat Type | Habitat Code | | | |
|-----------------|--------------------|--------------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| Wavy line | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| Wavy line | Potential Riparian | PR | - | - | A-C |
| Dashed line | Animal Habitat | A | i.e; (Cao) | - | A-C |
| Horizontal line | Spawning Gravel | SG | - | i.e; 30 | A-C |

Fish and Wildlife Inventory









APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:

PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASI-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

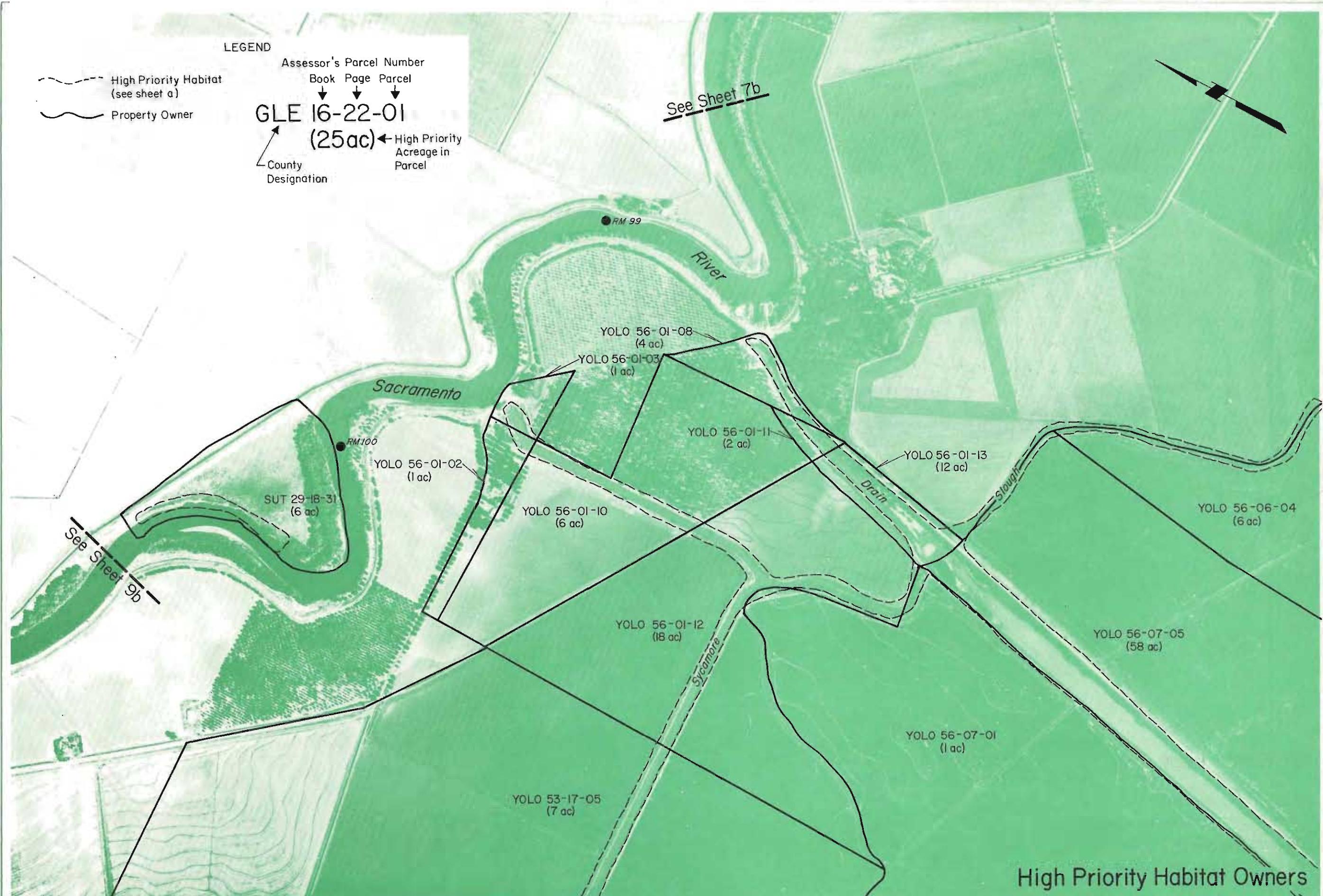
SHEET 08a OF 79

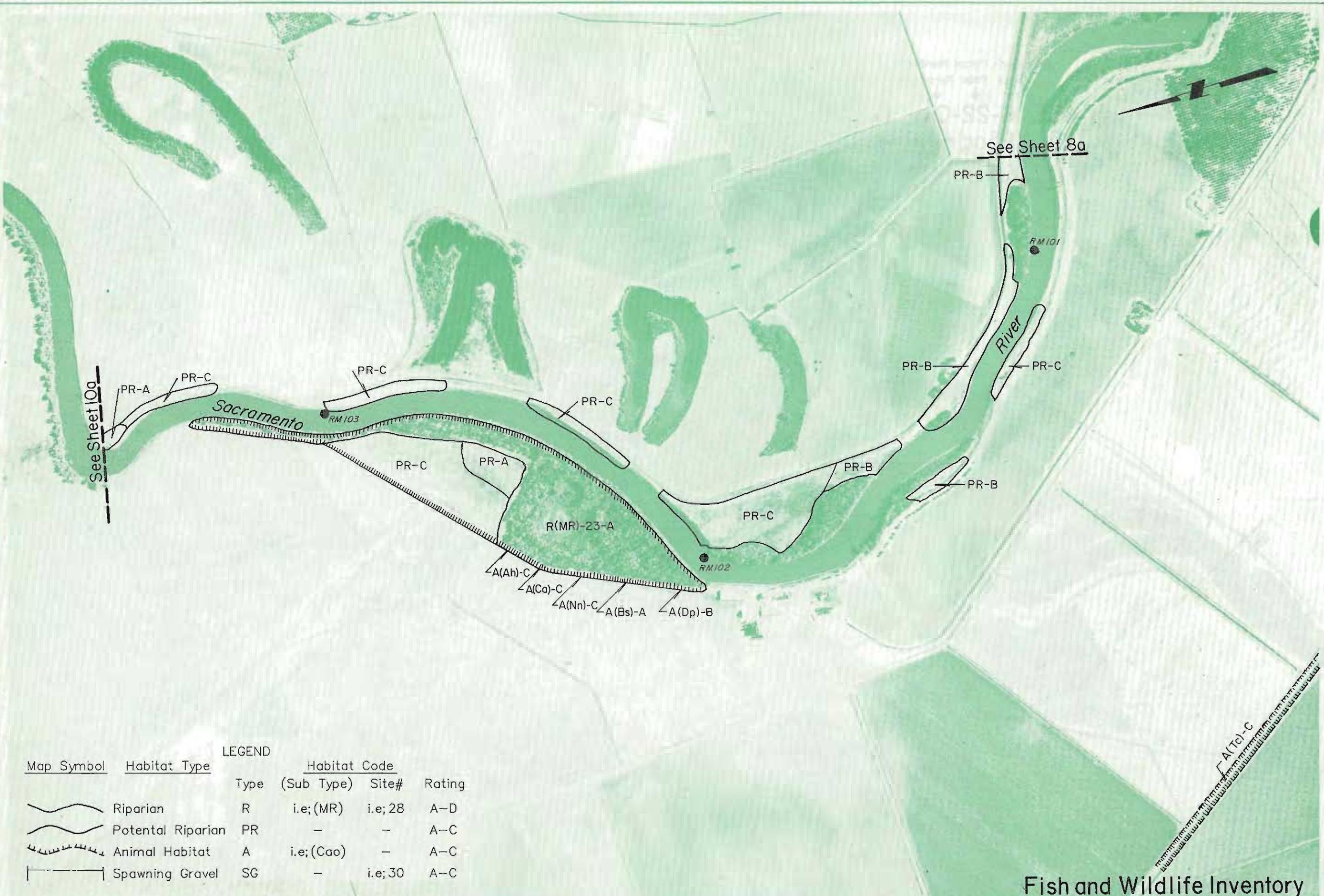
LEGEND

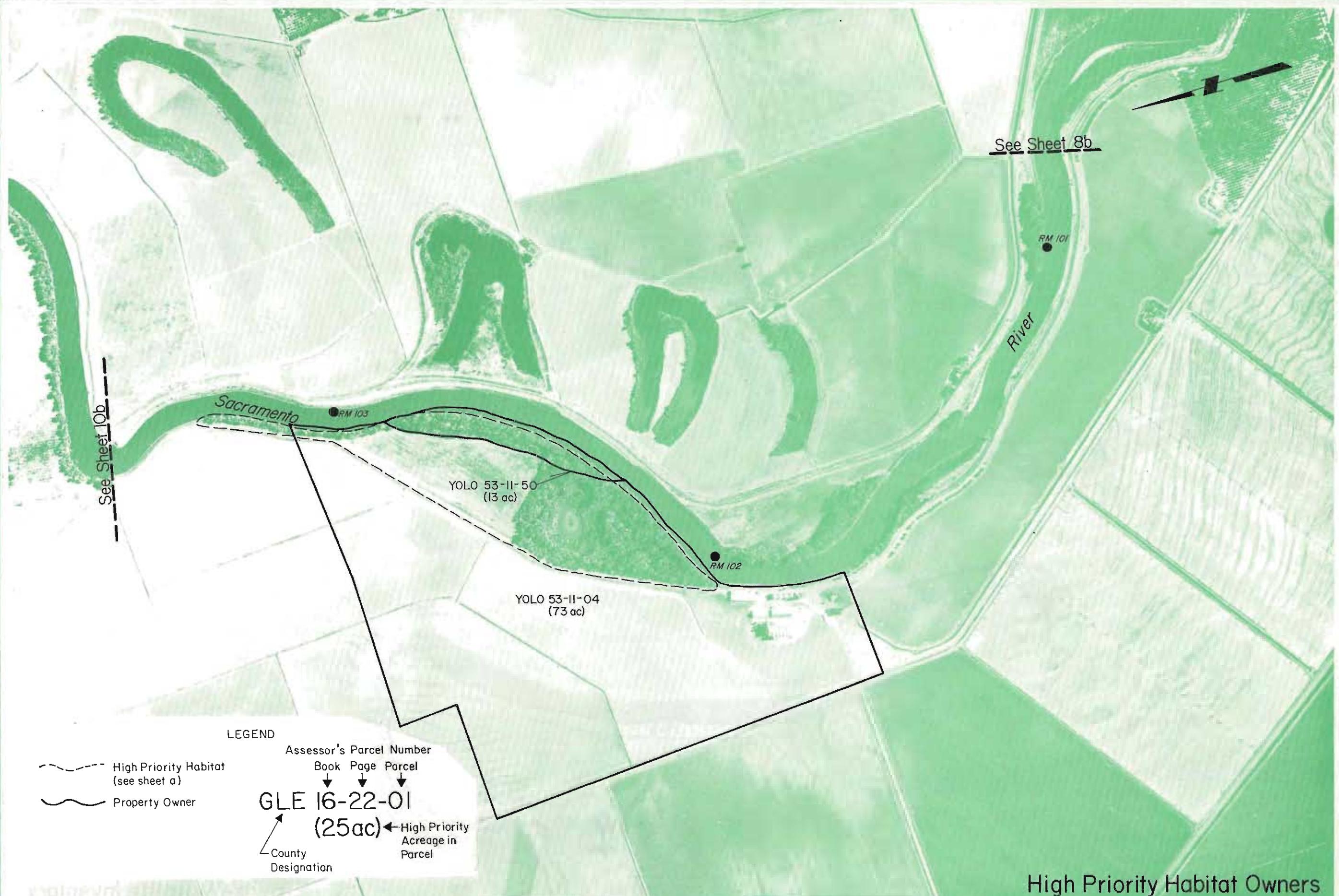
High Priority Habitat
(see sheet a)
Property Owner

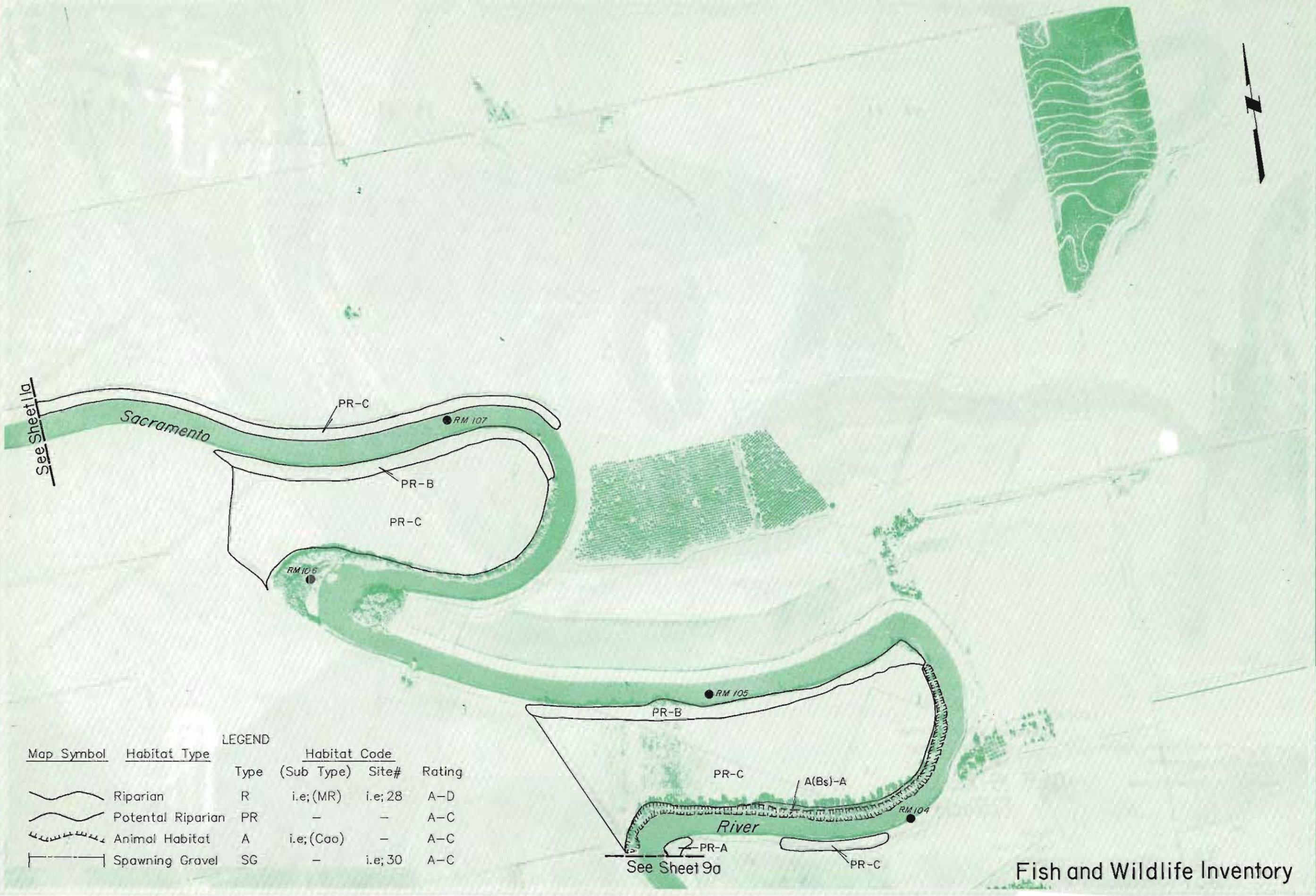
Assessor's Parcel Number
Book Page Parcel
GLE 16-22-01
(25ac) ← High Priority
Acreage in
Parcel
County
Designation

See Sheet 7b









See Sheet 11b

Sacramento

RM 106

RM 107

River

RM 105

RM 104

LEGEND

High Priority Habitat
(see sheet a)

Property Owner

Assessor's Parcel Number
Book Page Parcel

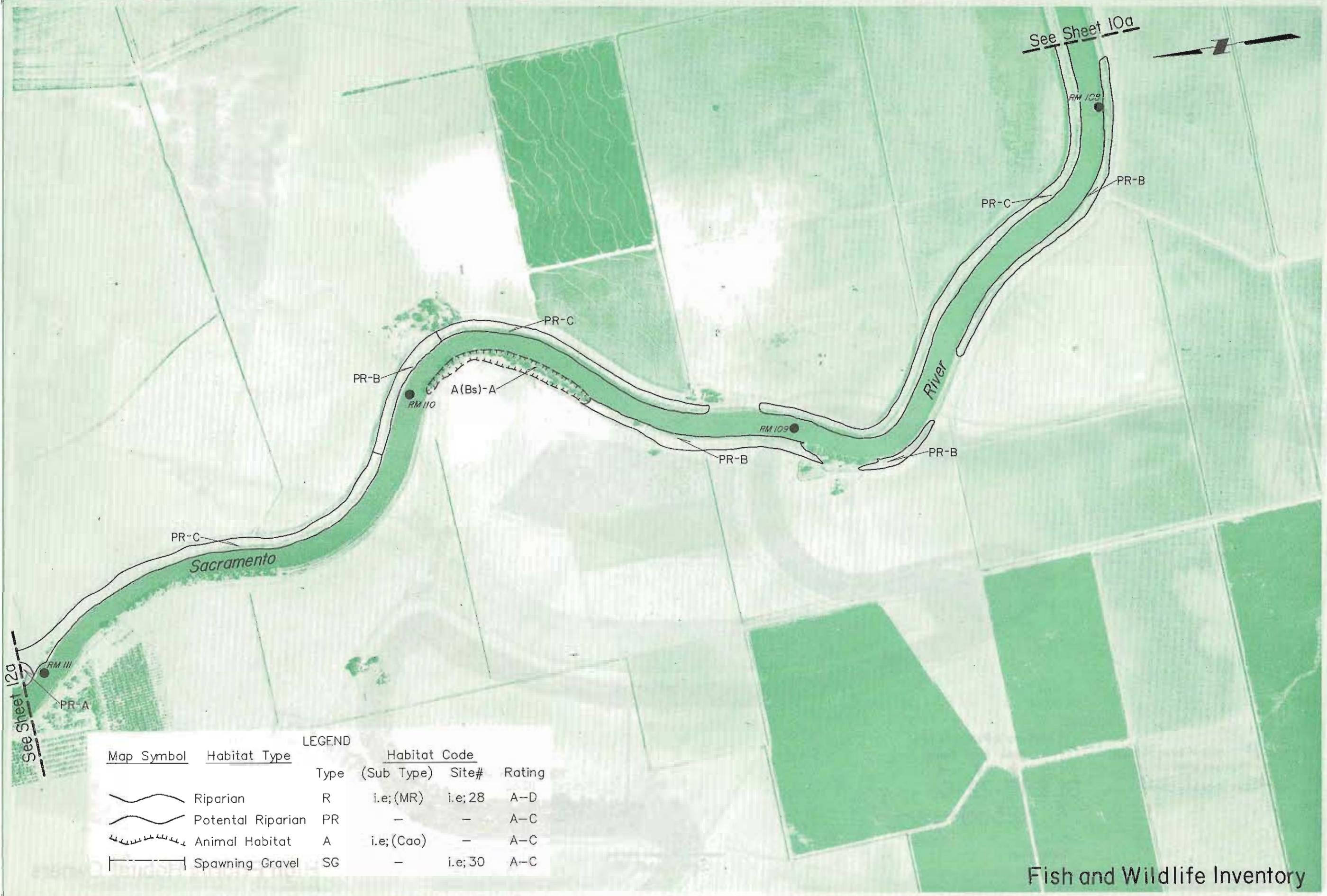
GLE 16-22-01
(25ac) ← High Priority
Acreage in
Parcel

County
Designation

YOLO 53-04-03
(12 ac)

See Sheet 9b

High Priority Habitat Owners

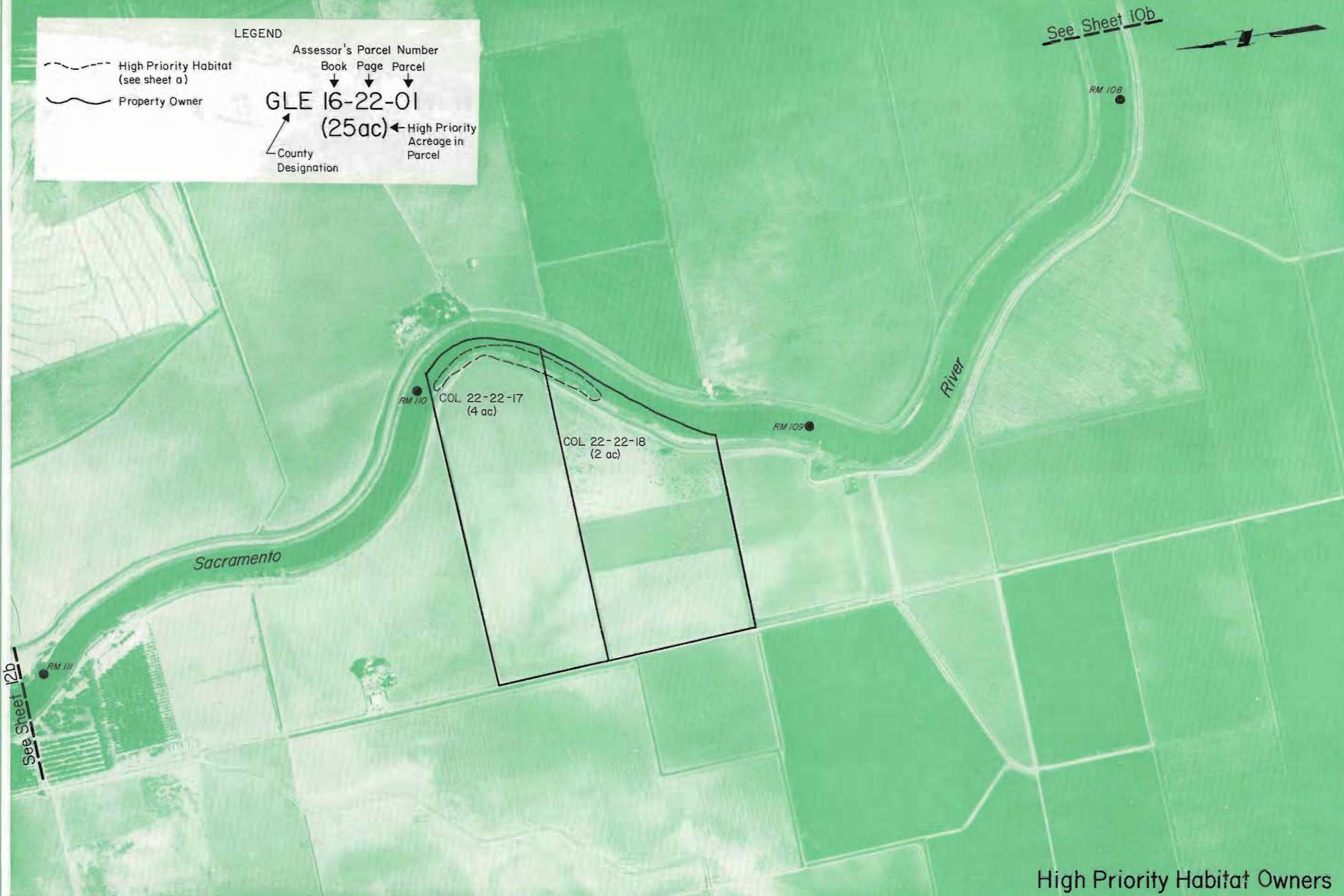


LEGEND

High Priority Habitat
(see sheet a)
Property Owner

Assessor's Parcel Number
Book Page Parcel
GLE 16-22-01
(25ac) ← High Priority
Acreage in
Parcel
County
Designation

See Sheet 10b



High Priority Habitat Owners

See Sheet 13a

Sacramento

RM 114

PR-B

PR-B

PR-A

RM 113

PR-C

A(Bs)-A

River

PR-C

A(Rr)-A

PR-C

PR-A

See Sheet 12b

LEGEND

| Map Symbol | Habitat Type | Habitat Code | | | |
|------------|--------------------|--------------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

Fish and Wildlife Inventory

See Sheet 13b

Sacramento

RM 113

RM 114

River

SUT 24-04-05
(5 ac)

COL 22-18-12

COL 22-18-13
(1 ac)

COL 22-18-11
(2 ac)

See Sheet 11b

LEGEND

High Priority Habitat
(see sheet a)

Property Owner

Assessor's Parcel Number

Book Page Parcel

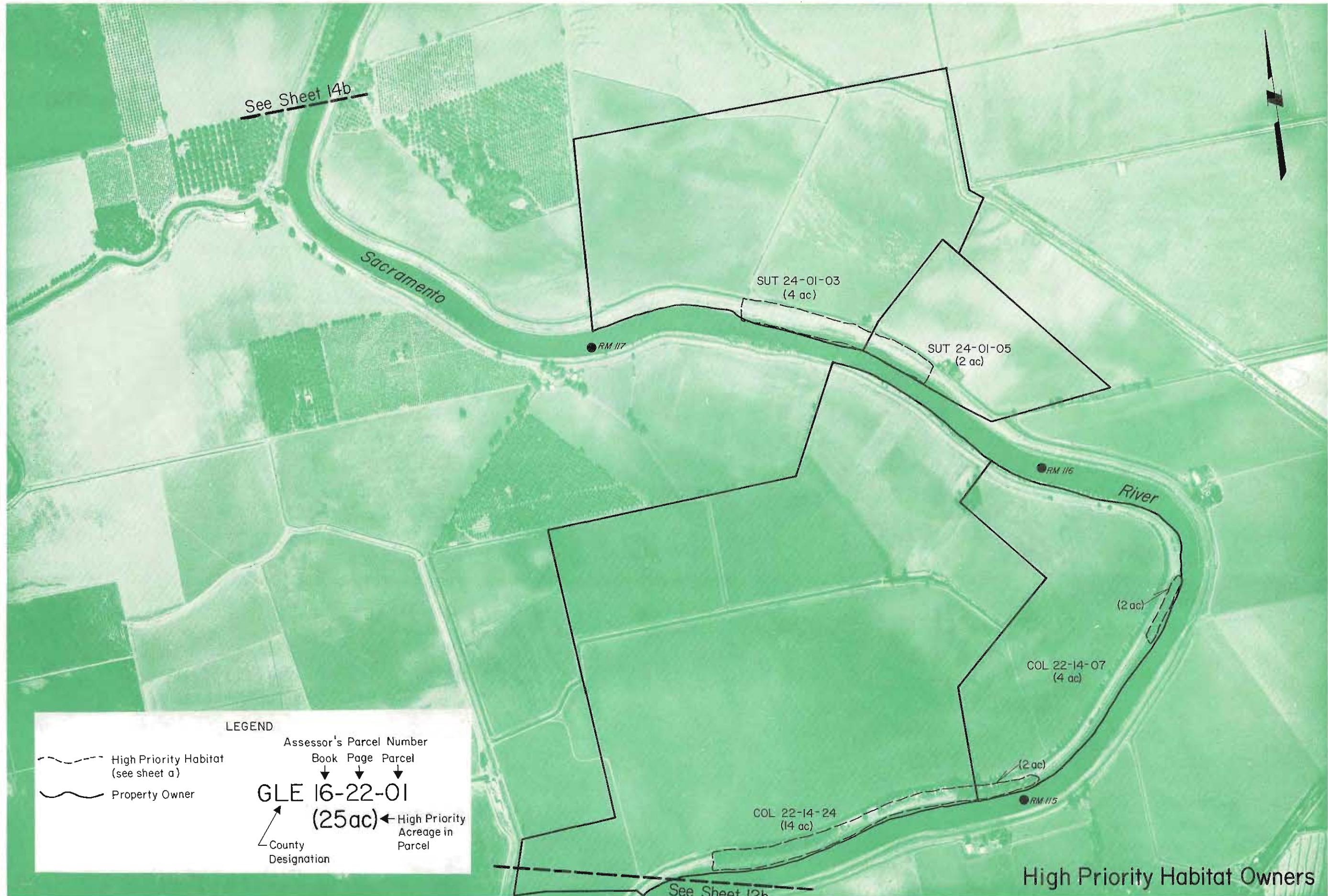
↓ ↓ ↓

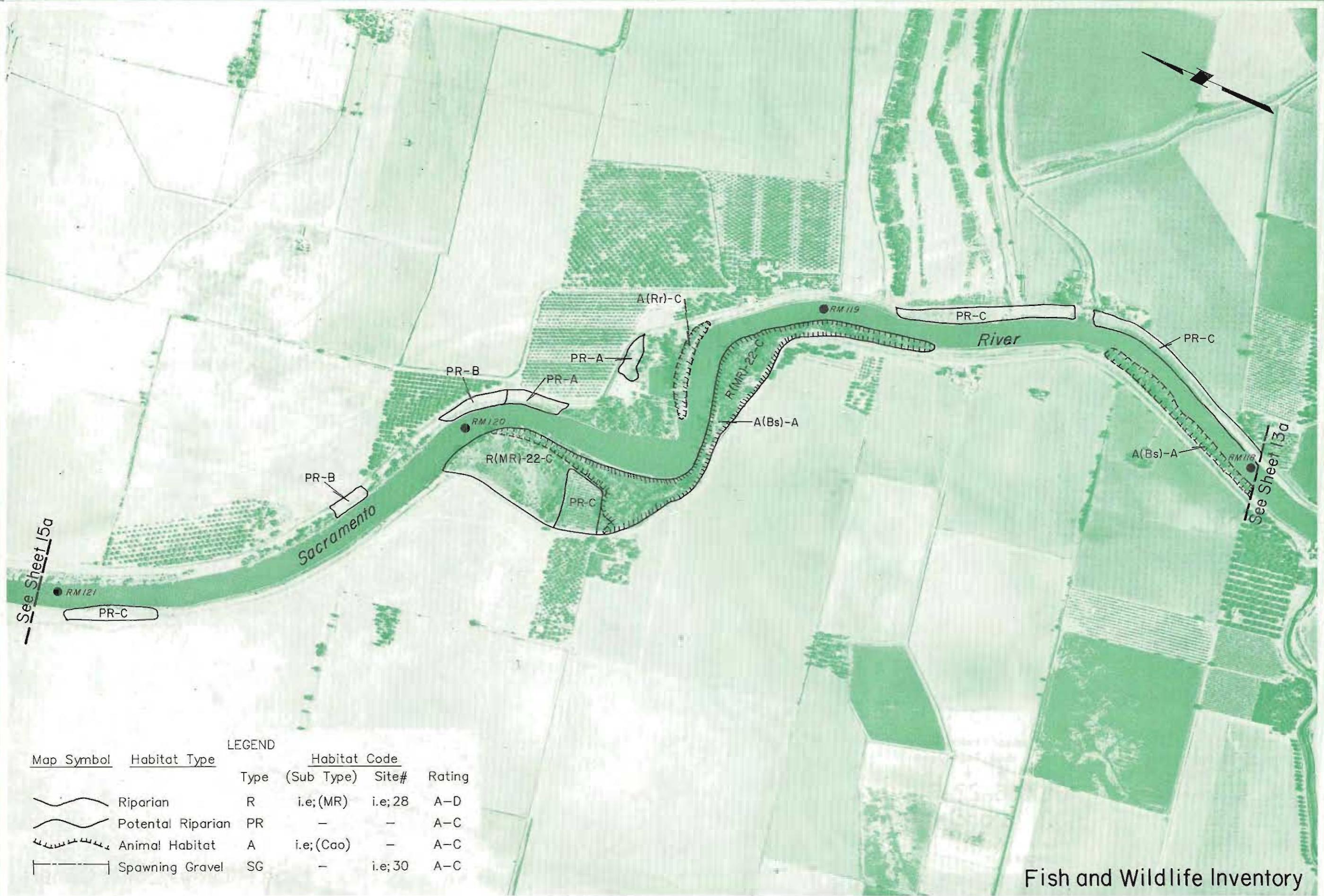
GLE 16-22-01
(25 ac) ← High Priority
Acreage in
Parcel

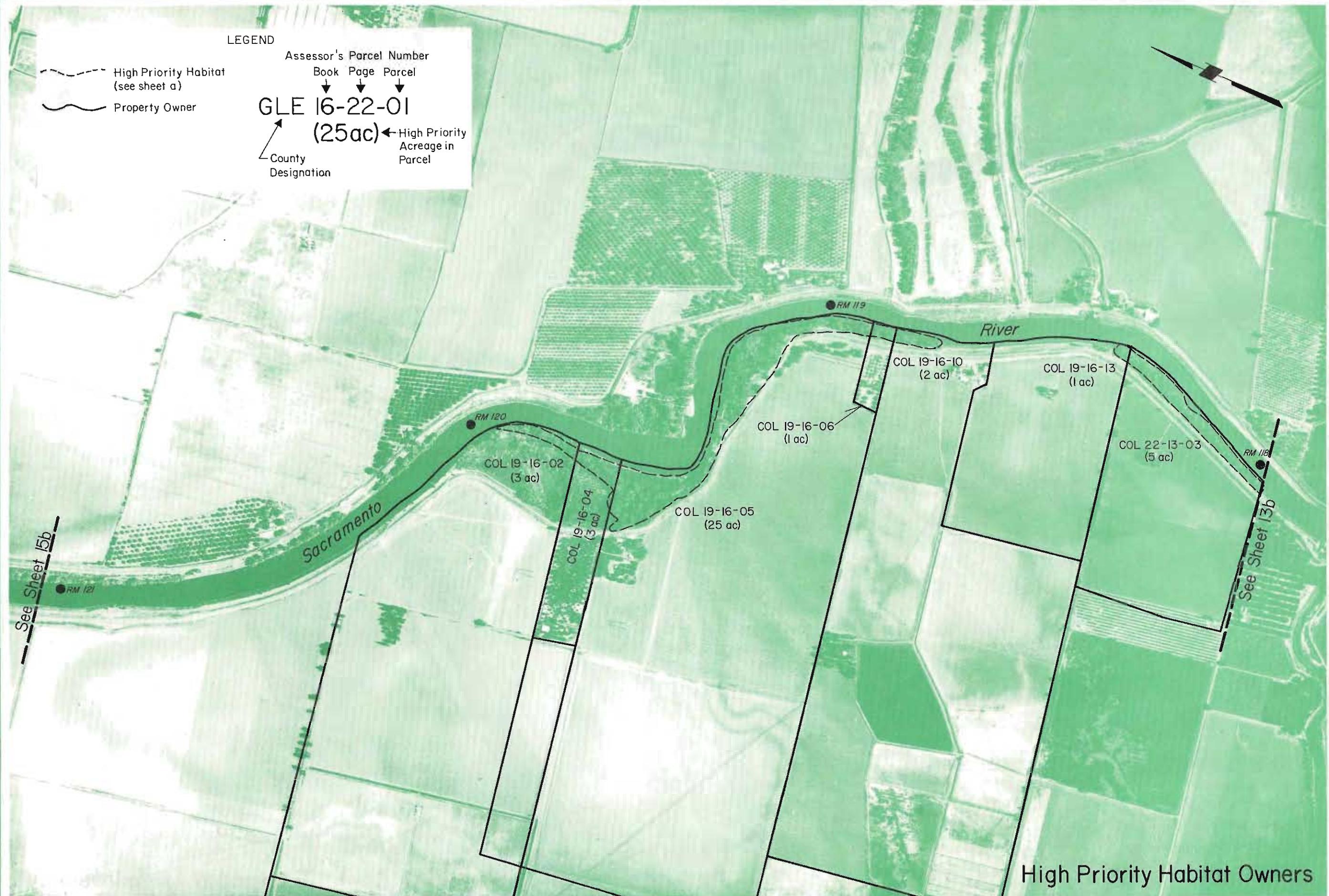
County
Designation

High Priority Habitat Owners

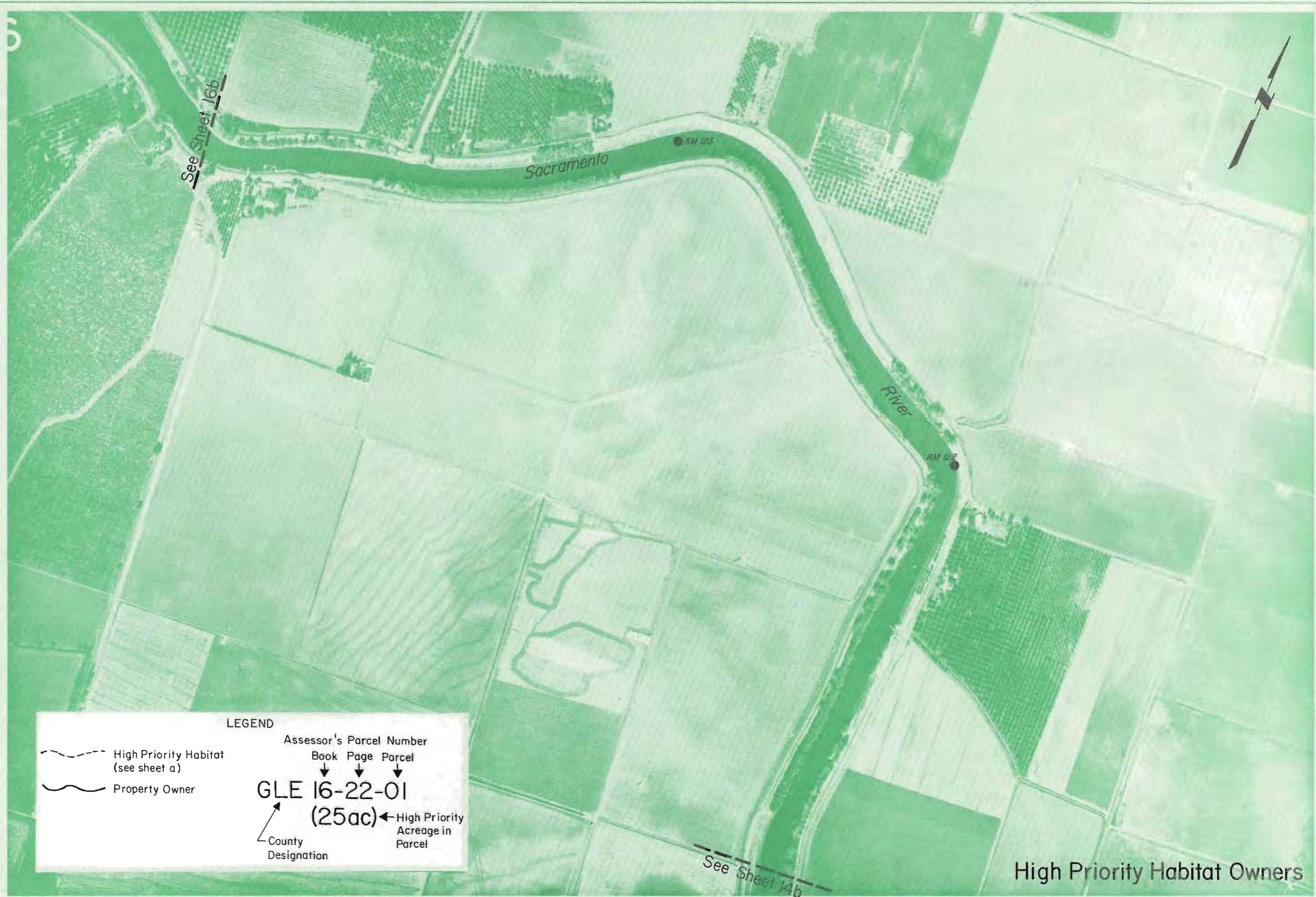












APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 15b OF 79



Fish and Wildlife Inventory

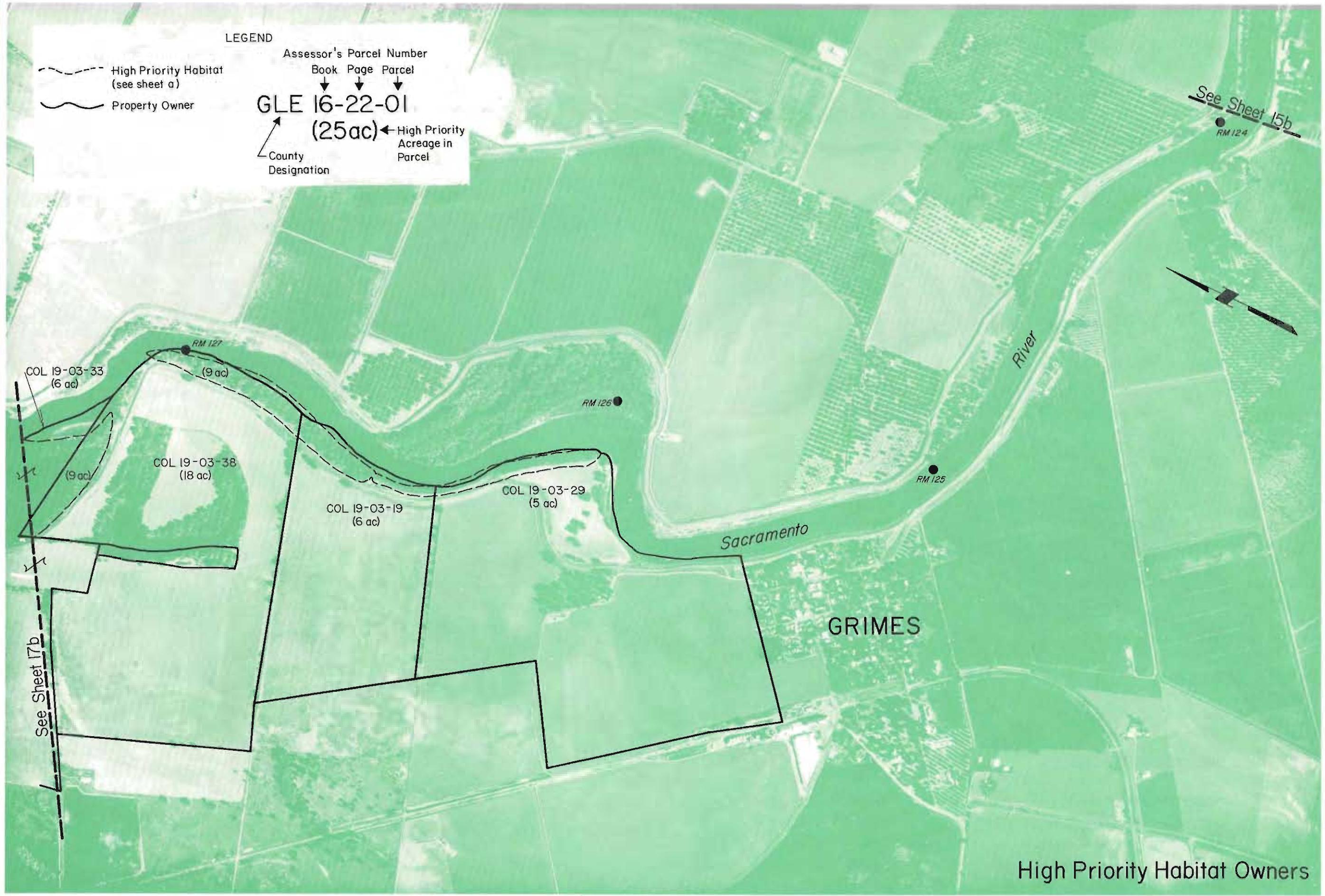
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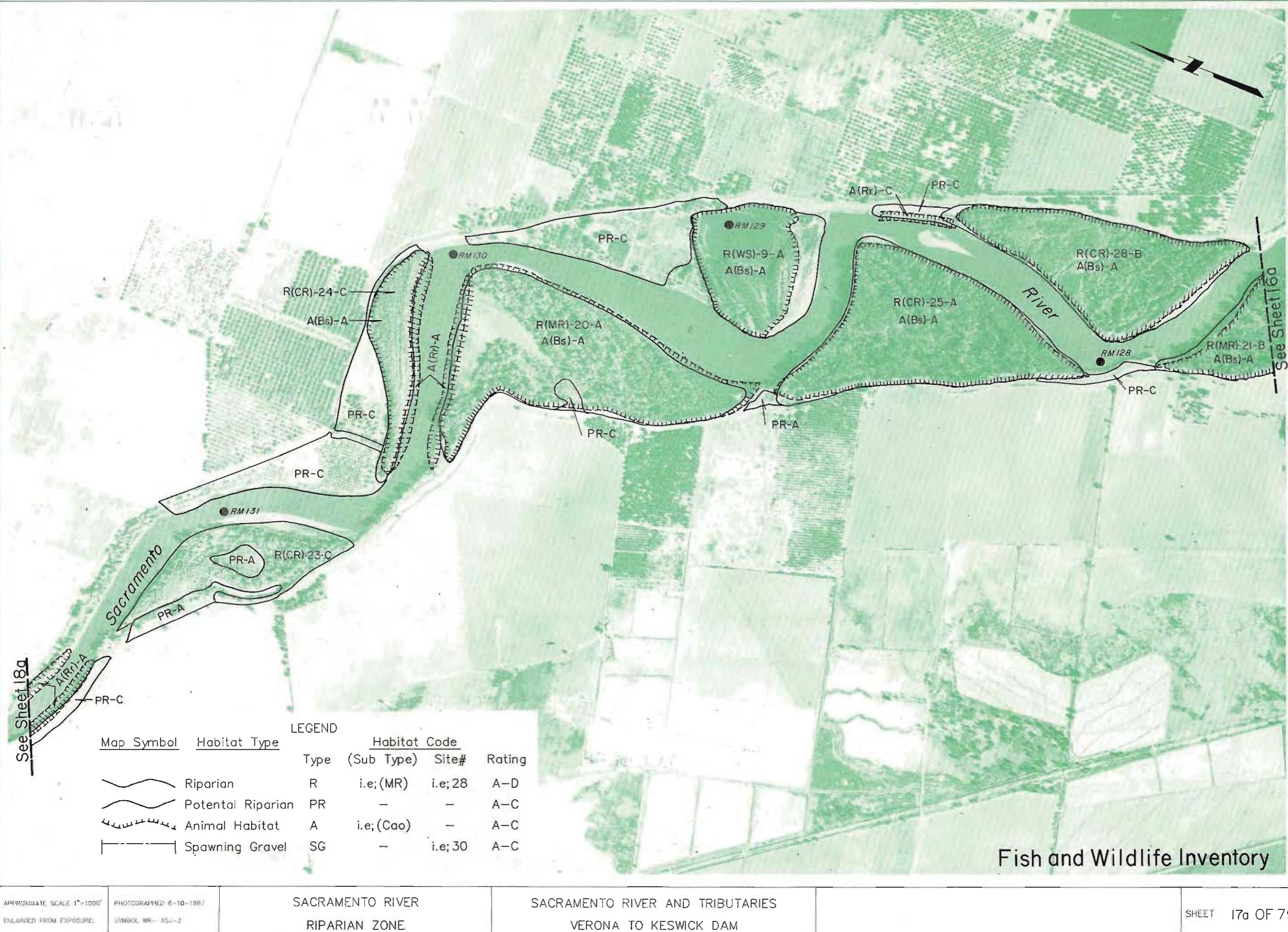
INTOKRAVED 6-10-1987
SYMBOL WR- ASJ-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 16a OF 79

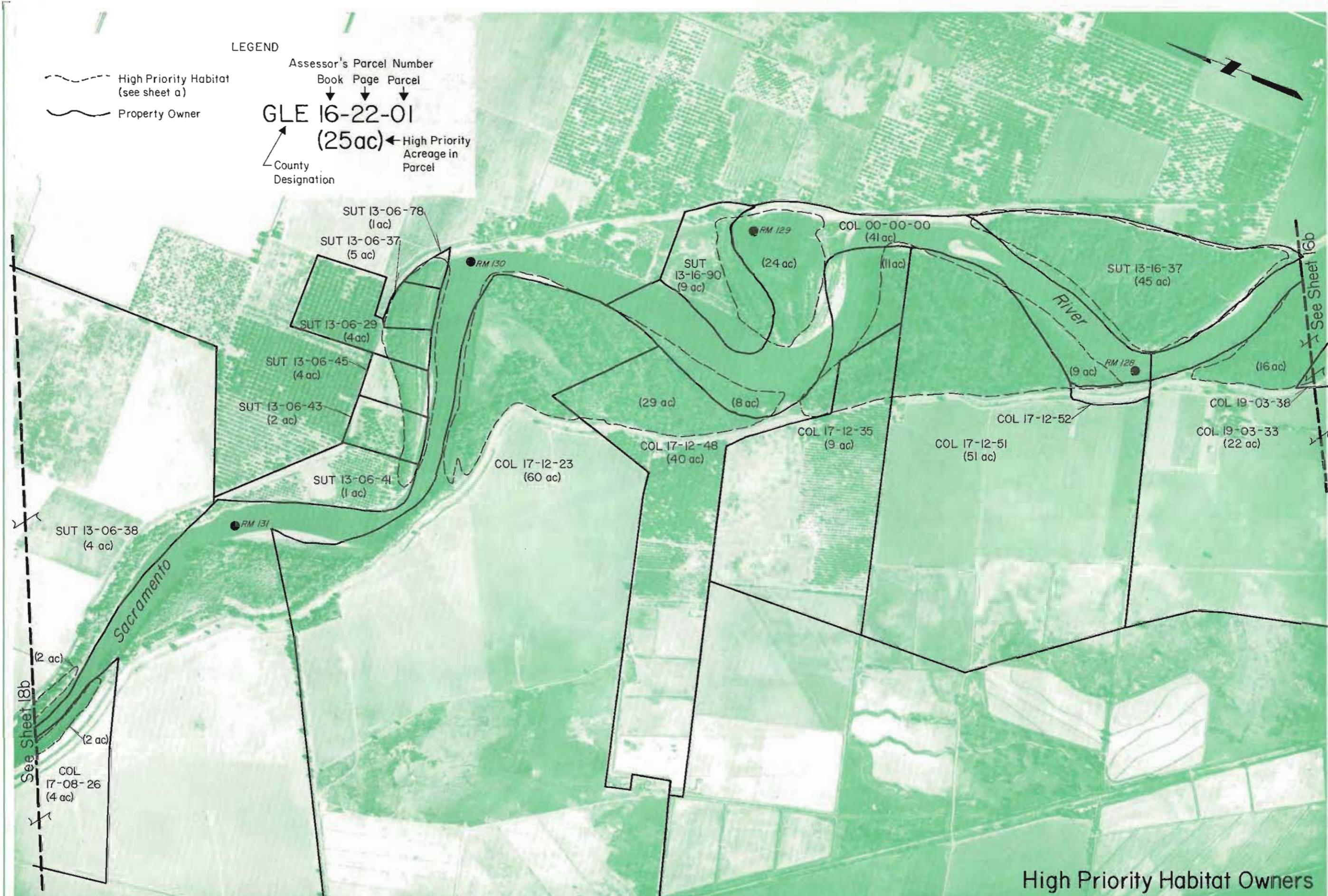




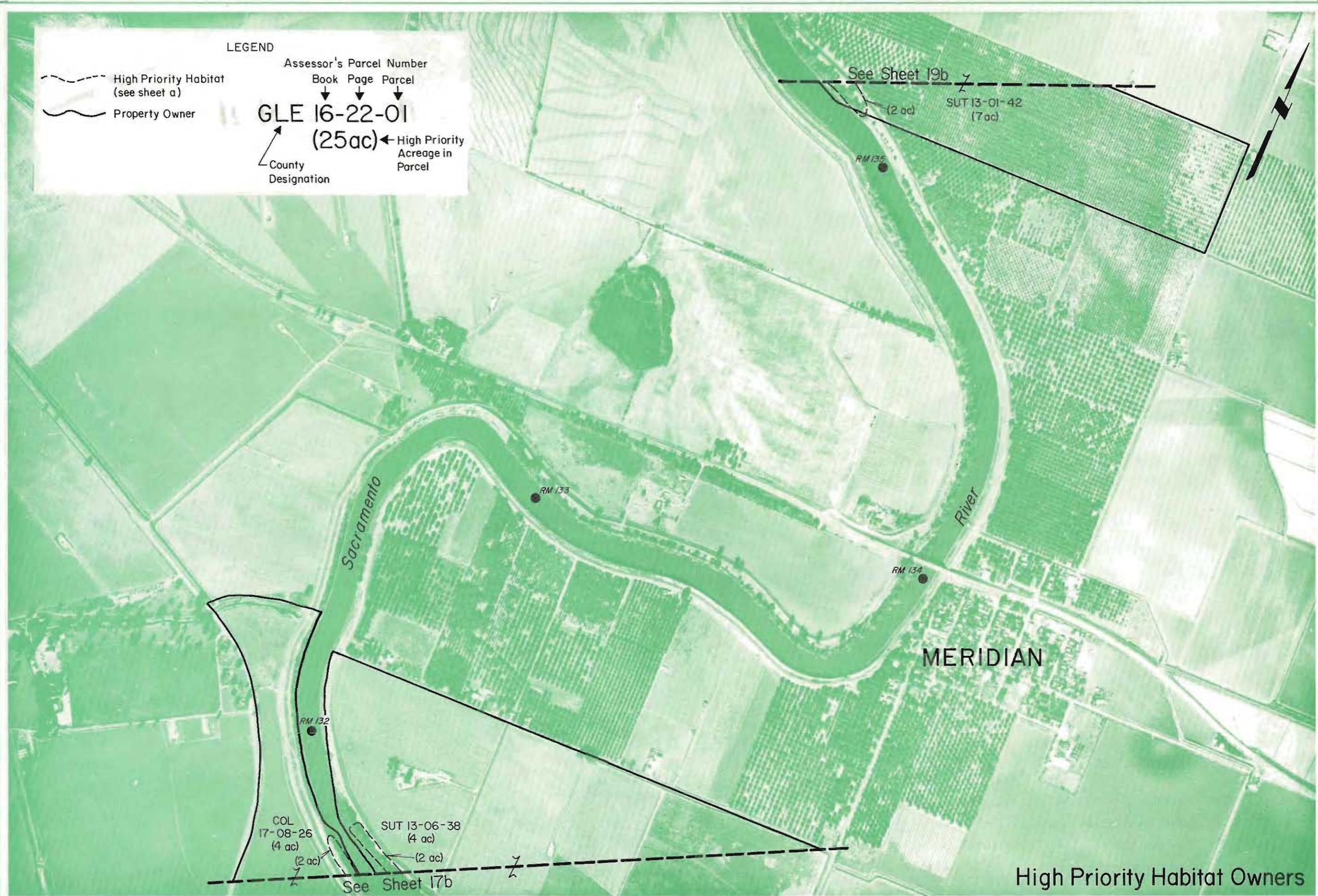
LEGEND

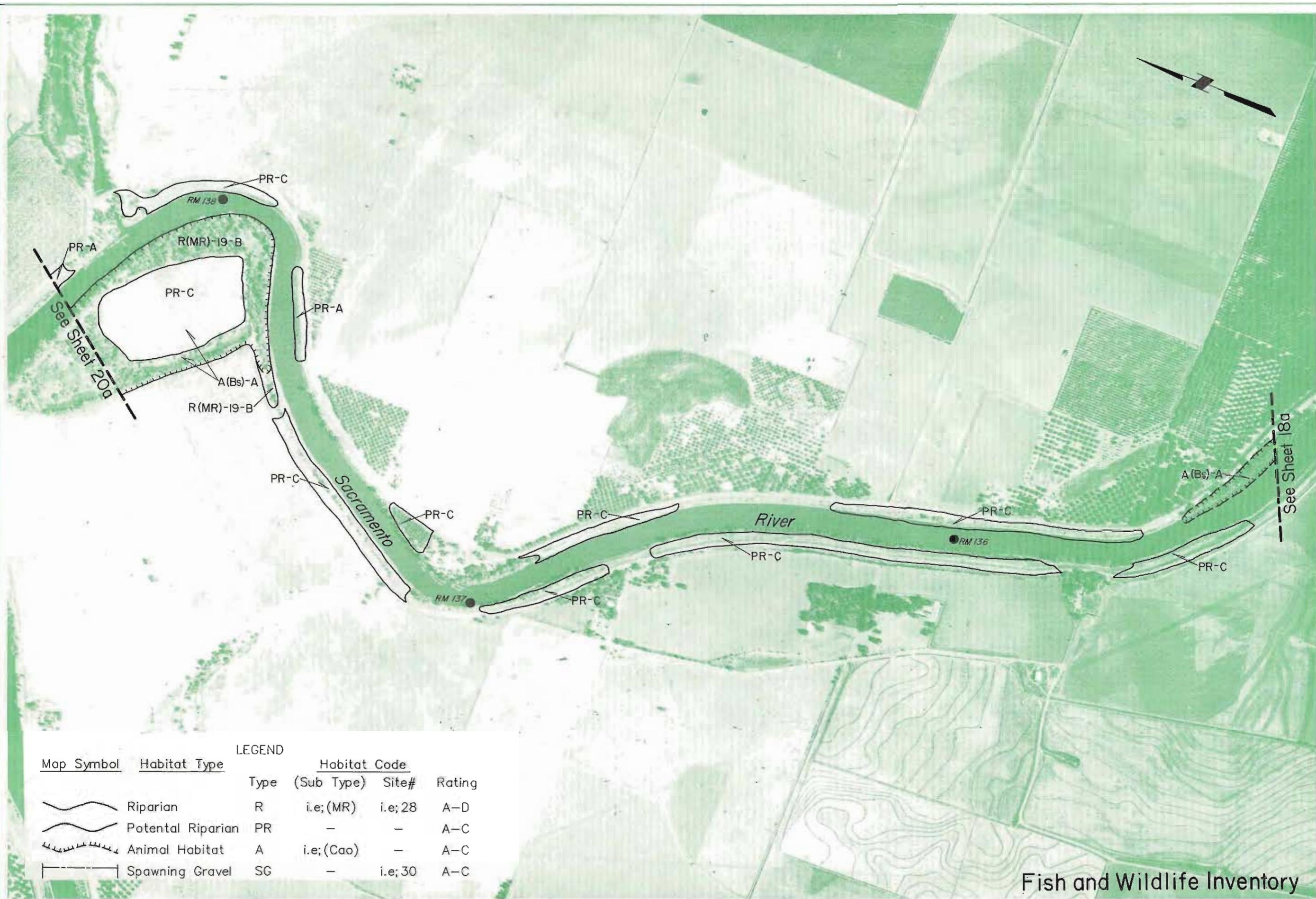
High Priority Habitat
(see sheet a)
Property Owner

Assessor's Parcel Number
Book Page Parcel
GLE I6-22-01
(25ac) ← High Priority Acreage in Parcel
County Designation







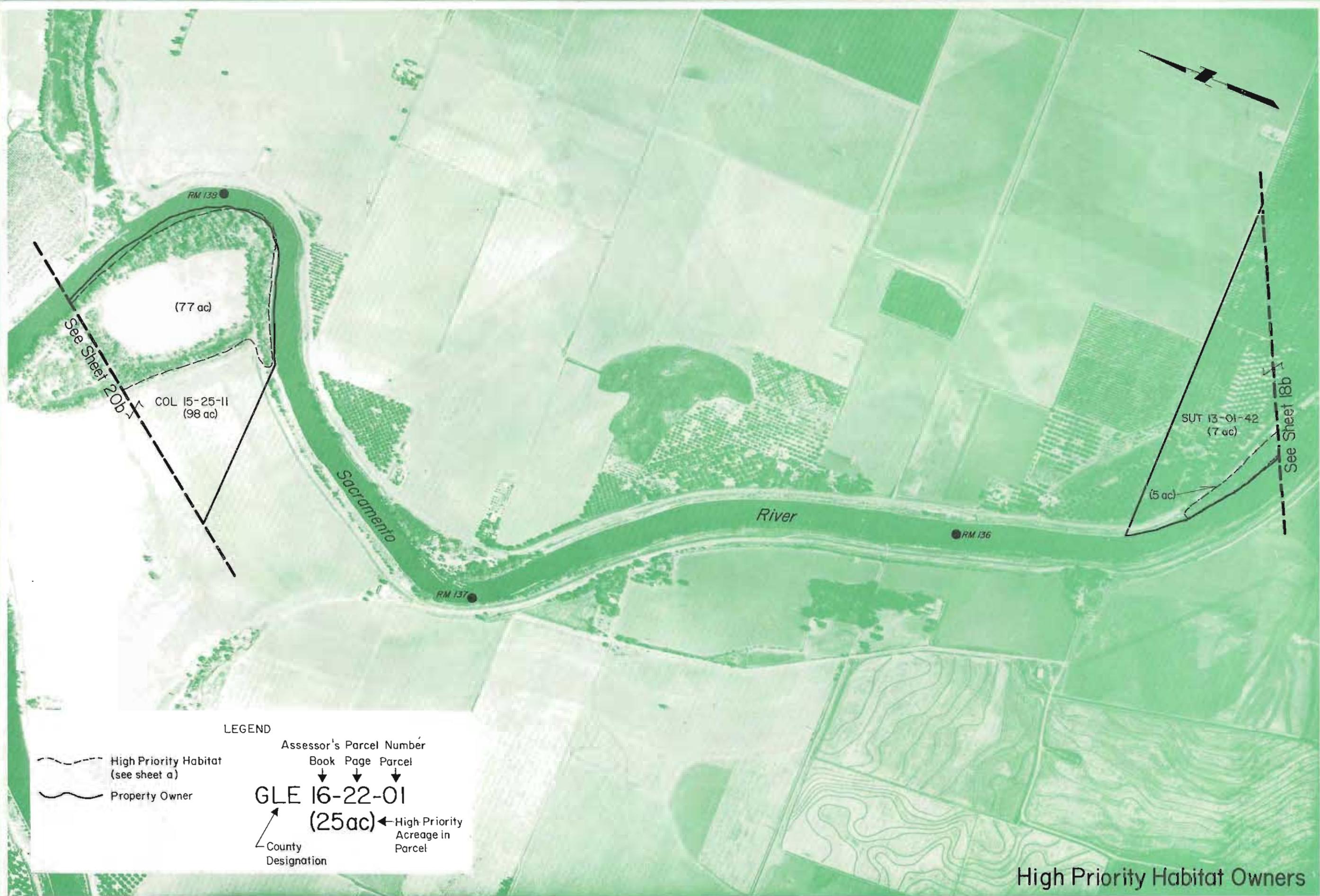


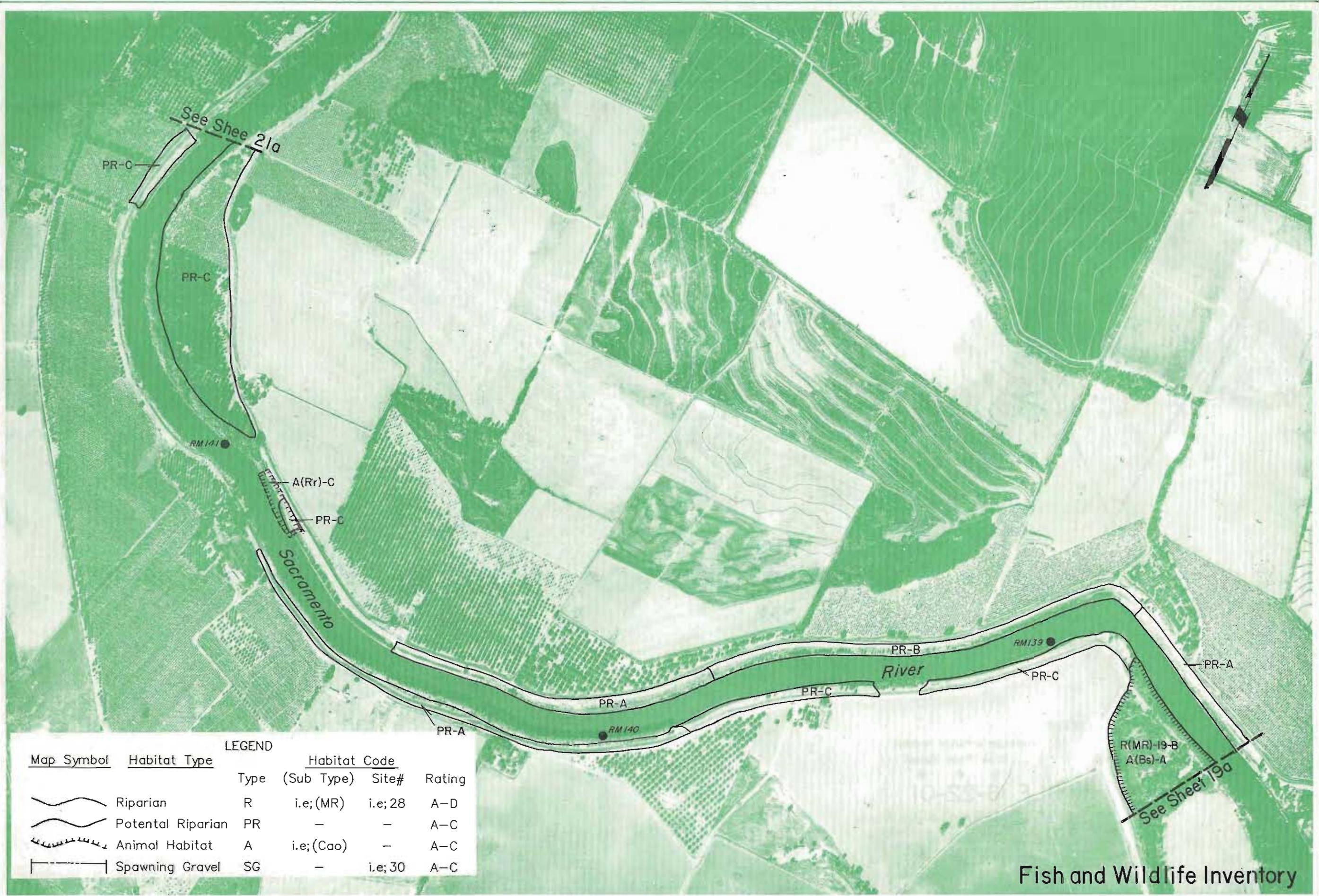
APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

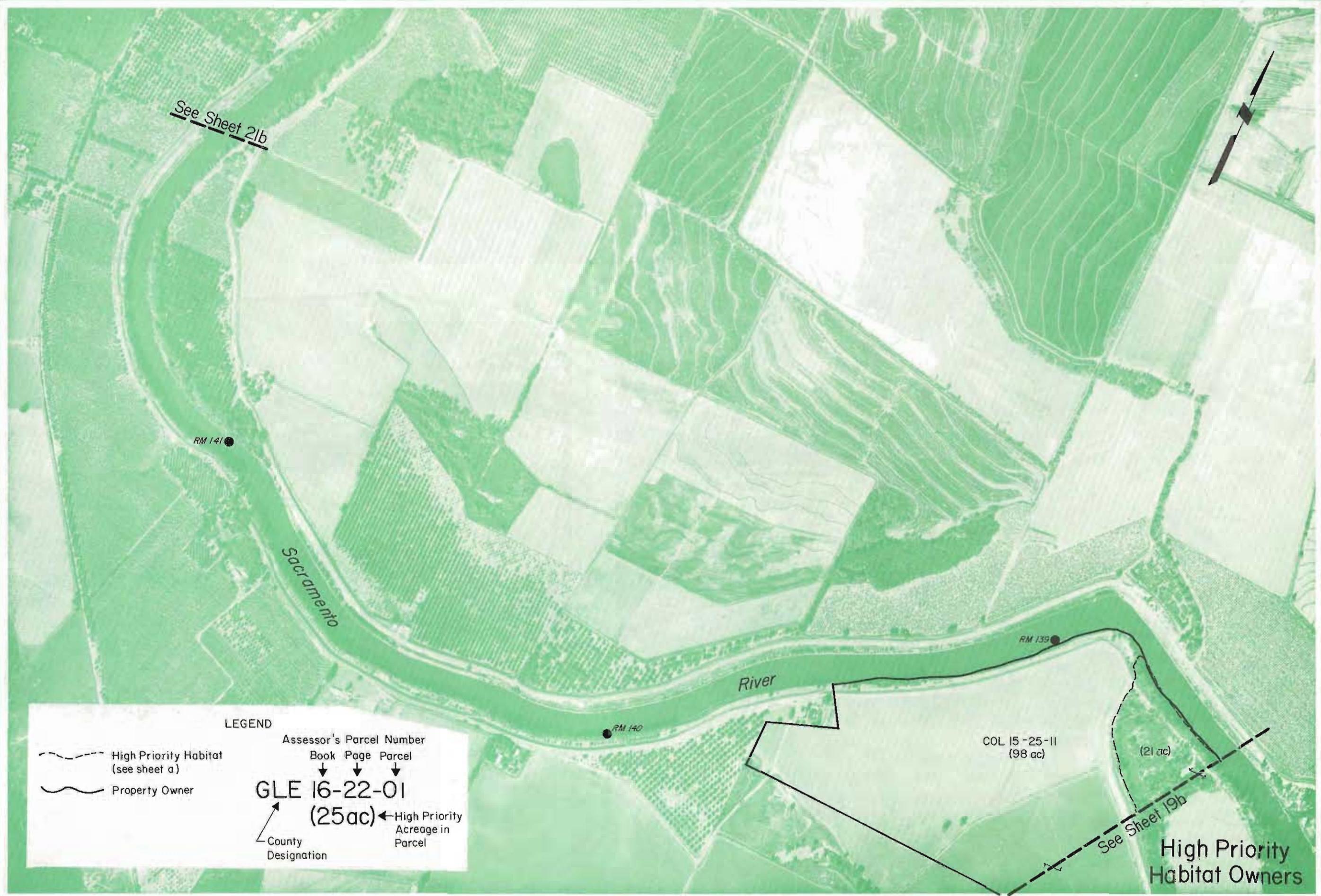
SACRAMENTO RIVER
RIPARIAN ZONE

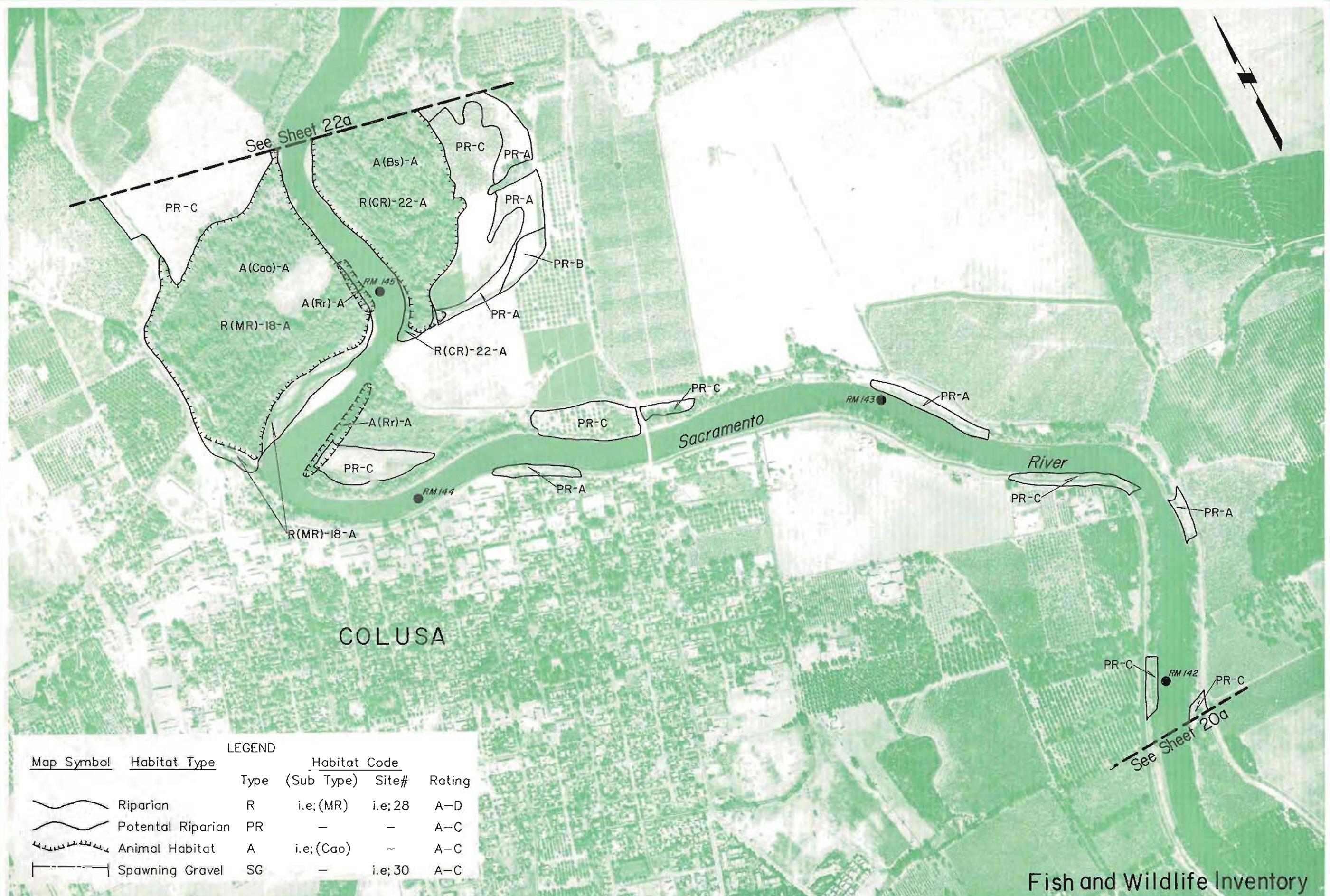
SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

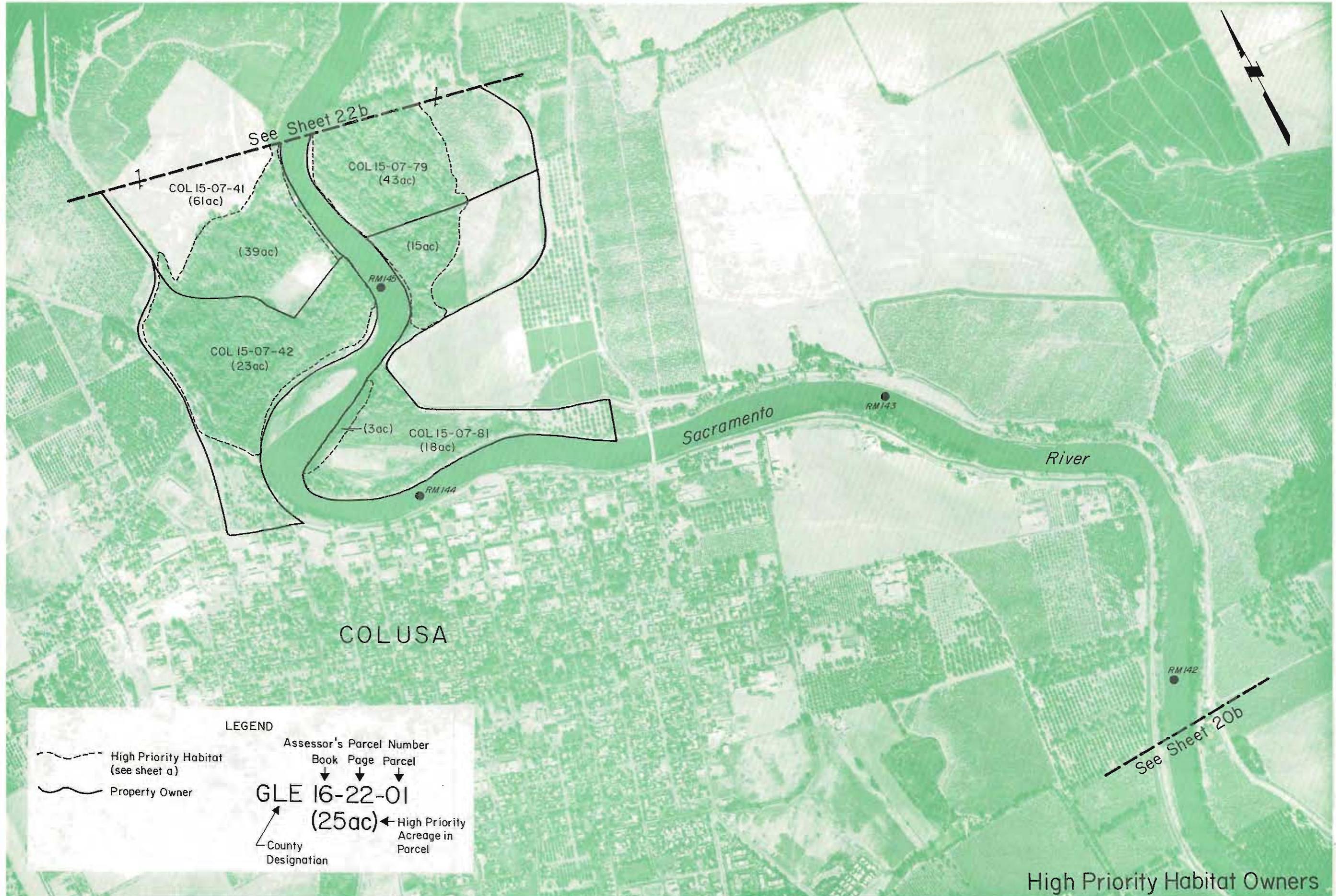
SHEET 19a OF 79

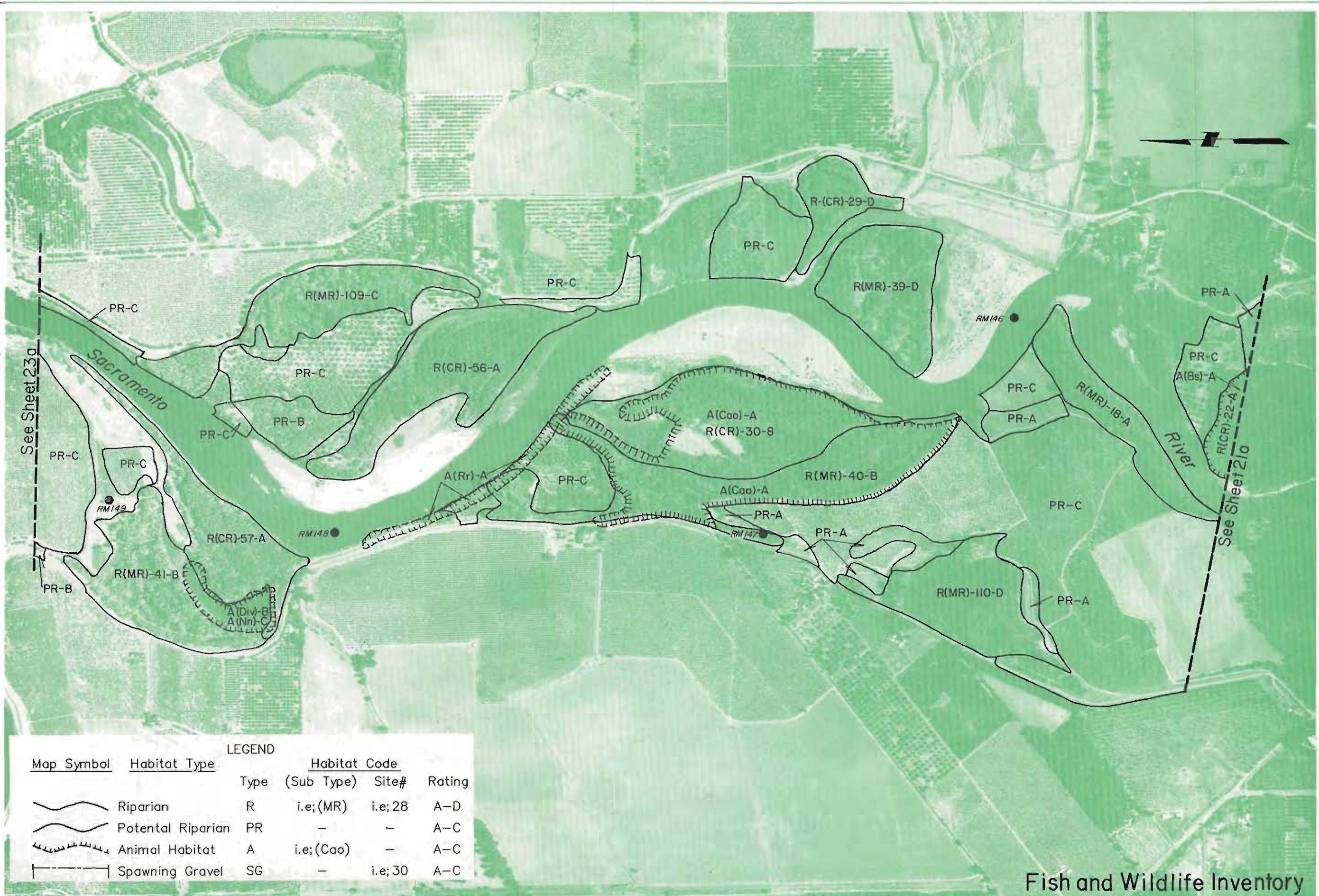












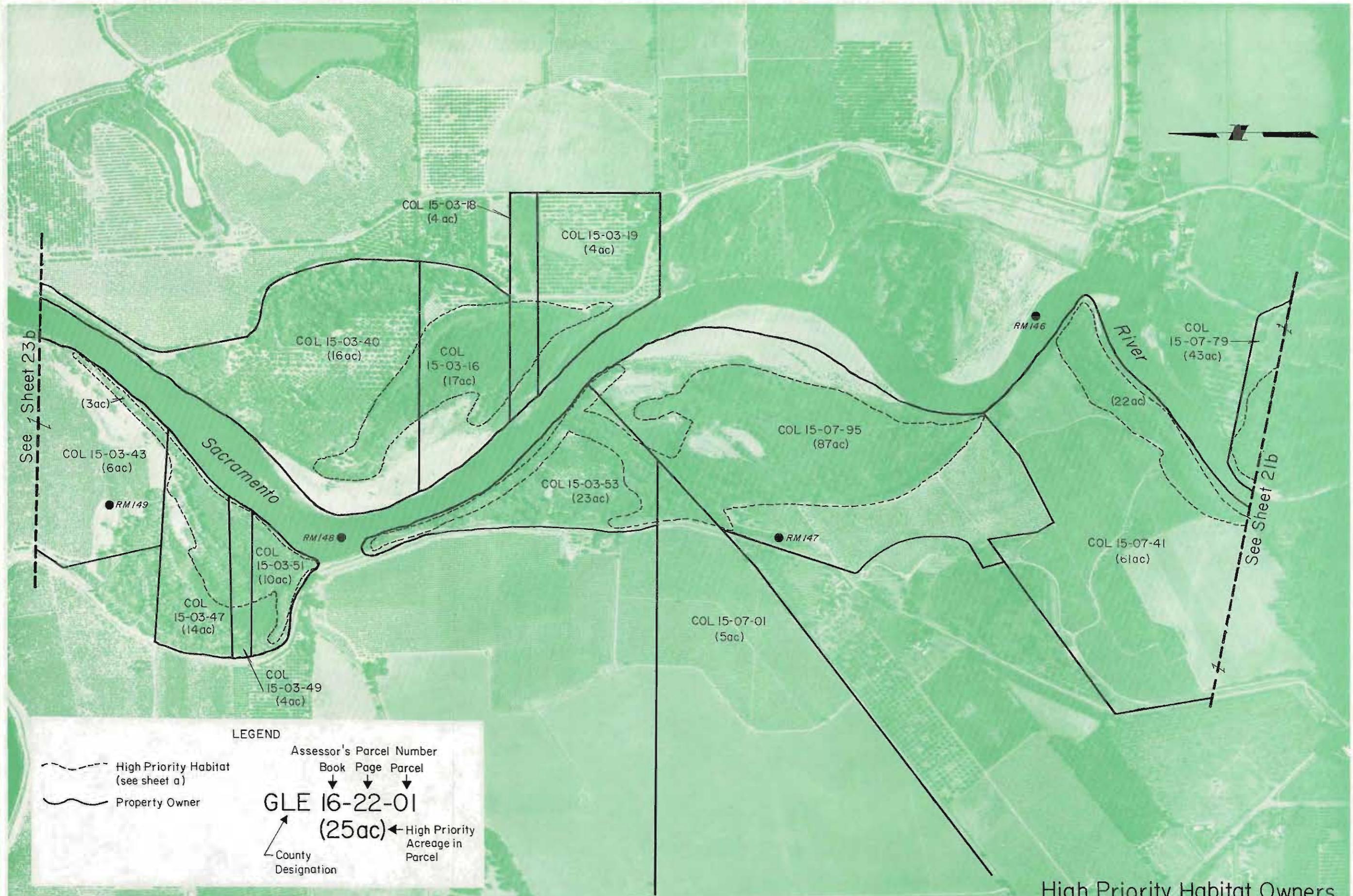
Fish and Wildlife Inventory

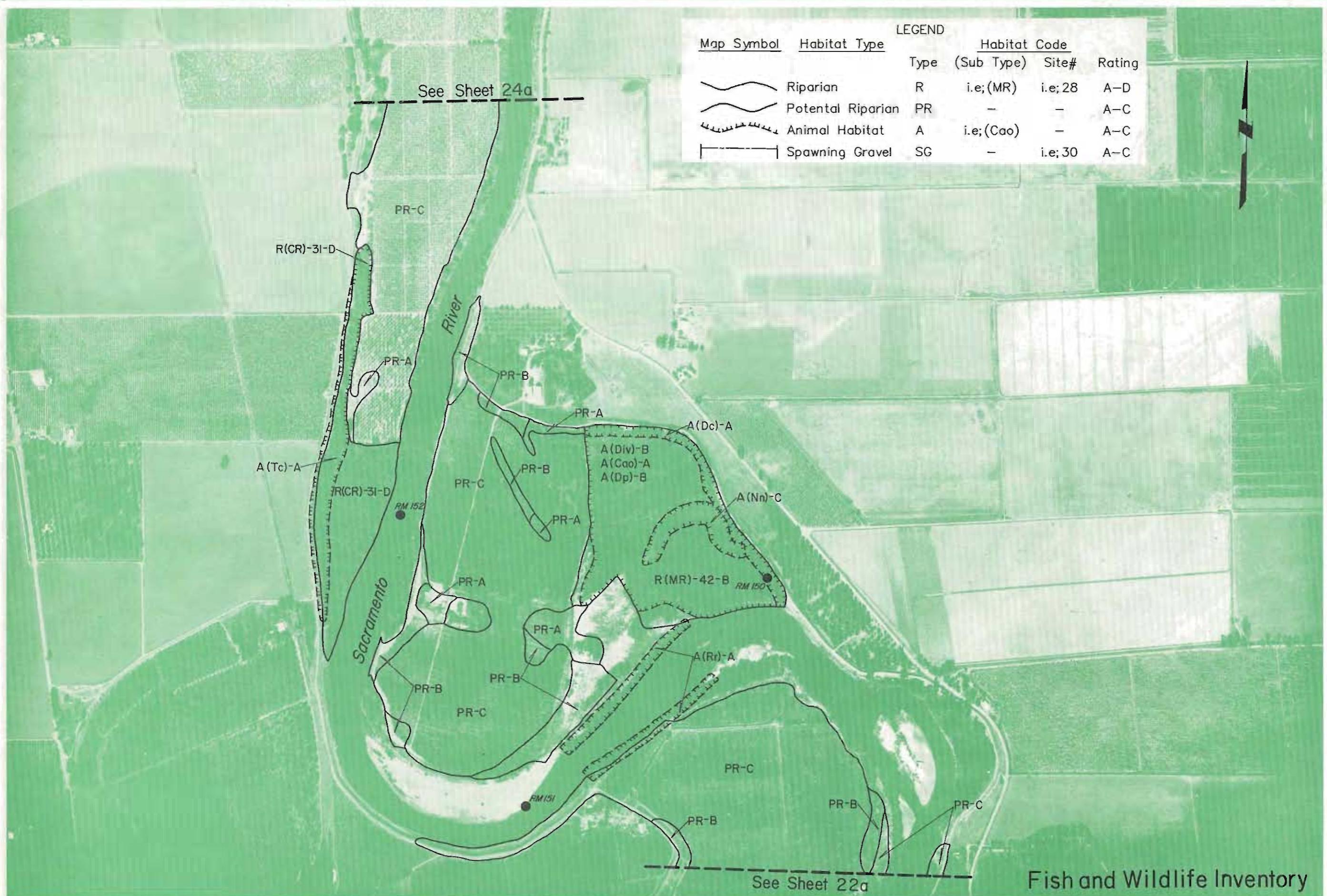
APPROXIMATE SCALE 1" = 1000' PHOTOGRAPHED 6-10-1987
ENLARGED FROM EXPOSURE: SYMBOL WR - ASJ-2

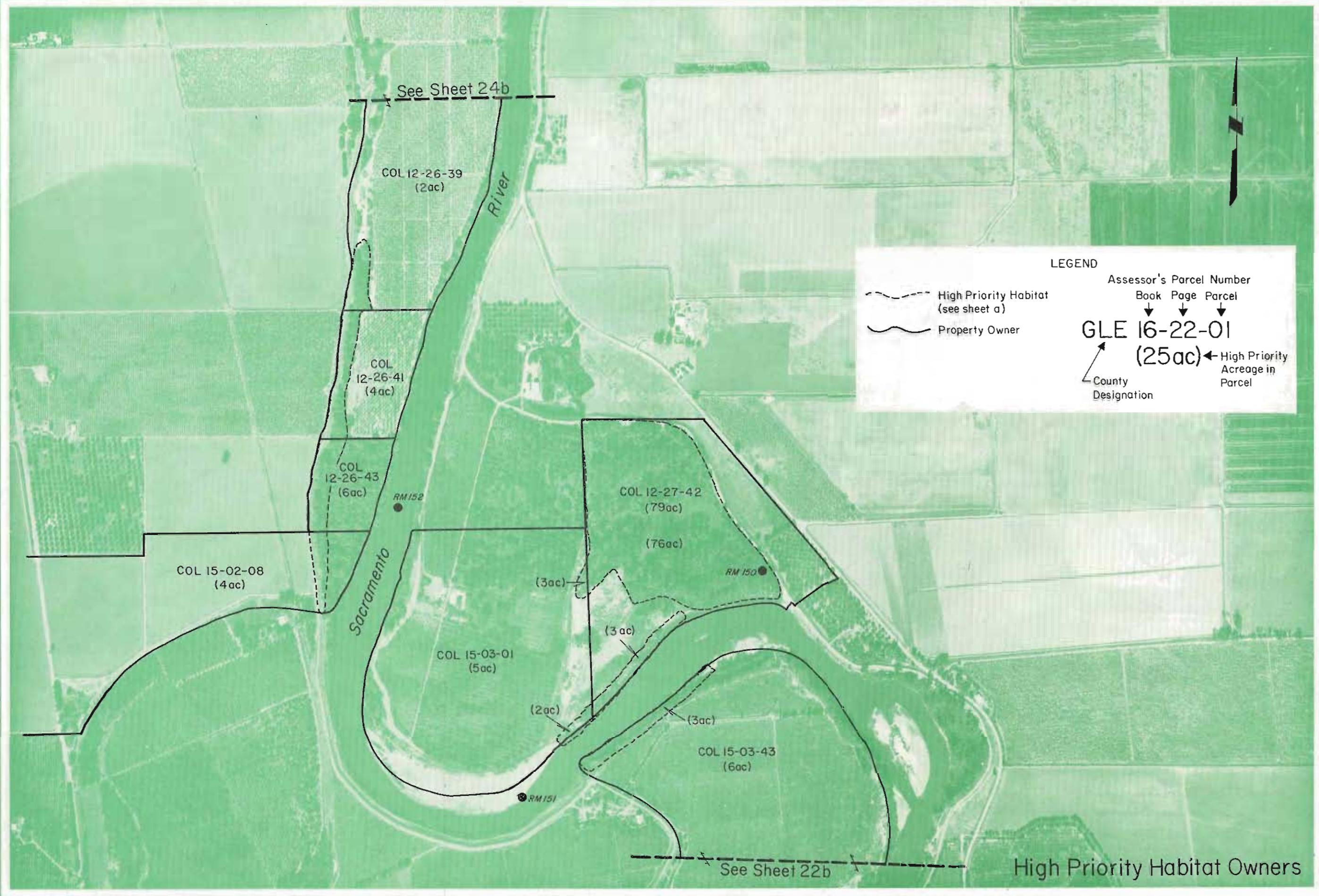
SACRAMENTO RIVER RIPARIAN ZONE

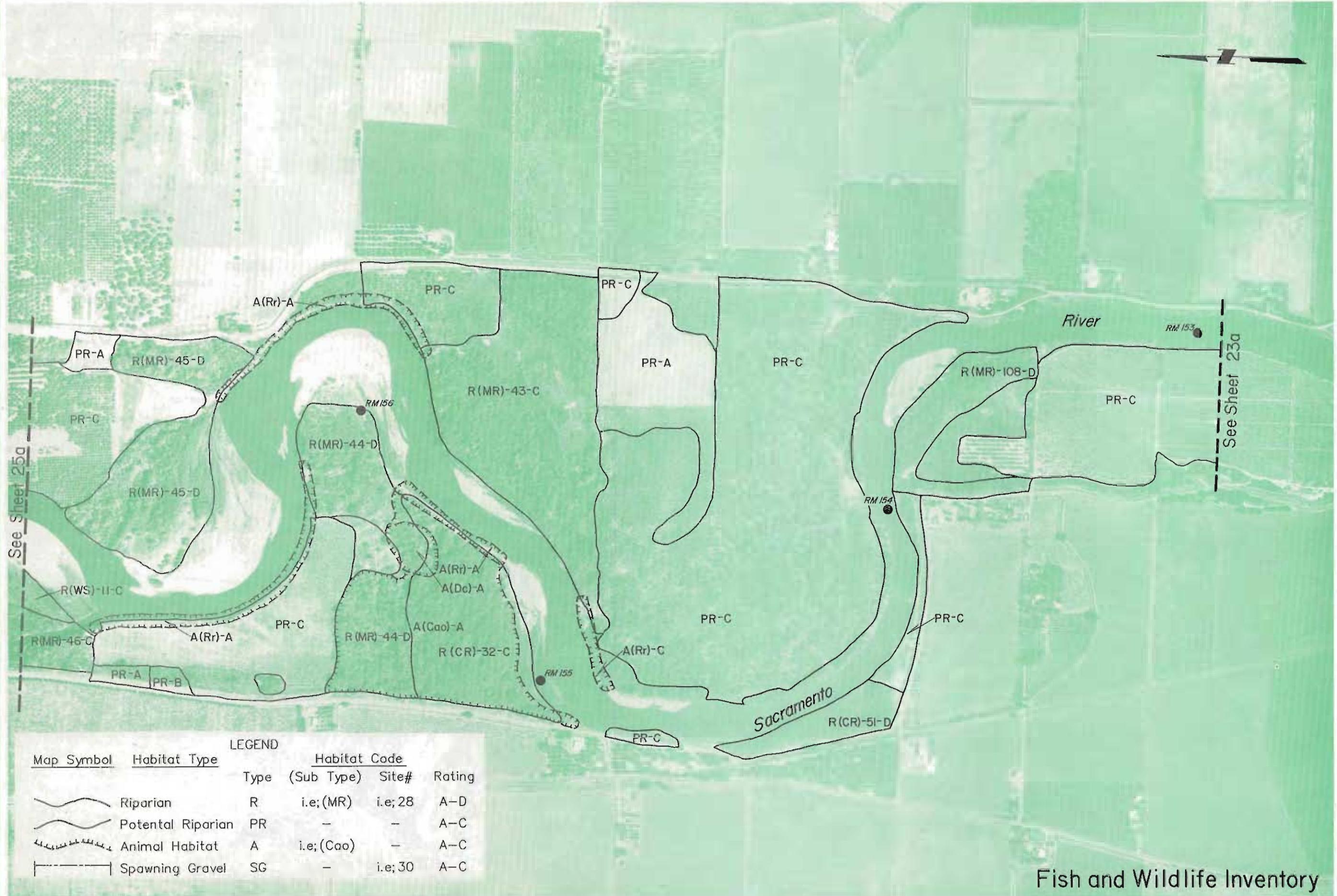
SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

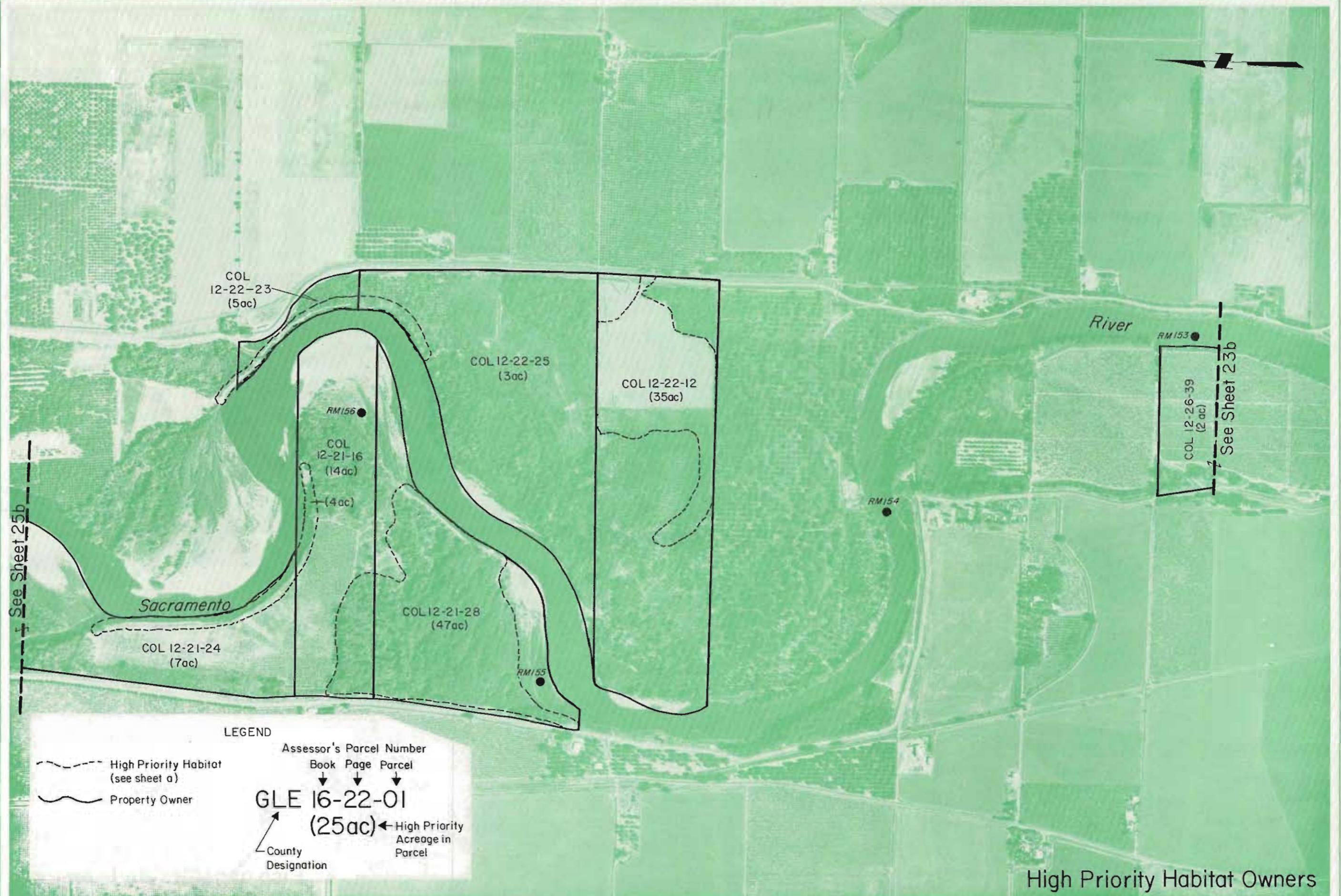
SHEET 22a OF 79

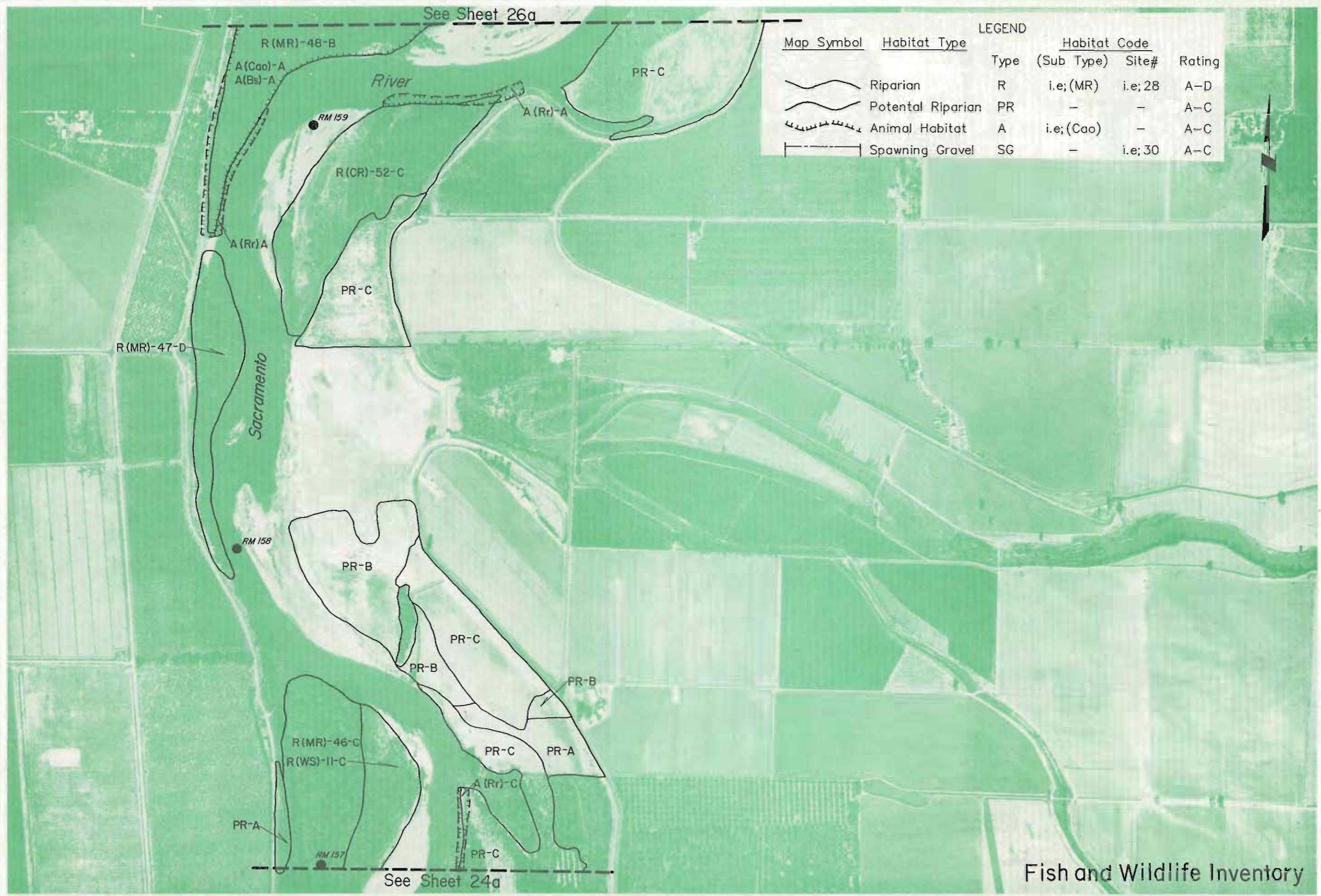


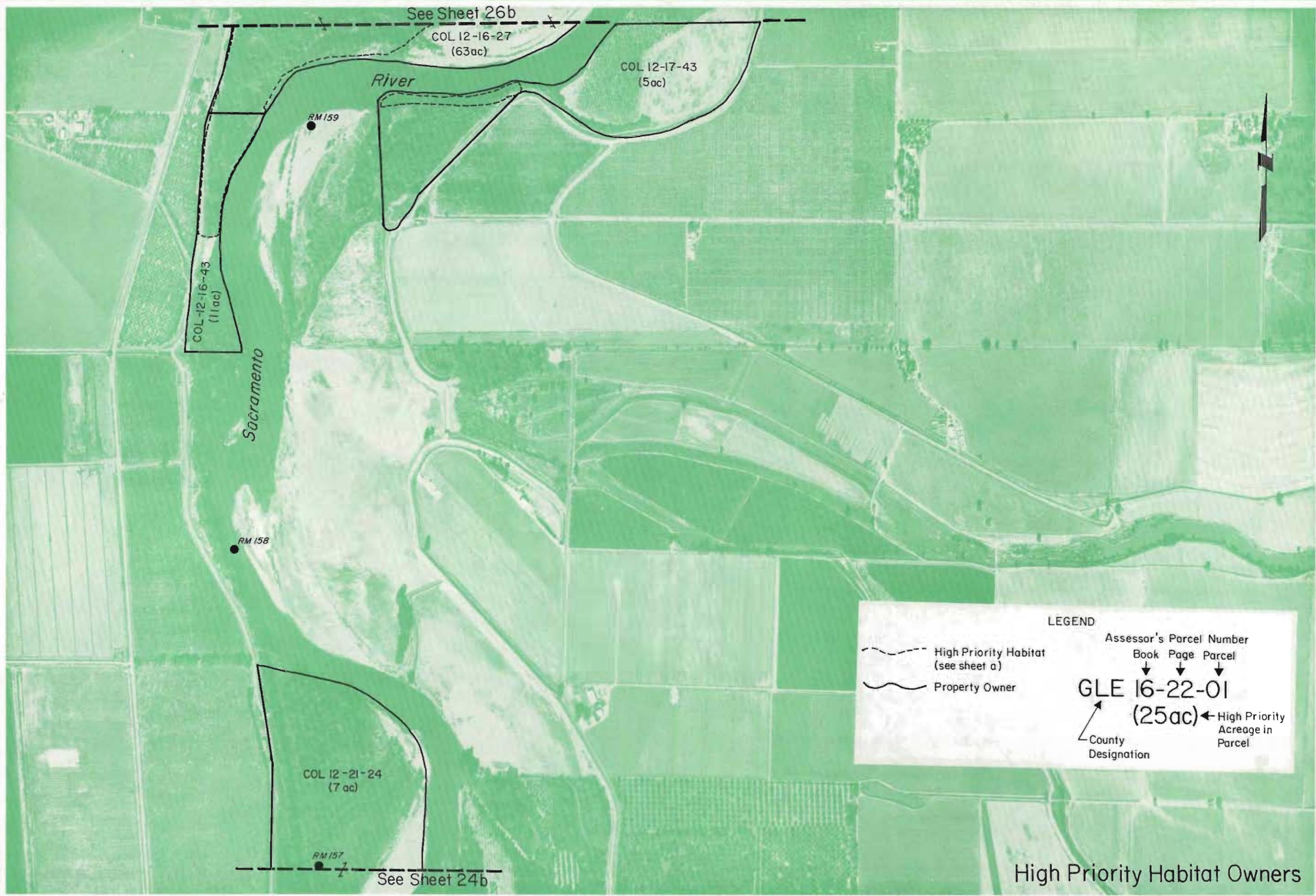








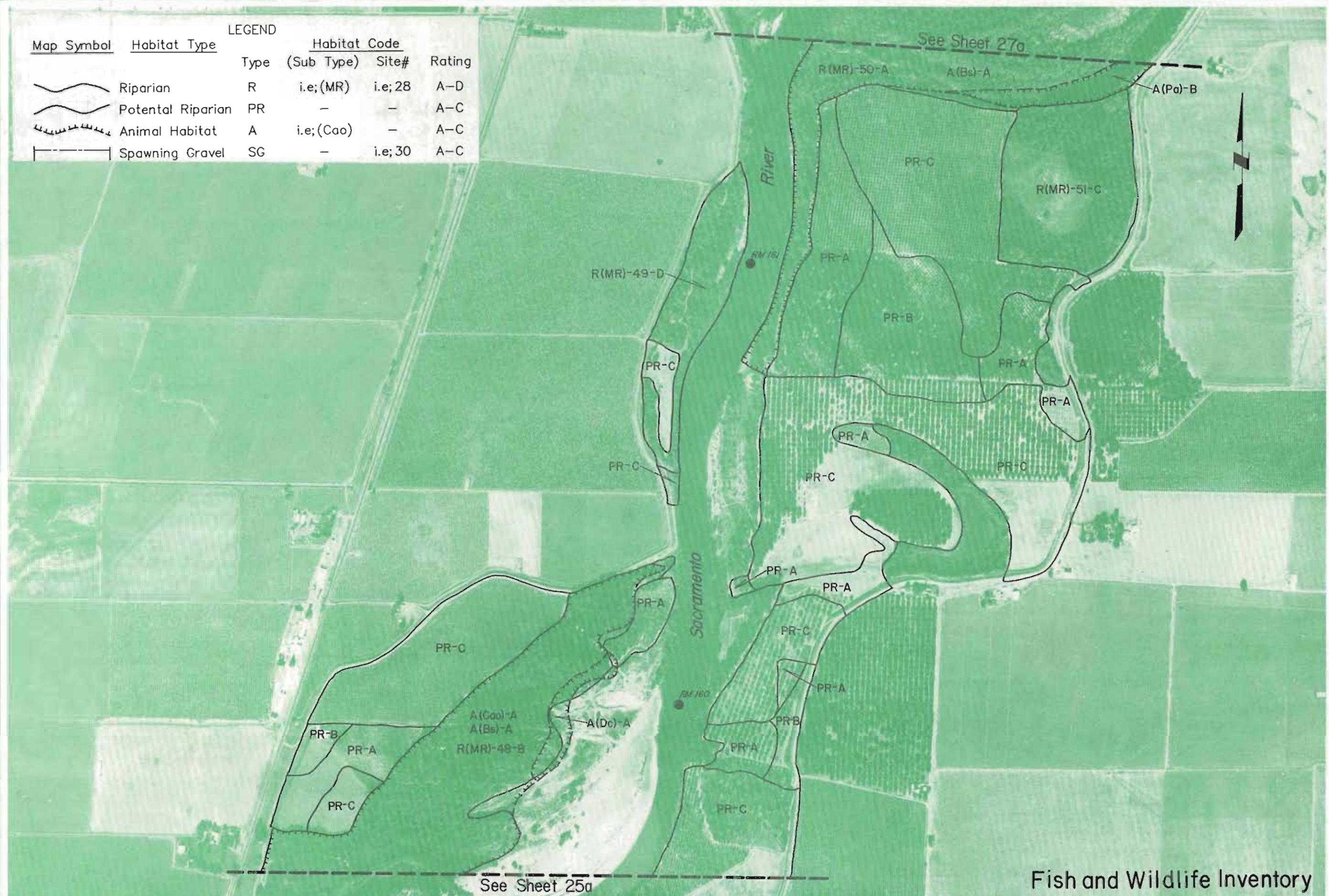


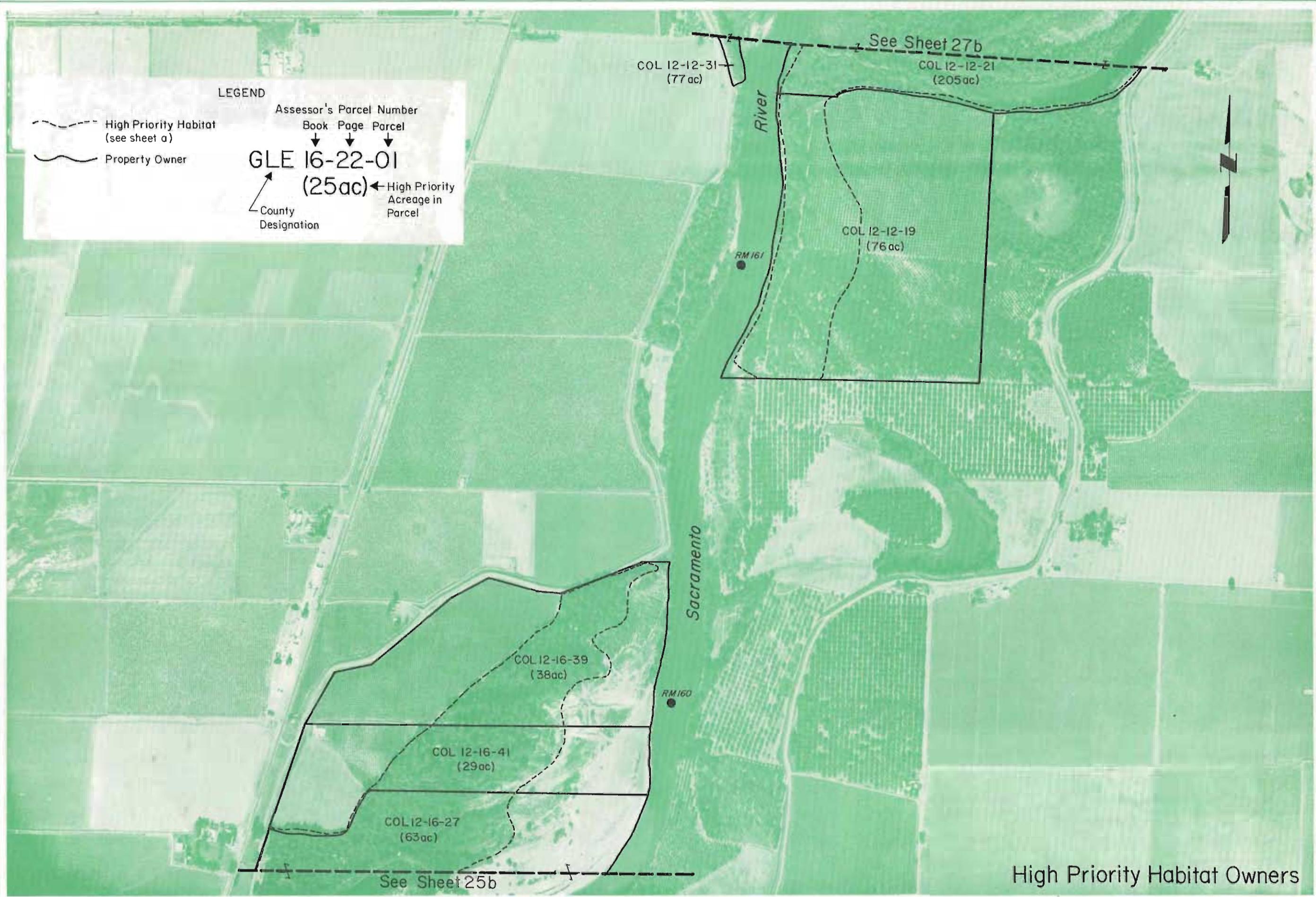


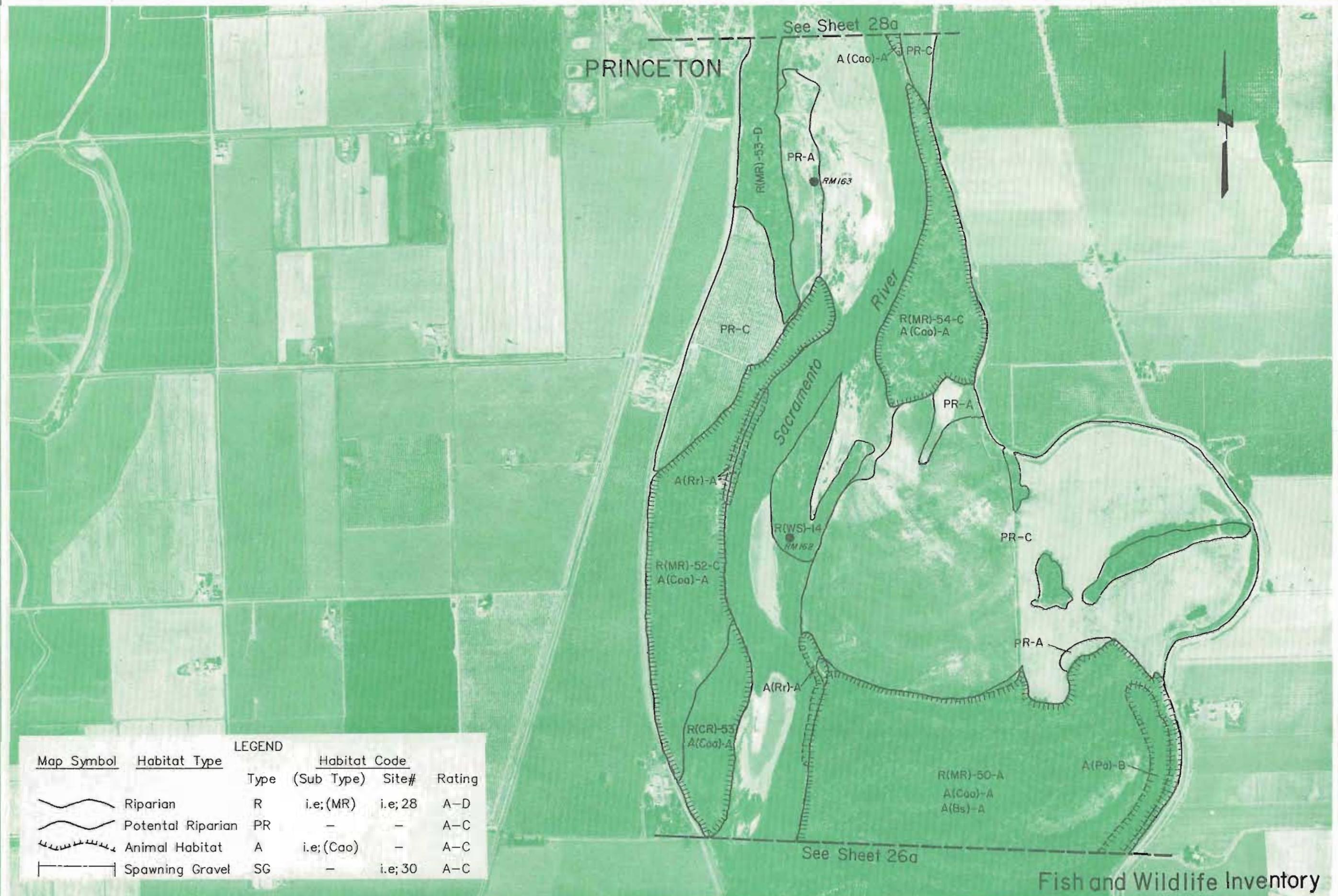
LEGEND

| Map Symbol | Habitat Type | Habitat Code | | | |
|------------|--------------------|--------------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

See Sheet 27a

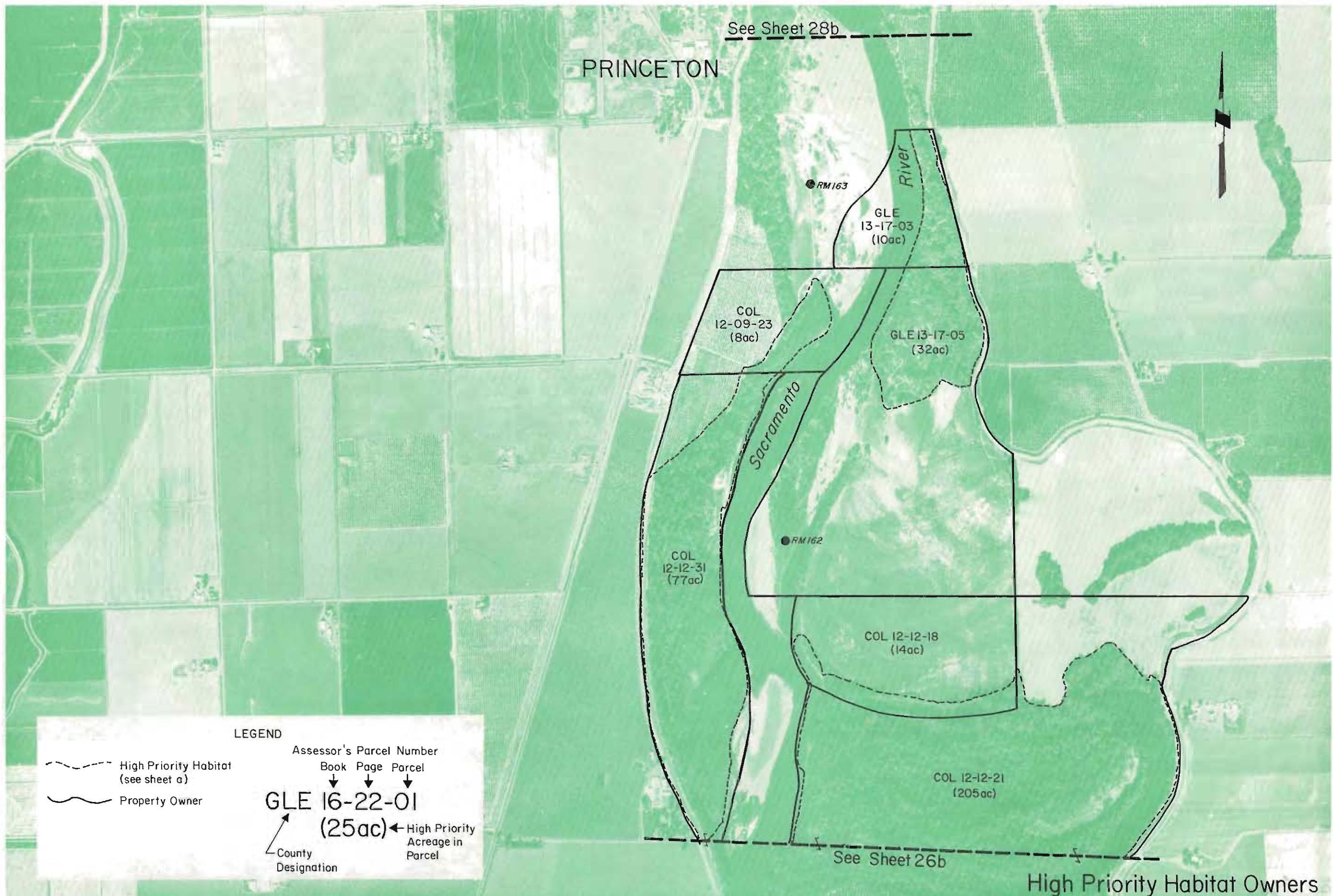


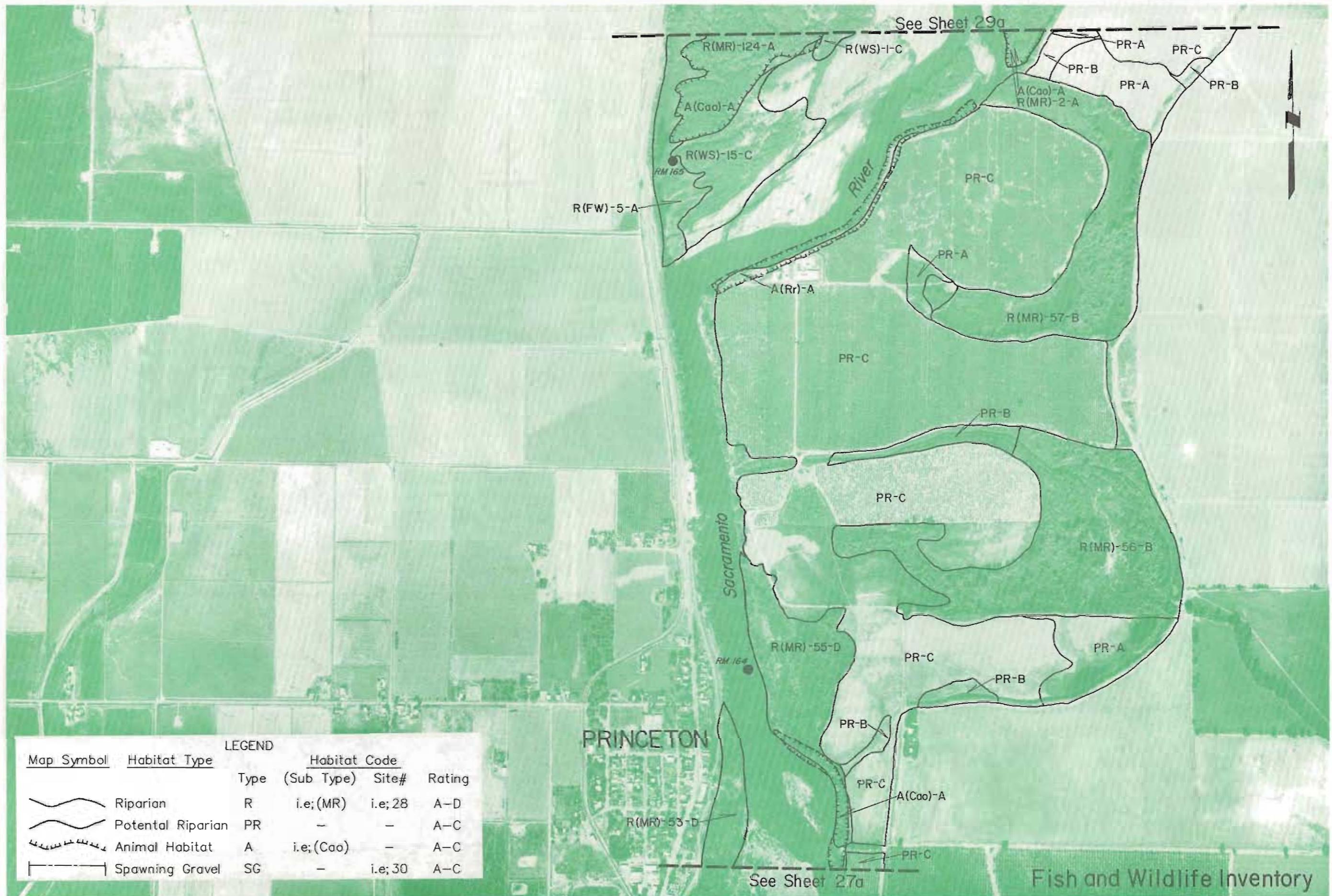


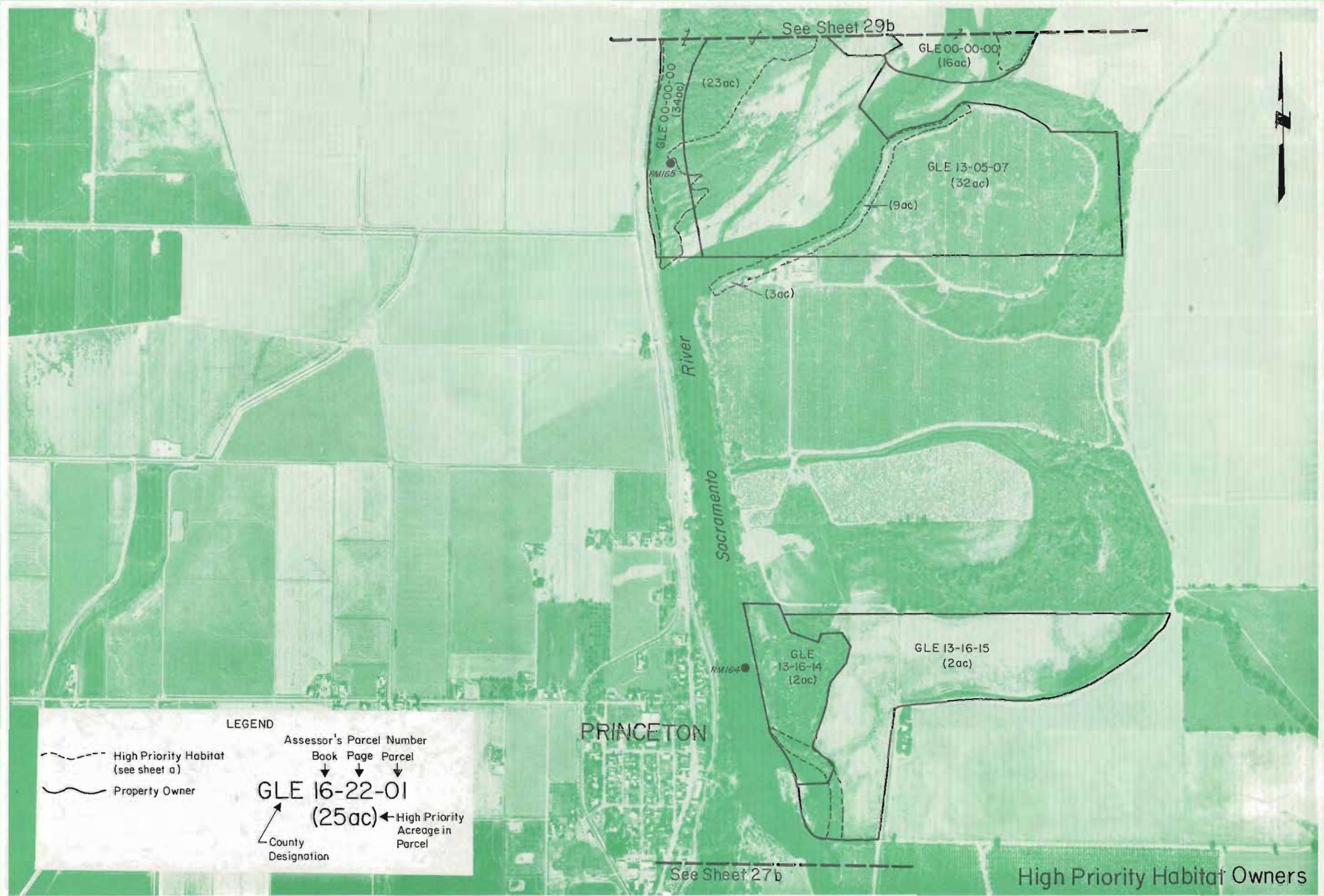


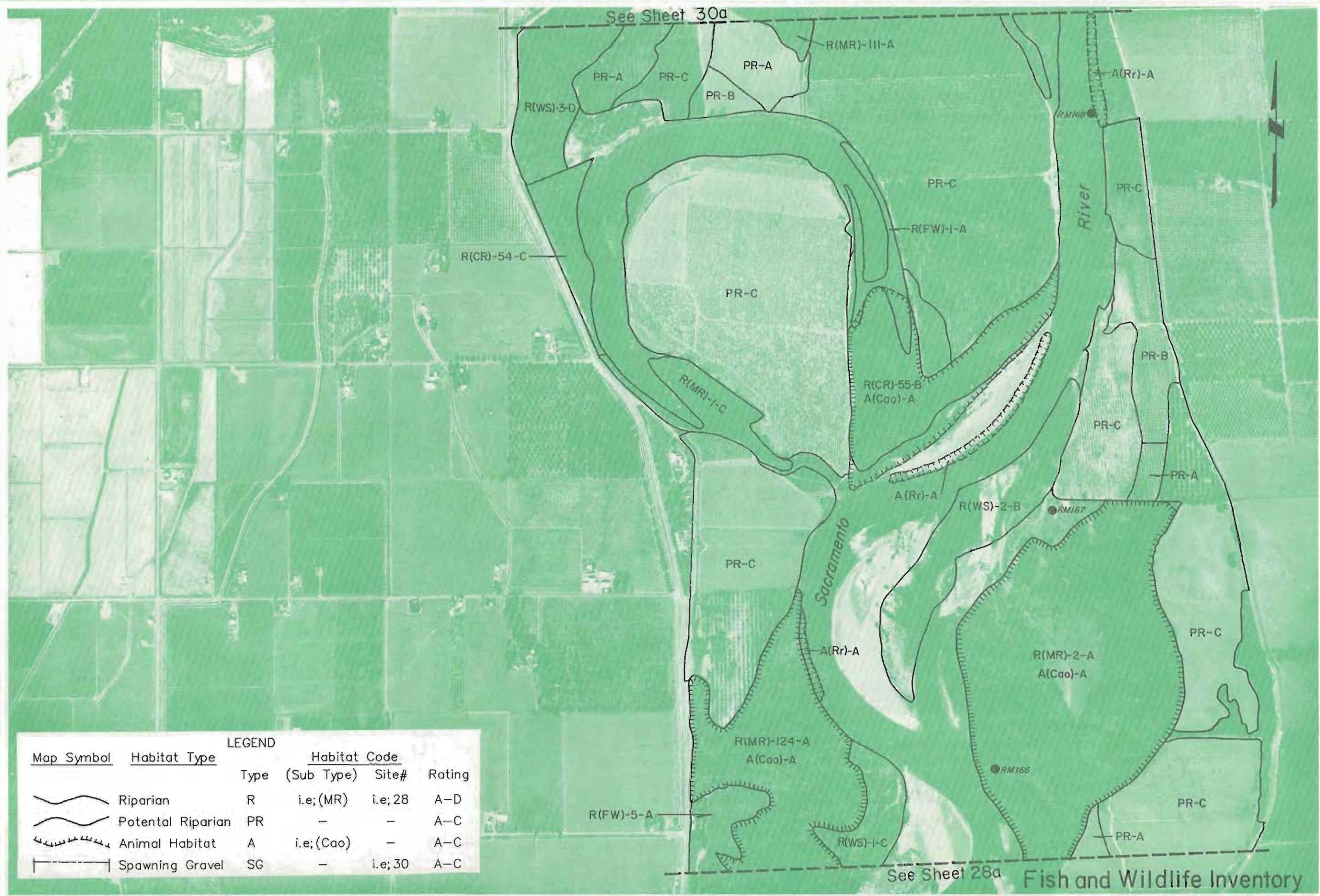
See Sheet 28b

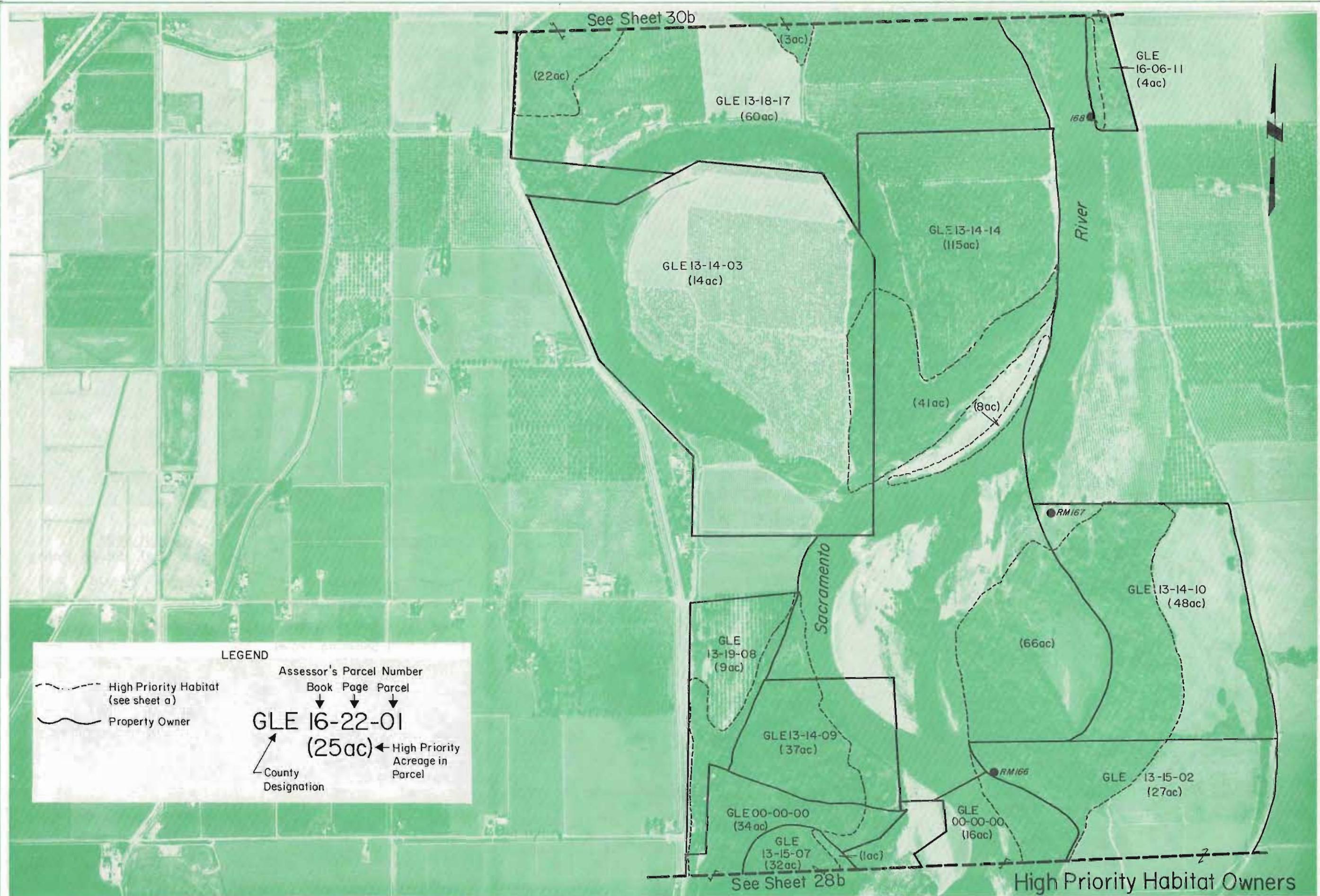
PRINCETON



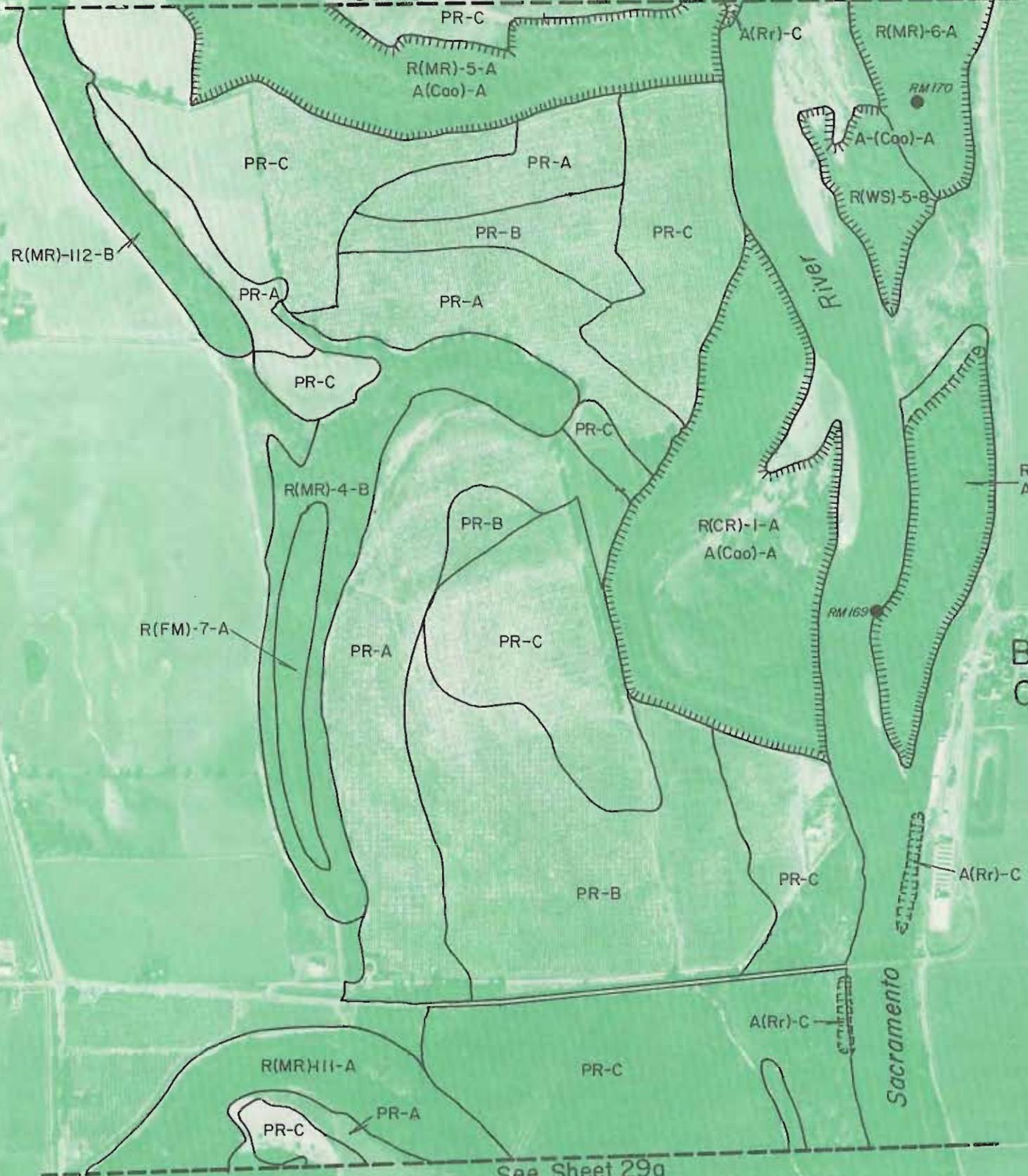








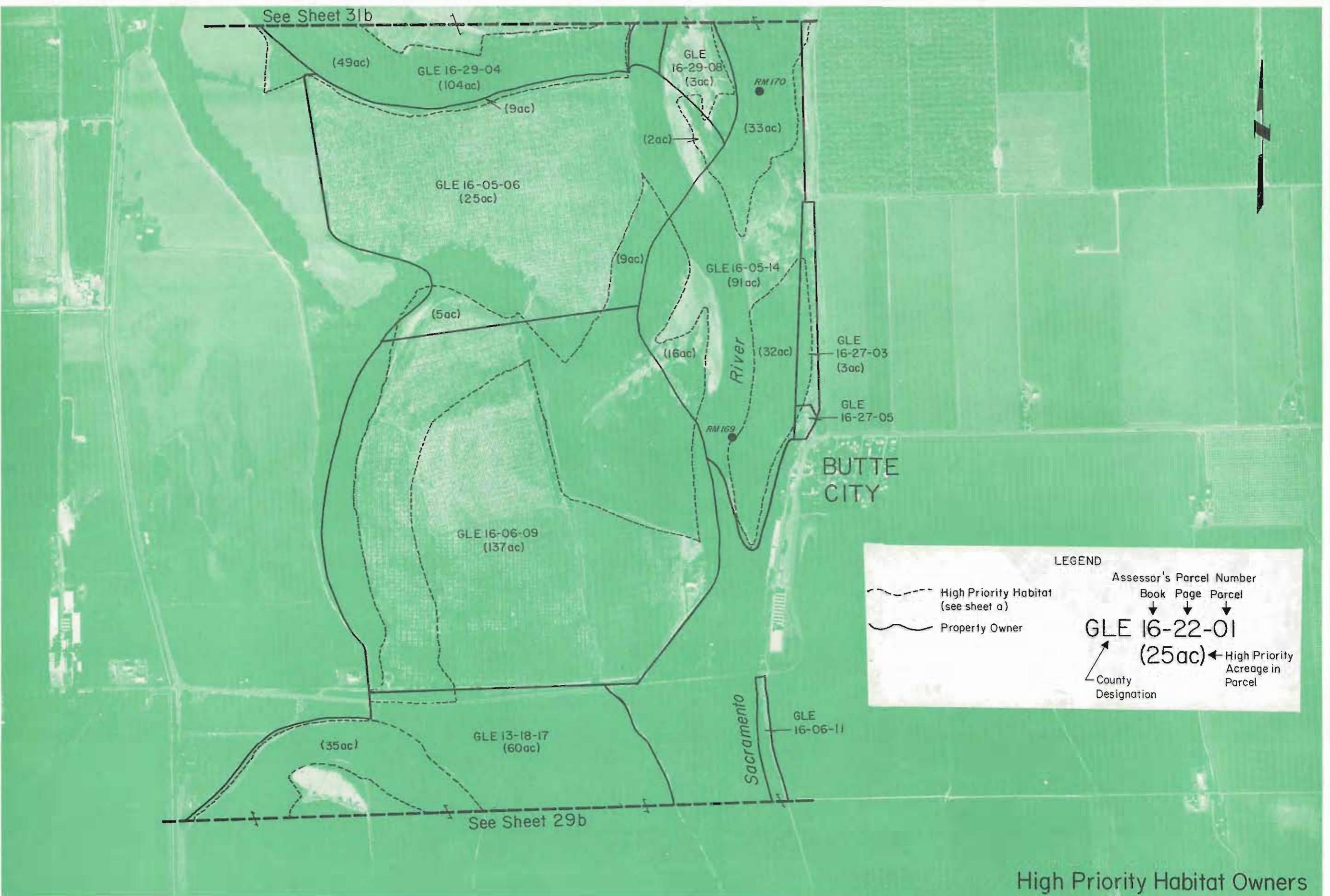
See Sheet 3a

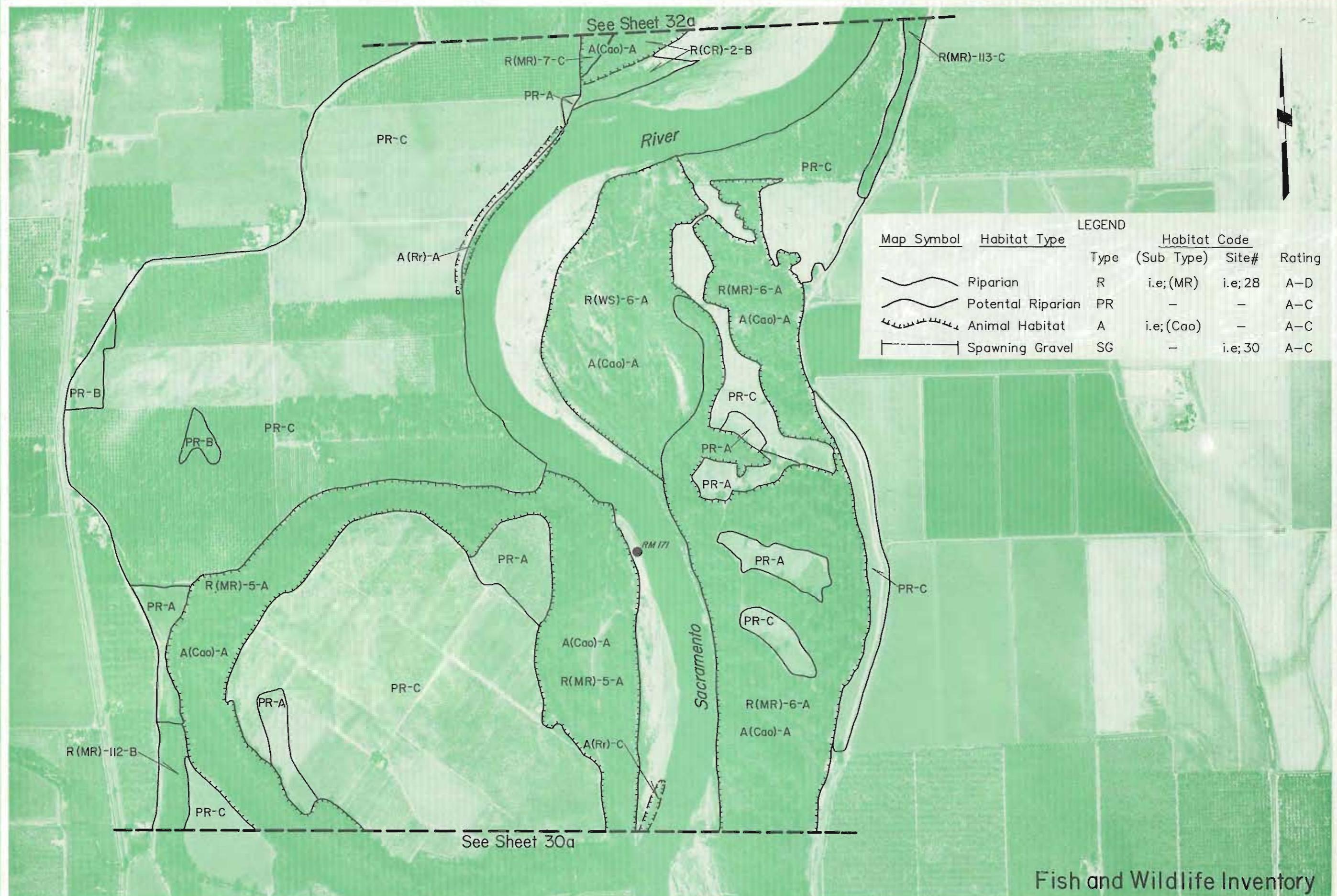


| Map Symbol | Habitat Type | Habitat Code | | | |
|---------------------|--------------------|--------------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| Wavy line | Riparian | R | i.e;(MR) | i.e; 28 | A-D |
| Wavy line with dots | Potential Riparian | PR | - | - | A-C |
| Dashed wavy line | Animal Habitat | A | i.e;(Cao) | - | A-C |
| Horizontal line | Spawning Gravel | SG | - | i.e; 30 | A-C |

See Sheet 29a

Fish and Wildlife Inventory



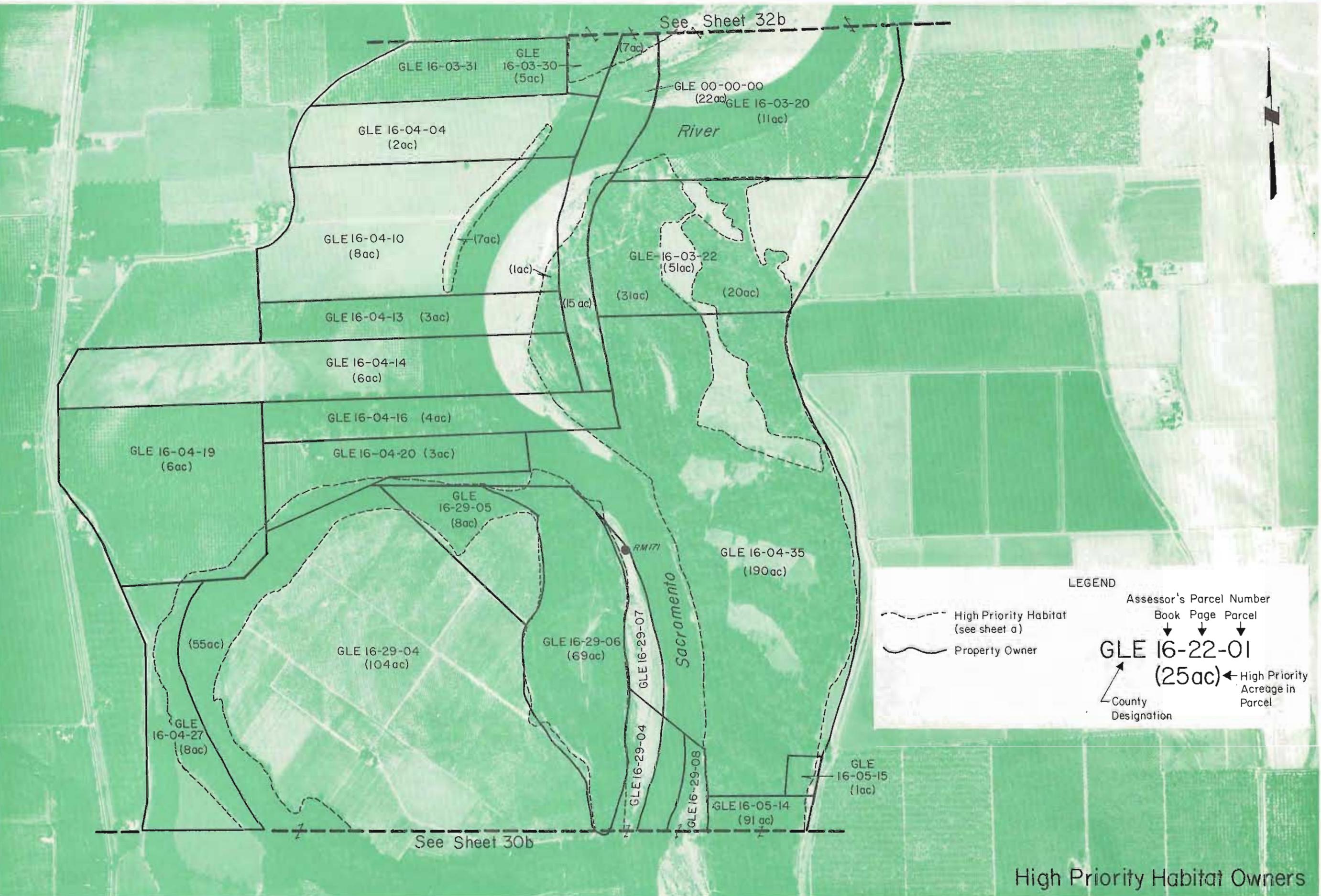


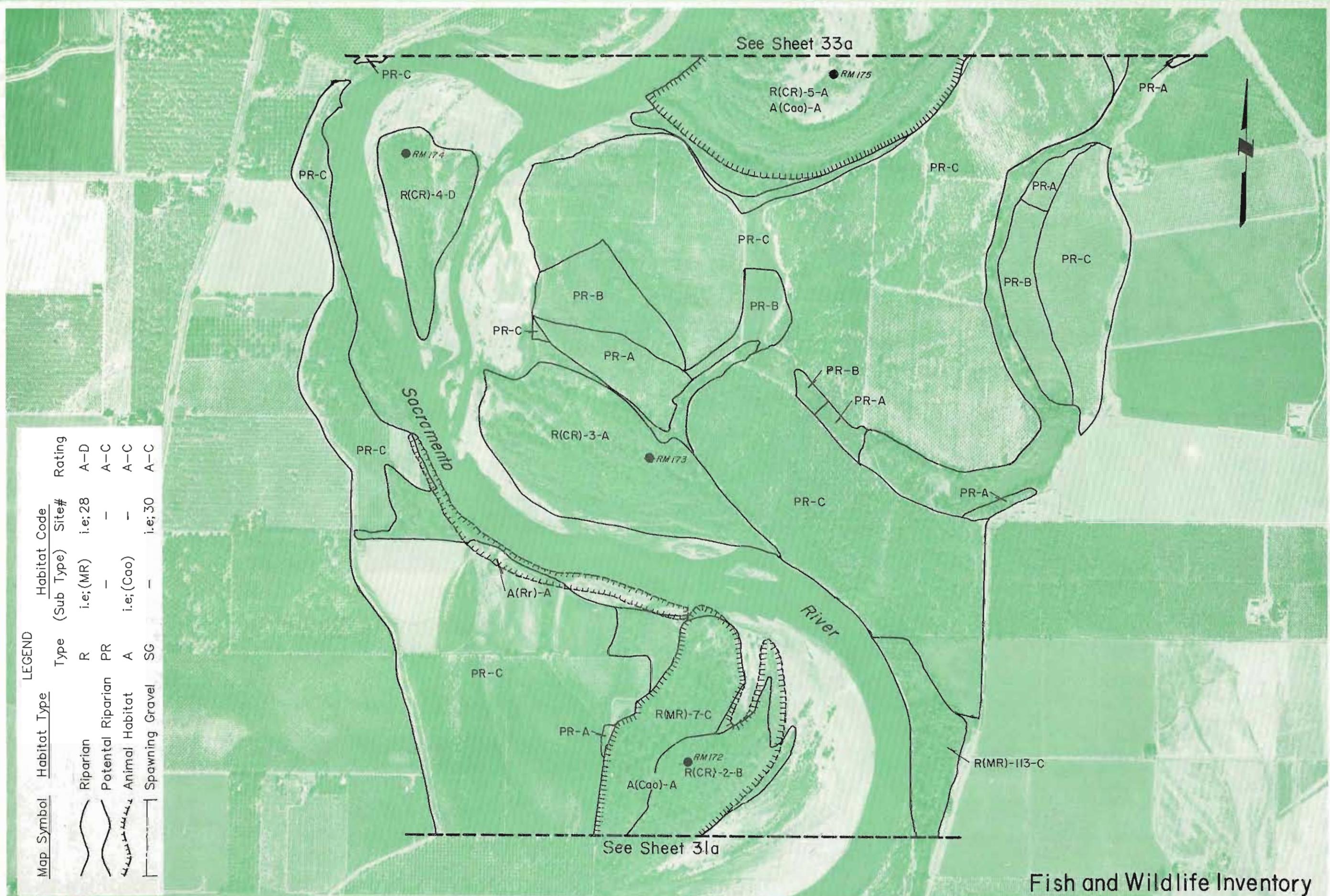
APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 31a OF 79





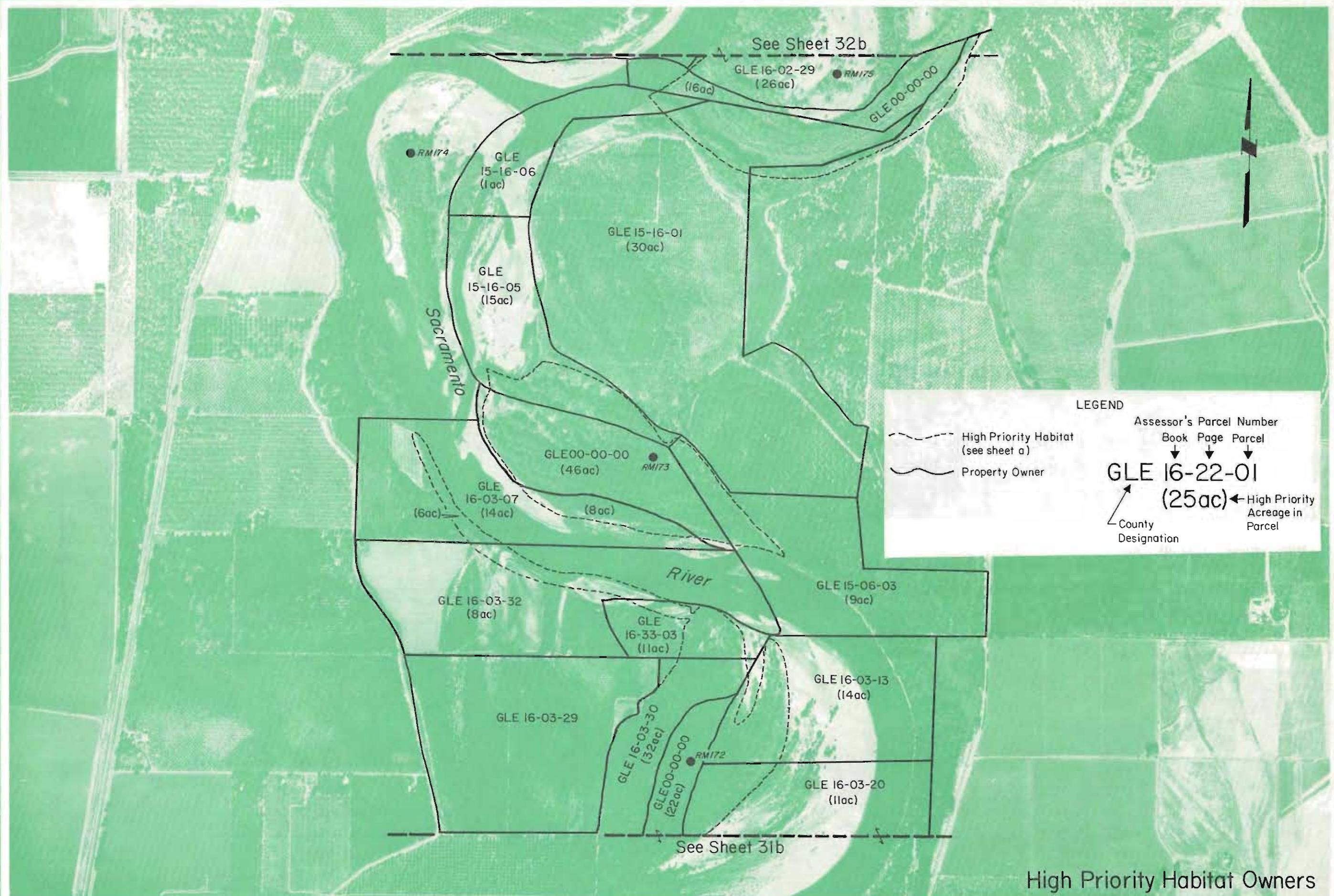
Fish and Wildlife Inventory

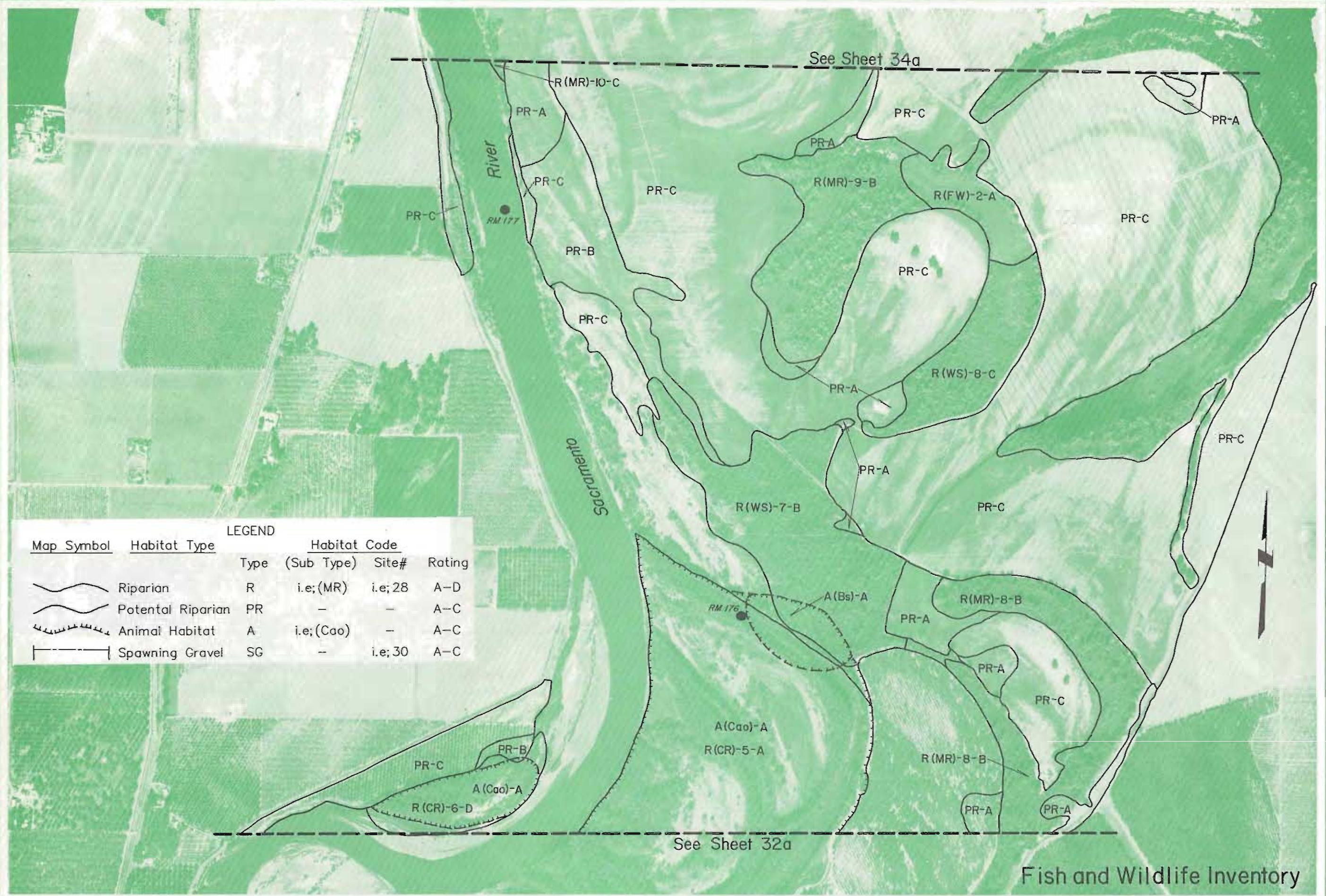
APPROXIMATE SCALE 1"=1000' PHOTOGRAINED 6-10-1987
ENLARGED FROM EXPOSURE: SYMBOL WR- ASJ-2

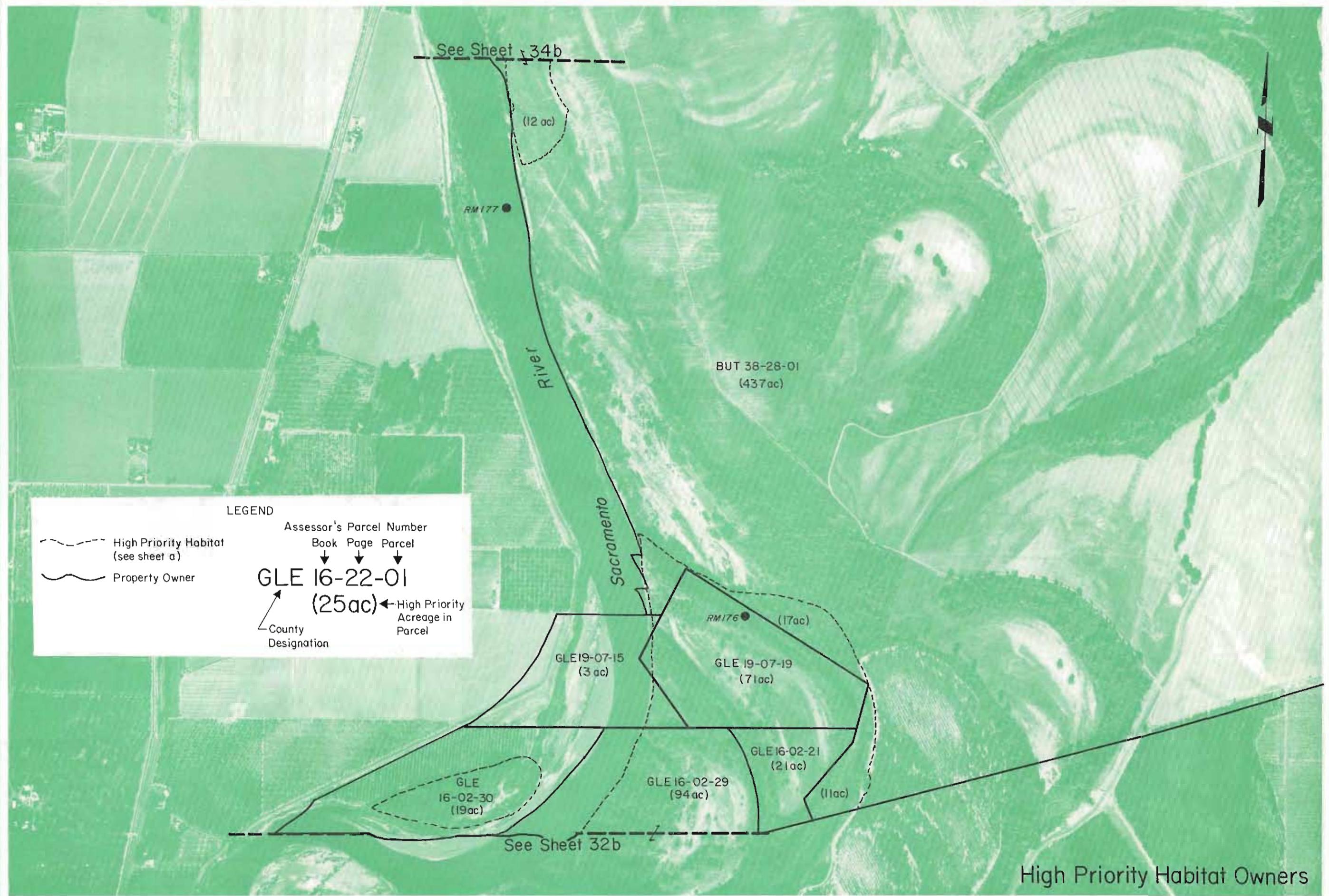
SACRAMENTO RIVER
RIPARIAN ZONE

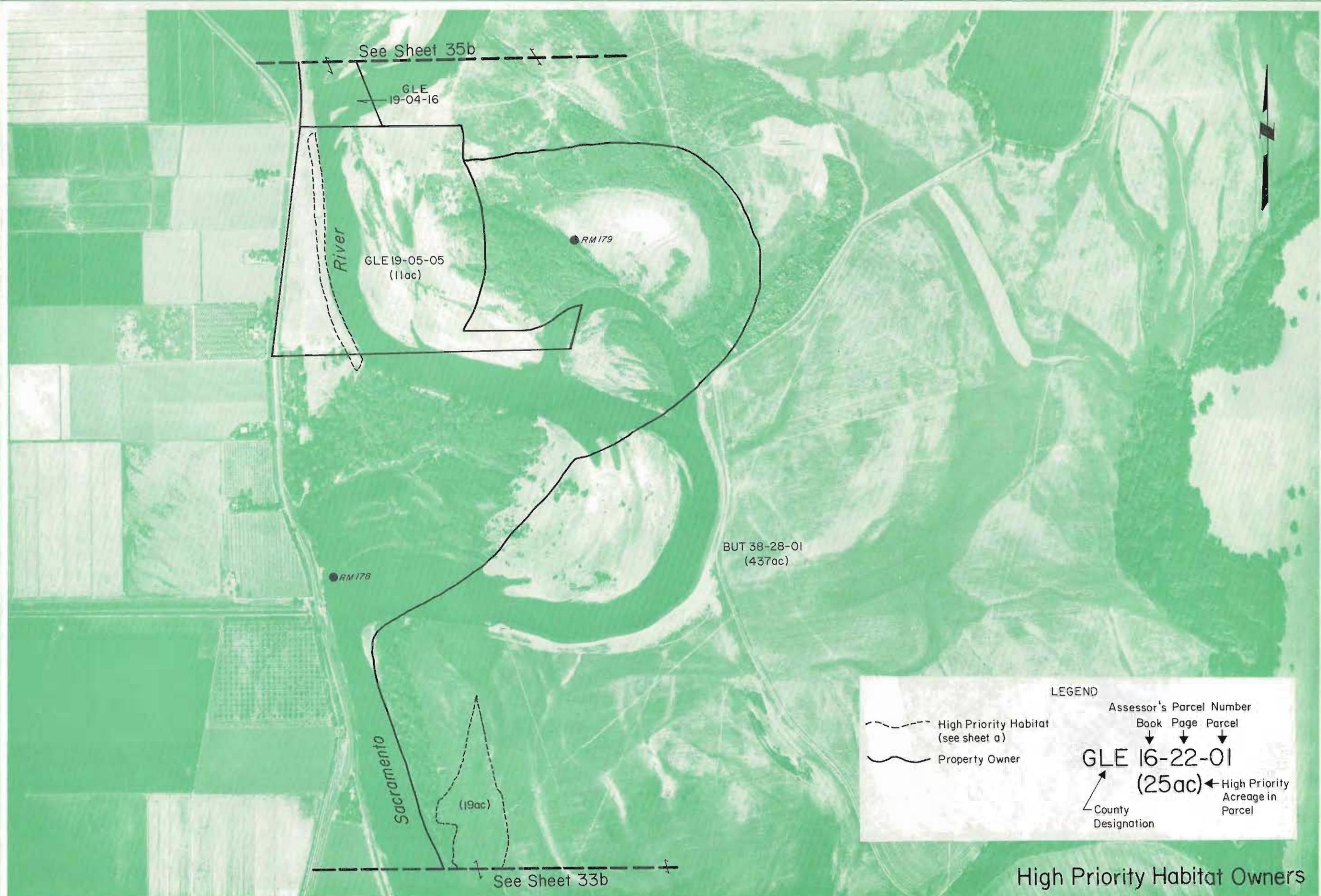
SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

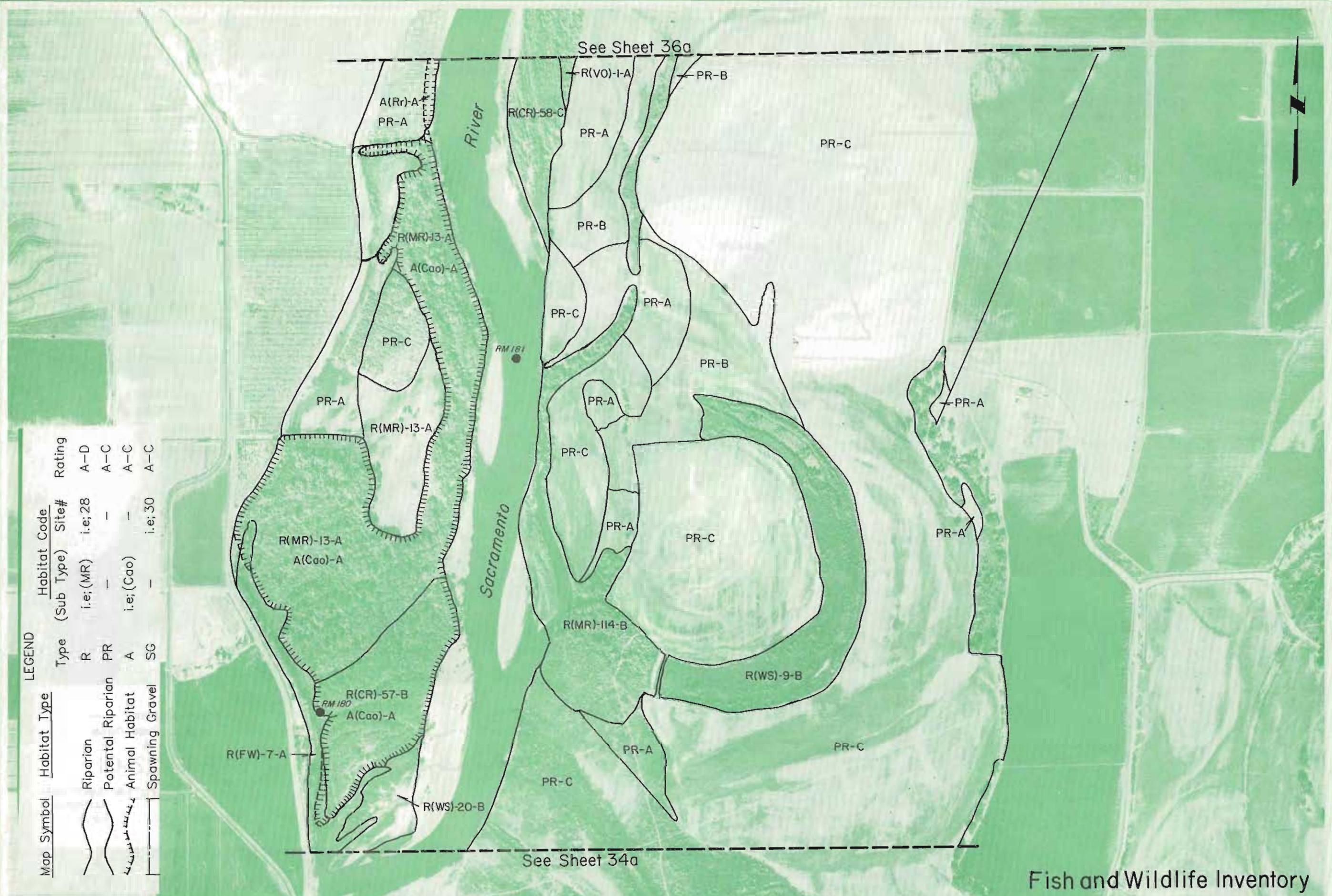
SHEET 32a OF 79

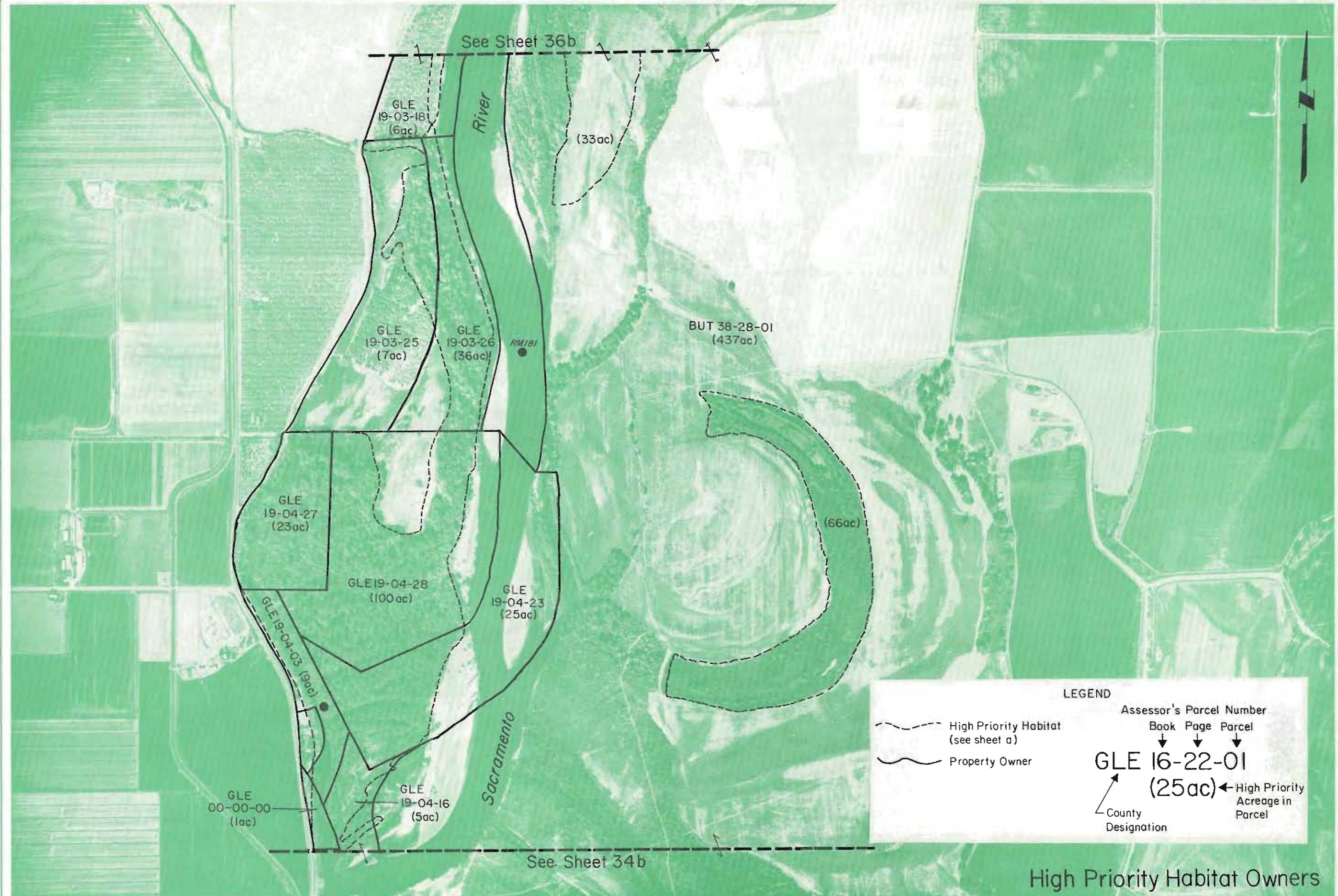




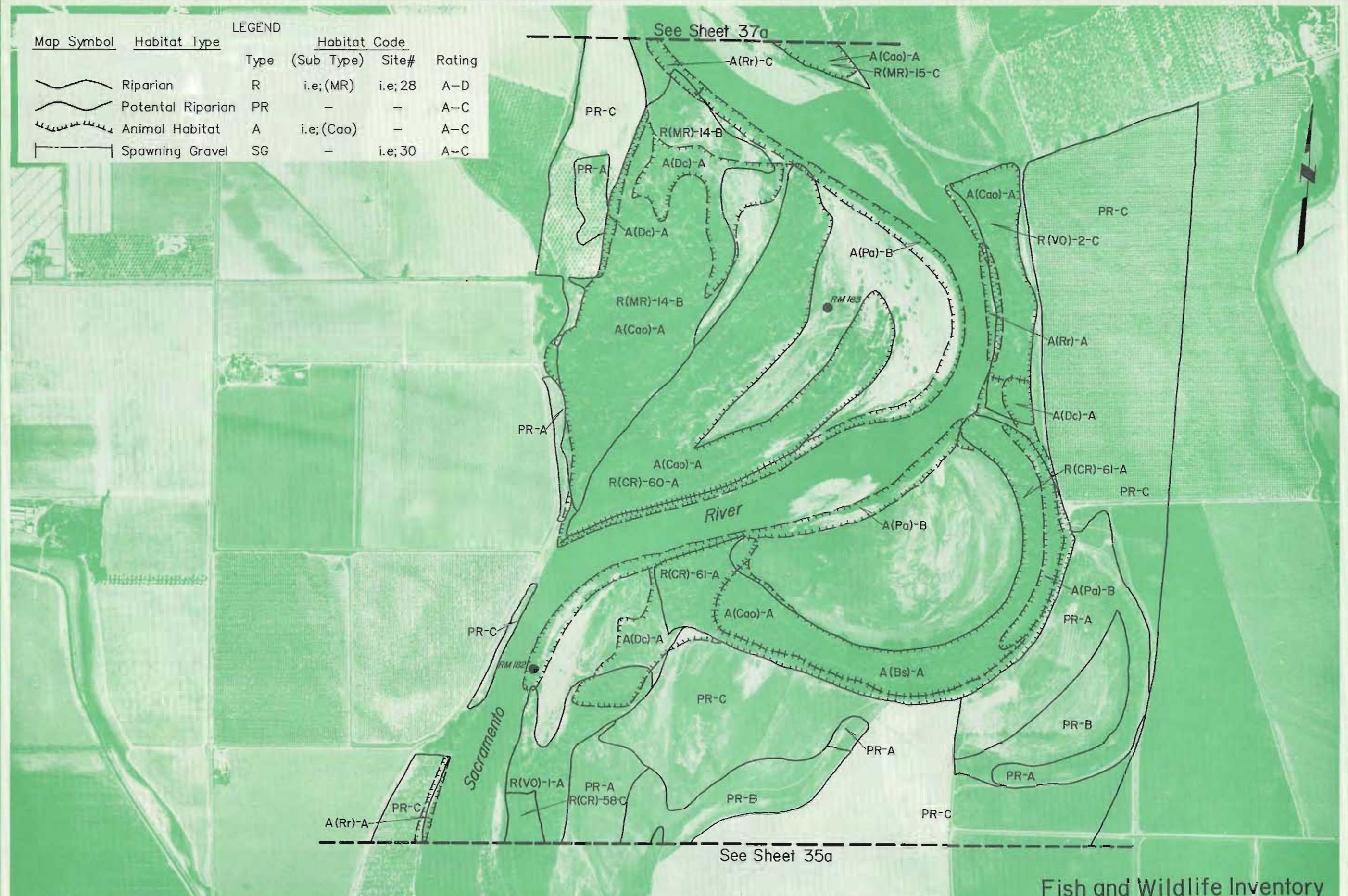




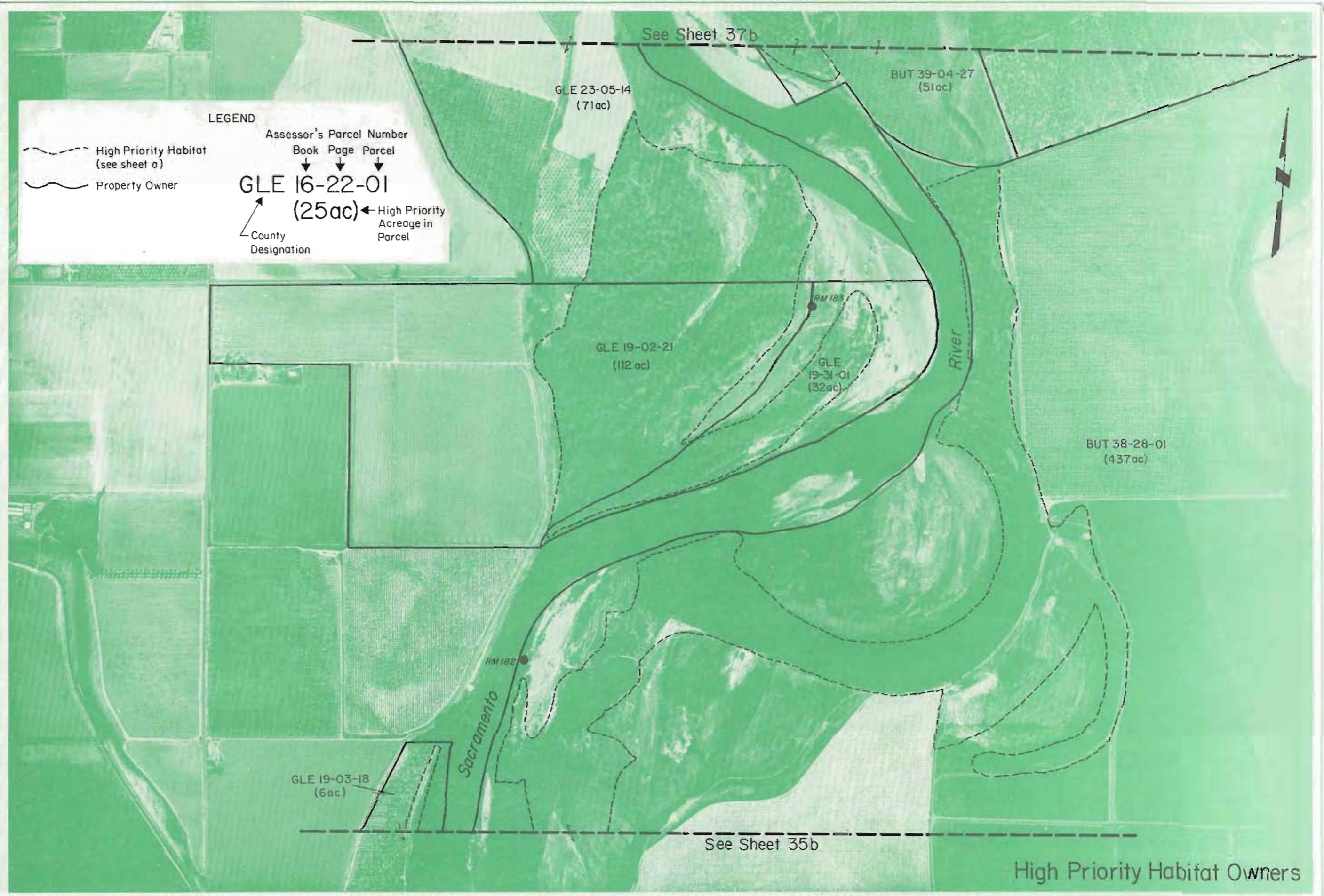


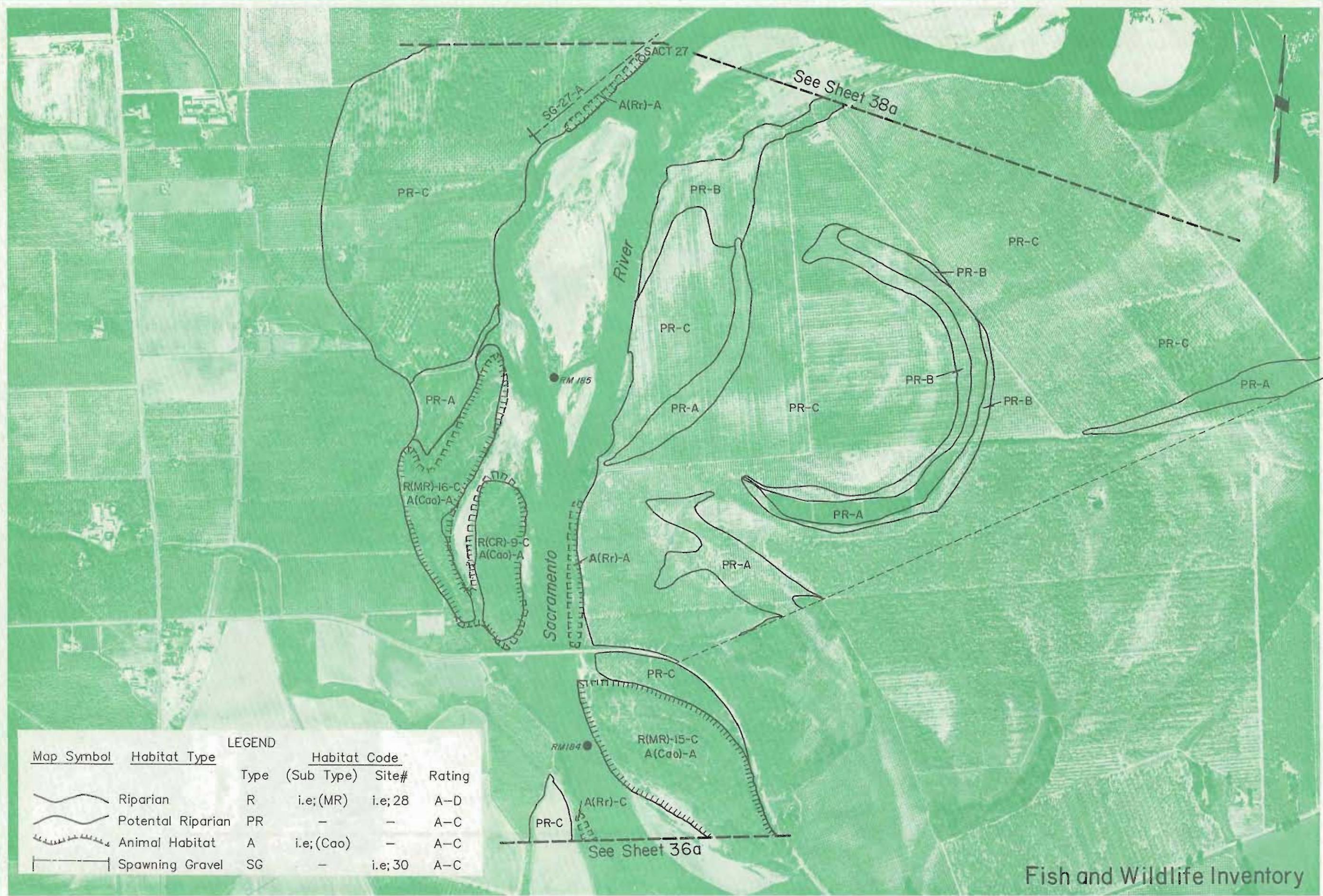


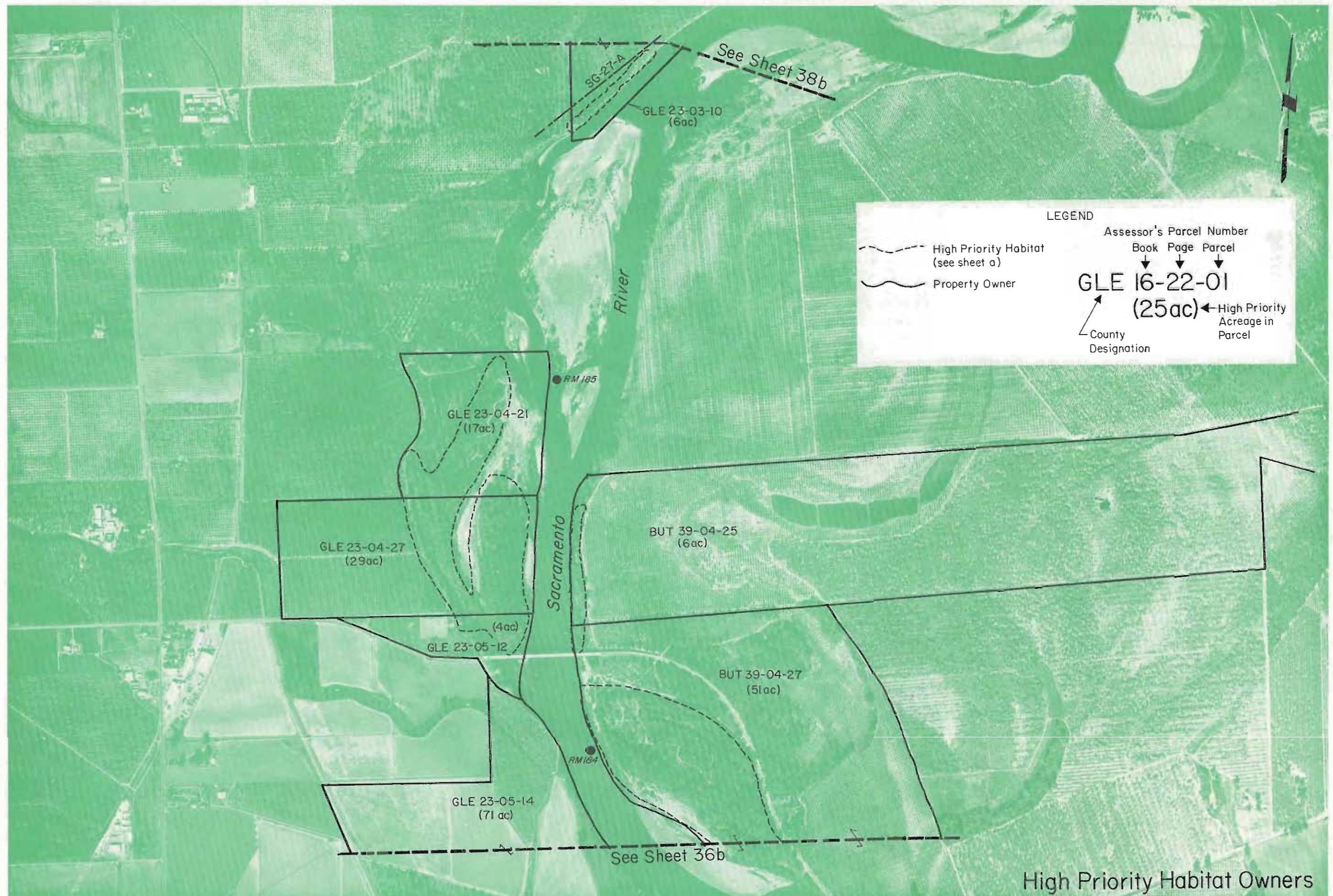
| Map Symbol | Habitat Type | LEGEND | | | |
|--------------------|--------------|--------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| Riparian | R | i.e. | (MR) | i.e; 28 | A-D |
| Potential Riparian | PR | - | - | - | A-C |
| Animal Habitat | A | i.e. | (Cao) | - | A-C |
| Spawning Gravel | SG | - | - | i.e; 30 | A-C |

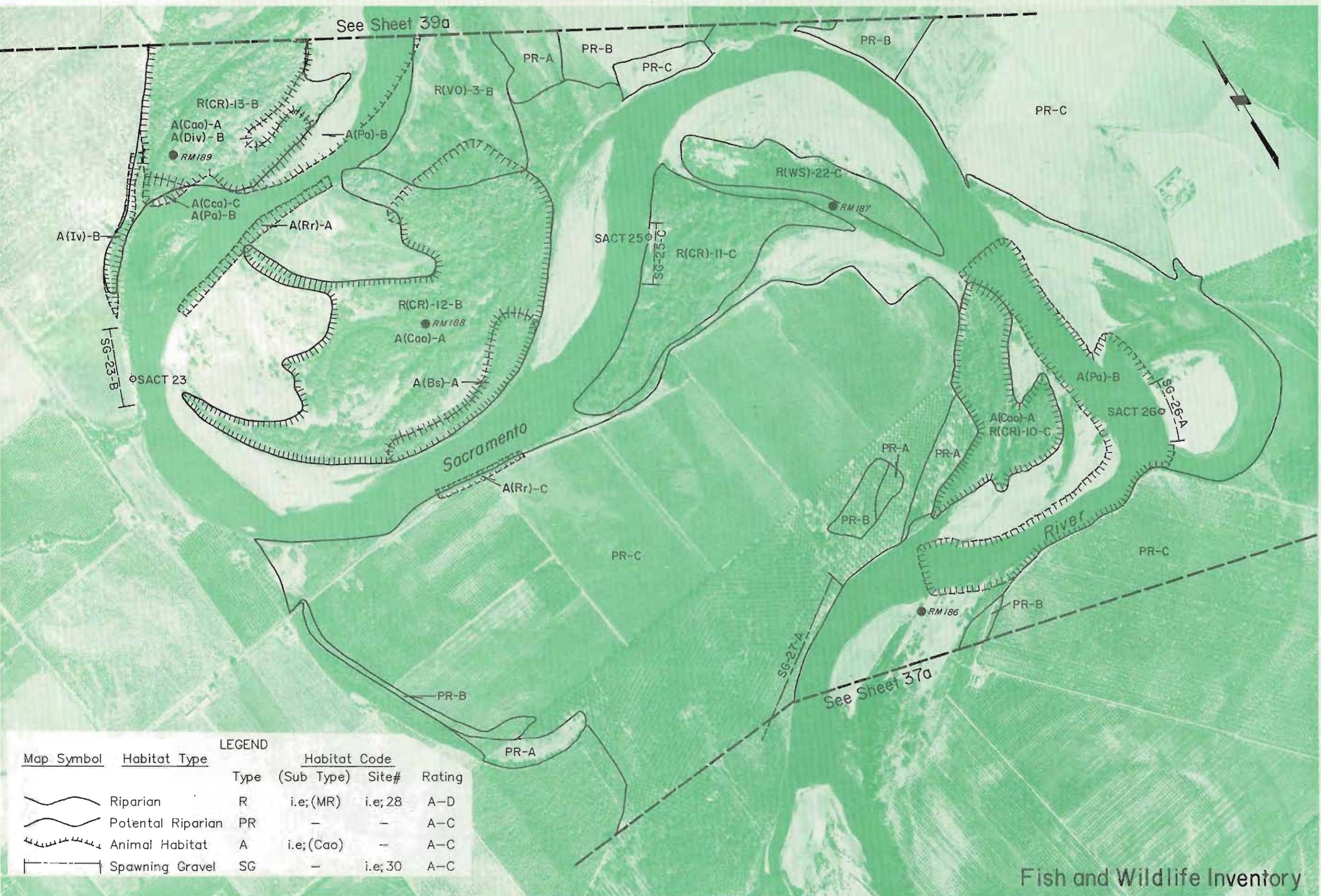


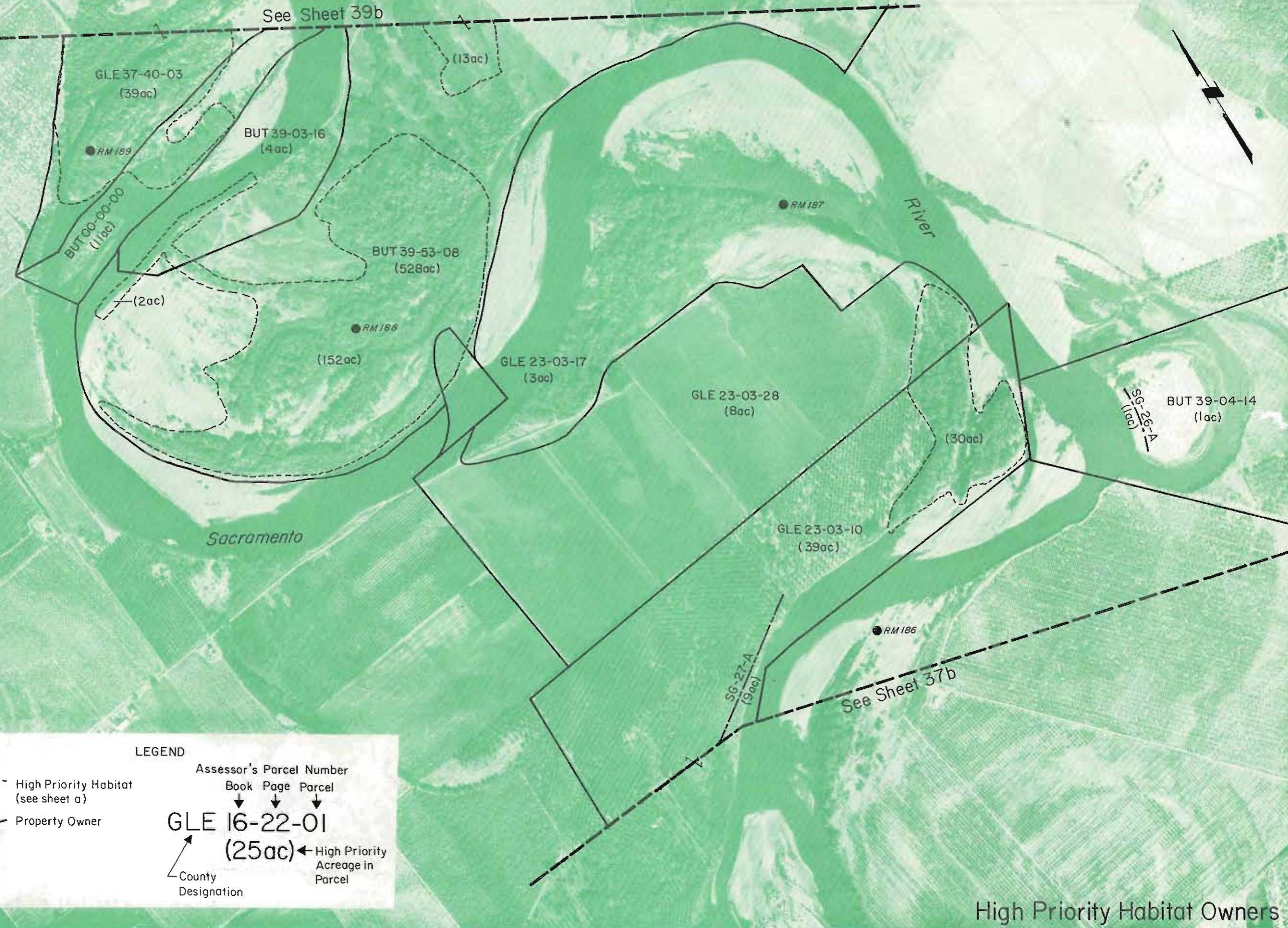
Fish and Wildlife Inventory

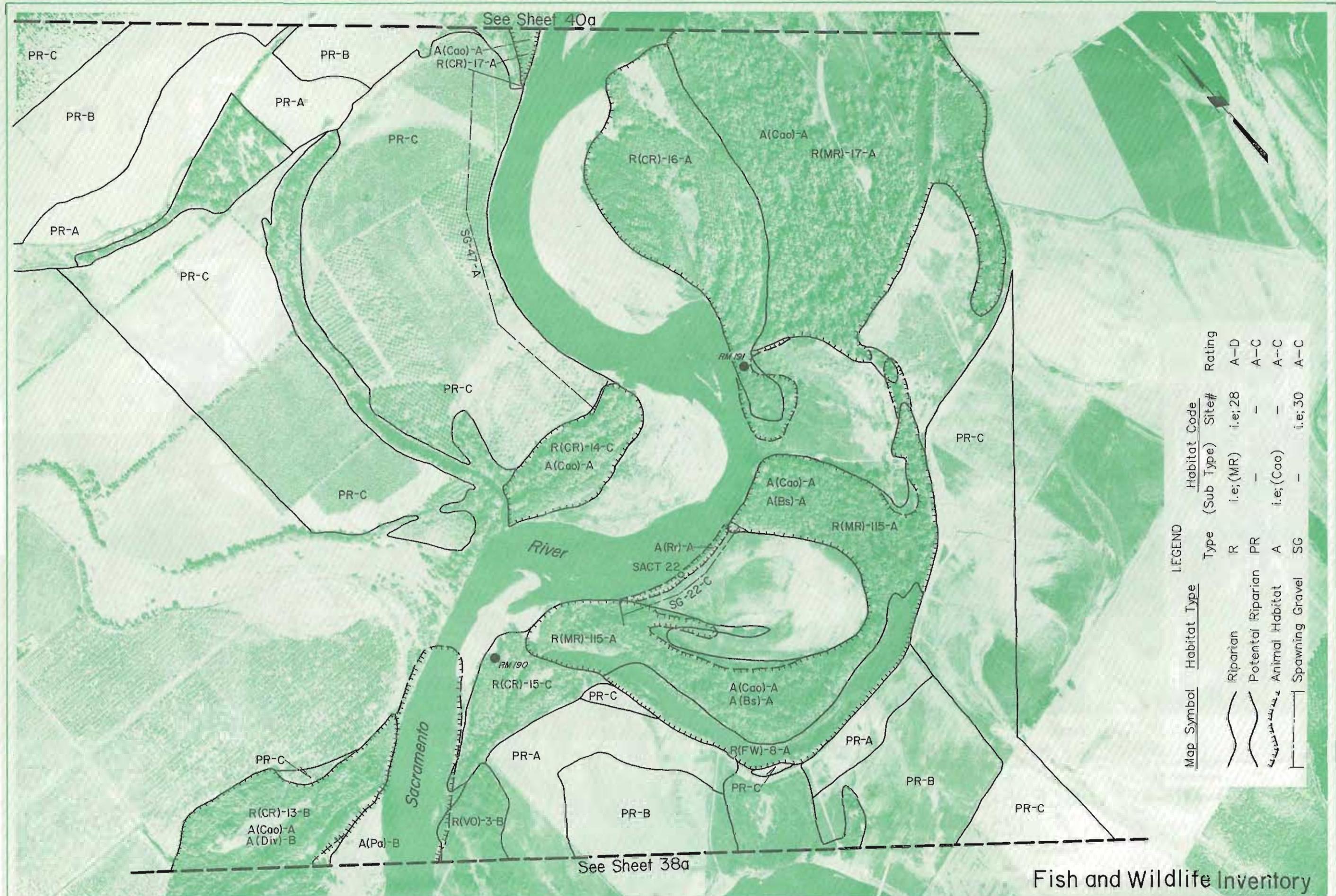




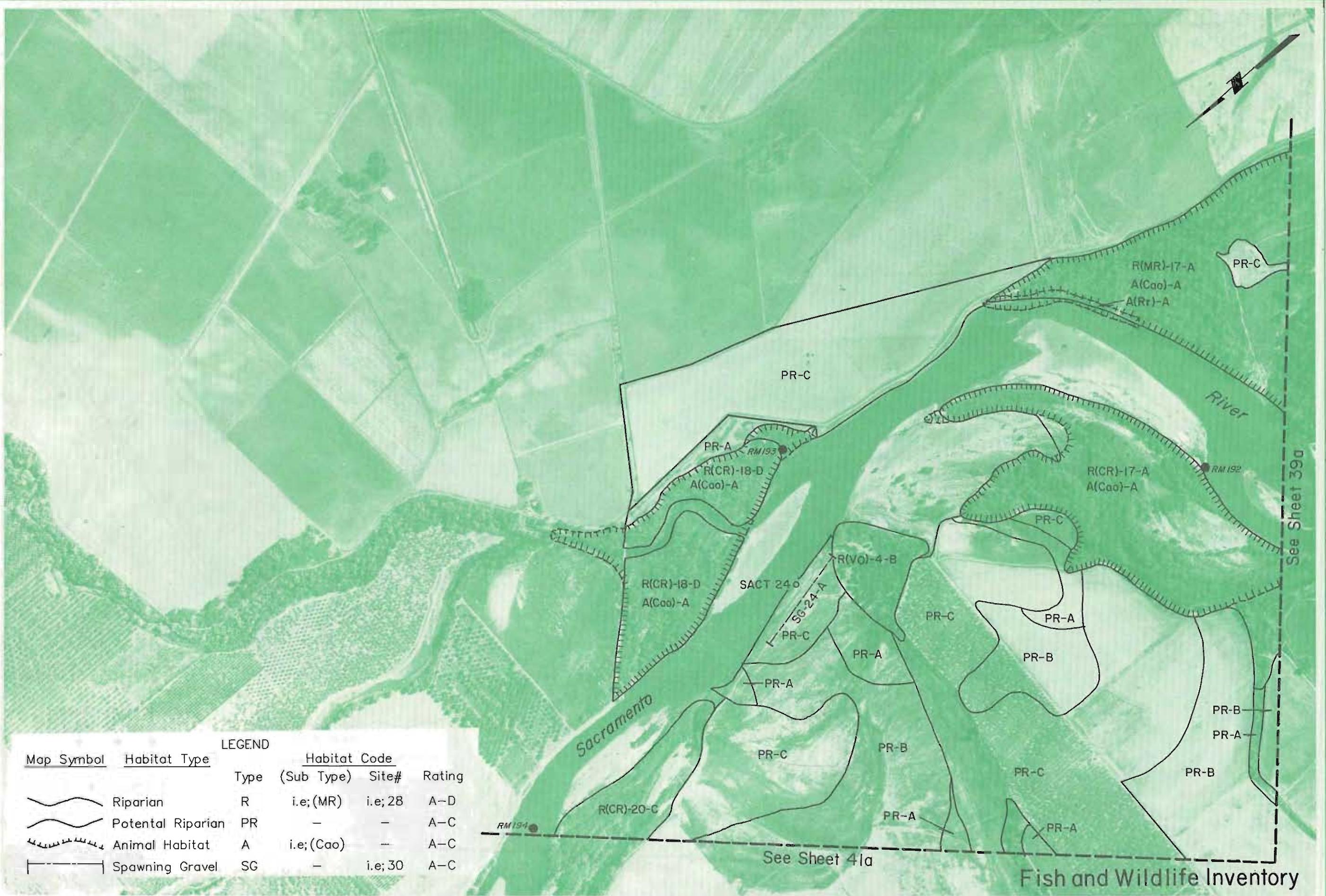


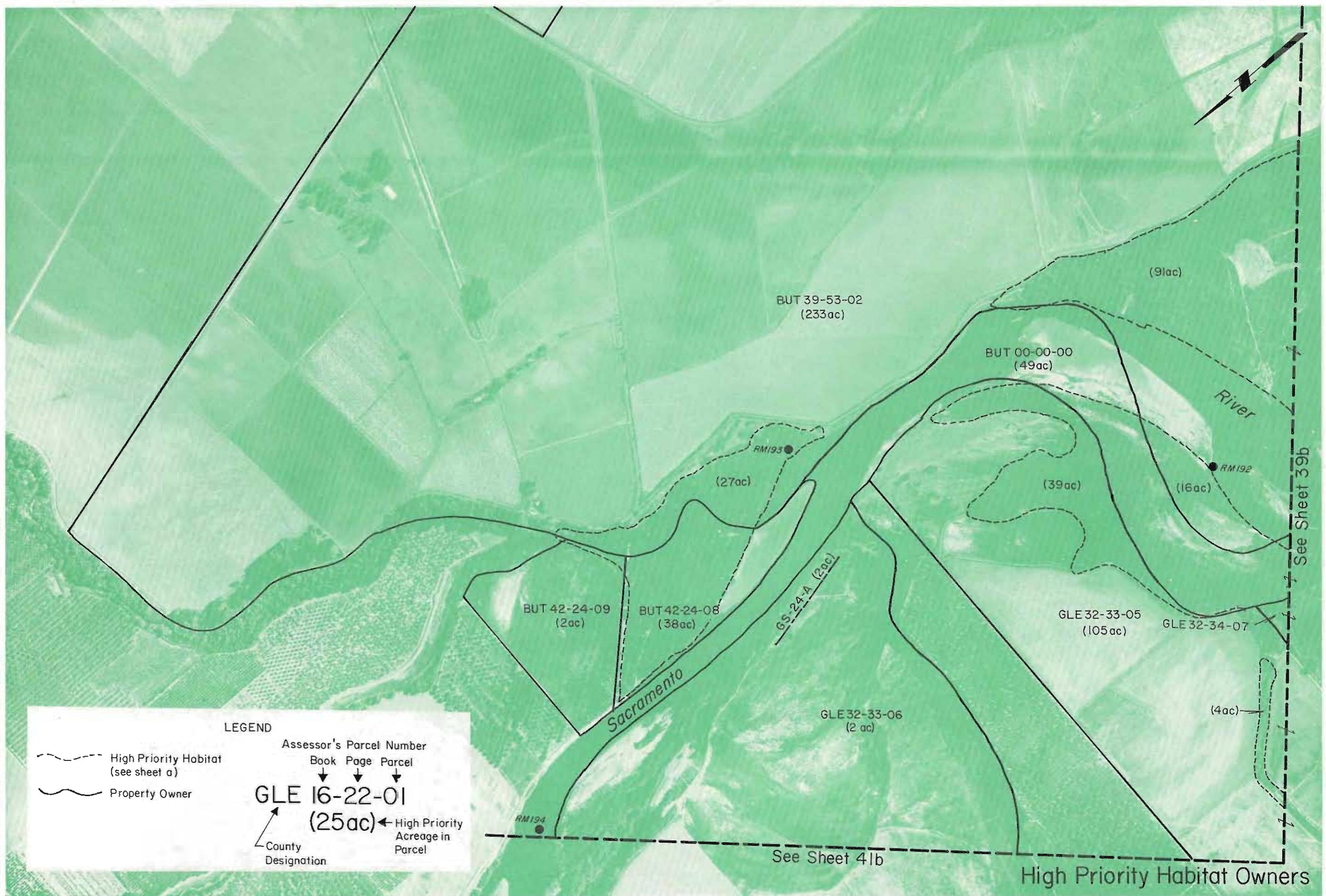




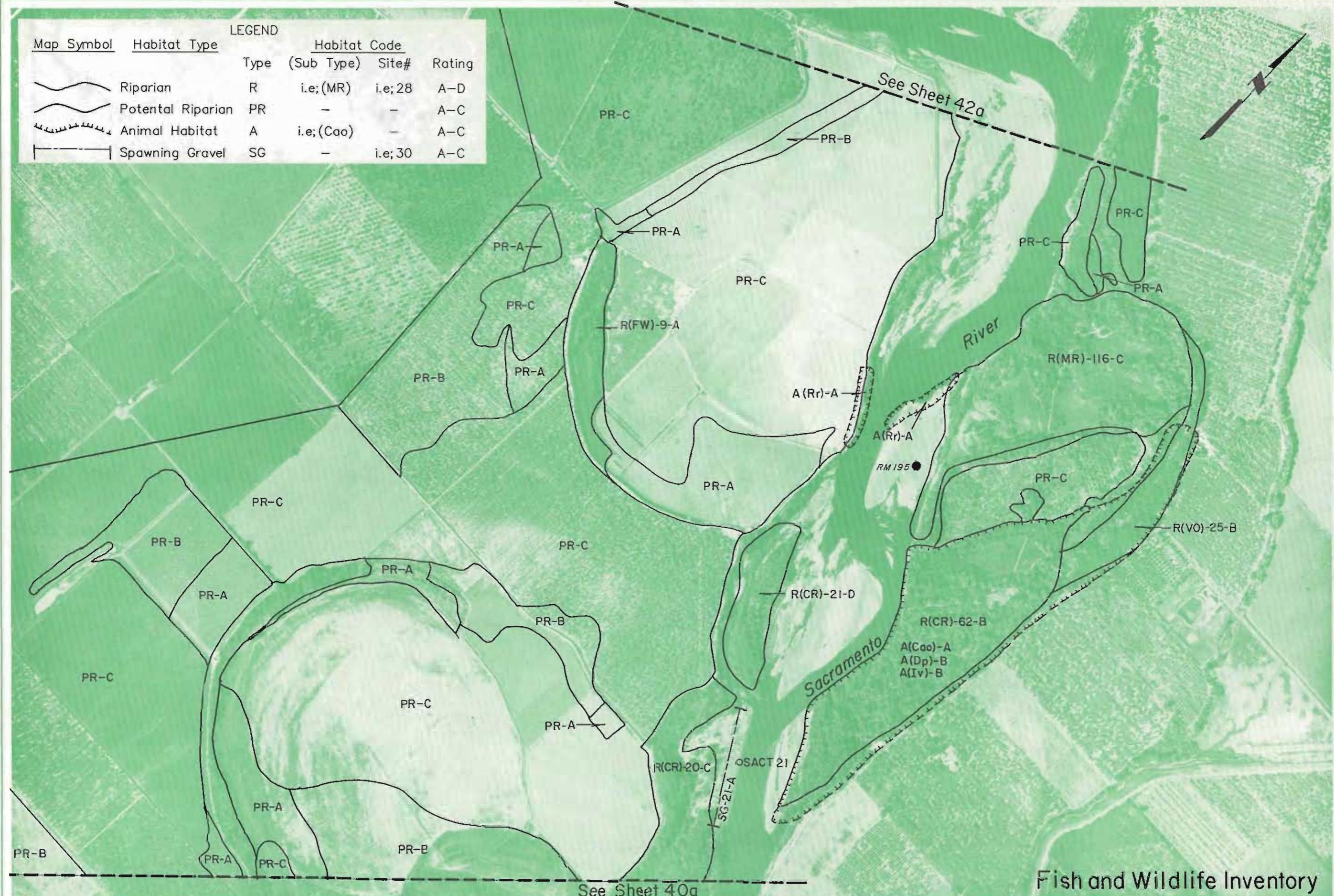




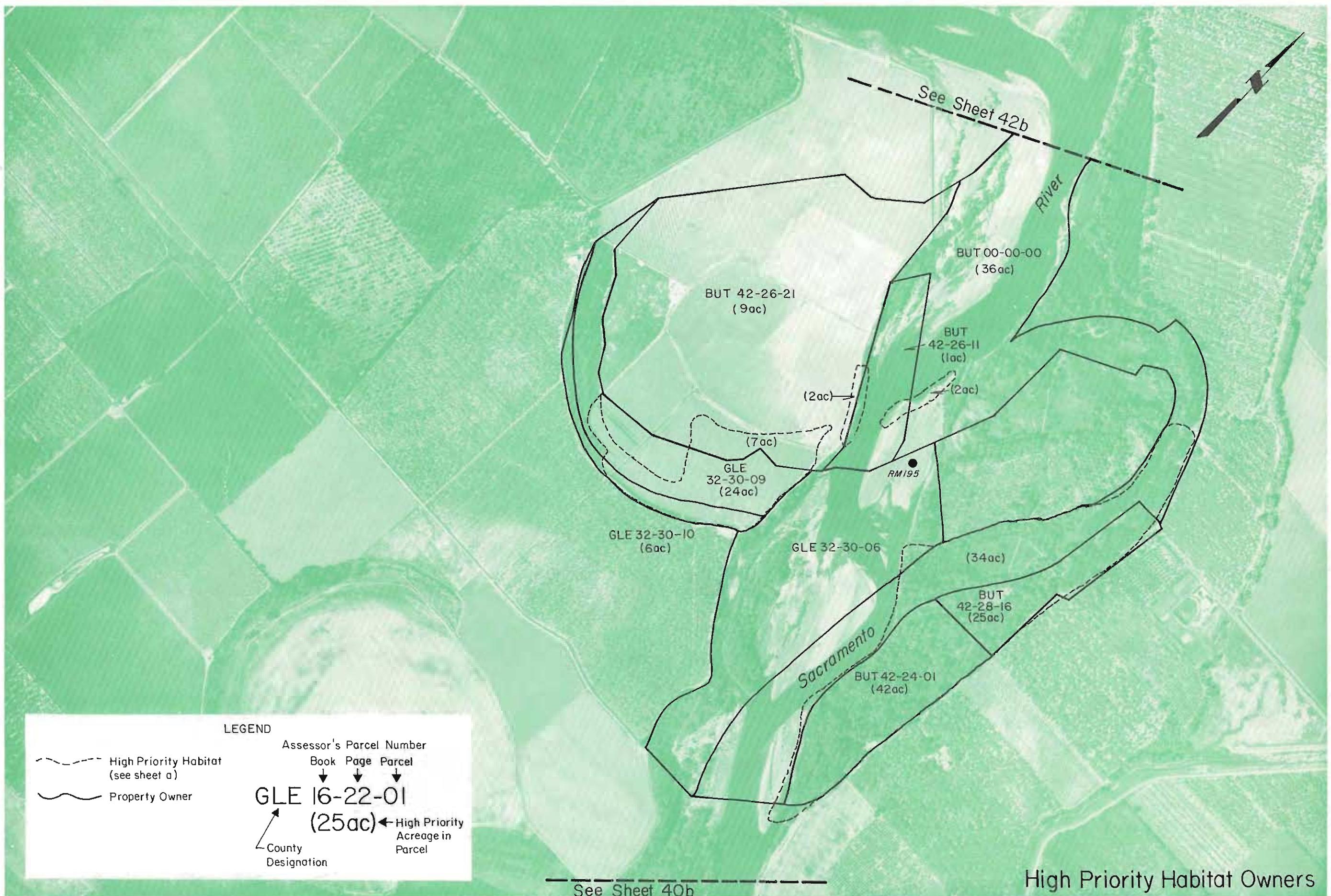


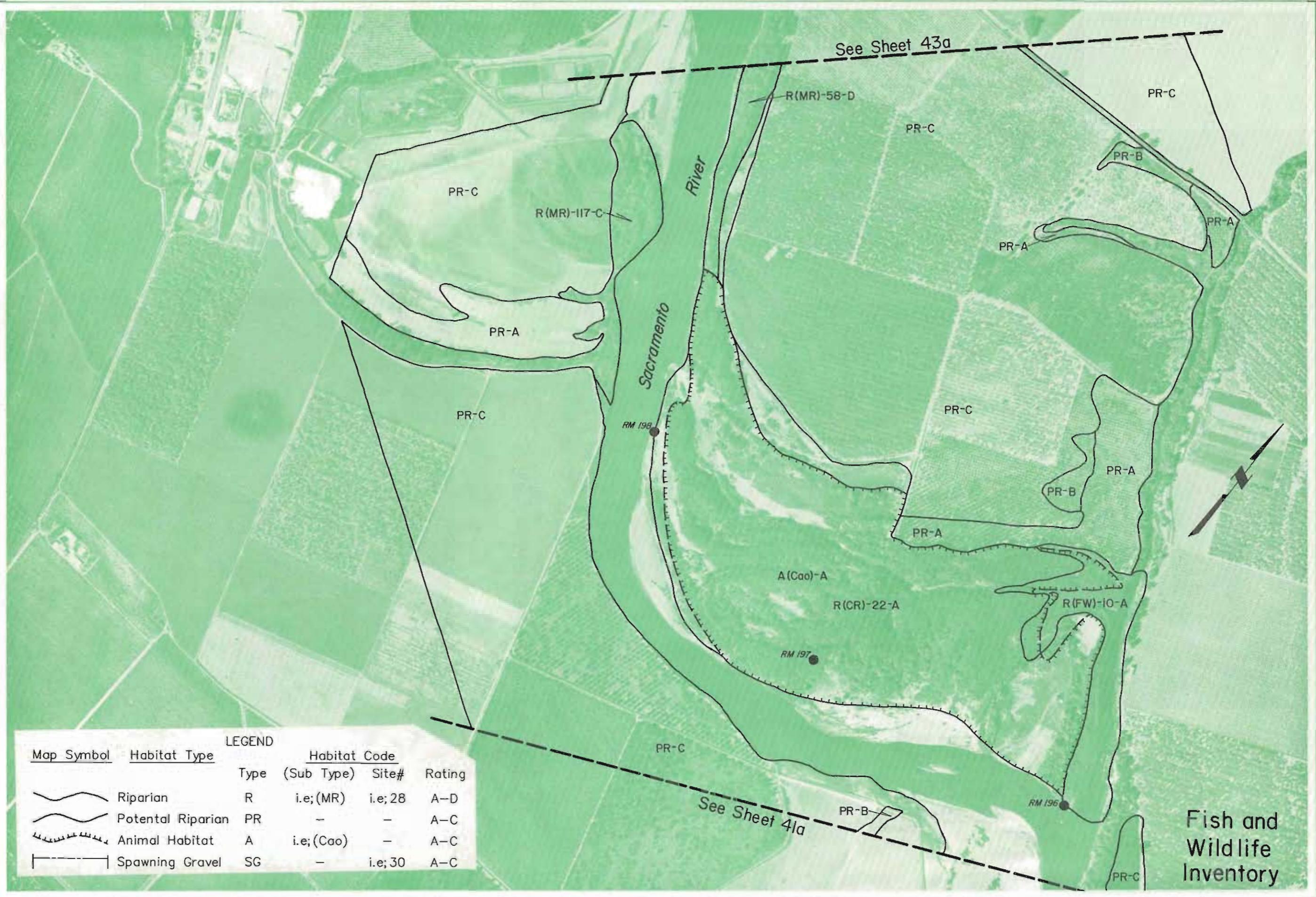


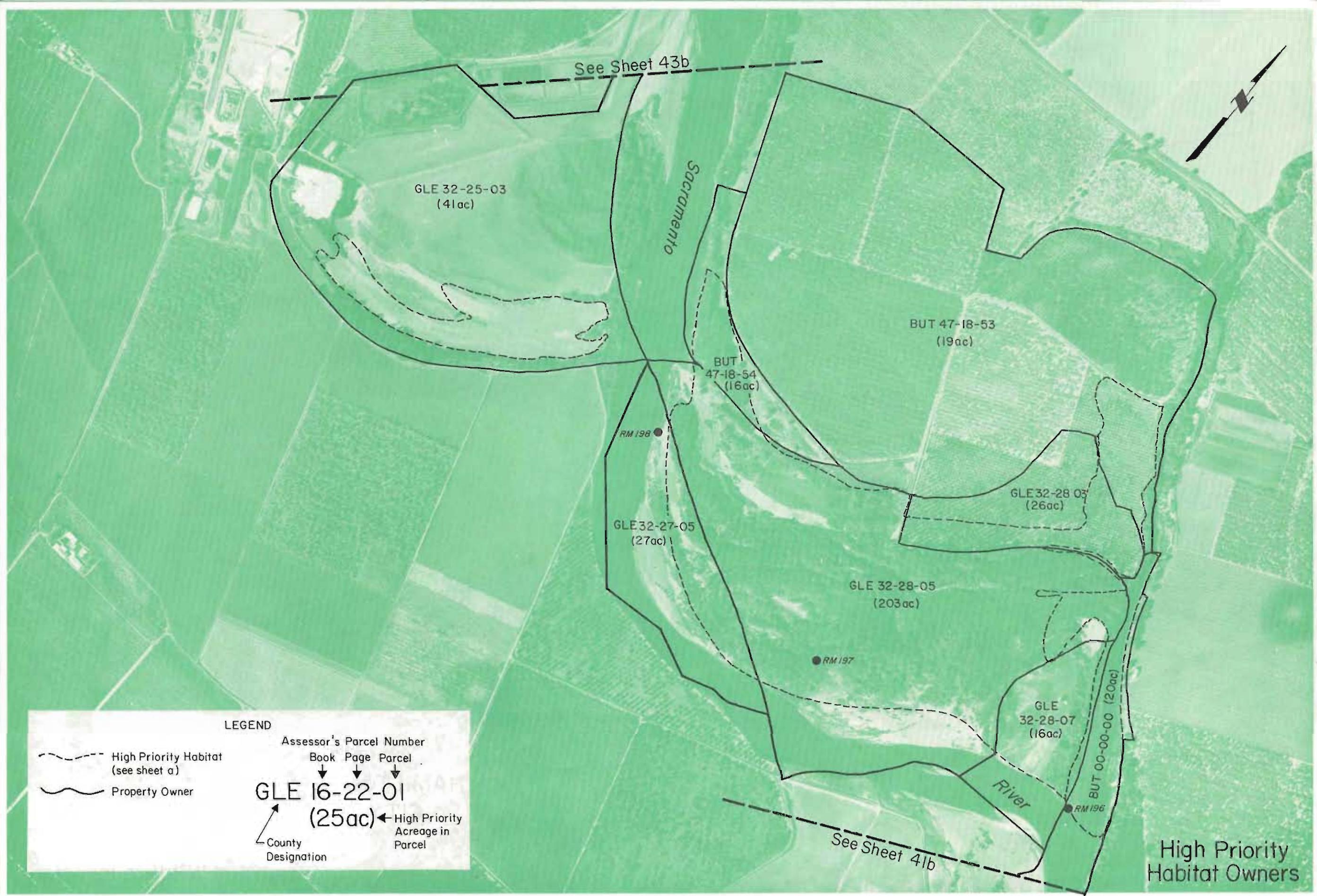
| Map Symbol | Habitat Type | LEGEND | | | |
|--------------------|--------------|------------|------------|-------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| Riparian | R | i.e; (MR) | i.e; | 28 | A-D |
| Potential Riparian | PR | - | - | - | A-C |
| Animal Habitat | A | i.e; (Cao) | - | - | A-C |
| Spawning Gravel | SG | - | i.e; | 30 | A-C |

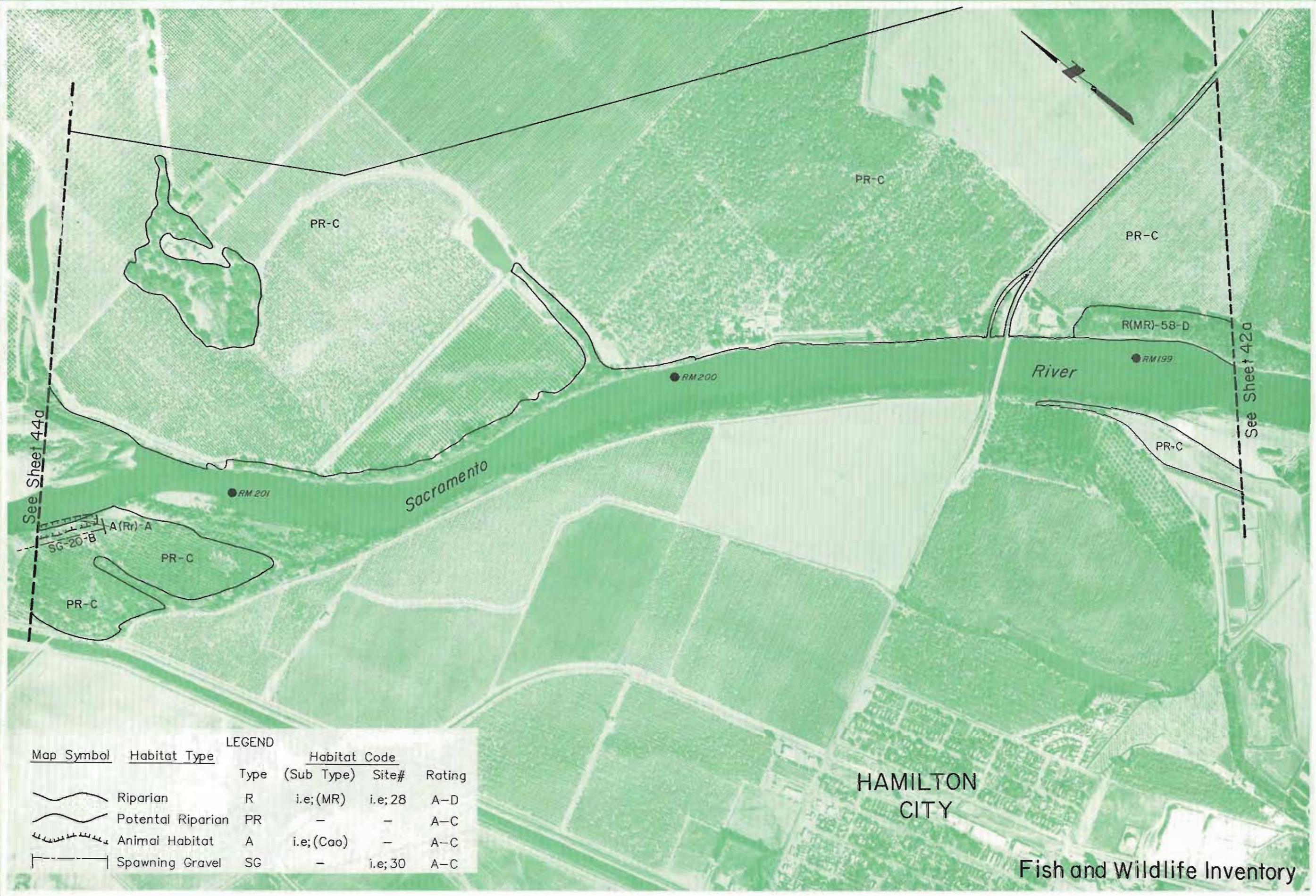


Fish and Wildlife Inventory





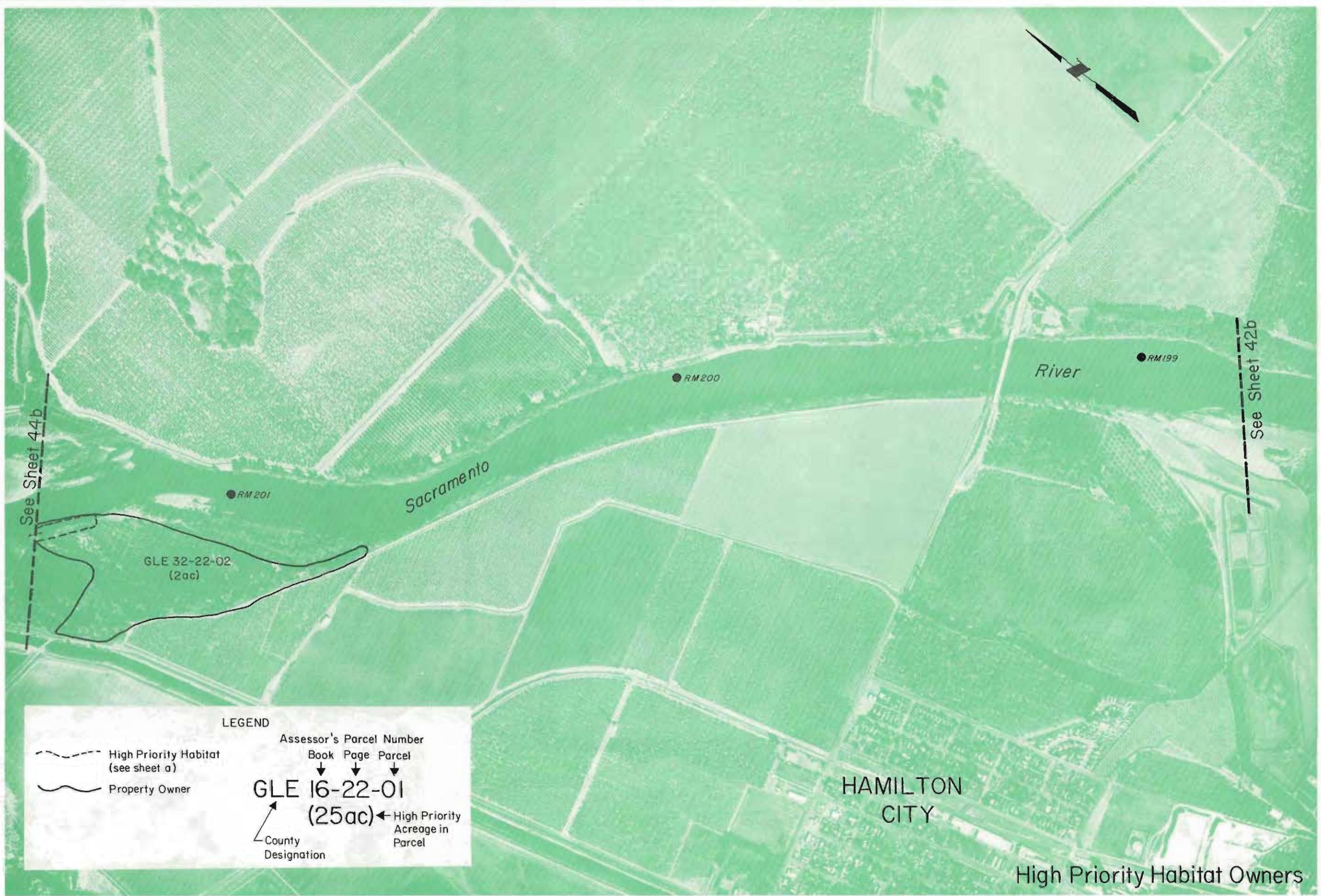


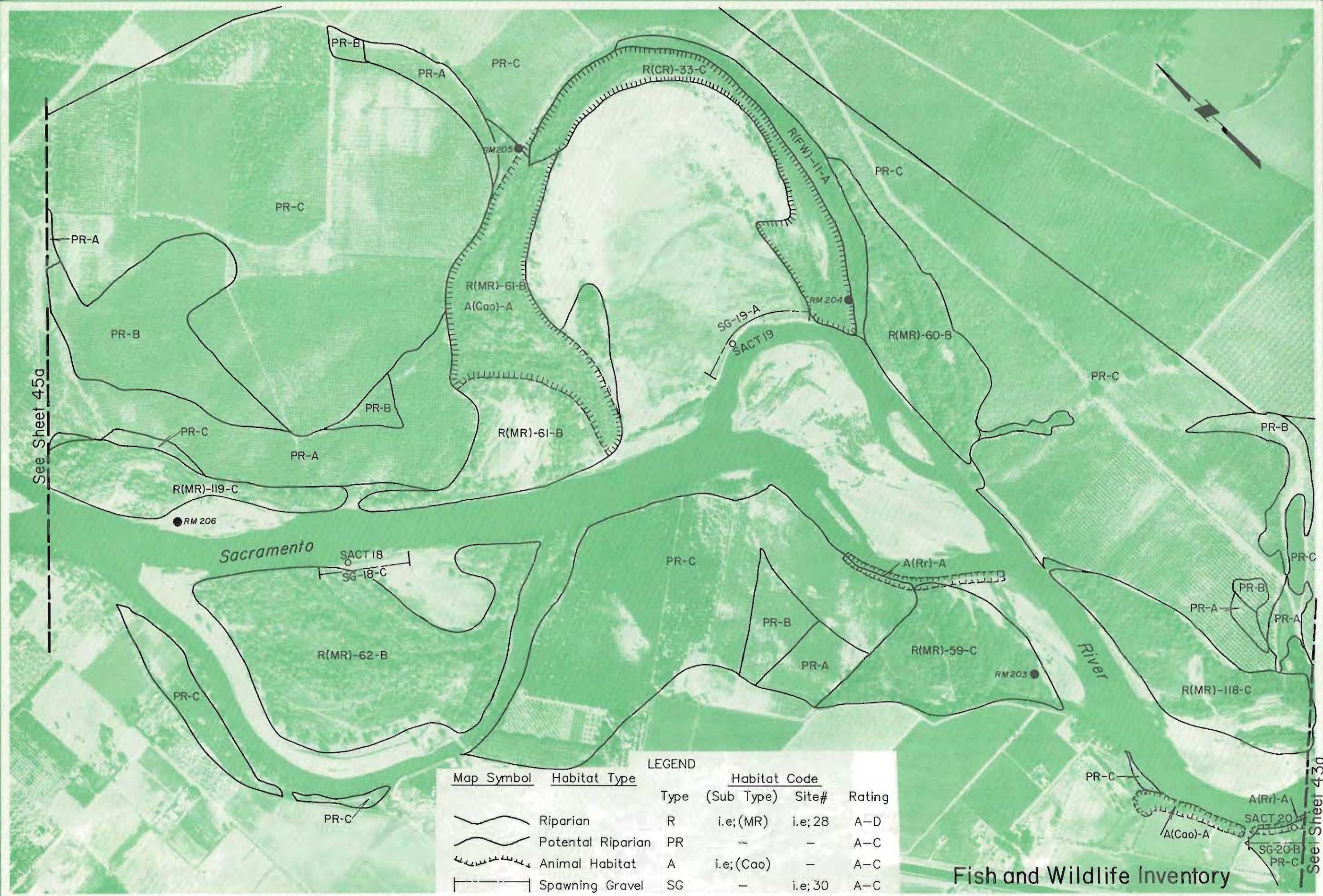


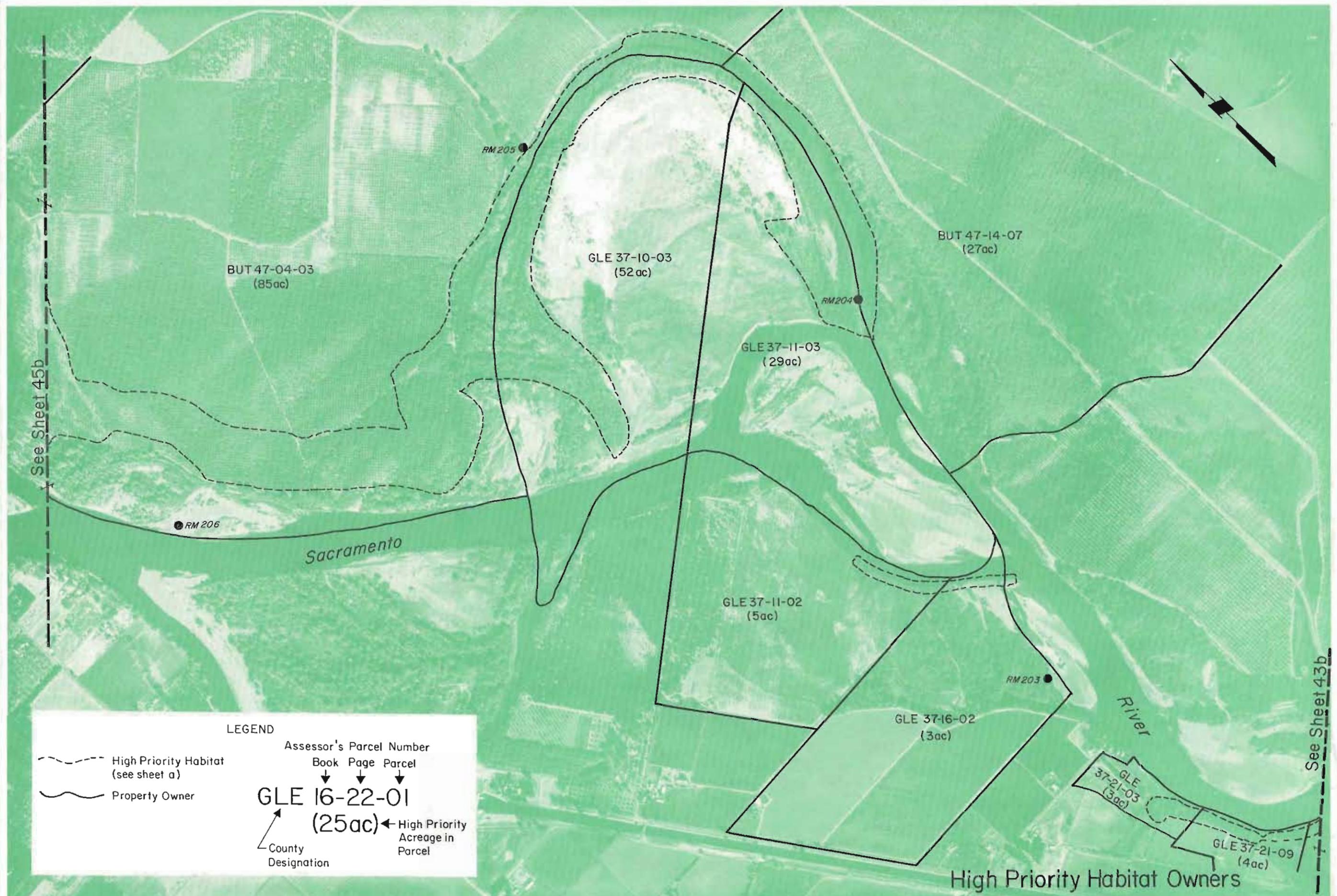
| Map Symbol | Habitat Type | LEGEND | | | |
|------------|--------------------|--------|------------|--------------|--------|
| | | Type | (Sub Type) | Habitat Code | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

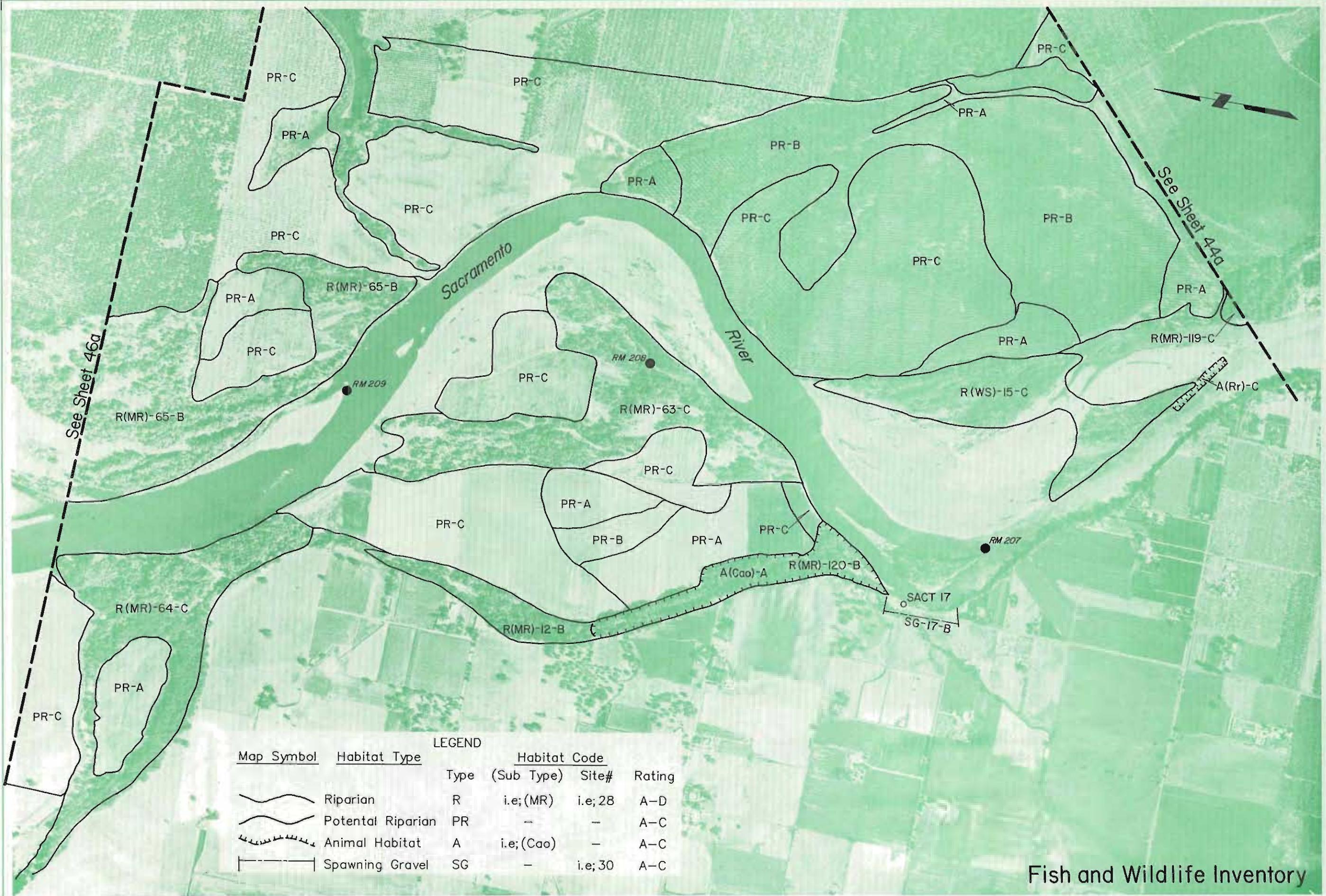
HAMILTON CITY

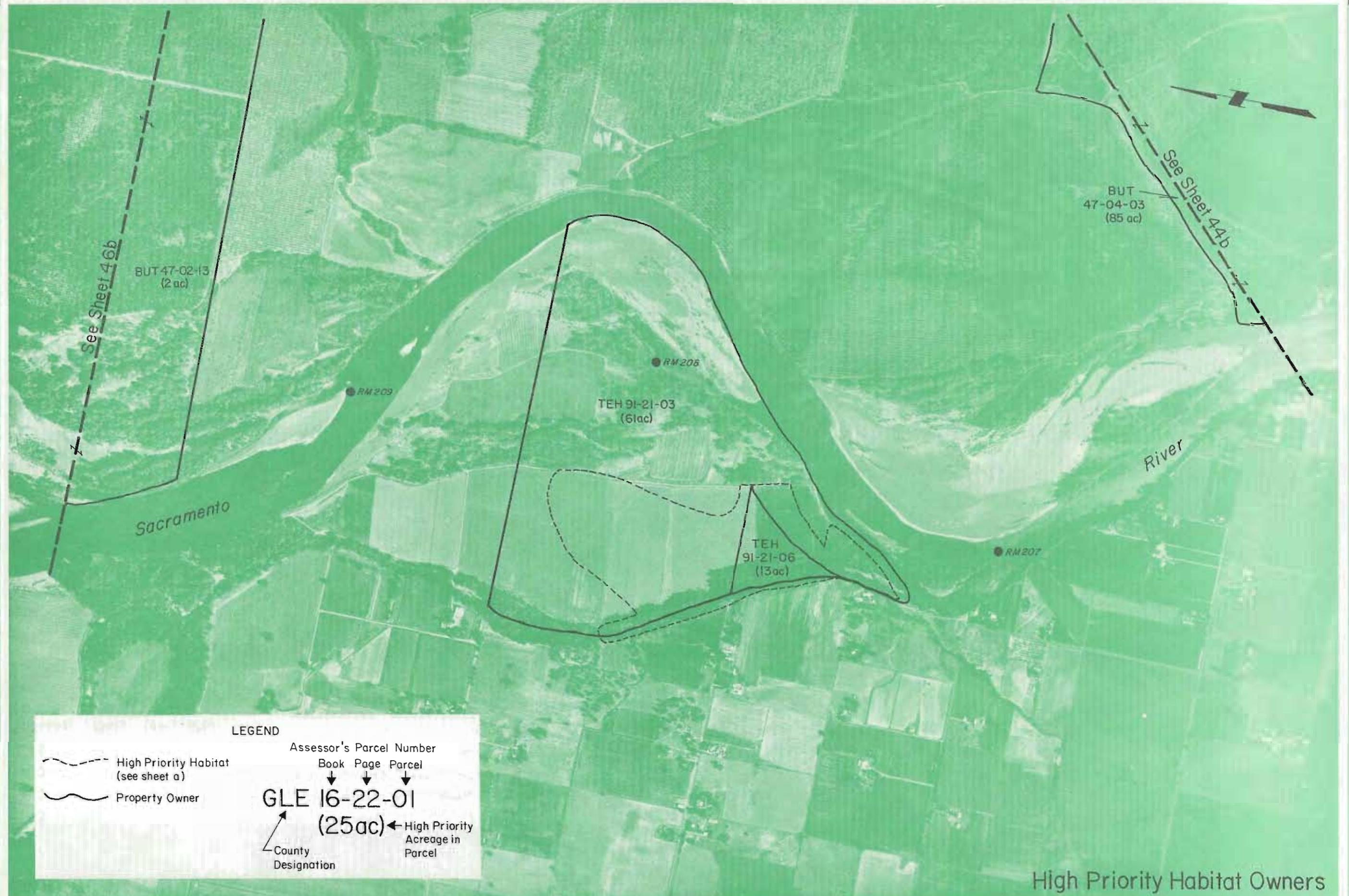
Fish and Wildlife Inventory

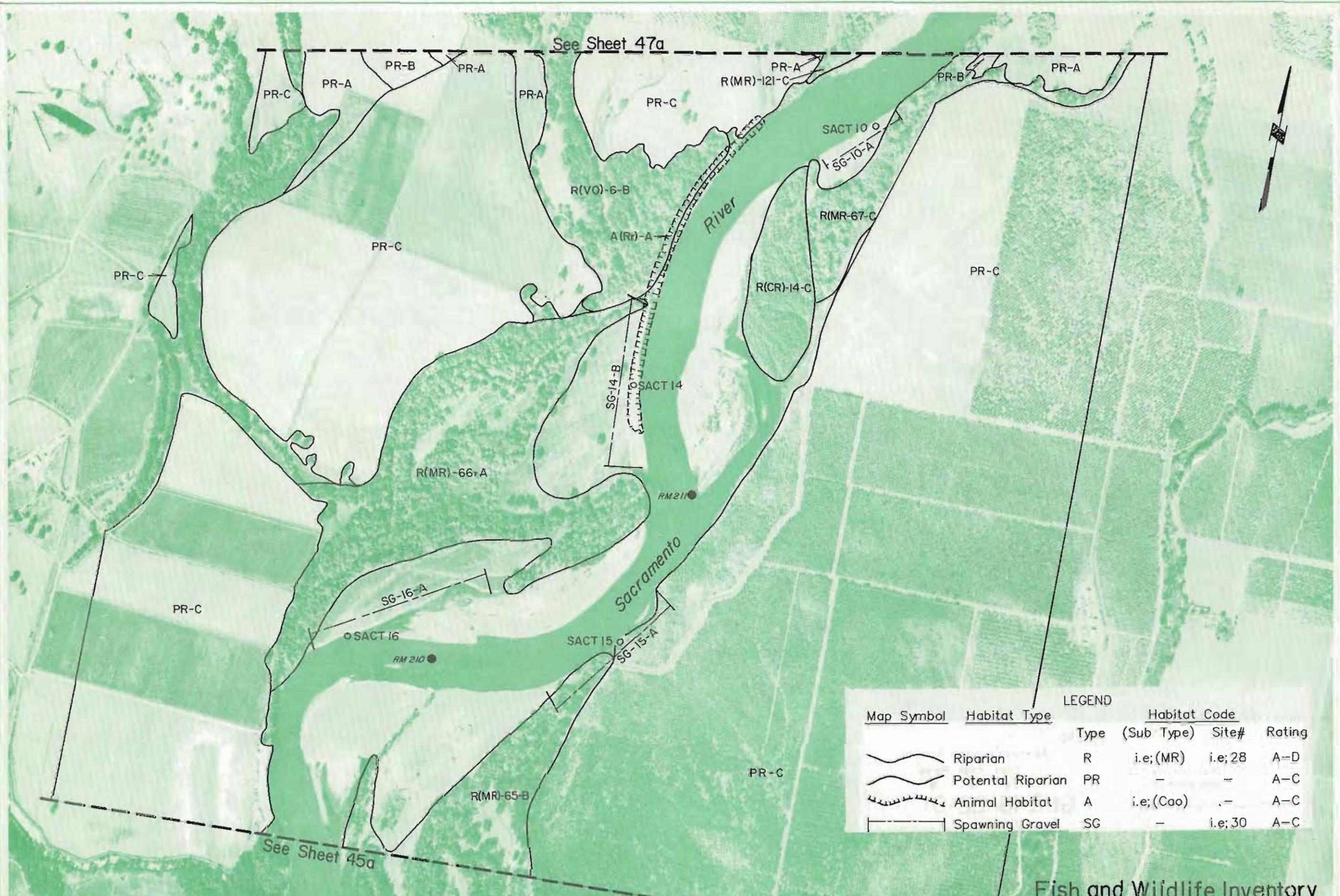


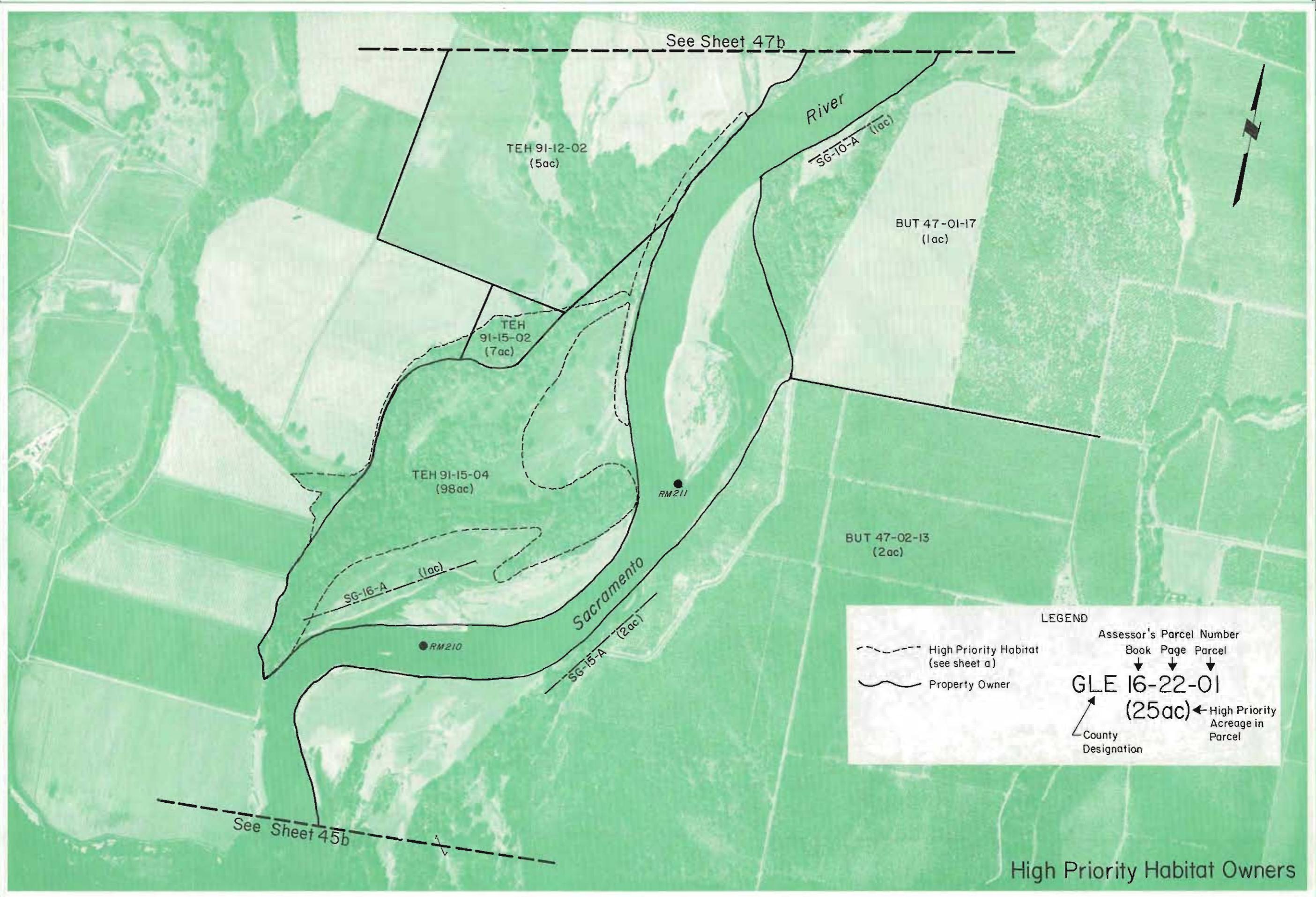


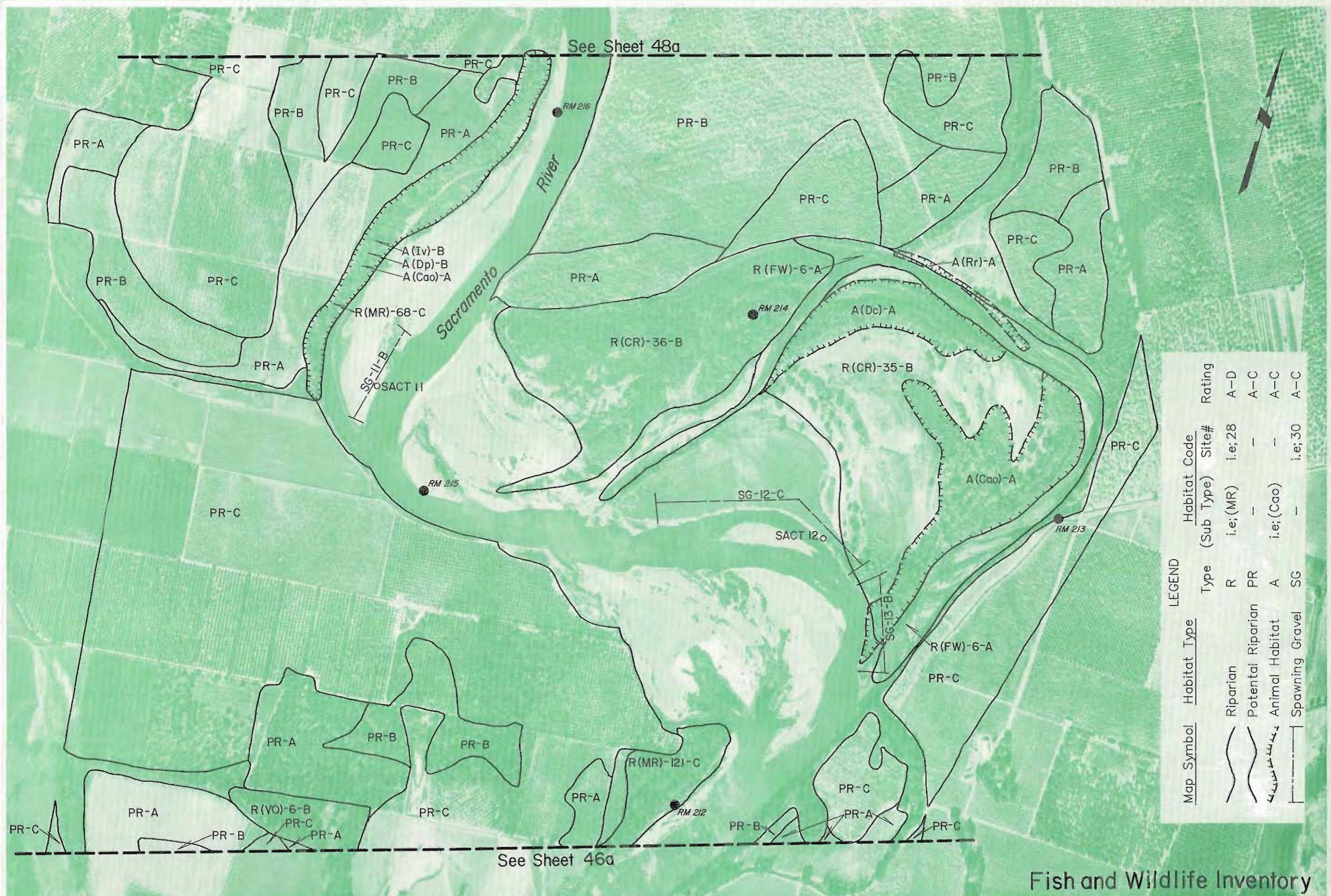




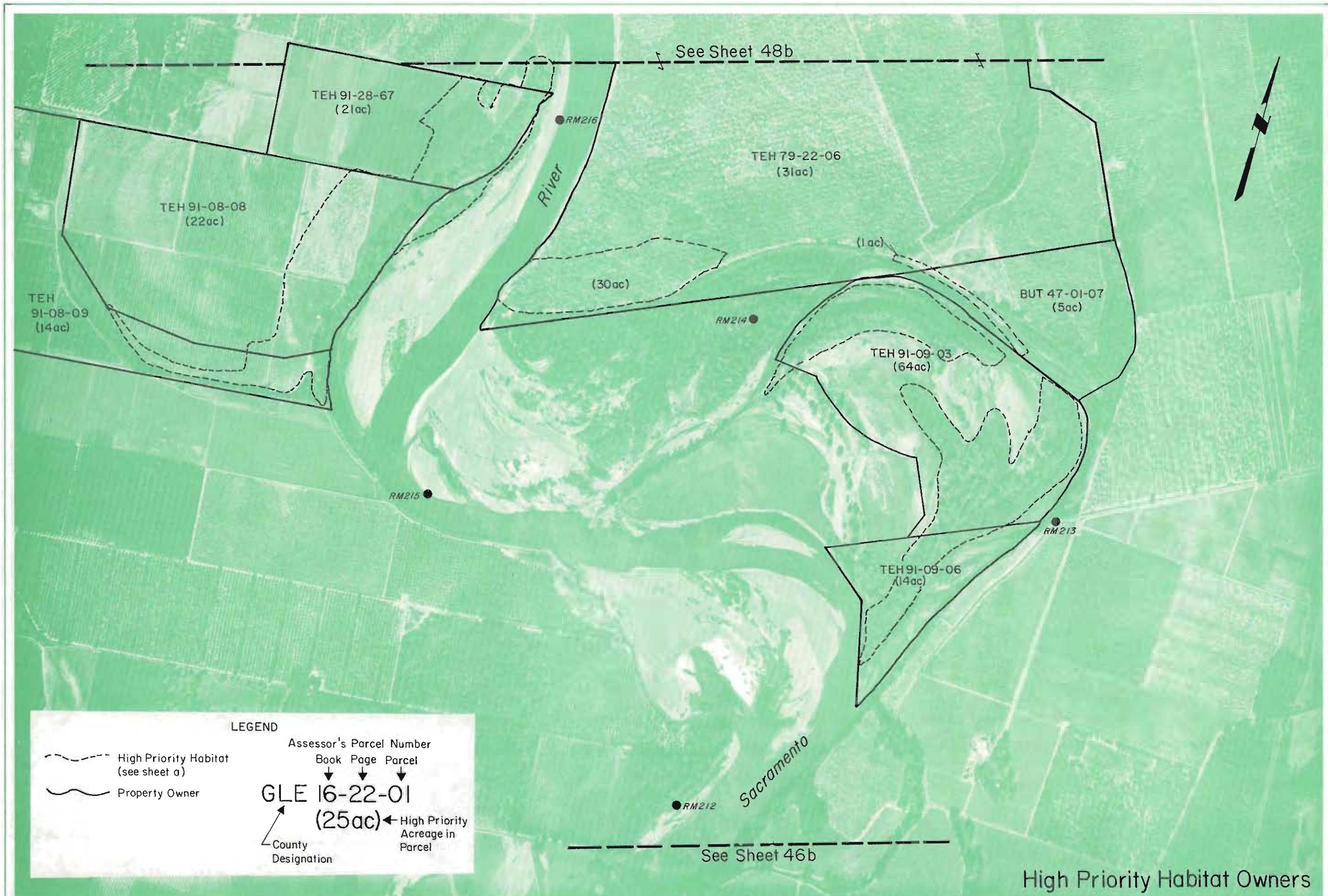


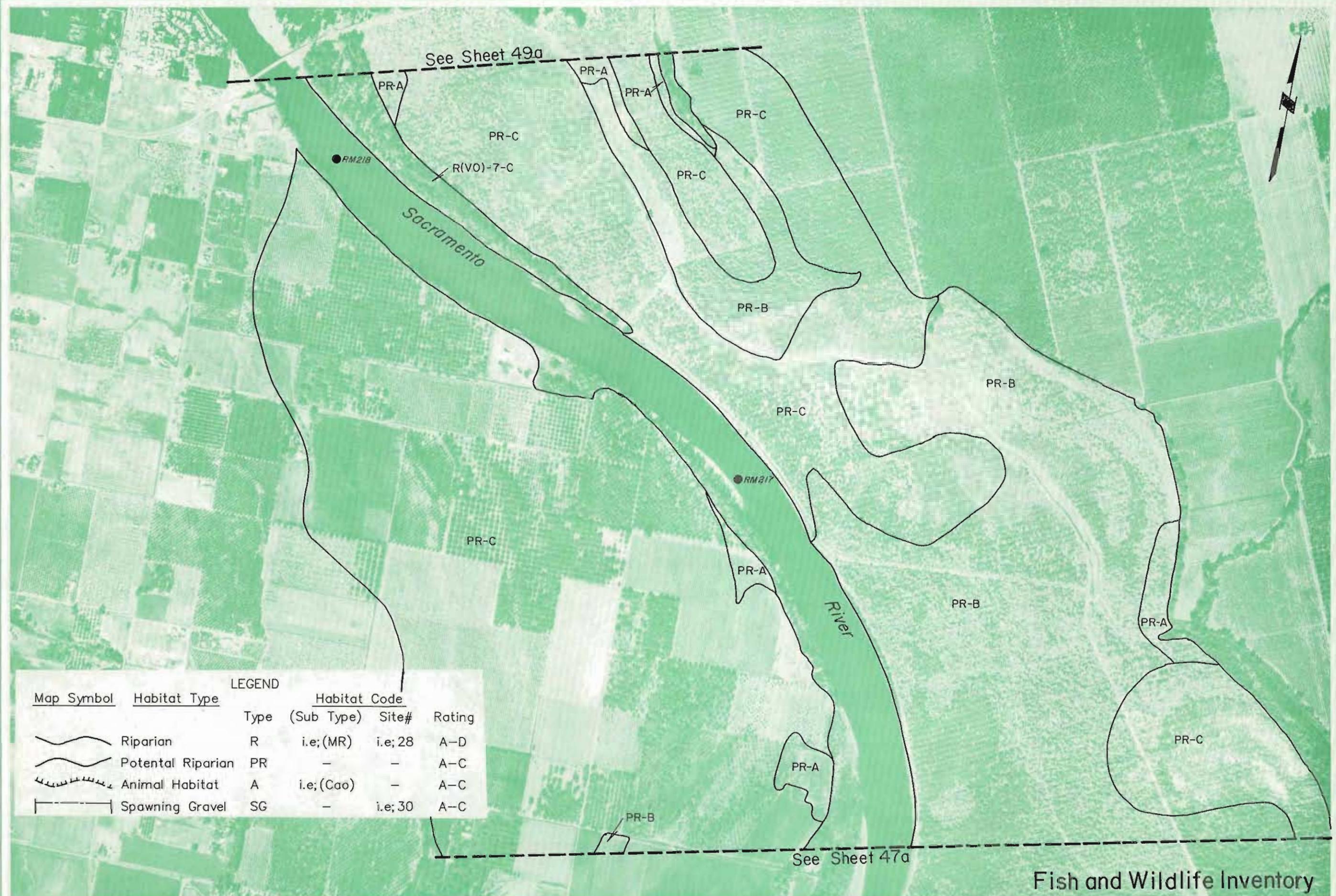


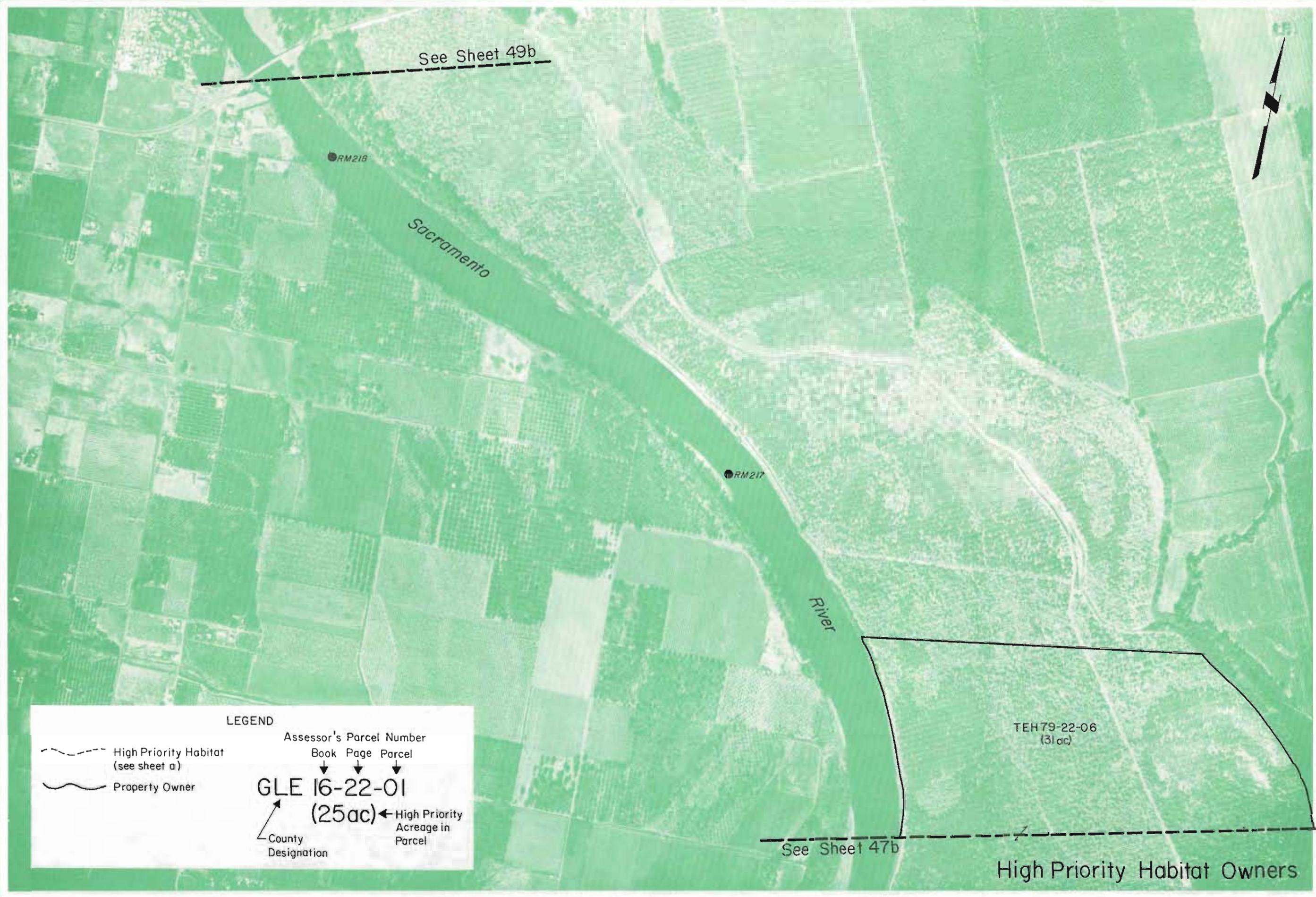


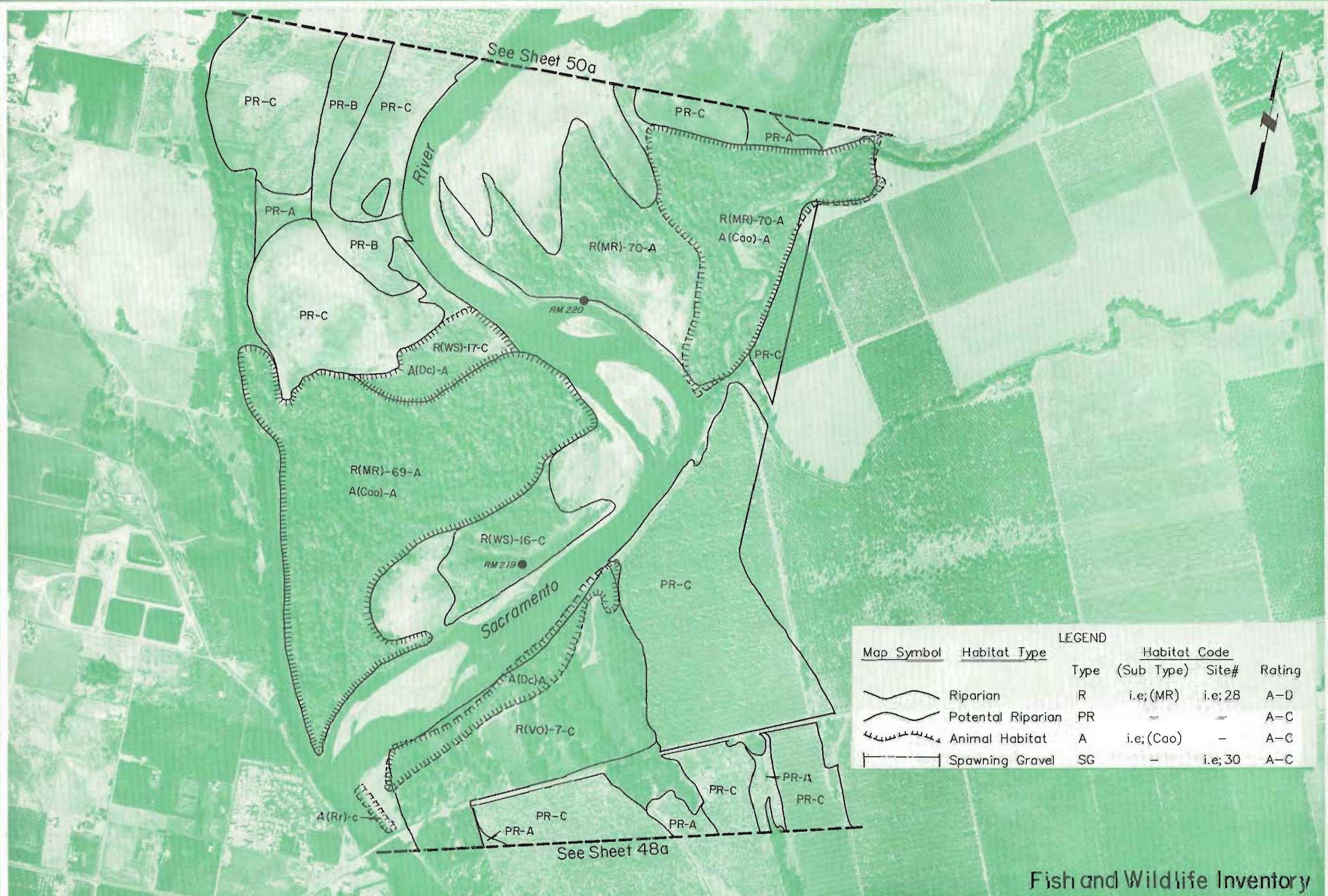


Fish and Wildlife Inventory









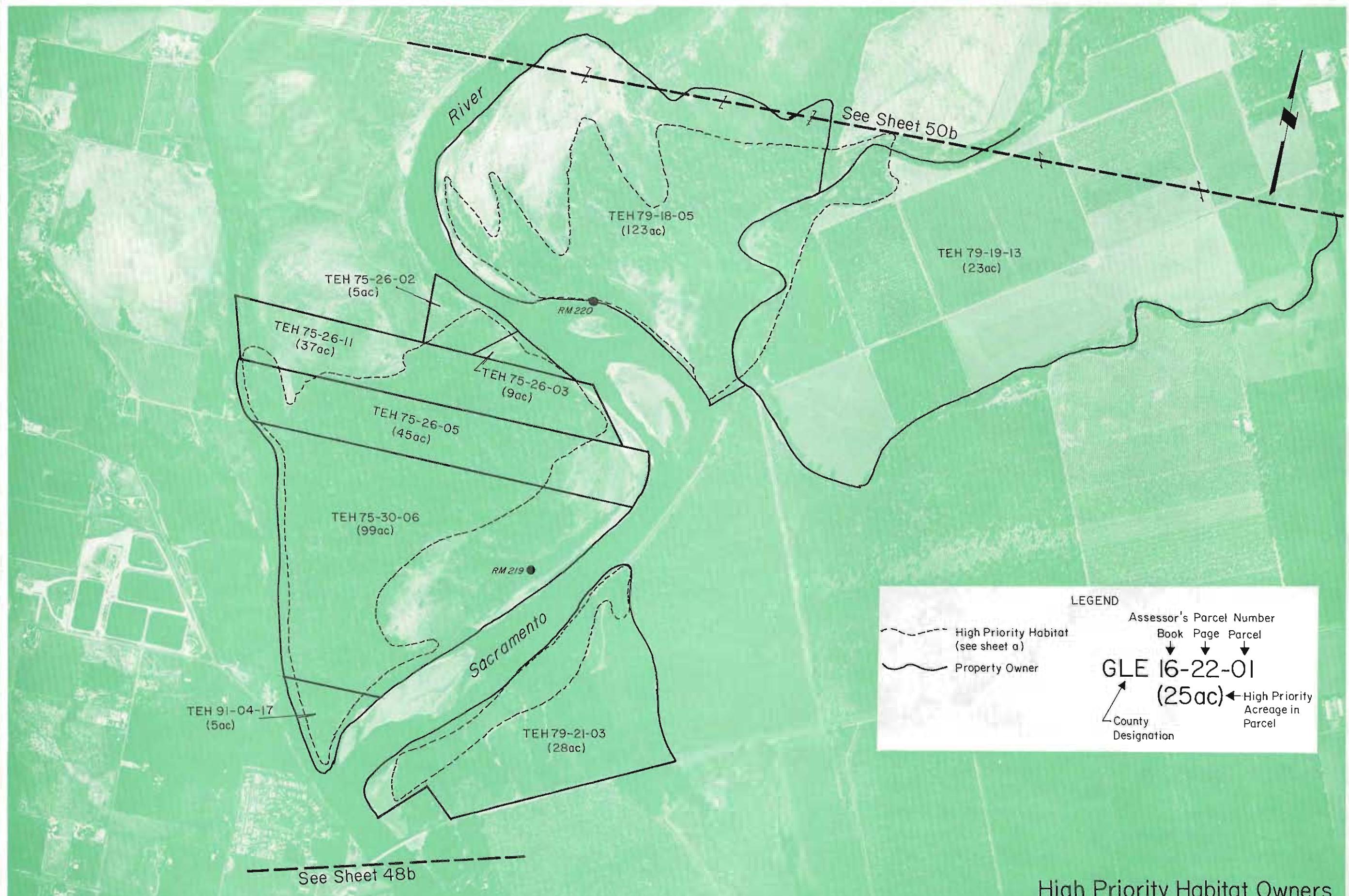
Fish and Wildlife Inventory

APPROXIMATE SCALE: 1"=1000' PHOTOGRAFED: 6-70-1987
ENLARGED FROM EXPOSURE: SYMCOF WR: AGR-12

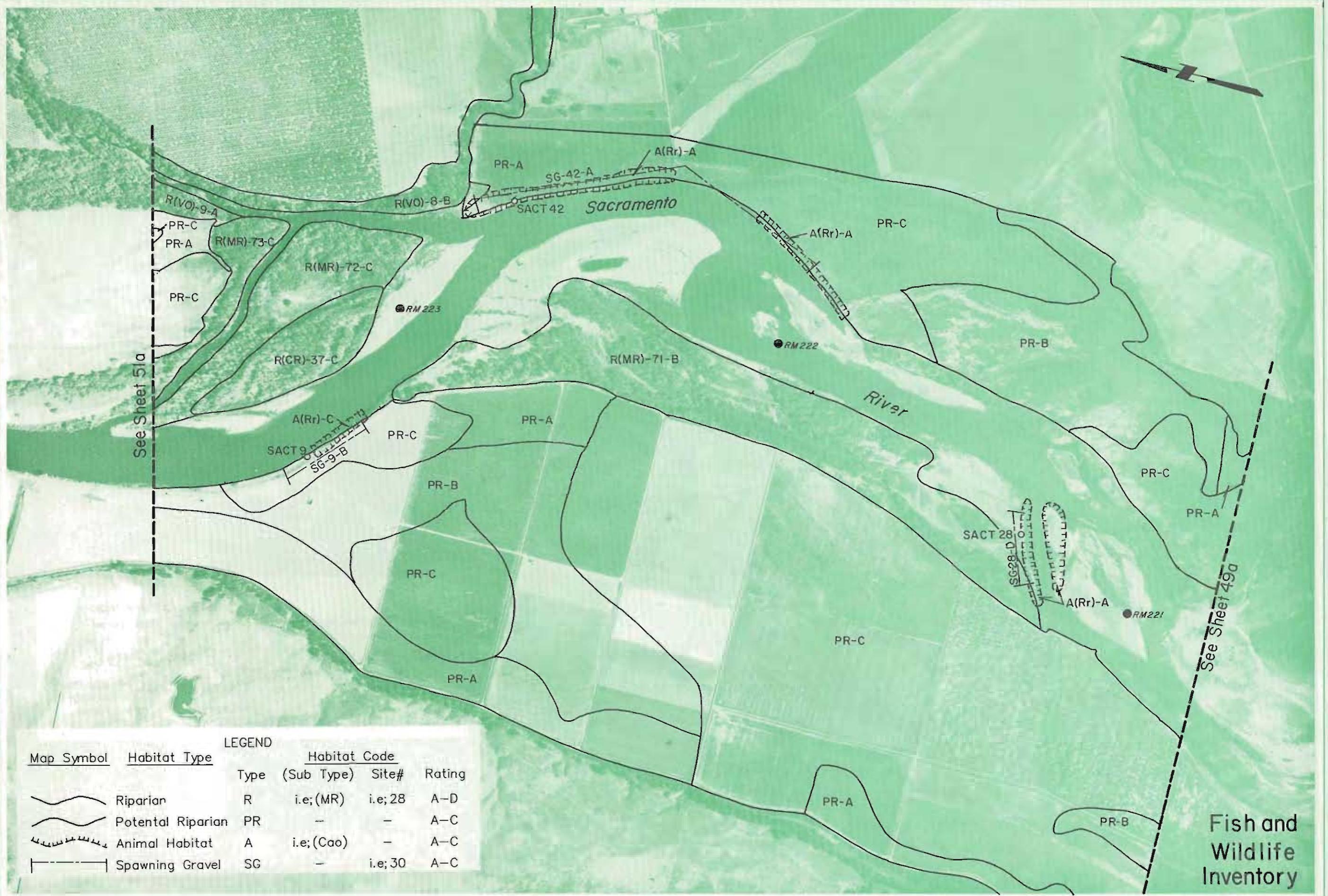
SACRAMENTO RIVER RIPARIAN ZONE

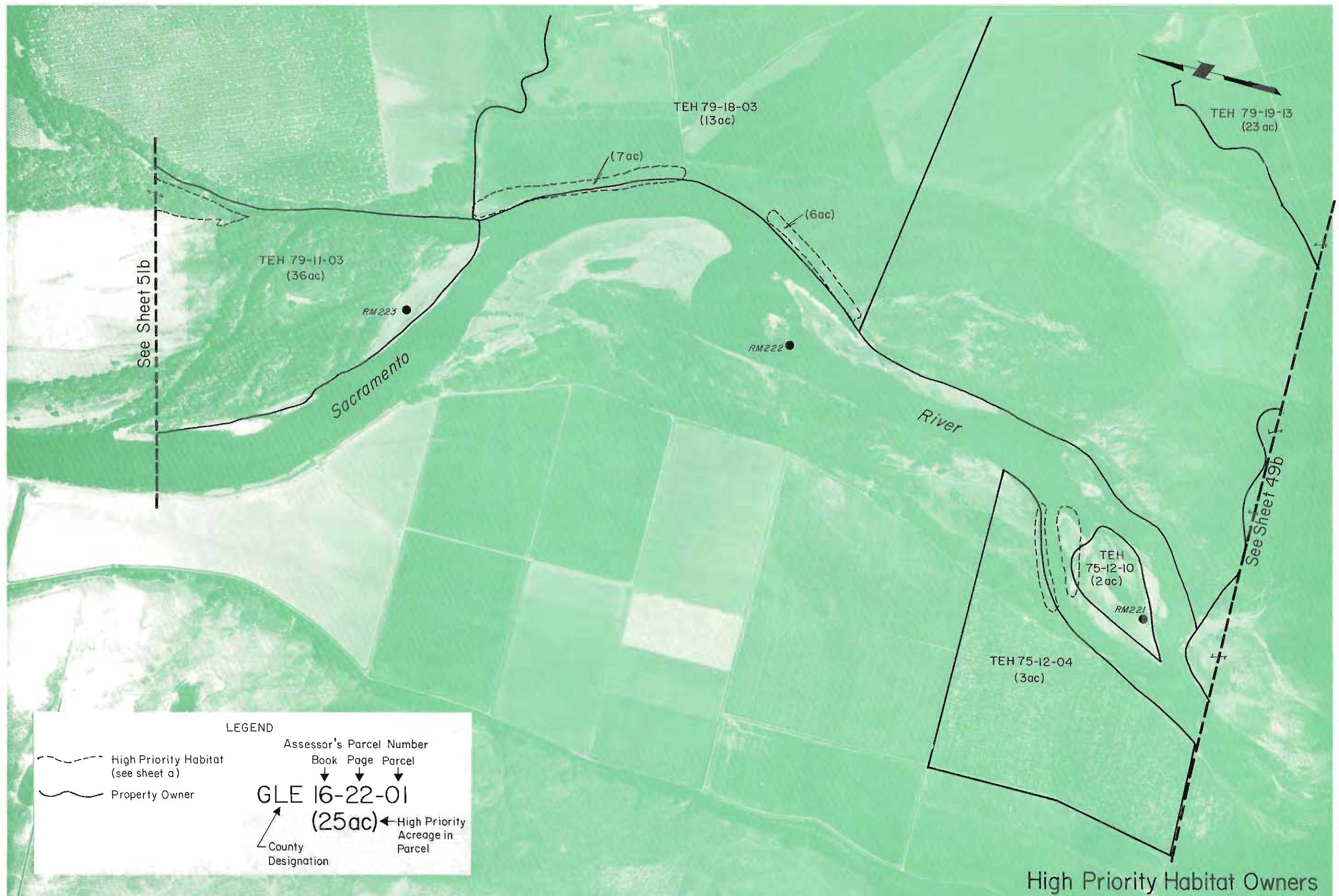
SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

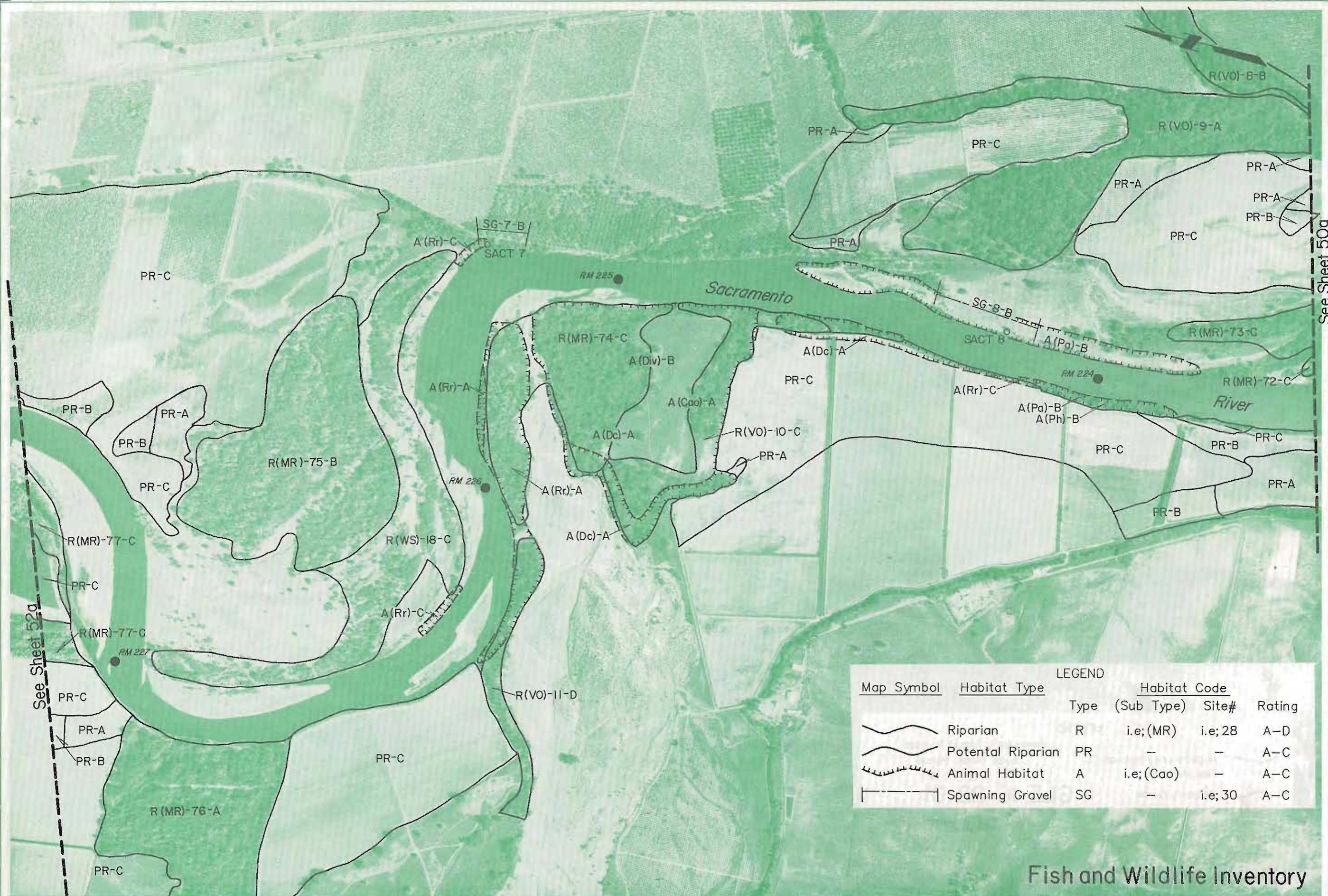
SHEET 49d OF 79



High Priority Habitat Owners





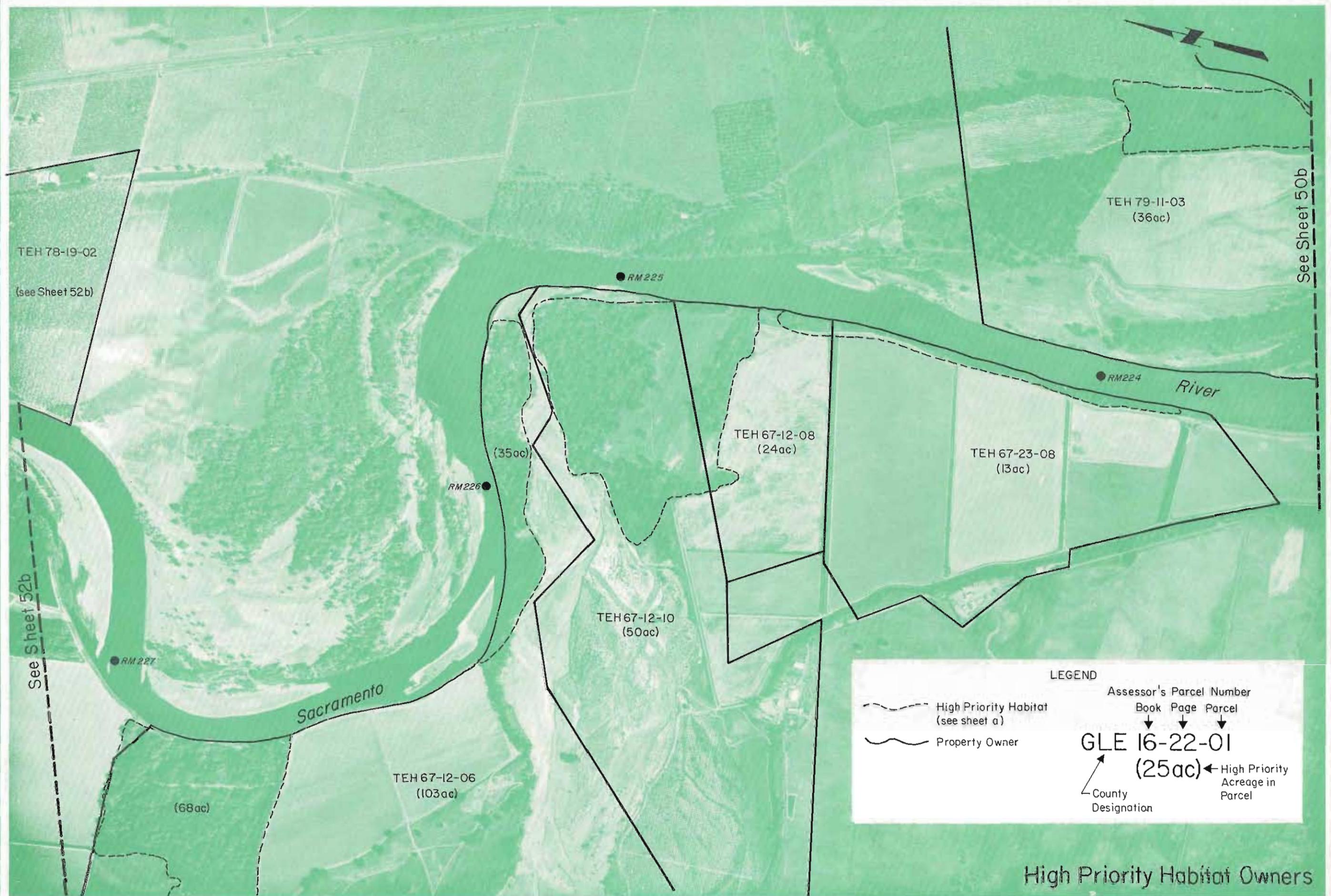


APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

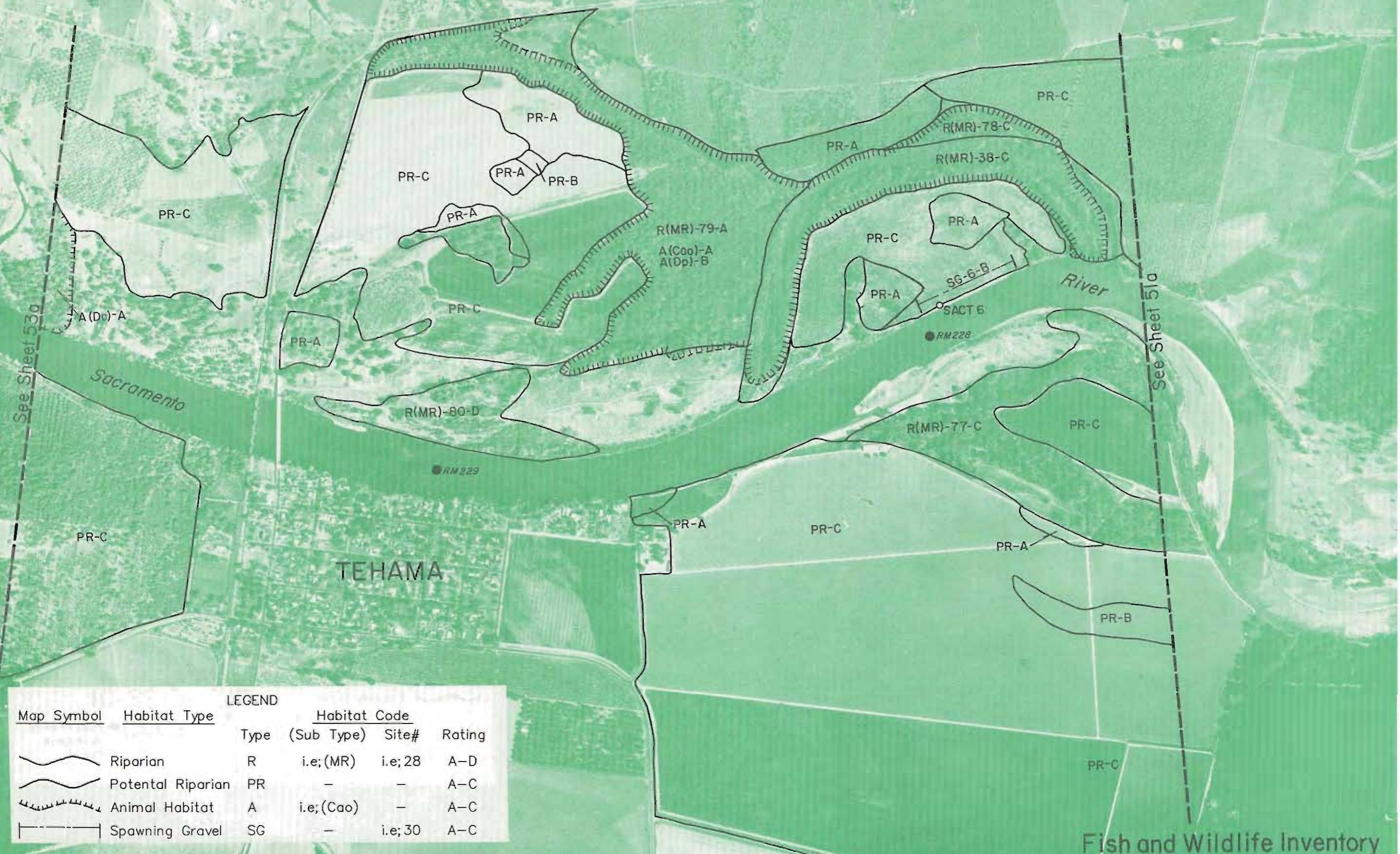
SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

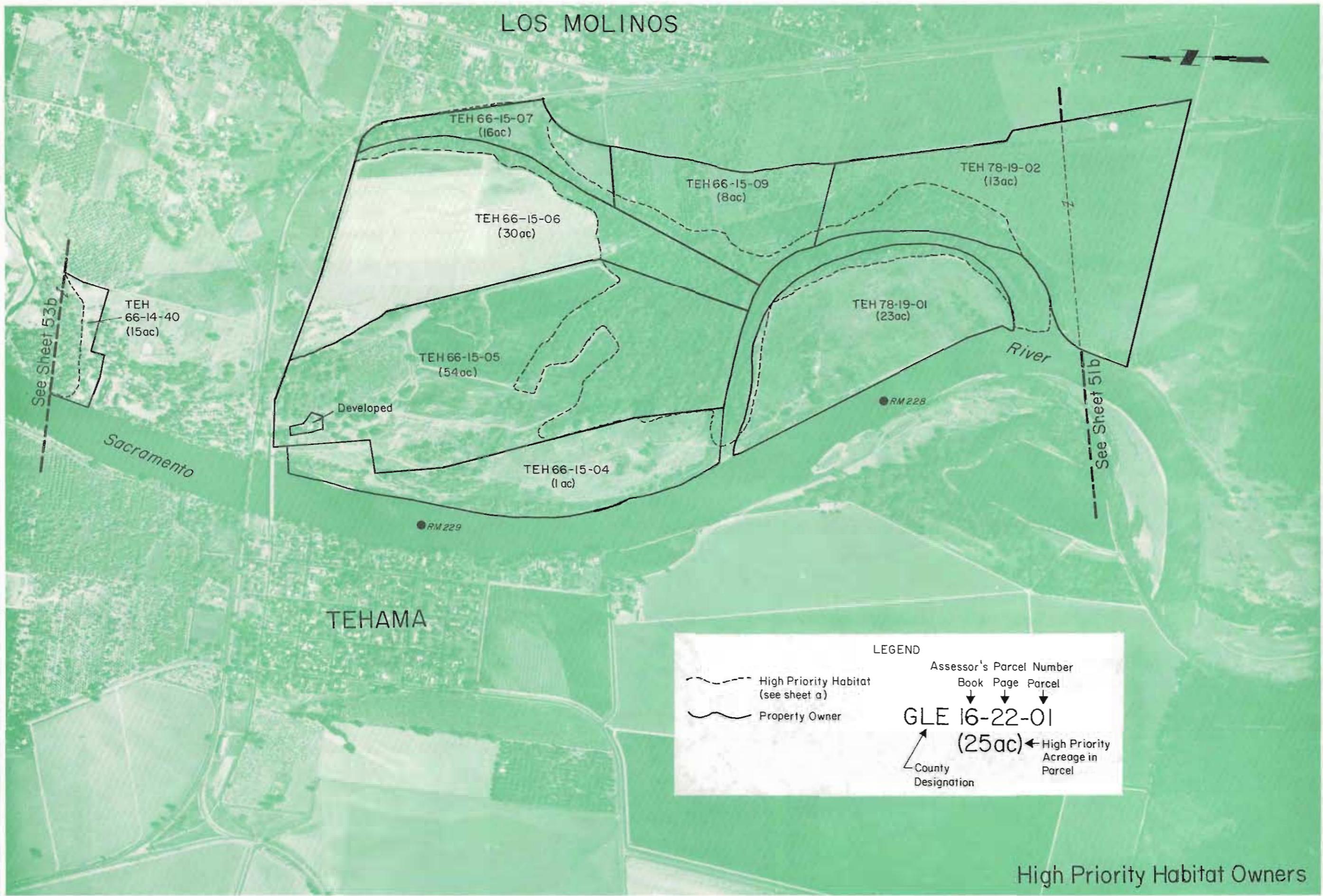
SHET 51a OF 79



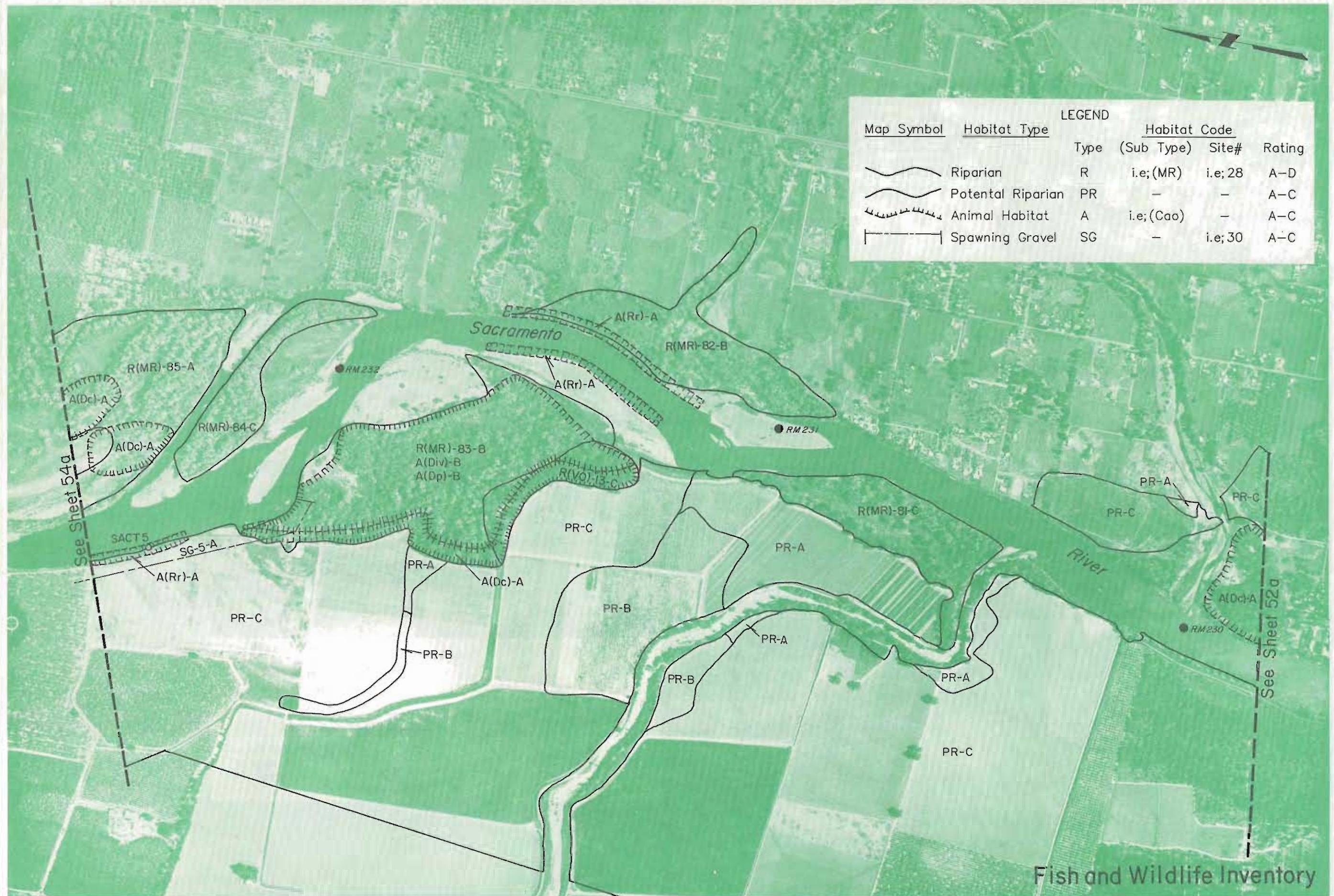
LOS MOLINOS

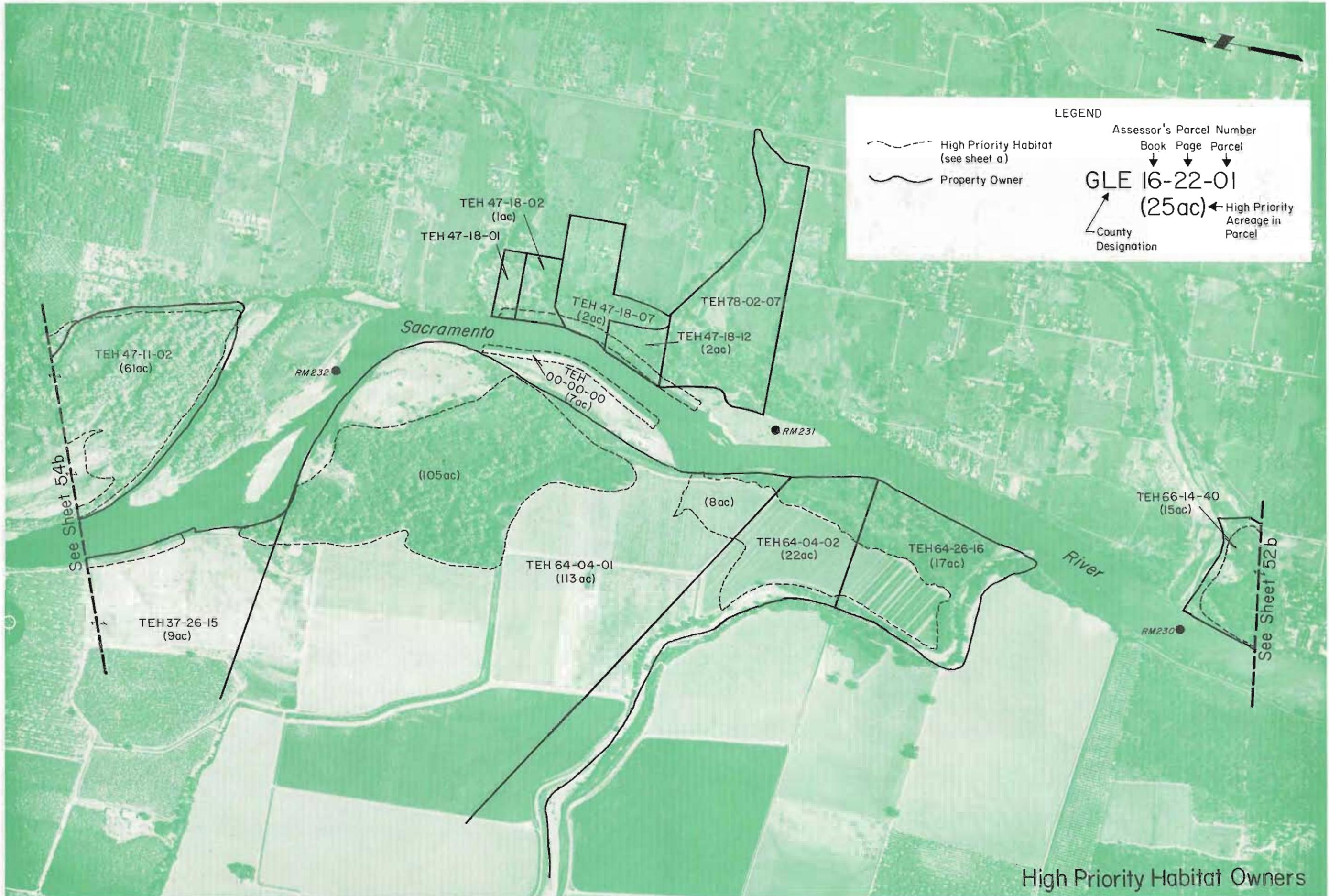


LOS MOLINOS



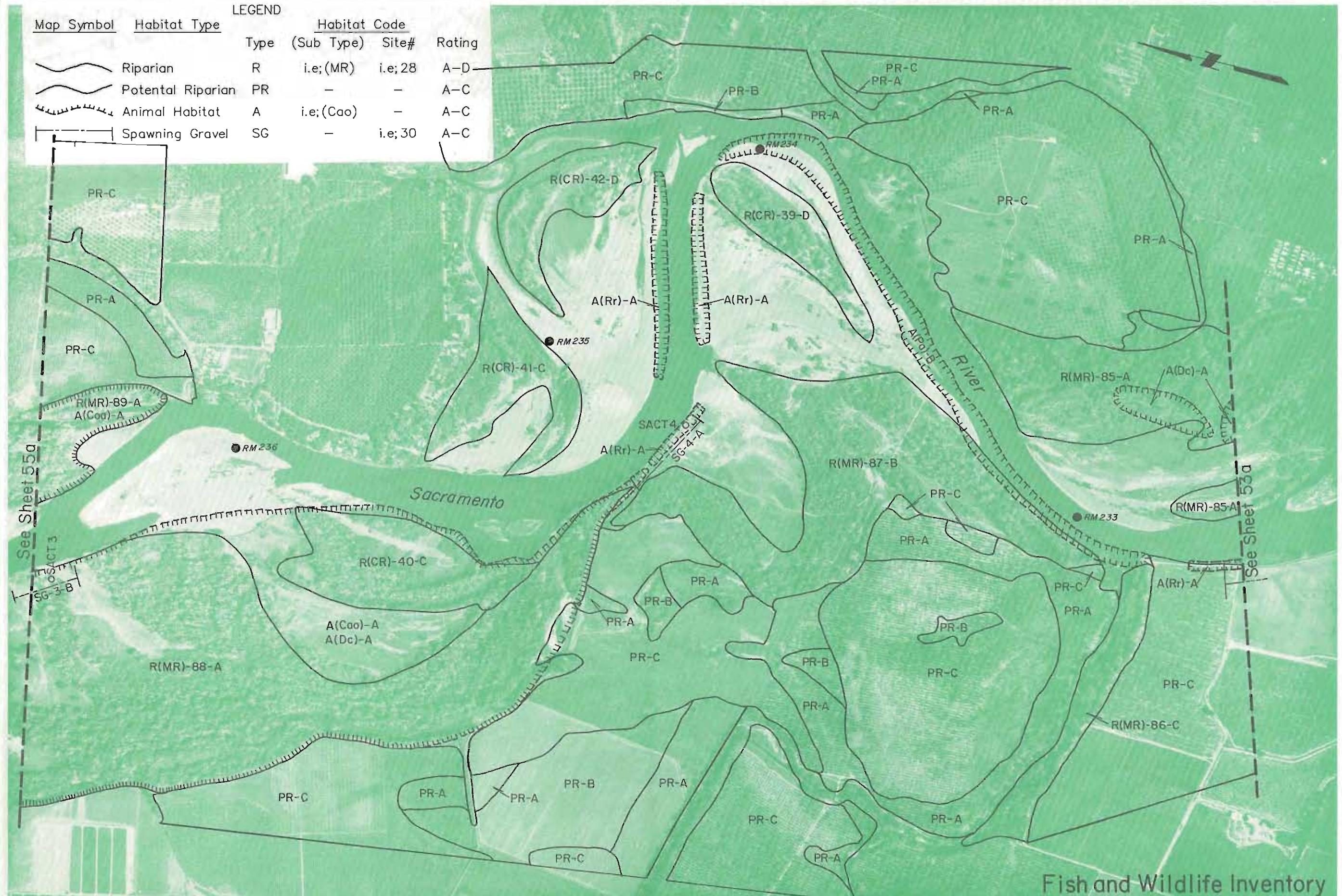
| Map Symbol | Habitat Type | LEGEND | | | |
|------------|--------------------|--------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| | Riparian | R | i.e;(MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e;(Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |





LEGEND

| Map Symbol | Habitat Type | Type | Habitat Code (Sub Type) | Site# | Rating |
|--------------------|--------------|------|----------------------------|---------|--------|
| Riparian | R | i.e; | (MR) | i.e; 28 | A-D |
| Potential Riparian | PR | - | - | - | A-C |
| Animal Habitat | A | i.e; | (Cao) | - | A-C |
| Spawning Gravel | SG | - | i.e; | 30 | A-C |

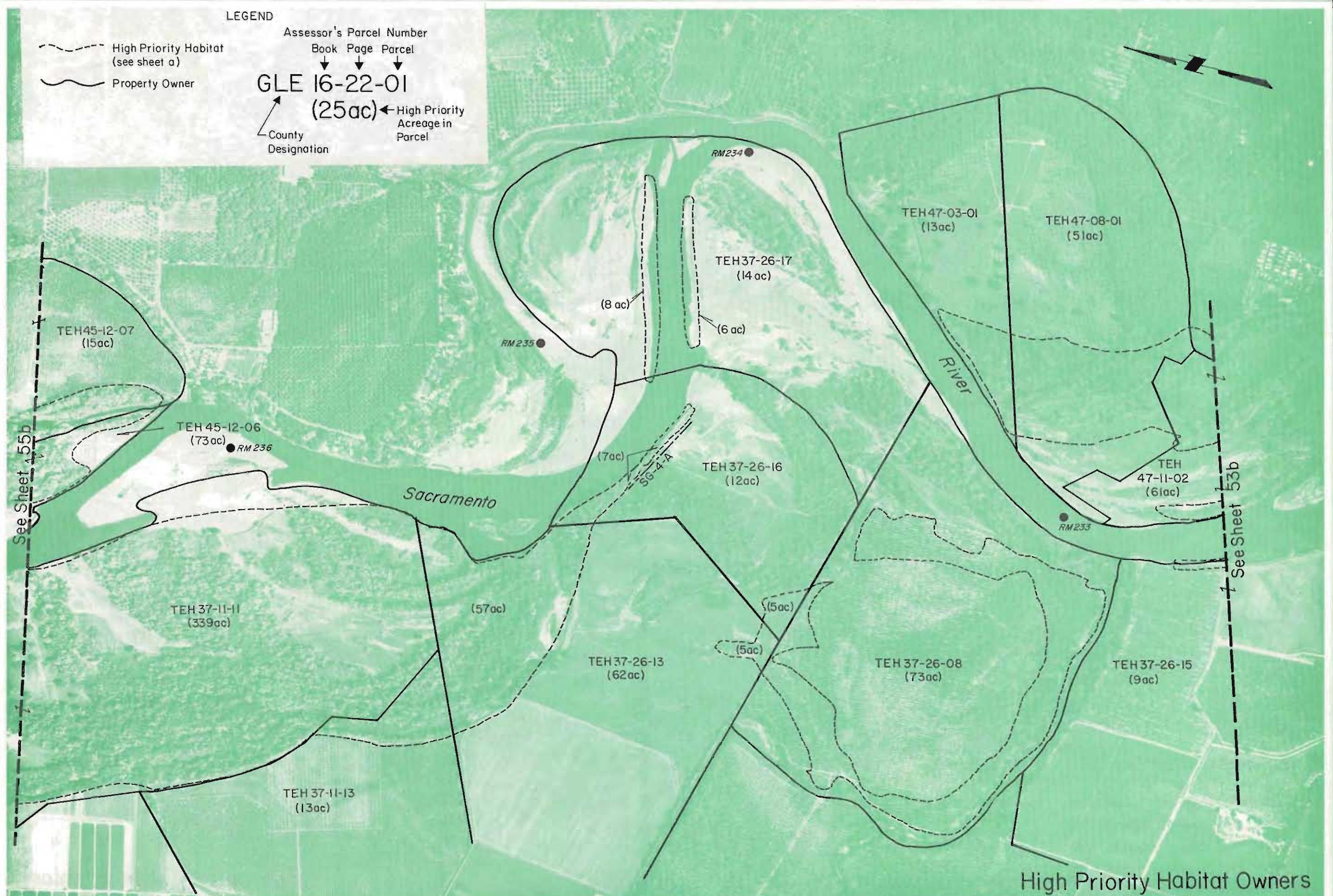


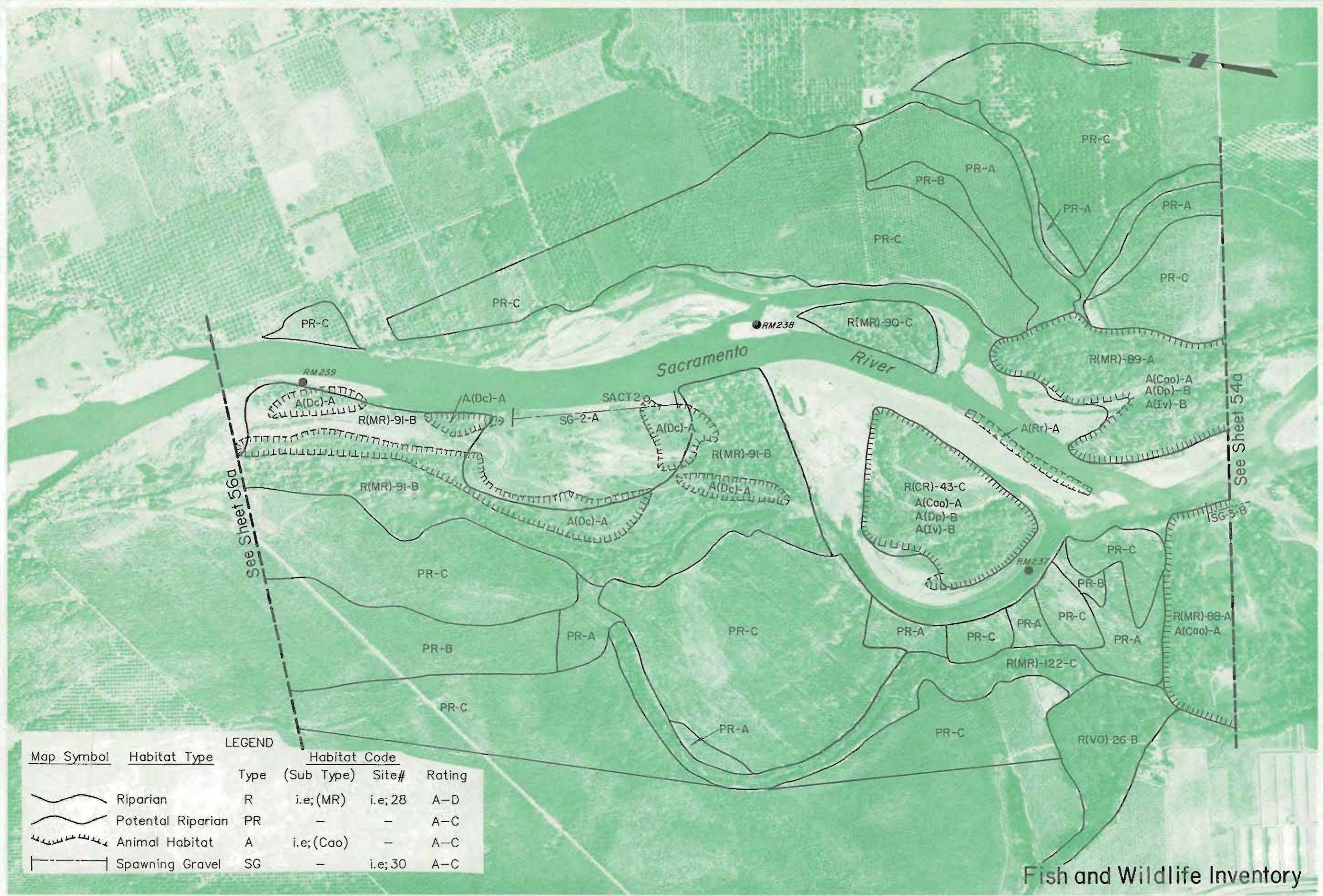
LEGEND

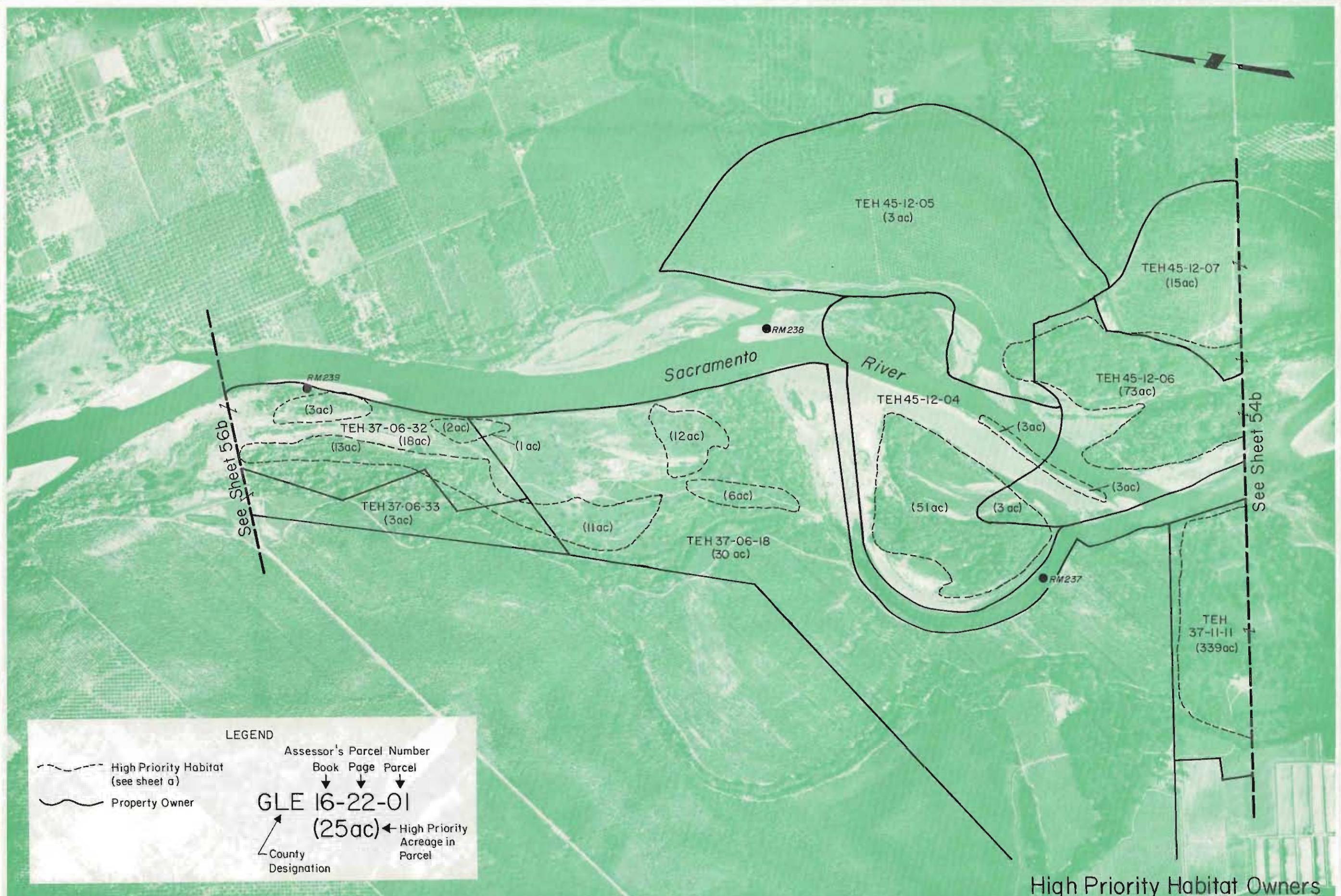
High Priority Habitat
(see sheet a)

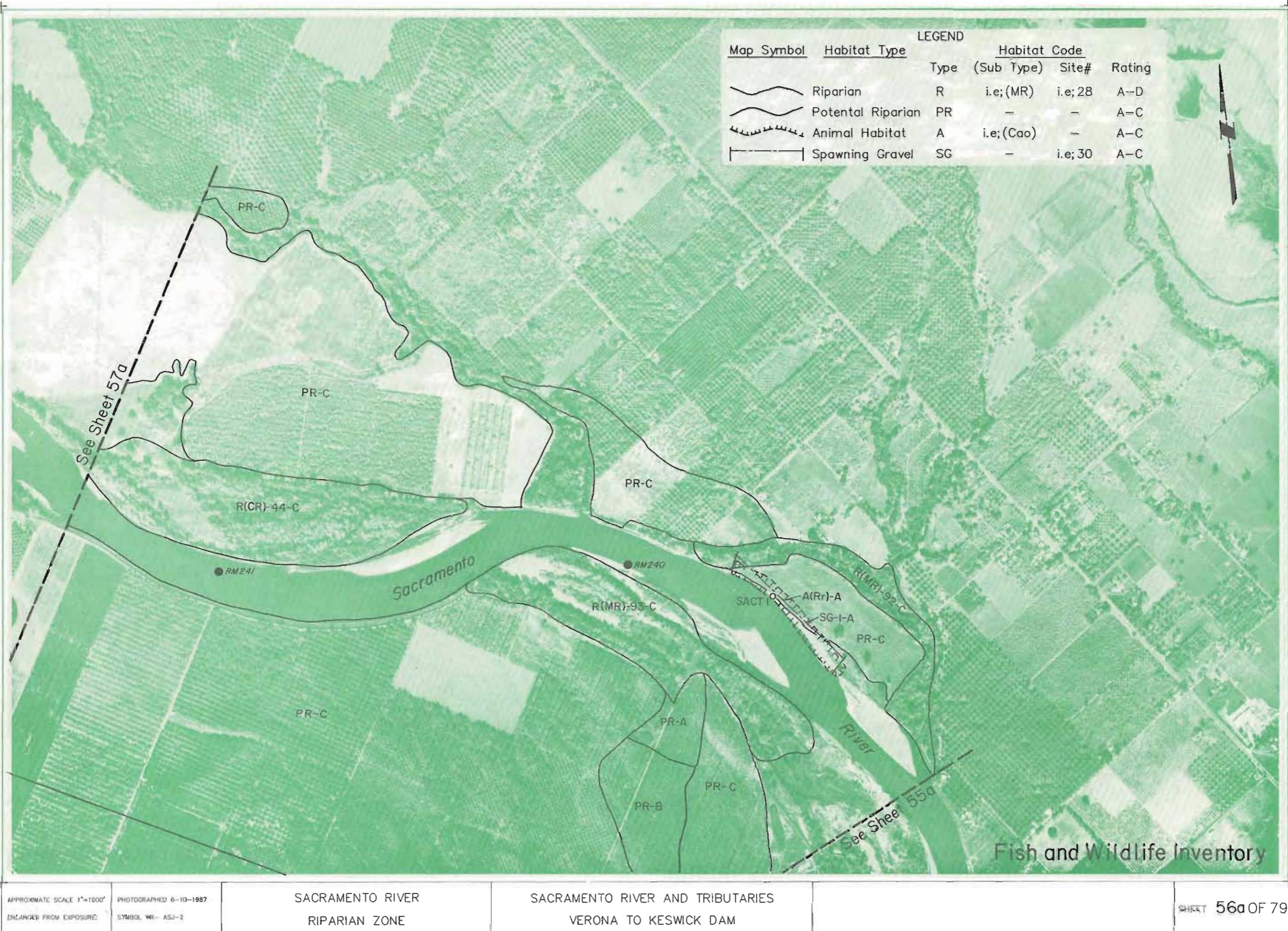
Property Owner

Assessor's Parcel Number
Book Page Parcel
GLE 16-22-01
(25ac) ← High Priority
Acreage in
Parcel
County
Designation







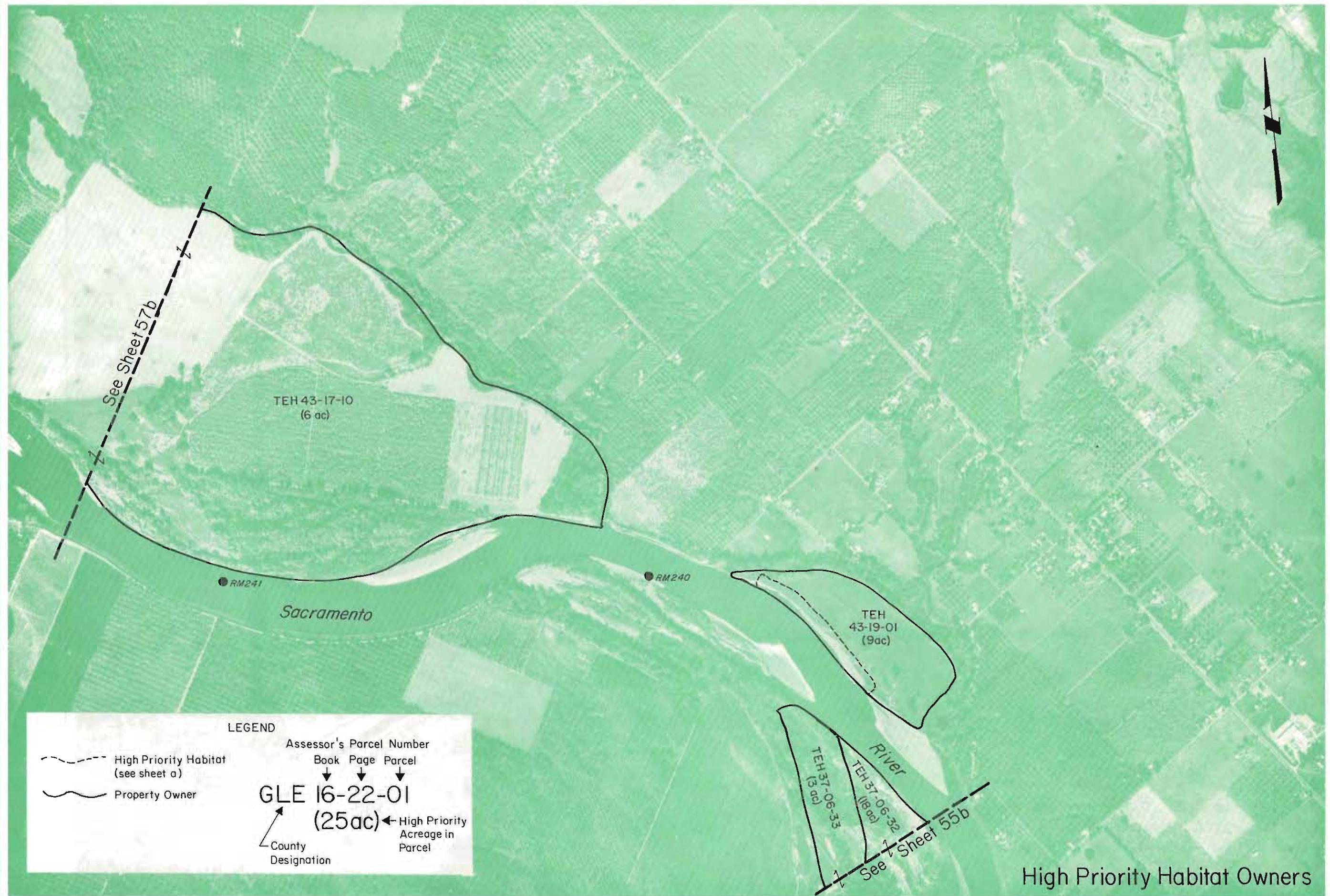


APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE: PHOTOGRAINED 6-10-1987
SYMBOL WR- ASI-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 56a OF 79

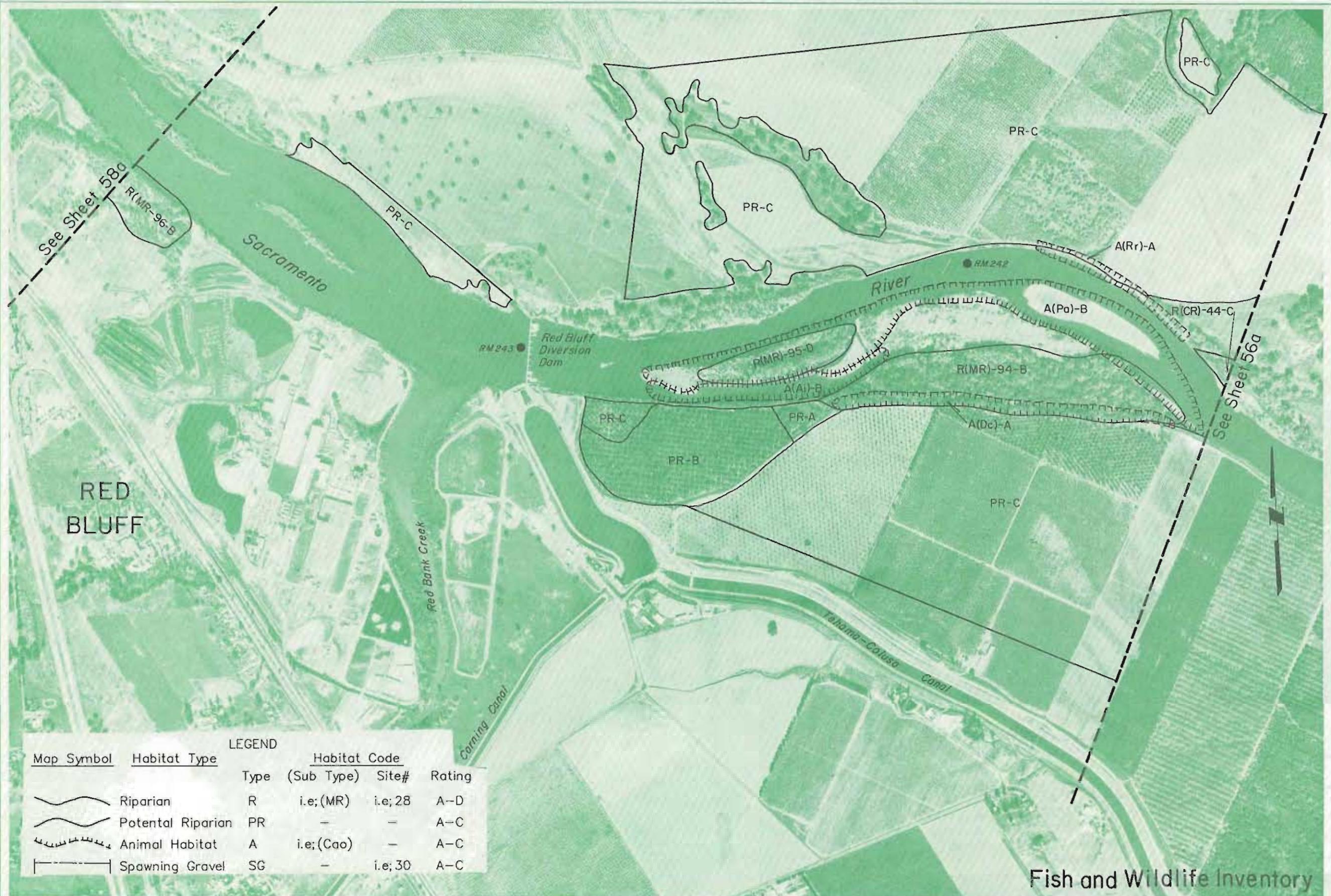


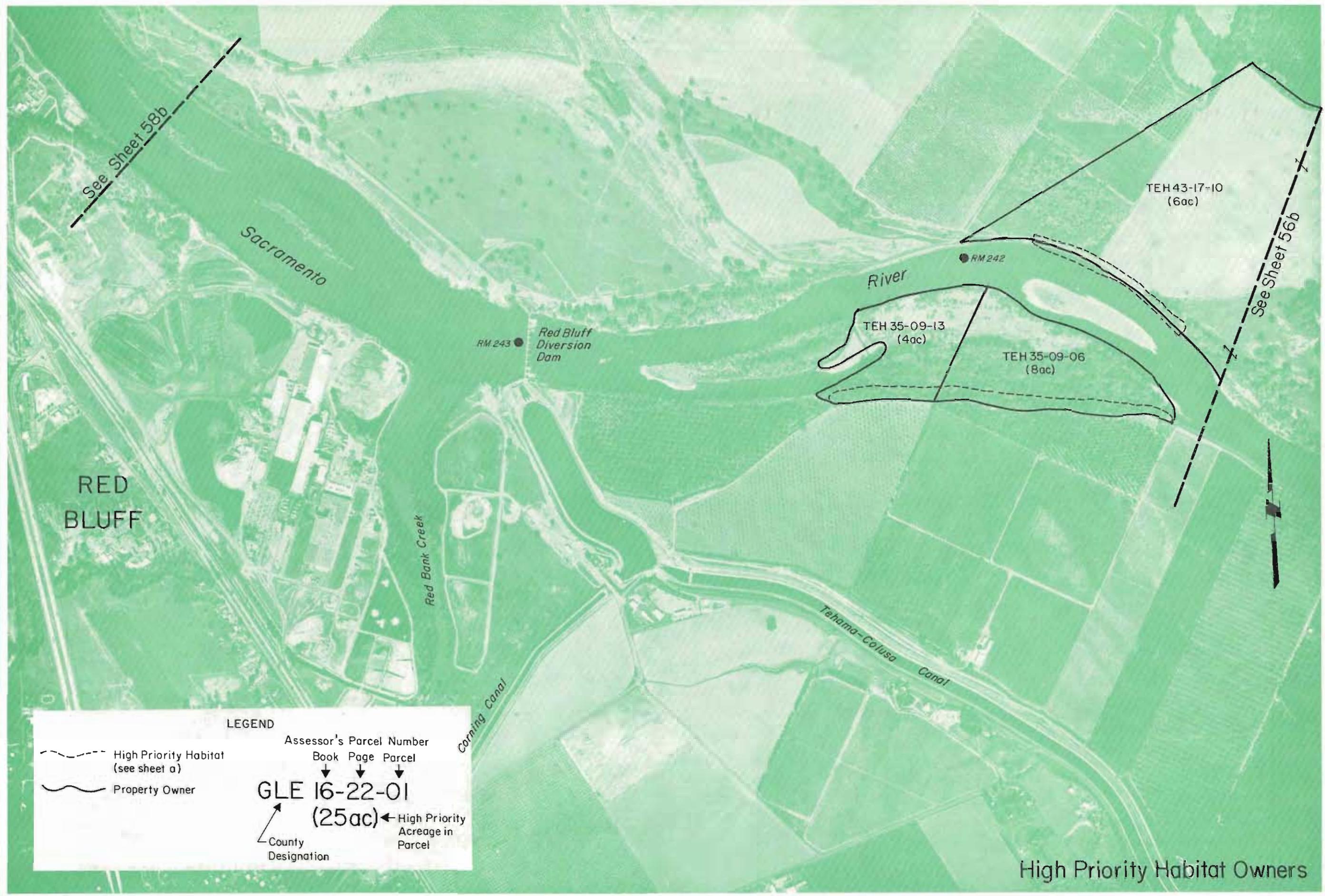
APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

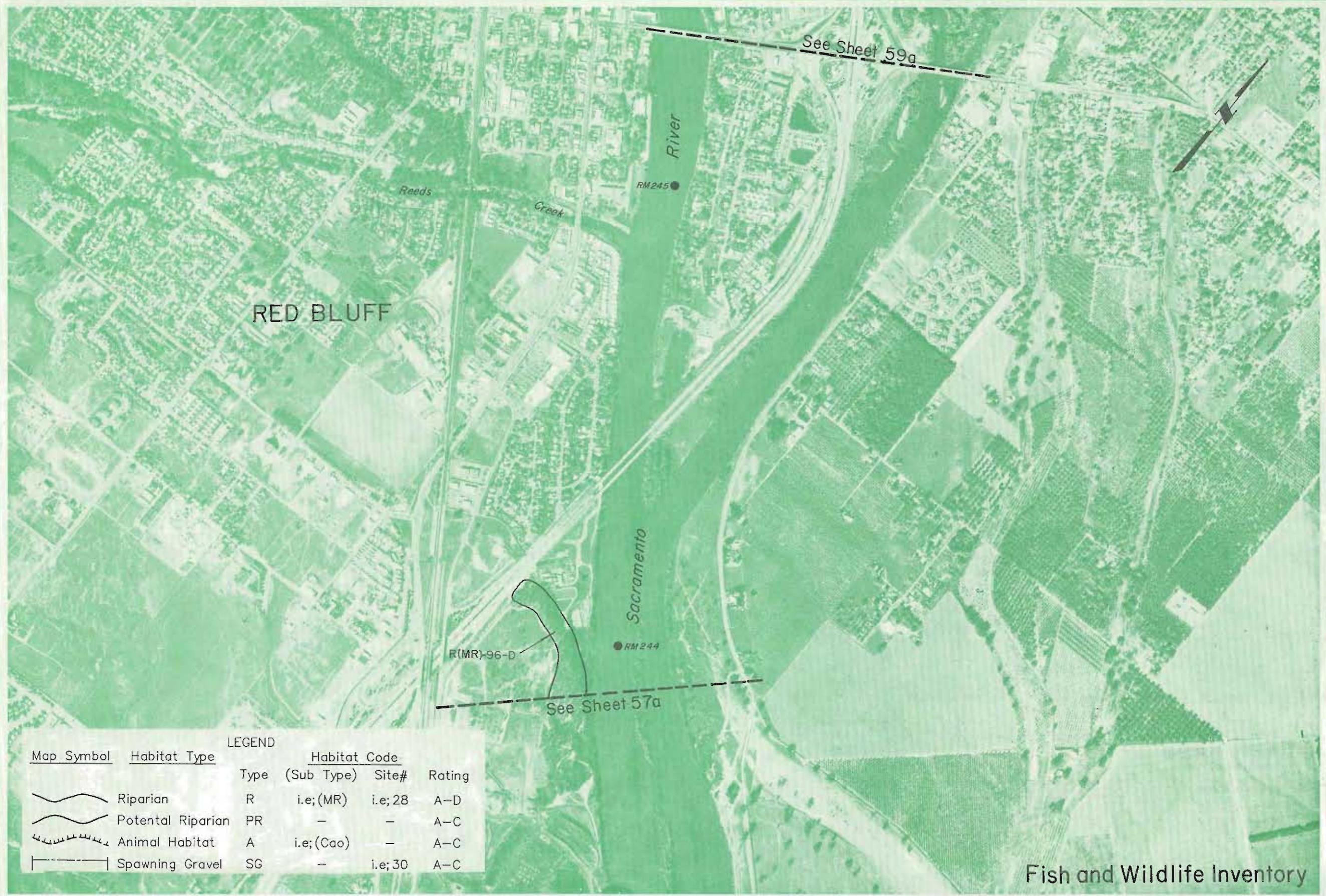
SACRAMENTO RIVER
RIPARIAN ZONE

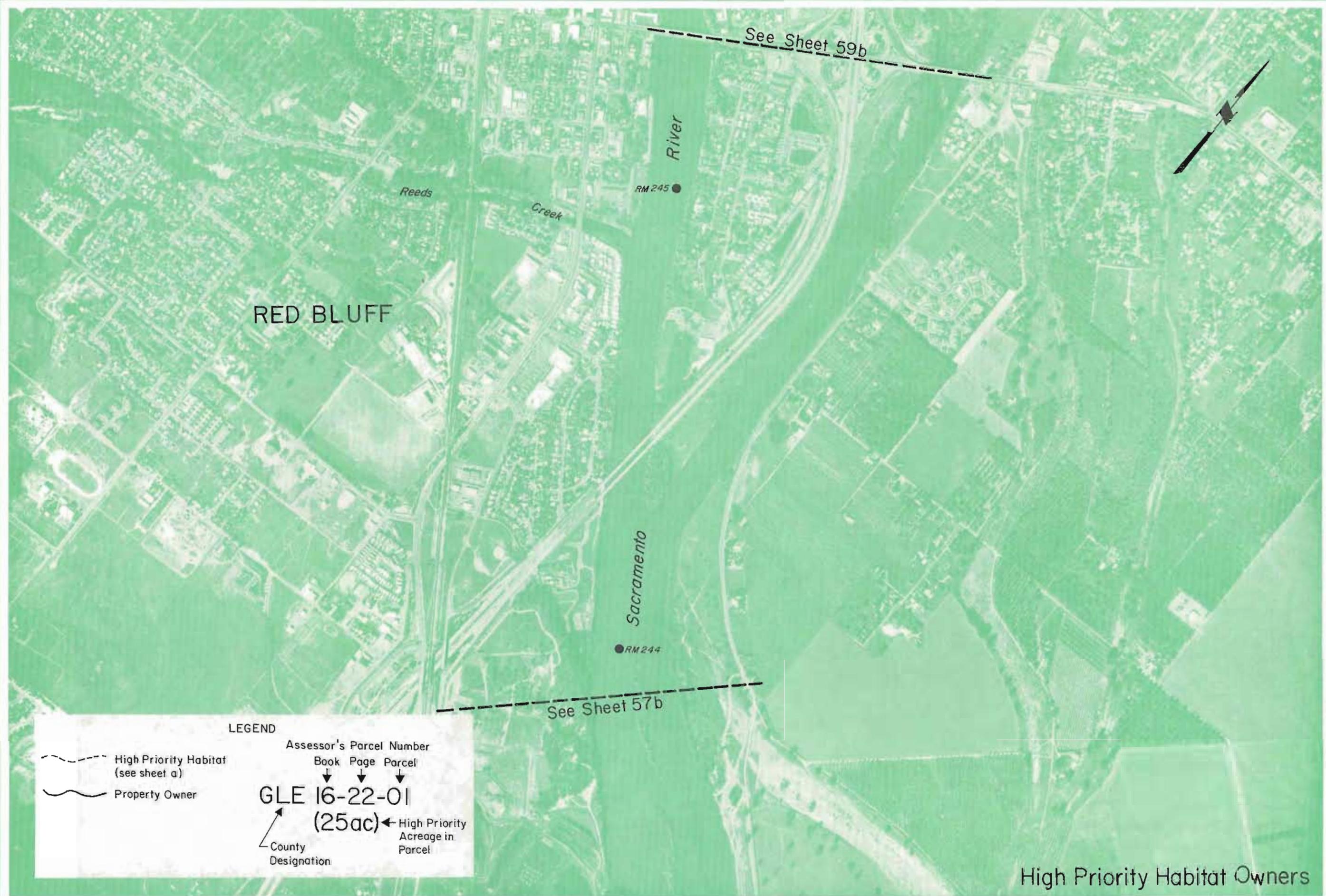
SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

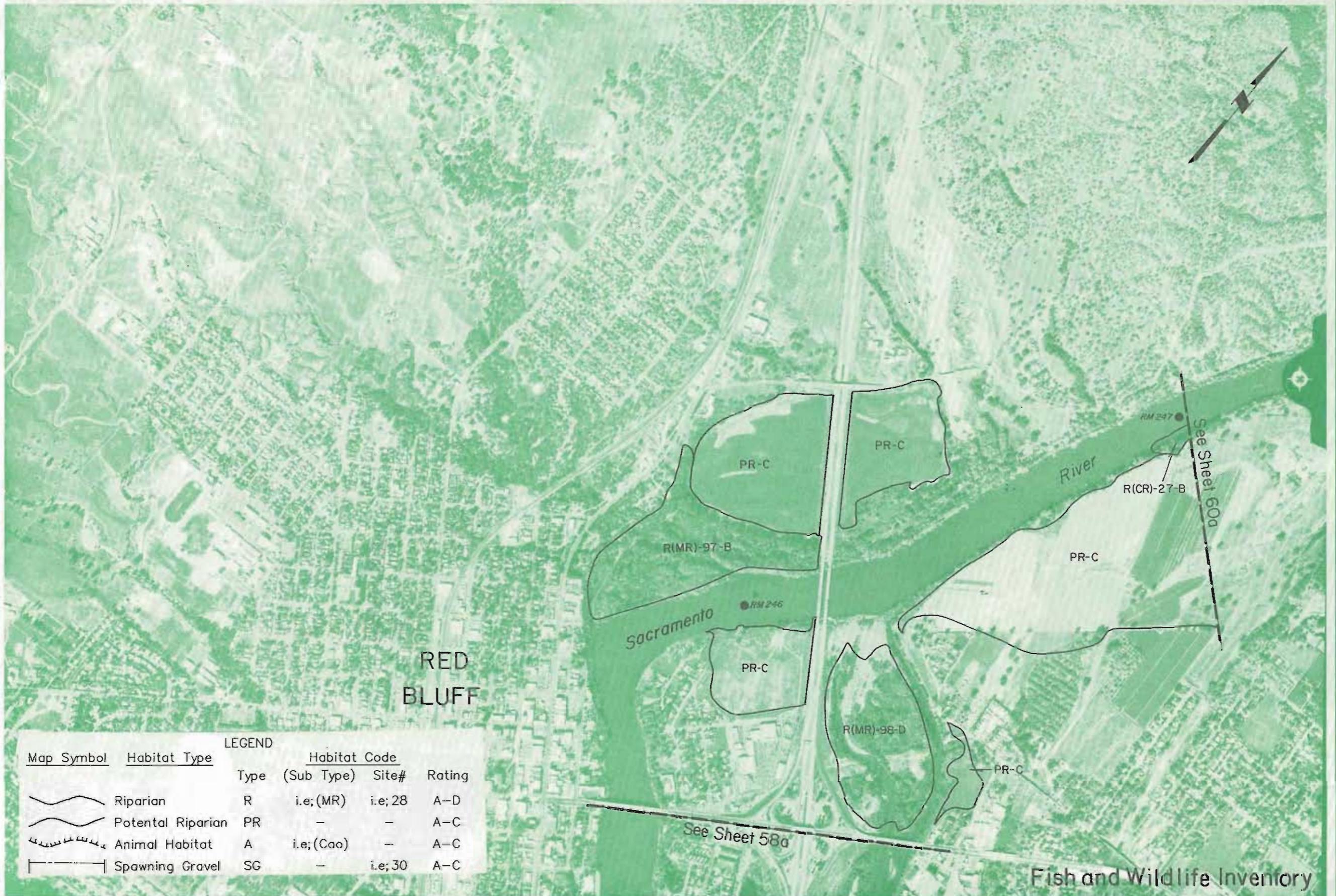
SHEET 56b OF 79









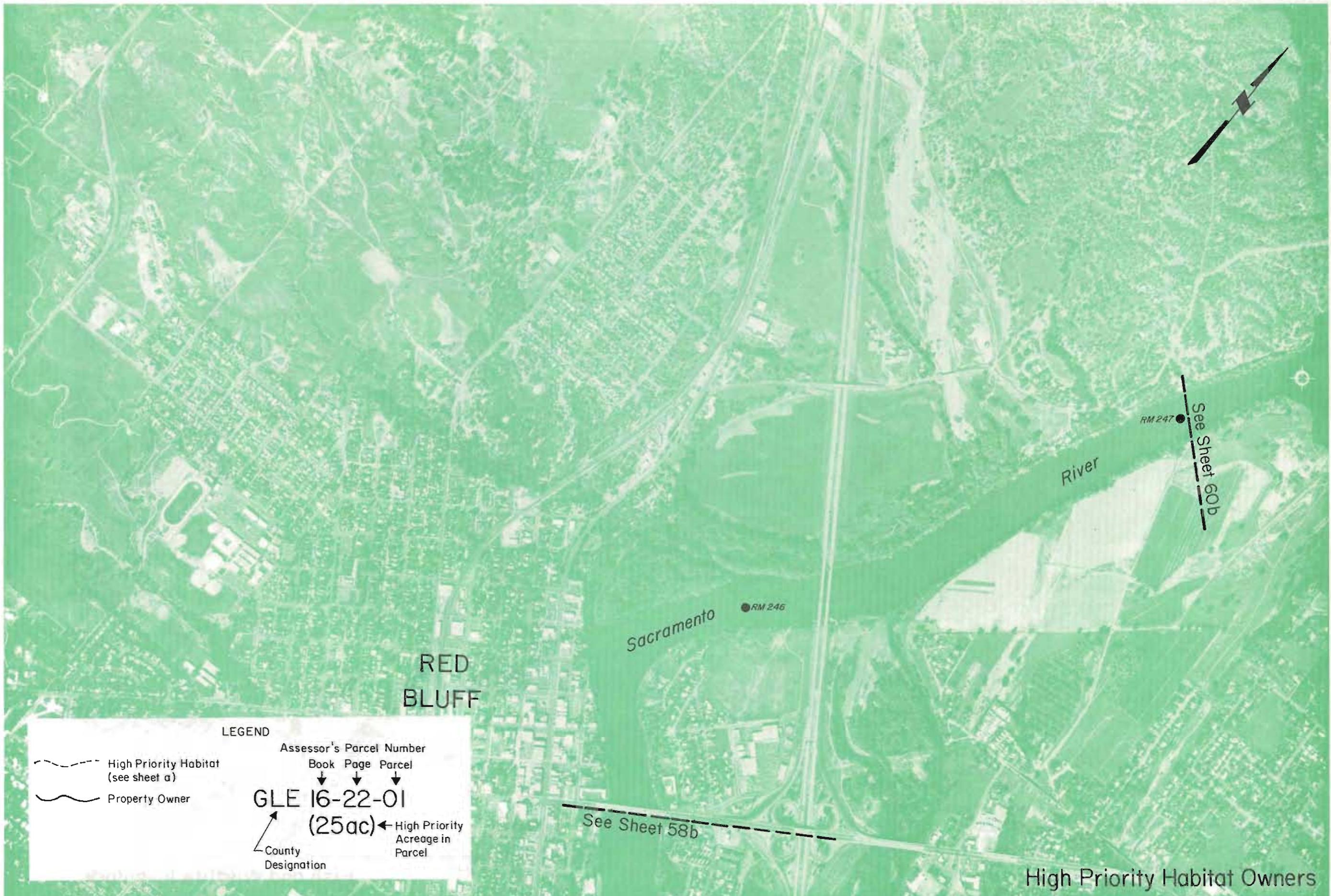


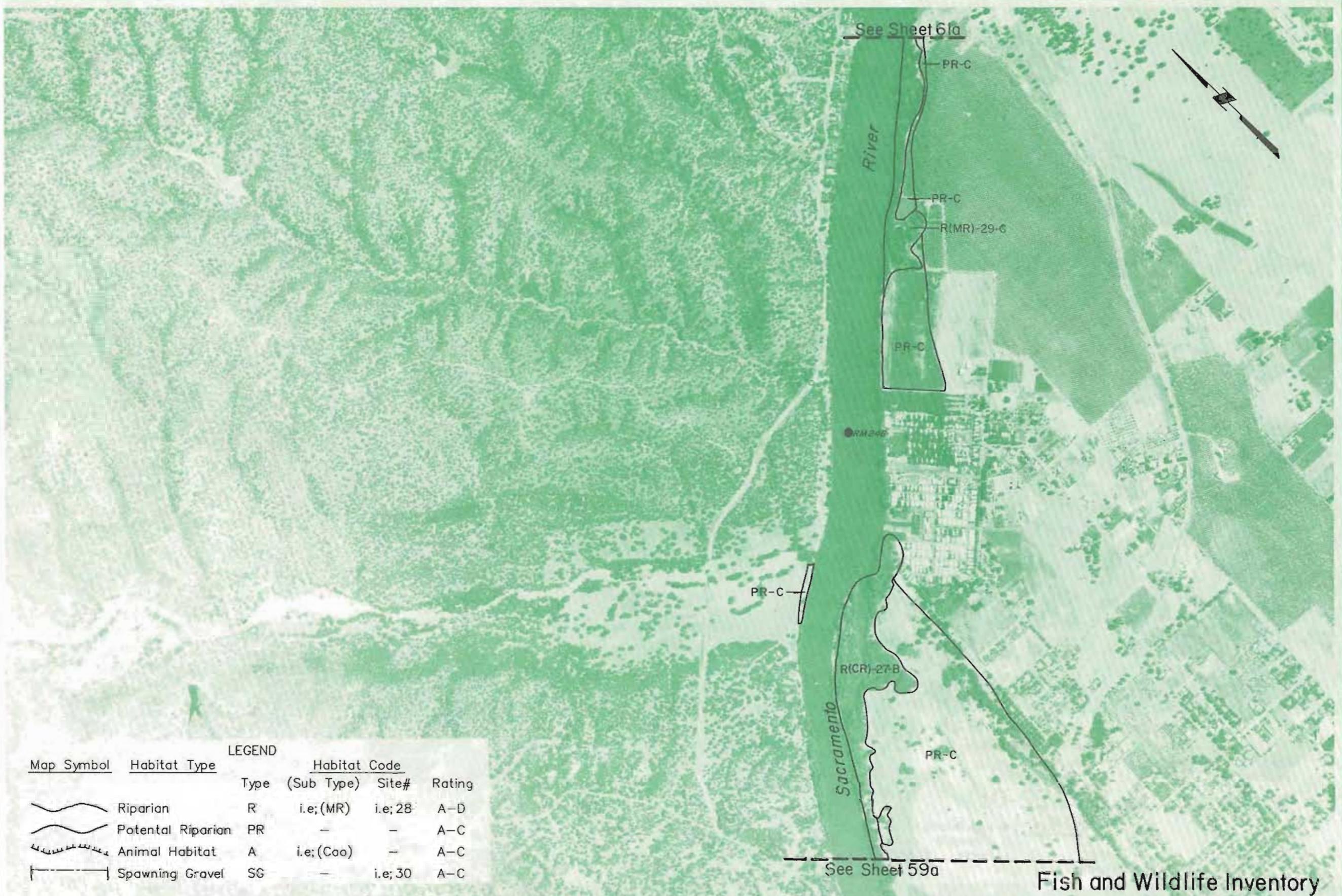
Fish and Wildlife Inventory

APPROXIMATE SCALE 1"=1000'
PHOTOGRAPHED 6-10-1987
SCALED FROM EXPOSURE:
SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 59d OF 79





See Sheet 6b

River

RME4B

Sacramento

See Sheet 59b

High Priority Habitat Owners

LEGEND

High Priority Habitat
(see sheet a)

Property Owner

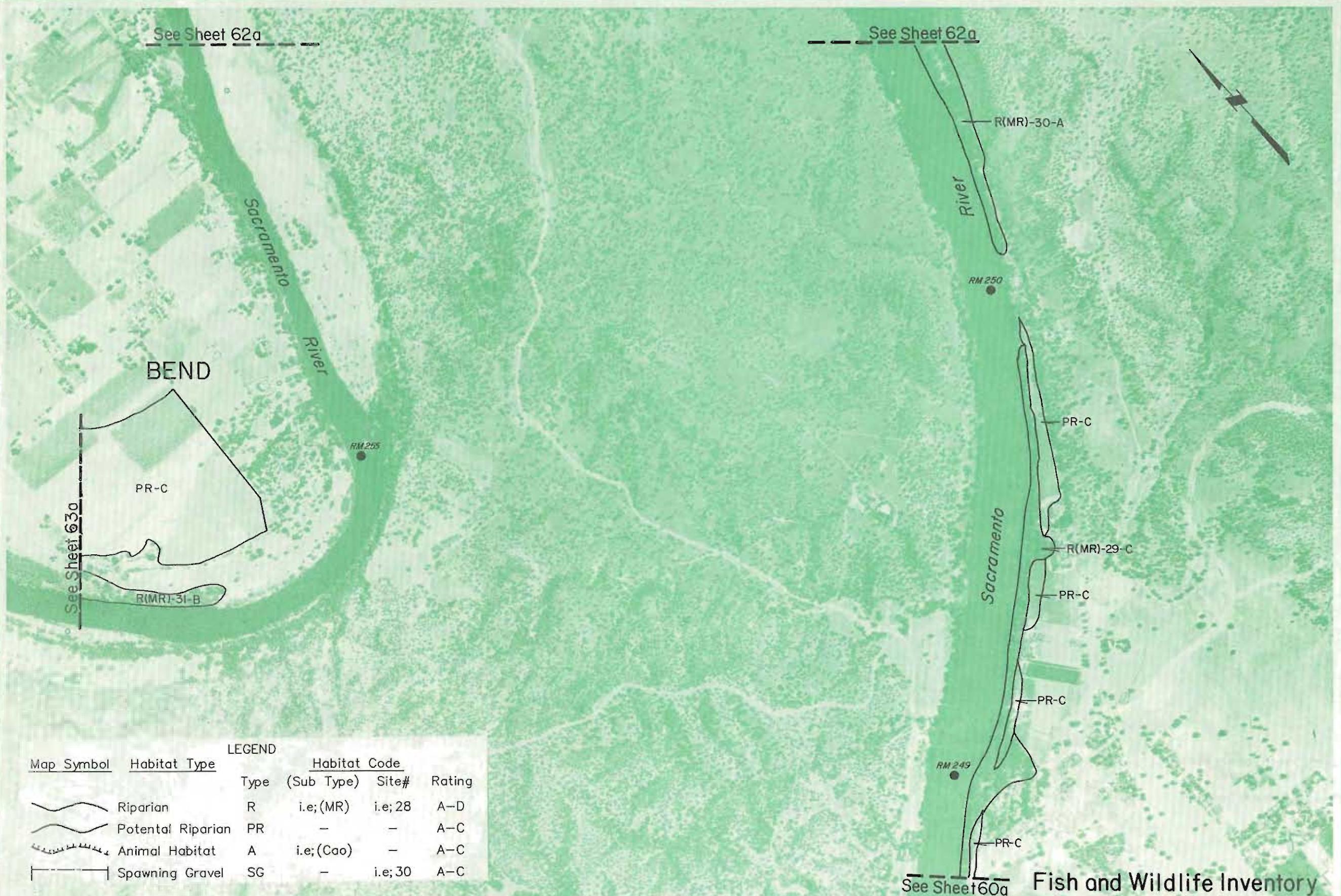
Assessor's Parcel Number

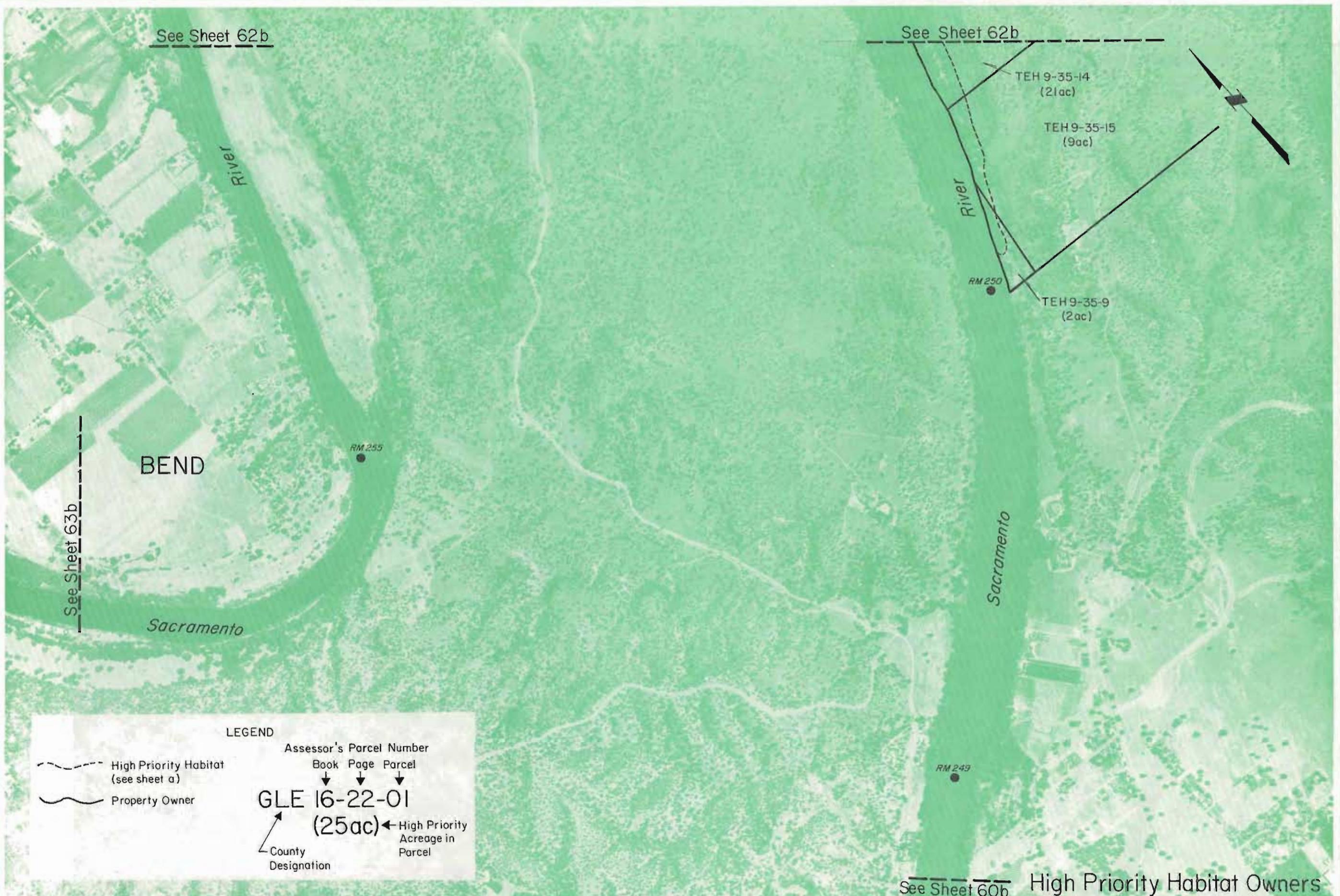
Book Page Parcel

GLE 16-22-01
(25ac)

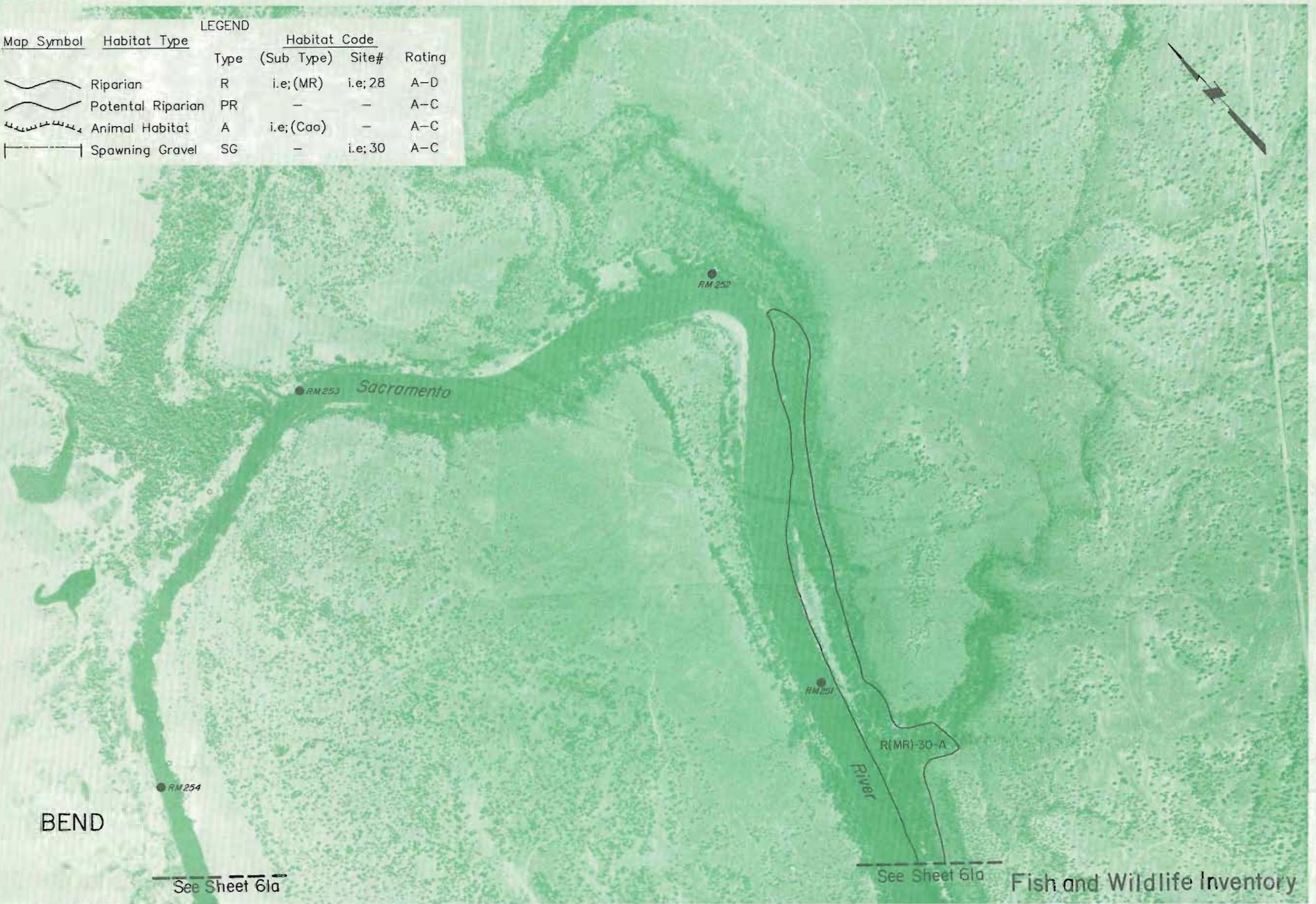
High Priority
Acreage in
Parcel

County
Designation





| Map Symbol | Habitat Type | LEGEND | | | |
|------------|--------------------|--------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

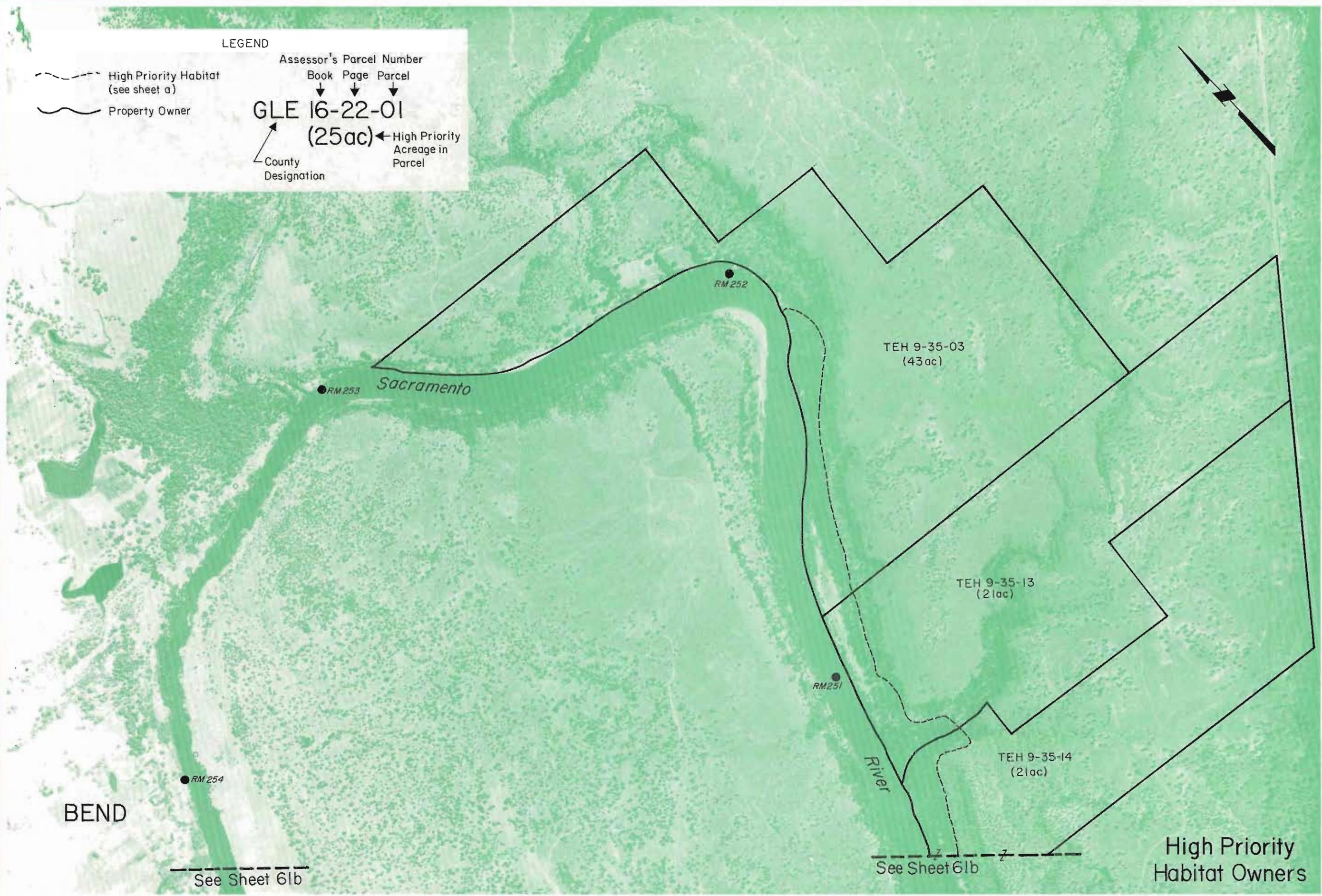


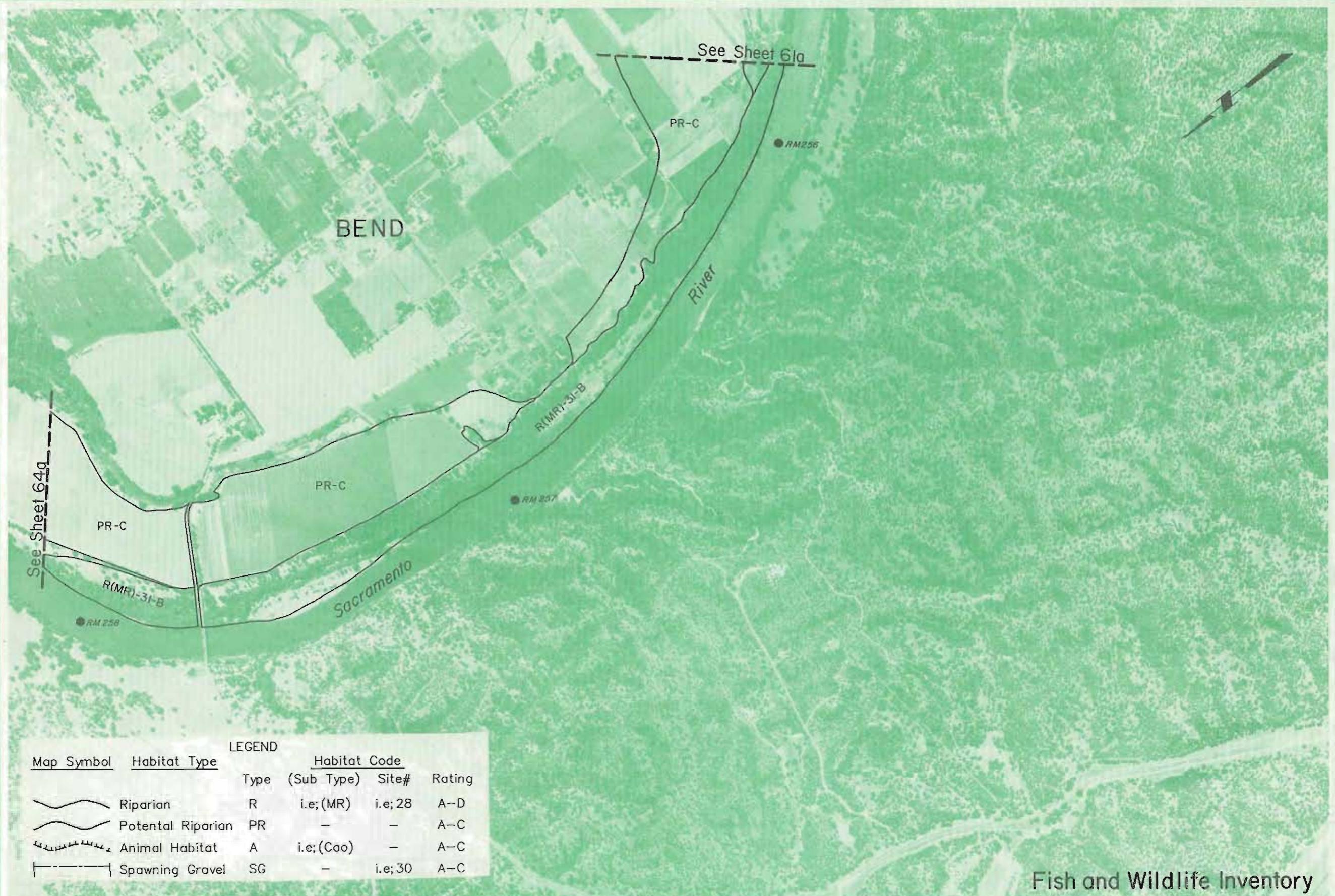
APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE:
PHOTOGRAPHED 6-10-1987
SYMBOL WR- ASJ-2

SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

SHEET 62a OF 79

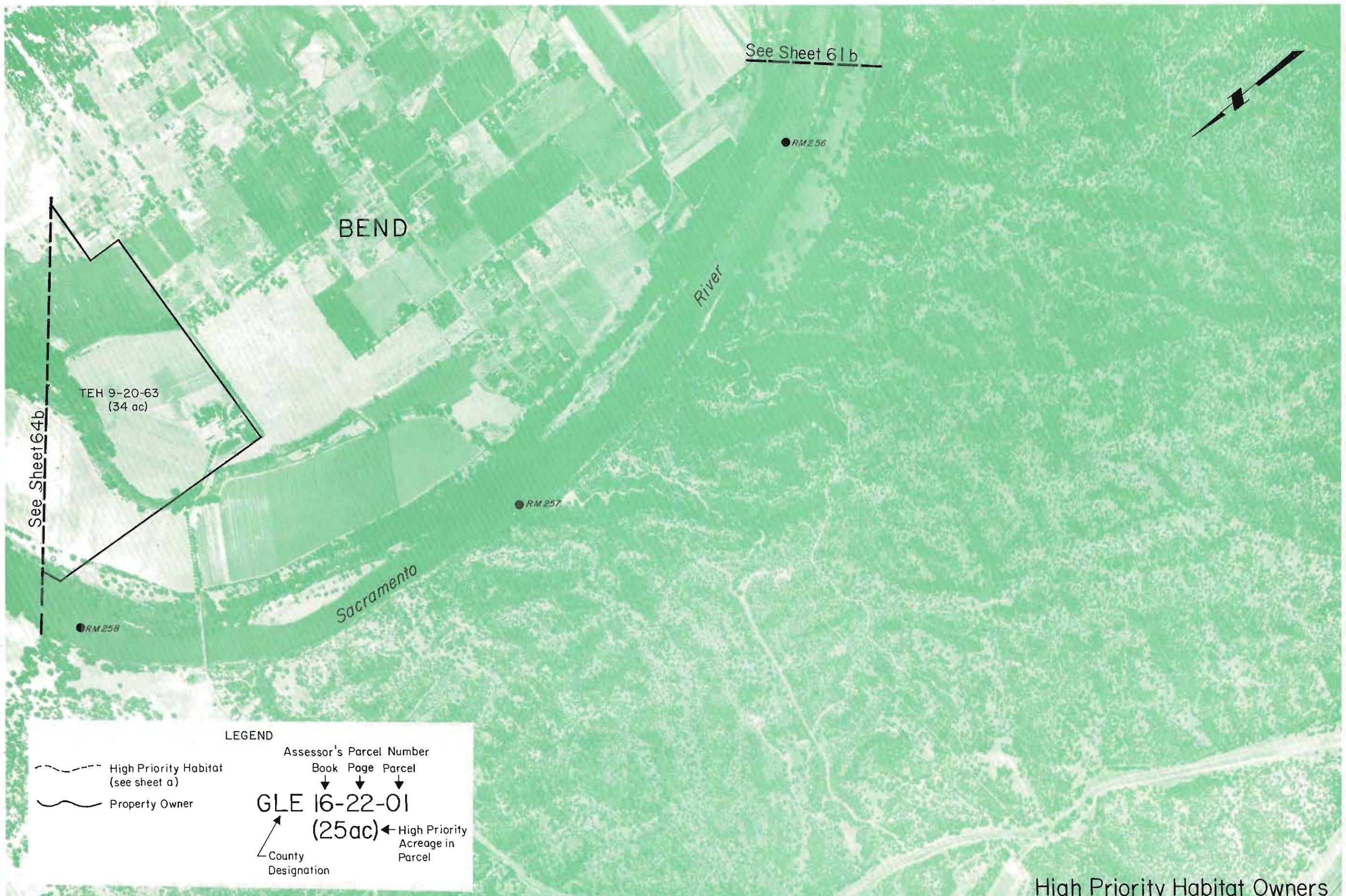




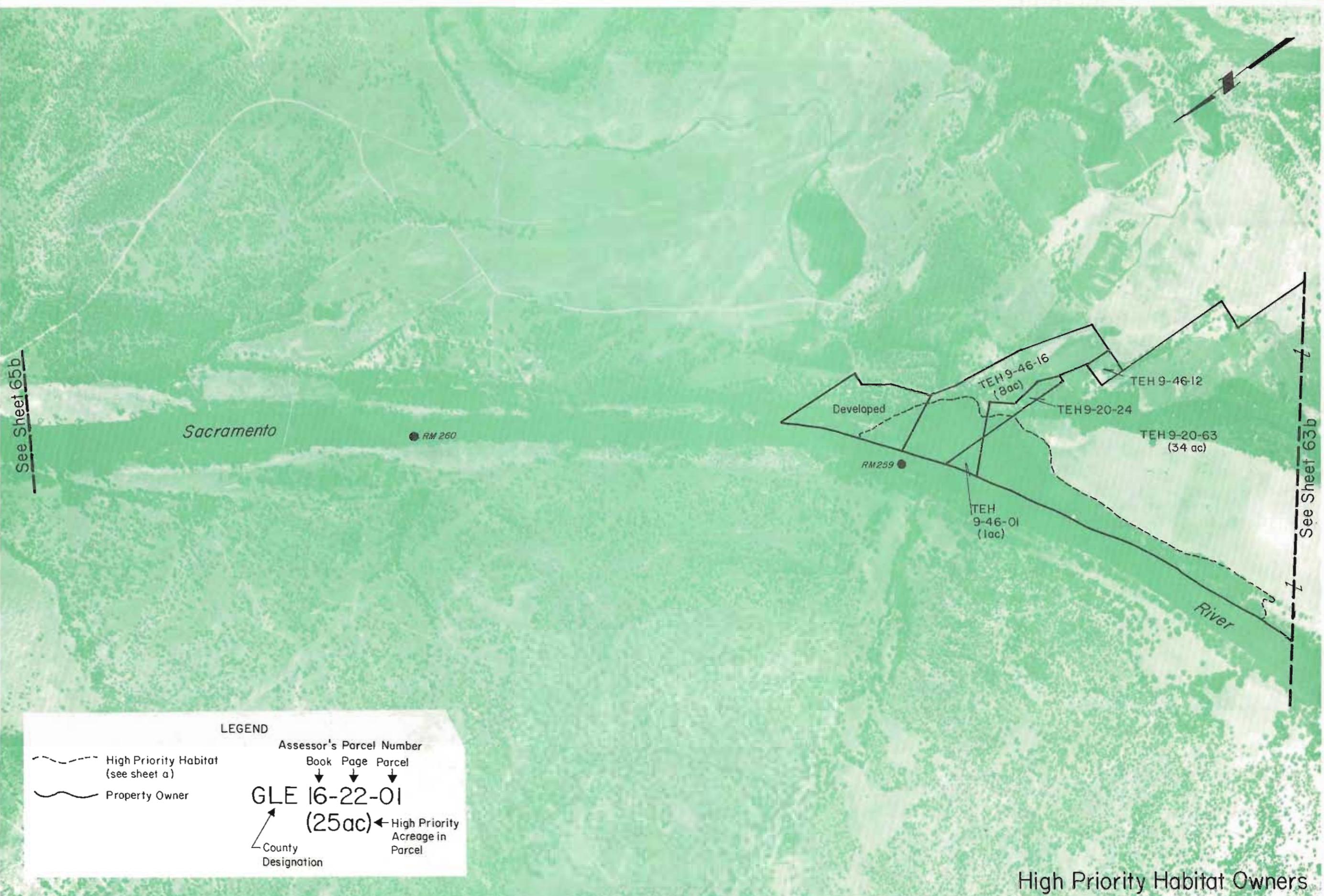
LEGEND

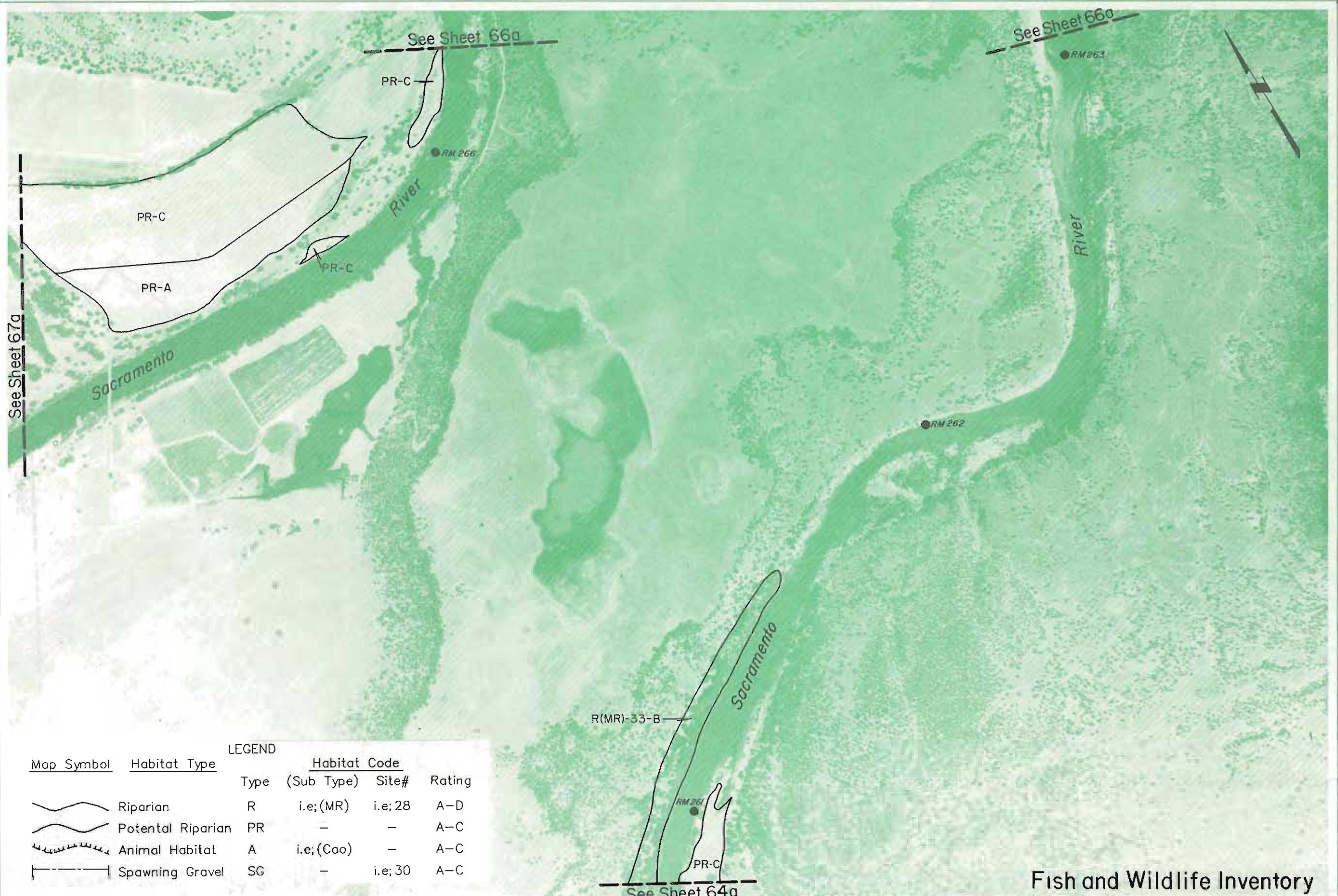
| <u>Map Symbol</u> | <u>Habitat Type</u> | <u>Habitat Code</u> | | | |
|-------------------|---------------------|---------------------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

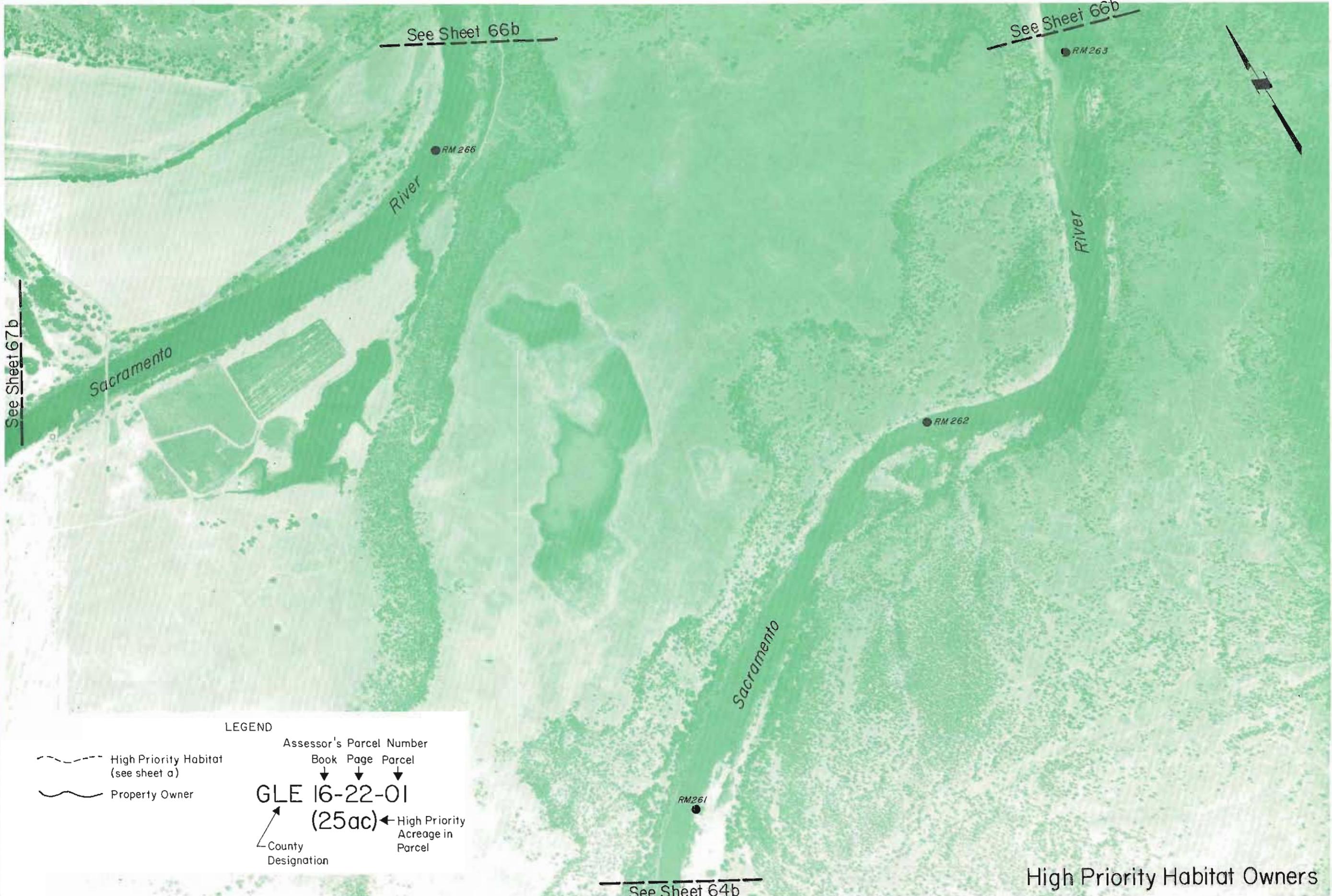
Fish and Wildlife Inventory



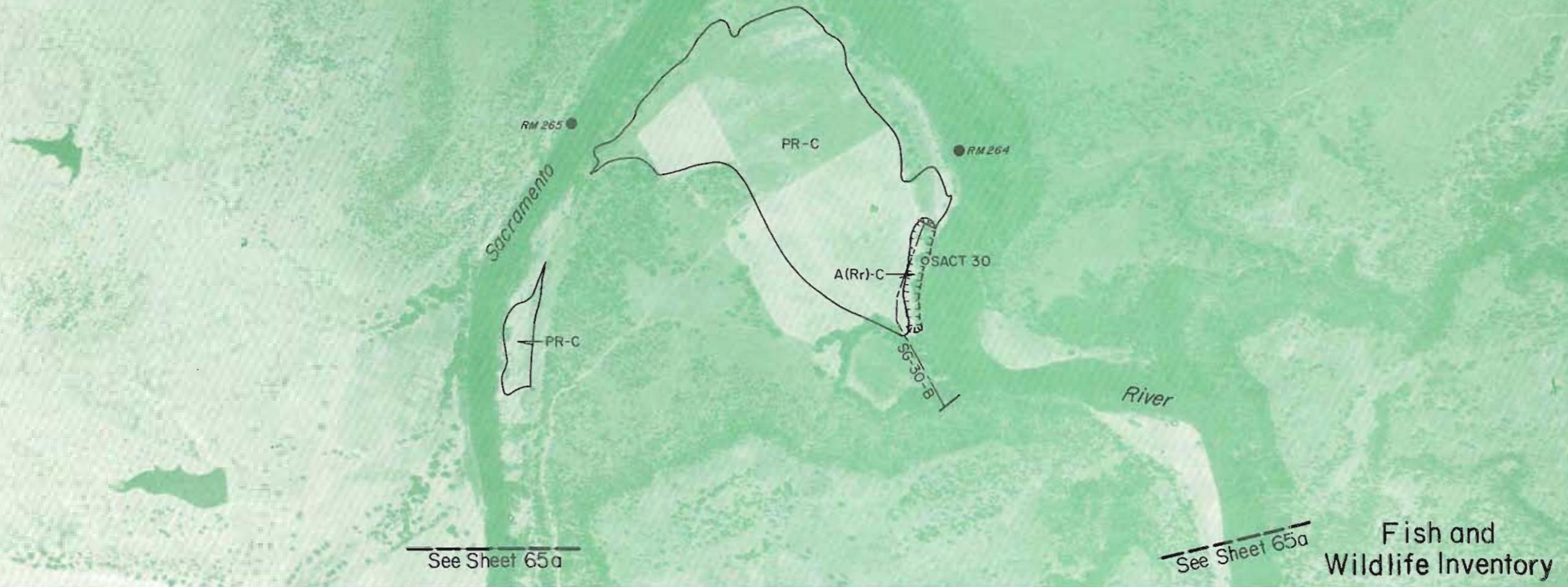








| Map Symbol | Habitat Type | LEGEND | | | |
|------------|--------------------|--------|----------------------------|---------|--------|
| | | Type | Habitat Code (Sub Type) | Site # | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |



Fish and
Wildlife Inventory

LEGEND

High Priority Habitat
(see sheet a)

Property Owner

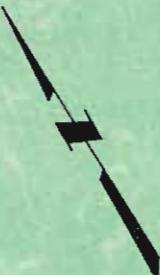
Assessor's Parcel Number

Book Page Parcel

GLE 16-22-01
(25ac)

High Priority
Acreage in
Parcel

County
Designation



Sacramento

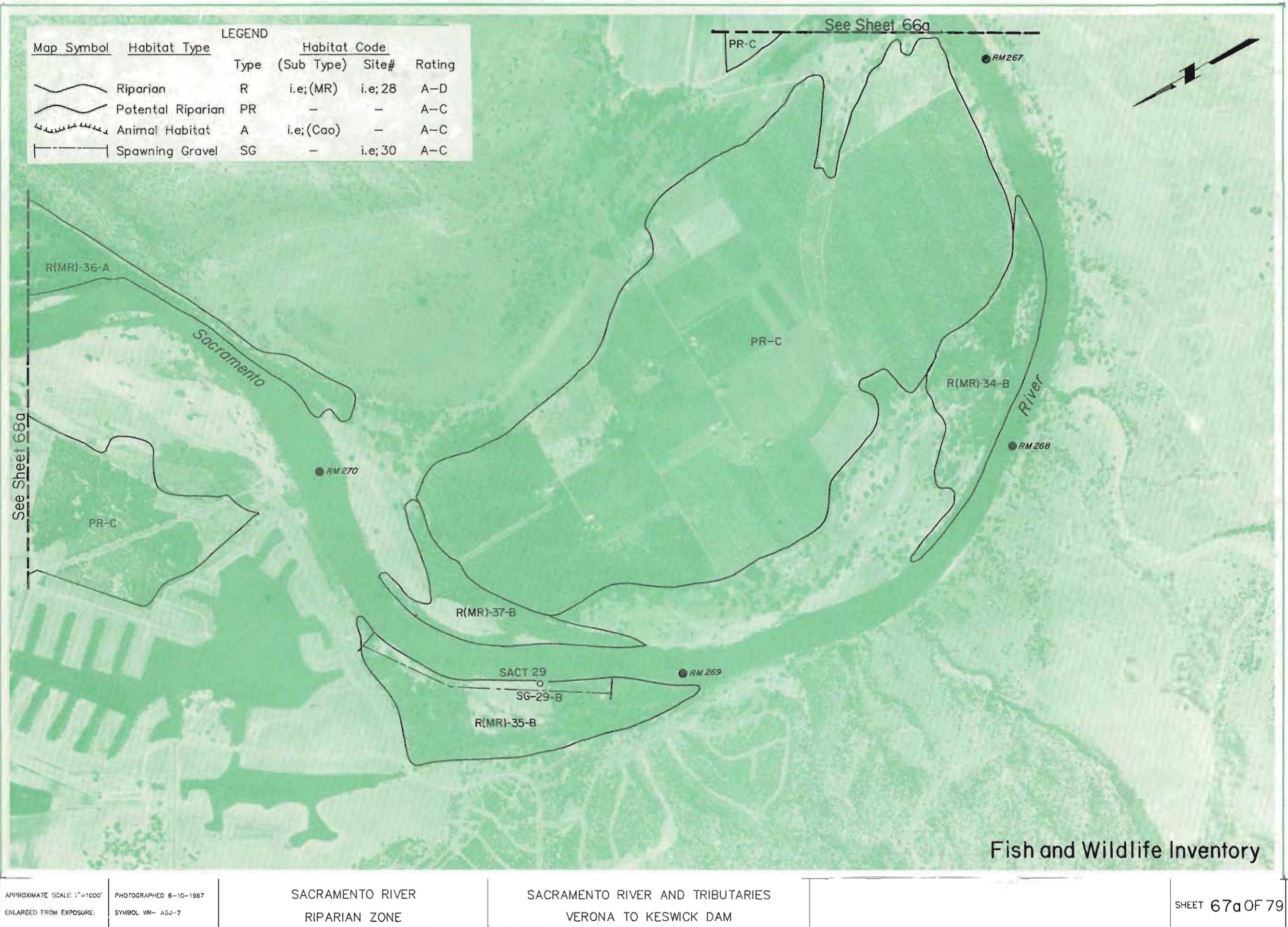
RM 264

River

See Sheet 65b

See Sheet 65b

High Priority
Habitat Owners



See Sheet 66b

RM267

See Sheet 68b
TEH 9-08-38
(21ac)

Sacramento

TEH
9-08-40
(33ac)

TEH 9-12-2
(11ac)

RM270

River

RM268

RM269

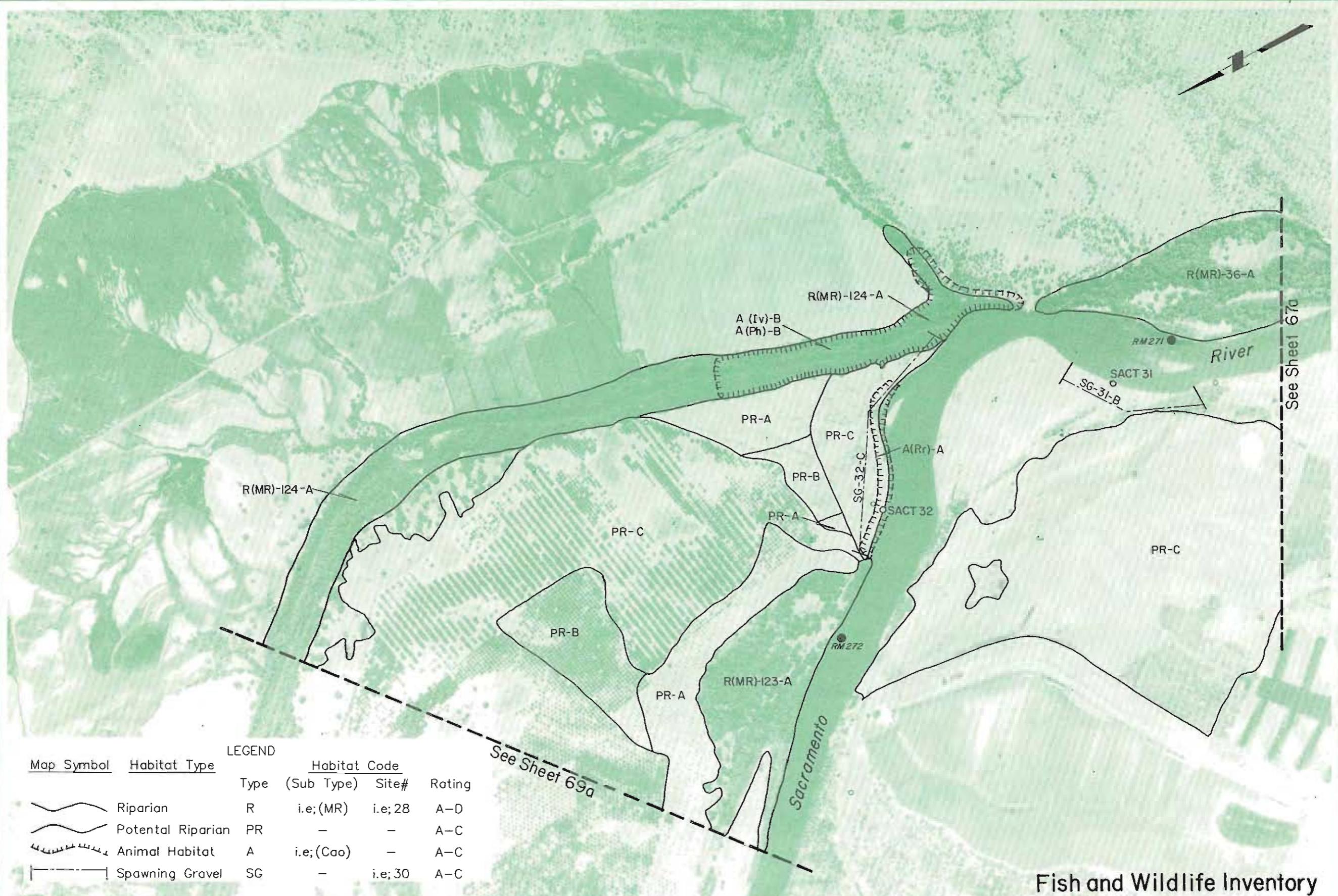
LEGEND

Assessor's Parcel Number
Book Page Parcel
High Priority Habitat
(see sheet a)

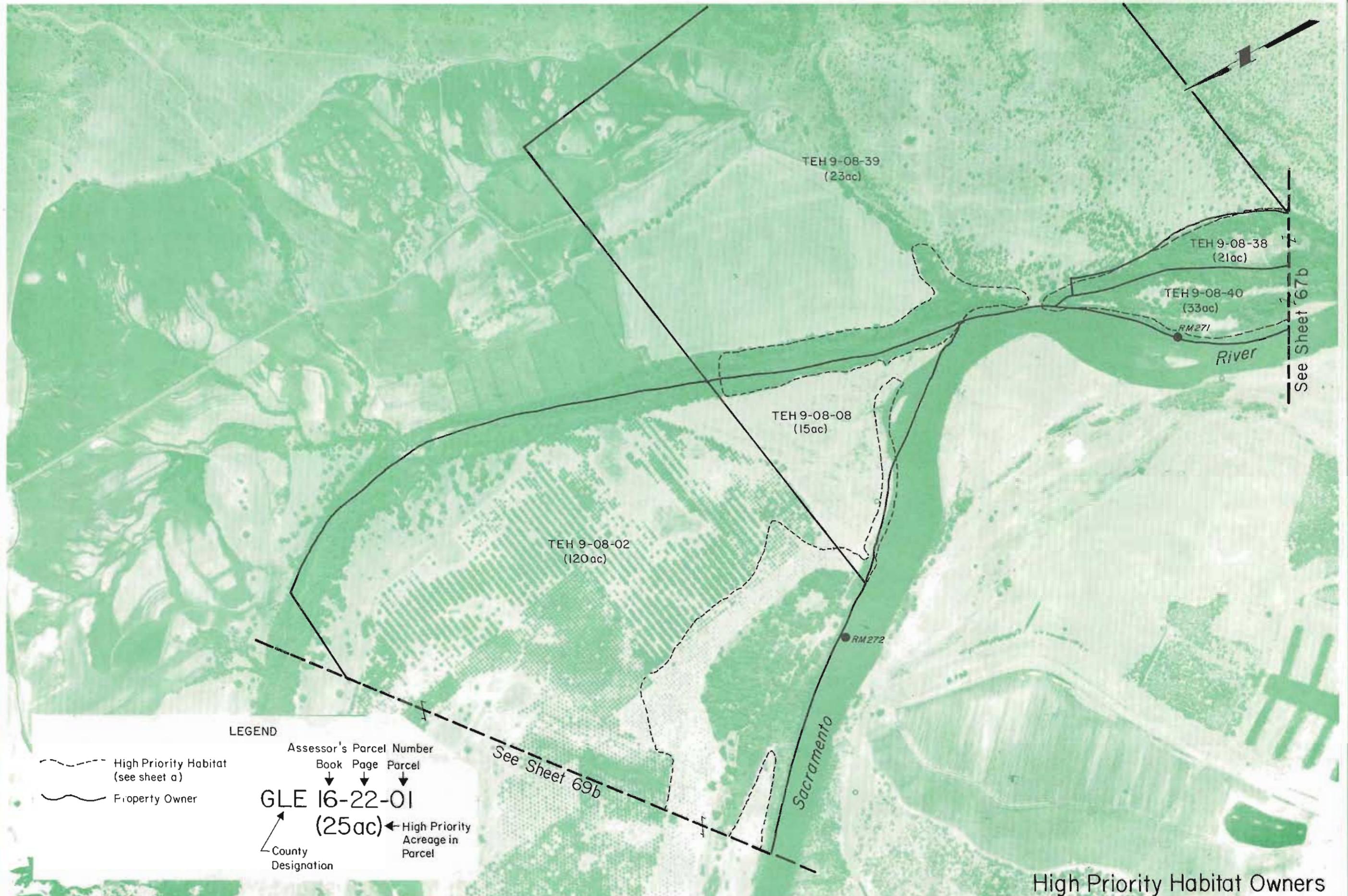
Property Owner

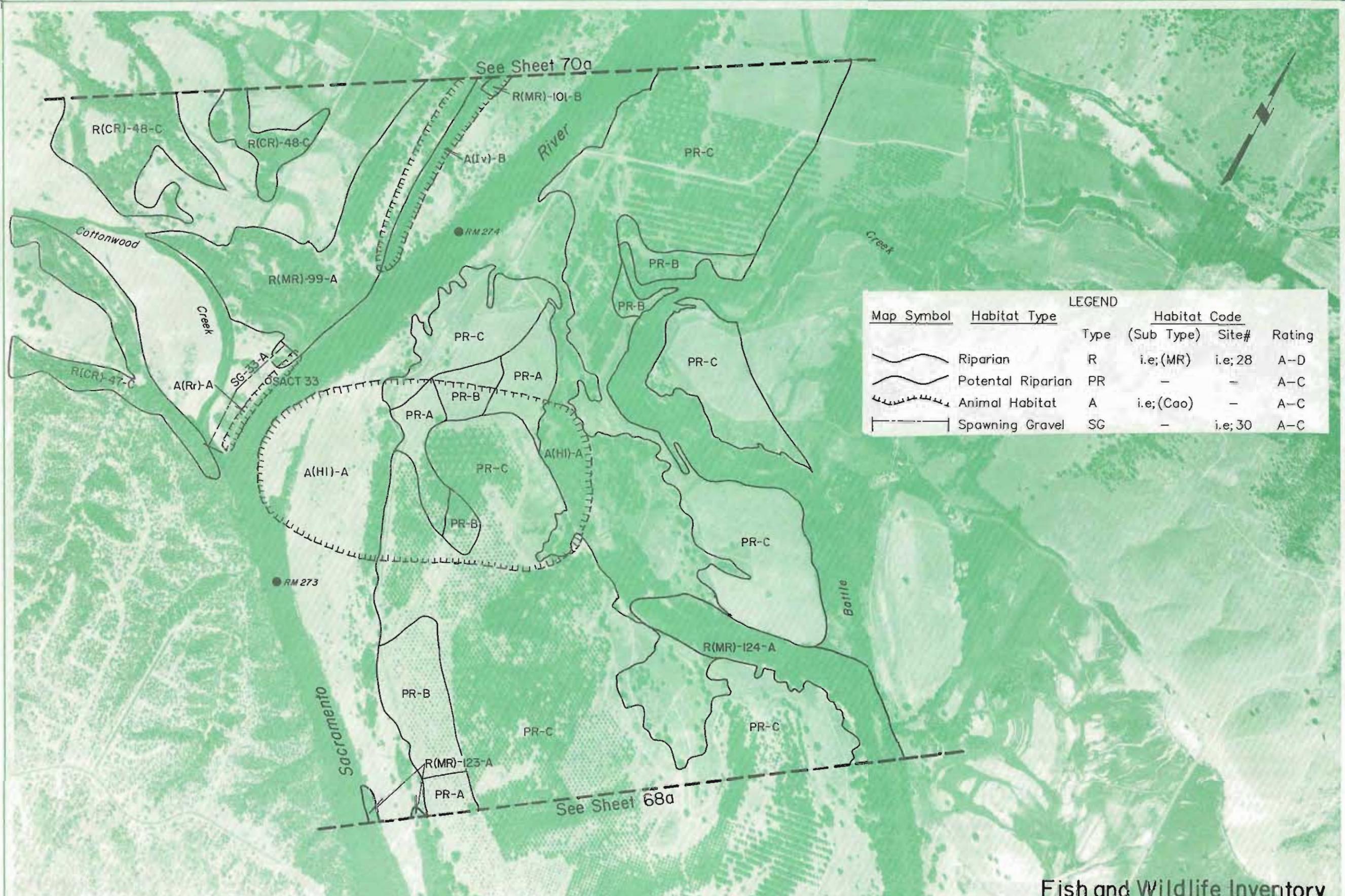
GLE 16-22-01
(25ac) ← High Priority
Acreage in
Parcel
County
Designation

High Priority Habitat Owners

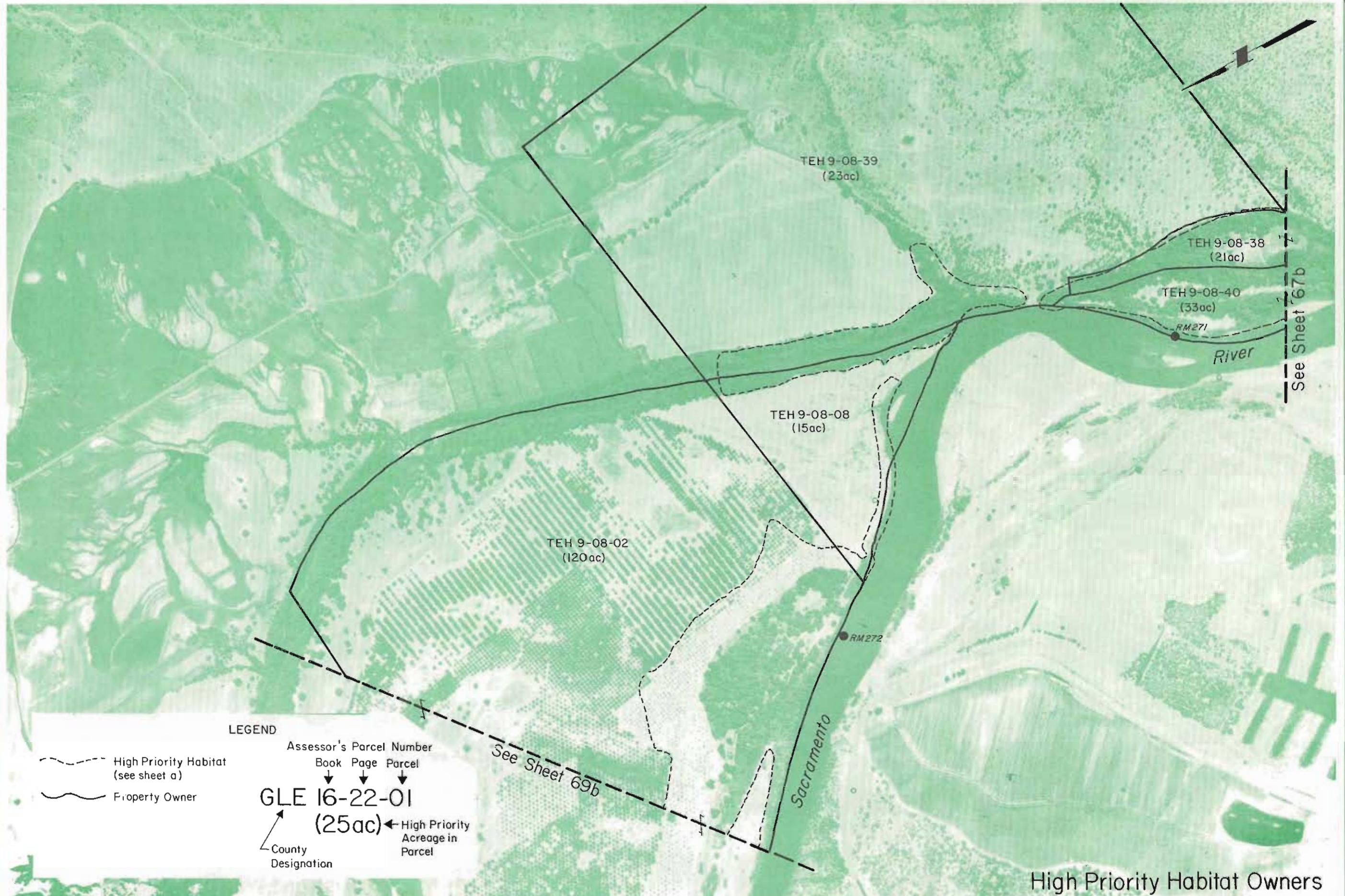


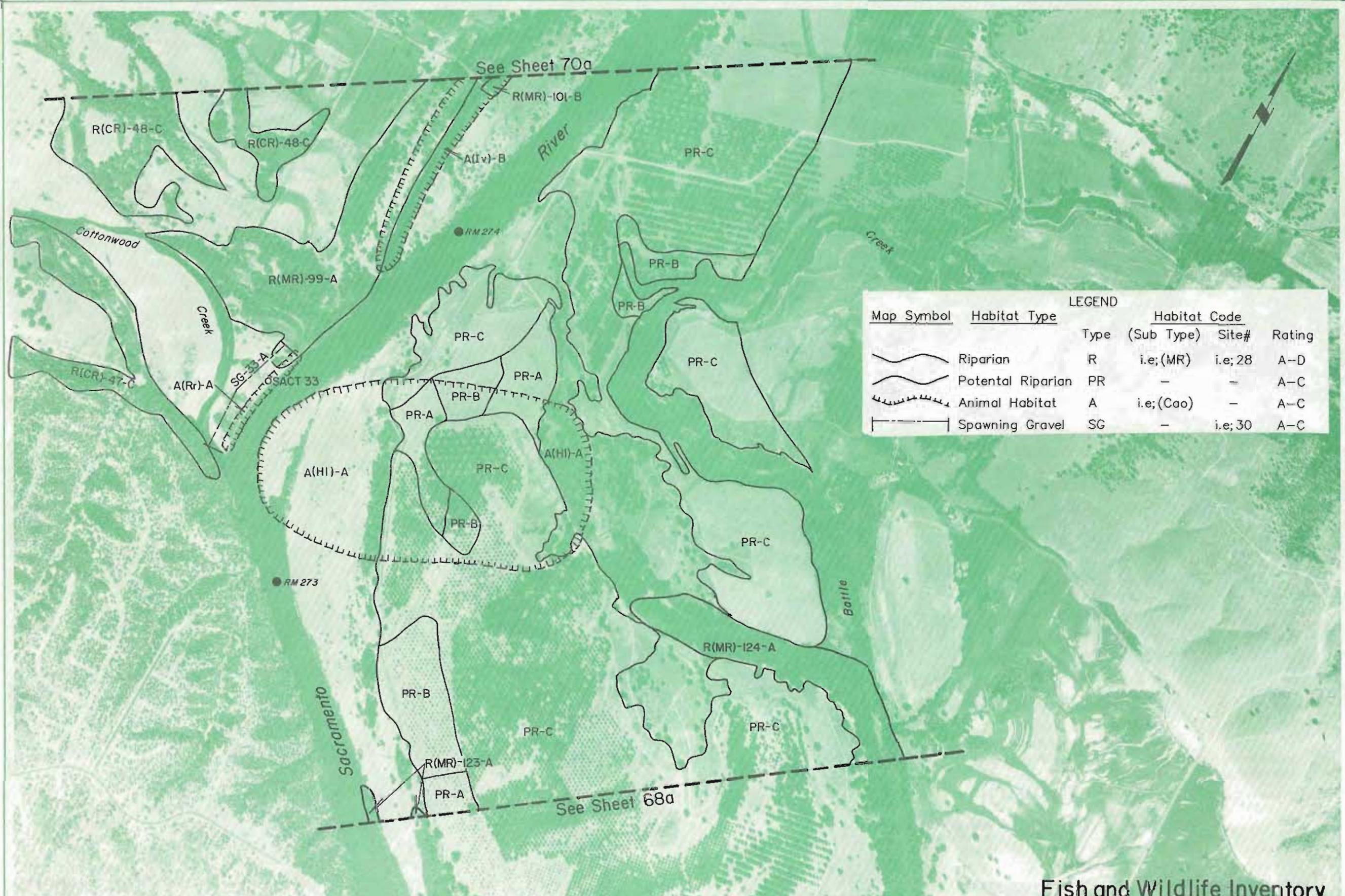
Fish and Wildlife Inventory



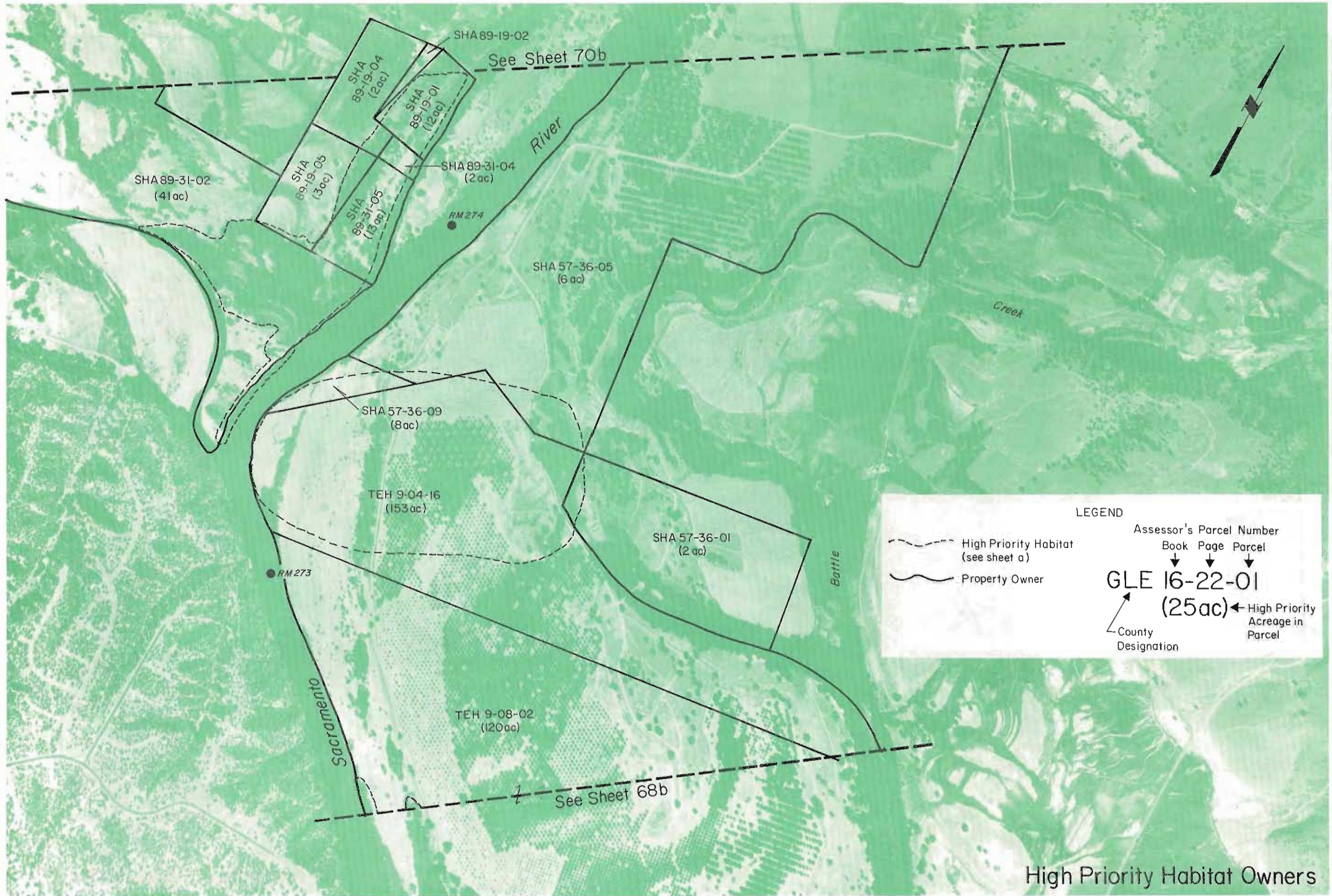


Fish and Wildlife Inventory





Fish and Wildlife Inventory

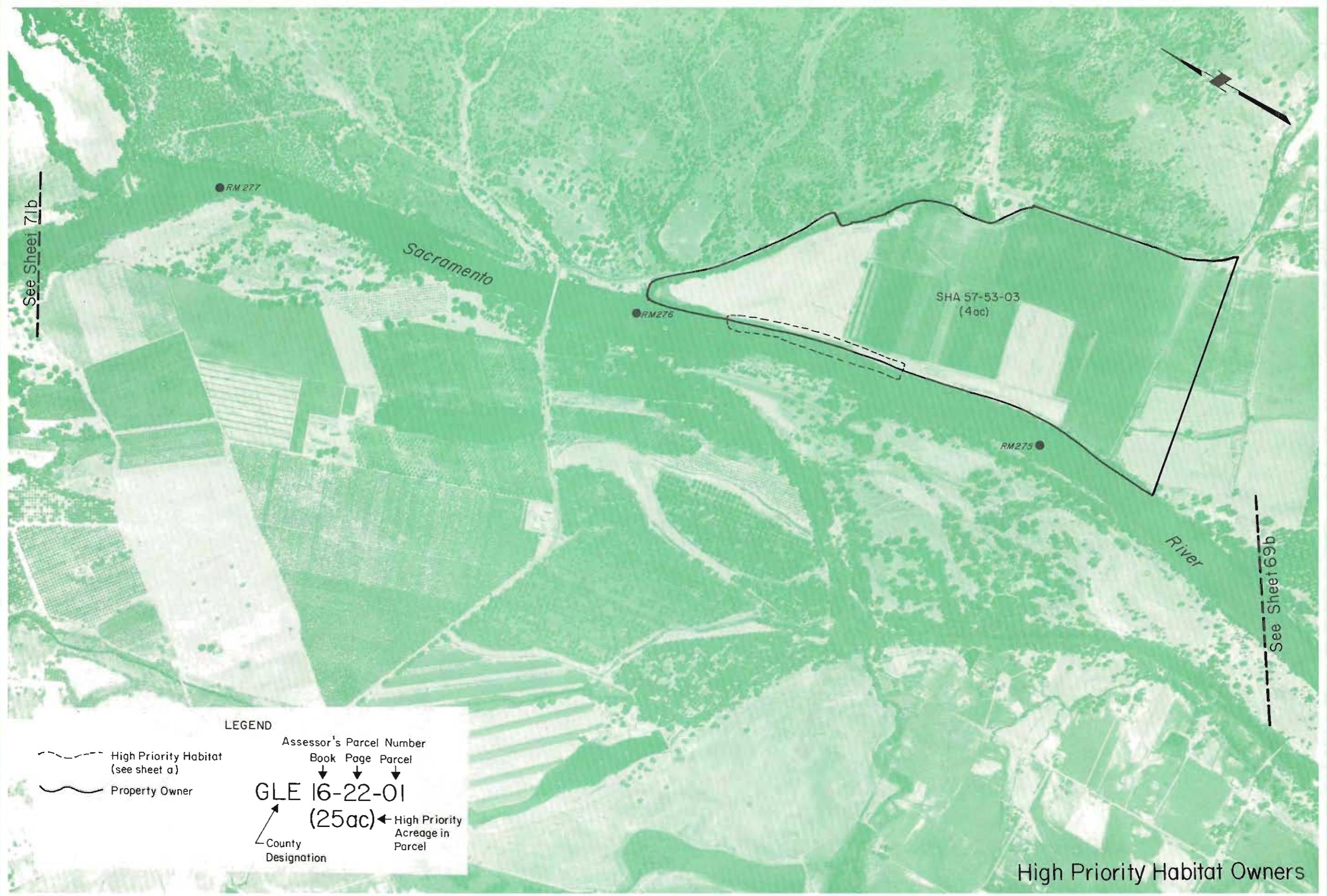




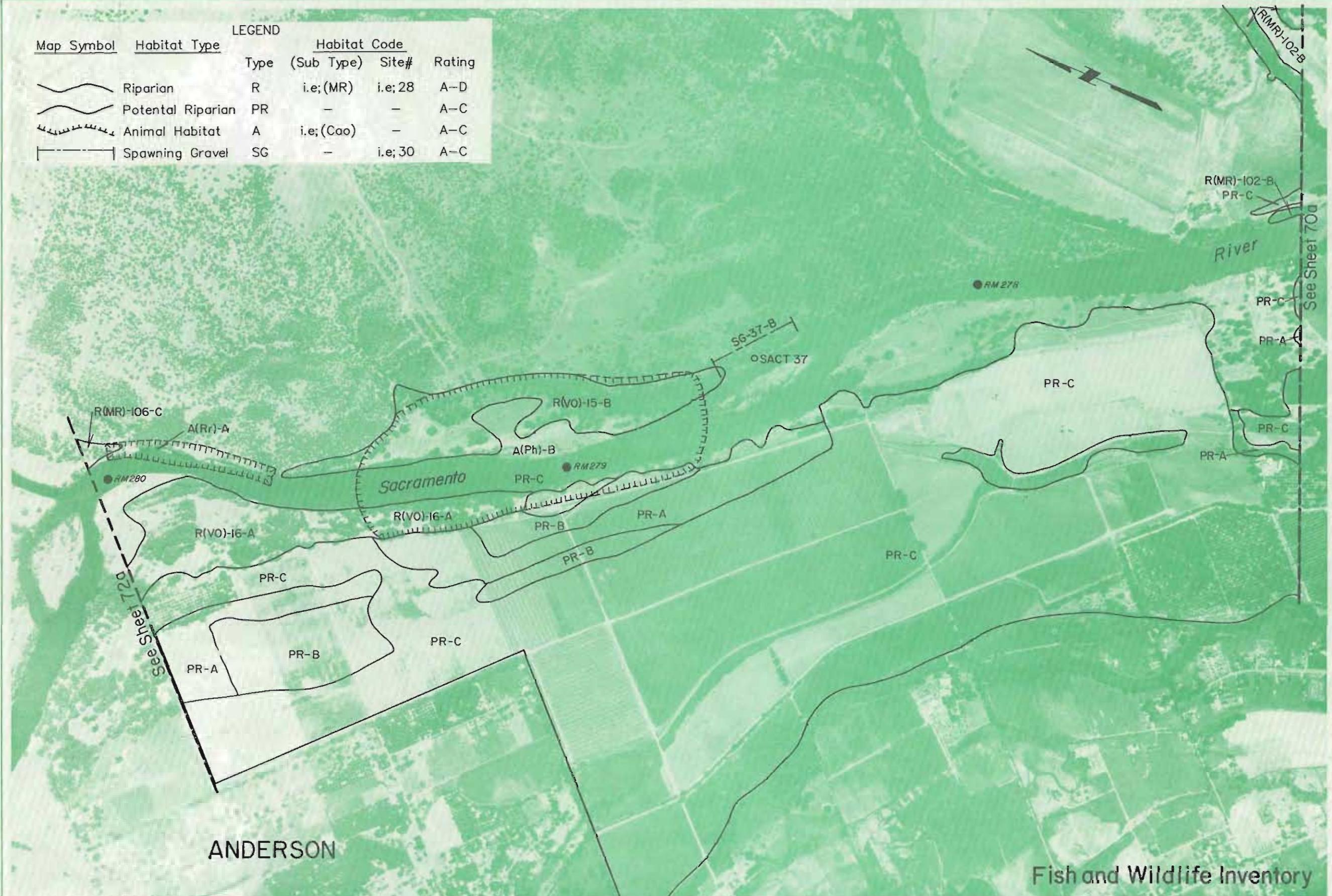
LEGEND

| Map Symbol | Habitat Type | Habitat Code | | | |
|------------|--------------------|--------------|------------|---------|-----|
| | Type | (Sub Type) | Site# | Rating | |
| — | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| — | Potential Riparian | PR | — | — | A-C |
| — | Animal Habitat | A | i.e; (Cao) | — | A-C |
| — | Spawning Gravel | SG | — | i.e; 30 | A-C |

Fish and Wildlife Inventory

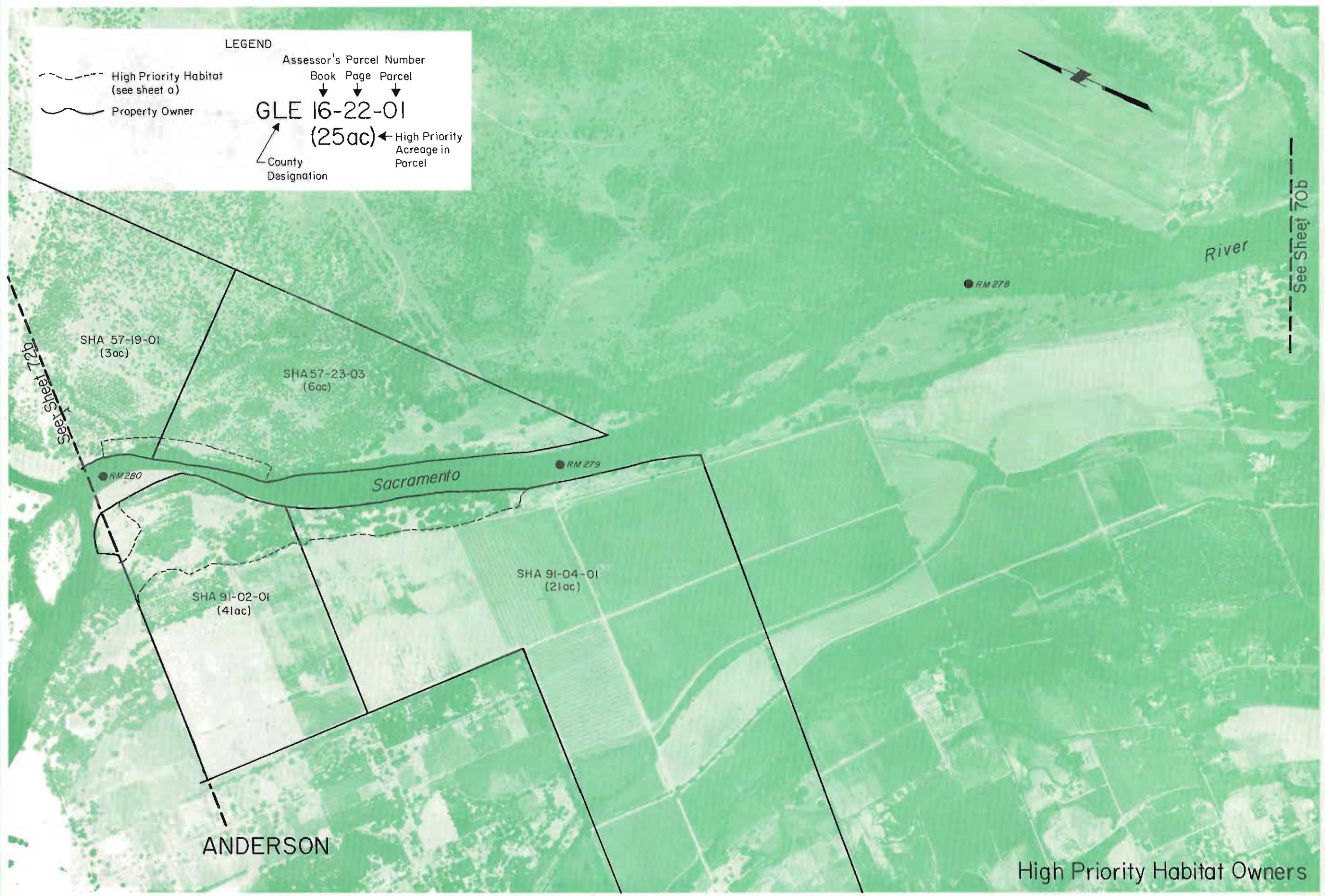


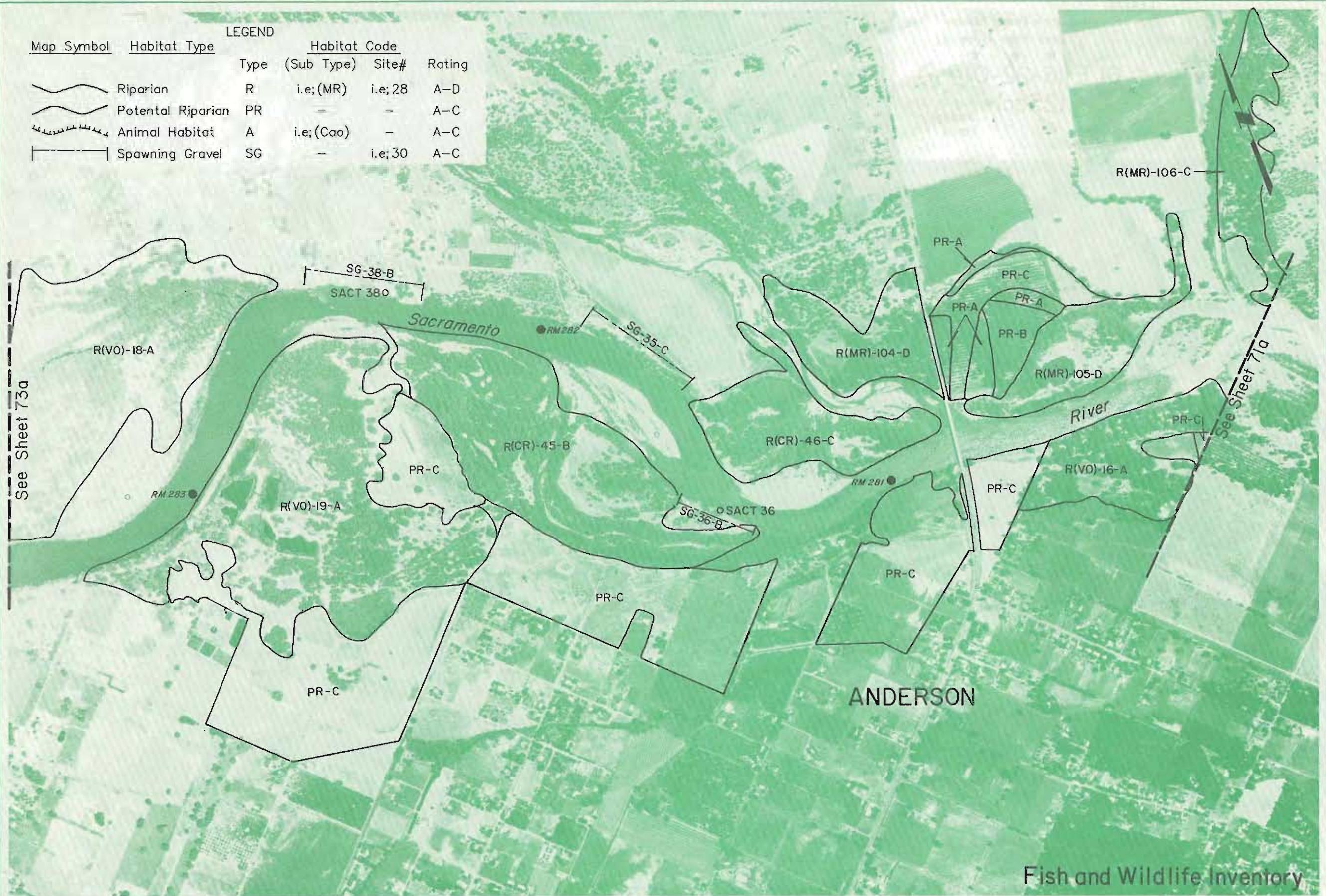
| LEGEND | | | | | | |
|-------------------|---------------------|------------|---------------------|---------|--|--------|
| <u>Map Symbol</u> | <u>Habitat Type</u> | Type | <u>Habitat Code</u> | | | |
| | | (Sub Type) | Site# | | | Rating |
| | Riparian | R | i.e.;(MR) | i.e; 28 | | A-D |
| | Potential Riparian | PR | - | - | | A-C |
| | Animal Habitat | A | i.e;(Cao) | - | | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | | A-C |

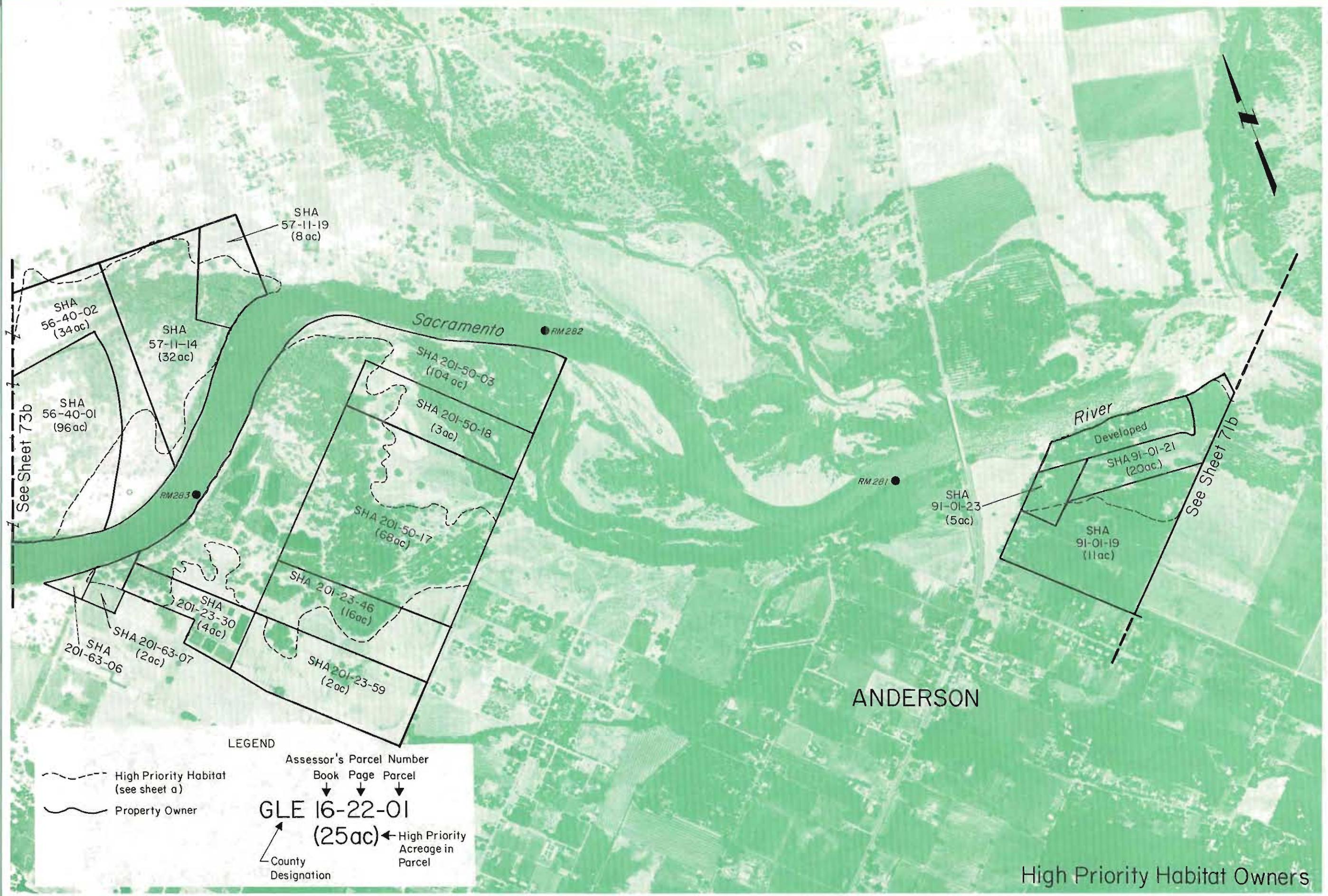


ANDERSON

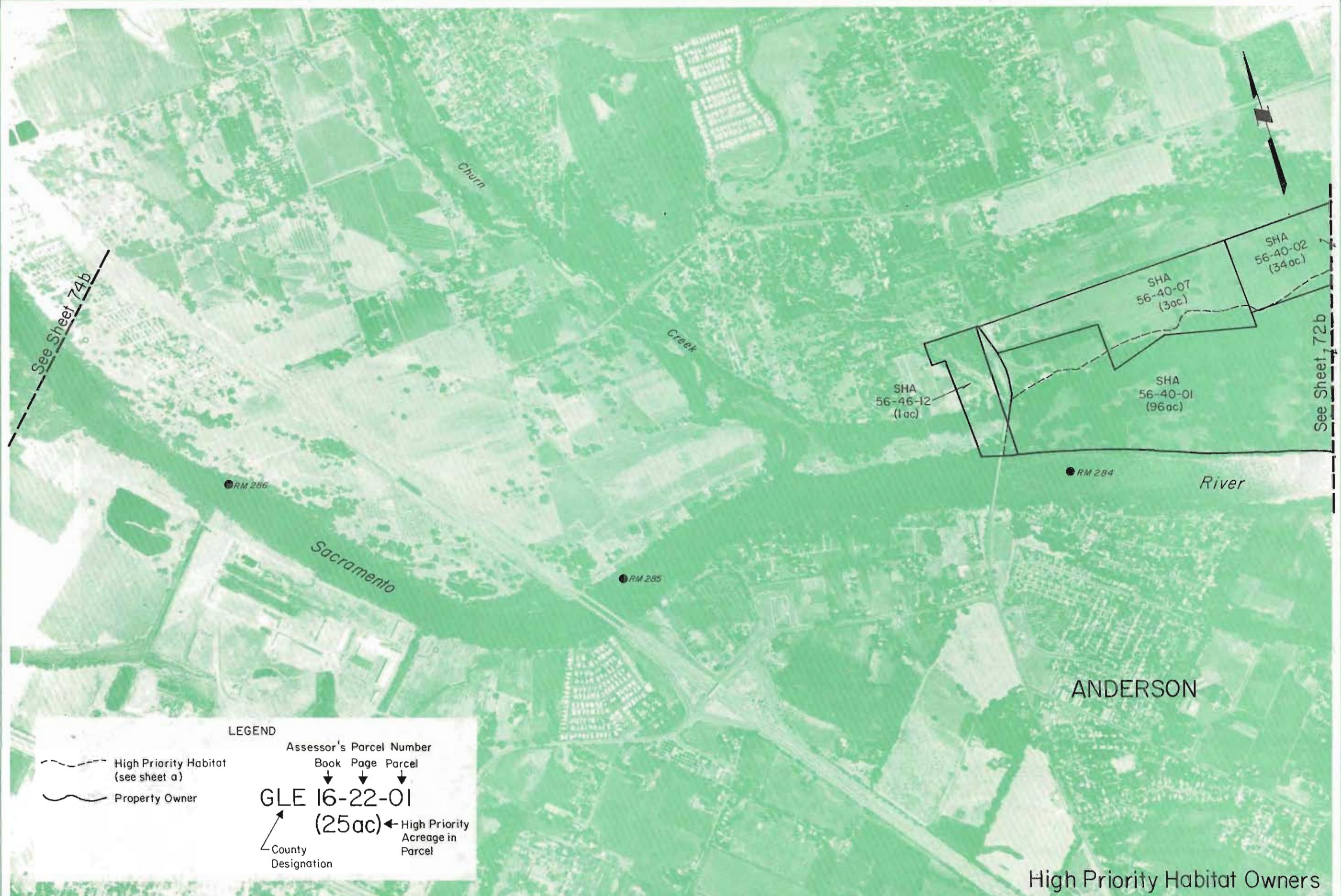
Fish and Wildlife Inventory

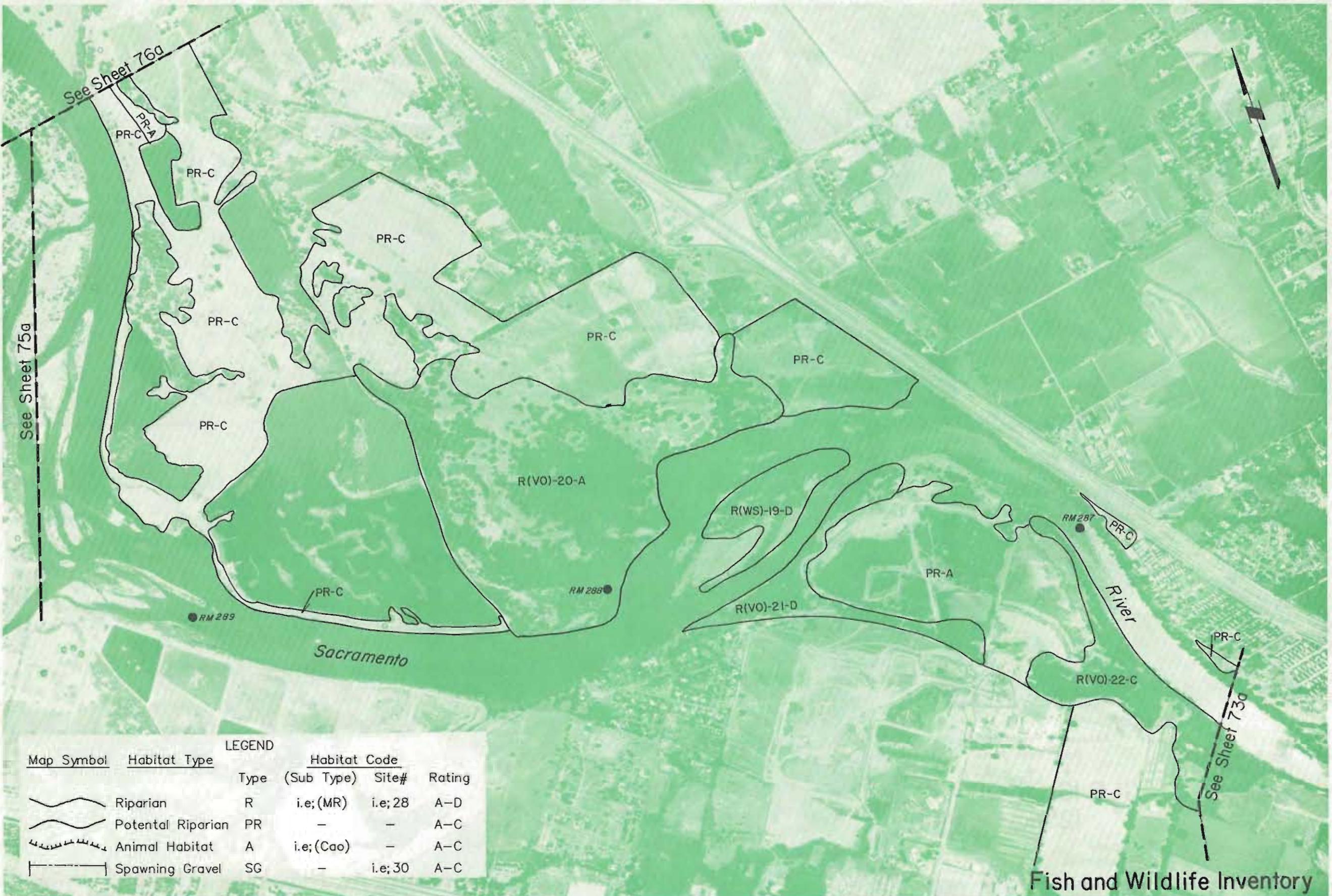


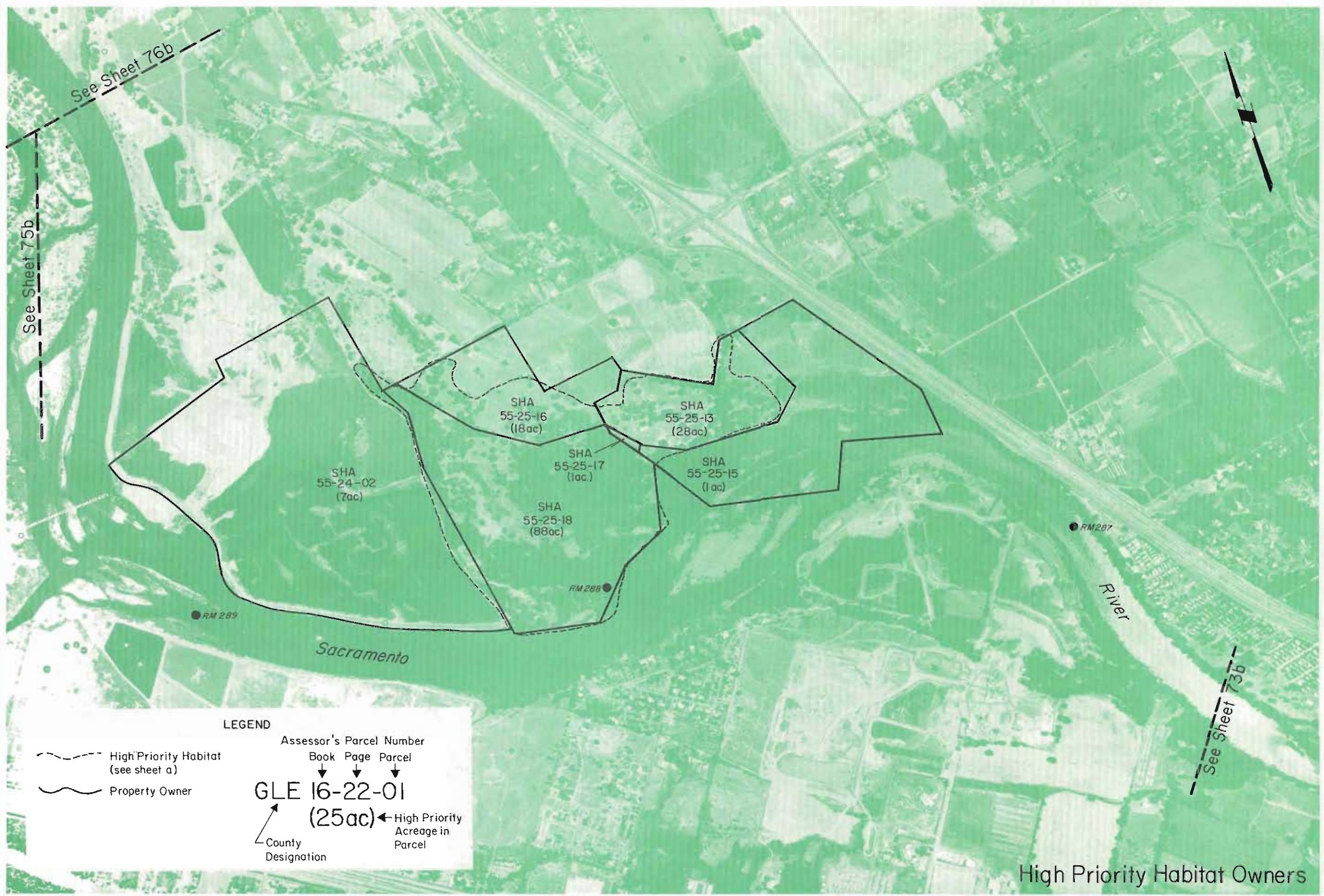












REDDING

76a

See Sheet

74a

PR-C

PR-C

PR-C

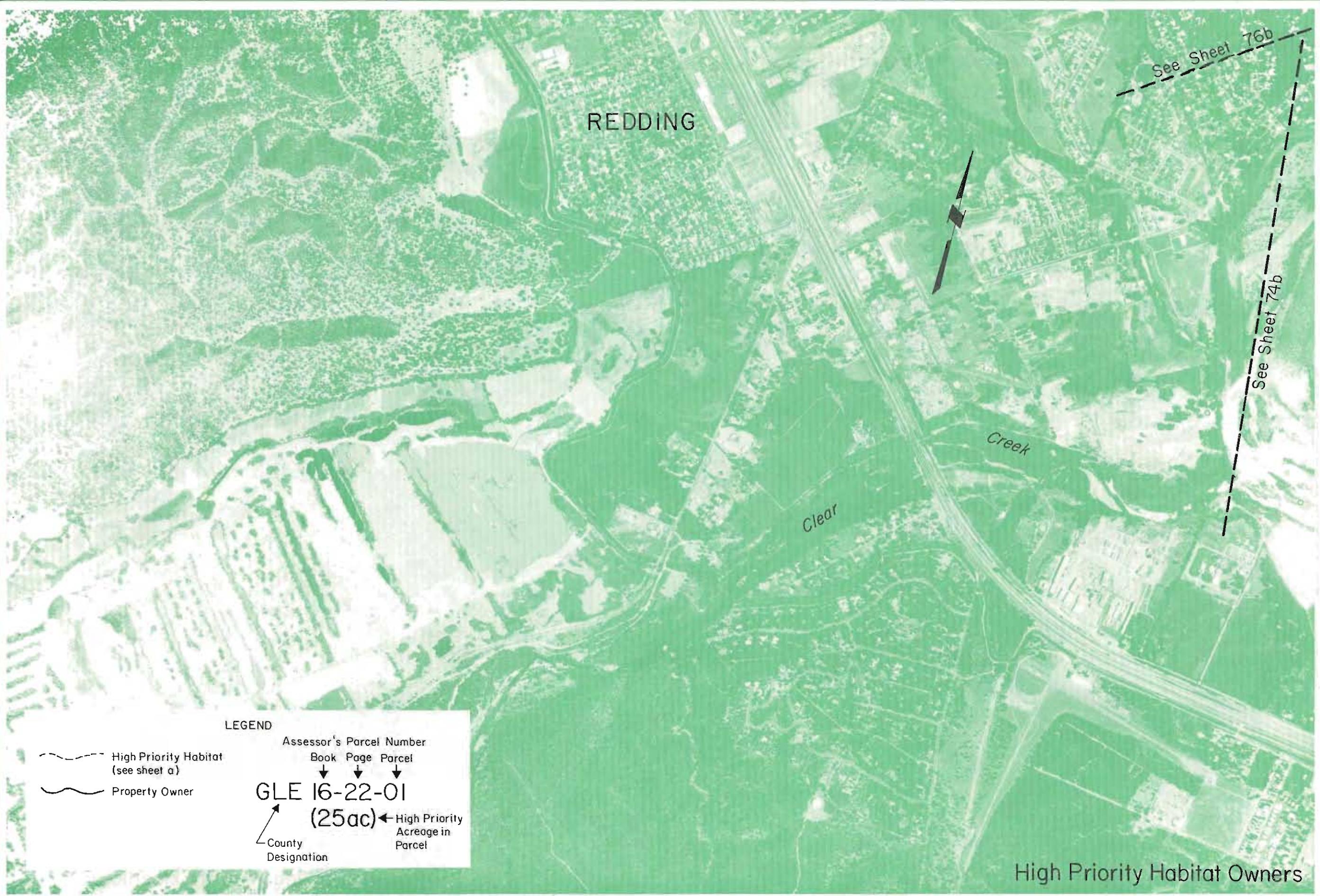
R(CR)-49-D

Clear Creek

LEGEND

| Map Symbol | Habitat Type | Habitat Code | | | |
|------------|--------------------|--------------|------------|---------|--------|
| | | Type | (Sub Type) | Site# | Rating |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

Fish and Wildlife Inventory



APPROXIMATE SCALE 1"=1000'
ENLARGED FROM EXPOSURE

PHOTOGRAPHED 6-10-1987
SYMBOL WR - ASJ-2

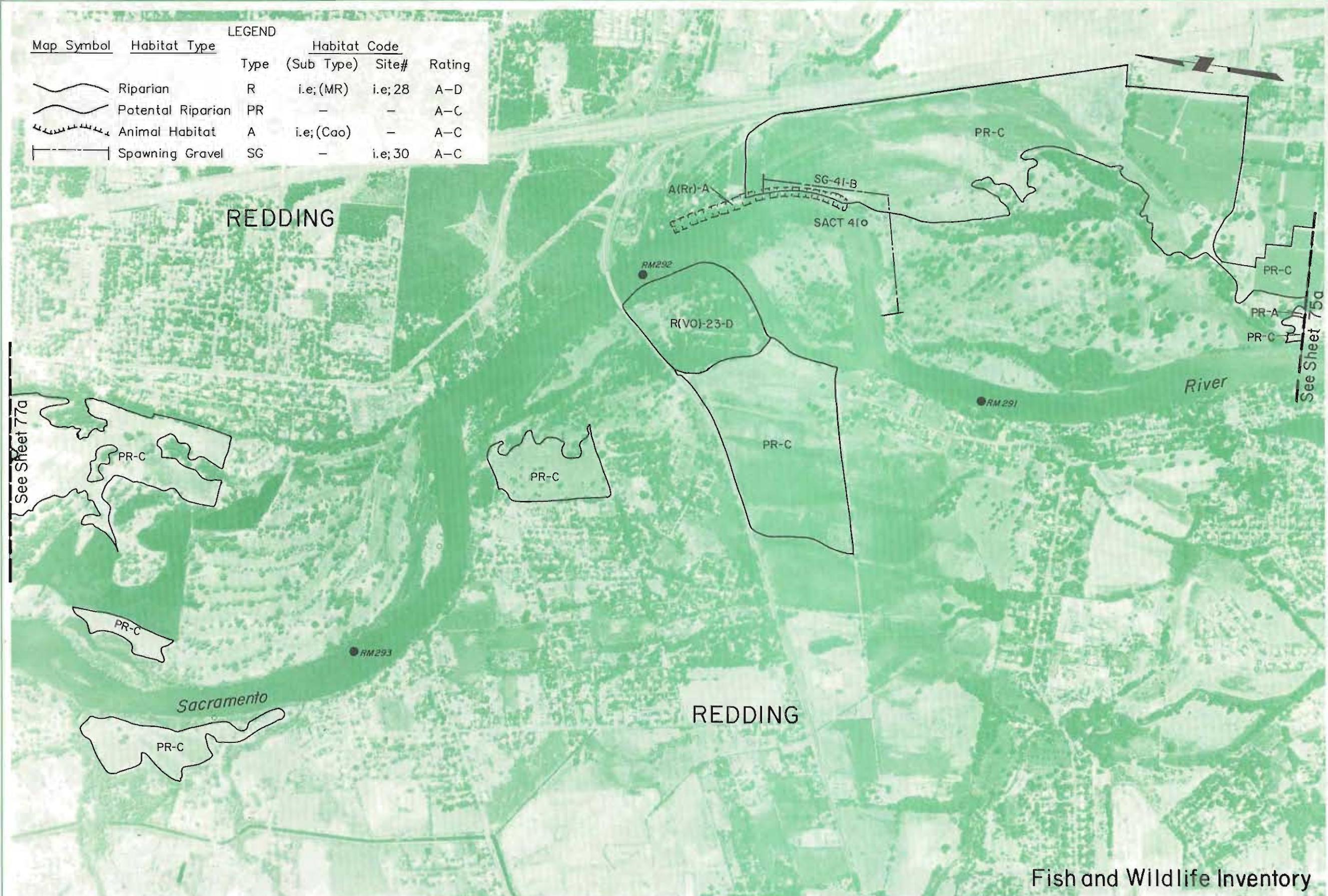
SACRAMENTO RIVER
RIPARIAN ZONE

SACRAMENTO RIVER AND TRIBUTARIES
VERONA TO KESWICK DAM

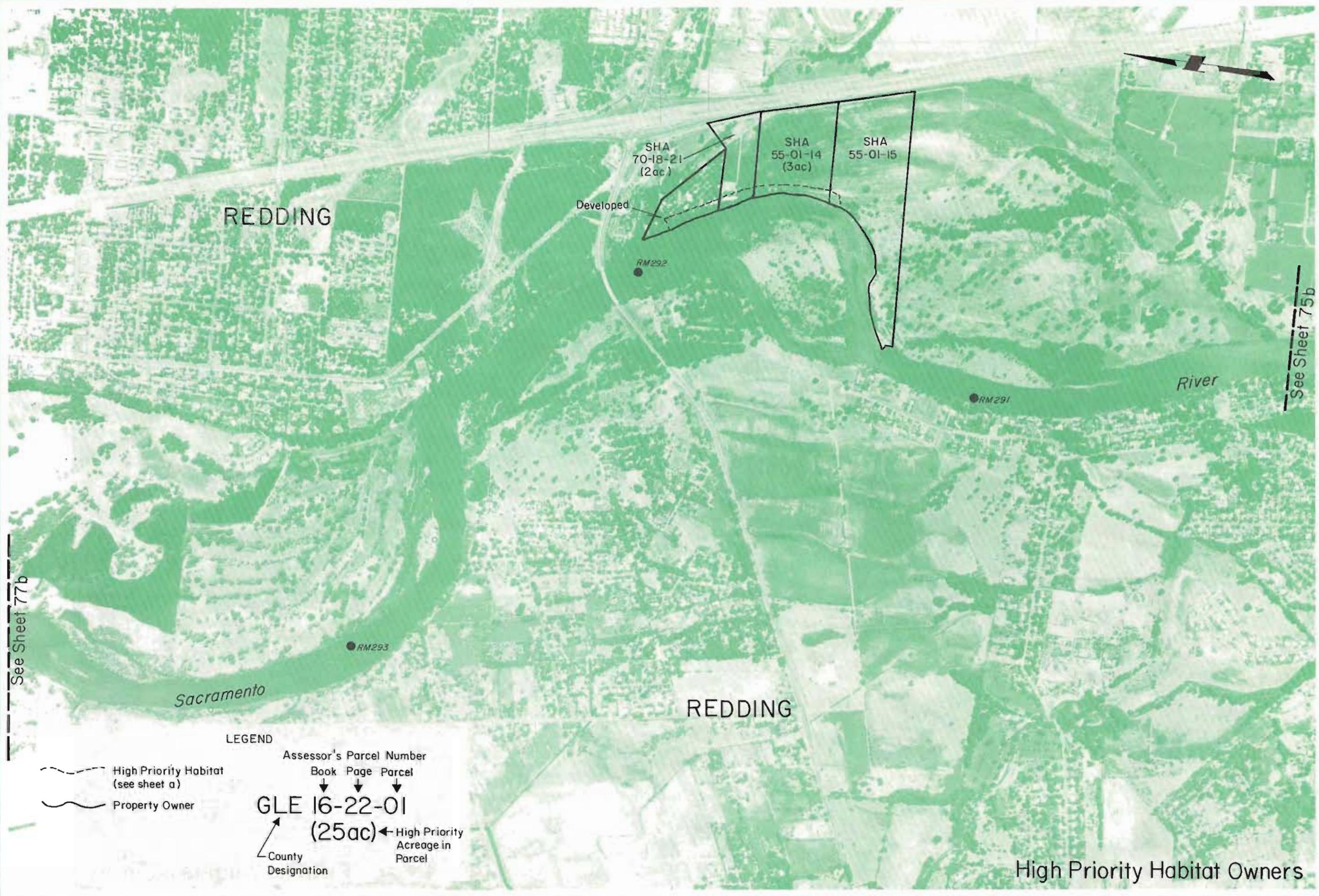
SHEET 75b OF 79

| Map Symbol | Habitat Type | LEGEND | | | |
|------------|--------------------|--------|----------------------------|---------|--------|
| | | Type | Habitat Code (Sub Type) | Site# | Rating |
| | Riparian | R | i.e.;(MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e;(Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

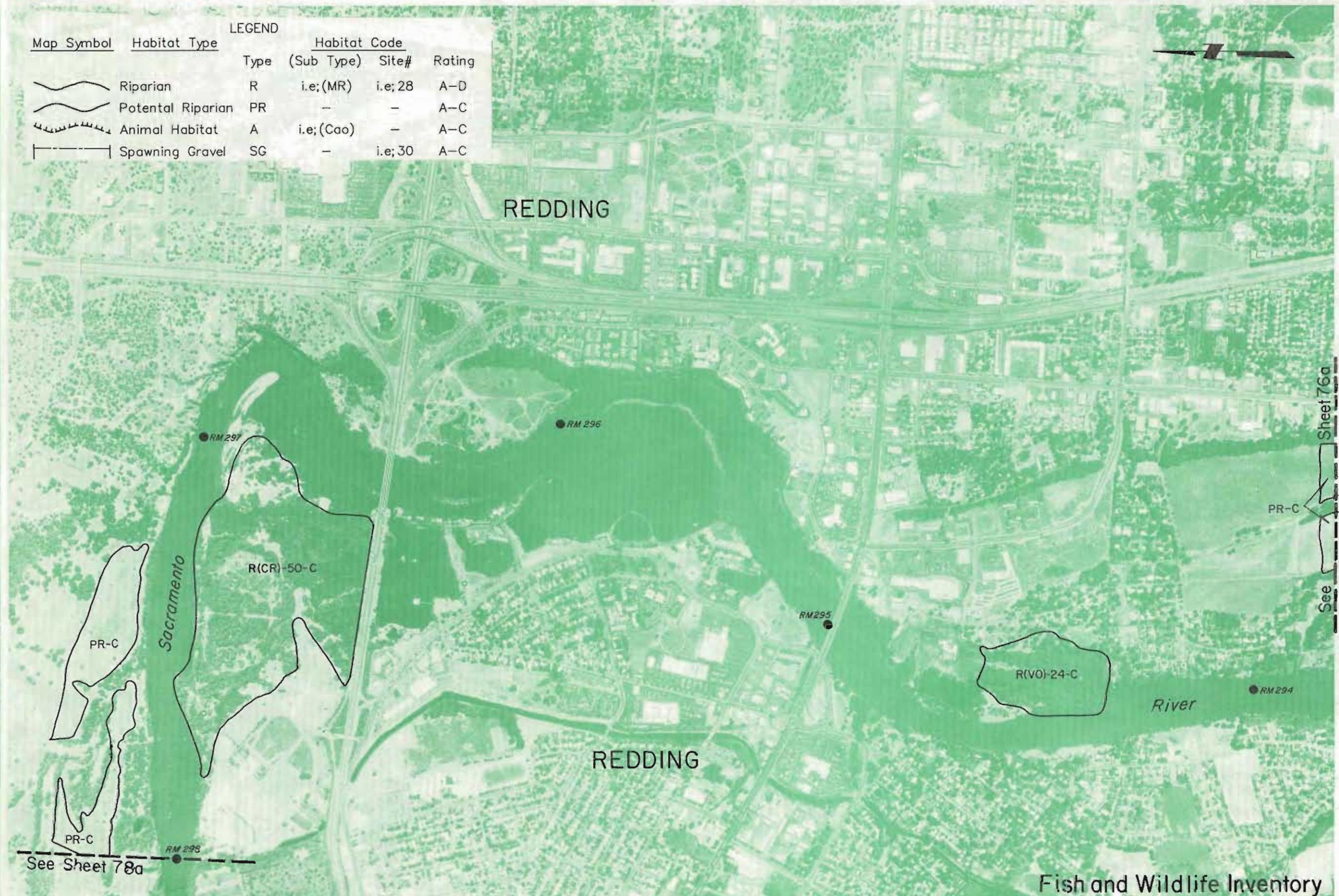
REDDING



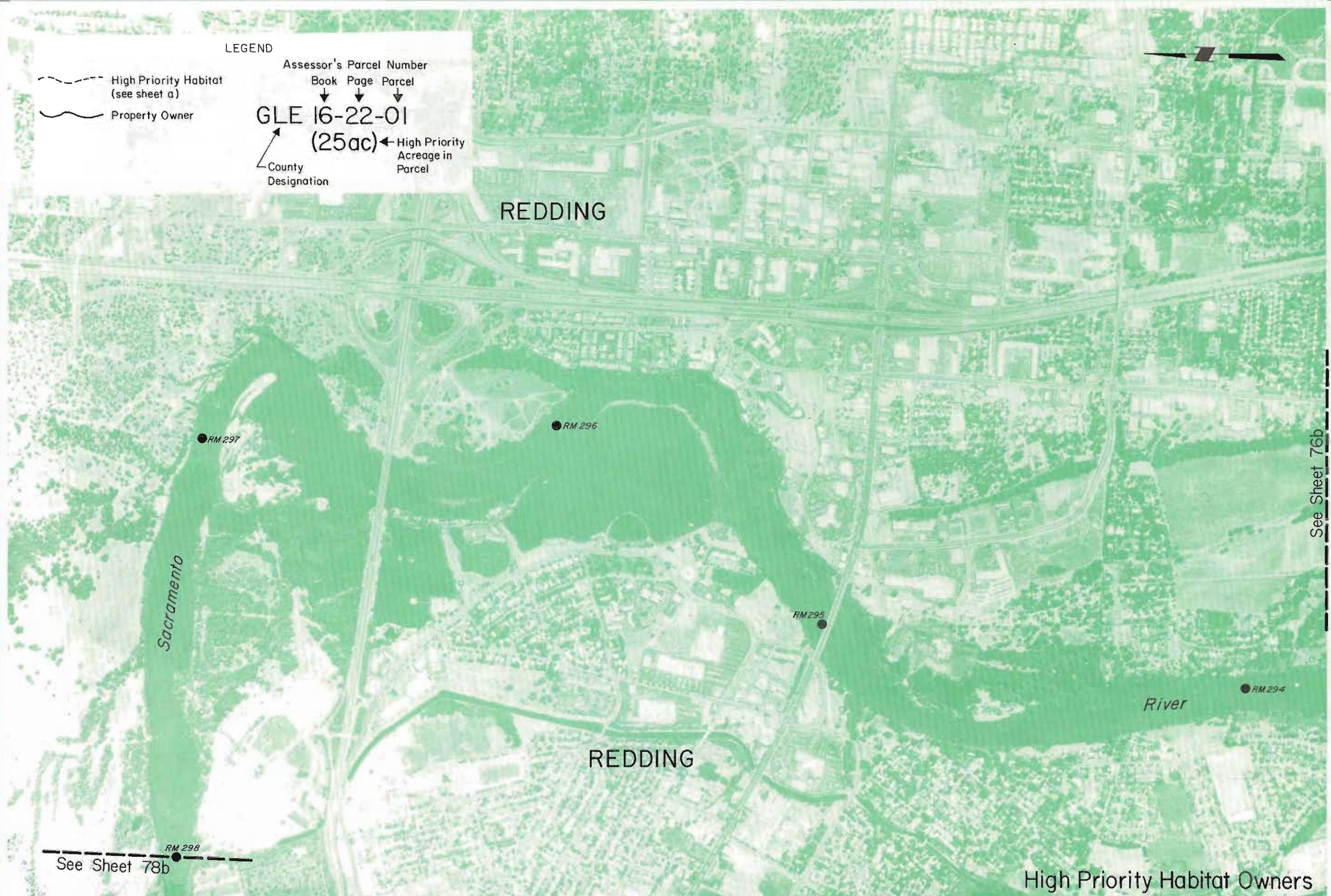
Fish and Wildlife Inventory



| Map Symbol | Habitat Type | LEGEND | | | |
|------------|--------------------|--------|------------|--------------|--------|
| | | Type | (Sub Type) | Habitat Code | Rating |
| | Riparian | R | i.e.;(MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e;(Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |



Fish and Wildlife Inventory



See Sheet 79a

Sacramento

RM 300

RM 299

REDDING

PR-C
PR-C

PR-C

River

RM 298

See Sheet 77a

LEGEND

| Map Symbol | Habitat Type | Habitat Code | | | |
|------------|--------------------|--------------|------------|---------|-----|
| | Type | (Sub Type) | Site# | Rating | |
| | Riparian | R | i.e; (MR) | i.e; 28 | A-D |
| | Potential Riparian | PR | - | - | A-C |
| | Animal Habitat | A | i.e; (Cao) | - | A-C |
| | Spawning Gravel | SG | - | i.e; 30 | A-C |

REDDING

Fish and Wildlife Inventory

See Sheet 79b

Sacramento

RM299

River

RM 298

See Sheet 77b

REDDING

REDDING

High Priority Habitat Owners

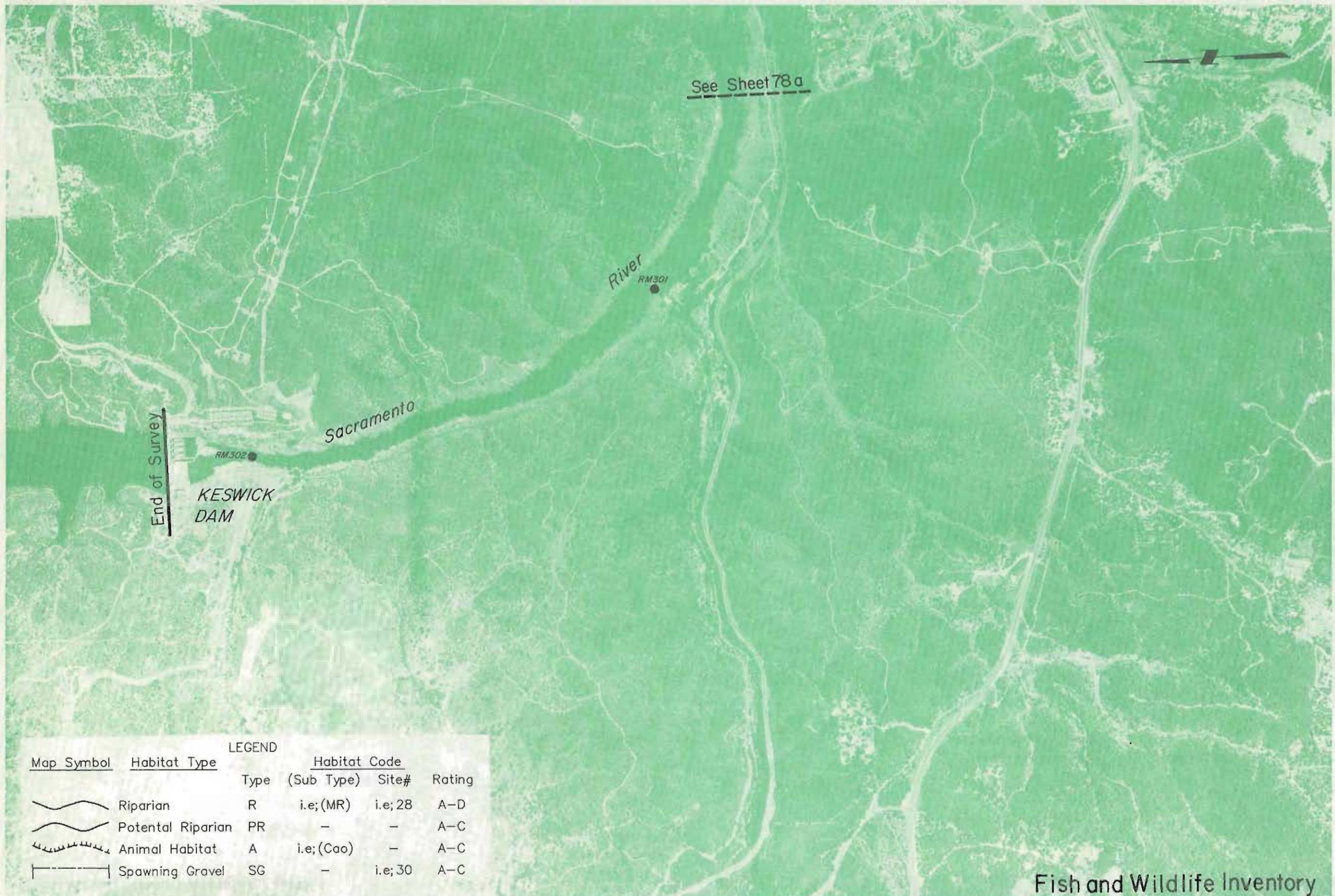
LEGEND

High Priority Habitat
(see sheet a)
Property Owner

Assessor's Parcel Number

Book Page Parcel

GLE I6-22-01
(25ac) ← High Priority
Acreage in
Parcel
County
Designation



Fish and Wildlife Inventory

