

On the Establishment of the Pacific Chorus Frog, *Pseudacris regilla* (Amphibia, Anura, Hylidae), at Ketchikan, Alaska

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Abstract

The only known population of the Pacific chorus frog (*Pseudacris regilla*) occurring and breeding within Alaska was studied in 1991 and 1992. Interviews, site visits and extra-site transect surveys were conducted on Revillagigedo Island of the southeast Alaskan Alexander Archipelago to determine the distributional status of the present chorus frog population. Information available to date indicates that the population of Pacific chorus frogs inhabiting a muskeg pond system in the Ward Lake Recreation Area of Ketchikan, Alaska, was probably introduced ca. 1960. Despite field verifications of breeding activity by chorus frogs at this site in May 1992, numerous extra-site transect surveys for amphibians along the existing road system of Revillagigedo Island conducted during May and July 1992 failed to detect additional specimens or populations of *Pseudacris regilla* elsewhere on the island. The introduced population was observed to breed in 1992, 1993 and 1994; males begin calling individually or in choruses when spring temperatures begin to approach 9.5–10.0°C (ca. 49–50°F). Two vouchers, one male and one female, are preserved in ultra-cold storage awaiting electrophoretic or histological work.

Only three amphibian species (*Bufo boreas*, *Taricha granulosa* and *Pseudacris regilla*) have been verified as occurring on Revillagigedo Island in the Alexander Archipelago of Southeast Alaska (Hodge, 1976; Taylor, 1979; Waters, 1991, 1992a,b). We have determined that the Ketchikan, Alaska, population of the Pacific chorus frog was probably introduced. Previously, one of us (BN) had theorized that the frogs traveled to Ketchikan aboard a timber barge (see Chase, 1992a,b,c), similar to the way in which the clouded salamander (*Aneides ferreus*) was introduced to Vancouver Island, British Columbia (Jackman, 1993). Also, it had been theorized that the population was possibly native (Waters, 1992a).

In 1991, the Pacific chorus frogs were observed by R. Hauver (U.S. Forest Service) at the Ward Creek Recreation Area, Ketchikan, Southeast Alaska. Two live adult specimens were collected on 21 June 1991 and sent to D. Waters for identification and then forwarded to the University of Alaska, Fairbanks, for ultra-cold storage (Waters, 1991, 1992a,b).

In 1992, BN located the population during breeding choruses and gained the interest of the local newspaper, the *Ketchikan Daily News*, which published a brief article on the existence of the population and how it may have arrived (Chase, 1992). The next day, Mr. Ernest DeBoer, Ketchikan resident of more than 45 years, came forward and told the *Ketchikan Daily News* and BN that he had released the frogs as early as 1960 (Chase, 1992a,b,c; DeBoer, 1992 pers. com.).

According to Mr. DeBoer, small (< 4.0 cm) and large (> 4.0 cm) tadpoles, and some small transformed frogs, were

collected from Kirkland, King County, Washington (DeBoer, 1992 pers. com.). Animals were transported in a 5-gallon bucket by plane to Ketchikan with DeBoer and released by him at the exact muskeg pond system site where BN heard ca. 30 chorusing males in late May 1992.

Mr. DeBoer reported that the contents of the bucket used in transporting the introduced specimens may have included at least one other species of frog in addition to the chorus frogs. Both *Rana aurora aurora* (the northern red-legged frog), which is native to western Washington, and *Rana catesbeiana* (the bullfrog), an introduced species to western Washington, occur commonly and breed in King County, Washington. These species are sympatric with *Pseudacris regilla* in the Kirkland, Washington, area, occupy similar habitats, and breed there at approximately the same time of year (Leonard et al., 1993; BN, pers. obs.). Our own recent fieldwork and work by Ketchikan field biologists has not produced any observations of ranids on Revillagigedo Island and at this time no evidence exists that either *R. aurora* or *R. catesbeiana* has been successfully introduced to Alaska.

Dominant vegetation types at the introduction site where BN heard chorusing males in May 1992 were studied at the site and through photographs of the area. A list of the botanical species present is given in Table 1. No frogs were seen at the site by BN though several hours of effort was expended in searching out calling males. Nor were any frogs heard or observed during a 1-hour time-constrained search made by BN and E. DeBoer at the chorus site in July 1992.

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Table 1. Botanical taxa found to be associated with the introduction site of the Pacific chorus frog (*Pseudacris regilla*) at the Ward Creek Recreational Area, Ketchikan, Revillagigedo Island, Alaska, May and July 1992. Botanical taxonomy follows Robuck (1985) and USDA (1990).

Common name	Scientific name
Alder	<i>Alnus</i> sp.
Sphagnum moss	<i>Sphagnum</i> sp.
Yellow pond-lily	<i>Nuphar polysepalum</i>
Sedge	<i>Carex</i> sp. (Family Cyperaceae)
Sitka spruce	<i>Picea sitchensis</i>
Western hemlock	<i>Tsuga heterophylla</i>
Grasses	Family Gramineae
Yellow skunk-cabbage	<i>Lysichiton americanum</i>
Old man's beard lichen	<i>Usnea</i> sp.
Salmonberry	<i>Rubus</i> sp.
Buttercup	<i>Ranunculus</i> sp.

While at the introduction site with Mr. DeBoer in July 1992, BN verified the exact location where DeBoer claims to have made the original release of transforming frogs and tadpoles. The site was exactly where BN had heard chorusing males in May 1992. The specific information reported in paragraphs four and five above as regarding tadpole size classes and types was obtained by BN during two extended interviews in June and one extended introduction site visit with Mr. DeBoer in July 1992.

Amplexed pairs, individual frogs, and egg masses of Pacific



Figure 1. Introduction site of an established breeding non-native *Pseudacris regilla* population, Ketchikan, Ward Lake Recreation Area, Revillagigedo Island, southeast Alaska. Chorusing males were heard calling from within and throughout the Alder strip (*Alnus* sp.) and *Carex* patches shown here which are the dominant botanical species at the immediate introduction site of DeBoer ca. 1960 in the shore interface zone. Facing west from 30 m west of the parking area adjacent to road. May 1992. Photograph by B. Norman.

chorus frogs were observed at the introduction site in June 1992 by Mr. Paul Zellmer (U.S. Forest Service, Tongass National Forest). Mr. Zellmer has observed breeding activity at the introduction site in 1993 and 1994 (Zellmer, 24 January 1995 pers. com.). He insists, however, that no new localities have been verified on Revillagigedo Island since he began his seasonal observations on the population in 1992 (U.S. Forest Service, unpublished data). His more specific observations to date are: 1) the frogs are utilizing clumps of grasses (Family: Gramineae) and sedges (*Carex* sp.) for cover adjacent to the pond system margins; 2) males initiate calling as spring air temperatures approach 9.5– 10.0°C (= ca. 49– 50°F) at the site; 3) as darkness increases less perturbation is tolerated by calling males before they cease calling in response; and 4) both green-dominated and brown-dominated color phases of this extremely varied species of frog are present at the introduction site (Zellmer, 3 June 1992 pers. com., 24 January 1995 pers. com.). The utilization of sedges and grasses as claimed by Zellmer is consistent with the observations of BN at the site in May 1992.

The distribution of the chorus frog in southeast Alaska appears to be limited to the single muskeg pond system in the Ward Creek Recreation Area where they were originally introduced (Figures 1, 2 and 3). Forty-five extra-site transect and quadrat amphibian surveys were conducted by BN on Revillagigedo Island during May and July 1992 at 24 localities including the introduction site (Norman and Hassler 1995). No additional populations or individuals of the Pacific chorus frog were discovered during these efforts. These data seem to indicate that the chorus frog population has not significantly expanded its range on Revillagigedo Island since its introduction there.

New localities on Revillagigedo Island for the rough-skinned newt (*Taricha granulosa*) and the boreal toad (*Bufo boreas*) were discovered during the fieldwork (Hodge, 1976; Waters, 1992b; Norman and Hassler, 1995) and these will be reported on specifically elsewhere. Both of these amphibian species are native to the island but only *T. granulosa* was found sympatric with the calling male chorus frog population at the introduction



Figure 2. Same locality as in Figure 1, moving left from Figure 1, which overlaps in the right portion of this frame. Note the fairly mature spruce and hemlock stand/muskeg interface at the far end of the main pond of the introduction site pond system. May 1992. Photograph by B. Norman.

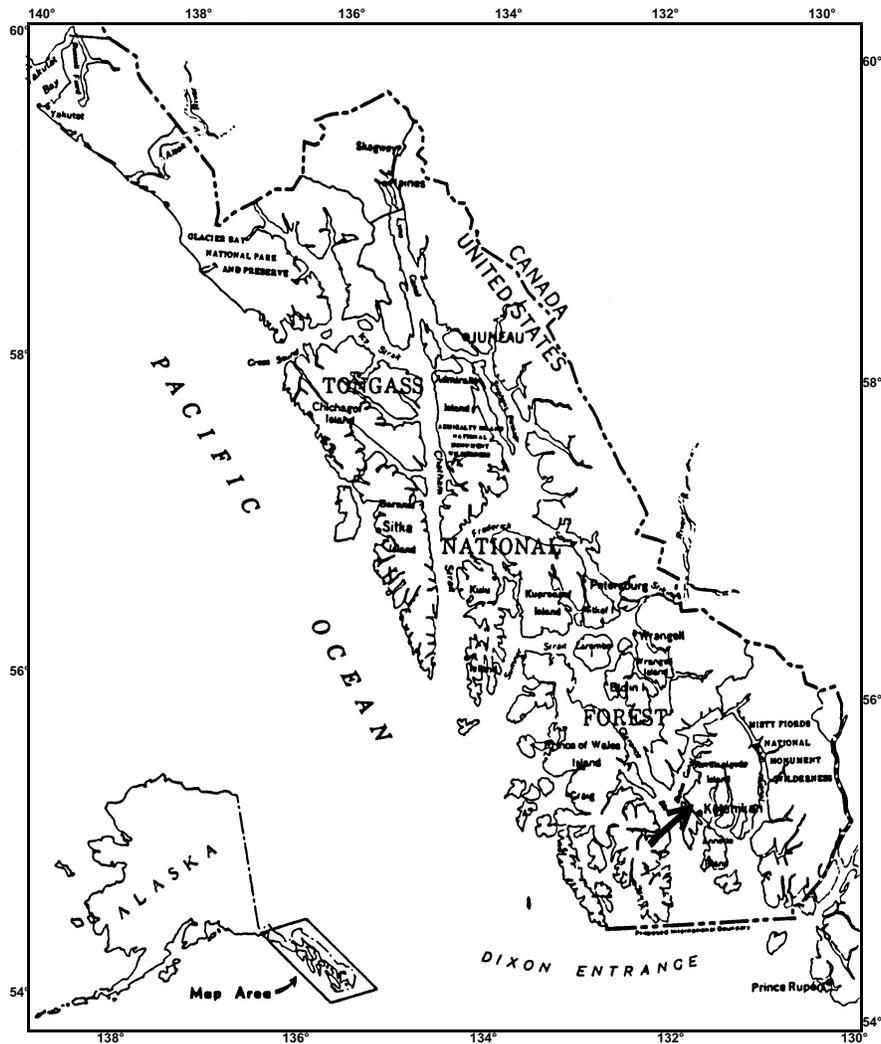


Figure 3. Map showing the location of the only known established population of *Pseudacris regilla* introduced to and breeding within the state of Alaska.

site. A recently metamorphosed newt was found under cover about 1.0 m from the chorus pond shore during the July 1992 visit, indicating that *T. granulosa* probably breeds at the site as well. Adult *T. granulosa* (females and males) in breeding condition were collected at the site during May 1992. *B. boreas* was found at a nearby Ward Lake locality and on the unpaved road bisecting the introduction site from the main Ward Lake area but not at the May 1992 chorus site per se (Norman and Hassler, 1995).

In studying Pacific chorus frogs in Oregon, Jameson (1956) determined that most juveniles were found to disperse < 200 yards from one rearing pond. It would be interesting to study whether or not similar dispersal patterns are in operation at the introduction site. Perhaps selective pressures limiting dispersal have resulted in an extremely limited insular distribution for this usually ubiquitously occurring taxon which inhabits all available and varied habitats within its range in the lower western United States and British Columbia, Canada (Stebbins, 1985; Leonard et al., 1993).

We invite interested workers to genetically compare *Pseud-*

acris from Kirkland, Washington, and from Ketchikan, Alaska. Two specimens have been collected from Ketchikan and are stored at the University of Alaska, Fairbanks, Museum. Please refer to Waters (1992a) for locality and museum information. In addition, further research into the impacts this introduction is presently exhibiting on the native amphibian populations of Revillagigedo Island, if any, is strongly encouraged.

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