

Recommended Minimum Dreissenid Mussel Early Detection Monitoring

| Calcium | Dreissenid Mussel Biology* | Monitoring** |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24 mg/L High | <ul style="list-style-type: none"> • Adult mussels survive long-term. • Reproduction and full life-cycle completion occurs. • Introduced veligers and other life stages can survive. • Calcium is not a limiting factor. | <p>Plankton tows:</p> <ul style="list-style-type: none"> • Twice per month at water temperature 16-24 °C (61-75 °F) • Once per month, 12-16 °C (54-61 °F) or 24-28°C (75-82 °F) <p>Surface surveys (and/or artificial substrates if no existing surfaces) checked at least monthly.</p> |
| 15 Moderate | <ul style="list-style-type: none"> • Adult mussels survive long-term. • Reproduction can occur, but survivorship is reduced due to inadequate calcium for veliger development. • Survivorship increases as calcium increases up to 24 mg/L. • Minimum calcium required for veliger survival (> 0%): <ul style="list-style-type: none"> • 15 mg/L for zebra mussels • 18 mg/L for quagga mussels • Introduced late-stage veligers likely to survive. | <p>Plankton tows:</p> <ul style="list-style-type: none"> • Twice per month at water temperature 16-24 °C (61-75 °F) • Once per month, 12-16 °C (54-61 °F) or 24-28°C (75-82 °F) <p>Surface surveys (and/or artificial substrates if no existing surfaces) checked at least monthly</p> |
| 12 Low | <ul style="list-style-type: none"> • Adult mussels survive long-term. • Reproduction may occur, but veligers cannot survive. • Introduced late-stage veligers may survive and settle. | <p>No plankton tows.</p> <p>Surface surveys (and/or artificial substrates if no existing surfaces) checked at least monthly.</p> |
| Very Low | <ul style="list-style-type: none"> • Adult mussels cannot survive long-term. • Reproduction does not occur. • Introduced veligers cannot survive. | <p>No plankton tows.</p> <p>Surface surveys (and/or artificial substrates if no existing surfaces) checked at least monthly.</p> |

*Assumes suitable pH (>7.0) and salinity (<6 ppt).

**Refer to monitoring protocols at [CDFW's Quagga and Zebra Mussels](#) webpage for more information.

References used to develop “Recommended Minimum Dreissenid Mussel Early Detection Monitoring”

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